

Kunming Forum on United Nations Global Geospatial Information Management  
Cities of the Future: Smart, Resilient and Sustainable

## Smart City Practices and Prospects in China

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- Chinese Academy of Sciences

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Aristotle said: people choose to live  
in a city because cities create  
better life.



## 1

## The Evolution of Cities

### City and Social Productivity

### 1、 Agricultural Society: Coming up of a City

- Animal powers promote the development of agricultural production, transportation.
- Increase of crop yield promote the population growth and residential area expansion.
- Extra-goods exchange makes up a market, one of key cities' roles.
- Public safety and soul exchange need to a city with fort, temples et al.



## City of a Garden



Ancient forms of a City:

Shrine, Village, Fort

The nature of a City:

lives in group, home of  
soul, creation of order

**Man in a  
nature !**

## 2、 Industrial Society: Expansion of City

- ❑ First and second industrial revolutions greatly enhance the production rate and make a new industrial economics and higher material civiliation.
- ❑ More and more, bigger and bigger cities grow up. More and more cultivated lands was occupied.
- ❑ The differences between poors and richers exsist greatly, and social conflicts endanger the urban



## The city with high buildings & mansions



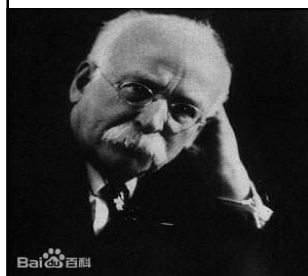
Subtle compositions:

Sky mansions, luxurious palaces, complex transportation

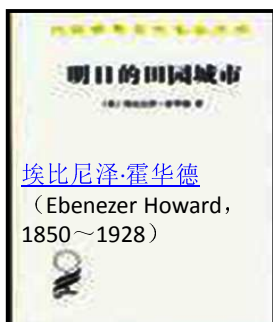
Higher functions of a city:


material civilization, rich culture, bureaucrat power

# Man in stone tress !



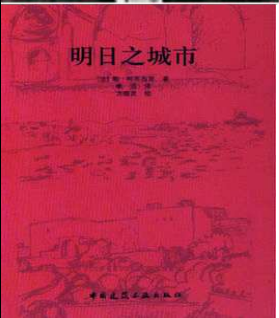
Ebenezer Howard: Garden Cities of Tomorrow, the world famous book on thinking the urban development published in 1898.





Le Corbusier  
1887年10月6日-1965年8月27日

Corbusier, the famous urban planner proposed his point-views on the urban improvements after the deep thinking on the urban development and its social issues: decrease the traffic jump in central city, increase the density of central city, increase the transport modes, increase the urban afforestation.



### 3、 Intelligent Society: Sublimation of a city

3<sup>rd</sup> industrial revolution (during period of 1960s-1990s) : semiconductor, computer and internet introduced people into digital production and life.

- 4<sup>th</sup> industrial revolution: AI, clean energy, quantum information promote the interaction among physical, digital and biological systems.



- Urbanization in developed countries are almost done after three industrial revolutions. What will happen in the coming 4<sup>th</sup> revolution?

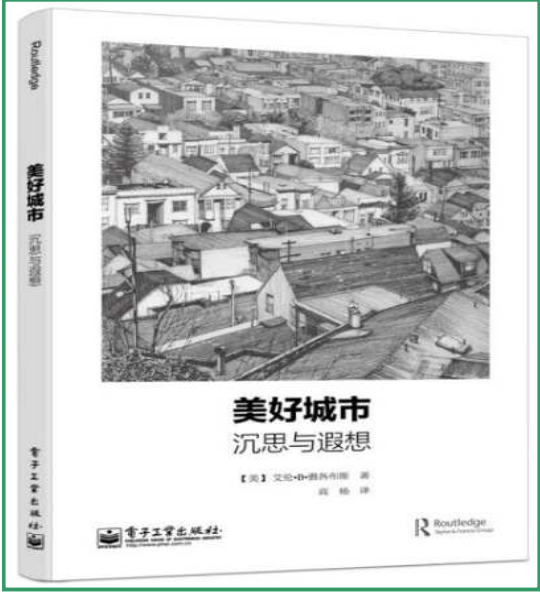
国家和地区	1980年	1990年	2000年	2002年	2003年	2004年	2005年		
世界	39.5	43.4	46.8	47.6	48.0	48.4	48.8	50.9	52.0
中国	19.4	26.4	35.8	37.6	38.6	39.5	40.4	49.7	51.6
中国香港	91.5	99.9	100	100	100	100	100	100	100
中国澳门	98.1	98.7	100	100	100	100	100	100	100
新加坡	100	100	100	100	100	100	100	100	100
英国	88.8	89.1	89.4	89.5	89.6	89.6	89.7	90.1	90.5
以色列	88.6	90.3	91.4	91.5	91.5	91.6	91.6	91.8	91.9
澳大利亚	85.8	85.1	87.2	87.6	87.8	88.0	88.2	89.1	89.2
美国	73.7	75.2	79.1	79.8	80.1	80.5	80.8	82.3	82.4
加拿大	75.7	76.6	79.4	79.7	79.8	80.0	80.1	80.6	80.7
法国	73.3	74.0	75.8	76.2	76.3	76.5	76.7	77.8	78.7
德国	82.6	85.3	75.1	75.1	75.2	75.2	75.2	75.8	75.8
日本	76.2	77.4	65.2	65.4	65.6	65.7	65.8	66.8	69.7

The urban history is just one of human nature seeking

Eliel Saarinen (1873~1950), world famous architect.

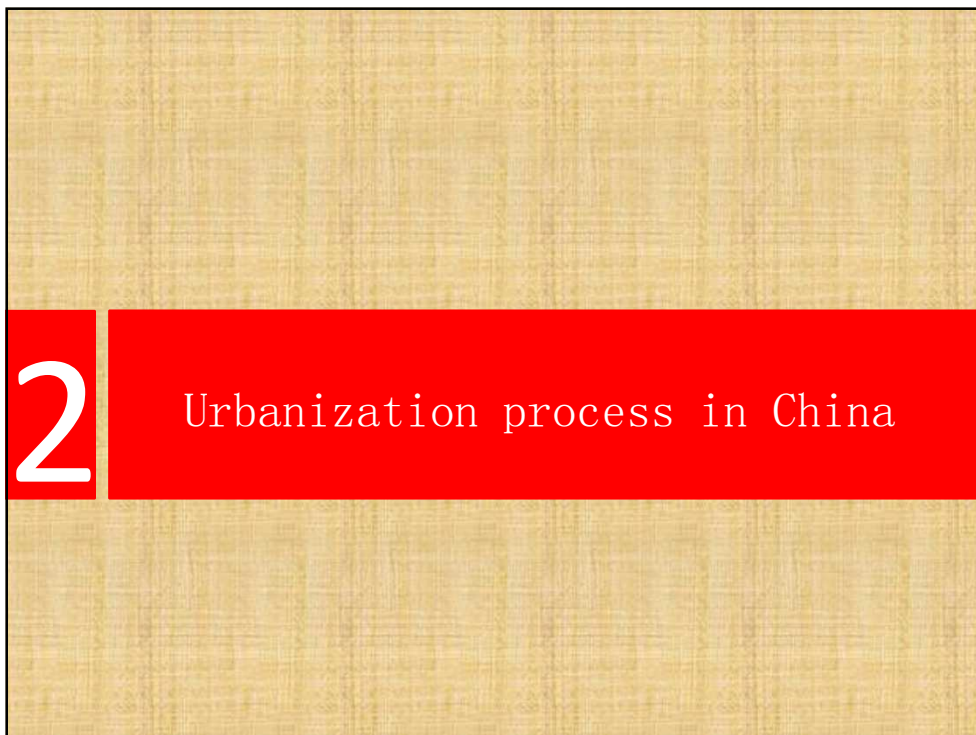


- A city must be based on human scale and standards.
- A city should provide good infrastructure for residential life and work.
- A city make the life



The image shows the front cover of a book titled '美好城市 沉思与遐想' (Beautiful City: Reflections and Dreams). The cover features a black and white photograph of a dense urban neighborhood with many small, multi-story buildings. The title is written in large Chinese characters, with the subtitle '沉思与遐想' below it. The author's name, '【美】艾伦·B·雅各布斯 著', and the translator's name, '高扬 译', are listed. The publisher's name, '电子工业出版社' (Electronic Industry Press), and the Routledge logo are also visible. The book is published by Routledge, as indicated by the logo and the text 'Routledge' at the bottom right.

Allen B Jacobs,  
urban planner of  
world reputation,  
wrote this book  
with his 60 years  
experience and  
thinkings about  
idea city.



The image shows a section header for a presentation slide. The background is a light brown, textured surface. A red horizontal bar is positioned at the bottom of the slide. On the left side of the red bar, the number '2' is written in white. To the right of the number, the text 'Urbanization process in China' is written in white.

2 Urbanization process in China



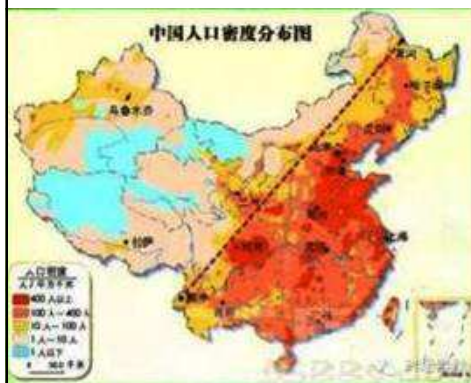
## China is a Big Country

- 9.6 million km<sup>2</sup> of lands
- 3.X million km<sup>2</sup> of seas
- 1.3 billion people



## Uneven Distribution of Population

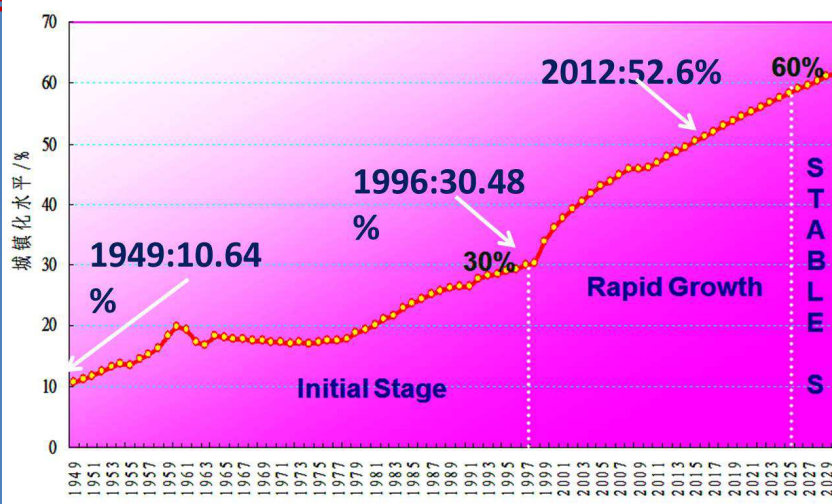
- Prof Huanyong Hu found the phenomenon in 1935.
- 94.1% of population live in the 43.8% of east lands



- Urbanization in China over last 60 years spans different stages, especially in 1995 when the process came into a high development period

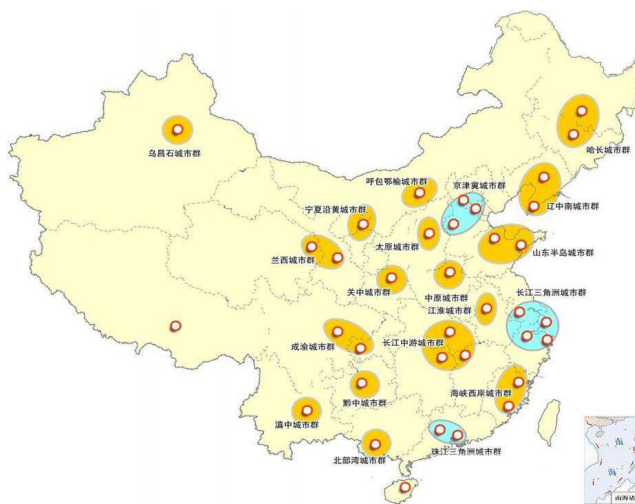
年份	城镇化水平(%)	年份	城镇化水平(%)	年份	城镇化水平(%)
1949	10.64	1970	17.38	1991	26.94
1950	11.18	1971	17.26	1992	27.46
1951	11.78	1972	17.13	1993	27.99
1952	12.46	1973	17.20	1994	28.51
1953	13.31	1974	17.16	1995	29.04
1954	13.69	1975	17.34	1996	30.48
1955	13.48	1976	17.44	1997	31.91
1956	14.62	1977	17.55	1998	33.35
1957	15.39	1978	17.92	1999	34.78
1958	16.25	1979	18.96	2000	36.22
1959	18.41	1980	19.39	2001	37.66
1960	19.75	1981	20.16	2002	39.09
1961	19.29	1982	21.13	2003	40.53
1962	17.33	1983	21.62	2004	41.76
1963	16.84	1984	23.01	2005	42.99
1964	18.37	1985	23.71	2006	43.90/44.34
1965	17.98	1986	24.52	2007	44.90/45.89
1966	17.86	1987	25.32	2008	45.8/46.99
1967	17.74	1988	25.81	2009	46.5/48.34
1968	17.62	1989	26.21	2010	47.80/49.6/49.95
1969	17.50	1990	26.41	2012/2013	52.6/53.7

### Three Stages of Urbanization over Last 60 Years



## Urban residents of 7700 millions in 2015

Urban scale	number
1000万人以上	6
500-1000万	10
300-500万	21
100-300万	103
50-100万	138
50万人以下	380
城市数总计	658
建制镇总数	2万多个



## A Big Urbanization Trend over Next 20 Years

	2000年	2010年	2030-2040年
城市人口数量	4.6亿	6.7亿	~10亿
人工表面 (平方公里)	3.65万	5.24万	~7.20万

**3亿人** 迁移到城市    **220个** 百万人口城市    **20个** 五百万人口大城市

**10个** 千万人口超大城市    **40亿平方米** 新增建筑面积    **5倍** 城市经济总量

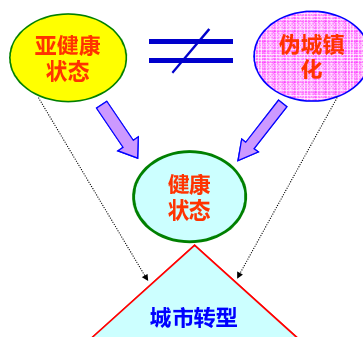


### (三) Critical issues in china urbanization

#### 1、sub-health and high occurrence of city illness

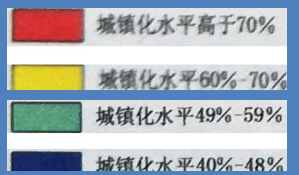


中国城镇化的亚健康状态示意图

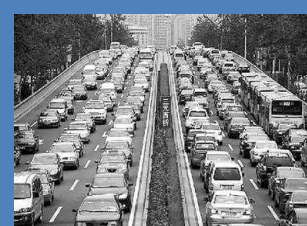


城镇化亚健康与伪城镇化关系示意图

### Critical Issues & Problems to be Solved

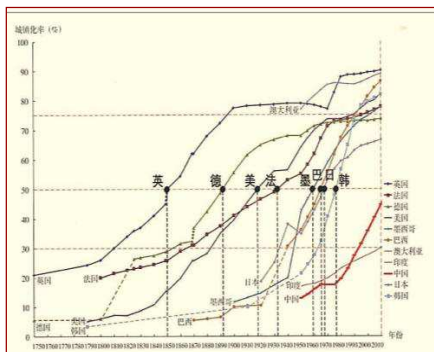


环卫工人用身体守护井盖，保证行人安全



## Trap of urbanization at the rate of 50%

The key point of flare-up and balance losing of urban issues and social contradiction



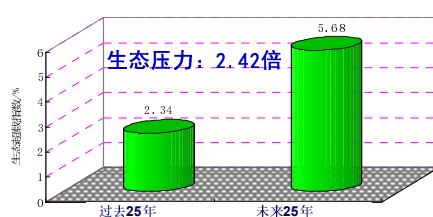
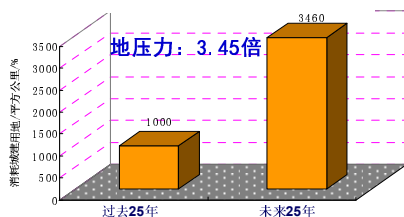
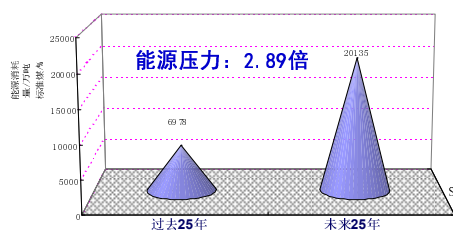
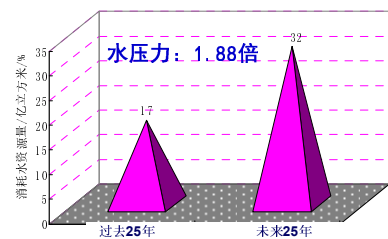
### (1) 城镇化率首次超过50%的年份

英国1850年，德国1892年  
美国1918年，法国1931年  
日本1968年，韩国1977年  
中国2012年 (52.6%)

### (2) 从20%首次超过50%历经时长

美国近60年，日本近50年  
英国/德国用了100多年  
中国用了35年

## 2、Serious pressure of resource shortage and eco-environment deterioration.

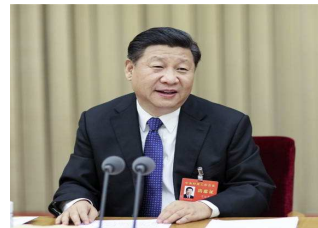


### 3、 Strategic shifting of future urbanization models

Green and innovation city.

- From radical mode into step by step mode
- From passive urbanization into active one
- From city orientation into residential orientation.
- From quantity urbanization into quality one.

### National president Xi' s marks on city development in 2015 central city conference



- A city is the place of various resources and social-economic activities aggregation .
- To promote new urbanization model of man orientation, therefore to defuse city illnesses.
- To build up smart cities to enhance urban management, provide more public service to residents.

## Premier Li' s marks on smart city development



- The new mode of urbanization is the integration and deep fusion of informationization, industrialization and urbanization in China
- To execute the plan of information for residents such as development of public information service platform, pilot experiment of smart city.

## Is smart city the road of urbanization for next decades in China?



# 3 Tides of Smart City in the world

## (一) International developments

• 全球有600多个城市正在建设“智慧城市”

The map highlights several key smart city initiatives and locations:

- 斯德哥尔摩** (Stockholm)
- 伦敦** (London)
- 哥本哈根** (Copenhagen)
- 阿姆斯特丹** (Amsterdam)
- 2005年i2010计划** (i2010 plan)
- 首尔&松岛** (Seoul & Songdo)
- 北京** (Beijing)
- U-Korea**
- 柏之叶&丰田市** (Utsunomiya & Toyota City)
- 1-Japan2015**
- 旧金山** (San Francisco)
- 萨里** (Surrey)
- 莱切斯特** (Leicester)
- 纽约** (New York)
- 哥伦布** (Columbus)
- 阿灵顿县** (Arlington County)
- IBM “智慧地球”** (IBM "Smart Earth")
- 印度** (India)
- 百座智慧城市计划** (100 Smart Cities Plan)
- 香港** (Hong Kong)
- 新北市** (New Taipei City)
- 新加坡“下一代i-Hub”** (Singapore "Next-Gen i-Hub")
- 马来西亚“多媒体超级走廊”** (Malaysia "Multi-Media Super Corridor")
- 伊普斯威奇** (Ipswich)
- 2015全球七大智慧城市** (2015 Global Top 7 Smart Cities)
- 里约热内卢** (Rio de Janeiro)

Legend:

- 智慧城市 (Smart City)
- 信息化、数字化计划 (Informationization, Digitalization Plan)



## 1、American experiences of smart cities

■ The development of smart cities is to update and reform the industrial chain, and cultivate new industry



■ 博尔德市较早启动了智能电网城市工程，通过配电网提供实时、高速、双向的通信服务，形成具备远程监控、实时数据发布等优化性能的“智能”变电站

■ 迪比克市与IBM公司共同合作，利用物联网技术，将城市的所有资源（包括水、电、油、气、交通、公共服务等）数字化并连接起来，监测、分析和整合各种数据，进而智能化地响应市民的需求并降低城市的能耗和成本。

## 2 Talk London: Collective wisdom

TALK LONDON is the channel and tool for residents to participate in urban governness such as debate on urban housing plan, public safety



Welcome to Talk London

大伦敦市政府通过TALK LONDON 网站征集市民集体智慧

### 3 Sweden: the City of Tomorrow

#### Low carbon, sustainable, and zero discharge

高密度  
住宅区

出行：  
步行  
自行车  
公交便捷

多功能  
规划商业  
娱乐功能



### 4 JAPAN: NEW ENERGY CITY



Residential solar system

Energy visual

Community electronic bikes

Innovation Center

## 5 India: Smart office and tele-medical

园区无线网络全覆盖



WiFi full cover

智能化办公预定平台



Smart office

远程医疗



Tele-medical care

## (二) Smart cities development in China



智慧城市 珠海市

华南城市



桂林山水甲天下

智慧城市 桂林市

西南国际旅游城市



智慧城市 上海浦东

新区

华东地区国际大都市



智慧城镇 乐从镇 (佛山新城)

华南地区典型商贸城镇



智慧新城 洋湖、滨江

中部地区省会城市新区

## Pilot Demonstration Cities by Ministry of Housing and Urban-rural Development



2012: 90  
 2013: 103  
 2014: 84  
 Total 277

## Smart Beijing

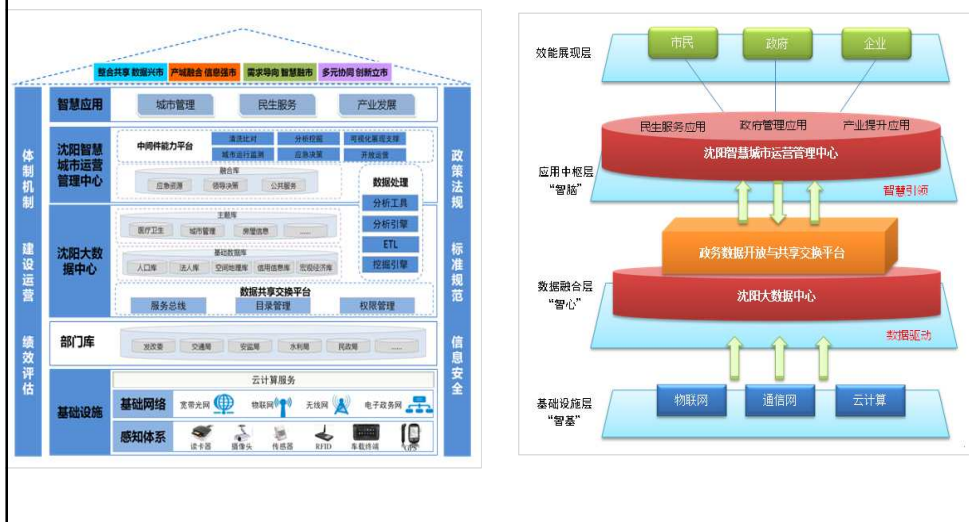
- 4 infrastructures
- 24 projects related to 8 fields such as transportation, environmental management.
- Investment of 5 billions



## Smart Shanghai Urban Safety Monitoring & Protection



## Smart Shenyang: Industrial Big Data

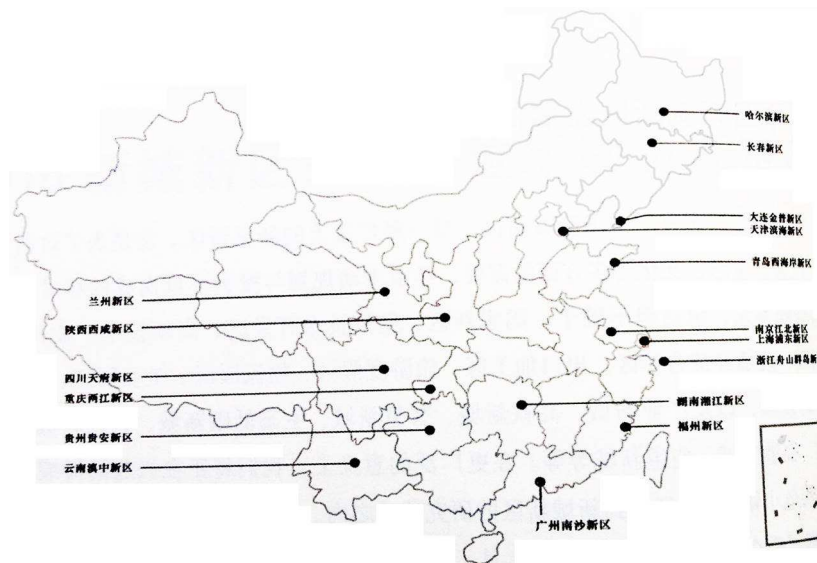


## Pilot Industrial Parks of Low Carbon by Commission of Development and Reform



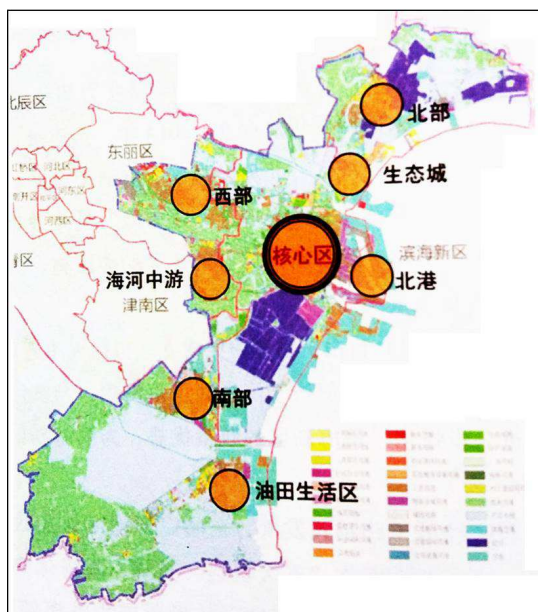
- 36 Cities of Lower Carbon
- 55 Industrial Parks of Lower Carbon

## 17 National New Districts



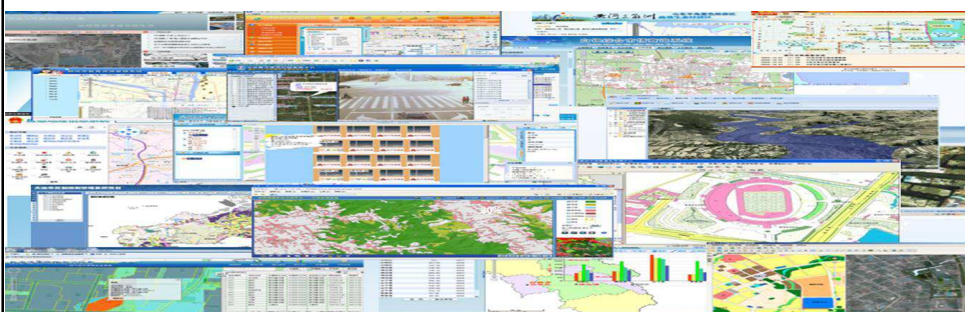
## Seashore New Districts of Tianjing

- Residents: 2.97 millions
- Annual GDP: 930 billions yuan in 2015



## Pilot Demonstration Cities by National Administration of Surveying, Mapping and Geoinformation

40 Cities Such As Chongqin, Guangzhou, Wuhan, Taiyuan to construct spatial information infrastructures by investing 12 billions yuans



## Smart Cities Along with High-speed Railway

- 19 new cities along Beijing-shanghai HSR



## WIT 120: People Health by BAT

Provide patients easy ways to reach hospitals and doctors

	Baidu 百度		Alibaba.com		Tencent 腾讯	
	投资	自建	投资	自建	投资	自建
健康管理 + 医疗业务	 www.yihu.com	   	 www.xywy.com  		 www.mama.cn     SCANADU	  
医药业务	 ZHWO.COM 		 YAO.THALL.COM		  TENGAI.DOCTOR.TANG	



## Smart City Solutions by Companies

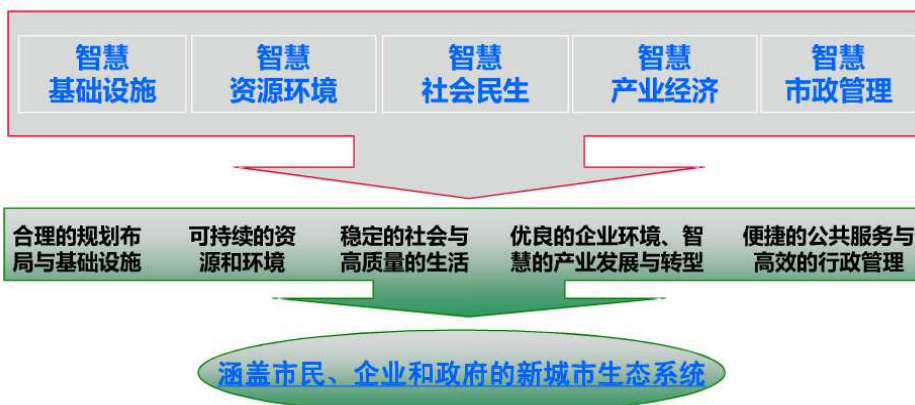
Smart Yingchuan  
by ZTE

Smart Longgang  
by Huawei

Smart Liaoyuan  
by SoftStone



## Five main targets for development of smart city



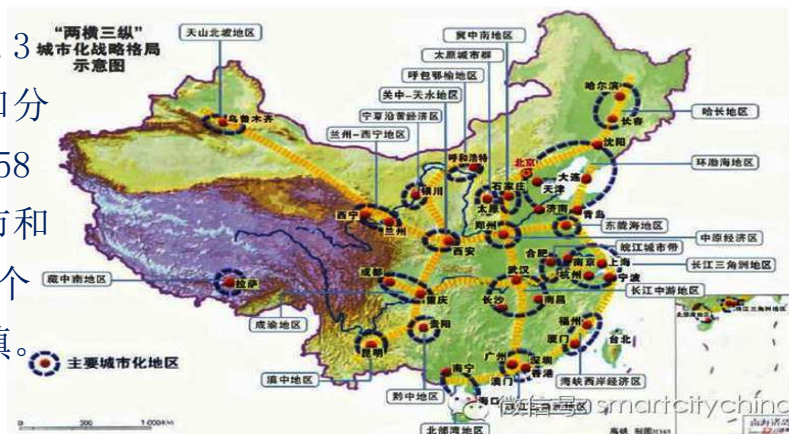
## 4

## Thinking over Wisdom in the Smart City

## (一) Wisdom for Urban Plan

Any city cannot exist like an isolated island

- 全国7.3亿人口分布在658个城市和近2万个建制镇。



■ The city and town without people: 对于人口规模预判的不准确, 城市总体规划的不完善, 住宅地产没有与其他产业进行很好的配套等, 导致

■ 鄂尔多斯新区-康巴什: 如今这里依然人丁稀疏, 房价又已跌去7成, 由盖楼兴起的借贷行业也几乎崩溃, 现在的鄂尔多斯不仅是空城, 也是债务之城。



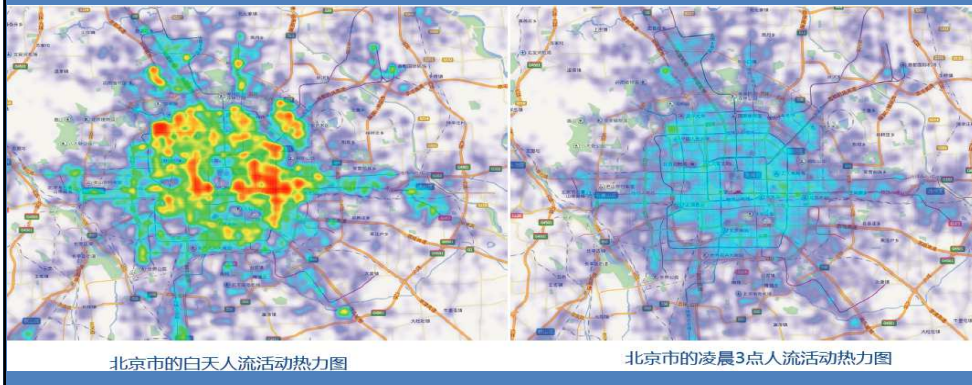
A good plan is the start of ideal City



世界上最大的社区: 北京天通苑



## Urban activities: people in daily and night in Beijing



**A smart urban plan needs**  
**Precise position**  
**System layout**

## (二) Wisdom for Urban design

### ■ long-term infrastructures

青島市人大辦公樓（原德國總督府）



棧橋東側德占時期建成的泄洪口今日還在使用。

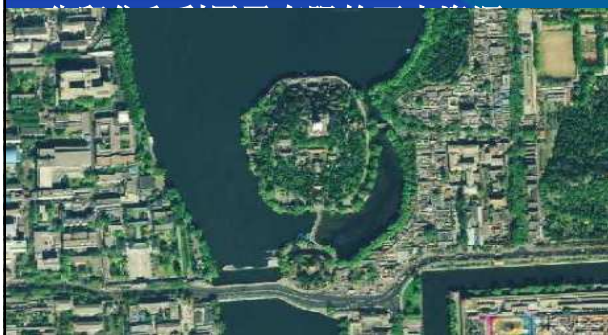


青島百年的“古力”井蓋仍然發揮着作用

## Drainage system of 800 years in Beijing

暴雨時雨水通過青磚及涵洞滲入地下，多余的水順着涵洞圍繞團城逆時針旋轉後流走；中小雨時土壤水飽和後，水分回滲到涵洞中。這樣一個系統充

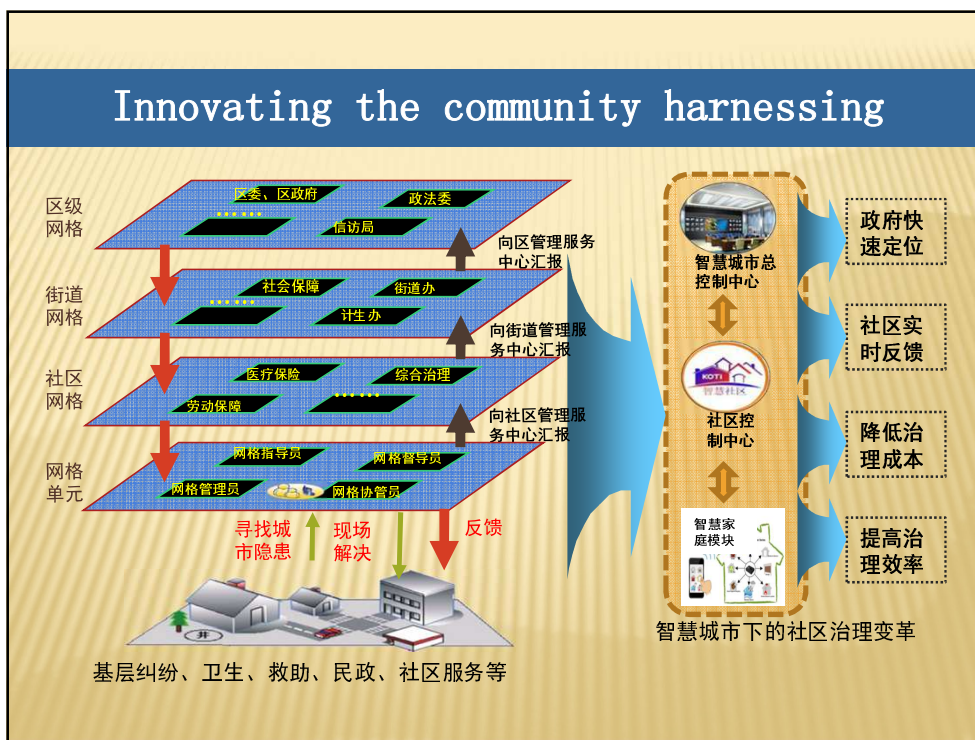
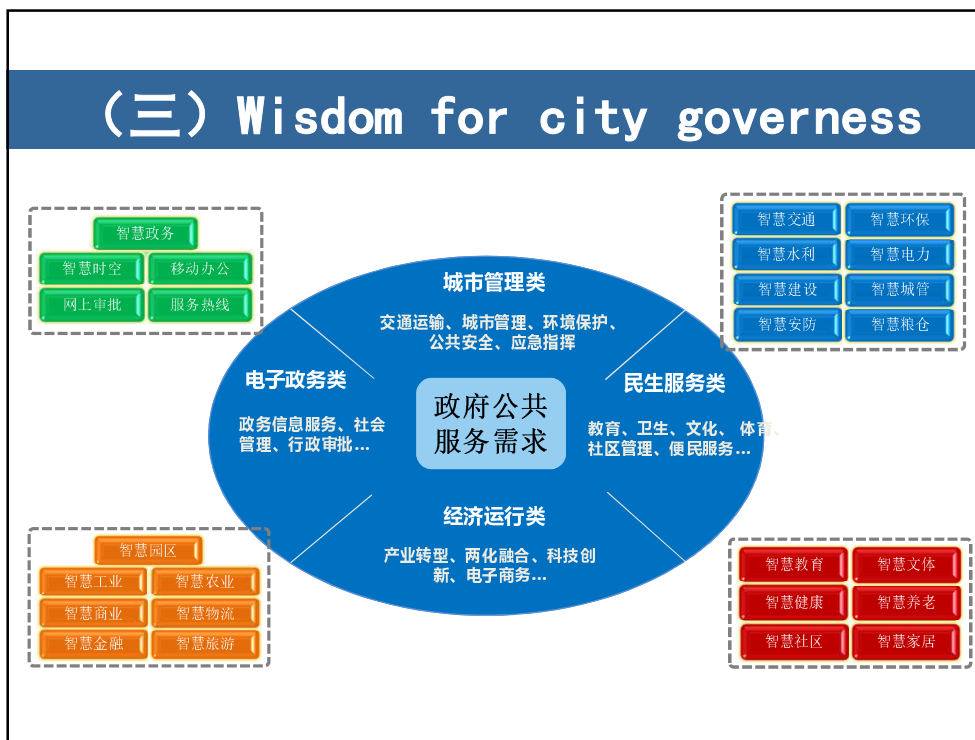
北海團城270多米長的城牆沒有一個泄水口，地面上沒有排水明溝。無論下多大的雨，城池上只是雨過地皮濕

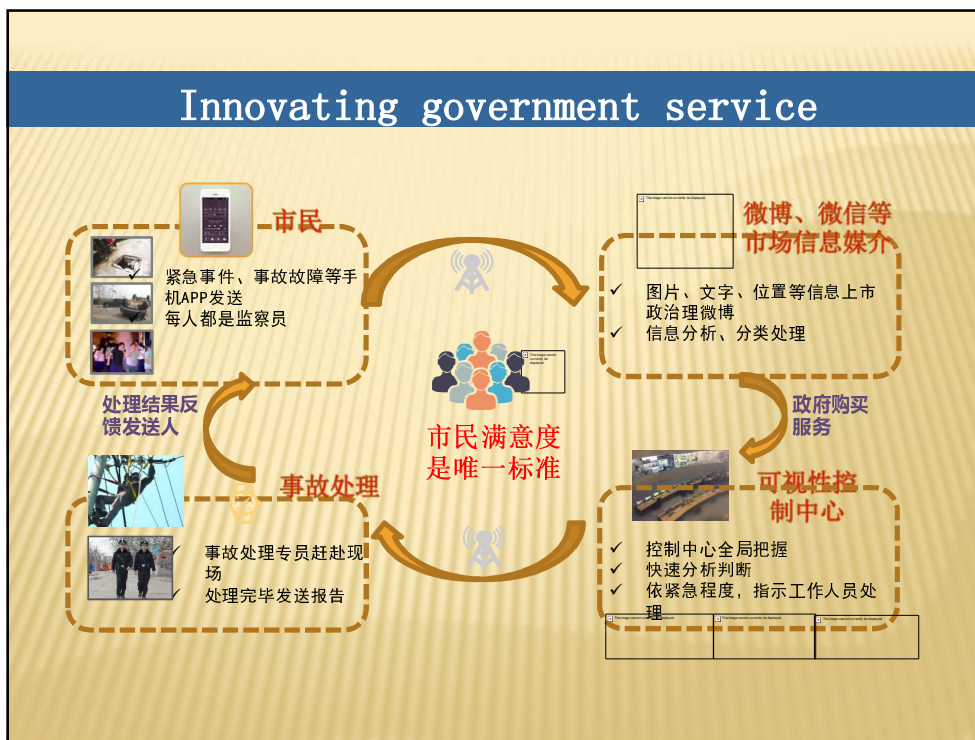


**Idea spatial distance:  
working place, living place and community**



Urban Design needs  
 Long-term view, millennium strategy  
 Full space view, surface &  
 underground space







## New issue of sharing bikes

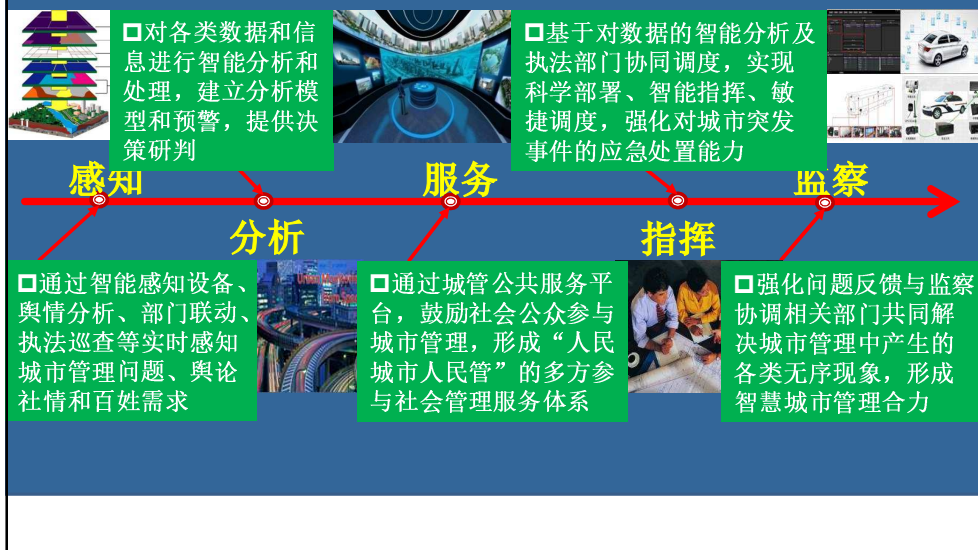


City governess needs

People-oriented view: city for people

Time view: synergy of physical city  
and virtual city

## (四) Wisdom for City Operation



## A National Strategy of Smart City Road



Improve urban management, provide best service



Set up shared information platform, enhance economic development

Thank for your attention  
谢谢，敬请批评指正！

中国科学院地理科学与资源研究所  
资源与环境信息系统国家重点实验室

致谢-  
部分材料来自同行研究成  
果