



# Construction and Evaluation of New Type Smart City in China

**Prof. Weifeng Lyu**

**School of Computer Science and Engineering, Beihang University**

**General Working Group on Chinese Smart Cities Standardization**



# contents



## Smart City Construction in China



## Evaluation Challenges



## China's Efforts on Evaluation





# Smart City Construction in China



# Urbanization Rate in China

Construction

Agricultural Civilization



Industrial Civilization



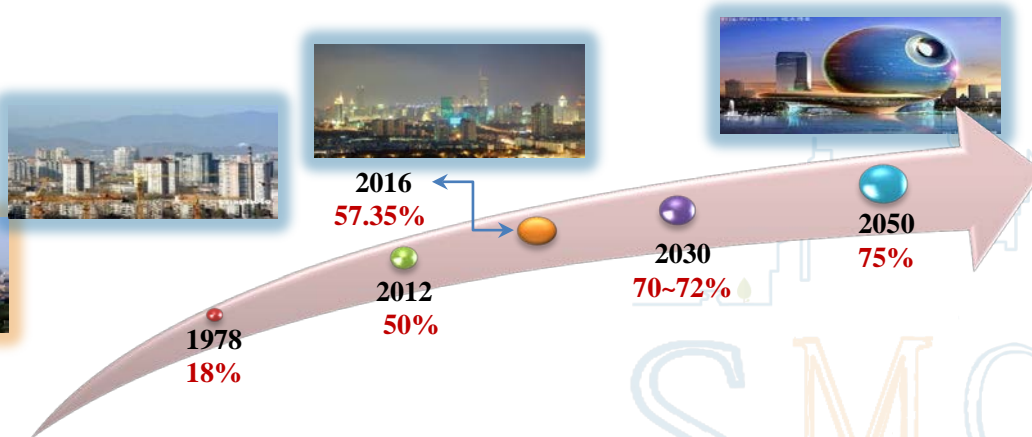
Post-Industrial Civilization



IT Civilization



Urbanization rate  
in China



SMCSTD

# Common Challenges of Cities in China

## Construction



**Transportation problems.**  
Need better public services and administrative efficiency



**Air pollution, global warming,**  
resource un-sustainability...



**Soil and Water**



**Need to develop new industries and**  
Improving traditional industries.



**Environmental**



**Social security problem.**  
Health care and education.

# China's National Strategy

## Construction



### Promoting Smart City Development Guidance

- *Promoting Smart City Sound Development Guidance* is issued in August 2014, and it is co-issued by 8 different ministries.
- This guidance proposed that a group of smart cities should be constructed to 2020, and by that time, their aggregation and radiation effects and comprehensive competitive advantages will be strengthened, which reflected on guaranteeing and improving civic livelihood, innovating social governance, and maintaining Internet safety, etc.

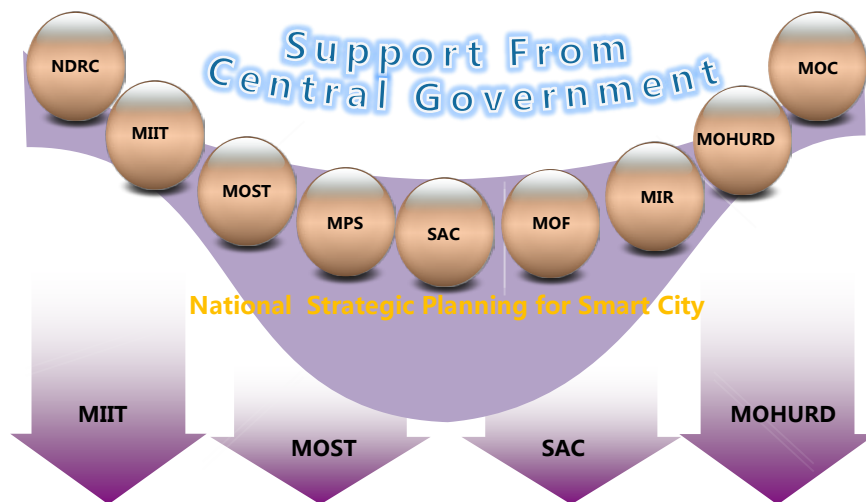




# China's National Strategy

## Construction

### *Direction of smart city in China*



### Smart City in China



Wideband network

Information technology of management

Intelligent Infrastructure

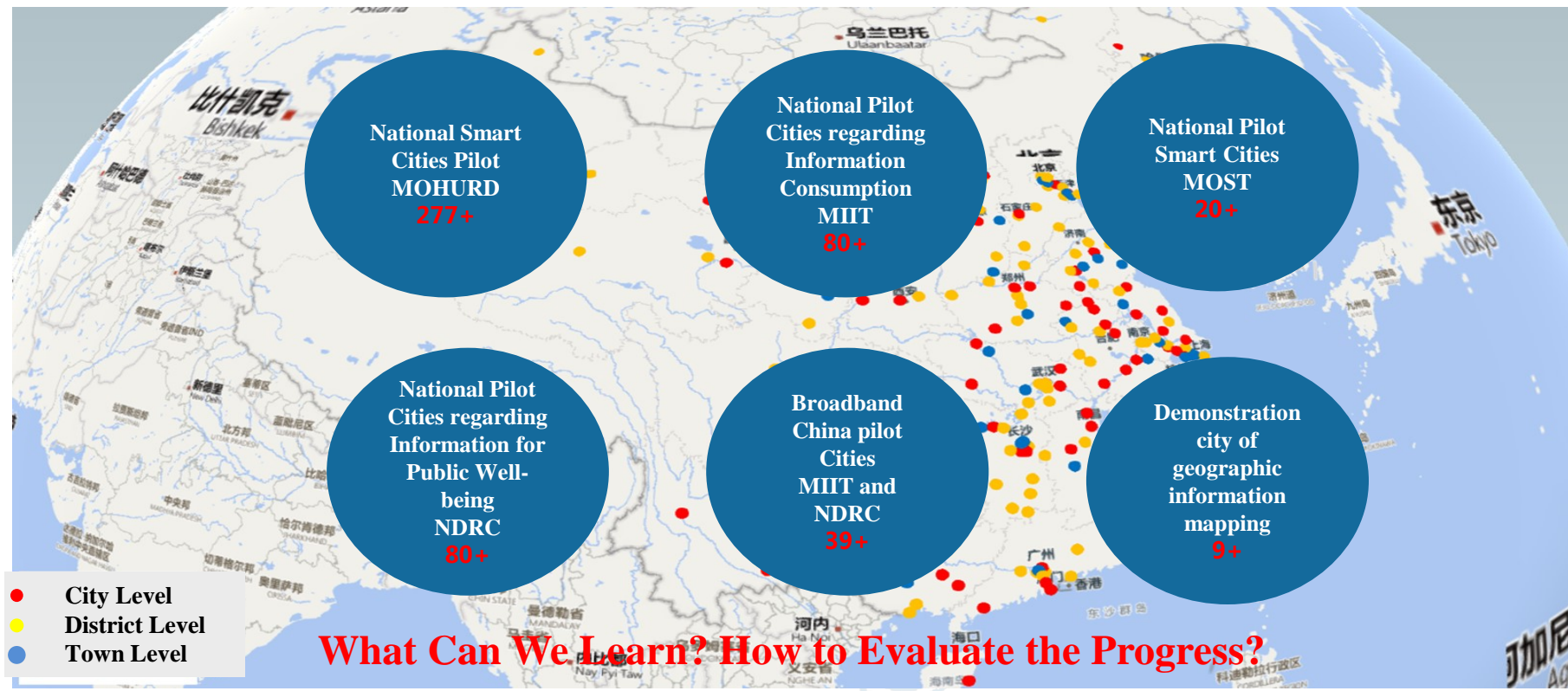
Convenient public service

Modern industry

Fine governance

# Pilot Studies of Smart City in China

Construction







## Evaluation Challenges



# Significance of Evaluation

## Evaluation

### **Guided by the evaluation, identify the new smart city working direction**

Ask local governments to develop relevant work programs according to the system of the evaluation indicators, identify relevant measures, and effectively improve the effectiveness of smart city construction.

### **Measured by the evaluation, improve the level of citizen beneficial services**

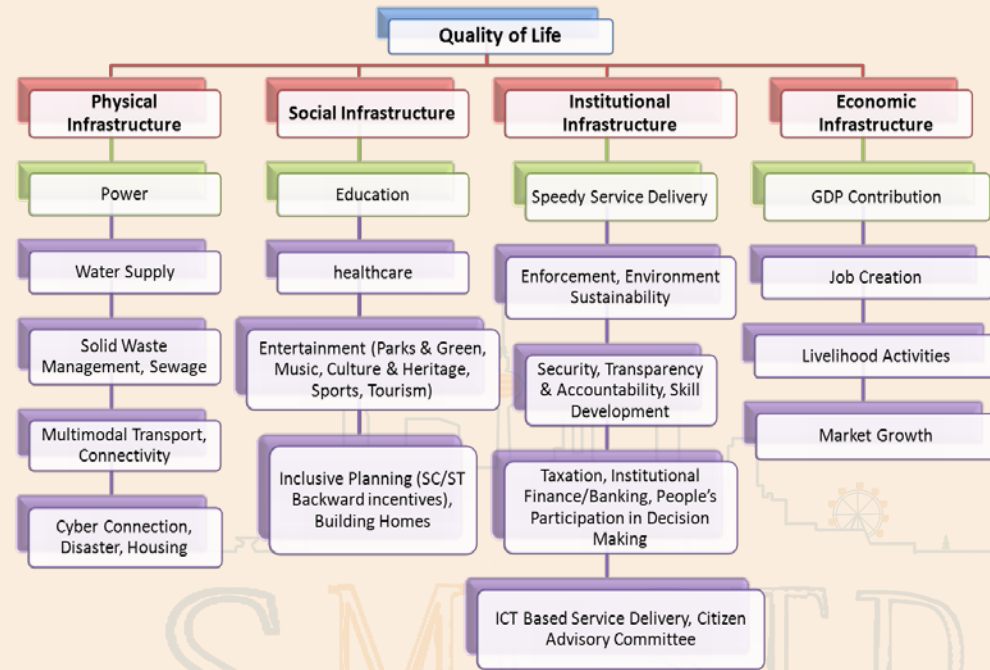
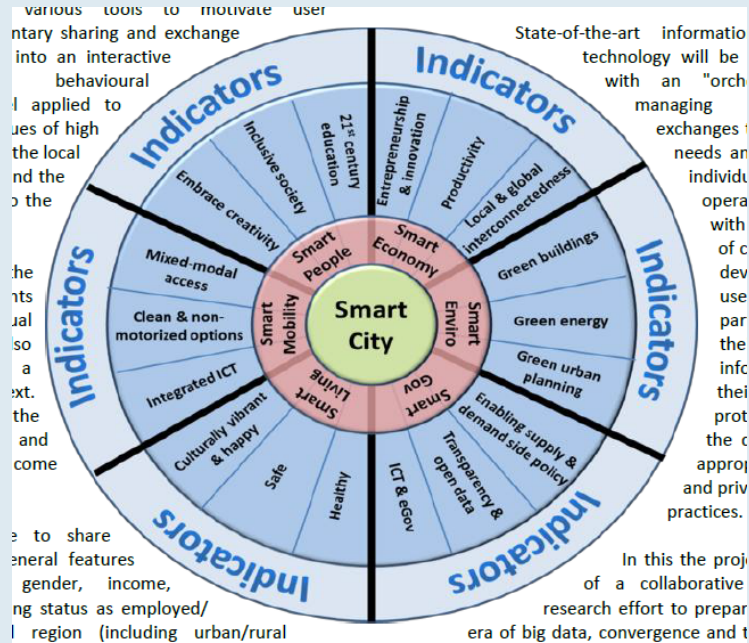
Evaluation can creatively take the feelings of citizens, sense of happiness and fulfillment as important evaluation aspects. Local governments need to focus on construction effectiveness and make the public and enterprises feel the convenience of new smart city.

### **Deepen by the evaluation, accelerate experience sharing and promotion**

Discover best practices, construction experience and common problems during the new smart city construction and promotion in different regions, at different levels and with different city scales. Summarize best practices which can be copied or extended to other cities and share development experience.

# Evaluation Proposal in Other Countries

## Evaluation



## Evaluation



## ISO/IEC JTC1/WG11 2016 till now

- **ISO IEC 30145 Smart City ICT Reference Framework and**
- **ISO IEC 30146 Smart City ICT Indicators**

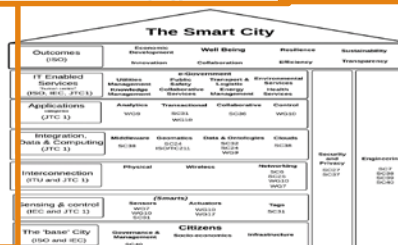
Project Number	Title	Project Editor
30145-1	Smart City ICT Reference Framework- Part 1: Smart City Business Process Framework	Editor: Michael Mulquin (UK) Co-editor: François Coallier (CA), <a href="#">Dapeng Zhang (CN)</a> , Nikita Utkin (RU), Danila Nikolavev (RU), Kishor Narang (IN), Jun Seob Lee (KR)
30145-2	Smart City ICT Reference Framework- Part 2: Smart City Knowledge Management Framework	Editor: Jacqui Taylor (UK) Co-editor: François Coallier (CA), <a href="#">Junfeng Zhao (CN)</a> , <a href="#">Dapeng Zhang (CN)</a> , Mark Fox (CA), Nanjangud Narendra (IN), Jun Seob Lee (KR)
30145-3	Smart City ICT Reference Framework- Part 3: Smart City Engineering Framework	Editor: <a href="#">Dapeng Zhang (CN)</a> Co-editor: François Coallier (CA), Prasant Misra (IN), Jun Seob Lee (KR), Nikita Utkin (RU)
30146	Smart City ICT Indicators	Editor: <a href="#">Tangli Liu (CN)</a> Co-editor: <a href="#">Chen Jii (CN)</a> , Jacqui Taylor (UK), Nikita Utkin (RU), Danila Nikolavev (RU), Mark Fox (CA), Kishor Narang (IN), Michael Mulquin (UK), Jun Seob Lee (KR), Bruno von Niman (SE)

# ISO/TC268 Indicators for infrastructure management



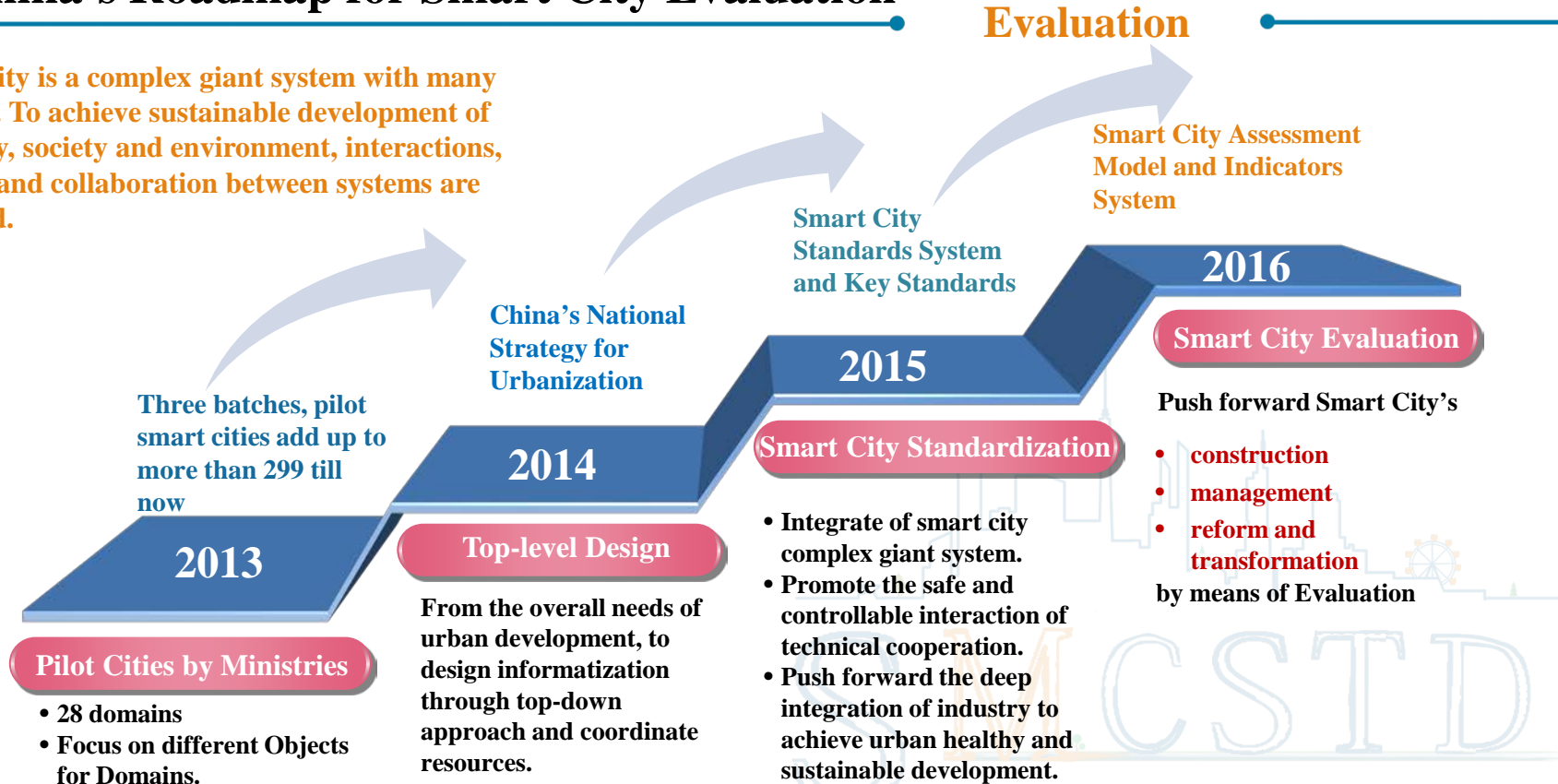
## ISO/TC268 37150 Review of existing activities relevant to metrics

**ITU-T/SG 20 Vice Chair**



# China's Roadmap for Smart City Evaluation

Smart city is a complex giant system with many systems. To achieve sustainable development of economy, society and environment, interactions, merges and collaboration between systems are required.





## China's Efforts on Evaluation

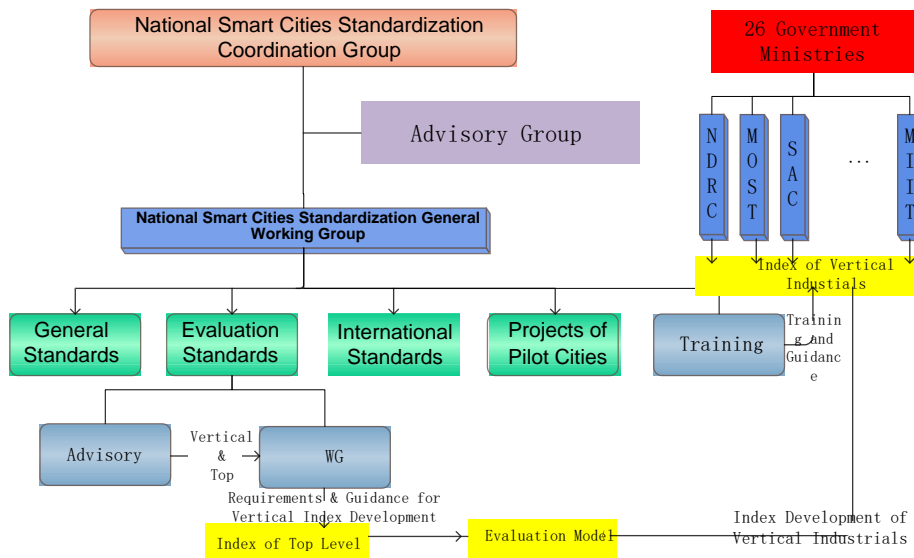




# Launch of National Coordination Group

## Roadmap

Under the leadership of the National Standards Commission and other relevant ministries, the National Standardization SmC general group established evaluation standards team, specifically support national SmC evaluation of applications, implementation, verification and indicators test. Our institute undertake the leader of evaluation team.



**Coordination Group**(11 Ministries including SAC, NDRC, MIIT, MoHURD, MOST, MOT, etc.)

**Advisory Group**(Experts and scholars)

**SAC**

Standardization Administration of the P.R.C.

**General Working Group**(over 120 members, ranges over scientific research institute, SDOs, enterprise, business alliances and local governments )

# Current Progress in Smart City Standardization

## Roadmap

**Book:**  
**The Guidance for  
Building SmC in  
Practice**  
July 2013

**China SmC  
Standardization  
White Paper**  
Nov. 2014

**Report of testing the  
innovative smarter  
city indicators**  
Sep. 2016

**GB/T 33356-2016  
Innovative smarter city  
indicators**  
Dec. 2016

**The Guidance of  
using smart city  
indicators and  
standards system**  
To be published

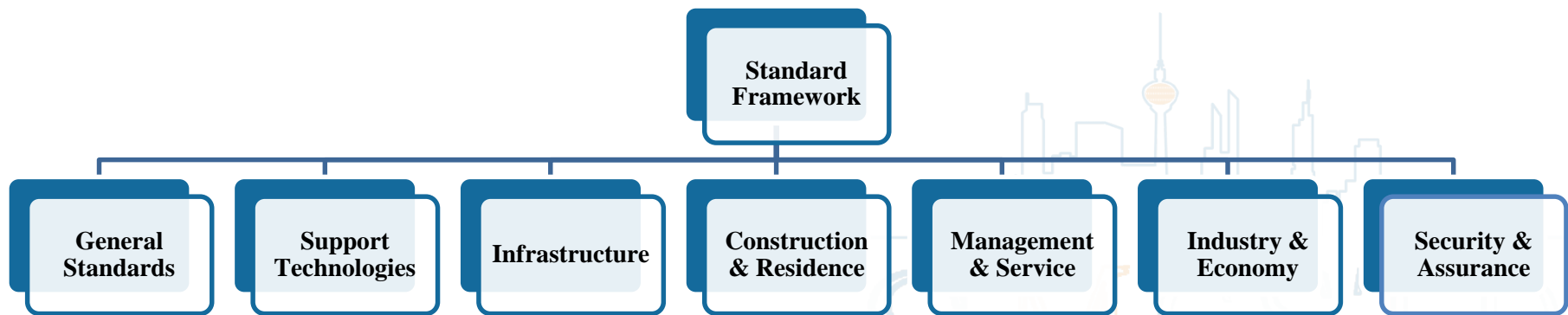


# China's National Standards System

## Roadmap

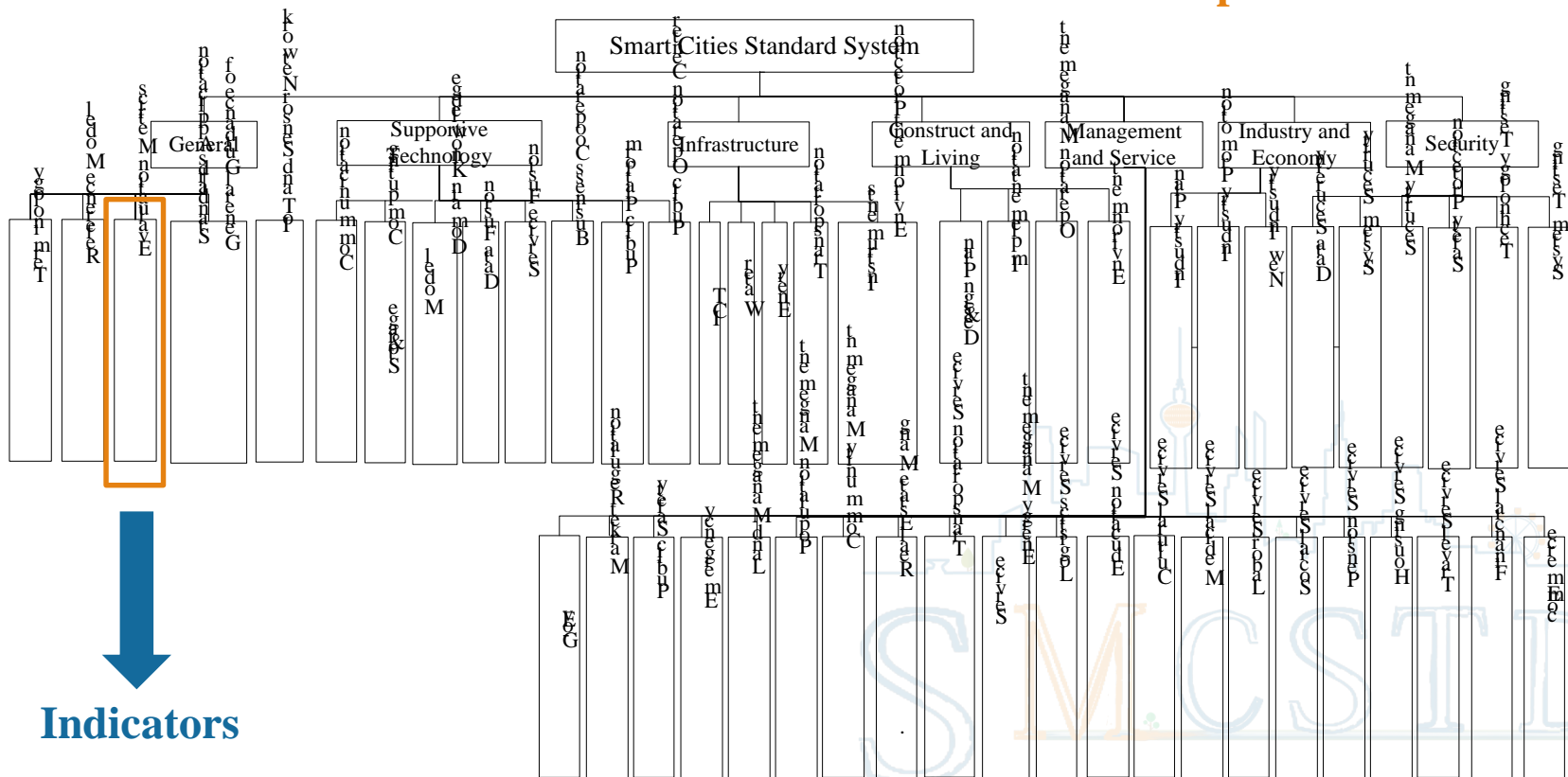
### Systematic Viewpoint of Standards for Smart City

**General Standards, Support Technologies Infrastructure, Construction and Applications, Management and Service, Industry and Economics, Security**



# Evaluation is Essential Part

## Roadmap



# Perspective of SmC Indicators Standards

## Roadmap

### ISO/TC 268

Sustainable cities and communities

#### ISO 37120:2014

#### Sustainable development of communities -- Indicators for city services and quality of life

100 quantitative indicators (46 core indicators & 54 assistant indicators) to steer and measure the **performance of city services** and **quality of life**

- Divided into **3 categories**: size, structure and performance
- cover **17 domains**: economy, education, energy, environment, etc.
- **39 summary indicators** helpful for horizontal comparisons
- **piloted** by a number of cities

#### ISO/TC 268/SC 1

Smart community infrastructures

#### ISO TR 37150

Smart community infrastructures -- Review of existing activities relevant to metrics technical status and performance indicators for **community infrastructures**

- **Status** of community infrastructure
- Technical **performance** and outcome of community Infrastructure

### ISO/IEC JTC1/WG11

Smart City

Evaluate both **smart city ICT applications and services** and **ICT infrastructure**

#### ISO/IEC JTC1/WG11 WD 30146

#### Information technology— Smart City ICT Indicators

- Divided into 2 categories: **ability** Indicators and **performance** Indicators

### IEC SyC

Smart Cities

Electrotechnical aspects of Smart Cities

#### IEC

#### Smart City Indicators —Electrotechnical aspects of Smart Cities

**Not yet set**

- To be focused on the electronic and electrical **integration**, **interconnection** and **interoperability** of systems (including equipment, software and services)

#### ITU-T Key performance indicators (KPIs)

**ITU-T Y.4900/L.1600** **Overview** of key performance indicators in smart sustainable cities

**ITU-T Y.4901/L.1601** Key performance indicators related to the **use** of information and communication (ICT)

**ITU-T Y.4902/L.1602** Key performance indicators related to the sustainability **impacts** of information and communication technology (ICT) in smart sustainable cities

**ITU-T Y.4903/L.1603** Key performance indicators for smart sustainable cities to **assess the achievement** of sustainable development goals

**In Future:** **e-services** and **smart services** for smart cities and communities (SC&C)

- ICT related KPIs: **use of ICT** in smart sustainable cities, **ICT impact** on sustainability
- Indicators for cities by global, national, regional, academic and company stakeholders

**ITU-T SG 20**  
Internet of things and smart cities and communities

# China SmC Indicators as inputs to the IS developed by the 3 SDOs

## Roadmap

### Citizen experience L8

Satisfaction survey L8P1

### Citizen beneficial service(s) L1

E-government services L1P1

Transportation services L1P2

Pension services L1P3

Health services L1P4

Education services L1P5

Employment services L1P6

Internet plus services L1P7

Services for disabled people L1P8

E-commerce services L1P9

### Precise governance L2

City management L2P1

Public safety L2P2

### Livable environment L3

Environmental protection L3P1

Green energy and energy efficiency L3P2

### Intelligent facility L4

Wideband network Infrastructure L4P1

Time-space geography platform L4P2

### Information resources L5

Sharing and openness L5P1

Exploitation and usage L5P2

### Cyber security L6

Management of information security L6P1

Systems and data security L6P2

### Innovation L7

Mechanism reform L7P1

### Self selected indicators L9

ISO/IEC JTC1/WG11 WD 30146  
Information technology— Smart City  
ICT Indicators

- ICT applications and services
- ICT infrastructure

IEC  
Smart City Indicators —  
Electrotechnical aspects of Smart Cities

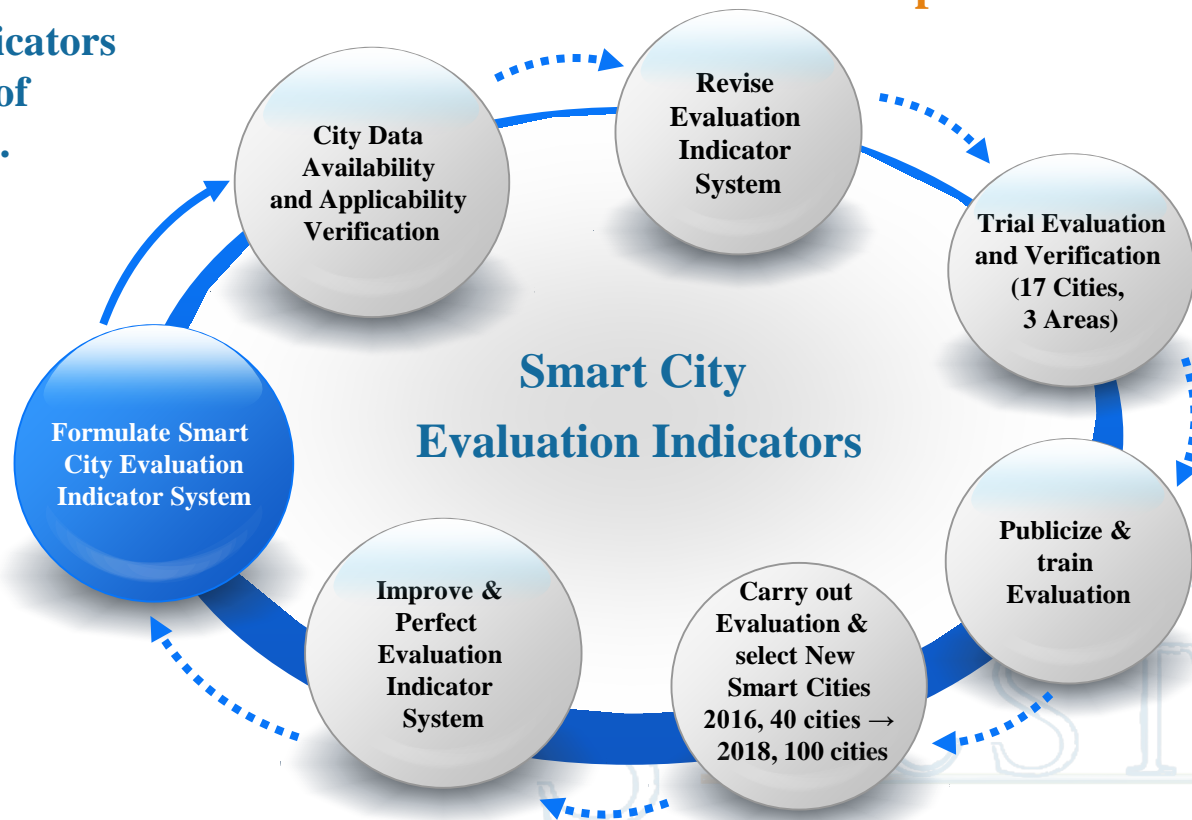
SMCSTD



# Formulation and Improvement Process of Indicators

## Roadmap

Establishment of Indicators  
is a continuous cycle of  
improvement process.



# Principles of Indicators Selection

## Roadmap

### Covering all the aspects with reasonable quantity

8 first tier indicators, 21 second tier indicators and 53 sub-second tier indicators

---

### Leading the future development with easy assessment method

To assess the effectiveness of the SmC performance by the citizen's satisfaction degree.

The indicators continuously included according to the degree of the maturity and readiness.

---

### Scientific and reasonable

The weights are assigned according to the importance degree of the indicators.

Citizen oriented and performance oriented

Large proportion of performance indicators including citizen benefit and citizen experience

# Principles of Indicators Selection

## Roadmap

### Subjective and quantifiable

Collect the corresponding data with an tool

Gain the degree of citizen satisfaction using the survey.

### In line with International Standards

Compared with two main ISs:

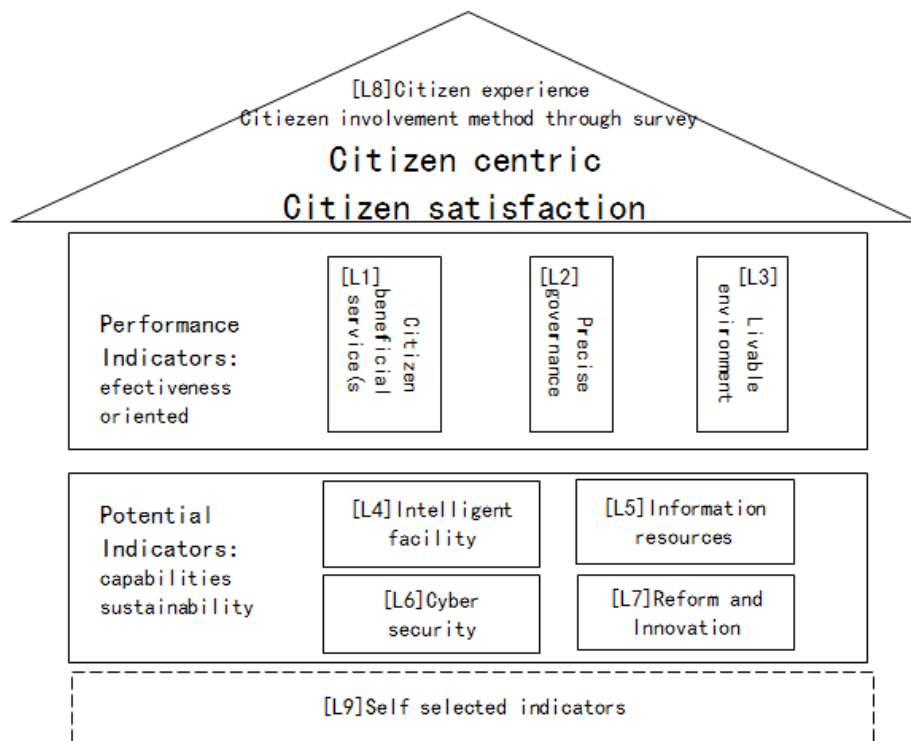
KPIs of ITU-T/SG 20

ISO 37120:2014



# China's Perspective of Evaluation Indicators

## Roadmap



The general framework of  
indicators in China





# Indicators Components

## Roadmap

The indicators include objective indicators, subjective indicators and optional indicators (measured separately ).

### Objective indicators

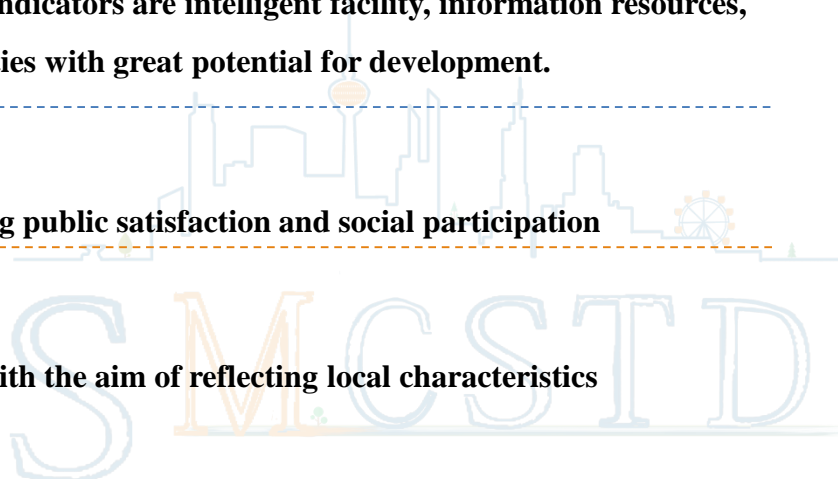
Consist of 7 first-tier indicators: 3 productive indicators are citizen beneficial service(s), precise governance and ecological livable which reflect the effectiveness of smart city; 4 directional indicators are intelligent facility, information resources, cyber security, and reformation and innovation which discover cities with great potential for development.

### Subjective indicators

Refers to “citizen experience questionnaire ”, aims at emphasizing public satisfaction and social participation

### Optional indicators

Refers to self established indicators issued by local government with the aim of reflecting local characteristics



# National Smart City Evaluation 2016

## Roadmap

To further summarize the experience and put forward the mission of constructing a number of new smart city demonstrations, which has proposed in “13th Five-Year plan”. **“Notice on Carry Out the New Smart City Evaluation and Promote the Development of New Smart City ”**(hereinafter referred to as the “Notice”) has been jointly issued by the National Development and Reform Commission, the Office of the Central Leading Group for Cyberspace Affairs and the Standardization Administration of the People's Republic of China (SAC).

SMCSTD



# National Evaluation 2016 Overview

## Roadmap

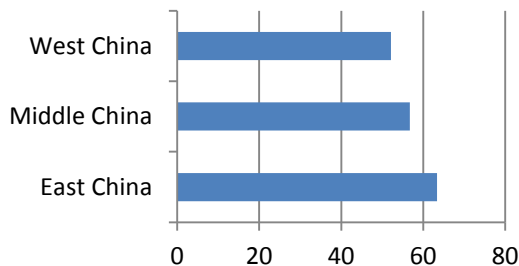
### Comprehensive representation

220+ cities out of 330+ prefecture-level cities have participated into the national evaluation project

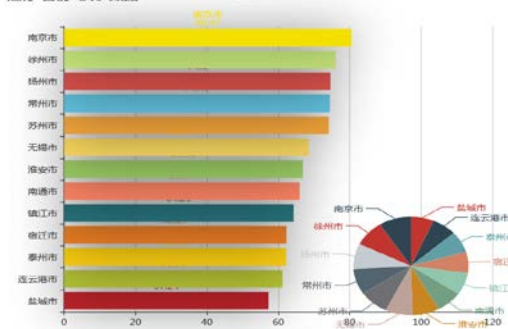
### Different Viewpoint

Data analysis in individual provinces and different economy areas

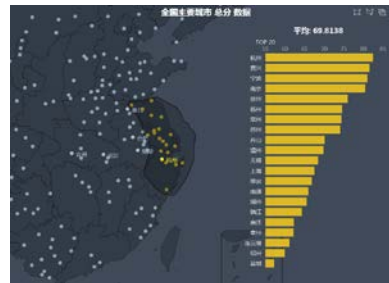
### Development Inequality



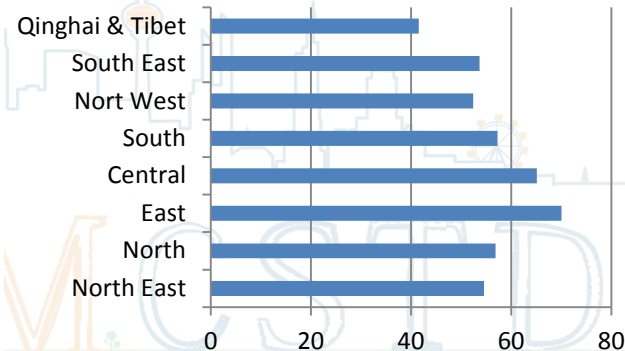
江苏 省份 总分 数据



### Overall Score



### Citizenship Experience





# Case Study — Yichang of Hubei Province

Roadmap

N	Second tier	Result	N	Second tier	Result
1	Administrative service(s) L1P1 (8%)	Outstanding	11	Public safety L2P2 (5%)	Good
2	Transportation service L1P2 (3%)	Outstanding	12	environmental protection L3P1(4%)	Outstanding
3	Pension service L1P3 (3%)	Inadequate	13	Green energy and energy efficiency L3P2 (4%)	Inadequate
4	Medical Service L1P4 (3%)	Inadequate	14	Broadband network Infrastructure L4P1(4%)	Required improvement
5	Education Service L1P5 (3%)	Outstanding	15	Time-Spatial information platform L4P2(3%)	Inadequate
6	Occupation service L1P6 (3%)	Good	16	Sharing and openness L5P1 (4%)	Inadequate
7	Municipal service L1P7 (7%)	Inadequate	17	Development and utilization L5P2 (3%)	Outstanding
8	Caring services L1P8 (5%)	Outstanding	18	Network security management L6P1 (4%)	Outstanding
9	Ee-commerce L1P9 (2%)	Inadequate	19	Security of system and data L6P2 (4%)	Required improvement
10	City management L2P1 (4%)	Inadequate	20	Mechanism reform L7P1 (4%)	Good



# Thanks!

<http://www.smcstd.cn>

