
**Report of pilot testing on the
application of ISO smart community
infrastructures standards**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*, Subcommittee SC 1, *Smart community infrastructures*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

ISO/TC 268/SC 1 identifies the best pilot cities on a global scale by continuously selecting cities to standardize SC 1 in subsequent smart city infrastructure. It provides guiding suggestions for the development of smart cities, provides reference and helps for the construction of international smart cities, reversely puts the results formed by standards into practice in cities and ensures that the development of smart cities reaches the level of performance they deserve.

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Report of pilot testing on the application of ISO smart community infrastructures standards

1 Scope

This document provides information on the results of pilot city testing of several ISO smart community infrastructures standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

data exchange

accessing, transferring and archiving of data

[SOURCE: ISO 37156:2020, 3.3.5]

3.2

data sharing

providing shared, exchangeable and extensible data to enable community infrastructure

[SOURCE: ISO 37156:2020, 3.3.6]

3.3

smart community infrastructure

community infrastructure with enhanced technological performance that is designed, operated and maintained to contribute to sustainable development and resilience of the community

[SOURCE: ISO 37100:2016, 3.6.2, modified — Notes to entry removed.]

4 General

4.1 Overview

4.1.1 How to succeed in testing smart community international standards in cities

Smart community international standards, which are combined with the current situation and development goals of local smart community construction, can promote the establishment of local characteristics of a smart community performance evaluation system (EVA), and guide and supervise the local smart community construction results. The correctness, completeness and implementation of the contents of international standards can be verified through specific projects in the construction content and construction practice. At the same time, the standards can get pilot testing feedback

according to the actual usage in the project construction. Also, the content of the international standards can be modified and improved to evaluate the achievements of smart community construction.

4.1.2 Recommendations for international standard pilot testing work

ISO/TC 268/SC 1 can promote the formulation of test targets and work programs, select proper pilot cities, implement pilot implementation programs and accept pilot test results, which greatly promotes the construction of smart cities and international standards.

4.2 Implementation

4.2.1 Global implementation

According to smart city standards and status analysis, different standards are selected to carry out pilot test work. The targets of the whole world are:

- Promote the practicality of international standards. Pilot testing work can verify the feasibility of smart community international standards, accelerate the implementation of standard results, further optimize and improve international standards, make international standards more mature and applicable.
- Improve the level of international standardization. Different countries and cities have different needs for the development of smart cities. The global pilot cities are testing under the same framework, which is conducive to improving the standardization of cities and the overall standardization of the international community.
- Promote the sustainable development of cities. Pilot testing work is helpful to establish a smart community performance evaluation system suitable for local characteristics, scientifically guide and supervise the effectiveness of smart community construction, improve the level of smart city and achieve sustainable development of cities and communities.

In addition, through the standards pilot and testing work, it can provide mature working ideas and methods for other international standard testing work.

Different cities can learn from each other. They can construct and improve the smart community design, city planning and maturity models in accordance with international standards. The pilot test results are promoted to the international standardization system to enhance the visibility of the community and attract the attention of the industry. Cities can also find shortcomings and further clarify the key points of smart community construction.

Until now, Chengdu and Nanhai in China have taken the lead in the pilot test work. Hefei, Kawasaki and Cambridge are going to start standard pilot testing work.

Hefei has a total area of 11 400 km² and a total resident population of 7 790 000. The urban built-up area of Hefei is 416 km² and the built-up area resident population is about 4,09 million. This city has selected ISO/TS 37151, ISO 37154 and ISO 37156 for pilot testing.

Kawasaki City was selected as a pilot city in Japan. Kawasaki is a sustainable growing city, it has multiple functions such as a heavy industrial area, a business area and a commuter town for Tokyo. Kawasaki selected ISO 37153 for pilot testing.

Cambridge was selected as a pilot city in the UK. Cambridge is the capital of Cambridgeshire in England. Cambridge's pilot and testing of smart community international standards has provided an important foundation for the future construction of a friendly city between Cambridge and Hefei.

4.2.2 Implementation in China

4.2.2.1 Chengdu

Chengdu is the provincial capital of Sichuan Province, China, and a sub-provincial city. It covers an area of 14 300 km² and has a resident population of nearly 16 million. Chengdu selected ISO/TS 37151, ISO 37153, ISO 37155-1 and ISO 37156 for pilot testing. Through the pilot test, several documents were formed. Since September 2017, the municipal government of Chengdu has investigated 20 departments. The research department has little information about energy and waste and has not collected corresponding data. In the three aspects of transportation, water and ICT, Chengdu seldom has the corresponding mature index system standards and norms, but the construction of a performance evaluation system has a certain basis. Chengdu already has the corresponding recognition and attention to the construction of the index system, but the construction of the index system only stays at the stage of a single and individual business, and there is no overall or global platform for the construction of the index system.

Based on the theory of the life cycle, there are four problems in the management of smart community infrastructure projects in Chengdu. First, there is no standard reference process or process documents for smart community infrastructure projects; second, the logic of the project process is not clear; third, the risk-prevention awareness of the project process is weak; fourth, the particularity of smart community projects is not fully considered.

The municipal government of Chengdu has a large number of urban basic data resources, but the management is decentralized and the system is not perfect; the data is incomplete, irregular, incorrect and inconsistent and has other quality problems. Furthermore, there is no unified data exchange management platform. Therefore, all departments in the city need to speed up the decentralized management of data resources and insufficient data sharing.

4.2.2.2 Nanhai

Nanhai district, Foshan, is located in the central part of Guangdong province, the hinterland of the Pearl river delta, adjacent to Guangzhou, adjacent to Hong Kong and Macao. The whole area covers an area of 107 382 km². Nanhai district, combined with the actual situation, selects ISO/TS 37151 and ISO 37156.

Through field investigations of smart cities in Nanhai district and face-to-face communication with the municipal government of Nanhai, we found that the research department in Nanhai has little information about energy and waste. It is very difficult to collect the corresponding data and there are very few mature indicators system standards or specifications. The construction of a performance evaluation index system in transportation, waste and ICT has a certain foundation, but there is no overall platform.

Moreover, we found that most of the databases of the municipal government of Nanhai cannot be shared or can only be shared in a very limited range. They are expensive and inefficient to use and poorly shared. In addition, at present, information sharing among the municipal government of Nanhai is mostly point-to-point mode and there is no unified data exchange management platform.

4.2.2.3 Hefei (high-tech zone)

Hefei has total area of 11 400 km² and a total resident population of 7 790 000. The urban built-up area of Hefei is 416 km² and the built-up area resident population is about 4,09 million. Hefei selects ISO/TS 37151, ISO 37154 and ISO 37156.

The municipal government of Hefei established the working group of pilot testing for international standards. From the city administrators, environment sector and citizens surveyed, it is learned that city administrators stress the size, operating efficiency and investment benefits of smart community infrastructures, especially the operating efficiency. The environment sector of Hefei values the effective utilization of smart community infrastructures and the improvement of energy use efficiency. By contrast, the citizens highlight the regional coverage and the accessibility of smart community infrastructures.

The municipal government of Hefei builds a data exchange and sharing platform for carrying out data acquisition, data storage, data cleaning, data mining, data visualization and analysis. It also promotes the big data technology exchange and transformation, the formation of several in the country with independent intellectual property rights of large data products representative.

NOTE [Annex A](#) includes details of Chengdu pilot testing work; [Annex B](#) includes details of Nanhai pilot testing work; [Annex C](#) includes details of Hefei pilot testing work; [Annex D](#) includes details of Kawasaki pilot testing work.

4.3 Methods

The pilot project of smart city international standards includes field visiting, research and analysis, global pilot selection, pilot implementation, pilot summary.

- Research and analysis. From the perspective of smart city technology development, the needs of smart city standard construction, the current situation of smart city infrastructure standards construction and the city's current needs, ISO standards are selected as testing standards.
- Global pilot selection. The selection includes the following aspects:
 - a) Application stage: the city will document an application form in accordance with the requirements.
 - b) Preliminary examination stage: the application materials are verified and experts organized to select qualified declaration cities in batches.
 - c) Verification stage: the city will start to enter the implementation plan development stage through the primary city. An ISO international expert group is formed using expert remote guidance and pilot site inspection to communicate with the city one-on-one and give expert opinion documents.
 - d) Selection and announcement stage: a comprehensive evaluation of pilot city's conditions, determination of pilot cities.
- Pilot implementation:
 - a) Interpretation of international test standards: organize relevant knowledge training.
 - b) Analysis of smart city infrastructure needs: comprehensively evaluate the development needs and goals of various infrastructures, consider the support of urban resources and relevant stakeholders and determine the development direction of smart community infrastructure.
 - c) Standards implementation: pilot work will be carried out in accordance with the implementation plan, with a period of 2 years.

5 Achievement and results

Through pilot testing work around the world, ISO/TC 268/SC 1 has accelerated the promotion of standard results, guided the construction of smart cities and achieved sustainable urban development. Up to now, a pilot awarding ceremony has been successfully held in Chengdu, Nanhai district and Hefei, and pilot testing work conducted. The progress of test work in pilot cities has been reported in meetings and on-site expert opinions absorbed to promote work progress. [Table 1](#) presents a phased summary.

Table 1 — Summary of work results (as of 20 April 2019)

Time	Location	Conference name	Summary of results
2017-02-06 to 2017-02-10	Paris	ISO TC 268 eighth plenary meeting	Through the resolution, ISO/TC 268/SC 1 will establish a new smart city international standard pilot and test working group (TG, Task Group)
2017-10-24	Mexico	ISO/TC 268/SC 1/TG 2 first working group meeting	The first batch of pilots (Chengdu and Nanhai District) started pilot work and three more cities became test candidate cities
2017-12-25	Chengdu, China	ISO/TC 268/SC 1/TG 2 working group meeting	First to launch the first batch of pilot cities (Chengdu, Sichuan and Foshan Nanhai, Guangdong) awarding ceremony, and issued the "Smart City International Standard Pilot Chengdu Consensus"
2018-05-15	Zhuhai, China	ISO/TC 268/SC 1/TG 2 second working group meeting	Hefei (high-tech zone), Anhui Province, China, Cambridge, UK and Kawasaki, Japan were selected as candidates for a new batch of smart city standard pilot cities
2018-09-26	Hefei, China	ISO/TC 268/SC 1/TG 2 pilot city meeting	Hefei pilot awarding ceremony
2018-10-18	Moscow	ISO/TC 268/SC 1/TG 2 third working group meeting	Experts discussed the technical report and give recommendations, representatives of various cities attended the meeting
2019-04-10	Paris	ISO/TC 268/SC 1/TG 2 fourth working group meeting	Start appeals for more pilot cities

In order to complete the application for the pilot cities, experts have been specially invited to form a team. The expert team guides the implementation of international standards. Through the feasibility study, academic discussions, expert communication and other activities, the scientific route and direction were organized. According to the international standard, the pilot implementation plan has been formed based on expert opinion.

In addition, under the guidance of international standards and industry experts, through scientific and academic activities, cities will be helped to prepare the implementation plan, then the pilot work targets, main tasks, implementation paths, expected benefits, safeguard measures and work schedules will be figured out.

On 25 December 2017, the first batch of pilot work conferences were successfully held in Chengdu, China. It was co-organized by the municipal government of Chengdu. The meeting successfully held the pilot city awarding ceremony.

On 15 May 2018 the second working group meeting was successfully held in Zhuhai, China. More than 50 experts and city representatives from the UK, France, Russia, Germany, South Korea, Japan and China attended the meeting. At the Zhuhai meeting, three cities were selected as a new batch of smart cities standard pilot cities: Hefei (high-tech zone) in Anhui Province, China, Cambridge in the United Kingdom and Kawasaki in Japan. At the meeting, the questionnaire, annual report and urban pilot template were consulted by experts from various countries.

Above all, ISO/TC 268/SC 1 will continue to work hard in the smart city pilot cities, continue to consult experts, call on more cities around the world to participate in the smart city pilot program and ultimately complete the selection and testing of 10 pilot cities on a global scale, providing a practical basis for standardization of smart city infrastructure.

Annex A (informative)

Testing report of Chengdu

A.1 General description

A.1.1 General

With the rapid development of the smart community in the world, the smart community management concept has become the popular model of urban development, driven by the global informatization trends. It would become the strategic approach of urbanization in the world. International standards organizations such as ISO, IEC and ITU-T, already have abundant research findings in relevant areas and have published a series of standards about smart community construction, which play the important role of guiding smart community development.

A.1.2 Overview of Chengdu City

Chengdu City is the sub-provincial city, which is the provincial capital of Sichuan Province. The municipal government of Chengdu are highly appreciated in developing smart cities, seeing it as the core context inside of GDP and social development plans. For promoting the construction of the Chengdu smart community, the municipal government of Chengdu proposed various projects which include improving the smart city construction, improving institutional mechanisms, innovating market cooperation models, promoting smart industry development, improving smart community infrastructure and promoting social development. Currently, Chengdu has the commanding lead in transportation services, urban management, public security, information infrastructure, electrical and water service, spatial geography and sharing information systems, which mean the basic conditions for smart development are relatively mature.

A.1.3 ISO documents used for this pilot test

In this pilot test, Chengdu participated in ISO/TS 37151, ISO 37153, ISO/37155-1 and ISO 37156.

Through the practising in the progress that transforming standards from international standards to national or local standards, it would help Chengdu's smart infrastructure developing with the better intelligent, better informational sharing, better environment and sustainability development.

A.1.4 Motivations and purpose

After years of developing, Chengdu has got a positive impact on smart community construction. However, there is still a gap between the current Chengdu infrastructure and the smart community requirements. In addition, Chengdu's smart community infrastructure is managed by different departments and different public organizations, such as the city planning department, building department, management department, transportation department, water service department and pollution checking department. For advancing the urbanization, the municipal government of Chengdu has been active in promoting infrastructure building which is the foundation and the necessary condition in urban economic and social development.

A.2 Pilot test outcome

A.2.1 General

Up to the present, a comprehensive evaluation of infrastructure construction and smart community construction in Chengdu has been compiled, including the “City Infrastructure Status and Needs Questionnaire”, “Smart Community Infrastructure Investigation Plan” and “Chengdu Smart Community International Standard Pilot Research Document”, which laid a solid foundation for the development of Chengdu's smart community.

A.2.2 Target areas and scope

Two comprehensive investigations have been conducted on relevant Chengdu municipal departments, in order to continuously understand the basic conditions and construction needs of infrastructure development in Chengdu's smart community.

[Table A.1](#) provides how many departments have taken part in the first term and second term.

Table A.1 — First-term and second-term departments

First-term departments	Second-term departments and companies
— City Port Logistics Office	— Municipal Forestry and Garden Department
— Information Port	— Municipal Water Affairs Department
— Municipal Public Security Bureau	— Municipal Safety Supervision Department
— Municipal Traffic Management Department	— Municipal Environmental Protection Department
— Municipal Construction Department	— Municipal Communications Commission
— Municipal Environmental Protection Department	— Municipal Public Security Department
— Municipal Management Department	— Chengdu Transportation Investment Group Co., Ltd.
— Municipal Forestry and Garden Department	— Chengdu Tianfu Greenway Construction Investment Co., Ltd.
— Municipal Water Affairs Department	
— Municipal Public Transport Department	
— Municipal Development and Reform Department	
— Municipal Economics Letter Department	
— Municipal City Planning Department	
— Municipal Quality Supervision Department	
— Municipal Safety Supervision Department	
— Municipal Public Security Traffic Management Department	
— Big Data Office	
— Municipal Education Department	
— Municipal Health Planning Commission	

A.2.3 Test means and process

Since September 2017, electronic questionnaires have been used to collect questionnaires from 20 relevant departments and enterprises in Chengdu. Then, field investigations on international standards have been carried out for each department, which provides a basic understanding of the development status and needs of infrastructure construction in Chengdu's smart cities.

After July 2018, on the basis of the analysis of the first survey results, detailed questionnaires and interviews with international standard experts were conducted again to eight relevant pilot departments in Chengdu, so as to better understand the status of infrastructure construction in Chengdu's smart cities. Then analysing advantages, researching negative disparity, benchmarking the standard construction, evaluating maturity evaluation, checking the life cycle and reviewing data sharing theory, in order to find the potential area where could be improved.

A.2.4 Data acquisition and adjustment

At present, the ISO 3715X collection of standards have been tested in Chengdu infrastructure departments, including the development needs of smart community infrastructure from different perspectives, the division of different development stages of smart community infrastructure life cycle, the composition of Chengdu data exchange and sharing system, the establishment of index system of Chengdu smart community infrastructure and the evaluation of infrastructure development maturity.

A.2.5 Notable results

Now we have a systematic understanding of the development of infrastructure construction in the Chengdu smart community. This pilot has preliminary design for infrastructure evaluation index, has made evaluation and improvement plan for the maturity of key indicators, has preliminary process guidance from planning, design, development, construction, operation, and maintenance to the whole life cycle process of project reconstruction, and has constructed corresponding infrastructure index system and evaluation improvement model, which can provide scientific guidance for smart community infrastructure construction more concretely and continuously, which could help to promote the Chengdu smart community data exchanging and sharing system development, building the digital platform, establishing the better Chengdu smart community.

A.2.6 Future challenge issues

Based on the above pilot work relevant to Chengdu's smart community infrastructure standards and the development needs of the Chengdu smart community, the next step would continue to deepen the research on ISO 3715X collection of standards Chengdu pilot. Keeping conducting in-depth research on Chengdu smart community infrastructure field, and continuously optimize Chengdu smart community infrastructure. Evaluating the indicator system, encouraging the Chengdu infrastructure evaluation model and cycle improvement plan, improving the whole life cycle process of Chengdu smart community infrastructure construction, promoting the Chengdu smart community infrastructure data exchange and sharing system, and continuously promote the standardization construction of Chengdu smart community construction, building the better urban smart community construction.

Annex B (informative)

Testing report of Nanhai

B.1 General description

B.1.1 Overview of the Nanhai district

The length of newly built optical cable line in Nanhai district is 9 096 km, the task completion rate is 298 %, accumulatively 463 196 km; the accumulated new fibre-optic fibre coverage user capacity is 3 236 846, the task completion rate is 123 %; the newly added fibre access user is 256 952, fibre-optic. The household rate is 73,8 %. A total of 254 administrative villages with fibre optic access were opened, with a task completion rate of 876 %, achieving the village-to-village fibre optic task.

B.1.2 ISO documents used for this pilot test

Nanhai district hopes to achieve the following pilot test targets of the ISO smart city standards, which have important practical significance for the development of the Nanhai, through the pilot construction of ISO smart cities, mainly adopting ISO/TS 37151 and ISO 37156.

B.1.3 Motivations and purpose

Nanhai district hopes to gradually build and improve relevant sub-items based on its economic strength, capacity building and on-demand construction by combining ISO international standards pilot work in urban construction, enterprise services and improvement of people's livelihood. Specifically reflected in the following specific targets:

- a) to promote international trade in smart community infrastructure products and services to achieve a smart city foundation by establishing a coordinated standard in accordance with ISO/TS 37151.
- b) to standardize the implementation of data on smart community infrastructure and improve the consistent understanding of data with ISO 37156.

B.2 Pilot test outcome

B.2.1 General

A comprehensive evaluation of infrastructure construction and smart city construction in Nanhai has been compiled, including the "Nanhai Localization Research Report", "Nanhai Localization Research Report-2", "Special Planning for the Index System of the Nanhai", "Optimization and Promotion Plan of Nanhai District Pilot Work Based on International Standards", "Evaluation Report on Pilot Work Based on International Standards in Nanhai District-Comprehensive Evaluation of Infrastructure Construction (or Development) Level".

The testing scope is mainly in the five categories, including ICT, water, waste, transportation and energy in Nanhai infrastructure.

The main target is to build an indicator system for the construction and development of an international smart city and guide the city planning and construction of pilot cities. The pilot testing work was completed and a qualified international standard localization research document prepared.

B.2.2 Test means and process

In 2017, the first Nanhai survey was conducted to find out the status and basic conditions of the smart city pilot project in Nanhai. “Nanhai Localization Research Report” and “Special Planning for the Index System of the Nanhai” report were completed by the end of October 2018. An expert check meeting organized for the modification of the report. After reviewing the opinions, modify according to the opinions and relevant specifications, standards, and technical requirements to complete the final vision.

In mid-August 2019, a second survey was conducted in 15 relevant departments of the municipal government of Nanhai. Through the second comprehensive survey of relevant departments and enterprises in the Nanhai district, a deep understanding of the basic conditions and construction needs of smart city infrastructure development in the Nanhai district has been found. A comprehensive evaluation and optimization report formed based on the second survey to reflect the actual situation of smart city construction in Nanhai district.

B.2.3 Data acquisition and adjustment

At present, the ISO 3715X collection of standard pilots have focused on the development of smart city infrastructure in Nanhai and the development needs of smart city infrastructure from different perspectives, focusing on the Nanhai data exchange and sharing system, and its designed services and management and also the Nanhai smart city infrastructure indicators. The system was established to conduct research and quantitative analysis.

B.2.4 Notable results

Nanhai specific experience of the pilot testing phase, testing content and the notable results are shown in Table B.1.

Table B.1 — Notable results in Nanhai

Stage	Main content of the report	Main results
Implementation phase	Survey on the comprehensive situation of smart city construction	“Investigation Scheme on Pilot International Standards for Smart Cities in Nanhai District” (2018-02) “Survey Report on the Pilot Questionnaire of International Standards for Smart Cities in Nanhai District” (2018-02)
	ISO/TS 37151 localization research	“Nanhai Localization Research Report” (2018-10)
	ISO 37156 localization research	“Nanhai Localization Research Report-2” (2018-10)
	Index system	“Special Planning for the Index System of the Nanhai” (2018-09)
Summary phase	Pilot upgrade plan	“Optimization and Promotion Plan of Nanhai District Pilot Work Based on International Standards” (2019-10)
	Pilot acceptance	“Evaluation Report on Pilot Work Based on International Standards in Nanhai District-Comprehensive Evaluation of Infrastructure Construction (or Development) Level” (2019-10)

B.2.5 Future challenge issues

Based on the above pilot work relevant to Nanhai infrastructure standards and the development needs of the Nanhai district, the next step would continue to deepen the research on ISO 3715X collection of international standard in Nanhai pilot.

In-depth research on smart city infrastructure in Nanhai district will continue, and the infrastructure of Nanhai smart city will be continuously optimized. Moreover, through evaluating the indicator system, promoting the Nanhai smart city infrastructure data exchange and sharing system, to continuously promote the standardization construction of Nanhai smart city construction, building the better urban smart community construction.

Annex C (informative)

Testing report of Hefei (high-tech zone)

C.1 General Description

C.1.1 Overview of Hefei (high-tech zone)

Hefei has a total of 11 400 km² and a total population of 7 790 000 . The urban built-up area of Hefei is 416 km² and the built-up area population is 4,09 million. Accelerate the construction of the sub-centre of the Yangtze River Delta world-class city cluster. Strive to become a city of innovation with international influence.

Hefei passed by the outline of “Thirteenth Five-year Plan for Smart Hefei Construction” and proposed that by 2020, there will be 100 % coverage of wireless broadband in the main urban area of Hefei and 200 Mbps optical fibres will be accessed in the urban area. Moreover, Hefei will construct integrated Hefei citywide big data centre and to achieve the city unified online booking registration and the smart library covering all communities and administrative villages.

C.1.2 ISO document used for this pilot test

According to ISO/TS 37151, ISO 37154 and ISO 37156, Hefei will accelerate the construction of information infrastructure and application of advanced smart technologies, and optimize the comprehensive urban management and service levels, and improve the quality of life of citizens, and create a good circumstance for the development of smart industries and the introduction of high-end talents.

C.1.3 Motivations and purpose in this pilot test

Based on the advantages of Hefei, Hefei high-tech zone will serve as a key pilot area for smart city development in Hefei. It will initially form a demonstration park with high-end industrial agglomeration, perfect innovation service system, active regional opening and cooperation, and highly integrated development of production and city.

C.2 Pilot test outcome

C.2.1 Target area and scope

The target infrastructure of this field test is indicator system, transportation, data sharing and exchange, and the area scope is the entire Kawasaki city.

C.2.2 Test means and process

Electronic questionnaires have been used to collect questionnaires from 20 relevant departments and enterprises in Hefei (high-tech zone). Then, field investigations on international standards have been carried out for each department, which provides a basic understanding of the development status and needs of infrastructure construction in Hefei's smart cities.

Through four times surveys, analysing advantages, researching negative disparity, benchmarking the standard construction, evaluating maturity evaluation, checking the life cycle and reviewing data sharing theory, in order to find the potential area where could be improved.

C.2.3 Data acquisition and adjustment

At present, the ISO 3715X collection of standards have been tested in Hefei (high-tech zone) infrastructure departments, including the development needs of smart community infrastructure from different perspectives, the division of different development stages of smart transportation, the composition of Hefei (high-tech zone) data exchange and sharing system, the establishment of index system of Hefei (high-tech zone) smart community infrastructure.

C.2.4 Notable results

The middle-results of this field test are concluded as follows:

- ISO 37156 is almost suitable from the holistic sense for smart community infrastructure data sharing and exchange;
- the view-point of selected metrics is mainly based on ISO/TS 37151, so it can be concluded that ISO/TS 37151 is a good choice for an exact tool for smart community infrastructure evaluation and improvement;
- ISO 37154 describes how transportation infrastructures should be designed and planned, provide how to upgrading to secure transportation modes for the city.

C.2.5 Future challenge issues

Based on the above pilot work relevant with Hefei (high-tech zone) smart community infrastructure standards and the development needs of Hefei (high-tech zone) smart community, the next step would continue to deepen the research on ISO 3715X collection of international standards Hefei (high-tech zone) pilot. Keeping conducting in-depth research on Hefei (high-tech zone) smart community infrastructure field, and continuously optimize Hefei (high-tech zone) smart community infrastructure. Evaluating the indicator system, promoting the Hefei (high-tech zone) smart community infrastructure data exchange and sharing system, and continuously promote the standardization construction of Hefei (high-tech zone) smart community construction, building the better urban smart community construction.

Annex D (informative)

Testing report of Kawasaki

D.1 General description

D.1.1 Introduction

The field test results in Kawasaki City for examining the applicability of ISO 37153 include target area, test means and process, data acquisition and adjustment, and future challenge issues.

D.1.2 Overview of Kawasaki City

The population of the Kawasaki City is 1 522 241 (2019), and the number of households is 734 501 (2019), with a total area of 144,35 km². The main features of this city are as follows:

- located in Kanagawa prefecture, in Japan;
- the 8th most populated city in Japan (including the Tokyo metropolitan area) and one of the main cities forming the Greater Tokyo area and Keihin industrial area;
- a sustainable growing city with multiple functions as of the heavy industry area, commercial area, and as of the commuter town of Tokyo;
- a model city in the activities not only overcoming environmental pollution but also keeping the city growth sustainably.

D.1.3 ISO document used for this pilot test

ISO 37153 focuses on smart community infrastructure especially on the maturity model for evaluation and improvement. A maturity model explains the practices and processes needed by each level to achieve the desired performance and thus, can be used for its users to develop a strategy to increase their levels based on the PDCA cycle.

D.1.4 Motivations and purpose in this pilot test

Since each country or city has different conditions and situations, it is difficult to have a standard that promotes a 'one-size-fits-all' solution. Therefore, this field test is motivated on gathering actual practical experiences, and gets useful feedback for keeping up with future development.

D.2 Pilot test outcome

D.2.1 Target area and scope

The target infrastructure of this field test is transportation, and the area scope is the entire Kawasaki city.

D.2.2 Test means and process

Test procedures:

- a) to identify the target area and target infrastructure;
- b) to identify the evaluation and improvement purpose;

- c) to identify necessary characteristics;
- d) to define criteria of maturity levels, including current level and target level;
- e) to complete an achievement criteria table;
- f) evaluation;
- g) improvement.

Figure D.1 provides a more detailed overview of the procedures and some example results.

