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[Choi, Jaz Hee-jeong](#) & [Seeburger, Jan](#) (2011) *Sapporo World Window : urban interaction through public and private screens*. In: 2nd IEEE Workshop on Pervasive Collaboration and Social Networking (PerCol 2011), 25 March 2011, Seattle, USA.

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Sapporo World Window

Urban Interaction through Public and Private Screens

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This paper introduces Sapporo World Window, a screen-based application that is currently under development for the new underway passage at the centre of Sapporo City. There are ten large public screens installed in the space, displaying user-generated videos about various aspects of the city and a real-time map that visualises users' interaction with the city. The application aims to engage the general public by functioning as a unique 'point of connection' for socio-cultural and technological interactions, making the space a lively social place where people can have meaningful experiences of interacting with people and places of Sapporo through mobile phones (keitai) and the public screens in the space. This paper first outlines the contextual background and key concept for the application's design. Then the paper discusses the user interaction processes, technical specifications, and interface design, followed by the conclusions and outlook.

Keywords: social networking; urban screens; locative media; mobile interaction; urban informatics

I. INTRODUCTION

Sapporo is the capital city of Hokkaido, the northernmost island in Japan, known particularly for its natural environment, fresh food, and long, snowy winter. Nearly one third (approximately 1.9 million) of the Hokkaido population live in Sapporo [1]. Over 14 million people visit Sapporo annually [1], making the city a vibrant urban hub as the central gateway for Hokkaido. In recent years, Sapporo has joined other Japanese cities such as Nagoya and Kobe in becoming a *Creative City* [2]. To further promote this initiative, the Mayor's Planning Office announced an international call for proposals for the new underground passageway linking the main train station (JR Sapporo Station) and Odori Park, the cultural heart of the city centre.

Officially titled "Space Content Application for the North 2 Underground Public Space in Sapporo Ekimae Street Underground Passage in 2010", the main objective of the project was to create a social space where the general public, government, as well as commercial and cultural sectors can collaboratively engage in promoting and learning about Sapporo's creative industries, tourist attractions, art, culture, and other relevant information, utilising ten large public screens and speakers that are to be installed in the underground passageway [3]. Figure 1 is a visual illustration of the environment.

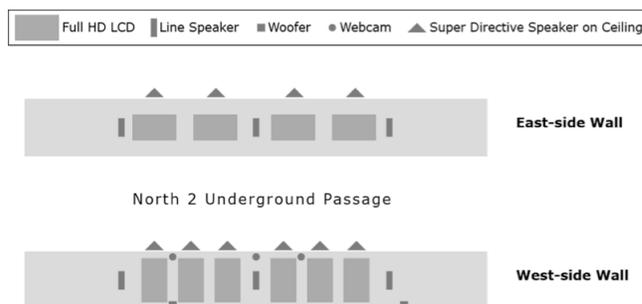


Figure 1. Plan of North 2 Underground Passage

Three key conceptual guidelines were proposed for the development of this environment: that the space is to i) promote the *Creative City Sapporo* initiative; ii) create liveliness to contribute to community development; and iii) be a hospitality place welcoming visitors and encouraging them to interact with local people, understand the culture, and experience the city.

With our colleagues, we proposed the concept of *Sapporo World Window*, a screen-based application that makes use of user-generated content about Sapporo and existing social networking services in order to encourage people to interact with others around them and the city via mobile phones and the public screens. We successfully won the bid. This paper introduces for the first time the conceptual design of *Sapporo World Window*, which is due to be launched at the beginning of April 2011.

II. KEY CONCEPTS

Being the pathway between main national railway station and bustling Odori Park, North 2 underground passage is a transitional space of coming and going, arrivals and departures, and inside and outside; it is a "point of connection" that is built upon and inspires Sapporo citizens to share their creativity with the locals and visitors alike. This unique attribute of the place became the motif for our proposed application, which is reflectively named *Sapporo World Window* (hereafter *SWW*).

Our aim is to turn this fundamentally in-between space into a lively social place, where people, within a reasonably short period of time, can have unique, meaningful experiences of interacting with people and places of Sapporo through screen-based interactive media. "*Urban Screens*

combines the function of the public space for commerce and trade with a cultural role reflecting the wellbeing of urban society: digital moving displays with a new focus on supporting the idea of urban spaces as a space for the creation and exchange of culture and the formation of a public sphere using criticism and reflection” [11].

The screens at North 2 underground passage present a visual ‘window to the outside world’ that enables pedestrians to discover new places, activities, and products as well as to connect collocated people based on their interests utilising their mobile devices in a private way. Symbolically, the ‘window’ metaphor evokes the aesthetic significance of its feature in traditional Japanese architecture as the passage for the light and darkness as described by Junichiro Tanizaki in *In Praise of Shadows* [4], and visibly embodied in many renowned architectural works of Tadao Ando. For the city of Sapporo the window has further symbolic significance as a visual passage with the nature during cold, snowy winter times, linking the interior of the house and people with the external landscape and nature. Our vision for *SWW* is built upon this conceptual ground.

III. URBAN SCREENS AND SOCIAL INTERACTION

In recent years, public digital screens are have become a common feature in urban environments. We often see – at least in developed countries – information displays on public transport systems, commercial advertisements on the digital façade of buildings, and increasingly on interactive touch-screens around central business districts. Urban screens are increasingly and pervasively present and influencing our everyday interactions with information, place, and people.

There have been numerous technical endeavours to increase social interactions amongst co-located people via urban screens and network technologies. For example, *Discussion in Space* [6] utilises urban screens and mobile phones to involve citizens in urban planning and design decisions through digital in-place augmentations. The *PhotoSwapper* [7] application enables urban dwellers to share pictures from their personal mobile devices with collocated people through visualising the images on a public screen to stimulate social user interaction. The *Opinionizer* [8] project visualises humorous and provoking statements on a public screen encouragea bystanders to share their thoughts through commenting via a laptop computer, resulting in real world social interactions. *TiltRacer* [9] is a gaming application utilising mobile phones as an input controller to play a car racing game visualised on a large public display.

In contrast to these research efforts, *SWW* fosuses on keeping the interaction private on the mobile device utilising the public displays as interactive posters that display appealing and useful content for locals and visitors alike. *SWW* considers and aligns to the apparent social behaviour of using mobile phones as socially-cocooning items [10] in public places. While *we* enable users to privately interact with *SWW* through their mobile phones, we also offer them the opportunity to digitally and anonymously partcipate in social user interactions based on common intrests in relation to unique aspects of Sapporo, as visualised on the urban screens.



Figure 2. Impression of the West-side Wall

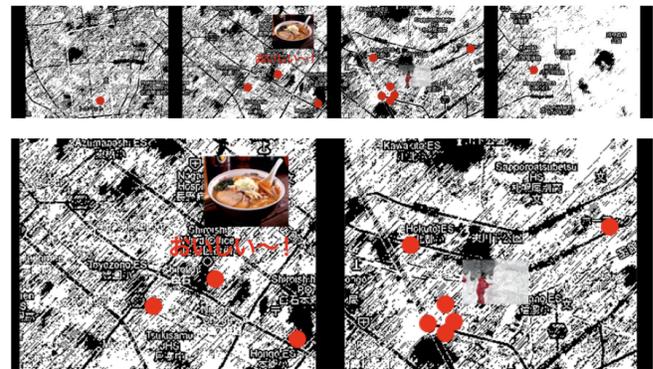


Figure 3. Overview and magnified view of the East-side Screens

IV. INTERACTION PROCESSES

Six west side screens show random selection of user/consumer-generated videos and images (Fig. 2). Audio is played through the super directive speaker above the screen. Social media content related to the specific place such as geo tagged tweets and Foursquare check-ins could also be visualised in form of an animation on top of the image to: (a) get pedestrians attention through dynamically changing content [5] and (b) visualise indicators for the ‘social activity’ at the respective place.

Pedestrians can choose to interact with the chosen video via their mobile phone for more information such as what it is, where it is, who is and who was there, travel route, tips and comments from others, as well as coupons for commercial establishments. The user can also view what other users around them are viewing on their mobile phones and communicate with them. This function encourages sharing of information, as well as understanding and exploring the city together.

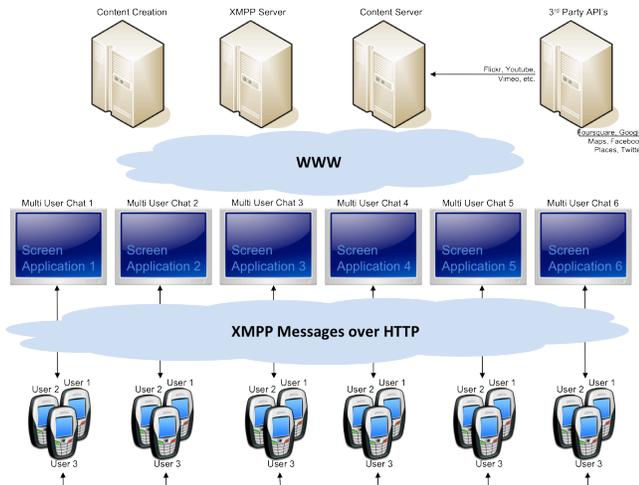


Figure 4. Architecture

Four east side screens display the map of Sapporo (divided into four sections) showing the real-time visualisation of where people have gone to using this application today (via integration with the location check-in function of social networking services such as Foursquare and Facebook), new videos, images, and twitter posts uploaded around Sapporo (e.g. <http://weeplaces.com/foursquare>) - see Fig. 3.

There are five guiding principles for the design of *SWW*:

- Locally specific content, global engagement*: the digital content to be displayed on the screens is uniquely Sapporo in that it is created by the citizens of Sapporo on subjects that are pertinent to the city; the content in turn appeals to and is useful for both locals and visitors.
- Sustained synergy between the private and public sectors through everyday creativity*: all sectors are involved in and benefit from creative outputs shared through the application.
- Strengthening the connection amongst people, place, and technology*: the application encourages social interaction as well as learning and experiencing the city through technological innovation.
- Ease of use*: the application should pose low technological barriers, and integrate effortlessly with existing technologies that are familiar to a broad range of people.
- Replicability within scalable networks*: the application can be implemented in different locations around the world with minor modifications to provide a point of connection and exchange with, for instance, other cities investing in social media innovation (e.g. Oulu, Finland) or Sapporo's sister cities such as Portland, Oregon. Implementations around Hokkaido or Japan (e.g. *Asahikawa World Window / Tokyo World Window*) can also establish regional/national-specific networks (e.g. Hokkaido / Japan networks).

V. TECHNICAL SPECIFICATIONS

This section describes the technologies used for the screen application, mobile application, and the communication between those components. However, it should be noted that the technical system at the North 2 underground passageway is currently being implemented, and thus the final hardware and software that are available in the space will influence the final production and development specification.

A. Screen Application

For visualising different media types such as images and film on the respective screens, a HTML5 frontend will be employed enabling a standardised approach to repurpose and reuse the screen content for future public screens in the city of Sapporo. Each screen will display an individually generated QR code allowing pedestrians to connect to the specific content that is linked to what is currently on display. QR codes are ubiquitously used in Japan. However, to support phones without QR code scanning functionality, an individual web address (such as www.sww.jp/sushi) will also be displayed to broaden accessibility. Additionally, displaying a specific web address on the screen can also contribute to lower the public exposure for privacy sensitive individuals who may not feel comfortable walking in front of a public screen and scan a QR code.

The visualised media for each screen will be delivered through a content server accessing relevant third party APIs according to specified hash-tags and geo-locations during the content creation process. The relevant APIs are Flickr (www.flickr.com) for images, Youtube (www.youtube.com) / Vimeo (www.vimeo.com) for videos, Twitter (www.twitter.com) for geo-coded messages, Foursquare (www.foursquare.com) for location-based check-ins and tips, and optionally Facebook Places for check-ins and wall posts along with other famous Japanese social networking sites such as Mixi (www.mixi.jp). The aggregated data will then be visualised and animated on the screen in an aesthetically pleasing and engaging manner.

B. Mobile Phone Application

The mobile application will be a web-based application allowing a wide range of internet-enabled devices to use *SWW*. However, to give the application the widely recognised look-and-feel of the native iPhone and Android phone applications, frameworks such as JQTouch or the platform and device independent JQuery Mobile Framework will be utilised for the mobile user interface design. By using QR Codes which contain a specific web address, the content server is able to deliver the appropriate content to the requesting mobile phone. This reduces the need for users to launch web browsers on their mobile phones and type in the web address visualised on the specific screen. Additional content will then be delivered to the mobile phone.

C. Screen to Mobile Phone Communication

To enable a near real-time push of content to a user's mobile phone and to manage the presence of other collocated

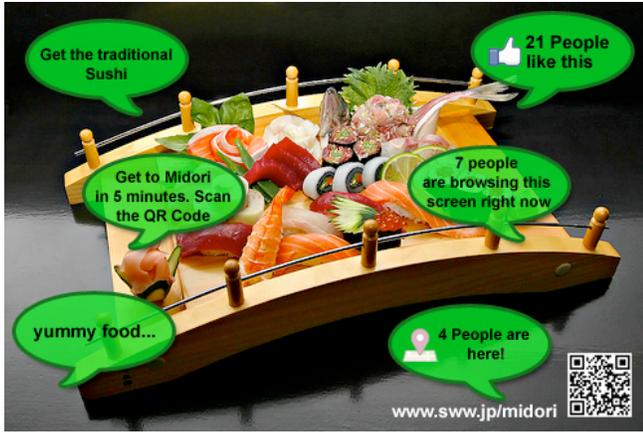


Figure 5. Initial Screen Design

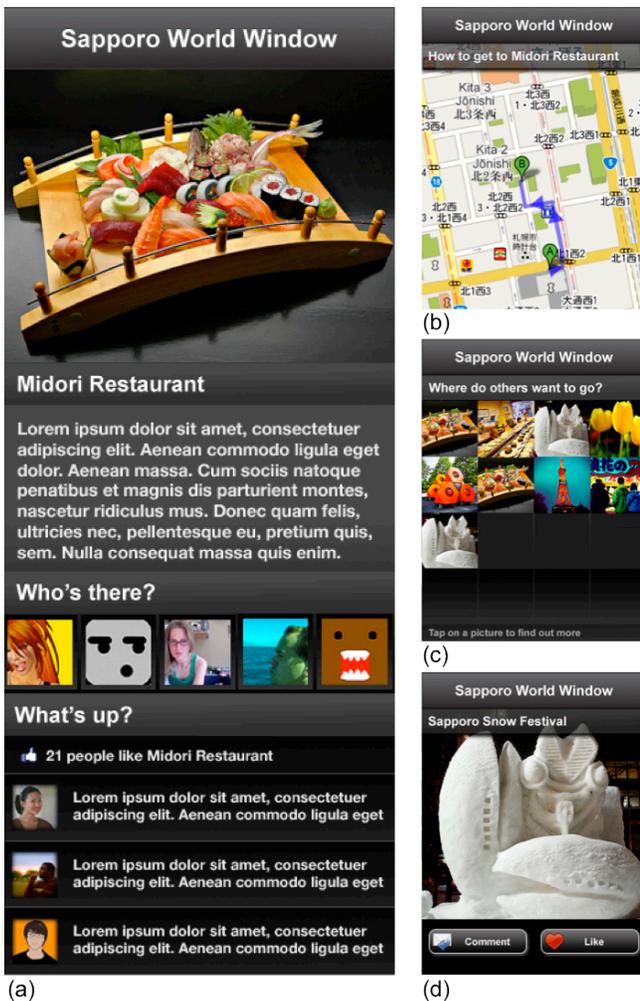


Figure 6. Initial Mobile User Interface

users who are currently interacting with one of the screens, *SWW* will utilise the eXtensible Messaging and Presence Protocol (XMPP). XMPP is an open standard that enables the sending and receiving of fully customisable XML strings such as HTML5. Our architectural approach as illustrated in

Fig. 4 utilises an XMPP server providing a ‘multi user chat’ for each screen application. A content server queries the relevant APIs and sends the results to the respective ‘multi user chat’ which delivers the information to the connected devices. For this purpose, the content server has an XMPP account for each multi user chat room enabling the initial content delivery as well as seamless update functionalities for social media data through sending a broadcast message to the connected clients in the respective ‘multi user chat’ for a specific screen.

The main benefit of employing XMPP for *SWW* is that the protocol enables an efficient way to enable the communication between and visualise the presence of other collocated *SWW* application users. As soon as an application user scans a QR code or types in the specific web address, an XMPP account will be automatically generated and assigned to the regarding ‘multi user chat’. Having access to all users in the same ‘multi user chat’ as well as users in different ‘multi user chats’ allows for the implementation of a real-time system enabling users to discover which screens are currently explored by other users in an anonymous way.

A content creation server will allow administrators to generate new screens for *SWW*, specifying hash-tags, locations, and desired social media types for visualisation.

VI. INTERFACE DESIGN

The visualised user interfaces only display the concept of the urban screen and mobile application. Through rigorous research and testing, the final user interfaces will appeal to Japanese aesthetics as well as being usable and meaningful for tourists and foreigners.

A. Screen Application

Figure 5 shows the initial user interface for one screen whereas the QR code and respective URL are visualised in the bottom right corner. Social media content queried from different sources is displayed in animated speech bubbles on top of the picture or movie. In this example we visualise how many people are currently there, how many people like the respective Facebook page, and two comments sourced from Facebook or Twitter. Additionally, we display how many people are currently browsing through the mobile content of the screen and how far away the respective place in Sapporo is.

B. Mobile Application

Fig. 6 (a) shows the application’s main screen displaying the respective picture or video as displayed on the public screen to give users indication that they are interacting with the selected screen. Additionally, a textual description provides further details about the subject matter depicted on the screen, followed by social media content to indicate the social activity at the location of the subject matter. A tab bar enables users to navigate to a map showing the directions to the geographical location as shown in Fig. 6 (b).

Through visualising social media content on the public and private (mobile phone) screens, we give users an indicator of the social activity at and provide a communication channel for user generated content attached

to a particular point of interest. At the same time, *SWW* also considers the social activity in the underway passage where the screens are installed through visualising which screens other collocated people are currently looking at with their mobile devices. We believe that the sharing of users' interests - that is the information about a place in Sapporo they are currently browsing on their mobile phone while spending time in the underground passage - can further enhance the user experience through giving an additional informational layer about the "hot spots" of the city by providing a sort of social navigation. This approach is visualised in Fig. 6 (c) displaying a matrix of screens. In addition, we provide users with the possibility to contact others in an anonymous and private way to find possible travel and sightseeing partners based on similar interests and/or navigate to the respective content to retrieve information about the viewed screen.

VII. CONCLUSIONS AND OUTLOOK

In this paper we introduced our concept of *SWW*, an application involving public displays and mobile phones to stimulate urban interaction. We aim to enhance the experience of collocated people in the underground passage through presenting and aggregating information about Sapporo by providing a visual 'window to the outside world'.

Whilst the first prototype is currently under development, we aim to inform the final design and development through conducting site observations. This will help us understand how the space is currently socially constructed, and thus how we can best address this in our design of *SWW* for users with various backgrounds and objectives. Additionally, having initial prototypes deployed for short periods of time will inform the final application.

SWW is a unique opportunity to conduct research in the intersection of people, place, and technology in an urban environment involving a real world setting. The first step of this research process will be implementing the screen application and the main mobile user interface as visualised in Fig. 6 (a). The underground passage and the initial development will provide us with a research testbed in a real world setting. This will further allow us to investigate how

we can create meaningful connections amongst collocated application users through collaboratively augmenting places of Sapporo and how such an approach can change the urban experiences for various people.

ACKNOWLEDGMENT

We would like to thank Greg Hearn, Marcus Foth, David Wright, Kohsuke Mikawa, and Amelia Hearn for their valuable contribution to the project. We would also like to thank the Sapporo City Council for co-funding this study.

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