Designing Cloud Computing into Taipei City: A Pilot Study of the Service Design from Taipei Cloud

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Abstract. For offering holistic service quality, in 2013, the Taipei City Hall promote "Taipei Cloud" service for citizen to enhance web services based on convenient, free, and public Wi-Fi hotspots all over the city. This pilot experiment explores on user experience and perception of "Taipei Cloud" service from subjects' usage by participant-observation to know whether "Taipei Cloud" service can match subjects' demand in their daily life. Six subjects use "Taipei Cloud" service randomly to obtain their cloud computing data record by their smart mobile phone APP during their own trips. Then, time-geography theory is applied to be evaluated subjects' usage. The finding are shown that: (1). there is no direct correlation between time and spatial facts through subjects' usage on citizen cloud service; (2).Until now, in subjects' opinion, to share or contact others should be a function added in citizen cloud; (3).To compare subjects' usage of citizen cloud, "command" is more popular than other online actions.; (4).In holistic user experiences, subjects usually prefer higher interaction with cloud computing service.

Keywords: Taipei Cloud, Location-Based Service, Time-Geographic.

1 Introduction

Recently, due to full-fledged technology of IT, the mobile value-added application is increasing to be the hottest topic. The cloud computing is vital to success of value-added application. Moreover, the cloud computing technology can affect directly the preference, effects, and experience of users in the area of mobile value-added application. In 2013, Taipei City Hall begins to promote "Taipei Cloud" service, not only for citizen to offer convenient, multifaceted web platform, but also for conducting better public quality. Especially, "Taipei Cloud" service is constructed at the base of "TPE Free"; it is official, convenient, and free Wi-Fi service, spread in all over Taipei city just like many traffic stations, libraries, and official units have been set hotspots.

This study chooses the "Taipei Cloud" service as a case study and experiment. The purpose of this paper aims at exploring on the different user experience by mobile devices through "Taipei Cloud". To focus on the usage situation and user experience of the commuters and travelers, move outdoor with specific distance traffic-demand. The researchers engage in participant-observation to focus and record the behaviors of six subjects on using "Taipei Cloud" service in their own trips. After experiment is finished, the researchers conduct draw down the space-time prism figures. The study do questionnaire interview of participants. They are asked individually to describe and explain the user experience of "Taipei Cloud" service they feel. Finally, the researchers integrate all result to conclude the study.

The research will be guided most generally by literatures of time-geographic theory combined. The models of the space-time prism from time-geographic theory will offer principle of experiment design and measurement. Moreover, the study adopts service design process based on service thinking as applied approach.

2   Literature Review

This section firstly reviews related literatures of time-geography and its space-time prism concept, methodology; then, introduces the features of the service design process that will be applied to arrange this experiment design.

2.1   Time-Geography Concept and Space-Time Prism

The time-geography concept is proposed initially by Hägerstrand [3] for regional scientists as a research approach. According to Hägerstrand [3], time geography theory is placed emphasis on individuals' movements in space-time path as well as how individuals, groups, and institutions route activities through space–time of daily life that defined by the availability of these two interrelated resources. Taking time and space as two elements to be a shared social arena or stage, people can interact with other individuals, agencies, and institutions [4-5]. However, the time–space interactions are naturally limited and constrained and extremely dependent on the daily geographies of people [5-6].

As above mentioned, a concept of time-geography theory so-called "space-time prism" proposed by Hägerstrand [3] has been developed to estimate the some locations of people's daily life. In space-time prism, the fixed venue and the actors involved in the formation of two locations prism on a continuous timeline constitutes a trip arranged by travel plan the day's activities.

Moreover, every place crosses its time point to form a space-time path [9]. Typically, the space-time prism concept has been used to explore on activity patterns in a theoretical sense and the effect of constraints, such as work hours and family activities [1]. Recently, the applications of space-time prism have focused on examining to the people from numerous segments what extent activity patterns can be accommodated [7-8, 10-11]. The space-time prism and space-time path are shown by Figure 1.
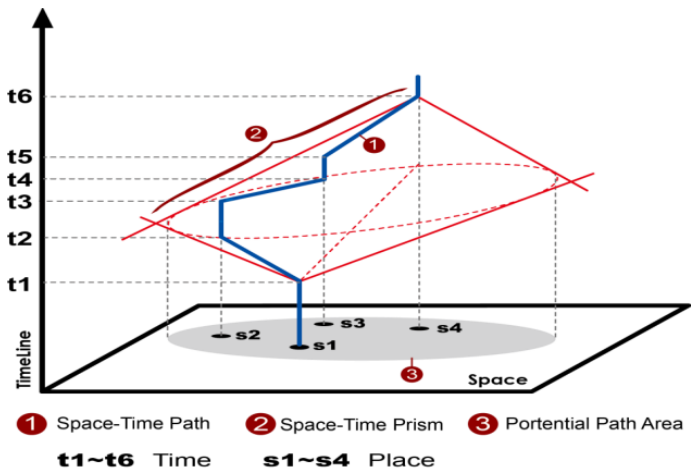
Fig. 1. Space-Time Prism Model

2.2   Service Design Process

Even if every designer requires a little diverse design approach and different design background also own their methods of working, whereas the value of co-creation emphasized in a service design project, hence, to care common novices there is a general model for all participants to use. The Design Council UK [2] has developed the "double diamond design process" model to divide into four distinct phases: Discover, Define, Develop and Deliver named the 4D method. In this model: 1. Discover: the first quarter of the 4D method, designers gather inspiration and insights, identifying user needs and developing initial ideas; 2. Define: within this step, designers try to make sense of all the possibilities identified in the Discover phase; 3. Develop: from this process of trial and error, designers construct some solutions, prototyped, tested. It also helps designers to improve and refine their ideas. 4. Deliver: the resulting product or service is completed and launched by all participants.

The 4d method leads how the design process forwards from one point where thinking and any possibility is as broad as possible to situations what they are consciously narrowed down and focused on distinct objectives. The double diamond design process is shown by Figure 2.
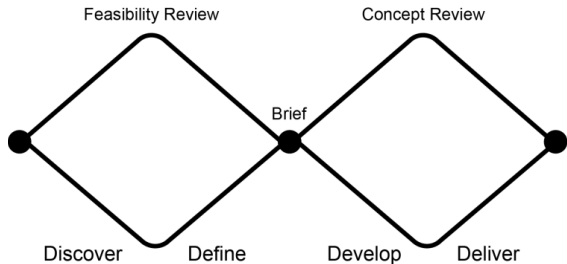

Fig. 2. The Double Diamond Design Process (Design Council, 2005)

3   Research Design

This section represents the research design that adopted in this pilot study. The main research method is experiment. The mobile devices are adopted in experiment to record space-time data of citizen cloud going with space-time prism model from time-geography theory.

3.1   Research Flowchart

The study is separated four steps to explore the usage of "Taipei Cloud" service and subjects' user experience. The research flowchart refers to 4D method developed by design council UK. We modify the 4D method as well as integrate cloud computing and time geography method into the research flowchart, shown by Figure 3.
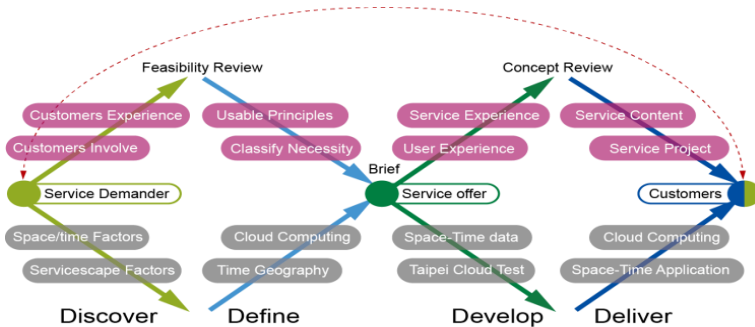

Fig. 3. Research Flowchart

3.2   Estimative Material and Subjects

The web platform named "Taipei Cloud" service contains 5 group-networking services: 1. Citizen cloud service; 2. Enterprise cloud service; 3. Education cloud service; 4. Health cloud service; 5. Opening data cloud service. Although the "Taipei Cloud" service platforms are established by different organizations, through monitor of government, some of them are not online yet like Enterprise cloud and Health cloud.

Therefore, to consider the holistic, essential, and functional constraining of cloud computing, the study selects Citizens' cloud service to be our estimate materials. For handling experiment smoothly and avoid the visual interference, we separate four teacups to put in independent boxes and cover top only retain front transparent for taking pictures. The citizen cloud service includes any contents of information, data that citizens should need and obtain, at the same time, it offers all registered web citizen to own 5GB web space to store, upload, and download data.

The study chooses subjects with the different carrier randomly as possible through social network websites. Six subjects volunteered to take part in the experiment. The age ranged from 19 to 24 years. All subjects are chose randomly from a social

network website. Caused by experimental necessity, all subjects are asked to confirm that they have a mobile device with cloud computing app ready to run in 3G internet environment. The information of six subjects is listed by Table 1.

Table 1. The Information List of Subject Teams

No.	Age	Gender	Code Name
1	22	Male	M122
2	23	Female	F223
3	19	Male	M319
4	21	Female	F421
5	23	Male	M523
6	24	Female	F624
Total	F:22.6 (mean)	F:3	6
	M:21.3(mean)	M:3	

3.3   Experimental Procedure and Method

Before beginning of experiment, all subjects must own mobile device with 3G/Wi Fi function (like smart phone, tablet etc.). Then, researchers tell the subjects the aim, rules and explain that there is no time limited, just feel free to record their own using state of citizen cloud during their journey by their mobile device. This procedure is adopted individually from any place where subjects move to another one. When the subjects interact with citizen cloud service, the time and places of operation are recorded.

Finally, all contents of data are generalized to analyze. The relationship among one-day mobile application, subjects' behaviors by Facebook's "check in places", Google map "search" can assist our study to explain the usage of subjects in citizen cloud service. The experiment procedure of "Taipei Cloud" service is shown by Figure 4.
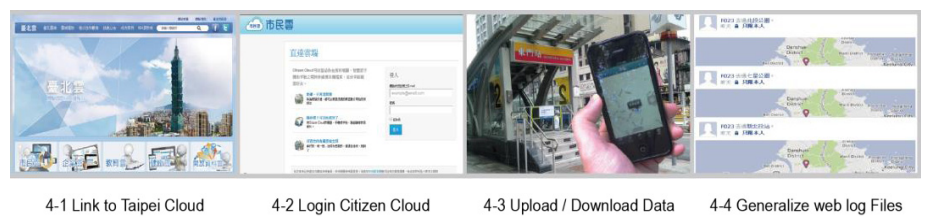

4-1 Link to Taipei Cloud   4-2 Login Citizen Cloud   4-3 Upload / Download Data   4-4 Generalize web log Files

Fig. 4. Experiment Procedure

4   Result

4.1   Spatial-Temporal Behavior

The space-time path made by all subjects and the usable behavior of citizen cloud can be shown by Figure 5. By Figure 5, the behavior of six subjects on citizen cloud is spread on the space-time paths. The more common behavior on all paths is "command" and "search". On other hand, the behavior of fewer times is "download".

From Figure 5, the study classifies the total time and contents on usage of citizen cloud are shown by Table 2.
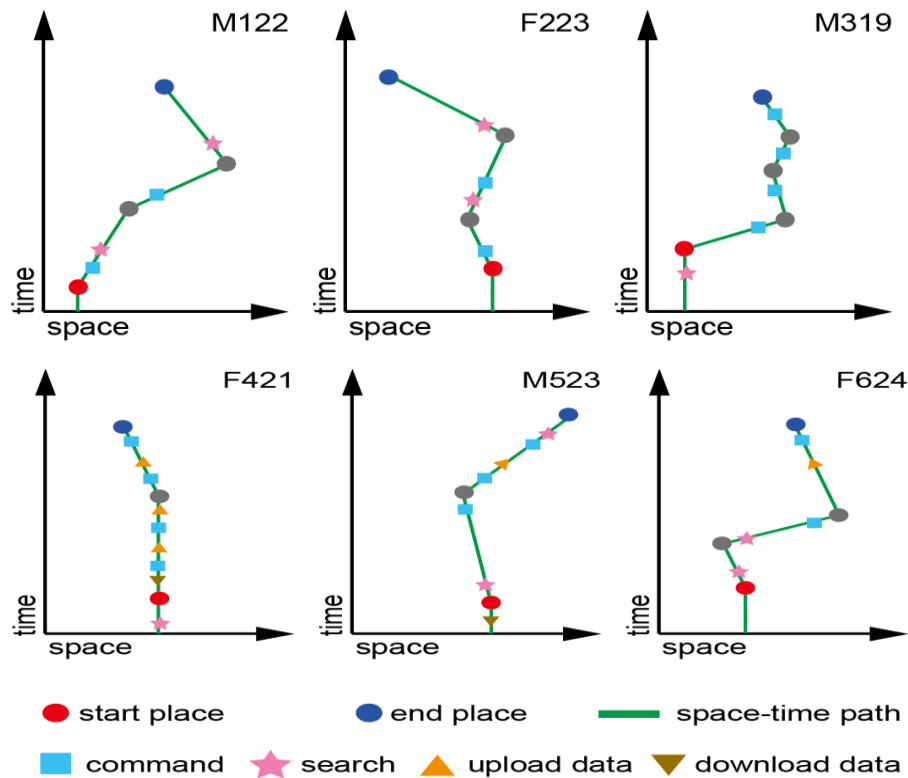

Fig. 5. The Subjects' Behavior of Citizen Cloud on Space-Time Path

By Table 2, it takes 272 minutes totally from six subjects on citizen cloud and the much time is devoted to "command" than other actions.

Table 2. The Information List of Subject Teams(unit: minutes)

subject.	🟦 command	⭐ search	🔺 upload data	🔻 download data	**Total**
M122	14	22	0	0	36
F223	19	26	0	0	45
M319	37	10	0	0	47
F421	34	12	11	6	63
M523	32	8	4	4	48
F624	14	16	3	0	33
Total	150	94	18	10	272/6=45.3

5   Conclusion

Although this pilot study we adopt small samples in test experiment, the findings are shown as followed:

1. In this pilot study, there is no direct correlation between time and spatial facts through subjects' usage on citizen cloud service.
2. According to the subjects' commands, the speed of internet result in directly different preference of usage during their journey.
3. When subjects login their own   account into Taipei Cloud services, there are some intruption to bother them.
4. Even if users can only share or contact others by citizen cloud, the subjects still would like generate contents through cloud computing.
5. In holistic user experiences, subjects usually prefer higher interaction with cloud computing service, such as social networking, search engine with electric map service.

By the theory of time-geographic, this study tracks contents of spatial-temporal behavior for the people (commuters and travelers), middle dependent on moving around Taipei city. In addition, to classify the patterns on usages of mobile devices and types of activity place, the study can realize the characteristics demand on cloud computing and spatial-temporal behavior of interaction with citizen cloud on different places.

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