Improving the communication channels of the Chongqing 3D SDI in China

Progress Report

Chongqing Survey Institute

October 2017

Contents

1 Project introduction

1.1 Project name

Project name: Improving the communication channels of the Chongqing 3D SDI in China

1.2 Project source

GSDI SMALL GRANTS APPLICANTS 2017.

1.3 Project overview

As GSDI SMALL GRANTS APPLICANTS 2017, the project Improving the communication channels of the Chongqing 3D SDI in China is submitted for approval by Chongqing Survey Institute. Taking an active role in exploration, research and implementation of infrastructure, big data, and platform software in Smart City construction of Chongqing, Chongqing Survey Institute has developed geospatial information service platform and service center of Smart Nanan, spatial information service and cloud computing platform of Smart Chongqing, space-ground integration real-time map system, management concept of Intelligent Community, three-dimensional geographic information system (3D GIS) for urban drainage and waterlogging prevention, development and application of assistance system of 3D digital waterway, forming a professional software support system.

The program is oriented to enterprises, universities, the community public and other personnel. Activities included online publicity of science popularization, virtual reality modeling contest, offline technical presentation of experts and interactive experience of geographic information products, etc., providing conditions for the public to know about Smart City, cutting-edge technologies of Smart City, participate in construction of Smart City and help the development of Smart City in Chongqing.

2 Main works

With a combination of online and offline activities, the project aims to strengthen interaction of various groups, promote the public's understanding of high-technology, advocate a scientific lifestyle and innovative entrepreneurship. Specific activities are as follows:

2.1 Online activities

1) WeChat science popularization column

Science Popularization of Smart City Chongqing Column is published by WeChat, with Real Trip to Chongqing, Love Chongqing, Construction Progress of Smart City, Question and Answer, Smart Community and other sections in this column. In the form of online guides and information pushes of virtual city, relevant conditions for construction of Smart City will be popularized. Contents of the column would have rich interactive operations, easy-to-understand texts, and intuitive atlases.

2) SDI Development Contest

Prepare for data and open platform in the early stage and publish rules of the Virtual Reality Modeling Contest online. When registration starts, contestants can download a registration form and e-mail it to official mail account of the contest. After successful registration, contestants will receive an e-mail with team number. The organizing committee will provide necessary data resources and toolkit download link for contestants whose registrations are approved. The modeling themes can be indoor, outdoor and other virtual modelings of ancient architecture, modern architecture, natural landscape, etc. There are no restrictions on equipment, processing software and production methods. All materials can be used, such as text, pictures, videos, websites.

2.2 Offline activities

1) SDI Presentations

Relying on administrative functions of the Chongqing Planning Bureau, experts in the virtual reality of Smart City field were organized to carry out theme lectures about hot science and technology and issues surrounding citizens during the SDI Day. Lectures include Virtual Chongqing and Smart Life, Smart City Planning with Public Participation, Learn about Chongqing through

Pictures, Rename Mapping Tools, etc. At the final stage of each theme lecture, there will be an interactive session with cultural gifts about Smart City construction.

2) SDI Exhibitions

Taking the Chongqing Surveying and Mapping Cultural Park as a main venue, around the theme Improving the communication channels of the Chongqing 3D SDI in China, we will carry out science popularization activities with high interaction and public participation. Thematic exhibition boards, cultural map products, drone systems, streetscape scanners, and urban internet of things monitoring equipment are used on site to highlight the theme of combination of science, art and culture. Conduct exchanges and interactions among government, corporate managers, enterprise technicians, researchers and students in universities, and demonstrate creation achievements of Smart City construction.

Taking Chongqing Survey Institute as the venue for project activities, participants are guided to conduct field trips of results of Smart City virtual reality construction and to experience corporate innovation culture and atmosphere. Applications of Smart Chongqing are exhibited in 3D demonstration hall, including 3D digital city virtual scenes, space-ground integration real-time map system, smart community platform, etc. At the same time, various types of booths are set up on site to provide participants with interactive experience by VR glasses, VR helmets, and naked-eye stereoscopic equipment.

3) Awards of 3D SDI Development Contest

Referring to results of the online Virtual Reality Modeling Contest in the early stage and scores of modeling exhibition, contestants will be awarded bonuses and commemorative prizes.

3 Progress situation

After declaration work of the project was carried out, staff of Chongqing Survey Institute immediately conducted relevant research activities on contents of declaration and visited relevant units, enterprises and universities inside and outside Chongqing to grasp the current development status and the understanding of the various levels of people in 3D SDI field in China.

3.1 Preliminary preparations

After approval of the project, Chongqing Survey Institute immediately organized a project team led by vice president in charge of science and technology, including team members of

multi-professional technicians, marketing personnel, logistic support personnel, etc. According to work contents in project charter, preparations for preliminary planning of the project, preparations and launch of the WeChat science popularization platform, technical presentation of experts, exhibition of high-tech products for spatial information, and organization and evaluation of virtual reality modeling contests were carried out.

3.1.1 3D SDI and popularity survey of 3D SDI and Smart City

1) Survey of peer units in other cities

The team members went to Kunming to participate in the Area Seminar of National New Smart City Evaluation Work and carry out relevant research on Smart City. After that, they went to Beijing to participate in the High-end Forum for Surveying and Mapping Geographic Information and carry out research. More than 300 engineering technicians and scientific researchers from related companies, colleges and research institutes in surveying and mapping geographic information field attended the conference. In order to further master new technologies of Smart City, Chongqing Survey Institute invited South Digital Technology Corporation for exchanges. The in-depth exchanges and discussions were carried out on construction of Smart City, dynamic updating, management and application of basic geographic information data and information-based intelligent surveying and mapping.

2) Survey of relative units in Chongqing

Relevant personnel of Chongqing Survey Institute attended the 2017 Chongqing Industrial Internet Summit and the Second General Meeting of the Chongqing Cloud Computing and Big Data Industry Association to learn more about application status of technologies such as cloud computing and big data in Chongqing. In addition, Chongqing Survey Institute invited the director Jiang Yi from College of Computer Science of the Chongqing University of Posts and Telecommunications to have exchanges. Relevant experts from the Chongqing University of Posts and Telecommunications introduced basic conditions of the College of Computer Science, research progress and construction achievements in mobile internet sensor network and big data processing and mining, etc. Makerspace, intelligent perception of city, safety monitoring of urban underground pipeline, construction of big data cloud platform were discussed.

3) Conclusion about surveys

Comprehensive Internet infrastructure, 3D SDI technology and service system, as well as government policies promoted professional research and industrial development of the Internet and big data fields, which laid the foundation for construction of Smart Chongqing. However, construction of Smart City with support of 3D SDI also faced some problems. Information asymmetry and unbalance resource acquisition of different regions, people, urban and rural areas caused blocked channels of information exchange and sharing, obstructed integration and sharing of information technology and different cognition of 3D SDI among various personnel.

3.1.2 Planning and publicity of science popularization

To ensure publicity effects, contents and forms of publicity were novel and attractive. The project team discussed publicity plan. Based on highlights and practical plans put forward by team members, plannings and arrangements were made on contents and forms of publicity and organization of personnel.

Publicity forms were online and offline activities. Online activities utilized new media plus Internet technology to enable the public to access and understand construction of Smart City anytime and anywhere, including the push of WeChat public platforms, data online services, etc. Offline activities adopted live presentations, demonstrations, and interactions to allow the public to see, listen, and experience stereoscopic perceptions, including expert technical presentations and exhibitions of spatial information products (interactive experience and smart tourism).

3.1.3 Planning of SDI Development Contest

To ensure the effective implementation of the SDI Development Contest, the project team set up a modeling competition group and formulated a detailed activity plan after discussion, including contest rules, outcome evaluation indicators, and contest organization and arrangements.

Contest contents: The modeling themes can be indoor, outdoor and other virtual modelings of ancient architecture, modern architecture, natural landscape, etc. There are no restrictions on equipment, processing software and production methods. All materials can be used, such as text, pictures, videos, websites.

Contestants: all the Chongqing citizens

Awards: 1 first prize, 3 second prizes and 6 third prizes. The winning teams or individuals will

receive corresponding bonus (RMB).

3.2 Launch of WeChat science popularization platform

3.2.1 Application for WeChat official account

After being approved by Chongqing Survey Institute, the online publicity team applied for a WeChat official account according to online application process of the WeChat service account. Information of official account is as follows:

Name: Geo-King 3D digital city platform

Type: service account

Application unit: Chongqing Survey Institute

Main contents: 3D SDI science popularization information, Smart City service, Geo-King 3D digital city platform service.

3.2.2 Construction of WeChat official account

According to main push contents of WeChat official platform, Geo-King 3D digital city platform official account was divided into several sections, including Smart City, Smart Community, My Community and others.

3.3 Technical presentations of experts

3.3.1 Technical presentations in other cities

1) Participate in exchange meeting in Guizhou

On August 4, experts of the project team went to Guizhou Province to conduct a seminar. Based on research and practice of indoor and outdoor spatial information modeling, BIM technology, and spatial information integration in recent years, experts gave detailed reports on research background of indoor and outdoor spatial information fusion and application in the big data era, indoor and outdoor three-dimensional spatial information collection, indoor and outdoor spatial information fusion, indoor and outdoor integration applications and prospects.

2) Participate in exchange meeting in Yinchuan

On August 17, experts of the project team went to Yinchuan, Ningxia Province to report and discuss the exploration and practice of surveying and mapping technology in the spatio-temporal big data age. Starting with how to survey a city, the report was delivered around surveying and mapping industry and spatio-temporal big data, surveying and mapping techniques exploration, smart application and practice in new situation.

3.3.2 Technical presentations in Chongqing

Construction achievements presentations and technical exchanges have been carried out in terms of government departments, enterprises and public institutions. Relevant science popularization lectures on Smart City and Intelligent Community have been conducted for universities, communities and so on.

1) To communicate with related organizations of government departments

Transportation Commission of Jiangbei District, Chongqing Municipality, has been invited to Chongqing Survey Institute to communicate with us. In the 3D studio, technicians have made a presentation on three-dimensional aided design of cities, three-dimensional aided design of municipal road engineering, three-dimensional aided geological survey and smart monitoring cloud platform of urban infrastructure.

2) To communicate with enterprises and public institutions

We have invited Planning and Design Institute of Wanzhou District to conduct an in-depth discussion on methods of aided planning, management and verification, underground pipeline survey technology, three-dimensional high-tech research and development, and monitoring cloud platform, which promotes the communication and cooperation in technology.

3) To conduct lectures in communities

On September 21, the launching ceremony for the construction of the intelligent community on Shiyou Road was held at the sub-district office. In terms of work foundation, construction experience, three-dimensional technology and big data application, Chen Hanxin, the leader of Chongqing Survey Institute, was invited to make a presentation on the service capabilities and available support resources of our institute, and stated that it would cooperated with intelligent communities construction on Shiyou Road to promote social smart management to a new level.

4) To conduct lectures in universities

On August 29, technicians went to Chongqing University to communicate with teachers and students. Their communications included the review and reflection on Smart City, current situation and development scheme of intelligent communities program and so on. In terms of what the ideal smart cities are, our understanding of smart cities and seven application systems of Smart Chongqing, they had detailed communications from the general framework of typical smart cities to smart cities needing smart people.

3.4 Spatial information products exhibition

3.4.1 Science popularization activities with special theme

The publicity day of National Surveying and Mapping Law is on August 29. This year is the first year that *Surveying and Mapping Law of the People's Republic of China* has been carried out. With this opportunity, exhibition activities of the 2017 publicity day of surveying and mapping law have been held on Guanyinqiao Square. There were four exhibition areas, including display panel exhibition area, equipment capability of surveying and mapping exhibition area, experience area of surveying and mapping frontier, and service area of legal consultation. The subjects embrace three-dimensional digital city, fantastic exhibition of future life, low-altitude unmanned aerial vehicle (UAV) aerial photography and so on.

1) Three-dimensional digital city

Three-dimensional digital city comics exhibition and its demonstration equipment have been set up in the exhibition area. With the form of cartoon and dialogue, the comics exhibition presented the function of three-dimensional digital platform. The technicians offered on-site demonstrations and guided the public to personally operate it.

2) Fantastic exhibition of future life

With the platform of space-ground integration real-time system, fantastic exhibition of future life used the real-time map of sky, ground, indoor and outdoor as the carrier to display three-dimensional geographic information and social economic information from different perspectives. A fantastic and vivid world has been presented to the audience by three-dimensional advanced multimedia technology.

3) Low-altitude unmanned aerial vehicle (UAV) aerial photography

Technicians have set up UAVs in the original unit base of No. 231, electrical measure village, have conducted demonstrations of on-site operation of UAVs, and have presented achievements of flight image. In terms of surveying and mapping, planning, emergency monitoring and ecological protection of low-altitude UAV aerial photography, technicians have introduced them in detail.

3.4.2 Interactive experience of Smart City

The science popularization program have carried out demonstrations and interactive experience in the 3D demonstration hall, providing VR experience for the public with wearable device, leading the public to visit the smart city experience center of Nan'an District.

1) The 3D demonstration hall

As a multifunctional demonstration hall of our institute, the 3D demonstration hall is equipped with circular-screen projection system, which providing the audio and visual environment of immersive virtual simulation. The demonstration hall has deployed Geo-King 3D digital city platform, Love Chongqing, public service platform of Chongqing's geographic information, space-ground integration real-time map system, spatial information service cloud platform of Smart City and so on, which have provided conditions for the interactive experience. Here we have made demonstrations and interactive experience for government officials, staff from enterprises and public institutions, experts and scholars, students from universities and the public who came to our institute for exchanging, researching and visiting.

2) VR interactive experience

VR technology has been used in the three-dimensional digital city and space-ground integration real-time system. With the VR equipment, the public could see the roads, communities, parks, shopping malls and so on of Chongqing Proper as well as they could visit parks, go shopping and enjoy the night scene as if they themselves were on the street, which has attracted many people.

3) To visit smart city experience centers

The smart city experience center is located in Jiangnan New Town of Nan'an District, where the smart city's perception of future life can be understood. Our institute is responsible for the design and construction of entity sand tables, three-dimensional digital sand tables and LED touch technology. Participants have been invited to visit the smart city experience center in Nan'an

District after the end of signing up of the Smart City Virtual Modeling Contest.

3.5 SDI Development Contest

After the completion of the competition planning, the organizers of the competition modeling group formulated detailed rules for the contest, issued notices of the contest, opened the registration channel, conducted relevant training for the participants and organized the achievements after the deadline for the submission of works.

The notice of holding SDI Development Contest was issued on July 11, which was sent to relevant universities to push it by WeChat public platform.

On August 2, the list of participants was collected. There were 37 groups composed of 56 participants who are undergraduates and postgraduates from different universities, and modeling enthusiasts from different units.

On August 8, participants were invited to our institute to be trained in standardized modeling. Technicians made a presentation on texture modeling, model naming and detail processing in the modeling as well as explained and demonstrated the open data and platform interface. Participants were led to visit the unit base and office environment after the training.

On September 17, participants were contacted by email and telephone to be informed that modeling results should be submitted in time. All of the submitted modeling results were sort out.

A total of 35 modeling works have been received as of the deadline for the submission of modeling results. With various production methods and exquisite appearance, the subjects of these modeling works are rich and colorful, embracing ancient and modern building modeling, road and bridge modeling, Buddha and other sculptures modeling, character modeling, live-action modeling and so on.

4 Completion situation of the project

The project has carried out a total of 15 activities, embracing three activities on science popularization with special theme (which are the publicity of National Surveying and Mapping Law on August 29, fantastic exhibition of future life and low-altitude unmanned aerial vehicle (UAV) aerial photography), three activities on interactive experience (which are virtual reality experience in the 3D demonstration hall of Chongqing Surveying and Mapping Institute, three-dimensional digital cities and VR interactive experience of space-ground integration real-time system, and visit experience of the smart city experience center in Nan'an District), eight times of expert technical exchanges and lectures (including exchanges out of Chongqing two times, communicating with government, enterprises and public institutions in Chongqing three times, lectures in universities one time and in communities two times). What's more, SDI Development Contest has been held. A total of 56 people have participated in the Contest with 35 modeling works. There were more than 1000 people who were from governments, enterprises, public institutions, communities, universities and so on, benefiting from the activity.