UN GGIM Workshop on
Data Ecosystem for sustainable Development

# From Local SDGs Profile to SDGs Knowledge Service:

# Deqing's Case Study

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# Contents

# Challenges

appropriate indicators for a given sub-national

integrate geospatial and statistical data

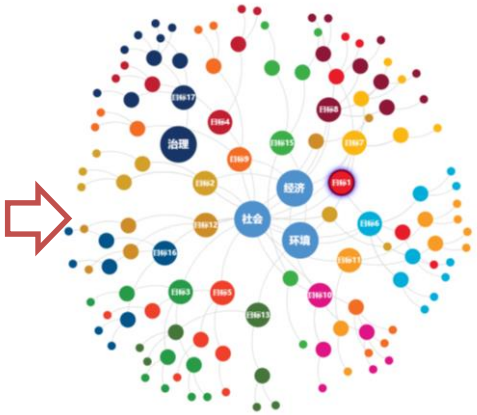
perform overall progress assessment

Transfer to knowledge

# From Local SDGs Profile to SDGs Knowledge Service

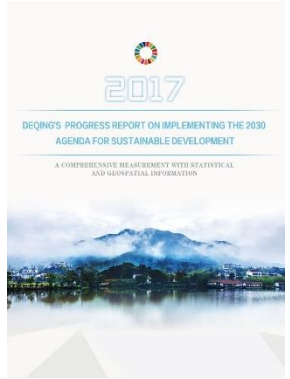
SDGs Knowledge Service

**Constructive Modeling** | **Knowledge Extraction** | **Knowledge Connection** | **Knowledge Representation** | **Knowledge Service**



Regional SDGs Assessment and Monitoring

**Localization of Indicators** | **Spatio-temporal data processing** | **Computing indicators with geographical angle** | **Indicator and evidence-based analysis**



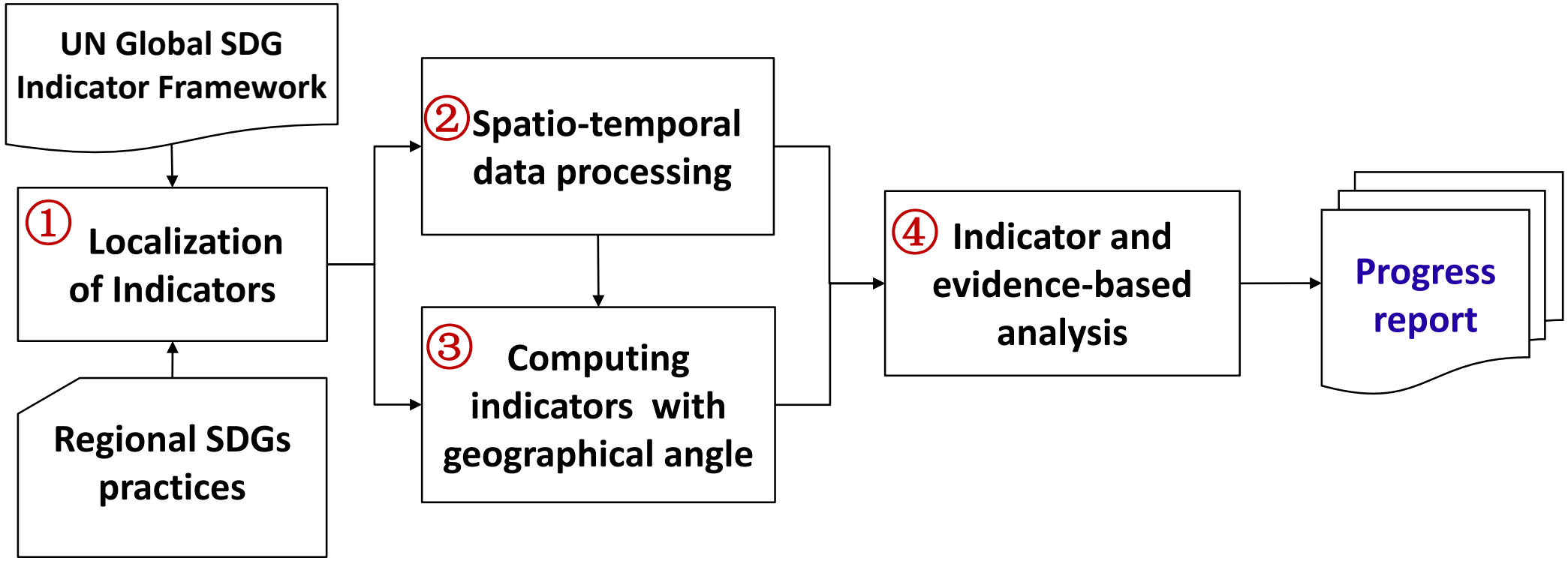

**Methodology**

**Progress**

# Contents

# 2.1 A data-driven and evidence-based approach

## This approach has four elements



# ① 102 SDGs Indictors Selected for Deqing

## ■ A set of 102 indicators was selected for Deqing County

### Criteria for Localization

- adaptability
- comprehensiveness
- measurability

- **A** Adopted **47**
- **E** Extended **6**
- **R** Revised **42**
- **S** Substituted **7**

**definition** → **calculation method** → **data requirements**

| SDG | UN | Deqing | |
|---|---|---|---|
| 1 | 14 | **5** | 1.1.1； 1.3.1； 1.4.1； 1.a.1； 1.b.1 |
| 2 | 13 | **7** | 2.1.2； 2.1.2； 2.2.1； 2.3.2； 2.4.1； 2.a.1； 2.c.1 |
| 3 | 27 | **15** | 3.1.1； 3.1.2； 3.2.1； 3.2.2； 3.3.1； 3.3.2； 3.3.3； 3.3.4； 3.4.1； 3.6.1； 3.7.1； 3.8.1； 3.b.1； 3.b.2； 3.c.1 |
| 4 | 11 | **8** | 4.1.1； 4.2.2； 4.3.1； 4.4.1； 4.5.1； 4.6.1； 4.a.1； 4.c.1 |
| 5 | 14 | **4** | 5.1.1； 5.5.1； 5.5.2； 5.c.1 |
| 6 | 11 | **7** | 6.1.1； 6.2.1； 6.3.1； 6.3.2； 6.4.1； 6.4.2； 6.6.1 |
| 7 | 6 | **3** | 7.1.1； 7.1.2； 7.3.1 |
| 8 | 17 | **6** | 8.1.1； 8.2.1； 8.5.2； 8.6.1； 8.9.1； 8.9.2 |
| 9 | 12 | **10** | 9.1.1； 9.1.2； 9.2.1； 9.2.2； 9.3.1； 9.4.1； 9.5.1； 9.5.2； 9.b.1； 9.c.1 |
| 10 | 11 | **2** | 10.1.1； 10.2.1 |
| 11 | 15 | **9** | 11.1.1； 11.2.1； 11.3.1； 11.4.1； 11.5.1； 11.5.2； 11.6.1； 11.6.2； 11.7.1； |
| 12 | 13 | **5** | 12.2.2； 12.4.2； 12.5.1； 12.6.1； 12.7.1 |
| 13 | 8 | **4** | 13.1.1； 13.1.3； 13.3.1； 13.3.2 |
| 15 | 14 | **7** | 15.1.1； 15.1.2； 15.2.1； 15.3.1； 15.4.1； 15.4.2； 15.a.1 |
| 16 | 23 | **6** | 16.1.1； 16.1.3； 16.3.2； 16.5.1； 16.6.1； 16.1.a |
| 17 | 25 | **5** | 17.1.1； 17.2.1； 17.3.1； 17.8.1； 17.11.1 |
| 总计 | 234 | 102 | |

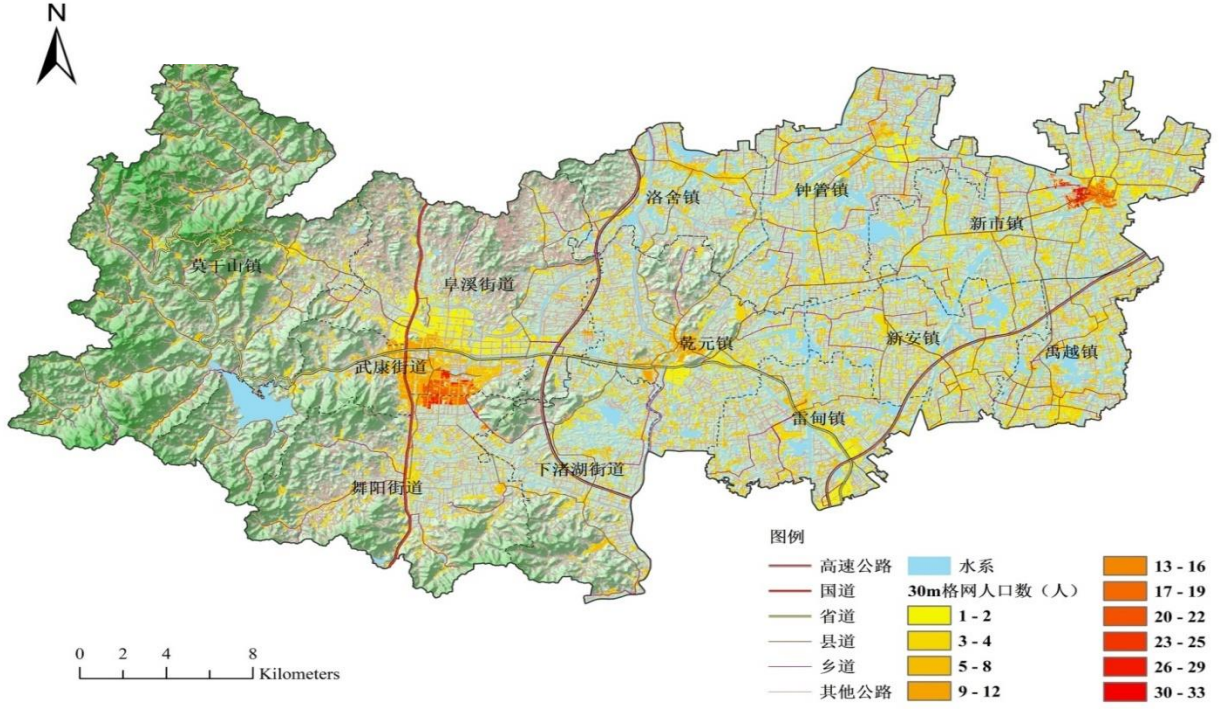
**All the 16 SDGs are covered that is essential for a comprehensive measurement**

# ② Spatio-temporal Data Handling

**45 geospatial datasets, 385 statistical datasets, 66 thematic datasets, and 27 other datasets were collected and processed.**

| 镇名 Town names | 人口 population |
|---|---|
| 武康街道 | 89944 |
| 阜溪街道 | 26008 |
| 下渚湖街道 | 23999 |
| 舞阳街道 | 52180 |
| 洛舍镇 | 20553 |
| 钟管镇 | 43856 |
| 莫干山镇 | 31643 |
| 乾元镇 | 49644 |
| 雷甸镇 | 37592 |
| 新安镇 | 31730 |
| 新市镇 | 72395 |
| 禹越镇 | 33297 |

30-m Population density with topographic information




Enabling integrated geospatial and statistical analysis

**Population were disaggregated at 30m spatial resolution using land cover/use data to facilitate integrated analysis of statistical and geographic data.**

# ③ Data-driven Indicator Measurement

## Three different ways to measure the 102 indicators

A **Direct calculation with statistical data** **85**

- using ratio (or proportion), rate of change, index or other calculations

B **Direct derivation from geospatial data** **10**

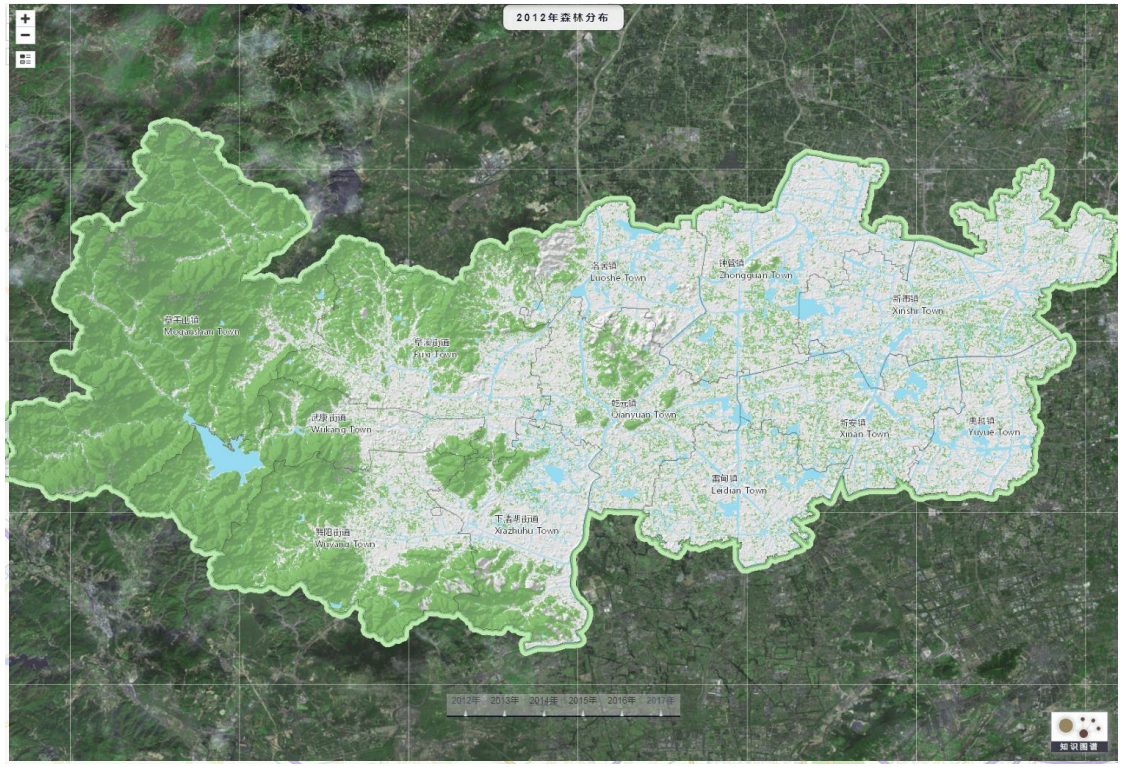
- using spatial density calculation, coverage classification and others

C **Integrated utilization of statistical and geospatial information** **7**

- based on quantitative measurement of spatial accessibility, coverage, spatial relations

# 17 Indicators Measured with Geospatial Data

| Indicator | Contents |
|---|---|
| 1.4.1 | population Proportion living in households with access to basic services |
| 2.4.1 | Proportion of agricult. area under productive/ sustainable agriculture |
| 3.8.1 | Coverage of essential health services |
| 6.3.2 | Proportion of bodies of water with good ambient water quality |
| 6.6.1 | Change in the extent of water-related ecosystems over time |
| 9.1.1 | Proportion of rural population living within 2 km of an all-season road |
| 11.2.1 | Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities |
| 11.3.1 | Ratio of land consumption rate to population growth rate |
| 11.7.1 | Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities |
| 15.1.1 | Forest area as a proportion of total land area |
| 15.1.2 | Proportion of important sites for terrestrial and freshwater biodiversity covered by protected areas, by ecosystem type |
| 15.2.1 | Proportion of forest change |
| 15.2.1 | Proportion of land that is degraded over total land area |
| 15.4.1 | protected area coverage of import. sites for mountain biodiversity |



# ④ Hierarchical Assessment

## A hierarchical assessment with three levels

- **Indicator Level:** **79/102** were Contracted and ranked

  - with SDGs Index and Dashboard, National Plan mandate requirements etc.

- **Single SDG level**: **16** were assessed

  - through grouped focused analysis with quantified indicators and evidences

- **SDGs cluster Level:** **3** , economy, society and environment

  - coherency analysis with degree of coordination, coefficient of variation

# 2.2 Deqing's SDGs Progress Report-2017


Approach briefing

Assessment of each Single SDG

SDGs Cluster analysis

Directory



Chinese version- around 70 pages

English version- around 80 pages

1) How to measure progress towards 2030 SDGs ?
2) How far is Deqing from 2030 SDGs ?
3) What are next steps ?

# Indicator and Single SDG Assessment - SDG 6 as an Example

**Grouping targets into sub-groups for focused analysis**

- Safe drinking water and sanitation ***6.1, 6.2***
- Water resource utilization ***6.3 6.4 6.5 6.a 6.b***
- Protection of water-related ecosystems ***6.6***

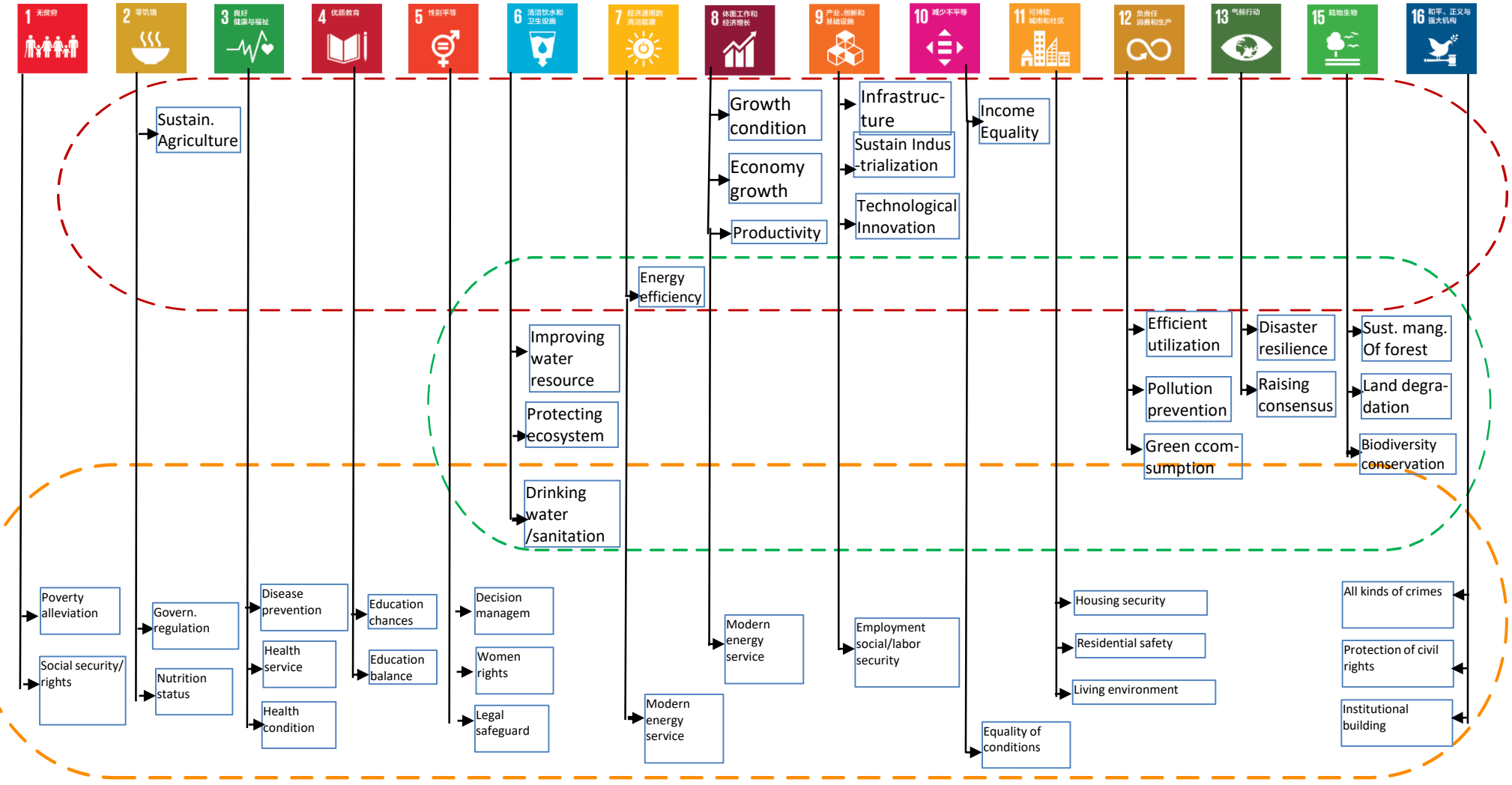
| Content | Indicators | Quantitative result | Evaluation reference | |
|---|---|---|---|---|
| Clean Water | **6.1.1** Proportion of population using safely managed drinking water services | Urban：100%<br>Rural：99.6% | Green≥98% | Ⅰ |
| | **6.2.1.a** Penetration rate of sanitary toilets in rural areas<br>**6.2.1.b** Service convenience of urban public toilets | 98%<br>From all parts of town, the nearest public toilet can be reached with in 16 minutes | Green≥95% | Ⅰ |
| Volume, quality and efficiency of water resources | **6.3.1** Proportion of wastewater safely treated | Urban domestic sewage: 91.06% | Municipal domestic sewage:92.4% | Ⅳ |
| | | Rural domestic sewage: 80.68%; | Coverage rate of the treatment of domestic wastewater (upper- middle-income countries) :59% | Ⅲ |
| | | trade effluent: N/A； | | |
| | **6.3.2** Proportion of bodies of water with good ambient water quality | 68.75%,100%** | 76.9% | Ⅳ |
| | **6.4.1** Change in water-use efficiency over time | The water consumption per 10,000 CNY of GDP in 2017 was 67.5m³, dropped 23.52% from 2015 | By 2020, the efficiency of water use will be 23% lower than at of 2015 | Ⅱ |
| | **6.4.2** Level of water stress: freshwater withdrawal as a proportion of available freshwater resources | 25.08% | Green≤25%<br>Yellow:25%<x≤75% | Ⅰ |
| Sustainability of water-related ecosystems | **6.6.1** Change in the extent of water-related ecosystems over time | 6.47%; High sustainable | 0-20%:High sustainable;<br>21-40%:Local sustainable but threatens global stability;<br>41-60%:Border-line sustainability. Corrective actions are strongly recommended;<br>61-100%Unsustainable. Urgent renewal is required. | Ⅲ |
| | **6.6.1.a** Rate of change in the spatial extent of water-related ecosystems | 11.14% | | |
| | **6.6.1.b** Rate of change in the water quantity characteristic of water-relate ecosystems | 8.26% | | |
| | **6.6.1.c** Rate of change in the water quality of water-relate ecosystems | 0% | | |
| | **6.6.1.d** Health state of the typical wetland ecosystems | Xiazhuhu wetland: well | | |

**Metrics Used for Comparing/ ranking**

- Ⅰ -- SDGs Dashboard
- Ⅱ -- National plan
- Ⅲ-- Multiple evaluation
- Ⅳ--- others

- 1st Quarter
- 2nd Quarter
- 3rd Quarter
- 4th Quarter
- No ranking

# SDGs Clusters Analysis




**Economy growth (5)**

- Growth condition
- Growth trend
- Growth development

**Natural Beauty (5)**

- resources utilizing
- environment protection
- response to global change

**Social harmony (12)**

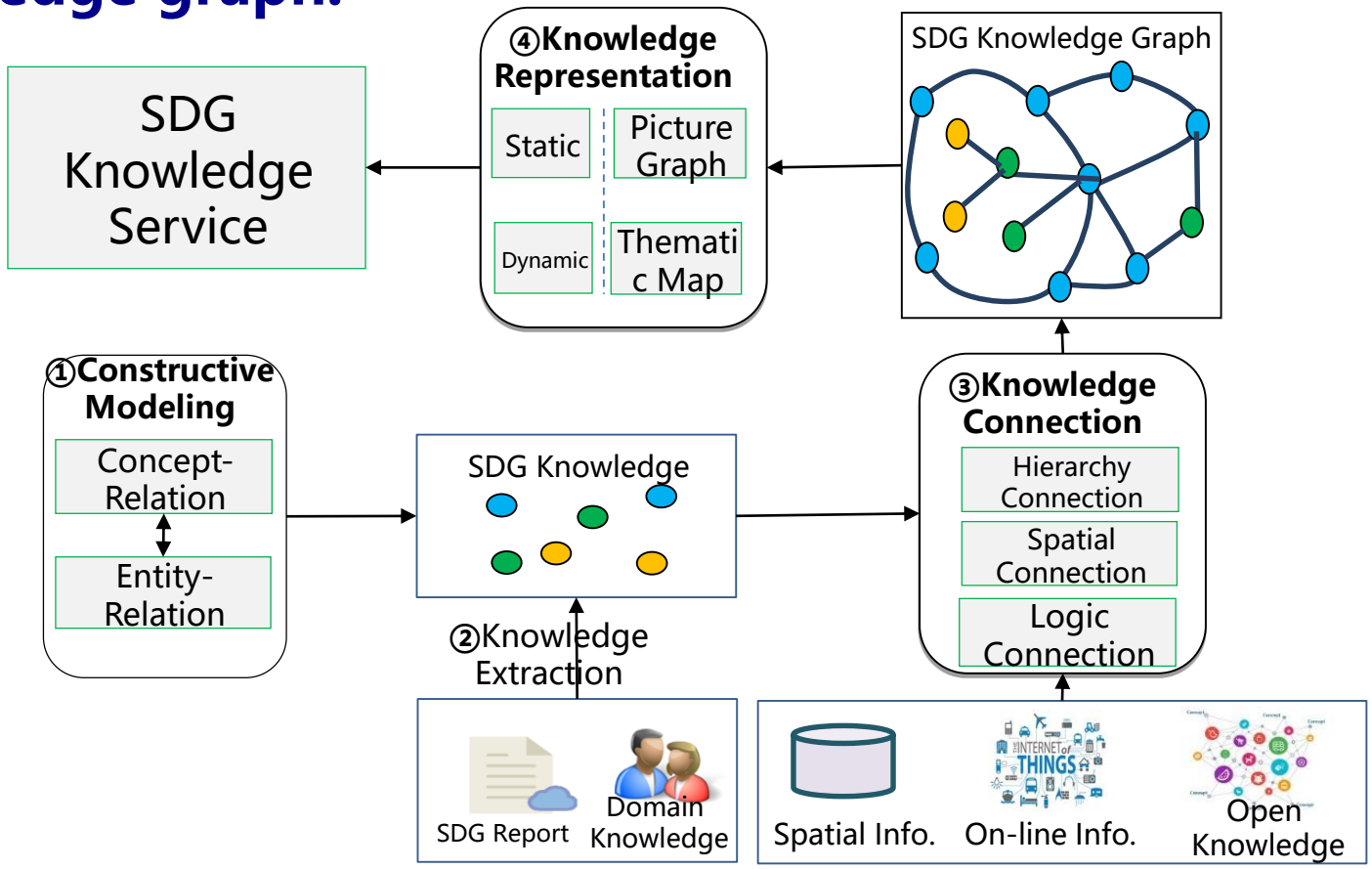
- survival needs
- security needs
- development needs

**Lower Coefficient of Variation means a better coordination**

# Contents

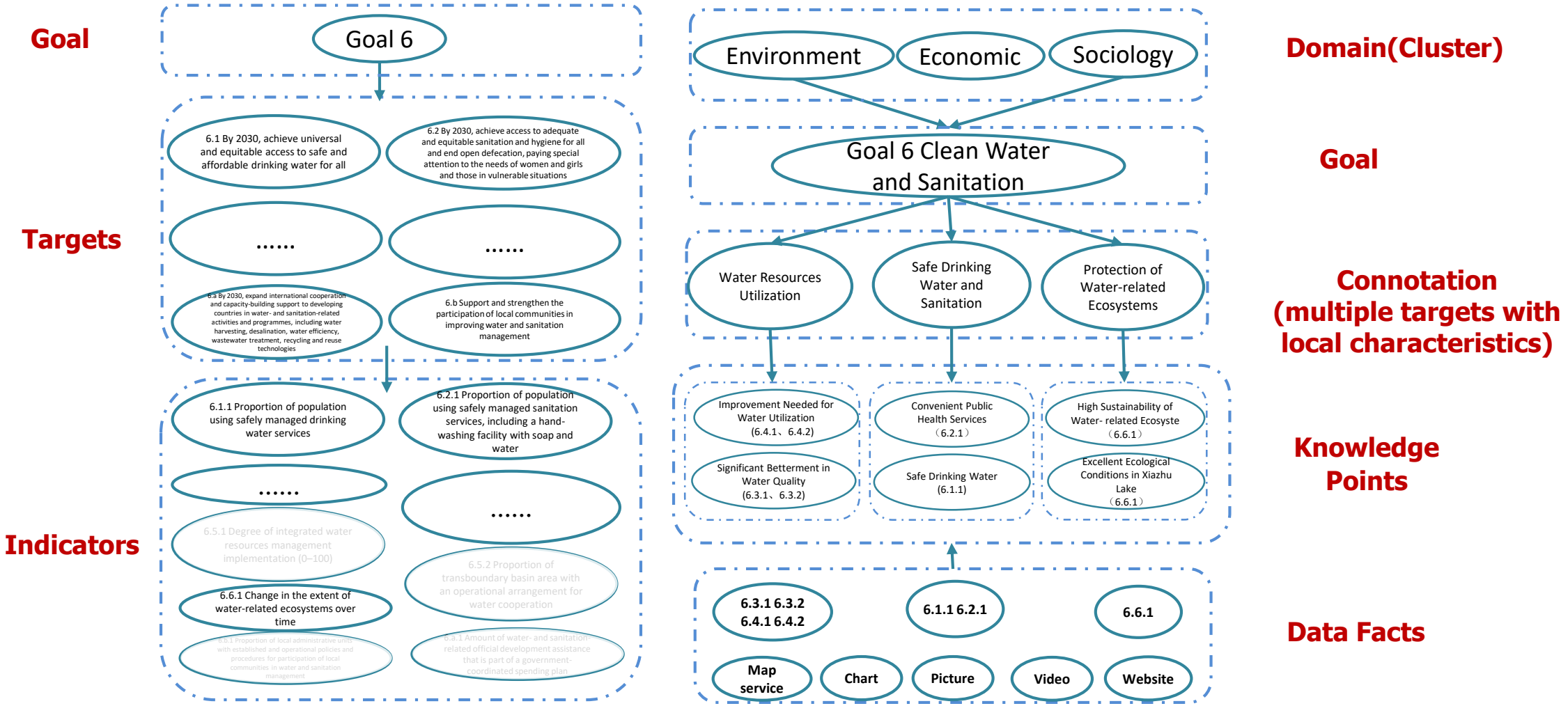
# SDG Knowledge Modeling and Service

**Based on the characters of SDG, the constructive model has been built , then extract knowledge from the report with the process of knowledge connection to form the knowledge graph.**



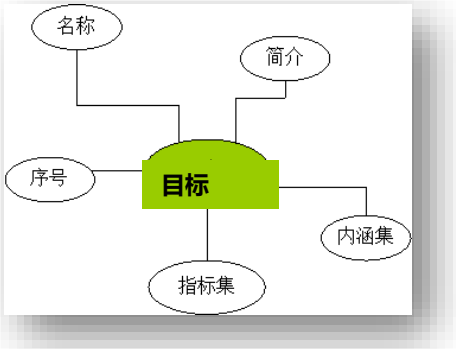
# Constructive Modeling

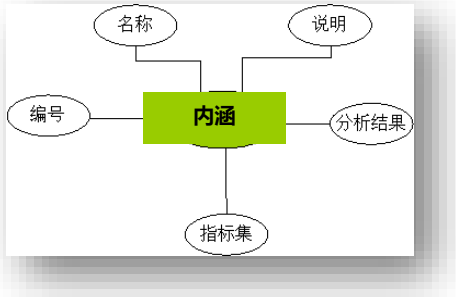
## Expand a five Hierarchical model from the concept of UN GIF

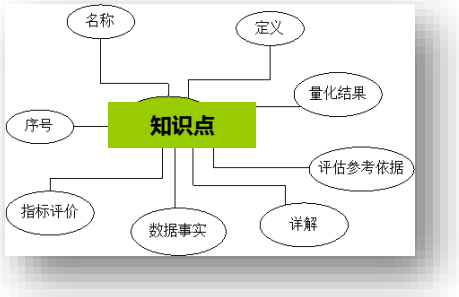


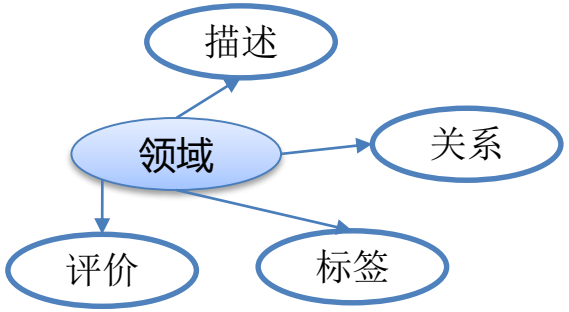
# Constructive Modeling

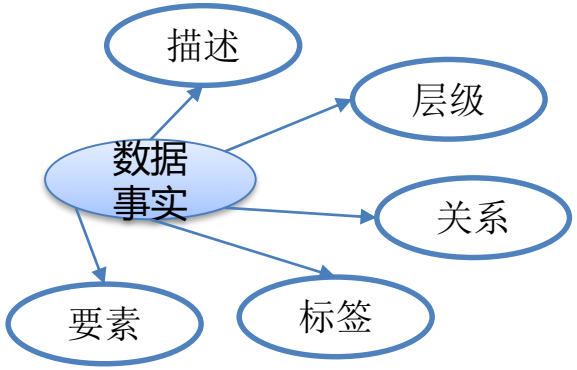
**Define the entity-relation for each level to describe each level**



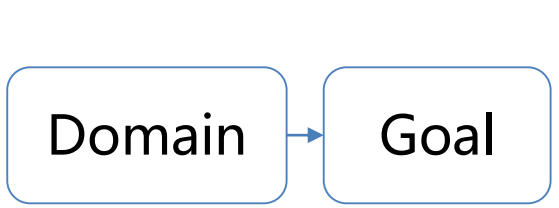



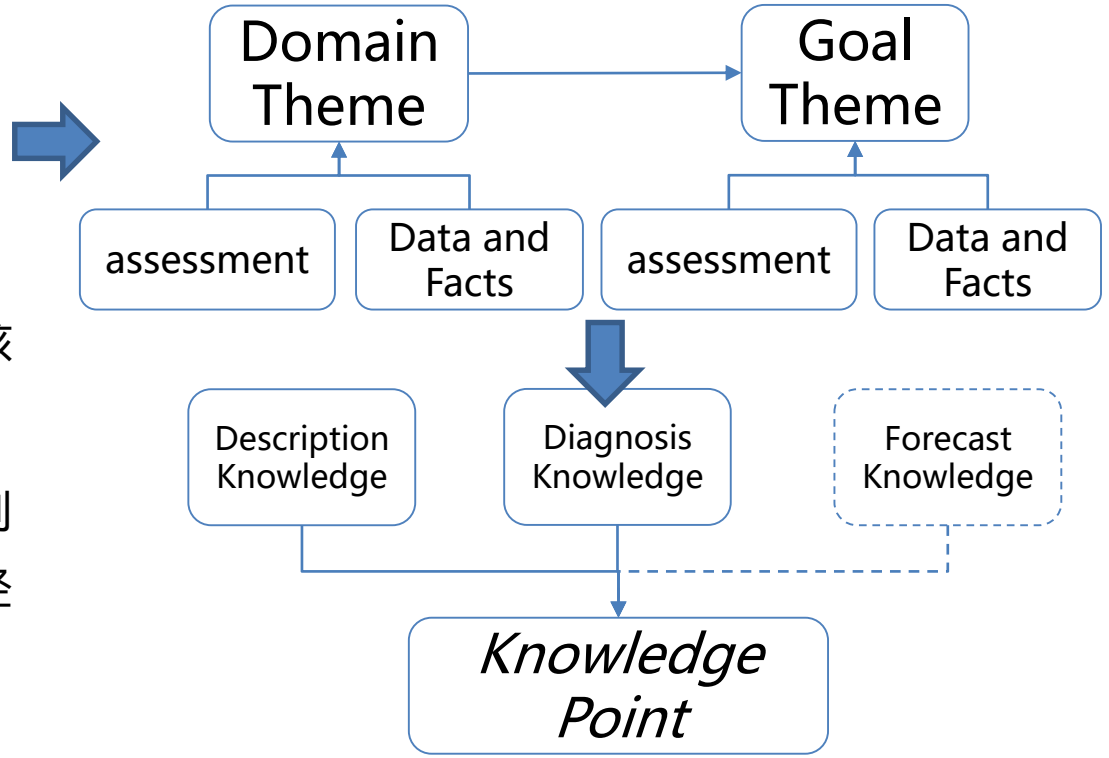



# Knowledge Extraction

**According to the domains and goals, integrate the quantitive assessment with facts to form the knowledge point**



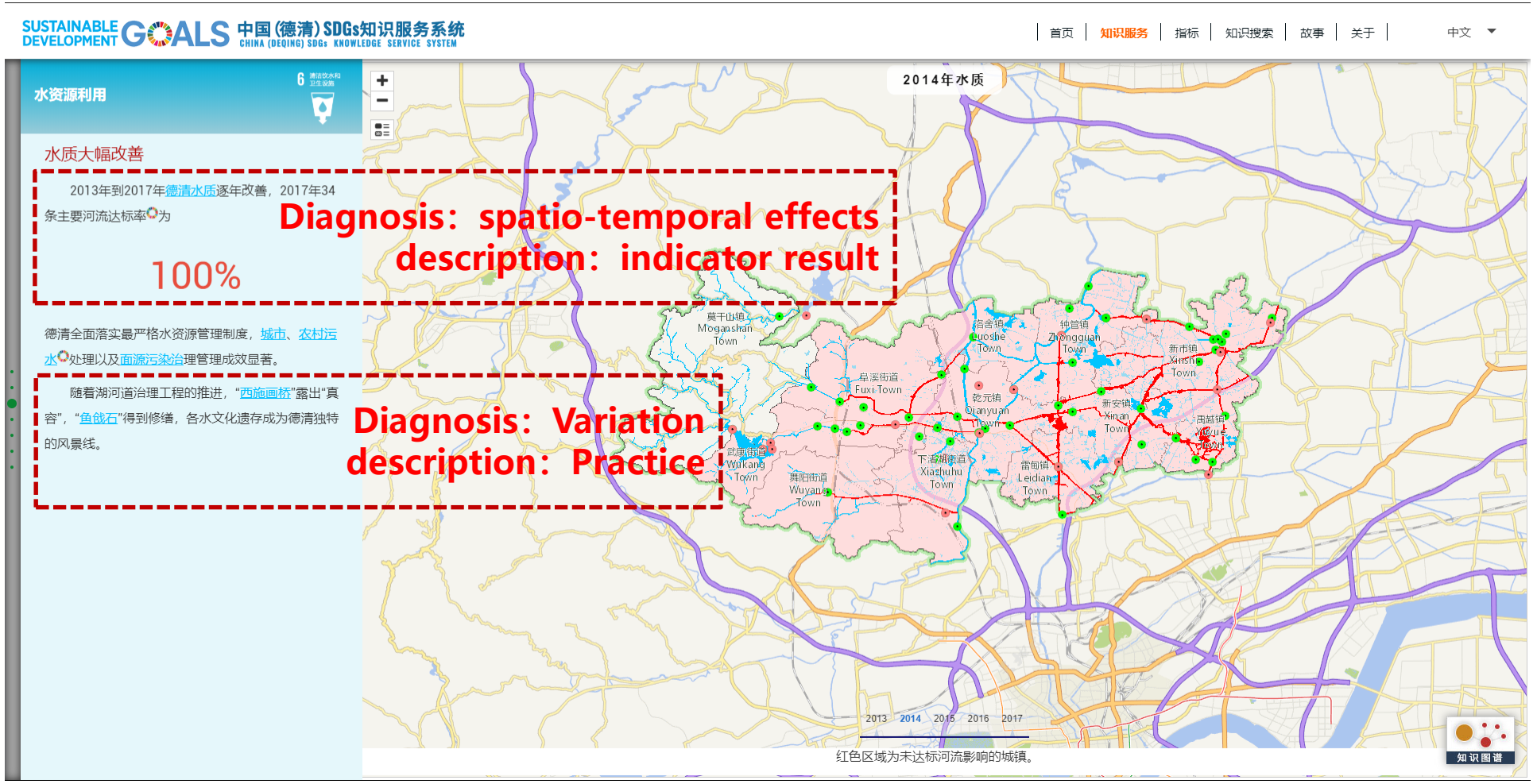

- 以领域、目标、内涵、指标为核心，抽取SDG核心知识内容
- 将核心知识内容与数据事实分别梳理成描述型、诊断型知识，经过组合，形成知识点

**Over 130 knowledge points have been extracted from the progress report ,covered all domains and goals.**

# Knowledge Extraction

**Description：assessment、practices，actions……**

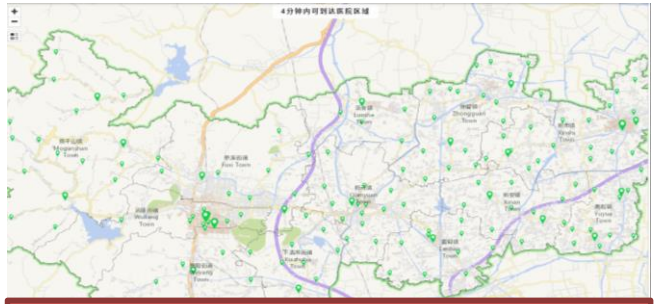
**Diagnosis：indicator judgment 、variation，spatio-temporal effects……**



# Knowledge Connection

**Using spatial connection to process the knowledge with spatial info.**

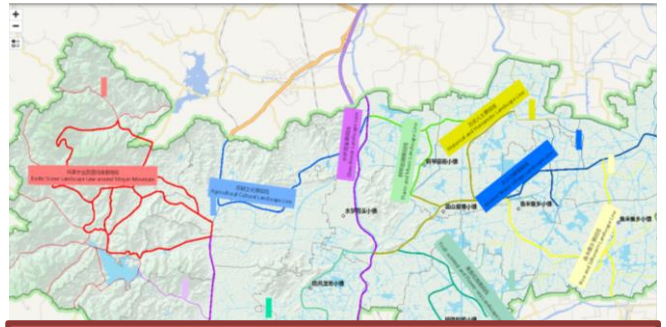
**All knowledge is logically connected with related info. elements such as pictures, videos…**



Hospital Distribution

Backbone channel

**Spatial connection includes geocoding, semantic transformation and spatial situation simulation.**



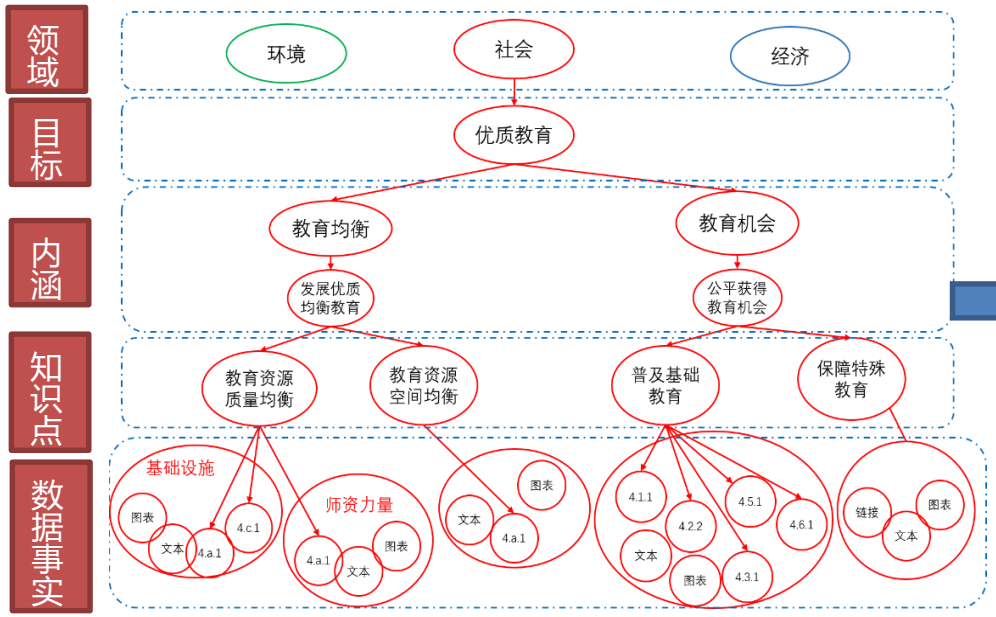
Afforestation landscape line

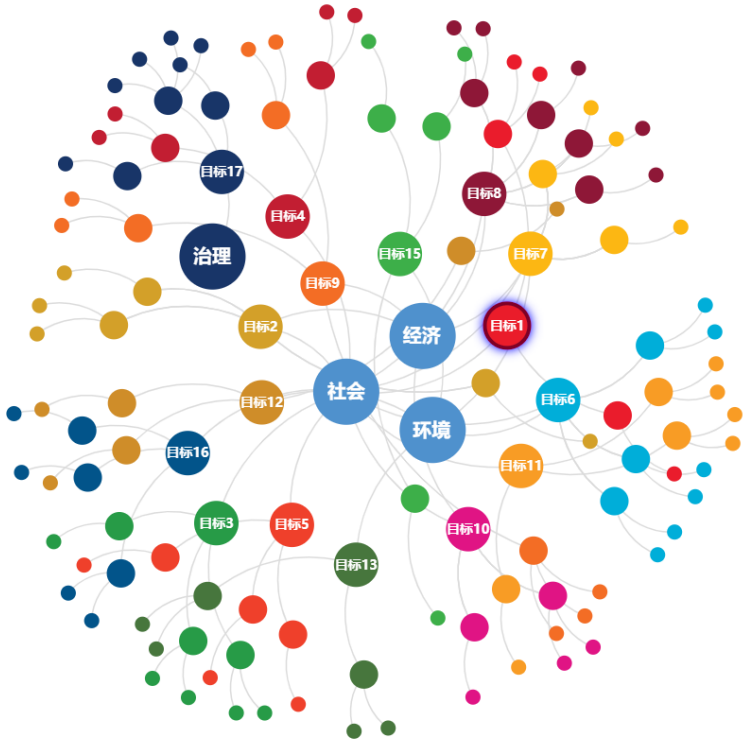
Situation relation

**Over 100 spatial related facts have been processed**

# Knowledge Connection

**According to the established SDGs hierarchical model, the knowledge nodes are connected hierarchically to form a knowledge network and construct a knowledge graph with hierarchy structure.**

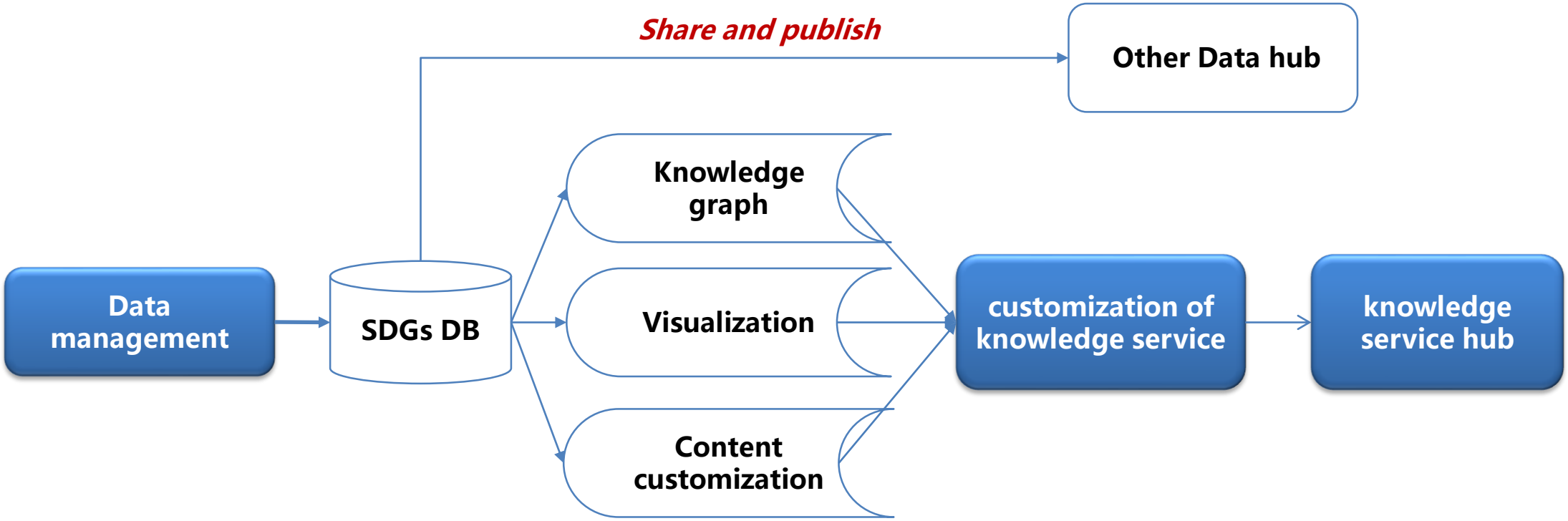



**5 Levels of knowledge network，3 field nodes, 16 target nodes, 44 connotation nodes, 68 knowledge points， over 700 data facts.**

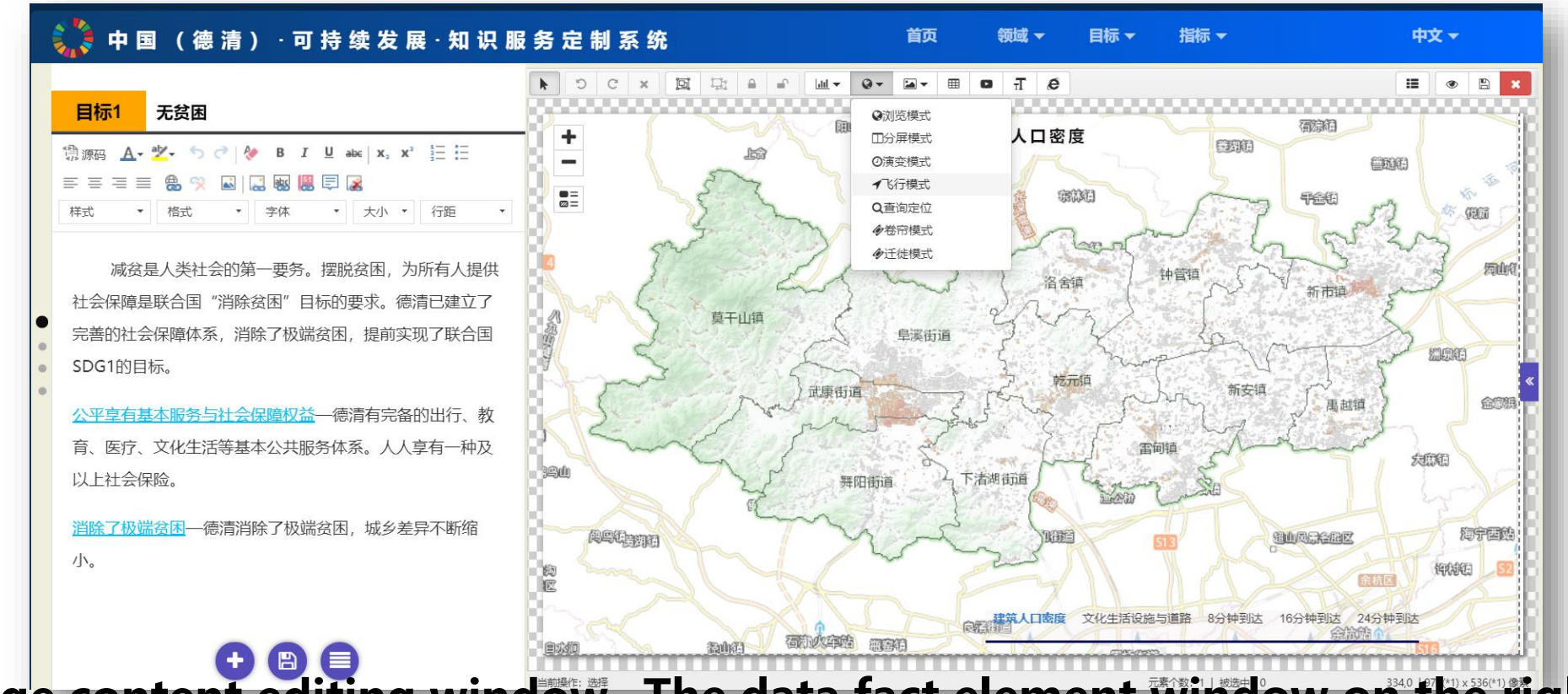
# Service System Development

**According to the idea of centralized management, customization and knowledge service, data and information resources are integrated and managed to realize customization of knowledge service and build knowledge service hub**



# Knowledge Service Customization Tool

**Using component model to customize knowledge service page, what you see is what you get.**

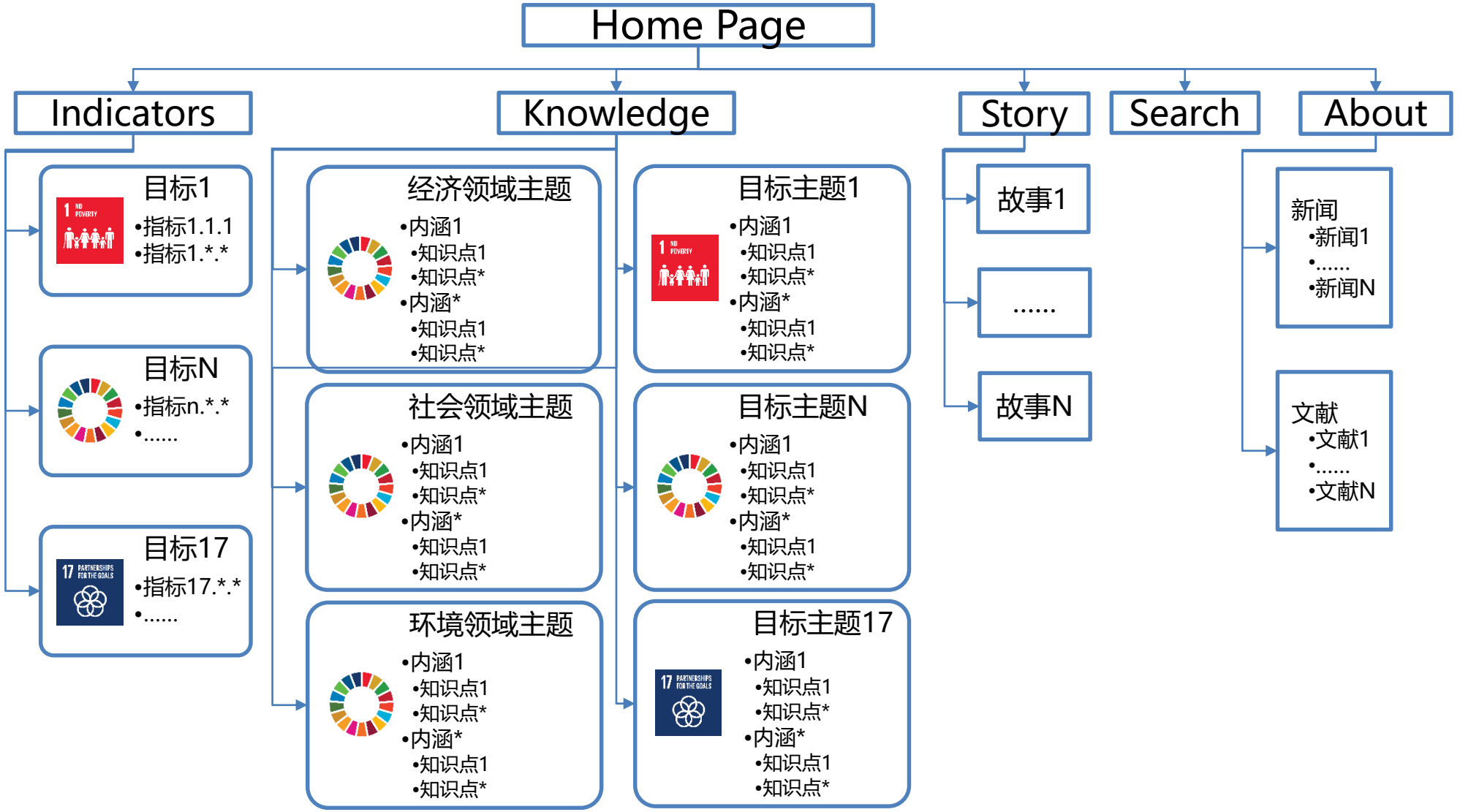



**The knowledge content editing window on the left provides rich styles and multiple interactive response modes.**

**The data fact element window on the right provides multiple data visualization functions such as chart, geographic information configuration, etc.**

# Website Map of the Hub

**All pages of the website are customized by the customization tool**

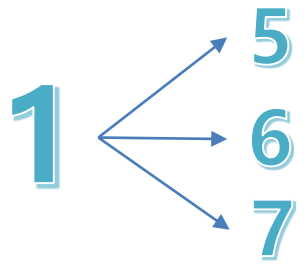


# Hub Function

## Seven Functional Modules




1. Menu
2. Language Switch
3. SDG Turntable
4. Domain Button
5. Introduction
6. Search Box
7. Story map Button




**Multi-entrance and interactive**

# Contents

# Summary

- This pilot project realize a practice to realize a comprehensive measurement of an entire administrative region' s progress towards SDGs by combing geospatial and statistical information.
- Four different methods were utilized to measure and analyze SDGs with geospatial information
  - geospatial disaggregation of statistical data
  - derivation of indicators with geospatial parameters (such as spatial density, accessibility, coverage and relations)
  - provision of spatial-temporal evidences
  - location-based visualization and knowledge representation

# Monitor-Knowledge-Decision-Implementation

Decision-Making oriented Application

Implementation

SDGs Knowledge Service

**Constructive Modeling**

**Knowledge Extraction**

**Knowledge Connection**

**Knowledge Representation**

**Knowledge Service**

Regional SDGs Assessment and Monitoring


**Localization of Indicators**

**Spatio-temporal data processing**

**Computing indicators with geographical angle**

**Indicator and evidence-based analysis**

Infrastructure

Data

Tools

Standards

**Partnership**