

Urban Design Charrette with Using GIS: The Case of Japan-US Collaborative Charrette in Kobe where Eleven Years have passed after the Great Hanshin-Awaji Earthquake Struck

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Abstract

“Charrette”, originally a French word, denotes an intense work session that includes analyzing a focused area and proposing future designs for the area. It is becoming popular in the urban design field especially in US. GIS seems to be useful in charrette because GIS can provide considerable geographic information to participants efficiently. Therefore, in this study, we practice the charrette with using GIS. In this paper, we reported the outline of the charrette, and discussed about the GIS use in the charrette and the evaluation by the Local community. As results, it is said that Using GIS is effective in the charrette and charrette will be effective also in Japan, in general. But, especially in the case of design smaller neighborhood, detailed data should be needed. It seems that making detailed GIS data available for the charrette is important also in Japan. It can be also said that charrette will be effective also in Japan by this study. Therefore, the method of promoting outreach activities will be established.

Introduction

“Charrette”, originally a French word, denotes an intense work session that includes analyzing a focused area and proposing future designs for the area. It is becoming popular in the urban design field, especially in US (Kelbaugh, 1997; Maryman and Maggio, 2004; Urban Design Associates, 2003). Normally, in a charrette, participants work for about a day to a week while hearing residents’ opinions and proposals for urban design and community planning. This technique is used merely for initiating actual urban design and community planning, but it leads to actual urban design and community planning. Although a charrette will be useful planning technique also in Japan because it can create the start of the community planning, we can see very few trials of the charrette in Japan (Kobayashi, 2002).

GIS seems to be useful in charrette because GIS can provide considerable geographic information to participants efficiently and charrette participants must understand the environments of the focus area. On the other hand, at the engineering research field, the importance of application of the urban related research results to actual planning is pointed out. But the method for the application is not developed. Therefore, providing some lucid advices from some research fields to the charrette participants by using GIS will be significant from the view of actual application of the some research fields’ results.

From such backgrounds, in this study, we practice the charrette with using GIS in Japanese city. In this paper, we reported the outline of the charrette, and discussed about the GIS use in the charrette and the evaluation by the local community. Focus areas were three neighborhoods (Shinyo, Mikura and Takatoriyama) in Nagata Ward that is a ward in Kobe City (Fig.1).

Outline of the Nagata Charrette

Focus Neighborhoods (Fig.2)

1. Takatoriyama Neighborhood (Area: circa 103.7 ha)

Takatoriyama is located in northern Nagata Ward. This neighborhood is a residential area including part of a mountain “Takatori-yama”. Therefore, these residents can enjoy a rich natural environment. Notwithstanding, there are many steep slopes, and natural hazard risks such as floods, landslides and fires. In addition, many narrow streets exist there as well. This neighborhood had no severe damage in 1995. They have social problems such as decreasing

population and aging of residents.

2. Mikura Neighborhood (Area: circa 6.3 ha)

Mikura is located in central Nagata Ward. Its many small factories are located among the residential houses. When earthquake struck, this neighborhood suffered severe damage by fire physically and socially. After the earthquake, local government undertook land readjustment project in this neighborhood. However, many vacant lots exist now because rebuilding is difficult in some cases. In addition, social problems such as the decreasing and aging population confront residents, just as in Takatoriyama.

3. Shinyo Neighborhood (Area: circa 65.4 ha)

Shinyo is located in southern Nagata Ward. Some shopping streets are located there, among the residential buildings and small factories. The number of customers and shops has continued to decrease. Although they had physical damage in 1995 in some parts of this neighborhood, the main landscape was unaltered. Consequently, they have had some physical problems such as high density of old wooden houses and narrow streets. They also have persistent social problems such as decreasing population and aging of residents, just as in Takatoriyama and Mikura.

Theme and Goal (Products)

In 1995, Kobe was subjected to a 7.2 magnitude earthquake: the Hanshin-Awaji Great Earthquake. Especially, Nagata Ward suffered severe damage. After the earthquake, residents, local government, designers, and planners made various efforts in its rebuilding. Even now, however, difficulties persist there, including social problems, economic problems, and environmental problems.

Therefore, the goal of this charrette was to propose the urban design for the three neighborhoods in Nagata Ward. The theme of this charrette was “Revitalizing Nagata: Design the Start of Changes”. This includes the meaning “propose a new direction from fresh eyes”. In addition, concrete contents of the proposal were the followings.

1. Concept of the proposal
2. The goal of the plan and narrative for achievement (Short Term / Medium Term / Long Term)
3. Plan for the entire neighborhood (Medium Term / Long Term)
4. Some future images for some sites
5. Prior action that should be completed in 3–5 years

Participants

Participants were 19 graduate students (Kobe University, 9; University of Washington, 10) whose majors were architecture, landscape architecture, and urban design and planning, and they have basic knowledge and skills for urban design. We divided the 19 participants into three teams of 6-7 persons. (One team had targeted one neighborhood.) In Seattle, where University of Washington is located, some charrette is held. Therefore, some participants from University of Washington had an experience to join charrette before the Nagata Charrette.

Process

Nagata Charrette was held in 2006. The Process of the Nagata Charrette is as follows. All activities except for field survey were held at the studio in Nagata-ward, and residents and local planners came to the studio for advising at their convenient time.

1. Introductory session

We held lectures for the participants at the Kobe University on March 10, and at the University of Washington on February 6. At the lectures, we explained the outline of the project as an introduction to the focus neighborhood. And, we also divided the 19 participants into three teams at this session.

2. Monday, March 20

Morning: Introduction (Greetings from organizers, Explanations of the charrette outline, Explanations of the three neighborhoods by residents)

Afternoon: Field Survey

Evening: Studio Work

3. Tuesday, March 21

Studio Work (All day)

4. Wednesday, March 22

Morning: Interim Presentations (Residents and representatives of local governments also joined.)

Afternoon: Studio Work

5. Thursday, March 23

Studio Work (All Day)

6. Friday, March 24

Day Off (Studio work was done according to the team's conditions.)

7. Saturday, March 25

Morning: Studio Work

Afternoon: Final Presentation (This Final Presentations were opened to the public.)

Geographic Information System (GIS) used in the Charrette

System

In the charrette, participants were able to use computers in which GIS software (ArcGIS that is used usually by some participants) had been installed. We prepared this computer with projector for each team, to make it possible for the participants to discuss with watching projected GIS. Accompanying it we customize the GIS as follows.

1. The GIS was customized to make it possible to sketch on the projected GIS on the wall by using pen-like device. (This device also works as a mouse on the projected wall.)
2. The GIS was customized to make it possible to save the sketch on the projected GIS on the wall as a Geo referenced digital data.

Fig.3 shows the image of the pen-like device, and Fig.4 shows the photo in which participants discuss by using projected GIS.

Data

The GIS provided some prepared information (GIS Layers) to the participants. Table1 shows all GIS layers that are prepared for the participants. These layers are divisible into two categories "Basic Information for the Planning", and "Advice Map". "Basic Information for the Planning" included base map, population for each "chome (it is like census track)", building use, and so on. "Basic Information for the Planning" also included the data about the damage when earthquake struck, because the earthquake has a large influence on present environment.

On the other hand, "Advice Map" represents the advices or hints from the view of urban-related research field, such as geo-technical engineering, hydrology, urban climate, and ecology. These maps were made by collaboration with the expert of each field. As an example of the "Advice Map", Fig.5 shows advice map from the view of urban climate that represents corridors of wind. Corridor of wind is important in this area for the ventilation and heat island mitigation. In

addition, participants could also create a new GIS layer based on their field survey.

Products

Every team could make the proposals by using GIS. The summaries of the products are as follows.

Takatoriyama Neighborhood (Title: Community Design with Nature -Protect and Preserve-)

The Takatoriyama Team inferred that steep topography increases natural hazard risks such as landslides and floods and fire risk, while creating difficult situations for access to the houses. It also prevents aging residents' free mobility and decreases community connections. Therefore they proposed the "Satoyama-Open Space" as a buffer zone between the natural area and residential areas at the foot of Takatoriyama Mountain and the valley. "Satoyama" is a Japanese traditional rural landscape that is secondary forest in which people used some natural resources sustainably. It is a traditional village practice of landscape husbandry. This proposal was intended to return residential areas on the slopes to natural areas as population decreases. This team found the following characteristics of this site by watching prepared GIS layers and GIS layers made by the participants.

1. Natural hazard risks (floods and landslides) are high.
2. Fire risk is also high
3. Many houses have access problems.
4. Corridor of wind exists there.
5. A rich ecosystem exists around there.

This proposal is intended to reduce some hazard risks, improve access to the houses, use wind effectively for ventilation and urban heat island mitigation, and restore the ecosystem, while recreating cultural amenity, by changing this site to "Satoyama". Thus, multiple effects will be expected by this proposal. In addition their proposals included some political proposals such as using community bus. Fig.6 shows one of the proposal drawings by Takatoriyama team.

Mikura Neighborhood (Title: Reconnecting Mikura)

The Mikura Team thought that earthquake and land readjustment projects that were

undertaken after the earthquake that particularly examined infrastructure building and disaster prevention extinguished the good points of this neighborhood (connections of residents, vitality, and so on). For such reasons, they set four goals of their plan as follows.

1. Recover human-scale streets again with consideration of disaster prevention.
2. Recover mixed-use land use and vitality.
3. Connect residents, halls, parks, and rivers, and connect Mikura and surrounding areas.
4. Recover lively Mikura again through the vitality-increasing measures of 1–3.

Actually, the plan is classifiable into three phases. At the first phase, they defined the characteristics for each street such as a ring road on which emergency cars can pass, pedestrian path, and so on. They designed a main pedestrian street that connects attractive places and the center of Mikura. They called this street a “spine” and planned mixed-use public residential houses at vacant lots along that “spine”. At the second phase, they planned the connection between Mikura and surrounding areas. At the third phase, they planned compound developments at other vacant lots. They thought that land readjustment, which made much of “safety”, extinguished the other issues such as communication of residents. Therefore, the pillar of this proposal is to make streets for residents’ communication while retaining “safety” by defining the characteristics for each street. This proposal is intended to integrate livability and safety. In addition their proposals included some political proposals such as giving incentives to the households that move from hazard areas such as Takatoriyama Neighborhood to Mikura. Fig.7 shows one of the proposal drawings by Mikura team.

Shinyo Neighborhood (Title: Cultivate Shinyo)

Although immigrant residents from Korea, China, and Vietnam offer many advantages of rich cultural internationalism, the Shinyo neighborhood faces various problems such as a shopping street on which an empty store stands out as a symbol of decreased customer traffic, manufacturing that keeps decreasing, bad manners, residents’ dwindling knowledge about the history and cultural heritage of the neighborhood, high density of narrow streets, aging residents, and sparse natural scenery. This team thought that techniques that impatiently change neighborhoods are unsuitable for this neighborhood because social problems and physical problems are so complicated. They also thought that a careful planning technique that gradually infiltrates the neighborhood is suitable there. Actually, “Node + Pass” that indicates various resources in the neighborhood which exist like points or lines are assumed to be a

concept of the proposal. The team intends to solve various problems by “cultivating (adding new functions or reinforcing the functions)” nodes and passes. For example, changing small vacant lots to attractive open spaces (short term), making a park along the river (medium term), and changing an industrial area in the water front area to a large park are proposed for “cultivation”. Fig.8 shows one of the proposal drawings by Shinyo team.

Discussions

GIS use in the charrette

After the charrette, we asked three questions as follows to the participants, by using questionnaires for investigating GIS effectiveness in the charrette and GIS layers that will be needed in the future charrettes.

Q1. Do you think GIS is useful in the charrette?

Q2. Enumerate five GIS layers (that was not included in GIS this time) that you thought to be necessary for your planning and design process?

Q3. How did you use GIS in the Charrette?

Fig.9 shows the result of Q1. Table2 shows the results of Q2. In Table2, some GIS layers were mentioned by plural participants.

From Fig.9 we can say that GIS worked well in the charrette generally. But relatively Mikura team made a negative evaluation. This seems to be because Mikura is smaller than other neighborhood and spatial resolution of the some GIS layers prepared is not enough when consider about design in Mikura.

In Table2, we can see that some teams mentioned building structure, building age, landownership, and parcel land use. We could not use these kinds of detailed GIS layers that local government has, because they are not open to the public in Japan. On the other hand, in US, these kinds of detailed GIS layers are open to the public, and planners and designers can use them in their planning process. This seems to be the reason why table2 shows many detailed GIS layers. Especially in the case of design smaller neighborhood such as Mikura, these kinds of detailed data should be needed. It seems that making detailed GIS data available for the charrette is important also in Japan.

Summaries of GIS works each team performed are as follows. These are based on the results of Q3.

1. Takatoriyama Team: Grasping the present situations, making base map for the proposals, creating new maps (stairs map, narrow streets map, and fire hazard area map), spatial analysis (picking up inconvenient access houses and fire hazard houses), studying on the planning with overlaying some layers, and making proposals.
2. Mikura Team: Grasping the present situations, making base map for the proposals, creating new maps (vacant land map, vacant building map, and detailed building use map), and 3D volume study.
3. Shinyo Team: Grasping the present situations, making base map for the proposals, creating new resource maps (a stone statue of Jizo map and vacant land map), 3D volume study studying on the planning with overlaying some layers, and making proposals.

As mentioned before, Takatoriyama team could consider some aspects in their planning process and integrate them in their design (Satoyama open space) by using GIS effectively. It seems to be that Shinyo team also used GIS in their design process effectively. For example, when they chose the site for changing small vacant lots to attractive open spaces (short term plan), they selected the site nearby Jizo and wells by overlaying Jizo map and wells map. It intended that the open spaces work as communication places of residents, because Jizo have been located at the center of community historically. And it also intended that the open spaces works when disaster occurred, because wells are useful at the time.

In Mikura, however, the GIS works are limited relatively. As mentioned before, this is because spatial resolution of the some GIS layers prepared is not enough for Mikura.

Evaluation by the Local Community

After the final presentation, we asked three questions as follows to the audience (Local community people: residents, local government officials, planners, researchers and others), by using questionnaires for evaluating the charrette activity. The number of effective answers was 18 (residents: 3; local government officials: 2; planners: 3; researchers: 6; others: 4).

Q4. Do you think this kind of charrette is effective also in Japan?

Q5. Do you think this Nagata charrette will be effective for your activity?

Q6. Do you think the proposals are fresh for you? (for each team products)

Fig.10 shows the result of Q4. Fig.11 shows the results of Q5 and Fig.12 shows the results of Q6. From Fig.10, it can be said that the charrette will be effective also in Japan. And Fig.11 shows that this Nagata charrette has an impact on the local community. Fig.12 shows the all proposals

were fresh for local community and we can say that especially Takatoriyama teams' products had an impact.

Although this charrette got a positive evaluation by local community generally, the opinions "Next step will be important" is also heard. Although the report of the Nagata Charrette was published to the public, we need to promote some outreach activities in the next step.

Conclusions

In this study, we practice the charrette with using GIS. In this paper, we reported the outline of the charrette, and discussed about the GIS use in the charrette and the evaluation by the Local community. From the products and the results of the questionnaires, as results, it is said that Using GIS is effective in the charrette and charrette will be effective also in Japan, in general. However, the GIS works by the Mikura team were limited relatively. This seems to be because spatial resolution of the some GIS layers prepared is not enough for Mikura, which is smaller neighborhood. Especially in the case of design smaller neighborhood such as Mikura, detailed data should be needed. It seems that making detailed GIS data available for the charrette is important also in Japan. It can be also said that charrette will be effective also in Japan by this study. Therefore, the method of promoting outreach activities will be established.

References

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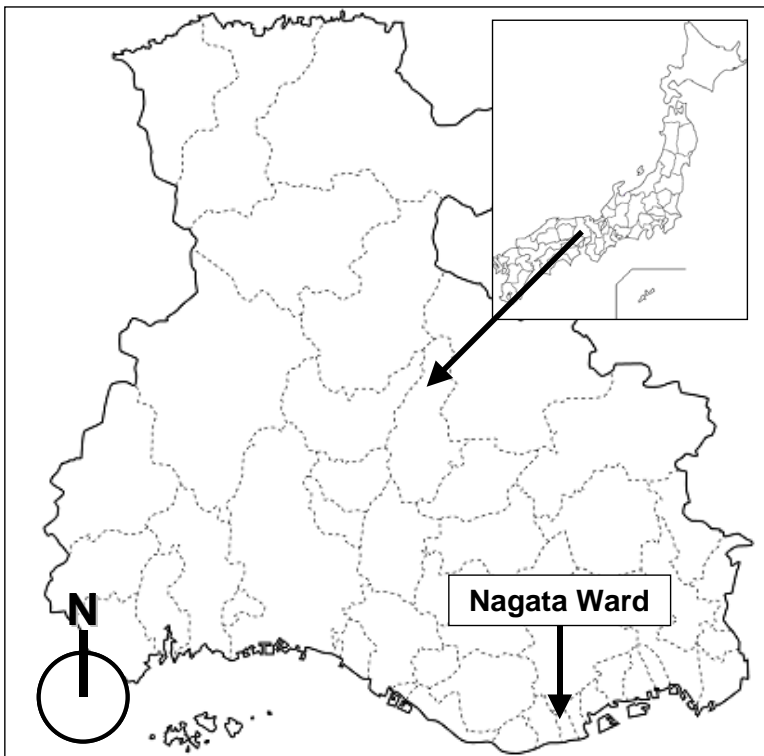


Fig.1 Place of Nagata Ward

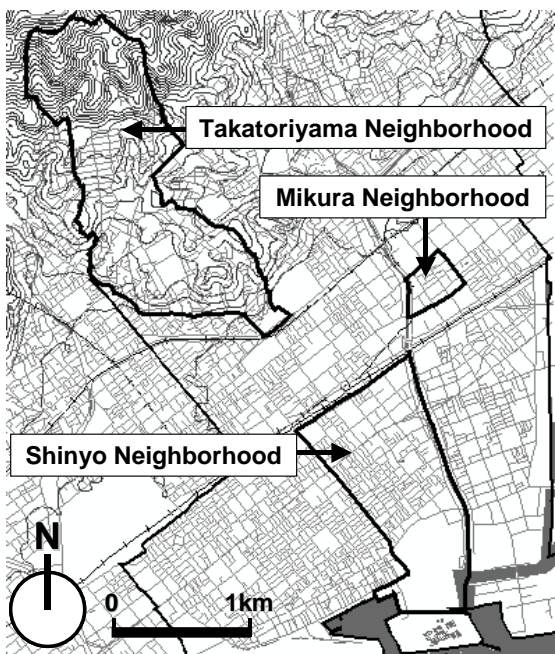


Fig.2 Focus neighborhoods

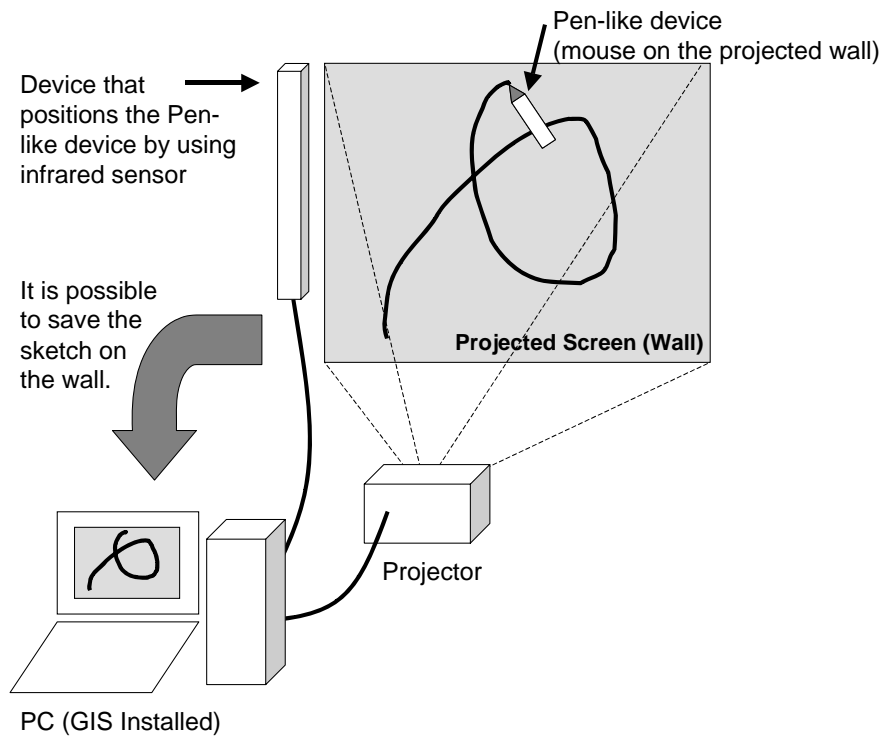


Fig.3 Image of the pen-like device



Fig.4 Photo in which participants discuss by using projected GIS

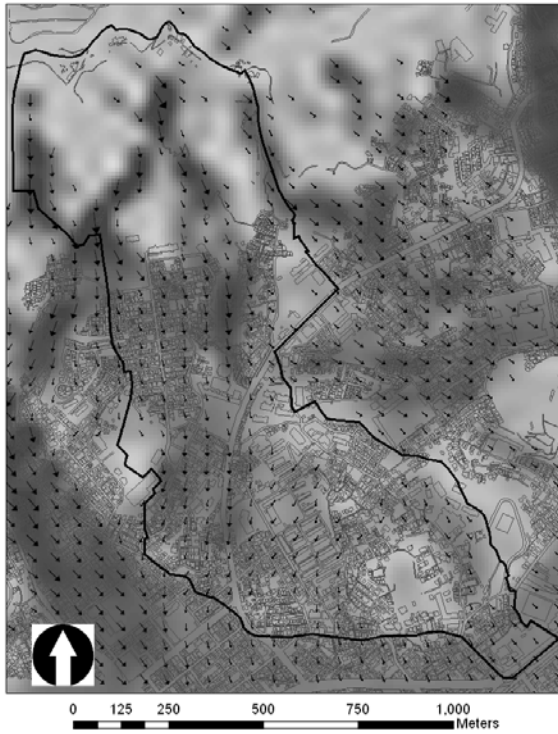


Fig.5 Advice map from the view of urban climate that represents corridors of wind

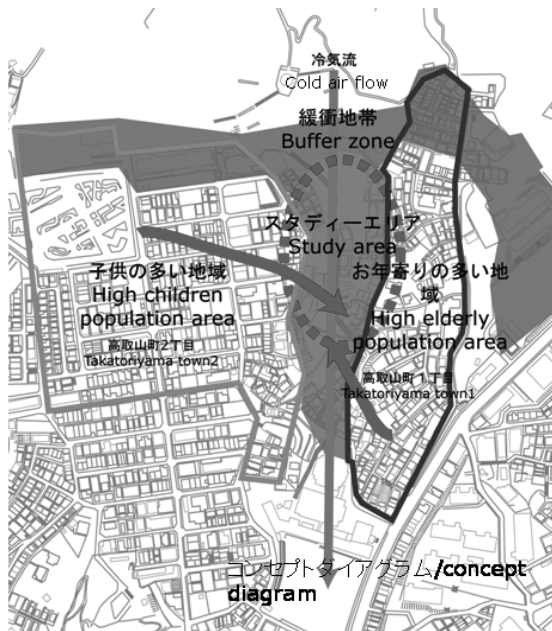


Fig.6 One of the proposal drawings by Takatoriya team (Grey area is the site for “Satoyama-Open Space”.)



Fig.7 One of the proposal drawings by Mikura team (“Mikura Spine”)

**異なる活動主体が真陽をタガヤス
Potential Responsible ORGs**

「ノード」と「パス」による柔軟で継続的なまちづくりを進めるためには、多主体によるタガヤシが必要である。

It is necessary to cultivate it by a multi subject to advance a flexible, continuous development by "Node" and "Pass".



- 地区住民
Residents
- TMO、組合、町内会などの団体
Community Organizations
- 企業
Business
- 行政と企業
Government & Business
- 行政と団体と住民
Government, Organizations & Residents
- 行政と団体
Government & Organizations



Fig.8 One of the proposal drawings by Shinyo team (Potential responsible organizations that “cultivate” “Node” and “Pass”)

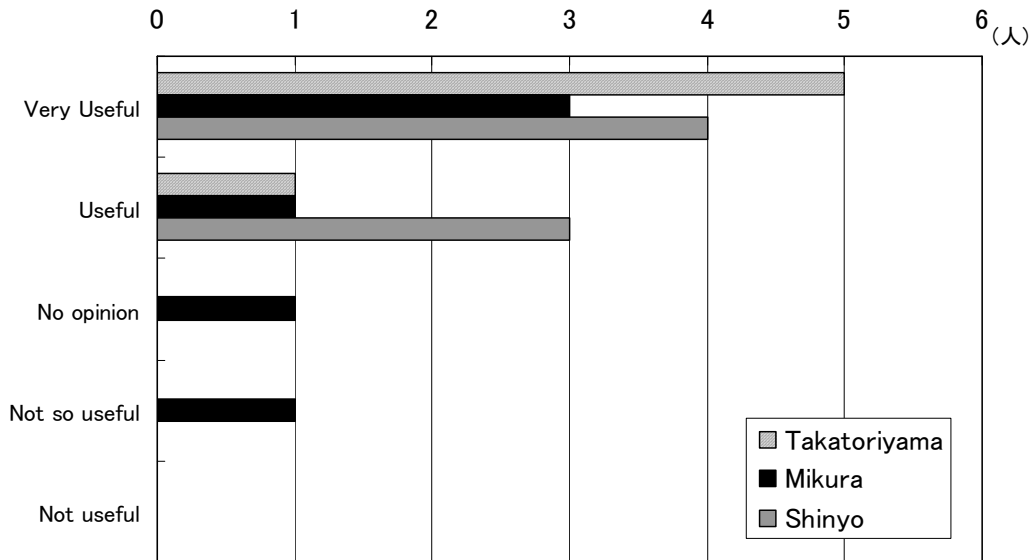


Fig.9 Results of the Q1 “Do you think GIS is useful in the charrette?”

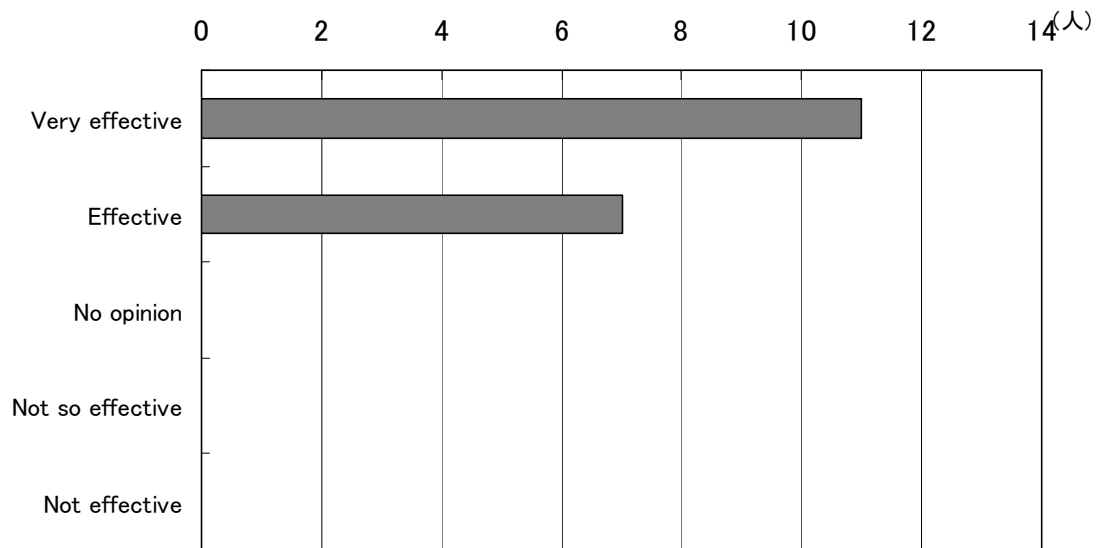


Fig.10 Results of the Q4 “Do you think this kind of charrette is effective also in Japan?”

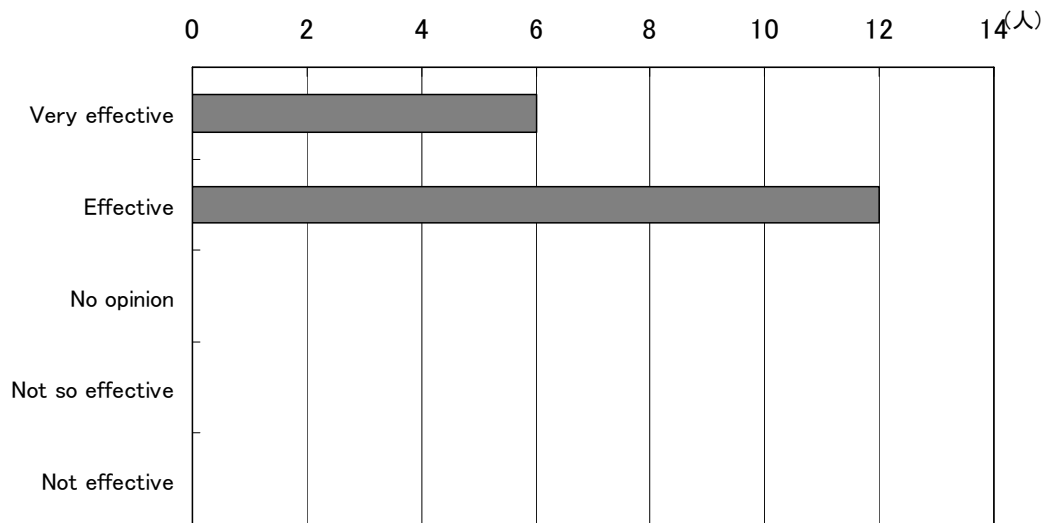


Fig.11 Results of the Q5 “Do you think this Nagata charrette will be effective for your activity?”

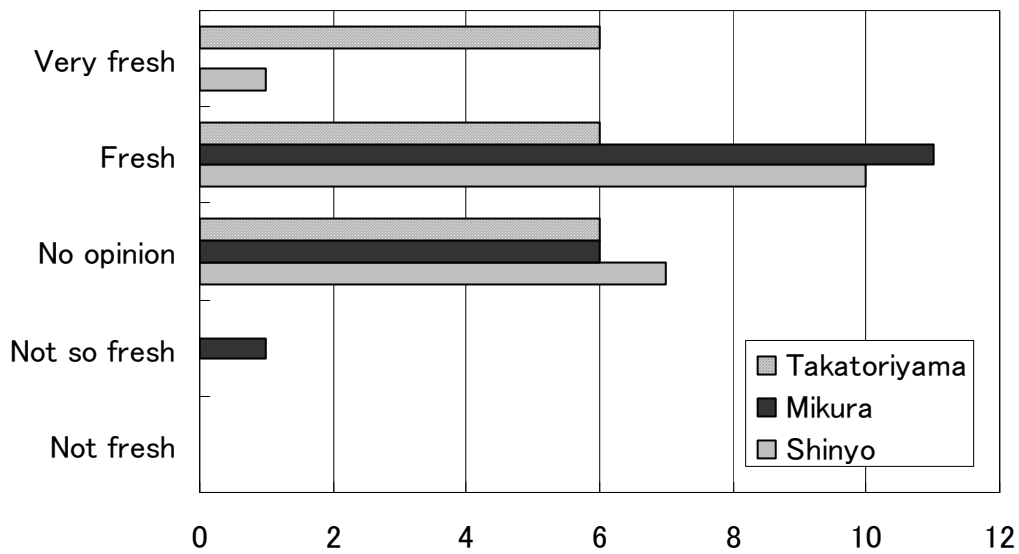


Fig.12 Results of the Q6 “Do you think the proposals are fresh for you?”

Table1 All GIS layers that are prepared for the participants.

Focus Area	Category	GIS layers	Comments
Nagata ward (Including 3 neighborhoods)	BI	Base Map	Made from DM data made by local government.
		Population	for each "chome (it is like census track)".
		Population Density	for each "chome (it is like census track)".
		Population (Over 65 years old)	for each "chome (it is like census track)".
		Population Density (Over 65 years old)	for each "chome (it is like census track)".
		Building Use	Made from building map made by private firm
		Elevation	Made from DM data made by local government.
		Railway	Include stations.
		Water System Network	Made from DM data made by local government.
		Aerial Photo	taken in 2002. (Geo-referenced).
		Liquefaction in 1995	Liquefaction area when earthquake struck.
		Retaining Wall Damage in 1995	Retaining wall damage area when earthquake struck.
		Building Damage in 1995	for each "chome (it is like census track)".
	Grand Displacement in 1995	Grand Displacement when earthquake struck.	
	AM	Vegetation Map	Advice Map from Ecology.
		Geomorphology Map	Advice Map from Geography.
		Old Pond	Advice Map from Geotechnical Engineering.
		Landfill (Old Valley)	Advice Map from Geotechnical Engineering.
		Old River	Advice Map from Geotechnical Engineering.
Old Shoreline		Advice Map from Geotechnical Engineering.	
Flood Zone in 1967		Advice Map from Hydrology.	
Takatoriama	BI	Park	Made by local community.
		Building Stories	Made from DM data made by local government.
		Building Damage in 1995	Buildin damage gradet when earthquake stuck. (Field survey results right after the earthquake)
	AM	Corridors of Wind Map (Path of the Wind)	Advice Map from Urban Climate. (based on numerical simulation)
		Surface Temperature Map (Daytime and Nighttime)	Advice Map from Urban Climate. (by using airborne thermal infrared sensor)
		Flood Hazard Area Map	Advice Map from Hydrology.
		Debris Flow Hazrd Stream Map	Advice Map from Hydrology.
		Landslide Hazard Area Map	Advice Map from Geotechnical Engineering.
		Wells Map	Advice Map from Disaster Mitigation Planning.
		Mikura	BI
Building Stories	Made from DM data made by local government.		
Building Damage in 1995	Buildin damage gradet when earthquake stuck. (Field survey results right after the earthquake)		
AM	Place that Residents Like		Advice Map from community planning.
	Place that Residents Don't Like	Advice Map from community planning.	
Shiryo	BI	Surface Temperature Map (Daytime and Nighttime)	Advice Map from Urban Climate. (by using airborne thermal infrared sensor)
		Park	Made by local community.
		Building Stories	Made from DM data made by local government.
	AM	Building Damage in 1995	Buildin damage gradet when earthquake stuck. (Field survey results right after the earthquake)
		Aging People Beviar Map	Advice Map from Urban Transportation.
		Wells Map	Advice Map from Disaster Mitigation Planning.
Street Width Map (Narrow Street)	Advice Map from Disaster Mitigation Planning.		

Table2 Results of the Q2 “Enumerate five GIS layers (that was not included in GIS this time) that you thought to be necessary for your planning and design process?”

Category	Takatoriya	Mikura	Shinyo
Building	Building Structure	Building Age	Building Structure Building Age Building Height
Land	ParcelLandownership	ParcelLandownership ParcelLand Use Parking Lots Land Value	ParcelLand Use Vacant Lots
Social	Job Income Population of Home AllA bne	Housing RentalFee	Income Households' Members Working Place
Environment	Watershed		
Others	Voice from Community	Human Behavior	