



Development and Practice of Smart City in China

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Course Objectives:

Smart city is an integrated application area of IoT. In this course, we will know about Overall process, practice, characteristics and the trend of Smart City in China.

Agenda



- 1. Overall progress of smart city in China**
- 2. Focus areas of smart city**
- 3. Characteristics of smart city in China**
- 4. Trend of Smart city**



1、 Overall progress of smart city in China

Why China need smart city



Smart City: to break the shackles of traditional thinking and solve the key problems in the process of urbanization.

The urbanization rate grows rapidly during last decade; in 2011, it goes beyond 50% and marked that urbanization has entered a new period for the first time. With every one point increase in the urbanization rate, there will be 14million rural people turn into **Urbanian**.

The Sustainable Development

- Extensive economy growth mode
- The shortage of resource: water, land and energy
- Ecological environmental degeneration
- Lack of social capital :social trust 、 community spirit and community attachment
- City management and public services
- Traffic jams.....



The equity of development (region/city and countryside /social groups)

- The quality of living
- Public services
- Opportunities of developing.....



The Overall Development of smart city in China



- Until 2016 , six ministries and commissions of China approved 542 pilot cities from different departments and fields;
- In scope of cities, the number of smart cities in China reached 386, covering 100% of the provincial / sub-provincial cities, 74% of the prefecture-level cities, 32% of the county-level cities.

The total pilot status of smart city in china



Chart 1: General development situation of China

| Category | Smart city number | Proportion | Growth rate |
|-----------------------|-------------------|------------|-------------|
| Provincial city | 4 | 100% | — |
| Vice-provincial city | 15 | 100% | — |
| Prefecture-level city | 248 | 74% | 19% |
| County-level city | 119 | 32% | 34% |
| Sum | 386 | 55% | 22% |

The new town and new district of smart city are mainly concentrated in Eastern areas, expanding to western.



Why?

- **Advanced economy—means they have money to do this**
- **Talented people----means they have technology to build this**
- **Open-minded----means they are easy and willing to accept kinds of new concepts, not only smart city**



Smart City Present 3 Development Model

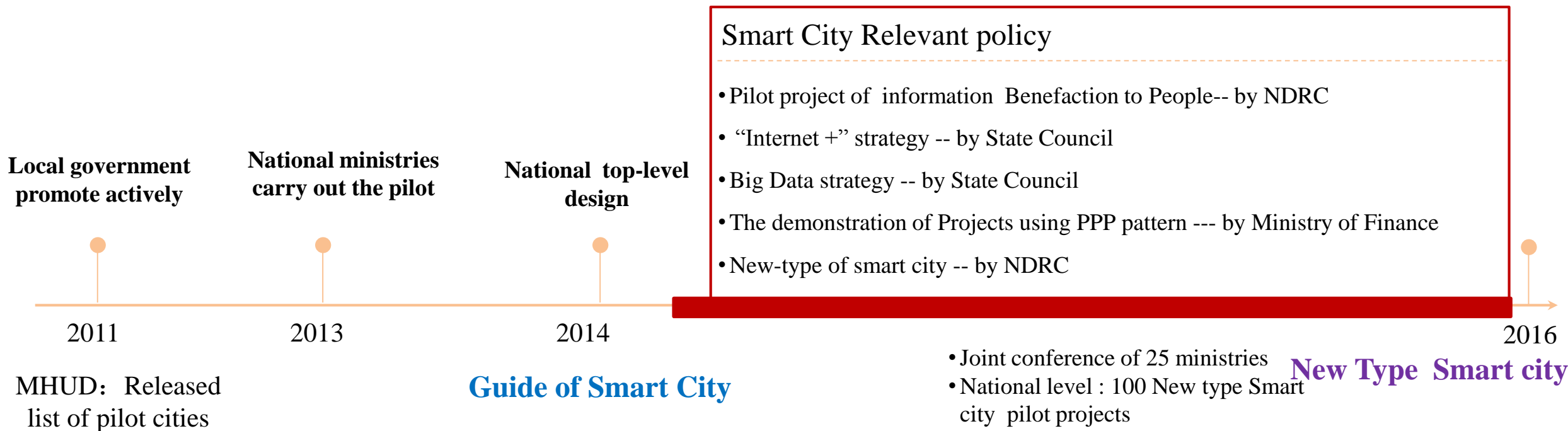


| Type | Development Characteristics | Representative city |
|--|--|--|
| Comprehensive Development Model | <ul style="list-style-type: none">• Large-scale city, strong Economic, high- level Informatization• The construction of Smart City is a city development strategy, which drives the development of city and promotes the transformation and upgrading of city | <ul style="list-style-type: none">• First-tier city like Beijing 、 Shanghai 、 Guangzhou |
| Industries Pulling Model | <ul style="list-style-type: none">• Highlight local competitive industry, such as resources.• The construction of Smart City pulls special industries, and bring more quality resources with local advantage. | <ul style="list-style-type: none">• The southeast coastal developed cities like Wuxi、 Yangzhou |
| Follow-up Model | <ul style="list-style-type: none">• The promotion of information infrastructure and application , combined with the city strategy itself, could consolidate the foundation of smart development and reference for other cities. | <ul style="list-style-type: none">• Small and medium-sized city like Zhuzhou、 Siping |

Important strategy of smart city in China



- ❑ To promote the construction of Smart City in China , 26 departments, including Development and Reform Commission, Central Information Office Network and Ministry of Industry and Information Technology, formed inter-ministerial coordination working group.
- ❑ April , 2016, New-type of Smart City inter-ministerial coordination working group convened the first meeting, defined the key factors, development goals, core concept, construction path and etc..
- ❑ During “Thirteen Five Year Plan”, 100 New-type of Smart City will be selected.



Development features of New-type Smart City in China



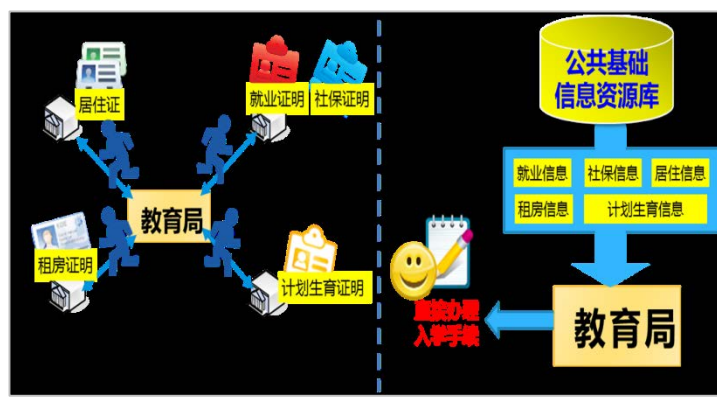
1 Organization and coordination

China sets up the “New-type Smart City building inter-ministerial coordination working group”, solves the drawbacks of early separately promotion, isolated building, closed applications, and effectively connects all aspects of the construction and application of Smart City.



2 Actual impact oriented

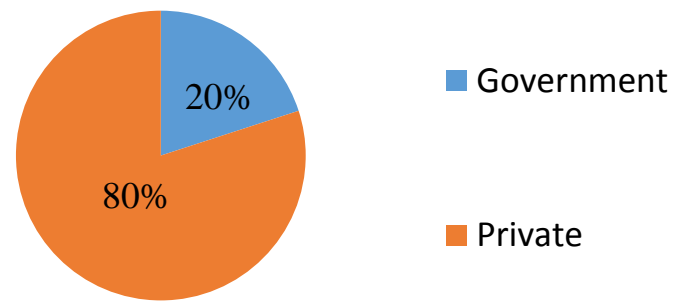
To transition from building “Smart City System” to emphasizing “actual impact for local residents”, construction of Smart City establishes human-centered system.



3 Innovation of construction path

Under the circumstances of wider construction of Smart City, Cities are encouraged the innovation of construction and operation pattern. More social resources are guided to participate in the construction and operation of Smart City

IDC's Prediction of Smart City Construction investment in 2020



Development Goals of New-type Smart City in China



Competitive industrial environment



Attractive living environment



innovation management pattern

Industry

Resident

Government

Improve Public Service Performance

Smart City development core is “benefit people through information”. Through release digital dividend, it could benefit people through information anywhere and build a harmonious, livable, vibrant and more features modern city.

Enhance Urban Governance Level

By innovating institution and integrating city recourse, it could promote accurate, transparent and efficient urban management and impel the modernization of urban governance system and governance capacity.

Focus on “two development goals”

Business model



| View point | Measures |
|-----------------------|---|
| Policy | <ul style="list-style-type: none">❑ The government is strongly involved in the formulation of smart city-related policies, and it will co-ordinate the national construction of smart city.❑ The role of the central government is limited to providing guidance and support for urban development and related projects for cities that are willing to build smart cities. |
| Business Model | <ul style="list-style-type: none">❑ Chinese pilot smart cities are financed primarily through local municipal grants and government investments.❑ Some pilot cities have or plan to set up local government financing tools (platforms), through the financing of local government tools (platform) to enable banks to bank loans, issue bonds, so as to raise funds for the construction of smart city.❑ PPP, BOT, government procurement services are innovative business model directions which China is focus on promoting. |



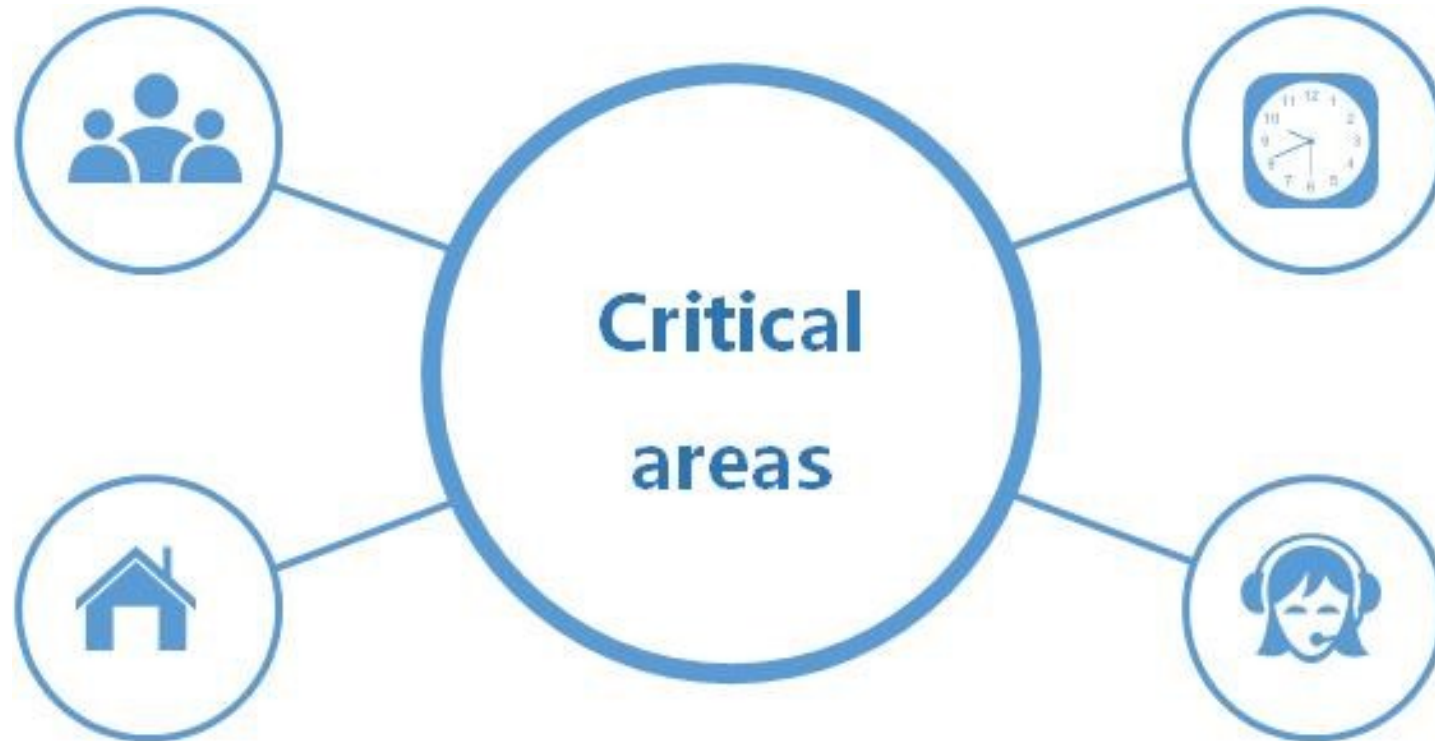
2、 Focus areas of smart city

Focus areas of smart city in China



Urban Public Service

Governmental Service



Urban Management

Information Economy

Area 1: Urban Public Service



The service benefit the public has remarkable characteristics: high efficiency of information technology, good social benefits, demonstration significance, strong driving effect.

Information issue and inquiry

- Air quality index monitoring
- Traffic condition inquiry



Offline service to online service

- Application, appointment, registration
- Submit and review information online
- Check the progress of the work, the audit results, inspection reports



北京市预约挂号统一平台



广东省网上办事大厅

www.gdbs.gov.cn

Offline resources to online resources

- Digital library
- Digital teaching resources
- Digital tourism resources



Service channels diversification

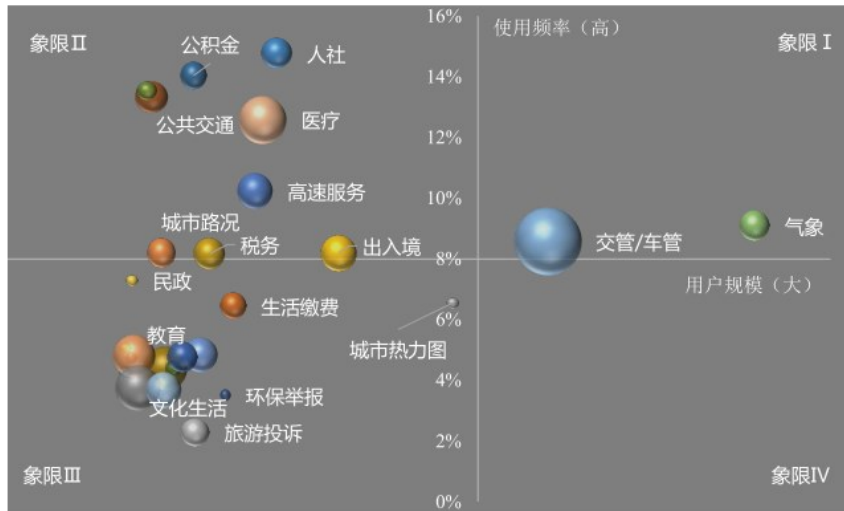
- Office window, online service hall, the official micro-blog, WeChat public number, APP, hotline, self-service terminals, etc.



Case: Innovative ways of providing public service



- With the help of opening, collaboration, and user-experience-first of internet companies, public service breaks the barriers between government departments, public organizations and across regions, provides integrated and high-quality services to the public.



The content of Wechat city services
Source: China "Internet+" index 2016

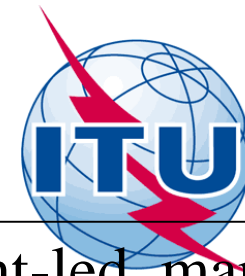


2015.5, Alipay launched 82 future hospital
Source: Future hospital service data report

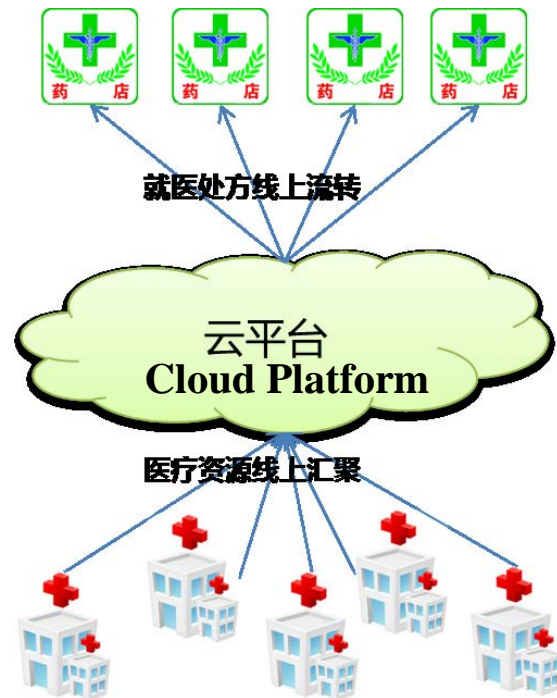


Average waiting time: 43.3min → 26.4min

Case: Internet + Medical Service



Cloud Hospital : Ningbo Municipal Government take the government-led, market-oriented operation mode, and establish a telemedicine services and collaboration platform with enterprises, called "Ningbo Cloud Hospital".



Advantage 1

Nearby Pharmacy
Four pharmacies work together to provide services



Platform Scale

- ✓ 100 primary medical institutions
- ✓ 226 registered doctors
- ✓ 4 cooperated pharmacies

Advantage 2

Online Inquiry
Open up four cloud consulting room



Risk Control

- Patients must be in stable condition
- Signed an online treatment protocol with physicians

Advantage 3

Resource allocation
Access to primary medical institutions and family doctors

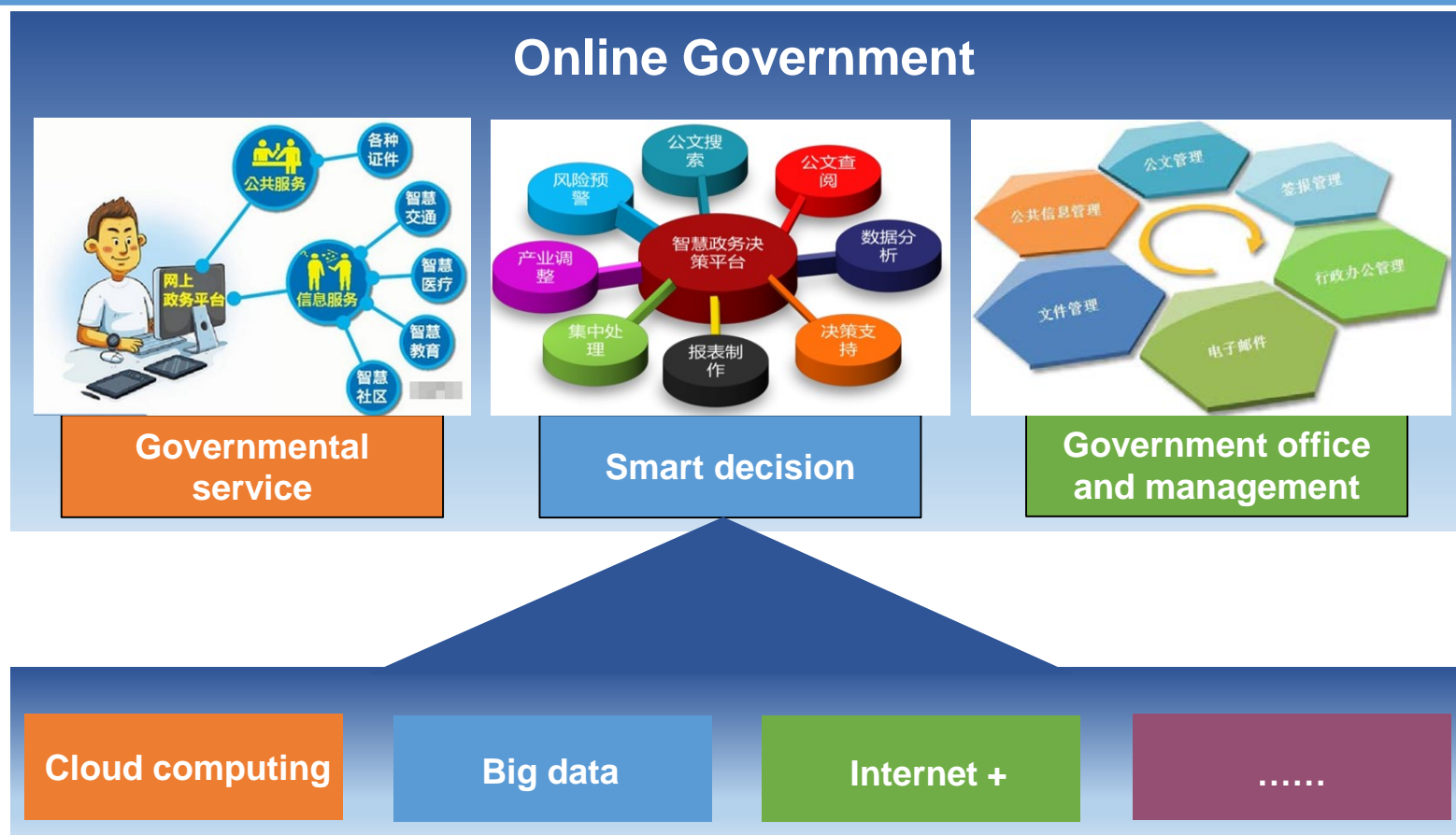


Area 2 : Governmental Service



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With the help of cloud computing, big data, “internet+” etc., online government promotes government efficiency and scientific level of decision-making, pushes a change from management government to servant government, allows people to enjoy the convenience of information technology services.



Case: Internet + Government Affairs Service



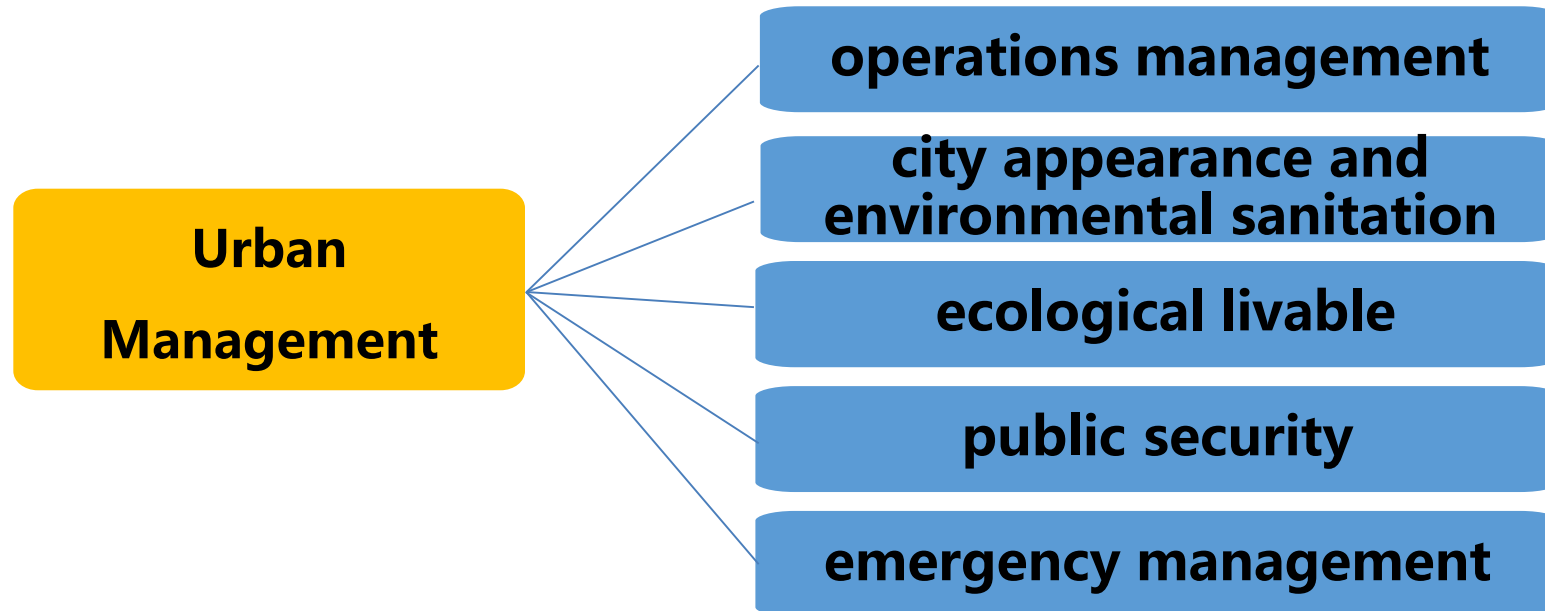
- ❑ By the end of 2014, there are 52 provincial units have settled in Guangdong online business lobby, and there are 1641 service issues ,which all matters online bid rate is 99.57%.
- ❑ Online service hall: Based on the principle of net office, and non net office as an exception.

- ❑ Expanding self-service, community agents , and postal courier service channels, and building cross-regional, cross-level, integration of online and offline government services channels.

Area 3: urban management



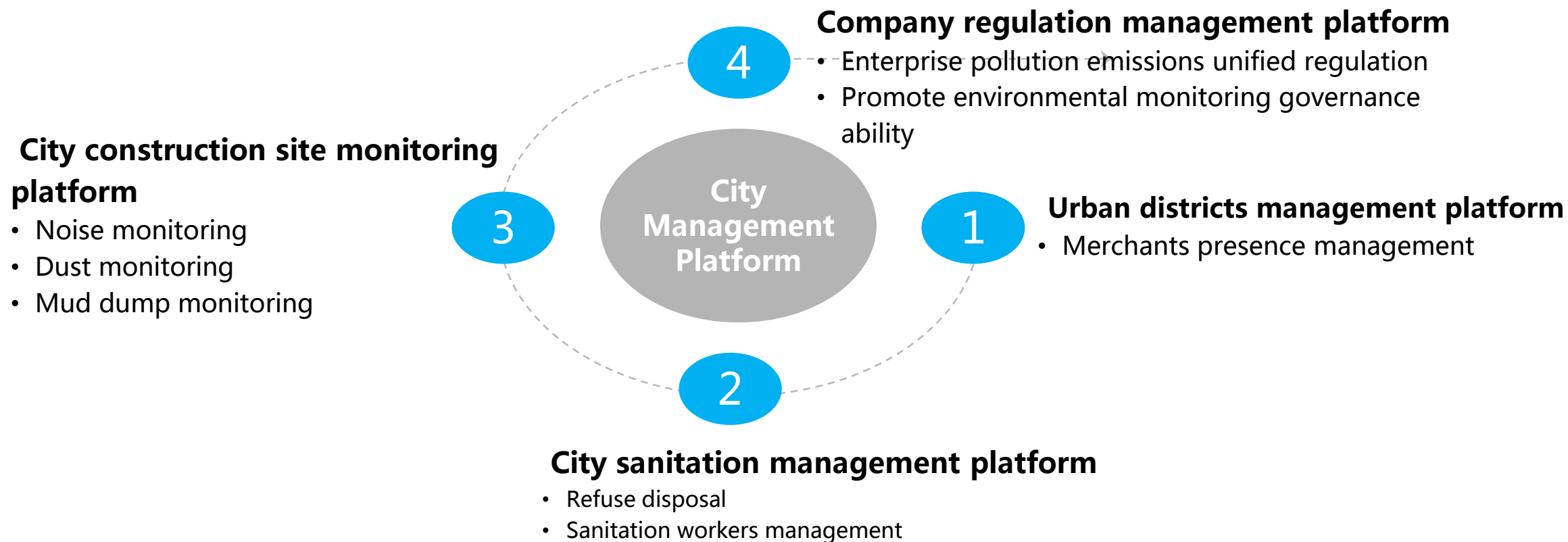
Smart city integrating the resource of the city by using modern information technology ,such as the big data and IoT, in order to perfecting the urban governance mechanism and innovative urban governance mode , achieving fine precision of urban governance.



Case: Platform of city integrated management



Set up information perception network and management platform by using information means.
Formulate urban comprehensive solution through big data analysis. Promote intelligent application level of urban infrastructure ,such as city appearance、 sewage drainage、 construction site、 pollution monitoring of urban facilities.



Area 4 : Information Economy

Case: Sharing Economy



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Promoting the shared model development of our country traditional industry ,by taking Didi taxi、Shen Zhou taxi、Tujia、Xiaozhu rent such business as the main force, changing the traditional industries such as traffic and leasing mode.

China travel O2O application is divided into five subdivision industry : comprehensive taxi、special car、carpooling、car generation、car rent. Now every domain has typical applications and a good momentum of development.



MOBIKE (720P).qlv



The practice of specific city---Guangzhou

Guangzhou has good basis for smart city construction

Strong support of Information infrastructure

- Internet exchange and international export
- International gateway bandwidth is 58% of the country

High level of application of informatization

- Over 72% of the enterprises develop e-commerce activities.
- E-government system covers 80% of the government administration and public services

High penetration of informatization in the public

- The telephone penetration rate is 230.7%
- Family Internet access rate is 88.2%
- Internet penetration rate is 72.9%

Fast development of information industry

- Information industry has become a pillar industry of the national economy in Guangzhou.

Tree Structure of Smart Guangzhou



Leaf: To popularize the smart applications and tri-networks integration for exploring new innovative pattern of network management services



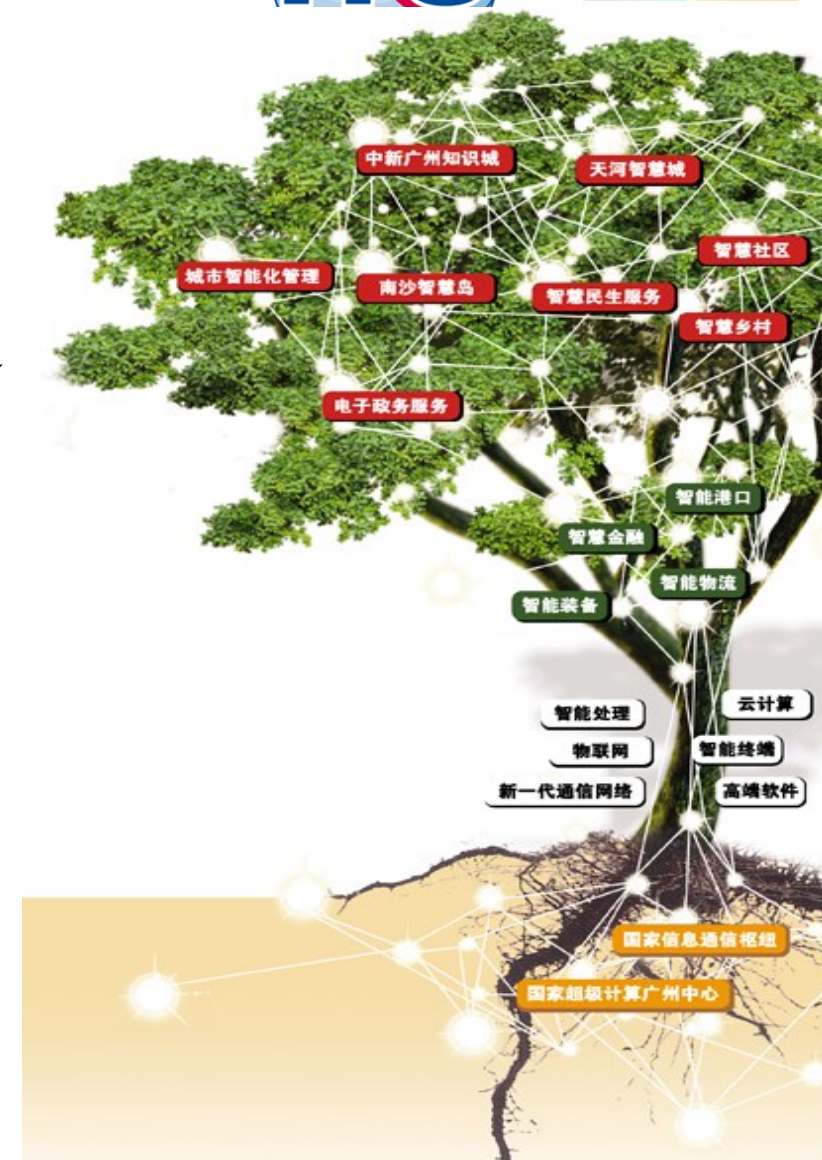
Branch: To accelerate the development of smart industry by promoting intelligent products and emerging intelligent industry for building intelligent industrial clusters.



Trunk: To break through the core technology, such as the Internet of things, cloud computing, intelligent terminal



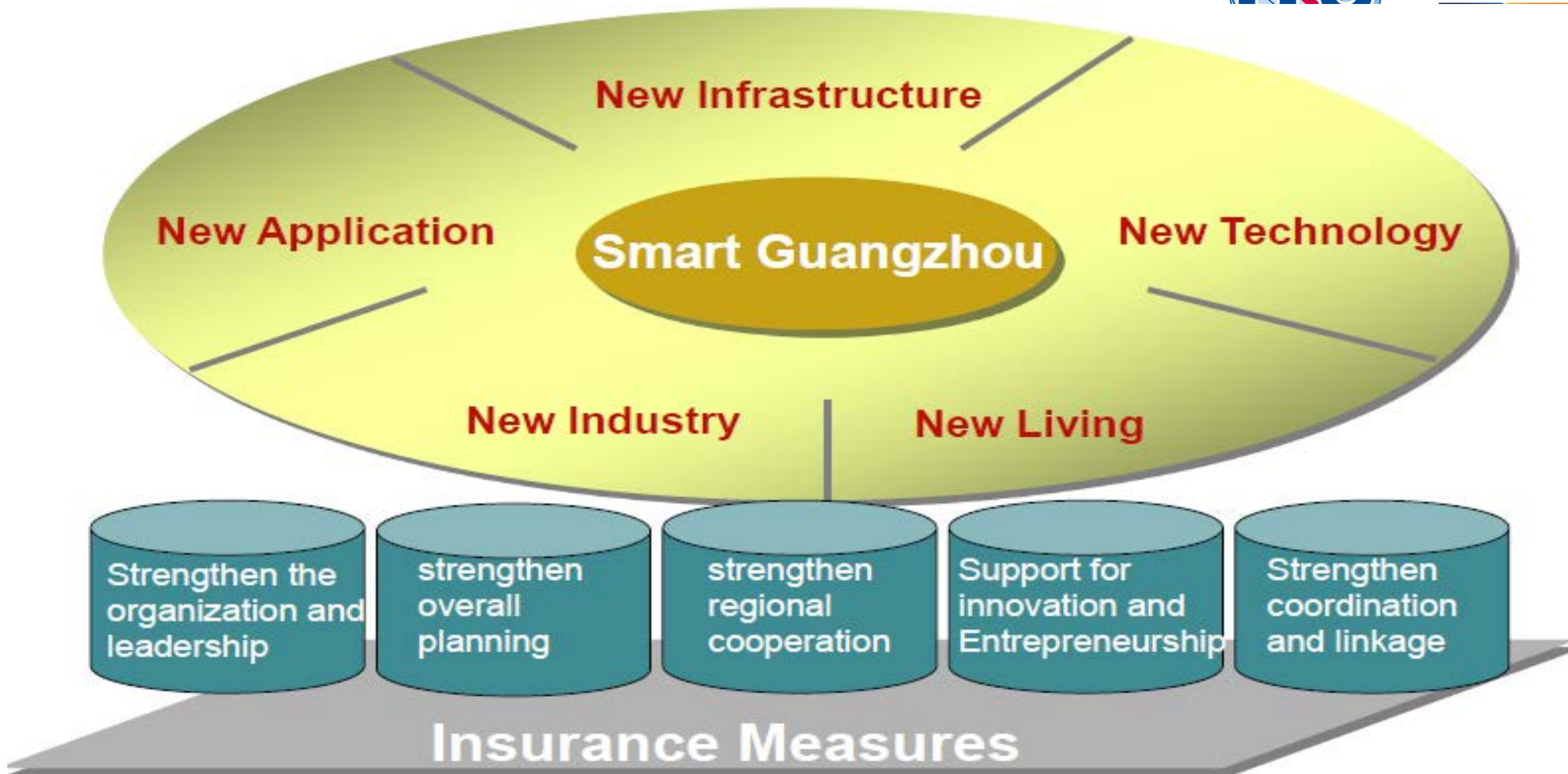
Root: Five demonstration projects of smart information infrastructure, including Nansha smart island, smart country etc.



Goals of Smart Guangzhou



11
12

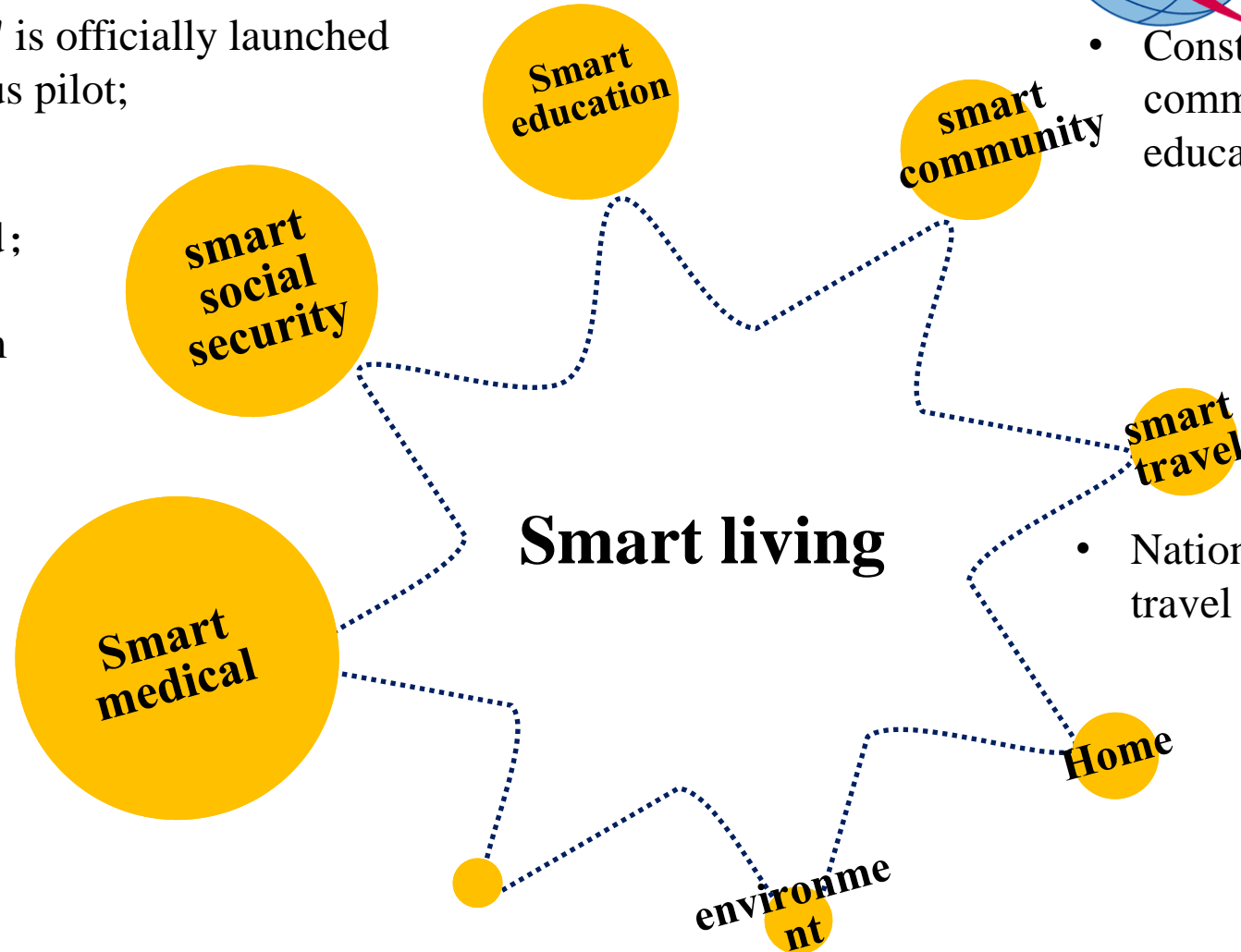


Overview of Smart Guangzhou

-New Living: Seven Typical Applications-



- Construct “district-street-community” three-level education network



- Guangzhou "Digital Education City" is officially launched
- Primary and Secondary smart campus pilot;

- Promote the social security card;
- Construct household economic status check information system

- build more than eight million electronic health records;
- Promote the applications such as appointment registration on the website;

- National smart travel pilot city

Achievement for Smart Guangzhou

-New Application: E-government



Online administrative approval



Digital certificate and electronic signature



Promote digital certificate and electronic signature to protect the security of e-government and e-commerce.

- 政府信息公开指南
- 政府信息公开目录
- 政府信息公开工作年度报告
- 政府信息依申请公开
- 政府信息公开意见箱
- 商事主体开业信息公示
- 经营异常名录公示
- 政务资讯

Government information publicity

At present, there are 46 units have applied Guangzhou unified platform system for information publicity directory, and 11 units are docking information platform. The public Webpage has been visited more than 2320848 times.

Achievement for Smart Guangzhou -New Living: Smart Medical-



The regional health information platform

The regional health information platform has applied in five Municipal hospitals and five grassroots medical institutions, and is being promoted to all municipal and district hospitals. At present it has built more than eight million electronic health records.



Guangzhou appointment registration system

Guangzhou appointment registration system has applied in 29 major hospitals; the citizen can enjoy the appointment registration service of these hospitals by making a call or landing a website.

smart medical APP

Currently, many high level hospitals have released smart medical APP. The citizen can enjoy making an appointment, lining up your turn, payment and other services through APP.



Achievement for Smart Guangzhou -New Living: Smart Education-

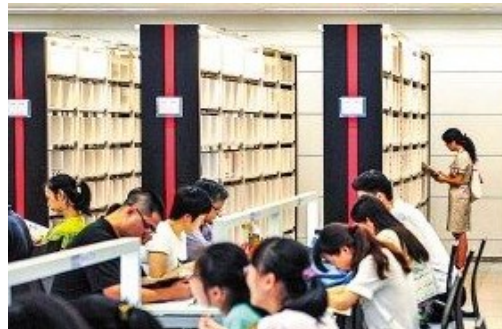


Guangdong Telecom operator constructs “campus cloud” to help build “smart campus”

“campus cloud” integrate campus teaching, research, management and service information, whenever and wherever provide the mobile information service, realize the education informatization, scientific decision-making and management standardization. Guangdong Telecom has signed the agreement with 78 schools, and provided high-quality campus cloud service for 150000 users.

Guangzhou "Digital Education City" is officially launched

More than 30 application systems have been integrated. It contains more than 90% teacher data and 100% student data



Guangzhou University City started ten school library interlibrary loan system

Guangzhou university city started interlibrary loan system in ten school libraries . The interlibrary loan service is oriented to all students of 10 schools.



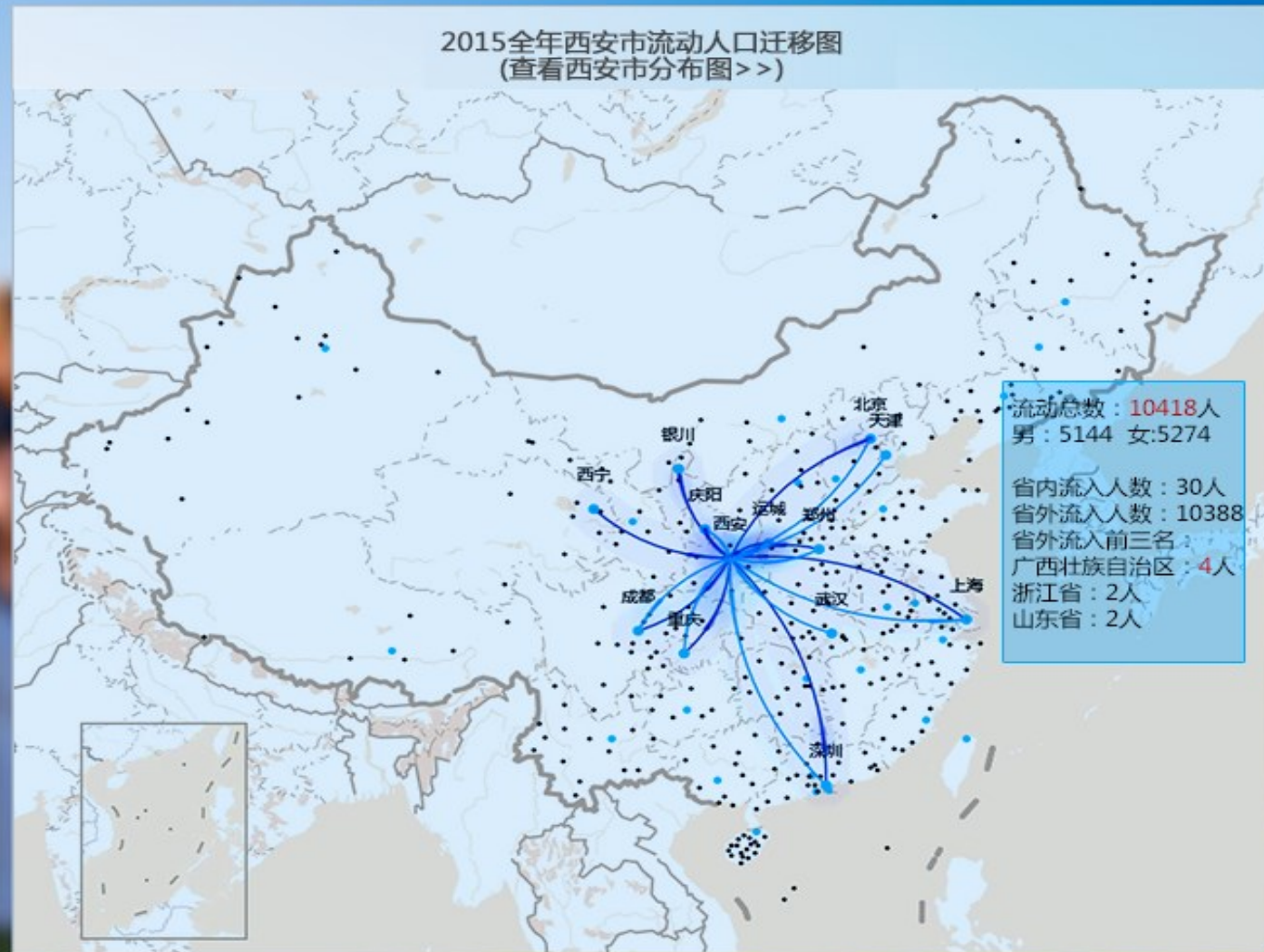
The practice of specific city---Xi'an

Improving supervision and services for migration



To tell the mayor

- Population num of move in/move out
- They move out to where?
- They move in from where?
- What kind of job do they do here?
- What kind of service should we this city to provide to meet their demand?



Smart Bus



Real time arrival information

- Knowing how far is the bus from you and when does it arrive?
- Without worrying about missing the bus
- Many cities have provided such services



Expanded

For bus company operator

- To know each bus's location
- To know each bus's condition
- To know each bus's driving time
- To know which route takes the most passengers

Simple analysis

- Where are traffic jams often happen
- How to optimize all bus routes
 - To provide better service
 - To increase profit

Analysis based on data share

- Bus station searching based on LBS.
- Route planning and destination navigating

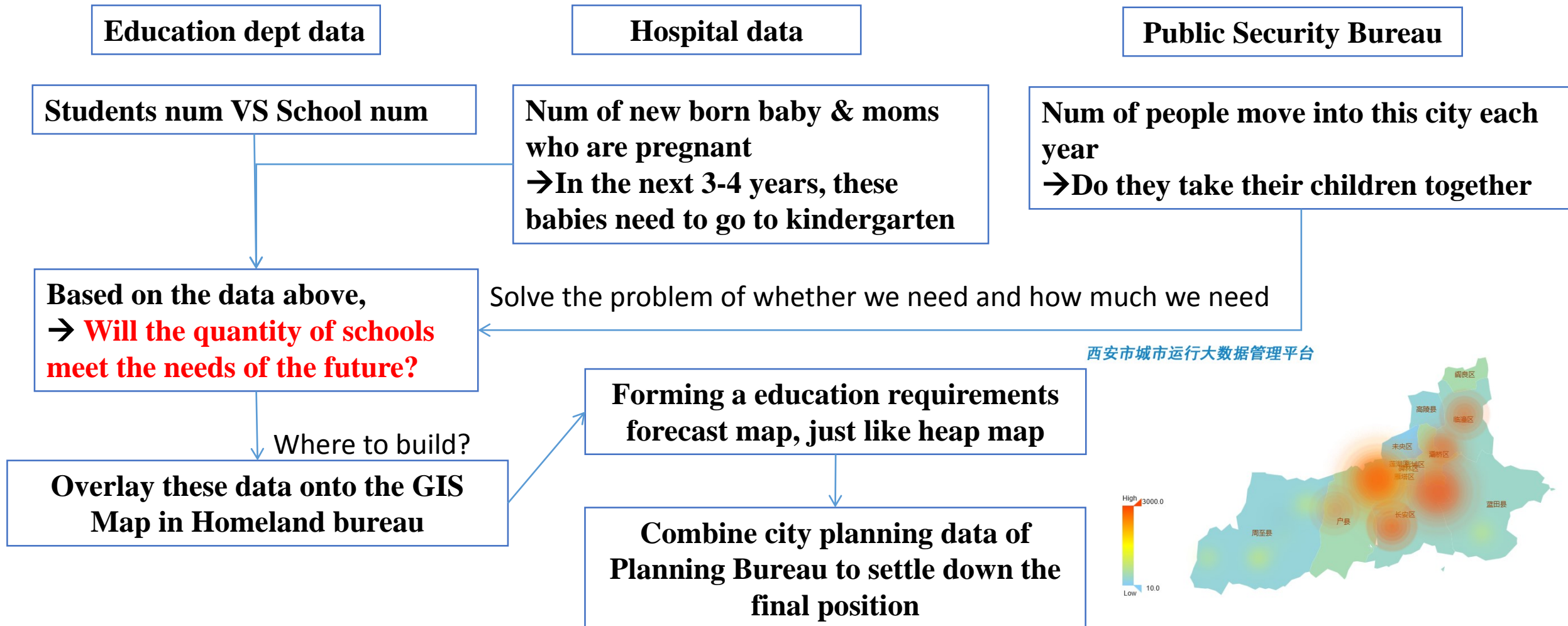
- Citizen traffic heat map and why?
- How to optimize city planning and bus station setting?



For education department—School building



- **Make decision by data and scientific analysis, not by personal feeling or intuition**



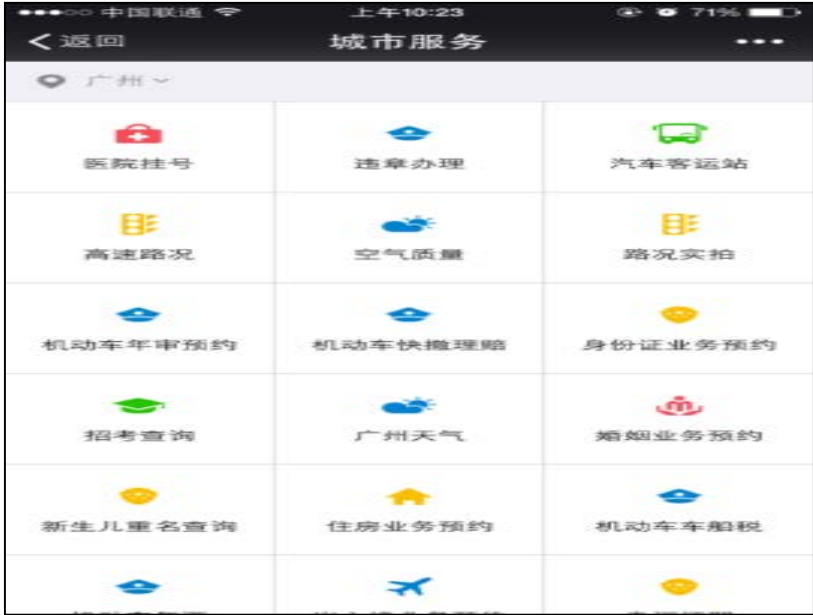


3、 Characteristics of smart city in China

CHARACTER 1: Internet+ Dominates the City Services



Large Internet enterprises access various service systems through APP and official accounts, integrating the fragmented services.



- Public Services of WeChat :
 - Covering 12 provinces and 69 cities, up to Oct. 2015
 - Serving 200million users

- City Service of Alipay :
 - By the end of 2015, 19 provinces, 124 cities have joined the platform.
 - Having over 4000 business and 100million users

CHARACTER 1: Internet+ Dominates the City Services



“Internet+” effectively improves distribution of city resources and promotes equalization of public service, rebuilding the existing pattern.

Smart Medical



- There are **almost 100 hospitals** provide mobile treatment and payment across China.
- There are **more than 1200 hospitals** support the registration by WeChat .
- There are **more than 3 million patients** have been served and **more than 6 million hours** have been saved.

- Didi Dache(China Uber) has covered **400** big and medium-sized cities,like Beijing,Shanghai,Guangzhou,Shenzhen
- **1 million** Taxi drivers and **110 million** passenger are using Didi
- **3 million** people use it everyday, and average daily orders exceed **5 million**, and peaks at **15million**

Smart transportation



CHARACTER 2: Information Infrastructure Becomes Strategic Facilities of the City



As the footstone of smart cities, information infrastructure is incorporated in the merger of regulations. Its status of strategic facility is increasingly prominent. The process of speeding up and lowering fees in 2015 was distinctly accelerated.

The Merger of Regulations

- Information infrastructure is included in the city integrated planning as the key factor. It is no longer individual behavior of enterprises and operators.

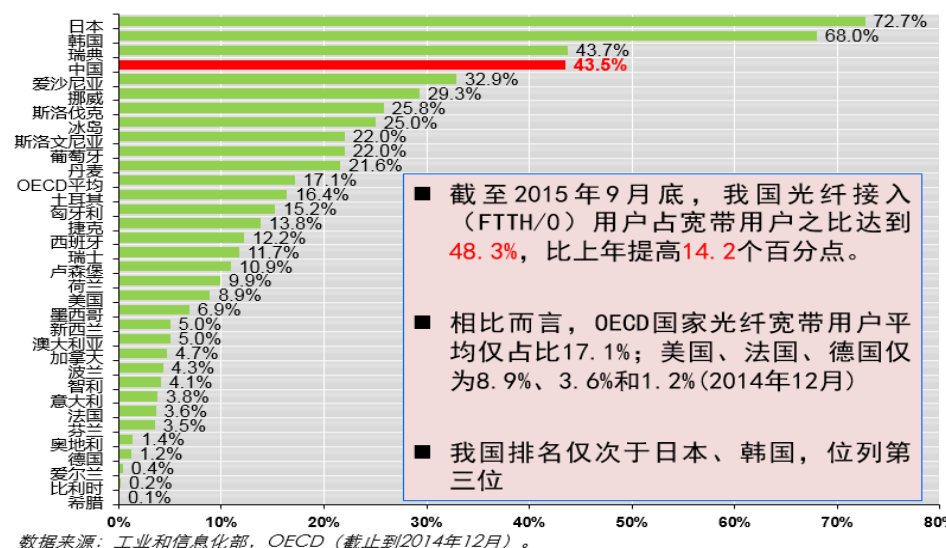


- Hainan: Information infrastructure is incorporated in overall planning of the province.
- Guangzhou, Xiamen: Regulations merger of city level covers information infrastructure.

Speeding Up and Lowering Fees

《Guideline to Improving Internet Speed and Lowering Fees》 May 2015

- China's fiber subscribers account for over 48%, ranking 3rd in the world.
- Average fee of mobile flow and WBN decreases 30% by the end of 2015.



■ 截至2015年9月底, 我国光纤接入 (FTTH/O) 用户占宽带用户之比达到 48.3%, 比上年提高14.2个百分点。

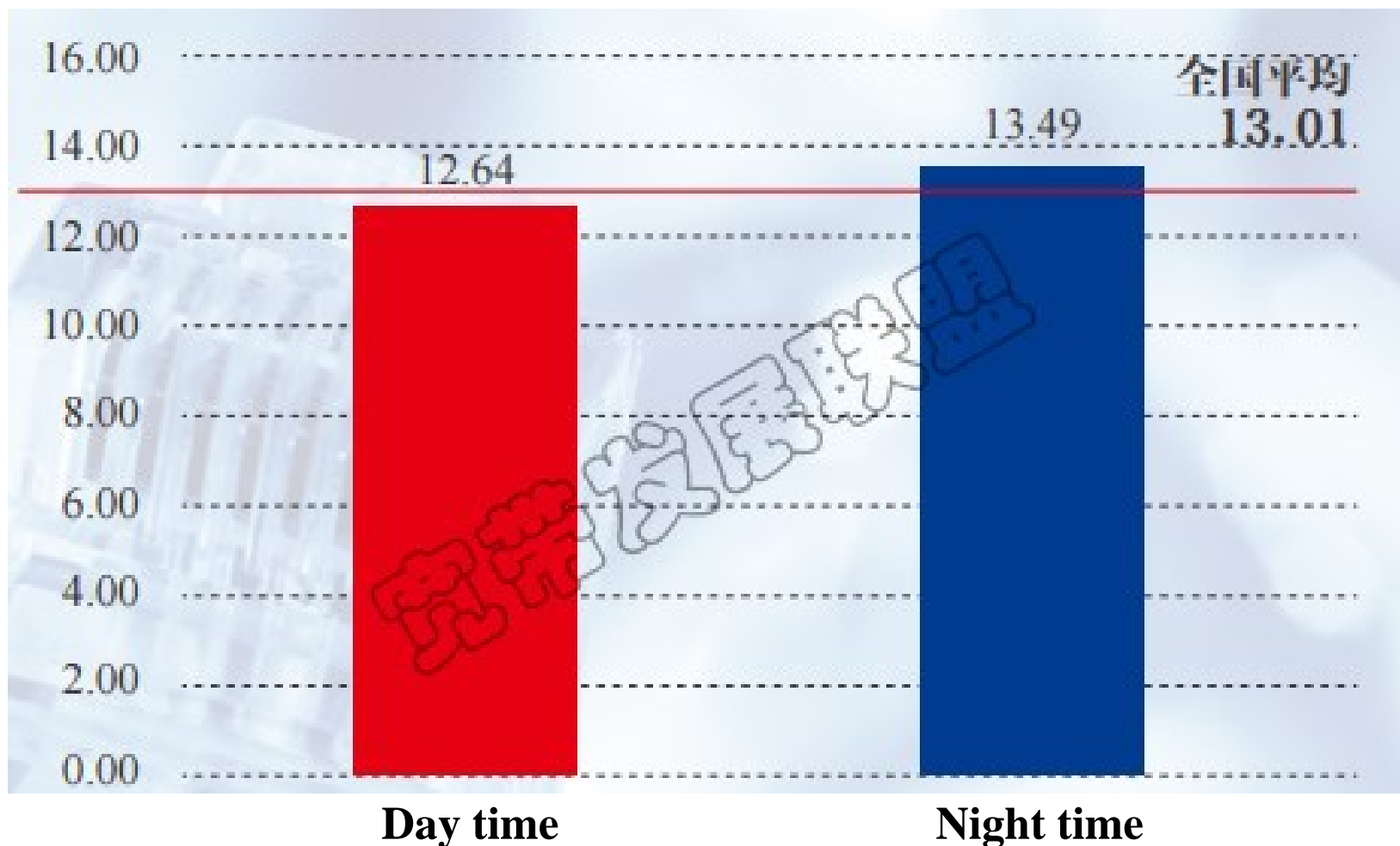
■ 相比而言, OECD国家光纤宽带用户平均仅占比17.1%; 美国、法国、德国仅为8.9%、3.6%和1.2% (2014年12月)

■ 我国排名仅次于日本、韩国, 位列第三位

Nowadays Broadband Network in China



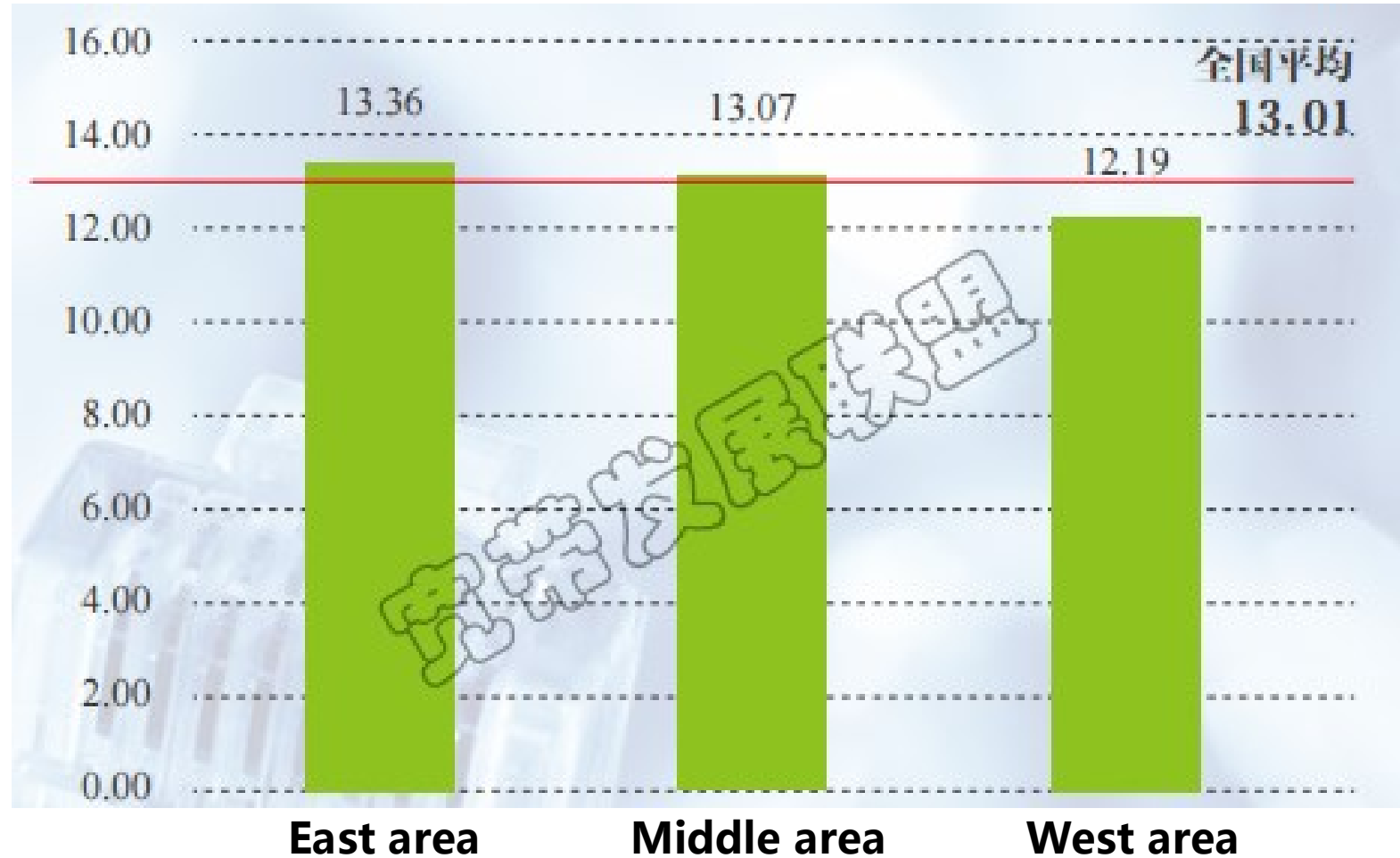
To Q1,2017, the average download speed is 13.01 Mbit/s



Nowadays Broadband Network in China



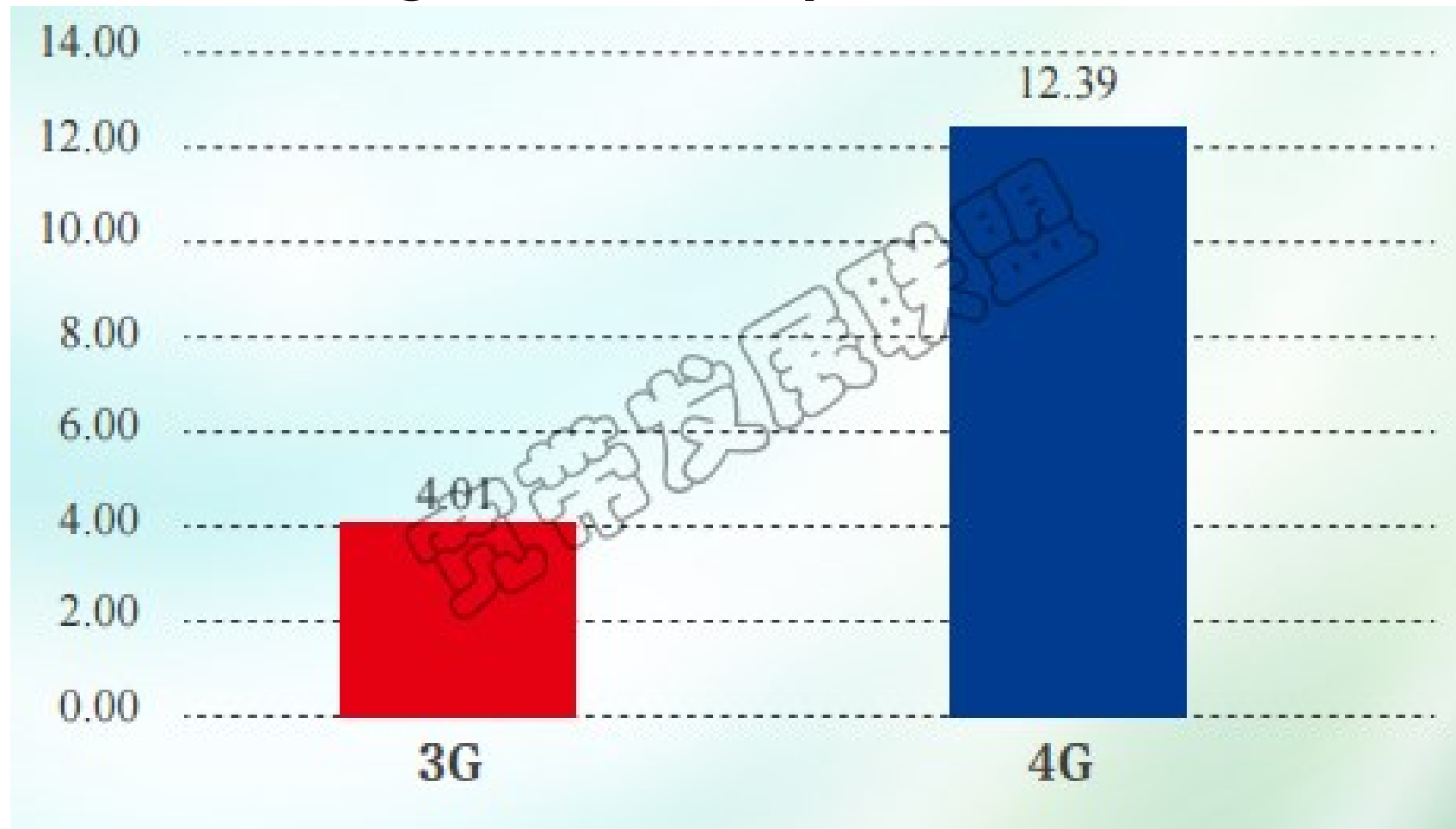
To Q1,2017, the average download speed for different areas(Mbit/s)



Nowadays Broadband Network in China



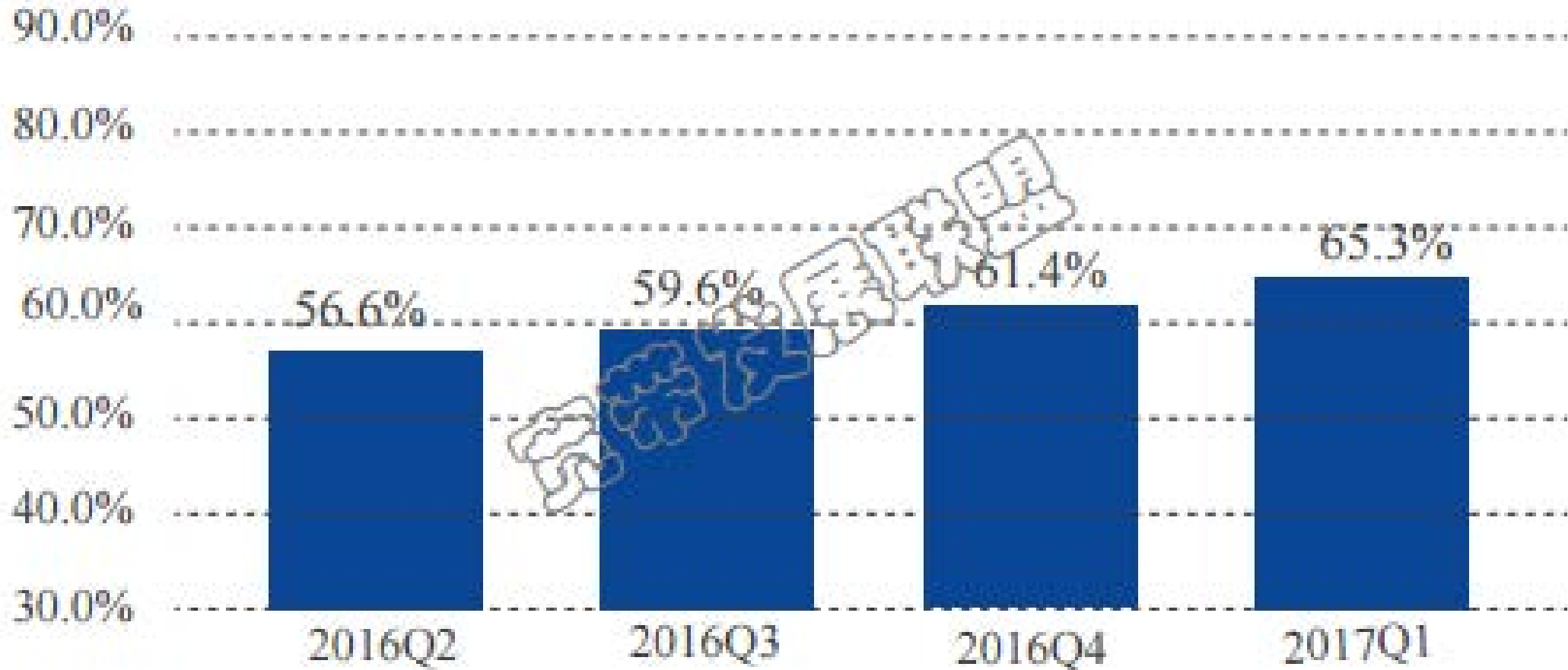
To Q1,2017, the average download speed for Mobile Network (Mbit/s)



Nowadays Broadband Network in China



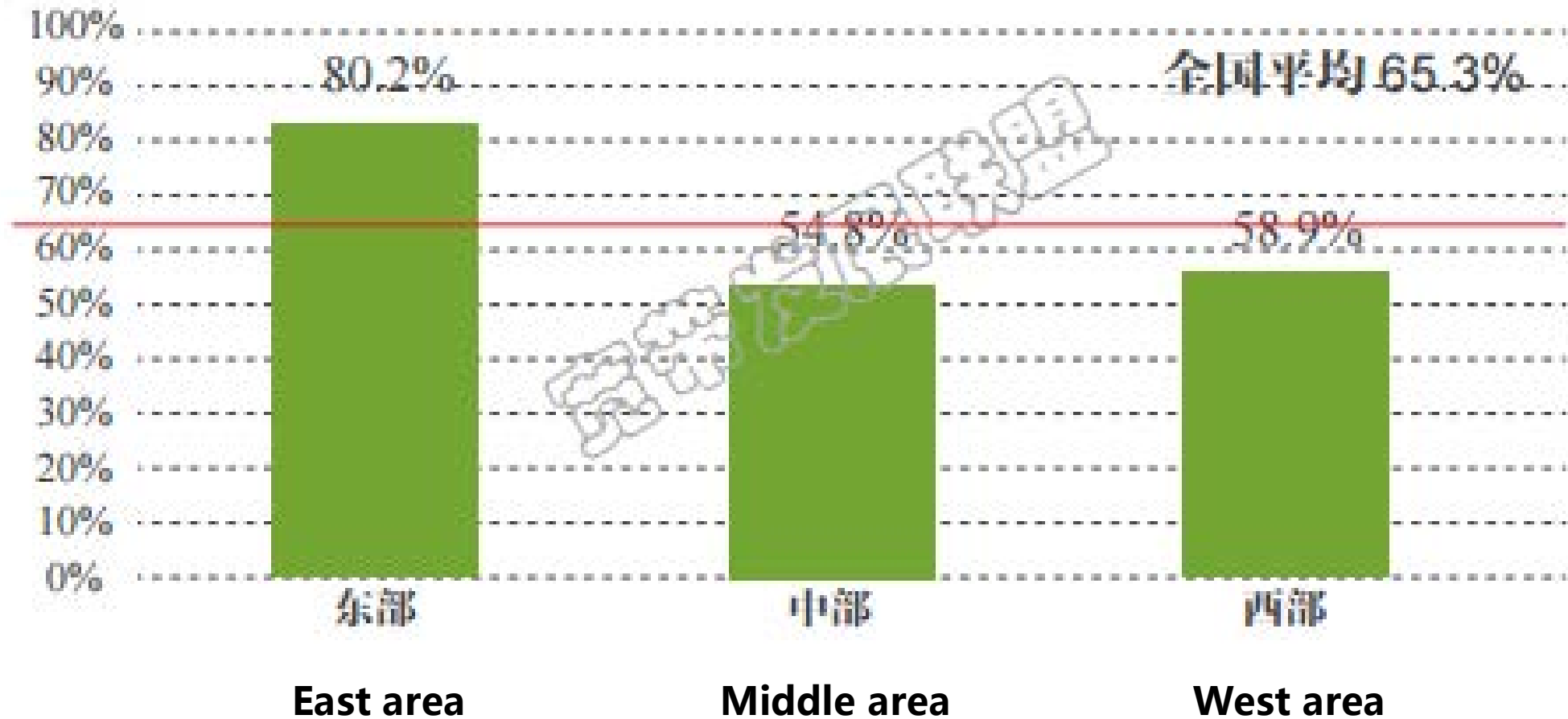
To Q1,2017, the fixed broadband home penetration over the nation



Nowadays Broadband Network in China



To Q1,2017, broadband home penetration of different area



CHARACTER 3: The development of EG is increasingly focused on one-stop service



Mode 3 : Provinces, cities and counties multilevel linkage

- Enjoy a multi-level serve provided by several department after Single sign-on
- Supervising service effectiveness and assessing performance
- Building strong propulsion mechanism

Mode 2 : Establishing online server center

- A front-end unified service interface
- System integration background
- Providing a unified the efficiency of supervision
- Provide tracking process



Mode 1 : Multiple Government Portal

- Different service interface
- Limited ability of integration
- Weak intensivism of platform

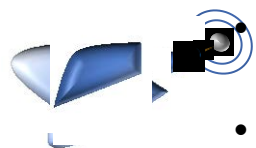


Office online as a principles , Not through the network as an exception 。
——Guangdong province : The proportion of online business is up to 99.57%。

CHARACTER 4: The PPP model is widely explored in city's construction



The PPP model will replace the government investment model gradually, become the mainstream mode of new urbanization construction and Smart City's construction.



PPP project library of National Development and Reform Commission contains 2125 projects, with a total investment of 3.5 trillion yuan。

- The number of PPP project recommended by country is up to 6650, with a planned investment of 8.7 trillion yuan。

——according to the Ministry of Finance

But now the contract rate of PPP project is not high, enterprise cooperation pattern need to be discussed again.



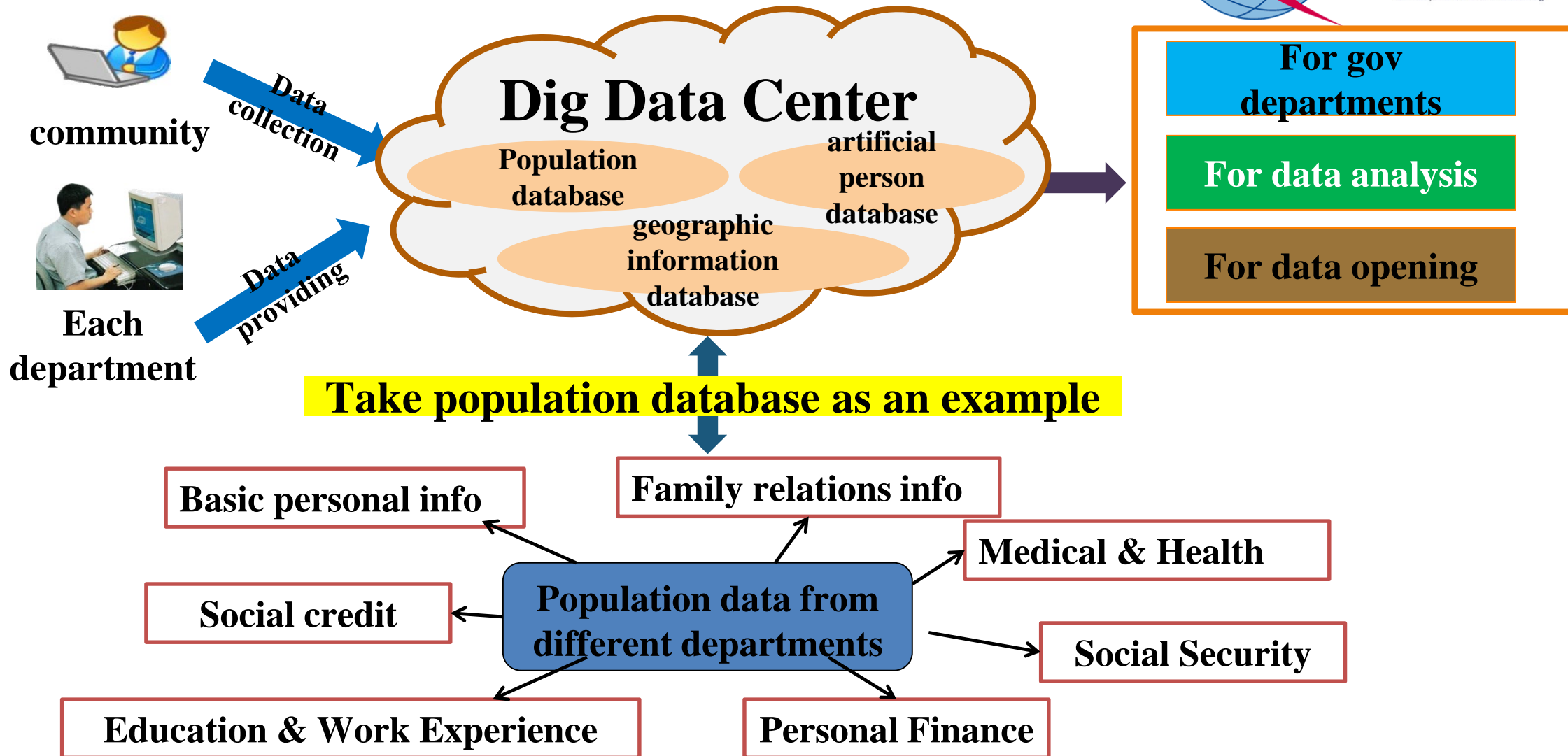


4、 Trend of Smart city

Data driven

International Co-operation

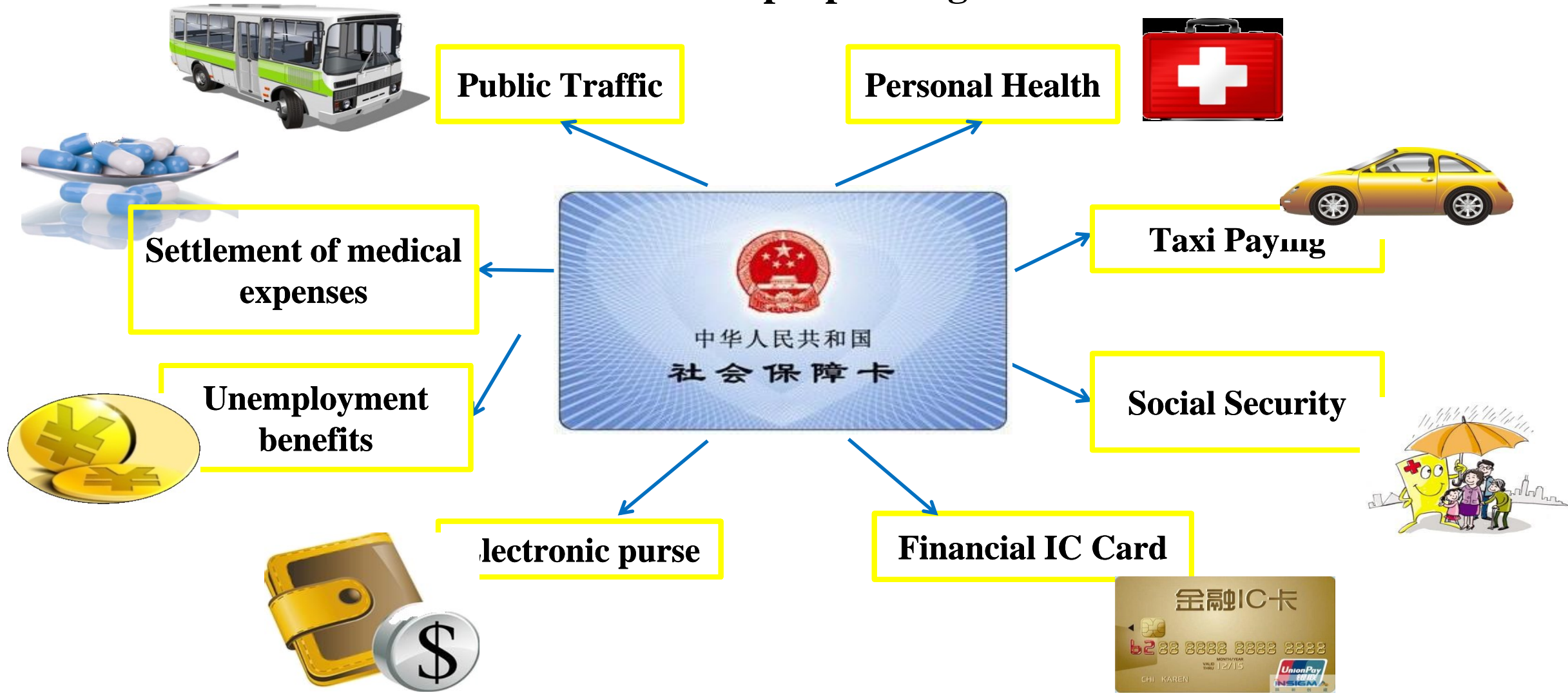
1、 Data sharing : Service based on Data Sharing



Data sharing : Service based on Data Sharing



Based on Data Sharing to expand china social security card functions and facilitate people usage



Data sharing : Service based on Data Sharing



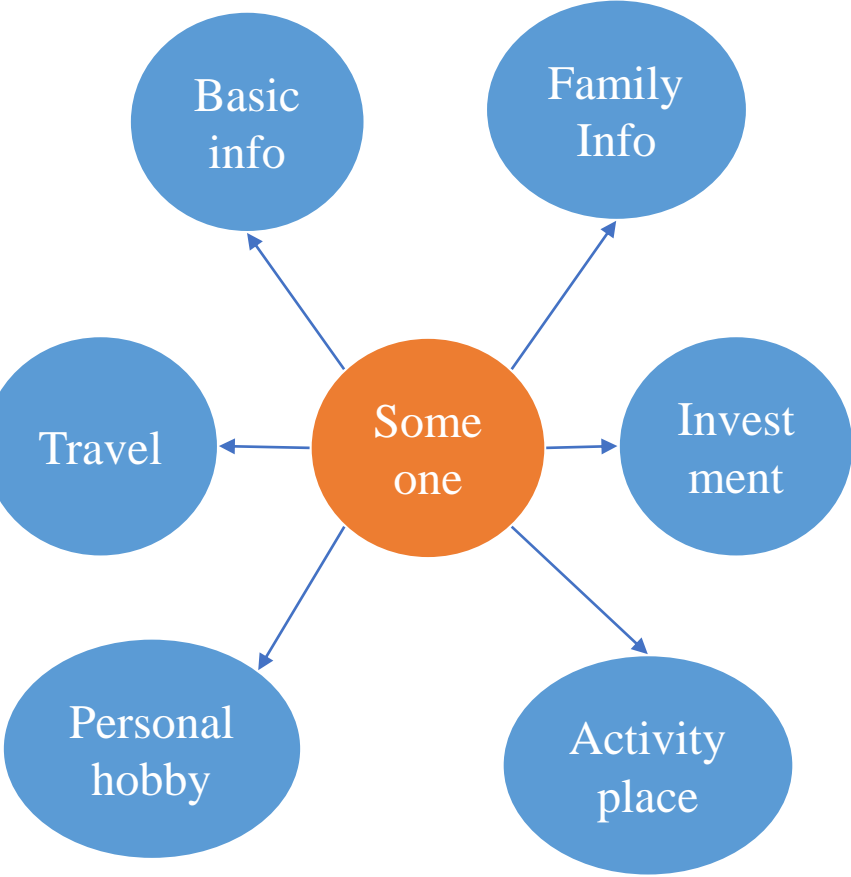
Police System :
Name : Someone
Gender : Male
marital status : married
Address : xx street, xx building
....

Corporation system:
Name: Someone
Corp. name : XX company
...

Education System
Name : Someone
Graduate Univ : Peking University
Graduate Time : 2012
...

Social Security :
Name : Someone
Security type : medical + Unemployment insurance
Data : 2012.7
....

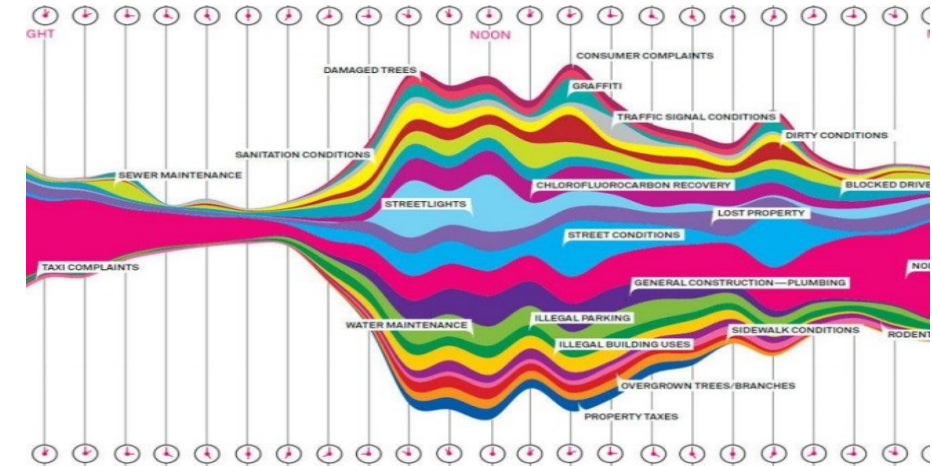
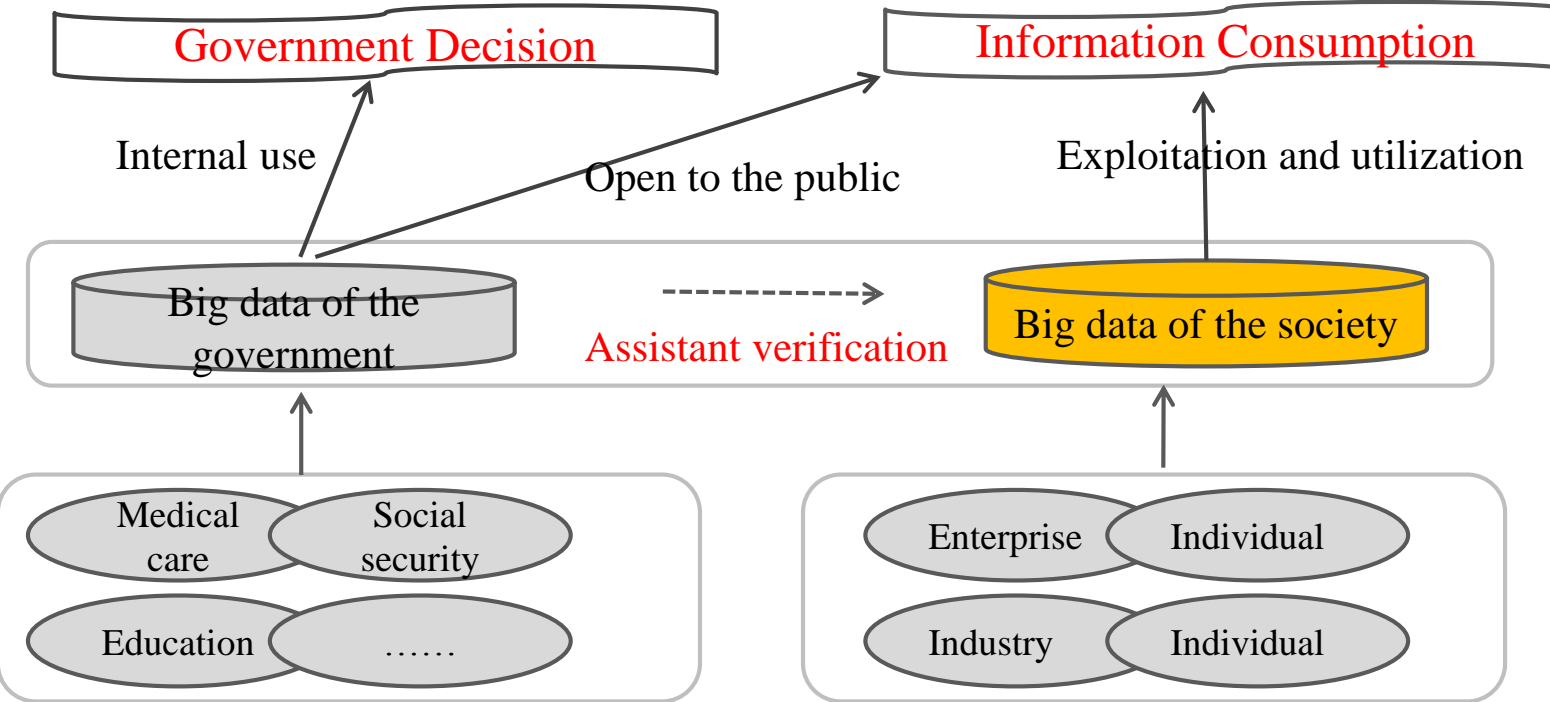
Data integration



Big Data: Decision-making mode based on data open and data exploitation is remodeling the governance capacity of government



The mayor can dynamically and visually control the situation in real time, Identify problems then make timely adjustments.



Operation Monitoring

Operation Analysis

Trend Forecast

Industrial output
Energy consumption
Pollution Index
Traffic flow
Weather conditions

is the economic situation boom?
is the industrial structure reasonable?
How high is the people satisfaction?
Analysis of major accidents
Reveal potential hazards

Industrial output
Energy consumption
changes in people's needs

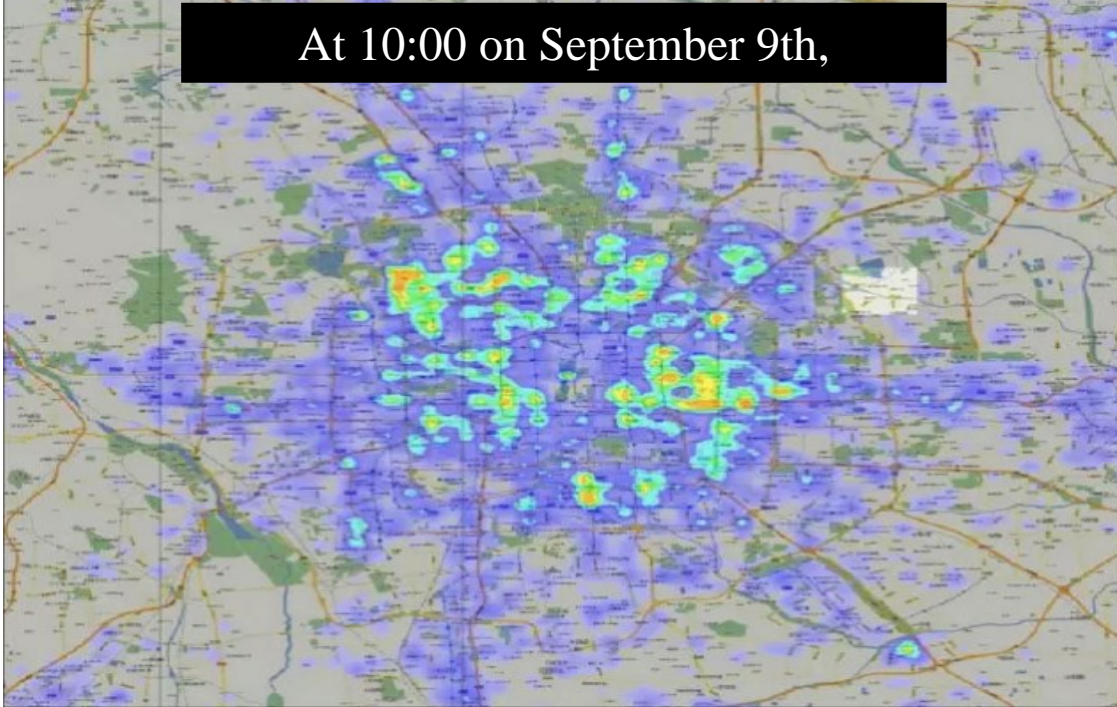
Big Data : Analysis on Bei Jing



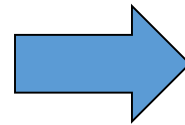
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Daytime: working population distribution Heatmap

At 10:00 on September 9th,

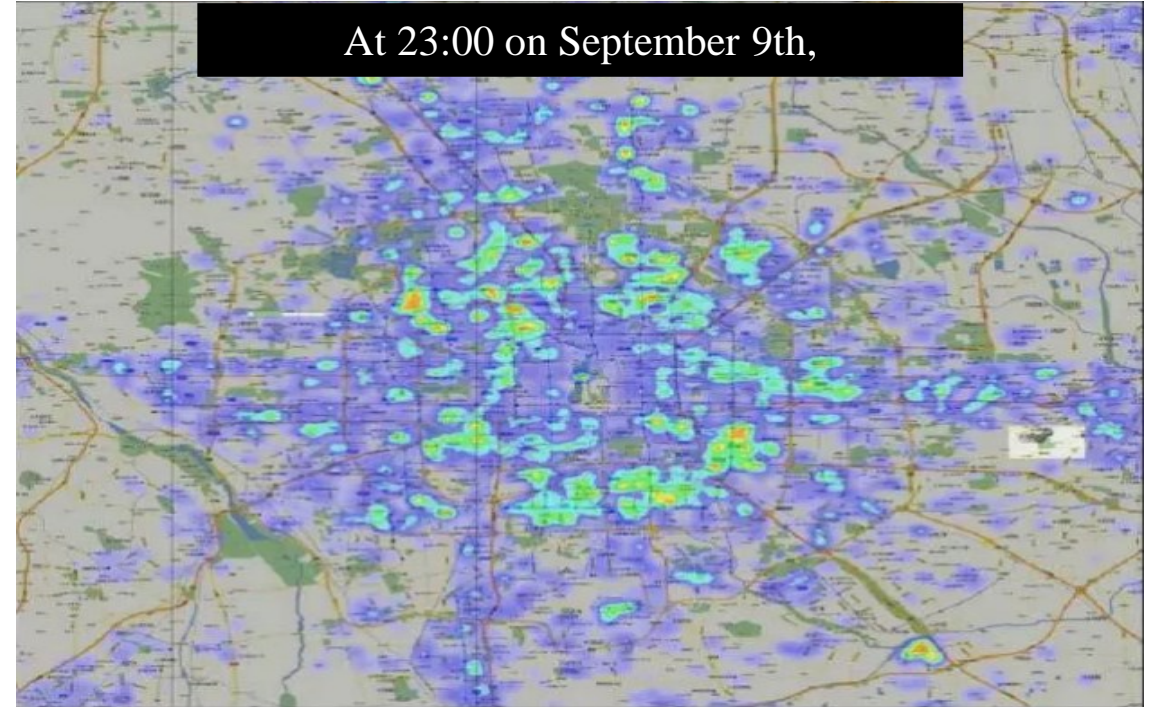


- Visual analysis of urban layout ribbon
- Urban construction planning
- Improving urban traffic flow and congestion



Nighttime: Resident population Distribution Heatmap

At 23:00 on September 9th,



- ❑ Rely on data to enhance refinement of the planning and management level
- ❑ Meet the Infrastructure and public service needs of different people
- ❑ Maximize the services capability of limited facilities
- ❑ Improve usage efficiency

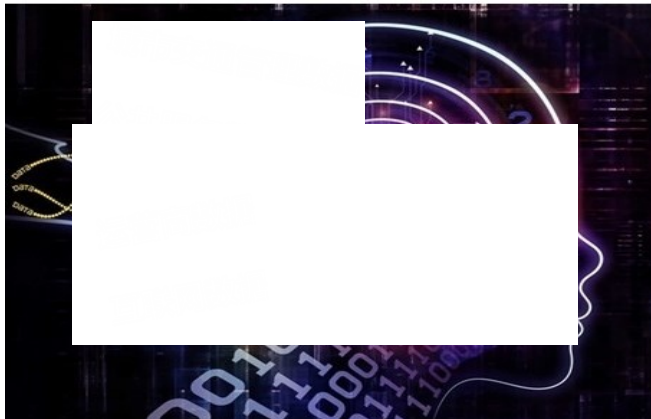
AI in smart city



City Brain

Hangzhou : City Data Brain

- Government: open data
- Enterprise: analysis



CCTV:50,000

Save manpower:
150,000

Experts in Alibaba,
Foxconn...

- ✓ Comprehensive monitoring
- ✓ Automatic optimization

City laboratory

Shenzhen:

Intelligent pedestrian red light forensics system:

1. video detection of pedestrian red light
2. intersection large screen display
3. Write into the integrity system



Baidu : AI is the core of smart city

AI service platform in common use

AI for self-driving car

AI for Intelligent hardware

AI for other aeras

The Benefit of Data Sharing For local Government



- Take Population Data Sharing as an example
 - What Government can get?
 - Check personal pension funds.
 - Check wrong retirement pay for those who has died.
 - Check social assistance
 - Check the applying quality for affordable housing

Problem on Data Sharing



- 1. Data isolation
 - Different bureaus have different data and they have no wish to share their data with other bureaus, which becomes a big obstacle to promote smart city building
- 2. Lack of standard
 - Different systems have their own interfaces, or database has its private data storage format, which causing systems from different areas can not be connected together. That means, may be smart in local ,but not over the nation
- 3. Responsibility
 - Dept A provide a data to Dept B, and Dept B give a suggestion based on that data, then Dept C execute the suggestion, however, the result is bad and wrong, who should responsible for it?

2、 International Co-operation: The Global Smart Cities Enter a New Stage



U.S.A: Formal national level strategy in 2015

National Strategy Phase:

- **White House Smart Cities Initiative (2015.9)** , planning to invest \$16million
- **《New Strategy for American Innovation》 (2015.11)** , one of the 9 important future strategy areas

EU: Overall deployment & sustained investment

“The European Innovation Partnership on Smart Cities and Communities” (EIP-SCC)

——Horizon 2020

- Deploying overall smart city markets in Europe, focusing on ICT infrastructure, transportation and energy
- Typical Cases: Amsterdam, Copenhagen, Stockholm, London, etc.

India: Exploring and catching up

Digital India initiative:

- Planning to invest \$18billion with fiber-optic network covering 250 thousand villages, promoting e-government construction

“100 Smart Cities” Project (2015.8) :

- 98 key cities, planning to invest 480billion Rupees
- Strengthening cooperation with Singapore, U.S.A. etc.

Singapore: Earliest national strategy, keep updating

Intelligent Nation 2015 (iN2015,2006)



Singapore : 2025 (2014)

Connect

Collect

Comprehend



China Actively Carrying Out Multilateral Cooperation



UK



《UK-China Smart City MoU》

- Guangzhou—Bristol
- Jinjiang—Milton Keynes
- Wuhan—Manchester

Germany



■ 《Outline of Germany-China Cooperation: Co-innovation》 :

- Industry 4.0, electric automobile, smart e-home
- 《MoU on Germany-China Smart City Cooperation》

USA



■ 《USA-China Smart City Cooperation Framework Agreement》

- Clean Energy, Energy Conservation and Environment Protection, etc.

India



- 《Joint Statement between the People' s Republic of China and the Republic of India》 , launching smart city cooperation

ASEAN



■ 2015 China-ASEAN Smart City International Cooperation Symposium

- Economy & trade, Cultural exchanges, technology R&D, policy communication, people' s living, infrastructure

China-EU: Green Smart City Cooperation



1. Pilot cities

- 2013 Smart City Sub Forums
- Expert panel of China-EU
- 15 Pilot cities in China and Europe

2. White Paper

- Communication among pilot cities
White Paper and Comparative Study of Smart Cities in China and Europe
Pilot cities signed “China-EU Smart Green Cities cooperation declaration”

3. promote development

- Smart City of 2015 China-EU Urbanization Partnership Forum
Important area of China-EU cooperation and subsequent cooperation direction

China-EU: Project level cooperation intention



Since the 6th ICT Dialogue Conference, China and the EU pilot cities have carried out exchange activities and achieved cooperation intent in specific areas.

1、 Guangzhou + Bristol

- Guangzhou- Bristol Smart City MoU
- Visit National Supercomputing Center in Guangzhou
- Smart medical/High energy network & super computing/Big data analysis & data mining

2、 Wuhan + Manchester

- Strategic cooperation agreement between Digital China and Manchester
- Co-design and build Smart City Demo Center

3、 Jinjiang + Milton Keynes

- New-type urbanization AC docking activities
- Establish cooperative work mechanism
- Intense collaboration on Smart City-OC/Service/Wise medical

4、 Leshan + French Issie

- Exchange of research activities and inspection tour
- Topic exchanges about Smart power/Intelligent transportation/E-government



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Thank you!

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