

Publicizing of "Smart City Case-Study Collection [Introduction]

- Toward the Matching between Urban Challenges and New Technologies -" Ver2.0

(Research period: FY 2023 to FY 2024)

OMATA Motoyoshi (Ph. D.), Senior Researcher

KATSUMATA Wataru (Ph. D.), Director, Urban Planning Department

ANDO Ryosuke (Ph. D.), Researcher

SHINOHARA Shutaro, Researcher

ISHII Norimitsu (Ph. D.), Head

Urban Planning Division, Urban Planning Department

(Key words) smart city, urban challenge, new technology, case-study collection

1. Introduction

For the purpose of providing support for local public entities when they examine the direction of solving major urban challenges by utilizing new technologies such as IoT (transformation into a smart city), the NILIM is engaged in a systematic organizing of new technologies that can be used for the solution of various challenges of cities, and research and development concerning planning evaluation techniques related to the effects of the solution of major urban challenges by utilizing new technologies.

This paper presents the latest version, Ver2.0, with the recent addition of case studies, of the "Smart City Case-Study Collection [Introduction]"²⁾ that takes up smart city case studies in various parts of Japan as the subject, and presents new technologies that may possibly be introduced for major urban challenges in one-to-one correspondence, by focusing on the problems and solutions when introducing such technologies and the evaluation methods for the effects of introduction.

2. Overview of the Smart City Case-Study Collection

(1) Background

In the questionnaire survey conducted by the NILIM in FY 2020, many local public entities stated that "we do not know what kinds of technologies can be utilized for the urban challenges we are facing.". Many businesses expressed their opinion that "we do not know what kinds of urban challenges can be solved by utilizing the new technologies we possess," however we realized once again the necessity of sharing information on the matching between urban challenges and new technologies.

In light of that, we have decided to create a case-study collection that systematically presents new technologies that may be introduced to solve major urban challenges, on the condition that the collection of this data will be utilized by local public entities and businesses that intend to engage in a smart city from now on.

(2) Features of the Case-Study Collection

This Case-Study Collection is not simply a

presentation of each project, but it also has features that include how new technologies may be introduced for major urban challenges in one-to-one correspondence. It focuses on the problems and solutions when introducing such technologies and the evaluation methods for the effects of introduction. Also, a table of contents includes each of the items: "urban challenges," "new technologies" and "local public entities," enabling case studies to be searched in a multifaceted manner.

(3) Combinations of urban challenges and new technologies

In this Case-Study Collection, "new technologies" that are introduced in model projects, etc. of the national government are extracted, and they are associated with "urban problems" that are expected to be solved by the introduction of the new technologies, and case studies are narrowed down from the viewpoints of extraction that, among such associations, case studies in which the "urban challenge" and "new technology" are likely to be placed in one-to-one correspondence or case studies that have actually been introduced in the stage of implementation or in the stage of demonstration and experiment should be extracted (Fig.-1).

	New technology	Urban challenge	h	f	c	b	a	i	d	e	g	Total
			Automobile	Data utilization	Analysis /forecasting	Observation	Communication	Drone/robot	Data foundation	Big data	Energy	
A	Transportation		14		3		2	1	1			21
C	Bustle		2	5	4				2	1		14
D	Health and healthcare		2	3	1	1	1		2	1		11
G	Disaster management			2		2	3	1	1	2		11
F	Environment			2	1	2		1			2	8
B	Industry		2	1				4				7
E	Infrastructure		1		1	2		1	1			6
H	Security					2	3					5
I	Common to all fields			2								2
Total			21	15	10	9	9	8	7	4	2	85

Fig.-1 Combinations of urban challenges and new technologies (number of case studies)

3. Overview of the case studies presented in the Case-Study Collection Ver2.0

In the "Smart City Case-Study Collection [Introduction]," 9 case studies mainly covering urban challenges such as the environment and disaster management were newly added to the 76 case studies presented in Ver1.0 (Table).

Table 9 case studies added to the Case-Study Collection Ver2.0

	[Urban challenge] x [New technology]	Local public entity
①	Sharing/joint utilization of disaster information x Drone for monitoring	Jinsekikogen Town, Hiroshima Prefecture
②	Evacuation guidance x Push-type information transmission by concurrent calling	Kamisato Town, Saitama Prefecture
③	Evacuation guidance x Push-type information transmission by apps	Minato Ward, Tokyo Metropolis
④	Support for moving the elderly x Autonomous vehicle	Kasugai City, Aichi Prefecture
⑤	Measures to mitigate heat in city centers x 3D urban environment simulation	Kumagaya City, Saitama Prefecture
⑥	CO2 emissions control by citizens x Visualization tools	Kanagawa Prefecture
⑦	Increasing efficiency in garbage collection/processing x Smart garbage bins	Hiroshima Prefecture/Kobe City
⑧	Increasing efficiency in garbage collection/processing x Resident participation support tools	Kameoka City, Kyoto Prefecture
⑨	Promotion of rambling at city center x Integrated apps	Kumagaya City, Saitama Prefecture

Some of the case studies added in Ver2.0 are presented below.

(1) Evacuation guidance x Push-type information transmission by concurrent calling

In Kamisato Town, Saitama Prefecture, efforts are being made that take into consideration, the digital divide when it comes to delivering necessary information promptly to the elderly households and residents who do not have smartphones. Evacuation guidance, etc. when a disaster has occurred is implemented using a mechanism in which information by means of sound guidance is sent to pre-registered landline telephones by concurrent calling, for the purpose of increasing efficiency in information transmission among staff in the disaster management operations such as transmission of information for residents when a disaster has occurred and the management of evacuation centers (Fig.-2).

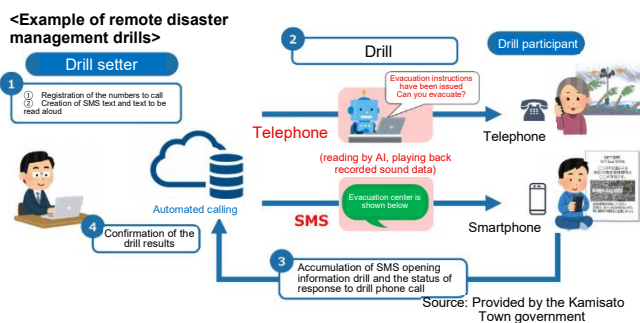


Fig.-2 Push-type information transmission by concurrent calling (Kamisato Town)

(2) Measures to mitigate heat in city centers x 3D urban environment simulation

In Kumagaya City, Saitama Prefecture, visualization of temperature changes in each area of the city on representative days in summer and in winter and the selection of areas suited to smart towns are implemented by utilizing the 3D urban model data and the weather data in 31 locations in the city where equipment is installed to transmit heat illness information. Also, by calculating the amount of heat radiated when walking, trial calculations are made to

evaluate the risks of heat related illness when living in such residential areas (Fig.-3).

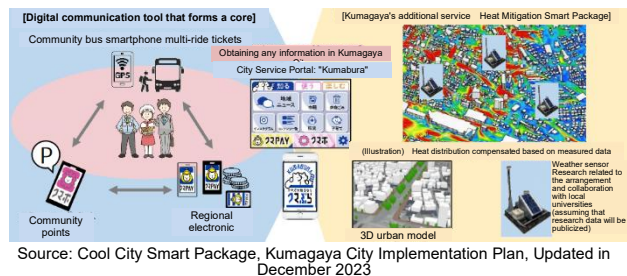


Fig.-3 Measures to mitigate heat in city centers (Kumagaya City)

(3) Increasing efficiency in garbage collection/processing x Resident participation support tools

In Kameoka City, Kyoto Prefecture, efforts are being made in a project aimed at building an environment where littering is unlikely to occur. Services have been provided since April 2022 in which the status of littering can be reported through the SNS account of the City. Analyzing the littering report data thus obtained, IoT garbage bins "SmaGo" have been installed at the North and South Exits of JR Kameoka Station that are crowded with people, where the number of littering reports was numerous, and are utilized for the processing of littered garbage that has been collected by cleaning activities (Fig.-4).

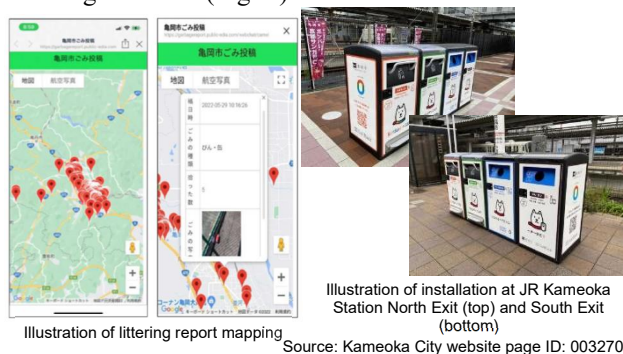


Fig.-4 Increasing efficiency in garbage collection/processing (Kameoka City)

4. Conclusion

At present the NILIM is making efforts in the creation of an evaluation model (draft) by which forecasting and evaluation are carried out quantitatively at the planning stage and the stage of progress, as to whether the effects of solution of urban challenges could be obtained that match the cost of introduction and operation of new technologies in a smart city. Regarding the "Smart City Case-Study Collection [Introduction]," we would like to revise it whenever necessary by continually engaging in the addition of case studies of efforts and the updating of the content in line with technological reform.

For more detailed information, visit:

- 1) Website of the Urban Planning Division
<https://www.nilim.go.jp/lab/jbg/smart.html>
- 2) "Smart City Case-Study Collection [Introduction]" Ver2.0
https://www.nilim.go.jp/lab/jbg/pdf/smart/SC_CA_SES_V2_0.pdf