A Proposal for Open Data of Sightseeing Event Information

Keywords:
Open Data, Sightseeing Events, Data Management, Web Applications

Mayu URATA, Nagoya University
Kazuma OGISHIMA, Nagoya University
Mana FUKUYASU, Nagoya University
Mamoru ENDO, Nagoya University
Takami YASUDA, Nagoya University

Abstract

Development events and application contests are held in various locations as a way to promote open data, and have demonstrated results to an extent. Promotions of open data by basic units of government require implementation of open data into daily municipal services upon considering the acceptability of local governments, and not merely launching the above measures intensively in the short term. Nevertheless, many local governments are promoting open data with limited human resources and budget amid vast operations. Following such circumstances, the research attempted to create open data and develop applications from sightseeing events hosted by local governments with the objective to establish open data promotion in conventional municipal operations. Using the sightseeing events hosted by local governments as case examples, the research attempted to create open data from organizing data from pamphlets distributed by local governments. The data was leveraged to develop an application for mobile devices that guide users through sightseeing events, and its demonstration experiment using this application was conducted at the "*Dai 15 kai Arukou! Bunka no Michi* (15th Annual Let's Walk the Cultural Path)" event held in Higashi-ku, Nagoya. The demonstration experiment clarified the application's effectiveness, and succeeded in demonstrating that the tested open data of sightseeing event information were useful. In addition, as a result of the research, the sightseeing event information for the "*Dai 16 kai Arukou! Bunka no Michi* (16th Annual Let's Walk the Cultural Path)" event is now scheduled to be made public as Nagoya's open data. Based on the above, the paper discusses on the promotion of open data for conventional municipal operations while considering the acceptability of local governments.

1. Introduction

Japan's promotion of open data is starting to become active among basic units of government ("local governments"), and the number of cities that are promoting data has reached to 164 as of October 2015[1]. Local governments are promoting open data by converting information that they possess into open data with usage rules that enable secondary usage and in machine-readable formats. In promoting open data, many local governments are disclosing statistics, disaster prevention and sightseeing information as information that is readily available for disclosure (MIC, 2014). The Japanese government has also assisted in the promotion of open data for local governments by opening a public cloud system[2] with sightseeing information as branches, and further vitalization of promoting open data among more local governments are anticipated. However, promotions of open data for local governments face the issue of having unclear specific advantages for local governments because there are only a few public service case examples (LASDEC, 2014). Development events and application contests such as Ideathons and Hackerthons are held and demonstrate results to an extent, but not many of them directly led to promotion of open data for local government. Moreover, according to Hayashida (2007), operation loads for local government employees, who are also the main players for the promotion of open data to decentralize the government, are increasing and call for consideration. Promotion of open data by basic units of government require implementation of open data into daily municipal services upon considering the acceptability[3] of local governments, and not merely launching development events, application contests and other open data promotion measures intensively in the short term.

Following such circumstances, the research aims to establish the promotion of open data in conventional municipal operations. Sightseeing information in which local governments can easily convert to open data were used as case examples upon considering the acceptability of local governments. The research test-created open data from actual sightseeing information communicated by local governments, and conducted demonstration experiments with sightseeing applications that leveraged the data. The results will also be taken into account in addition to acceptability to discuss promotion of open data in conventional municipal operations.

2. Considerations of Open Data and Their Utilization

2.1 Relevant Case Studies

Since the promotion of open data started in full scale in 2012, open data trials and creative utilizations are being conducted in Japan to promote open data among local governments (Fukuyasu, Ura et al., 2013) (Koike, Fukuyasu et al., 2015) (Sugimoto, Ikeda, 2015). In particular, creative service developments that leverage open data were conducted through hosting events such as Ideathons and Hackerthons, including International Open Data Day. Players of various status and background participated in these events and materialize the creation of public services through collaboration between the private and public sectors.

2.1.1 Biwako Great Fireworks Festival

Shiga's civic hack group, Code for Shiga/Biwako[4], started its open data promotion

operations for the Biwako Great Fireworks Festival in 2014. The group collected and organized information on the fireworks festival and sightseeing owned by the local government and relevant groups to convert into open data. As a result, nine types of applications that used open data were created to provide new services during the fireworks festival. According to the group (2014), although measures were implemented on a concentrated and short-term basis through aiming for the common factor, the fireworks festival, promoting measures with long-term perspectives is essential when considering the future. In addition, as Shoji (2012) points out, development in events have issues in that they are difficult to brush up as administrative services. Furthermore, Hayada (2014) argues on the importance of promoting open data from a circulating perspective, and mentions how open data events are not being coordinated well with local governments is one issue requiring a solution. Event personnel need to have event achievements and developed contents linked to open data promotion measures conducted by local governments, such as brushing them up as public services, instead of positioning them as temporary trends through working together with local governments. The research will display utilization case examples through testing of open data conversion so that they will lead to promotion of open data by local governments in the middle to long-term perspectives. It will thus focus more on open data promotion for conventional municipal operations through methods that will not increase burden for local government employees.

2.1.2 Open Data Use Case Contest

The Open Data Use Case Contest[5] hosted by MIC and METI was held in the end of 2013. The contest aimed to develop actual services based on ideas created at Ideathons. Out of the numerous works submitted, "NGY Night Street Advisor: The Safe and Reliable Navigation System for Pedestrians that Guide through Bright Routes" by the National Institute of Technology, Akashi College, won the Grand Prize. The application prevents crime by displaying how bright street lights are on the map to avoid gropers and crimes. The data on street lights were acquired from Nagoya after students and teachers requested cooperation (Arai, Itani et al., 2014).

The data on Nagoya's street lights, however, were provided for use only in the contest, and are not yet disclosed as open data as of 2015. In an interview conducted by us, Nagoya commented that the data on street lights cannot be disclosed as open data due to security reasons. Like this case, there are limits on converting some data to open data even when there are needs to do so because local governments have information that cannot be disclosed for a variety of reasons. In addition, each set of information is possessed by departments in charge. Acquiring the information requires understanding and cooperation of the government agency, but there are still many local governments that have yet to fully acquire understanding internally. Although it is important to newly convert beneficial information possessed by local governments in order to accelerate their open data promotion, it is desirable to first promote open data based on information that are already disclosed. The research will consider testing open data conversion of information already disclosed by local governments so that open data of information applicable for disclosure by local governments can be utilized.

2.2 Research Principles

Based on the issues revealed in preceding cases, the research aims to promote open data with consideration towards acceptability of local governments. Promotions of open data are conducted through methods that differ by local government, ranging from data collection, organization and disclosure. Aoki (2013) argues that when local governments work on promoting open data, it is more effective to start from the information that has conventionally been communicated already. In addition, Shimizu (2013) states that development based on data rather than needs will lead to higher degrees of completion when utilizing open data in Hackerthons. Working from conventional information is thus effective when promoting open data upon considering the acceptability of local governments, and contents that can better lead to public services can be anticipated for development as well. The research assumes that local governments will convert information collected, organized and communicated as their conventional operations to open data from the acceptability standpoint. Following this, the flow from information collection to communication in conventional municipal operations and the flow from information collection to disclosure in open data promotion were compared so that conventional municipal operations and open data promotion methods will correspond (Figure 1). The method described in "Let's Start Open Data: The Handbook for Local Governmental Bodies" by MIC (2014) was determined to be the method appropriate. The handbook describes contents on information organization in Step 3, and information communication in Steps 4 and 5. Following this, the research distinguishes between the two stages of "Information organization" and "Information communication" through using sightseeing event information as model cases, and discusses open data promotion that will be readily accepted in conventional municipal operations (Figure 1).

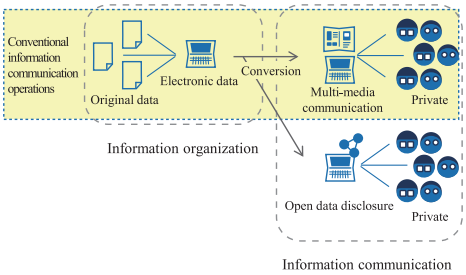

Figure 1 Open Data Promotion in Conventional Operations

3. Attempts to Convert to Open Data

3.1 Converting Sightseeing Event Information to Open Data

3.1.1 Subjects of Research

The research will examine regional events in the "Cultural Path" area in Higashi-ku, Nagoya, Aichi(6) ("Higashi-ku"). The Cultural Path area is about 8km^2 in area, stretching from central to western Higashi-ku, and is one of Nagoya's prominent sightseeing areas in which precious historical and cultural heritages from modern times remain. The area is maintained and utilized as an area with vivid modern culture of Nagoya as indicated in the "Historical Town Planning Strategy" developed by Nagoya (2011). The Cultural Path Area conducts walking events as well as historical and cultural events that utilize its characteristics. One of such events is the walking event, "*Arukou! Bunka no Michi* (Let's Walk the Cultural Path)" Events and stage events that educate on the region's history are held in sightseeing spots ("spots") scattered within the

Cultural Path area in the event. The event also possesses the following characteristics:

(1) Continuous hosting through public-private collaboration

The "*Arukou! Bunka no Michi*" event is held on November 3 (Culture Day) every year, and marks its 15th anniversary in 2014. Higashi-ku hosts the event, and forms an executive committee with Nagoya, residents and citizen groups to conduct planning and operation. The event is held through cooperation between public and private sectors, and is one in which local residents also embrace.

(2) Approaches for younger generations

"*Arukou! Bunka no Michi*" is an event that is popular among seniors due to geographical characteristics, and faces the issue of not being as recognized by younger generations. The event is considering various approaches for younger generations by communicating information through Facebook, for example, and anticipates participation from the generation in addition to seniors for its executive committee.

(3) Information communication from the local government

The executive committee manages and communicates information pertaining to the event. In particular, Higashi-ku conducts collection, organization and communication of event information as part of its municipal operations. Sightseeing events are generally held responsible by divisions that promote sightseeing and town planning, but "*Arukou! Bunka no Michi*" has been run by accounting departments.

Based on the following characteristics, the research will examine "*Arukou! Bunka no Michi*" to experiment on open data. First, the private-public cooperation structure is focused for promotion of open data in (1), but according to Nishida et al. (2013), but one of the reasons that Sabae, Fukui is proactive in open data promotion is that the city already had private-public cooperation rooted within them. Therefore, a cooperating structure between the private and public sectors can anticipate vitalization of open data promotion. For (2), one of the advantages of promoting open data for local governments is resolution of regional issues (MIC, 2015). Through utilizing open data, applications for mobile devices can be developed. And considering the penetration rate[7] of smartphones among younger generations, participation of the generation in the event can be incited by developing applications that leverage open data. For (3), many local governments have mainly information departments work on the promotion of open data, but information to be converted to open data are possessed by various departments. When considering the medium to long-term effects of open data promotion, the department that originally possesses the information should work on the promotion rather than concentrating the operations to information departments. It is thus important in terms of acceptability from local governments as well if the original department works to promote open data for information collected, organized and communicated through conventional operations. Based on the above, the research will examine "*Arukou! Bunka no Michi*" as its research subject.

3.1.2 Flow of Sightseeing Event Information

The flow of sightseeing event information in conventional municipal operations are represented as below when converting the sightseeing event

information of "*Arukou! Bunka no Michi*" into open data (Figure 2).

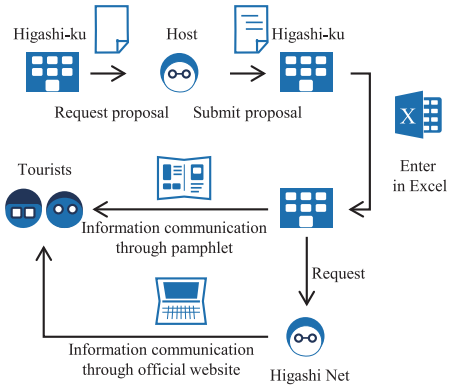

Figure 2 Flow of Event Information for Research Subject

In order to collect event information, the executive committee first had local residents and citizen groups that host events in each spot write a proposal. Based on the information written in the proposals, Higashi-ku employees organized the information on Microsoft Excel ("Excel"). Because data confirmation by employees need to be streamlined and tasks were consigned to private companies, the formatting needed to be legible to humans. The formatting thus required shaping of data, such as combining cells and entering multiple contents within a cell, and is not as machine-readable. Information is communicated through pamphlets and the official website[8] based on the organized information. Leaflets are printed doubled-sided onto A2-size papers, distributed to participants on the day of the event as information and support event participation for tourists (Figure 3). The area map and event information are printed on the leaflet, and event information are listed by spot to see at a glance (Figure 4). On the other hand, the official website is managed and operated by the citizen group "Higashi Net[9]," a member of the executive committee. The information included are similar to those on the pamphlet, but also play the role of communicating pre-event information prior to the event date.

Figure 3 "*Dai 15 Kai Arukou! Bunka no Michi* (15th Annual Let's Walk the Cultural Path)" pamphlet

Figure 4 "*Dai 15 Kai Arukou! Bunka no Michi* " pamphlet (magnified view of dotted area in Figure 3)

3.1.3 Procedures for Open Data Conversion

The research experiments on the conversion of information in the pamphlet to open data. The pamphlet information is entered in Excel and digitalized. The Excel formatting is not excellently machine-readable through cell combinations and multiple contents included in single cells, but involves little work for local governments because it is information that has already been communicated by them and digitalized beforehand, and thus easy to link to open data promotion from conventional municipal operations.

Following this, we organized information to convert to open data based on the information printed on the pamphlet. The organized data was test-converted to open data upon using an open data platform (Figure 5).

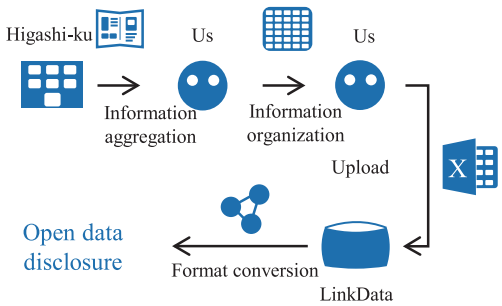

Figure 5 Flow of Open Data Conversion

3.2 Organization of Sightseeing Event Information

3.2.1 Types of Information

Open data of sightseeing event information are disclosed by some local governments other than the Biwako Great Fireworks Festival mentioned in the previous chapter. Key governments include Fukui and Toyohashi, Aichi (Table 1).

Fukui discloses open data on sightseeing events held in the prefecture in CSV format[10]. Names, phone numbers and locations of public facilities and sightseeing facilities where events are held are disclosed in addition to information on event names, times and details. Toyohashi, Aichi also discloses open data on sightseeing events in CSV format[11]. Similar to Fukui, the city discloses names, phone numbers and locations of public facilities and sightseeing facilities where events are held in addition to information on event names, times and details.

Fukui	Toyohashi	
Name of event	Event name	Event detail information
Content	Summary	
Genre		
Event start date	Scheduled date	Event time information
Event end date		
Event location	Location	
District	Address	Facility information
Town		
Street address		
Phone number	Phone number	
Transportation method	Transportation	

Table 1 Examples of Open Data on Sightseeing Event Information

Based on these examples, the information necessary as sightseeing event information are those pertaining to event details and event locations. Many sightseeing events are held in public facilities and sightseeing facilities. Facilities can be used for purposes other than sightseeing events, and when considering the versatility of information, the information on facilities and events should be separately categorized when converting to open data. Both Fukui and Toyohashi disclose open data on sightseeing facilities and public facilities as well, and can be concluded as information that has value in usage for situations other than sightseeing. In addition, sightseeing events are sometimes held multiple times with the same

title. Local governments can skip the task of repeatedly entering information by making information on event times independent from event details. The research considers the acceptability of local governments to distinguish between facility information and event information, and have event details and event times separated within event information (Figure 6).

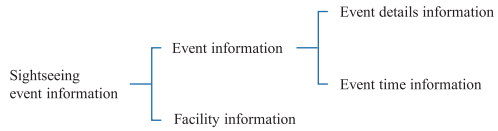

Figure 6 Organization of Sightseeing Event Information

3.2.2 Organization of Information for Research Subject

The leaflet information that is collected, organized and communicated by the local government was categorized into three: facility information, event details information and event time information. These information are conventionally organized through Excel that has been used in event management by local government employees. By considering open data conversion and reviewing the Excel format while also keeping legibility for humans, the research speculated that the data will lead to open data promotion that demonstrates acceptability for the local government.

(1) Facility information

Information on the spots that would be the event venues were organized as facility information (Table 2). The information printed on the pamphlet were facility names, phone numbers, opening hours and numbers for the stamp rally to be held on the event day. Together with organizing the data, addresses, latitudes, longitudes, transportation and closing days were acquired through the official website and Google Maps based on the case examples of Fukui and Toyohashi. Addresses and other added information were thought to be additional burdens for the local government when considering acceptability for the local government, but such information are basic information on the facilities and are also made public on the official website, and thus can be concluded as information possessed by the local government. Location information can also be continually used for the years ahead after once acquired because they don't significantly change. The acquisition of such information thus can be concluded as not causing considerable burden to the local government.

Term	Summary	Example
id	ID number	1
spot_name	Facility name	徳川園
yomi_name	Pronunciation	Tokugawaen
stamp	Stamp rally number	19
comment	Notable information	Special free admission
info	Outline	
open	Opening hours	09:30:00
last_admission	Last admission	17:00:00
close	Closing hours	17:30:00
subway	Nearest subway station	Get off at Meijo Line "Ozone" …
bus	Nearest bus stop	Get off at Meiguru "Tokugawaen" …
tel	Facility phone number	0529358988
fee	Usage fee	
map	Address and name when searching map	
url	Website url	http://arukou.higashinet.net/facil…
img	Photo	http://arukou.higashinet.net/bunk…
lat	Latitude	35.194478
lng	Longitude	136.932575

Table 2 List of Facility Information

(2) Event details information

For the event details information, sub-event information held in respective spots were each organized based on the information in the

pamphlet (Table 3). Event names, venues within spots, outlines, performers, costs, capacities and conditions including reservation requirements were included in the pamphlet, and were organized. Furthermore, genre information were also organized following that the pamphlet categorized event genre.

In addition, as part of event details information, spot IDs in which events are held were referred to from the facility information and organized. Assigning Ids based on the structure of the relational database facilitates calling of data. This enables association with other data, and eliminates tasks to enter relevant information.

Term	Summary	Example
id	ID number	1
title	Event title	Newly renovated, 10th anniversary concert…
subtitle	Event subtitle	
place	Detailed location in which the event will be held within the venue	Tokugawaen Garden Hall
spot	Venue information ID	1
genre	Event genre ID	2
info	Event details	Commemorative ceremony and concert…
limit	Capacities and information for bad weather conditions	
fee	Participation fee	Free
presenter	Presenters, supporters	Satoko Kakehi, Mamiko Kakehi, Kimura…

Table 3 List of Event Details Information

(3) Event time information

Information on event dates, starting times and ending times were organized as information pertaining to event times printed on the pamphlet (Table 4). Event names are linked with time information through using Ids assigned to events in the event details information.

Term	Summary	Example
id	ID number	1
event_id	Event information ID	1
date	Event date	11/03
start	Starting time	10:00:00
end	End time	11:00:00
comment	Supplementary information	Concert

Table 4 List of Event Time Information

3.3 Conversion to Open Data

The organized data were test-converted to open data. When converting the research used LinkData[12], an open data platform.

3.3.1 LinkData

LinkData is an open data platform operated by LinkData. Once registered an account, various private entitites together with local governments can disclose open data. More than 2,700 data has been registered as of July 31, 2015, of which about 2,000 are widely disclosed as open data.

Advantages of using LinkData are that Excel files can be easily converted to open data just by uploading, data can be jointly edited by multiple users and that data can be automatically converted to RDF and various formats when making them open data. Entities that do not possess much information technology may thus easily disclose open data to expand their capabilities of utilizing their information.

The research uploaded the Excel data as organized in the previous chapter according to the procedures directed by LinkData. The dataset "Walking the Cultural Path 2014[13]" was also prepared, and data were uploaded within the dataset. As indicated in Table 5, files on cooperating stores and transportation information, in addition to sightseeing event information, were registered onto the dataset and disclosed as open data.

Parts of open data on bus information[14] provided by the Transportation Bureau City of Nagoya are also disclosed within the dataset. Because the open data provided by the Transportation Bureau City of Nagoya is not in a

File name	Details
bunkanomichi_bus_route	Information on bus services operating within the area
bunkanomichi_bus_stop	Information on bus stops in the area
bunkanomichi_event_genre	Information on event genre
bunkanomichi_event_list	Information on event details
bunkanomichi_spot_list	Information on facilities holding events
bunkanomichi_event_timetable	Information on event times
bunkanomichi_kyousanten_genre	Genre of cooperating stores
bunkanomichi_kyousanten_list	Information on cooperating stores
bunkanomichi_station	Information on stations within the area

Table 5 List of Open Data Tested

format that excels in machine readability through cell combinations, we shaped the data requiring revision before registering them to the dataset.

3.3.2 Rights Handling of Open Data

In addition, rights handling need to be conducted to display "usage rules applicable for secondary usage" when converting to open data. We referred to Creative Commons Japan[15] and notated licenses for respective data.

Many of the open data by local governments possess "CC-BY" license, which only requires display of credit for the original author, and permits changes and usage for commercial purposes. The license has the least amount of limitations among Creative Commons Licenses, and data licensed can be widely used. Nagoya, Higashi-ku's superior organization, also discloses open data with "CC-BY" license. Following such circumstances, the test-converted open data were disclosed as data with "CC-BY" license upon obtaining approval from the executive committee.

4. Application Developments with Utilization of Open Data

4.1 System Development

An event guide application for mobile devices was prototyped upon utilizing the test-converted open data on LinkData. The application targeted external tourists visiting "*Arukou! Bunka no Michi*". The event had the issue of having "few younger generations participating in the event," and the executive committee hoped for contents that will stimulate the generation's participation. Following such circumstances, the research developed an application for mobile devices as an approach targeting the younger generation.

The application development was conducted on "LinkData App[16]," the affiliated sister site of LinkData. LinkData App uses open data on LinkData to enable online application developing on browsers, and various entities may develop contents as long as they have and established internet environment. The research used LinkData App to develop the sightseeing event guid application, "Arukou! (Let's Walk) Guide (Figure 7)."

Figure 7 "Arukou! Guide" Screen Display Example

4.2 Application Features

A guiding feature that urges tourists to participate in sightseeing events was thought to be an effective application feature. In order to achieve this, information on the official website

were used for missing information together with test-converted open data (Figure 8).

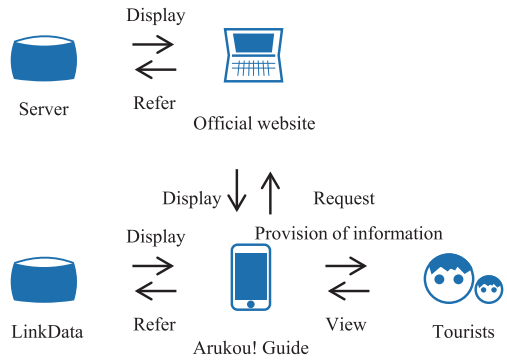

Figure 8 Coordination with the Official Website

In addition to event details held in spots, information to access sightseeing spots in which the events are held are also necessary to guide through sightseeing events. Conventional printed pamphlets only display access information through maps, and event information were only grouped by spot. On the other hand, application guides enable event searches by genre and timefor event details, and may be added bus information and routes in addition to maps for access information. In addition, information that was missing in the test-converted open data were compensated by coordinating also with the official website. Materializing these guiding features enable tourists themselves to select information as desired and create an event guide customized to individual tourists compared to conventional methods.

Features of the "Arukou! Guide" are as follows:

"Research surroundings" feature

This feature enables searching for spots and bus stops within 500m-radius of the user's current location by using the GPS feature of mobile devices. Spots and bus stops are listed in order of proximity to the user's current location. Features that link to spot detail pages on the official website, display bus route information and link to bus route schedules disclosed by the Transportation Bureau City of Nagoya by bus service were also added. The route guide provided by Google Maps was also linked to display routes leading to the destination to achieve an even smoother sightseeing guide. The feature was added through using Google Maps JavaScript API v3 made public by Google.

"Research venue" feature

The feature enables searching for spots within the area from a list. Similar to the "Research surroundings" feature, the application added features that link to the spot details page of the official website and guide through routes. Keyword searches for spot names and time were also enabled by adding a search window, and made selection of information possible for users.

"Research bus" feature

Because "*Arukou Bunka no Michi*!" is held in the Cultural Path area, aimlessly walking in the event would be quite exasperating even for adults. Following such circumstances, a search function for bus routes running within the area was added. Bus routes are listed to see spots along the way at a glance. In addition, features that links to the spot details page of the official website and guides through routes were also added, similar to the previous features.

"Research events" feature

The feature enables searching by genre and time for events held within the area, and lists results. Detailed information for events listed can also be viewed. In addition to information included in the pamphlet, map information around the venue through Google Maps, venue pictures taken from the official website, and transportation methods to event venues are

displayed.

"Research nearby stations" features

This feature enables researching of train stations within the area together with surrounding areas. The feature considers needs when tourists head home after the event, and by adding route guide functions as similar to the previous features, the application can present smooth routes heading home to tourists.

4.3 Demonstration Experiment

4.3.1 Outline

A demonstration experiment was conducted to verify the usefulness of the application that utilized the test-converted open data. The usefulness of the event guiding feature was compared with the pamphlet, the conventional guiding method. The promotion of open data on sightseeing event information will be discussed through the experiment results.

The experiment was conducted on the "*Dai 15 kai Arukou! Bunka no Michi* (15th Annual Let's Walk the Cultural Path)." There were a total of 22 participants including students and general event participants. Ages ranged from 20s to 50s, with participants in their 20s construing 80% overall. Participants gathered at the former residence of Sasuke Toyoda in the center of the Cultural Path, and each toured around the area using the pamphlet and application for about six hours after receiving explanation on how to use the application. With 27 spots scattered within the area, the participants went around as they wished. After certain time passed, all participants gathered at the former residence of Sasuke Toyoda once again, and answered questions on the evaluation sheet.

4.3.2 Results

For the four features that used the test-converted open data for the research, participants evaluated on a scale of 5 (5: Strongly agree, 4: Agree, 3: Neither, 2: Don't agree as much, 1: Disagree). For the event guiding method as well, the application and leaflet were compared on a scale of 5 (5: The app helped, 4: The app helped slightly more, 3: Same, 2: The pamphlet helped slightly more, 1: The pamphlet helped). Evaluations on features are indicated on the top part of Figure 9, and the evaluations compared with the pamphlet are indicated on the bottom part of Figure 9.

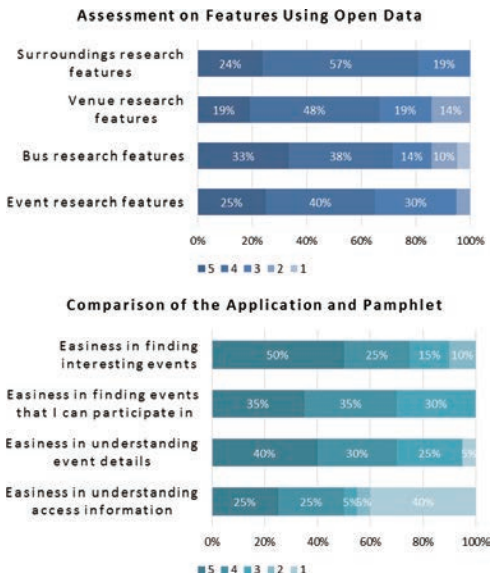

Figure 9 Experiment Results

The app generally received good evaluation for all questions. According to the question pertaining to "ease of understanding access information" comparatively evaluating the application and pamphlet, the app was easier to understand than the pamphlet. In addition, comments such as "Content categorization was

helpful in searching what I wanted," "Details of events were easy to see" were written in the free-answer question, indicating that the guiding application successfully assisted tourists to participate in events. As for the types of information, the experiment revealed needs for information on restaurants, public restrooms, parking and resting areas.

4.3.3 Discussion

Through the demonstration experiment results, it was verified that the application features were useful to tourists following the high evaluation points for all features that used open data. In addition, results from comparing the application and pamphlet indicated that converting information that have been conventionally communicated by local governments to open data enables tourists to select information they want, and assist in having tourists efficiently participate in sightseeing events. The testing of open data for conventional information using LinkData as conducted in the research can be concluded as an useful method to create new public services for local governments. Open data promotions by local governments try to disclose information responding to various needs amid vast operations to create new public services. As indicated in this research, however, converting information that has been conventionally communicated can also lead to creation of useful public services if converted to open data upon considering machine readability.

4.4 Research Achievements

The application developed in this research was well-received by the "*Arukou Bunka no Michi*!" executive committee members and Transportation Bureau City of Nagoya employees. Executive committee members commented, "The event guiding features such as event searches and route guide are excellent," and "I have always wanted to guide like this but couldn't. This system is just what we wanted." Transportation Bureau City of Nagoya employees also commented, "This is the first case example in which open data disclosed by the Transportation Bureau City of Nagoya was utilized," and "Examples like this is very meaningful for open data to cultivate."

The application developed in this research was very well-received by both parties. As the first case for the Transportation Bureau City of Nagoya's open data to be utilized, the application also contributed to the promotion of open data for Nagoya.

As a result of such positive feedback, we have received requests from the "Computerization Promotion Department" of Nagoya that is responsible for promoting open data starting this fiscal year to work with them in open data promotion. In addition, the conversion to open data demonstrated in the research was interpreted as not increasing work for local governments, and the sightseeing event information for the "*Dai 16 kai Arukou! Bunka no Michi*" to be held this year has been decided to be officially disclosed as Nagoya's open data. The testing of open data and its utilization as demonstrating in the research can be concluded as having led to actual promotion of open data for local governments.

5. Discussion of the Research Overall

The research conducted testing and demonstration of open data conversion to

promote open data for conventional municipal operations. The fact that the research results actually led to promotion of open data for local governments supports the interpretation that the method used in the research is one way to promote open data that possesses acceptability to local governments. In order to connect the research results too future open data promotions, the promotion of open data upon considering acceptability in the two stages of "information organization" and "information communication" in conventional municipal operations will be discussed:

(1) Information organization

Local governments have conventionally organized information pertaining to operations by using Excel. The information tend to not consider machine readability, such as combining cells or having multiple information included in the same cell. On the other hand, the information communicated by local governments require comparatively little work for employees, including information gathering and organization, and many can also be disclosed as open data as well as possess value. Compiling the information into a machine-readable format can thus anticipate effective utilization as open data. It is therefore important to conduct information organization with an eye for open data conversion beforehand when organizing collected information.

On the other hand, there are limits for local governments to organize information with machine-readable formatting when considering acceptability for local governments. Information gathering in conventional operations involve organization and compiling of information for employees to manage and view, or to consign operations to private firms, instead of organizing to prepare for secondary use through machine processing. Formatting that is adequately legible for humans are thus desirable, and in turn challenging to consider machine readability for conventional municipal operations. Therefore, open data promotion through public-private cooperation while also receiving cooperation from experts including private businesses, educational institutions and citizen groups. A cooperative attitude in working for open data promotion is required such as having local governments conduct open data promotion operations within an acceptable range so that experts will convert the information into machine-readable format.

In addition, versatile information organization methods that are common with other regions need to be considered when actually organizing information. For example, the field name for phone number information may differ by local government, i.e. "Phone number," "TEL" or "Number." Standardizing such vocabulary will enhance interoperability of contents utilizing open data, and utilizations can be anticipated to increase. There are many regions already that have developed contents that utilized open data in advanced ways. Promoting open data while using such advanced cases as reference can anticipate increased utilization and facilitate open data promotions with higher acceptability. The Japanese government is currently working on the Public Vocabulary Framework Project[17] as part of its measures to assist vocabulary standardization. Local governments should establish and develop versatile formatting while also effectively taking advantage of such measures.

(2) Information communication

Local governments are communicating their organized information through various media. Information communication through websites has become the norm after digitalization of regions, and most of open data from local governments are disclosed on their respective websites. Publicity departments are generally responsibly for local government websites, but much of the information communicated belong to different departments. On the other hand, information departments are responsible for open data promotion for most local governments. The promotion of open data with consideration of acceptability for local governments thus requires strengthening of cooperation upon obtaining publicity departments that manage the website and respective departments that possess information to become open data.

Website and open data linkage systems are currently being developed by private enterprises, including CMS (Contents Management System) that converts entered data on websites into appropriate formatting as open data[18]. Usage of these systems will anticipate further promotion of open data conversion for conventional information.

6. Conclusion

The research aimed to establish open data promotion through conventional municipal operations, and developed an application upon testing open data conversion of a sightseeing event hosted by a local government. Sightseeing event information on the pamphlet distributed by the local government was organized and test-converted into open data. The data was then leveraged to develop an application for mobile devices that guide through sightseeing events, and a demonstration experiment using this application was conducted in the "*Dai 15 kai Arukou! Bunka no Michi* (15th Annual Let's Walk the Cultural Path)" held in Higashi-ku, Nagoya. The demonstration experiment revealed the application's usefulness, and demonstrated that the open data prototype on sightseeing event information was also useful. In addition, as an achievement of this research, the sightseeing event information for the "*Dai 16 kai Arukou! Bunka no Michi* (16th Annual Let's Walk the Cultural Path)" is scheduled to be disclosed as Nagoya's open data. Based on the above, the promotion of open data for conventional municipal operations with consideration for acceptability of local governments was discussed.

When considering the interoperability of applications that will become public services, vocabulary standardization needs to be conducted for open data formatting disclosed by local governments. Wide-area cooperation will also become necessary so that the formatting using standardized vocabulary can be used with versatility. For example, the Shinetsu region that includes Nagano and Niigata is regularly holding open data conferences with experts, and is receiving good reviews on its promotion of open data. The true value of open data promotion shall be revealed by expanding such measures to various regions and creating connections. It is important for the achievements acquired in this research to not be a mere case example, and instead increase cases pertaining to open data promotion. We plan to continue with our research so that it will contribute to vitalization of the information society.

Acknowledgements

We sincerely thank Mr. Fukumi KATO who made

great effort during the research, as well as everyone in "*Higashi Net*," "*Arukou! Bunka no Michi*" executive committee and the Transportation Bureau City of Nagoya. This research was supported under the Grants-in-Aid for Scientific Research (KAKENHI), No.25280131, 15K00448, and 15K16097.

Notes

(1) List of Japan's open data cities <http://fukuno.jig.jp/2013/opendatamap> Accessed 2015, October 18.

(2) Public cloud system https://www.chiikinogennki.soumu.go.jp/k-cloud-api/> Accessed 2015, October 18.

(3) Acceptability of local governments refer to new concepts and technology being accepted upon acquiring understanding and endorsement from the local government and its employees.

(4) Code for Shiga/Biwako <http://opendata.shiga.jp/> Accessed 2015, October 18.

(5) Open Data Use Case Contest <http://openlabs.go.jp/opendata_contest/usecase/products_report.htm> Accessed 2015, October 18.

(6) Higashi-ku is located in the heart of Nagoya with an area of 77km^2 and population of approximately 75,000 (as of March 2015).

(7) According to results from "Survey on Usage Time of Information Communication Media and Information Activities" conducted by MIC in 2014, smartphone ownership rates are 68.6% among ages 10-19, and 94.1% among ages 20-29.

(8) Official website of *Arukou! Bunka no Michi* <http://openlabs.go.jp/opendata_contest/usecase/products_report.htm> Accessed 2015, October 18.

(9) Higashi Net is a citizen group that operates mainly in Higashi-ku, Nagoya. It operates the community site "Higashi Net," and is involved in the digitalization of Higashi-ku. <http://higashinet.net/nagoya/> Accessed 2015, October 18.

(10) List of Fukui prefecture's open data <http://www.pref.fukui.jp/doc/toukei-jouhou/opendata/category.html> Accessed 2015, October 18.

(11) List of Toyohashi's open data <http://www.city.toyohashi.lg.jp/16399.htm> Accessed 2015, October 18.

(12) A website operated by LinkData. More than 2,500 datasets have been uploaded, of which a little less than 2,000 are disclosed as open data. <http://linkdata.org/> Accessed 2015, October 18.

(13) Dataset "*Arukou! Bunka no Michi 2014*" <http://linkdata.org/work/rdf1s1870i> Accessed 2015, October 18.

(14) The Transportation Bureau City of Nagoya's open data <http://www.kotsu.city.nagoya.jp/about/opendata/> Accessed 2015, October 18.

(15) Creative Commons Japan <http://creativecommons.jp/> Accessed 2015, October 18.

(16) LinkData App <http://app.linkdata.org/> Accessed 2015, October 18.

(17) Public Vocabulary Framework Project <http://goikiban.ipa.go.jp/> Accessed 2015, October 18.

(18) Examples include "4Uweb/CMS" by Hitachi Government & Public Sector Systems, Ltd. and "i-City Portal" by Fujitsu Limited.

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