

Emergent Distributed Narratives in Spatiotemporal Mobility: An Exploratory Study on Mobile 2.0 Services

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Abstract

While experiencing space and time at a destination, tourists interact with people and artifacts to create meaning and sense of their experiences. Narratives are the ways in which they communicate, recall and enact the lived experiences of travel. This study deconstructs elements of tourists' narratives to provide insights about the narrativistic attitudes of tourists and conceptualize the framework of private and public narratives. Three basic types of spatiotemporal narratives were identified, along with three elements of narratives. These basic types and elements of spatiotemporal narratives involve interactions and imply different devices and infrastructures. Based on the concept of emergent distributed narratives, this study provides a scenario for future mobile 2.0 service developments.

1. Introduction

The rapid developments of mobile and wireless technologies, along with emergence of convergence devices, are fundamentally changing the way we experience information and communication technologies. First, technologies are increasingly leaving the desktop in the office and start moving along with people, on the street, in the car, and to the park [28]. Second, technologies are increasingly performing non-work related tasks [13]. Mobile devices are being used to take picture of mundane activities [34], to listen music, to guide our navigations, and so on. As mobile devices are becoming an indispensable part of our everyday experiences, the conventional conceptualization of information technology in information systems literature [24] is increasingly becoming problematic. As users of mobile devices perform non-conventional activities in non-conventional contexts, the designers

of these devices and the operators that provide these mobile services need to carefully re-conceptualize how these tools are actually used by the users. Although mobile service operators and device manufacturers have been looking for a “killer” application in the traditional work-related domains, much of the most popular applications of mobile devices such as short messaging systems, ring tone download and avatars show that one might need to look at much more mundane activities in order to find such a killer application.

There have been some efforts to study the *hedonic* use of information systems [33, 35]. These studies show that users have different motivation in using technologies for non-task related activities. Namely, these studies point out enjoyment and playfulness as key constructs that influence users acceptance of technology for hedonic purposes. Although these studies have expanded our way of thinking about the use of information technologies beyond the task-related activities, and related beliefs, such as usefulness and ease of use, they still fail to fully explore how information technology, particularly mobile devices and services, are changing the way we experience our everyday experiences.

Recognizing these gaps in the literature, the primary purpose of this exploratory paper is twofold. First, this study seeks to gain deeper understanding of how individuals experience time and space through the lens of tourism. Second, this study seeks new insights as how to enhance tourists' experiences by supporting digital convergence and mobility. In particular, this study intends to explore how the integration of so-called Web 2.0 technologies into mobile devices will the way tourists experience time and space.

2. Theoretical Background

2.1. Conceptualizing Mobile 2.0

The term “Mobile 2.0” in this paper refers to the integration of Web 2.0 in a mobile device. Although there still is an on-going debate about the exact definition of Web 2.0, it is often referred to as *the participatory web* and associated with user-created contents. Another important aspect of Web 2.0 is its ability to *associate* different contents through tagging, much the same way human actors form social networks. The result is a computing platform that enables emergence of dynamic and complex contents based on ever-changing associations among various elements of user created contents.

Based on those characteristics of Web 2.0, Mobile 2.0 platform can be conceptualized as a mobile computing platform that supports the participatory architecture, which enables the interactive and democratic organizing of the contents by users on the move. Mobile 2.0 thus allows mobile users to easily add contents and participate in the online community. Mobile 2.0, then, is connected to the idea of ubiquitous computing environments [19], hence potentially transforming tourism experiences. Mobile 2.0 platform can transform the tourism experiences because of its participatory and ubiquitous nature. Tourists on the move can share their gained knowledge instantly to help other tourists who travel at the same time but in different places (i.e., space gap), or who travel to the same place at different times (i.e., time gap). Mobile 2.0 in this paper is hence conceptualized as rich, ubiquitous, participatory and emergent tourism environments.

2.2 Theorizing Computing Experiences in Time and Space

Drawing on the tradition of phenomenology [4, 12, 22, 23], we focus on the user experiences in time and space as a way of understanding how potential use of mobile technologies in everyday experiences. In particular, we seek to understand how users move around in time and space, while interacting with their surrounding environments and other people. Drawing on the writing of Lakoff and Johnson [17] and John Dewey [6], we conceptualize individuals live out their everyday experiences as they interact with surrounding contexts defined as time, space, actors and artifacts. Figure 1 shows the basic model of experiential computing [36].

We adopted narrative as the basic mechanism to make sense of lived experiences of real users [25, 26]. Narrative is a fundamental cognitive device in human experience and “(it) has profound effects on the way in which people interact with others in the society” [20]. Much of the social information that people acquire in daily life is transmitted though narrative [1]. People

create stories to organize their experiences [7] and communicate those experiences to others. On the other hand, people may use the self-constructed narratives stored in their memory as a basis for judgments of other people, objects, or events [27]. Thus, it seems that narratives enable people interpret the world around them in order to create meaning and to encourage imagination [8].

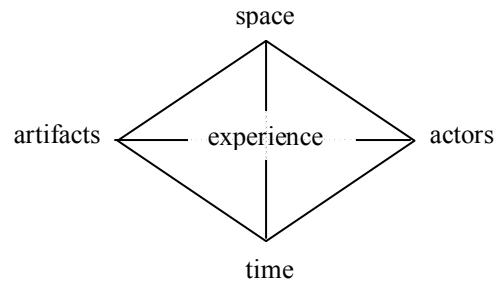


Figure 1. Theoretical Framework

Thus, in this study, we explore how users narrativize their experiences as they move around in time and space. In particular, we focus on the narrativized experiences of tourists in interacting with other people, various forms of artifacts as they move around in time and space. Tourists provide an interesting opportunity to examine how users experience time and space for two reasons. First, tourists are users are radically dislocated in time and space. As such, their narratives are likely to highlight and amplify some of the taken-for-granted everyday experiences that are often easily overlooked [9]. Second, tourism is inherently a lived experience with temporal and spatial qualities. The term “tourist experience” is associated with multiple interpretations from social, environmental, and components of the overall experience. Several writers have attempted to chronologically and temporally define the term tourist experience [14] based on the notion that the experience includes various phases: anticipatory, experiential, and reflective [5]. Furthermore, the tourist experience is becoming increasingly mediated [2], particularly by information technologies [31]. The development of information technology has brought time and space compression, enabling people to experience touristy activities using different modes of travel: corporeal, virtual, or imaginative [32]. The emergence of mobile technologies combined with the internet and multimedia capability allow tourists experience these different modes of travel simultaneously [31].

Tourists communicate their travel experiences through stories as representations of their lived experiences. In constructing a story, experiences are

presented in thematically and temporally related sequences. Therefore, narrative structure provides a framework for causal inferencing about the meaning of tourist experiences [8]. The use of narratives to communicate travel experiences offers the potential for particularly “thick” experiential aspects of a trip. Therefore, for tourism researchers, to recognize that individual's leisure experiences emerge from interactions with situational contexts is to recognize a personal story [29].

In this study, we examine how such interactions lead to the construction of experiences. In doing so, we explore new innovation opportunities for Mobile 2.0 applications.

3. Methodology

The data collection in this study involves naturalistic inquiry with a field study design. The participants were the tourists visiting Philadelphia who were 20-35 years of age and familiar with the basic features of a mobile phone and a digital camera. We recruited participants through the web site of the Philadelphia Visitor's Bureau. Participants were asked to use Nokia's N95 multimedia phone for several hours touring the central city, taking pictures and videos. N95 offers a variety of data services, including personal navigation services, internet browsing, digital camera, video camera, voice recording, FM radio, as well as typical mobile services. The phone has both 3G and Wi-Fi radios and the participants were encouraged to explore different features while touring, using available data services. We used embedded GPS device to record the participants movement in time and space. We also used ShouZu™ service, which record the longitude and latitude of each pictures taken using N95 by the participants. The digital pictures were then uploaded to Flickr™ website, which allows us to locate the photos on a digital map of Philadelphia. Participants were asked to provide additional descriptions for their pictures later.

At the time of writing this paper, a total of 22 participants have completed the tour. We used a multi-method approach in data collection in order to understand the participants experiences as they move around the city, including interview, observation, time-interval survey, and questionnaires.

In the time-interval survey, participants were asked to record every hour where they are, what they are doing, who they are with, what things they are interacting with and how they feel. The participants were given a set of cards consisting list of questions as guidelines for them to respond the questions. We then juxtapose the pictures and videos that they recorded and their recorded movements in order to develop a

complete picture of their experiences in time and space.

The time-interval survey resulted in diverse narratives about tourists' activities related to time and space, their feelings and mood states, and their perceptions toward their own experiences. Here, we report our analysis of the characterization and plots of the stories. Based on the narrative elements suggested by Escalas [7, 8] and Pentland [26], episodes (beginning, middle, end) and episode schema (initial event, psychological state, formation of goals, action, outcomes) were identified from the stories through the combination of a traditional narrative analysis method and grounded theory approach.

The analysis was conducted in two stages. First, we used an open coding method [30] to examine the texts from the narrative data. Here, we focused on how individuals narrativize their experiences with time, space, others and artifacts. This led to the identification of basic types of narrative elements. In the second phase, we employed an axial coding method by applying the theoretical sensitivity to suggest relationships among a category and sub-categories. Once a set of categories and their sub-dimensions were identified, the selective coding process involved linking the different categories to the core category (consisting of conditions, context, and consequences). This process helped us identify the three key types of spatiotemporal narratives that we present in the next section. Using the identified narrative elements, this study seeks to construct visionary scenarios for future mobile 2.0 applications.

4. Tourists' Movement in Space and Time

Our preliminary data analysis suggests three different types of spatiotemporal narrative emerging from the tourists we studied. The first one is goal-directed narrative, the second one is focusing on the interaction with the environment, and the third one is focusing on the interaction with others. For each, we provide an in-depth analysis of the spatiotemporal narrative of a representative tourist. Below, we present these three types of narratives.

4.1. Sojourner: Onon's Experience

Onon is a visitor originally from Mongolia, touring Philadelphia. She is in her 20's and was visiting the city by herself on May 12, 2007 about four hours. Figure 2 shows her movement in the city tracked through GPS.

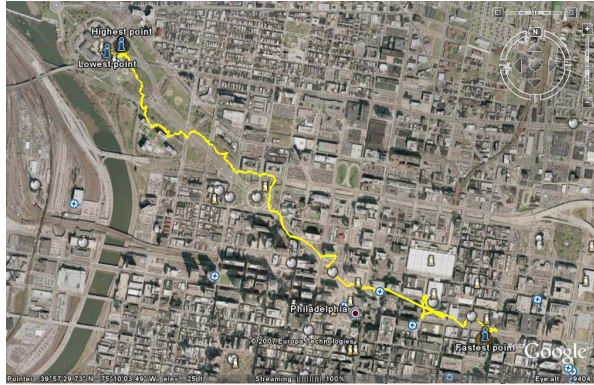


Figure 2. Onon’s Movement

Extract 1 an example of self-centric narratives from Onon. In all of her reports, we can clearly see the sense of direction and goals. In her first report, for example, Onon mentioned that she wants to go the gallery and Barnes & Noble to explore what are there. On her second report, she mentioned that having the feeling to get a task done has made her experience better and nicer; her goal is to find a Mother’s Day gift for her mother (line 1.2.2-1.2.3). The goal might be of social nature, but in the traveling circumstance, her action to achieve the goal is self-centric. Onon made the traveling activities as a context to perform her task; traveling in Philadelphia is a stage, the action of finding a Mother’s Day gift is the performance.

On her third report, Onon described the actions (and outcome of her actions) which caused her to feel even more positive toward her experiences. In her first report (not included in here), she also reports that “it’s getting better, since I’m eating ice cream now.” This again shows how she implicitly connects actions and consequences as she narrates her experiences. As it was pointed out earlier, in Onon’s stories, the contextualization of travel activities (which in this case include the activities of gazing and shopping) is driven by task-based actions to achieve self-goals.

Extract 1. Onon, how would you describe your experience?

First Report: The Terminal Market, 13:41

1.1.1	<i>I think I want to go to the gallery, see what's</i>
1.1.2	<i>inside, just to drop by and look around. I</i>
1.1.3	<i>might go to walnut street for shopping and I</i>
1.1.4	<i>hope to stop by Barnes & Noble and we'll</i>
1.1.5	<i>see what's gonna come up from there</i>

Second Report: The Gallery, 15:48

1.2.1	<i>It's getting better, its getting nicer, I have</i>
1.2.2	<i>this feeling that I'm gonna find a nice</i>
1.2.3	<i>Mothers' Day gift for my mom here... so</i> <i>we'll see...</i>

Third Report: The Gallery, 16:35

1.3.1	<i>I'm more pleased that I got a couple of things</i>
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1.3.2	<i>done, like going to the store, checking out on</i>
1.3.3	<i>the new things, new arrivals... for example</i>
1.3.4	<i>like GAP.</i>

Onon’s narrative represents the type of narrative where individuals’ narratives contain causal inferences of Goal–Action–Outcome. Within the stories, an individual’s activities are presented as performing of tasks to achieve a particular goal. Some of the tourists in this study created interesting narratives that emphasize on achievement of self-goals as key determinants for the quality of their experiences. Also, in this type of narrative, we can see a clear sense of linear movements both in time and space as they map out the next move.

4.2. Anthropologist: Michael’s Experiences

Michael is a 30 year-old male visitor from Austria who came to Philadelphia for visiting family. He toured Philadelphia on May 16, 2007 by himself for about four hours. Given the task to report every hour, his storyline has four reporting points.

Extract 2. Michael, what have you been doing?

First Report: Ben Franklin Parkway, 12:05

2.1.1	<i>I was just walking from the Art Museum in</i>
2.1.2	<i>the direction to the City Hall.</i>

Second Report: Market & 13th Street, 13:03

2.2.1	<i>I was walking from the Art Museum. I passed</i>
2.2.2	<i>by the Love Park and then the City Hall and</i>
2.2.3	<i>now I'm in Market Street. I haven't done</i>
2.2.4	<i>anything special just looked around the</i>
2.2.5	<i>environment.</i>

Third Report: Independence Hall, 14:06

2.3.1	<i>Most of the time I was eating and afterwards</i>
2.3.2	<i>I went now to the Old City.</i>

Fourth Report: Arch & 2nd Street, 14:57

2.4.1	<i>I was going from the Independence Hall to</i>
2.4.2	<i>Elfreth's Alley and mostly looking around</i>
2.4.3	<i>and enjoying the surrounding.</i>

All stories in Extract 2 contain references to places. He describes his movement within the durations between two reporting points. The stories confirm his movement throughout the tour which was stored by the GPS tracking application on the mobile phone that he used for the tour as shown in Figure 3.

Beside the movement from one place to another, which was described on his narratives by the term “walking” and “going,” the tourism activities identified from these stories involve the activity of “gazing,” which was described by the phrases: “look around” and “enjoy the surrounding.”

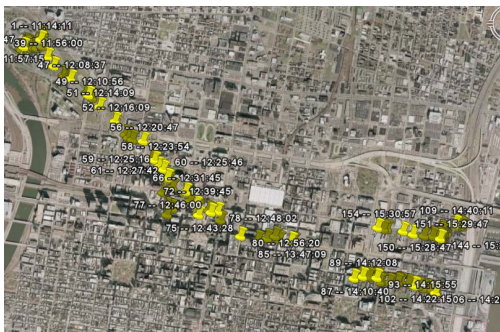


Figure 3. Michael's Movement Pattern

Extract 3 presents his general feeling toward the experiences (e.g., line 3.1.2-3.1.3 and 3.2.1) as well as the “reasons” for those feelings. Michael used references to weather (line 3.1.2, 3.2.3, and 3.3.3), people (line 3.2.2), and places (line 3.1.2 and 3.4.2) as key factors that determine the quality of his experiences.

Extract 3. Michael, how would you describe your experience?

First Report: Ben Franklin Parkway, 12:05

3.1.1	<i>(It) was only very short but it's a wonderful</i>
3.1.2	<i>weather and (it's) quite green here, so it's a</i>
3.1.3	<i>positive experience.</i>

Second Report: Market & 13th Street, 13:03

3.2.1	<i>I think in general it became more interesting,</i>
3.2.2	<i>because it's more vivid, more people are</i>
3.2.3	<i>running around, the weather is nice, so</i>
3.2.4	<i>everything is fine.</i>

Third Report: Independence Hall, 14:06

3.3.1	<i>I was eating food and actually I would say</i>
3.3.2	<i>after eating I became a little tired and it's</i>
3.3.3	<i>very hot outside which even added to my</i>
3.3.4	<i>tiredness.</i>

Fourth Report: Arch & 2nd Street, 14:57

3.4.1	<i>Especially the Elfreth's Alley, I think (it) was</i>
3.4.2	<i>a very nice place with some old houses.</i>
3.4.3	<i>However, I would have preferred this is a</i>
3.4.4	<i>little bigger than just one little tiny street.</i>

Furthermore, Extract 3 confirms the activities of “gazing,” which was identified from Extract 2, by giving references to the objects of the tourist gaze. From Extract 2 we found out that Michael walked pass (and gazed) different places (i.e., Art Museum, Love Park, City Hall, Old City, Independence Hall, and Elfreth’s Alley). Also, from Extract 2, we found out that Michael enjoyed observing the details of the places (i.e., “green” on line 2.1.2 and “old houses” on line 2.4.2) and activities of people (i.e., “more people are running around” on line 2.2.2-2.2.3).

Michael’s narrative represents the second type of narratives where the individual takes an anthropologist position. The stream of stories emphasize on “otherness” of the individual as determinants of the overall experiences. As we identified from Extract 3, Michael pointed out the characteristics of places and people as the reasons for his positive and negative feelings toward his experiences. In his case, the touristy place is not merely a stage, but also the performance. The place and the people are not just mediators for his touristic activities. Instead, he primarily interacted with the contexts, which shaped his experiences.

We can see a similar example from the narrative by Makarand (a visitor from India in his 20s who was visiting Philadelphia and made a tour with his brother in law on May 22, 2007).

Extract 4. Makarand, how would you describe your experience?

Second Report: Center City Post Office, 12:50

4.2.1	<i>It has been very good since I like studying</i>
4.2.2	<i>people, I like psychology, I like seeing</i>
4.2.3	<i>culture and different things it has been...</i>

Third Report: Macy’s, 14:28

4.3.1	<i>Very good, very exciting, because I'm seeing</i>
4.3.2	<i>different things to take back home, I'm trying</i>
4.3.3	<i>on some clothes, etc.</i>

Fourth Report: Love Park, 14:47

4.4.1	<i>It has been really thrilling going about this</i>
4.4.2	<i>whole exercise and doing my other stuff, like</i>
4.4.3	<i>shopping, etc.</i>

From his stories on Extract 4, we found that Makarand’s otherness and his anthropological perspective is clearly displayed (line 4.2.1-4.2.3). However, from the way he described the stories, Makarand can be categorized as a sojourner as he tells the stories from a first-person perspective. This role is becoming clearer after his third report.

Tourists who place an emphasis on otherness in their stories perform the activity of traveling and create the narratives from an anthropological perspective; their primary need is to observe others (place, artifacts, and people) and learn about context.

4.3. Social Being: Sara’s Experiences

Sara is a female visitor in her 30s from Washington DC who came to Philadelphia to “have fun” and enjoy the time together with her friends. She toured Philadelphia on May 26, 2007 with her two friends, Becca and Jessica, for about five hours, resulting in four reporting points for the study.

Extract 5. Sara, what have you been doing?

First Report: Race & 13th Street, 13:05

5.1.1	<i>I've been walking through Chinatown, I</i>
5.1.2	<i>bought some water, walked pass the Liberty</i>
5.1.3	<i>Bell line which was ridiculous, I'm not really</i>
5.1.4	<i>into the American history so I don't really</i>
5.1.5	<i>care about the Liberty Bell, so I just walked</i>
5.1.6	<i>by some horses... and I saw a guy with a</i>
5.1.7	<i>really bad haircut.. I did take a picture of it.</i>

Second Report: Eakins Oval, 14:04

5.2.1	<i>We finished walking down Race Street to the</i>
5.2.2	<i>fountain that down... Logan... Logan</i>
5.2.3	<i>Plaza... Logan Circle... Logan Fountain...</i>
5.2.4	<i>something like that, dip their feet in the</i>
5.2.5	<i>fountain.</i>

Third Report: Chancellor Street, 15:25

5.3.1	<i>I... we have left the Museum of Art, walked</i>
5.3.2	<i>down that big like esplanade thing where the</i>
5.3.3	<i>international flags are... and we walked</i>
5.3.4	<i>upon a Turkish American parade, that was</i>
5.3.5	<i>fun we watched some singing and dancing...</i>
5.3.6	<i>and we walked upon an Italian wedding,</i>
5.3.7	<i>oh... It's so fun to watch the bride come out</i>
5.3.8	<i>the church, there were a lot of interesting</i>
5.3.9	<i>people around, and they were speaking</i>
5.3.10	<i>Italian. That was really great.</i>

Fourth Report: Walnut & 18th Street, 16:32

5.4.1	<i>I actually have only been eating. I went to</i>
5.4.2	<i>Rouge, which is a restaurant splash bar</i>
5.4.3	<i>directly across the street from Rittenhouse</i>
5.4.4	<i>Square.</i>

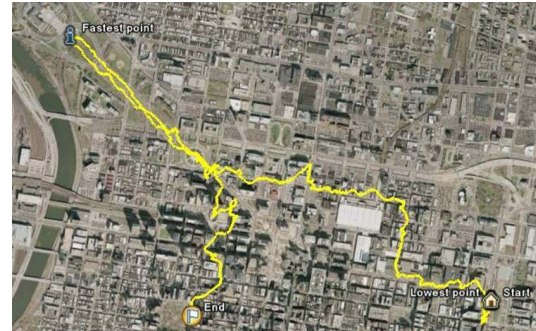


Figure 4. Sara's Movement Pattern

Extract 6. Sara, how would you describe your experience?

Second Report: Eakins Oval, 14:04

6.2.1	<i>Our experience has been really great, really</i>
6.2.2	<i>pretty city, easy to walk to, people on the</i>
6.2.3	<i>street seems pretty nice, the experience</i>
6.2.4	<i>overall has been good.</i>

Fourth Report: Walnut & 18th Street, 16:32

6.4.1	<i>My experience has been great, I had a really</i>
6.4.2	<i>lovely time with my friends and the food was</i>
6.4.3	<i>really great and the staffs and the people</i>
6.4.4	<i>sitting around us were really really nice,</i>
6.4.5	<i>and... it is wonderful.</i>

Her narratives contain references to places which confirm her movement pattern which was recorded by the GPS application on the mobile phone (Figure 4). In addition, we found that Sara perceived (and shared) her experiences as more than mere movements from one place to another but also contain many encounters with interesting and touristy events and sights. The activities identified from Extract 5 are not just “gazing” (e.g., line 5.1.5-5.1.6 and 5.3.1-5.3.3) but also include her interactions with the object of gazing (e.g., line 5.1.7, 5.2.4-5.2.5).

An important part of Sara’s experiences is her interactions with others (both her friends and people at the sites). The degree of interaction varied from just “laughing at” the scene (the Liberty Bell Line, on line 5.1.2-5.1.4), taking picture (line 5.1.7), and being a part of the event (line 5.3.7-5.3.10). These interactions are confirmed further on Extract 6 that presents excerpts describing her perspectives toward the experiences and factors determining the quality of her experiences.

Sara described her positive feelings toward the experiences (line 6.2.1, 6.2.4, 6.4.1, and 6.4.5). The factors that determine the positive experiences are the sights (“pretty city” on line 6.2.2), the convenience (“easy to walk to” on line 6.2.2), the service (line 6.4.2-6.4.4), and the people (line 6.2.2-6.2.3 and 6.4.3-6.4.4). Furthermore, we can conclude from her stories that she enjoyed the travel because it gave her opportunities to relate and interact with people. She was having a good time with her travel mates (fostering relationship with friends) and interacting with other people she encountered during the trip (e.g., people who were sitting around her at the restaurants). Unlike Michael to whom the places and contexts were the main driver of experiences, for Sara, the places and contexts were merely mediate her interactions with others or provide a backdrop of such interactions.

Sara’s experience highlights the type of narratives where social interactions with others become the main driver of individual’s experiences. For individuals who enjoy the activities which enable them to relate to and interact with others, this type becomes the primary type of narrative. Their primary needs are to interact with others. For them place and other artifacts become just a stage and social interactions are the main performance.

Another example can be found in Rahul’s stories presented on Extract 7. Rahul is a visitor from India in his 30s who was touring Philadelphia on May 22,

2007. During his tour, Rahul met different friends and acquaintances in different places. It is interesting to find that his movement pattern and his activities were mainly driven by his meetings with his friends (see line 7.1.1-7.1.2, 7.2.1-7.2.2, and 7.3.1-7.3.3). On his third report, Rahul even described how his plan has changed because of his friend. He postponed the plan for having lunch and instead followed his friend who had some works to do at Jefferson hospital. The story shows how Rahul was flexible with his travel plan and activities as he placed a greater emphasis on the meeting (and interaction) with his friend.

Extract 7. Rahul, what is your plan for the next hour?

First Report: Rittenhouse Square, 11:28

7.1.1	<i>I'm going to be visiting some friends...at 21st</i>
7.1.2	<i>& chestnut, at Riverview (Place), and once I</i>
7.1.3	<i>finished that we're planning to step out for</i>
7.1.4	<i>lunch... so once I'm through with that... I</i>
7.1.5	<i>will decide my next course of action</i>

Second Report: JFK and 18th Street, 13:20

7.2.1	<i>My plan for the next hour is to go to City</i>
7.2.2	<i>Hall, catch up with some friends and then go</i>
7.2.3	<i>out for lunch.</i>

Third Report: Jefferson Will's Eye, 13:50

7.3.1	<i>I was earlier to go for lunch... but now my</i>
7.3.2	<i>friend had to finish this work so we've come</i>
7.3.3	<i>here... so... once this work is done I will</i>
7.3.4	<i>head out for lunch</i>

5. Basic Elements of Spatiotemporal Narratives

The preliminary analysis of our data reveals three important elements of spatiotemporal narratives that provides insights for future Mobile 2.0 applications. These elements can be found in all three types of narratives that we discussed in the previous section, with different degree of emphasis.

5.1. Narrative as identity-shaping device

Narratives serve as an identity-shaping device for individuals as they move around in time and space. Through storytelling, individuals construct and reconstruct their identity. Here, narratives mediate the relationship between individuals' actions and their identity in two different ways. First, an individual's actions are shaped by his/her own identity. This relationship is mediated through individuals' own narrative about themselves. Here, individuals skillfully monitor their own actions in the durée of on-going actions and try to maintain a coherent self-image [11].

Such *reflexive narratives* are displayed as Sara when she says: "I walked pass the Liberty Bell line which was *ridiculous*. I'm not really into the American history so I don't really care about the Liberty Bell". Her own narrative about herself as a person who is not really into American history guided her actions of skipping one of the most important historic tourist sites in Philadelphia. Such a narrative is inherently reflexive, and impromptu.

Second, an individual's identity is shaped through the reflection and recollection of past events. Through such *reflective* narratives, individuals make sense of the past evenings and make meanings of events and places. When Michael saw old houses in Philadelphia with stairs outside of the side, he records: "When I was a child and saw a film from the U.S., I was wondering why they have all the stairs outside the house? Many questions and no answers after a nice travel day in Philadelphia." Similarly, after seeing the footprint of Rocky, he recalls: "Rocky is a giant. Like a real dinosaur he left his heavy footprints here. Or maybe like my grandfather in our house's gateway in the not yet ready asphalt. I think, I should also add his name one day."

These two modes of narratives, reflexive and reflective, serve as basic mediators between individuals' own actions and their own sense of identity as individuals move around in time and space. As in the case of Onon, individuals also use narratives to shape the direction of their movements in time and space. Narratives are social acts as personal narratives are always constructed in social space. Within a social space, other's narratives become the context or a part of our own narratives. In such a social space, different personal narratives are constructed, which then lead to co-existence of multiple meanings of place, signs, and symbols [21]. Together, these multiple meanings of places affect how we experience space and time.

5.2. Interaction with People

Another important element in spatiotemporal narrative is the interaction with other people in order to meet their "social" interaction needs. This element is most clearly displayed in narratives of Sara and Rahul. In this narrative, individuals demonstrate social mode of being. Here, places, signs and symbols are all mediators of experiencing social relationship with others at present. Therefore, the place recedes into the background as a context. Although individuals may be at a historic site such as independence hall or Liberty Bell, individuals are primarily concerned interacting with people who are around. For example, for a visitor, Peter, who happened to travel with his son, his entire narrative was about what his son did and how he interacted with his son. He records: "we're going to the

Please Touch Museum and watch my son running like a crazy boy.” In his case, all the physical settings and other people around them were merely contexts for his social interactions with his son. Many of these narratives were constructed from a first-person perspective.

Certainly many of these social interactions do take place through information technologies, such as mobile phone and text messaging, while individuals are on the move. From the post-tour questionnaires, we found that most individuals used the mobile phone to call their relatives and friends who were not traveling together with them. Some of the tourists shared their travel experiences with the relatives they called. These social interactions seem to meet the fundamental needs of ontological security in an increasingly isolated contemporary society [10].

Mobile photos taken as a part of this element of narrative shows many portraits both self and others, and serve as a device to remember the social experiences that they had with others. Again, places and signs are often used as a backdrop in those photos.

5.3. Interaction with Context

Finally, many narratives include the elements that where individuals were interacting with the contexts – place, building, sign, and people (both present and absent). Individuals take the perspective of a learner and observer, wanting to know about the place and the people who live there. We call this as anthropological mode of being of individuals. In these elements of narratives, the context becomes the main driver of an individual’s experience. An individual’s interactions with the context become the key part of reflexive narrative that guide her movements and experiences in time and space. Often the narrative takes the public form from a third person or an artifact standpoint. For example, open seeing a person wearing the colonial era clothing on the street of Philadelphia, Michael reflects: “Another giant of Philly? No wonder that he is nearly a “religious figure here. But is it Franklin, or somebody else? His son? His neighbor? After all, I do not know American history so well. In Austria, the same person would be employed as Mozart.” Also, at Eakins Oval where the flags from different countries are displayed, he records: “Jamaica, Kenya, Italy... somewhere should be also Barbados again. But who decides which flags are there? Who decides that the flag of the Vatican is there, but not the one of Indonesia? 558 citizens versus 206 million?”

Individuals’ activities of gazing and observing are driven by the need to understand and make sense of an artifacts and interpret and understand their meanings. These mode interaction include mundane activities such as inquiring the direction, trying to understand the

street signs or looking for public restrooms or restaurants. All of these activities are driven by the need to understand the local contexts and create meanings so that they can understand where they are.

In this mode of being, individuals not only interact with physical place or artifacts as they experience the place, they also interact with people who live or used to live there. For example, one visitor comments that he has “seen various stores, different kind of people, the way people are doing things here.” Unlike the social mode of being where individuals’ experiences are primarily driven by the social interactions with people, they are inquiring how these people live or used to live *here*.

6. Conclusion and Implications

Based on the preliminary analysis of 22 narratives of tourists who tour in Philadelphia, we identified three different types of spatiotemporal narratives. In addition, we identified three fundamental elements that constitute these narratives. While still very early in our analysis, we believe these three types and three elements of spatiotemporal narrative can be a useful conceptual device to understand how individuals experience time and space, meeting different fundamental human needs.

There are several key design implications for mobile services and the devices and infrastructure to support such services that emerge from our study. First, mobility is a simultaneously individual and social. It is individual as our corporal body moves in and out of space alone. No two bodies can occupy by the same physical space together at the same time. Therefore, mobility in time and space is experienced individually. And, as we move around, we tell our own stories both publicly and private, skillfully monitoring our own actions in order to construct and maintain our coherent self identity.

Yet, at the same time, the very same movements in time and space take place in a social space. The physical places are populated with other individuals. The places used to be occupied and visited by others, who remain their own stories behind in the form of signs, symbols, pictures and stories. We also interact with other contemporary companions who are either at the same place or different place. It is this social aspect of mobility that needs more careful theorization and empirical studies as much of past studies on mobility conceptualize it as an individual experience [3, 15, 18]

Second, our analyses suggest a conceptual framework that helps us better understand the social nature of mobility and our experience of space, through the lens of spatiotemporal narratives. Our framework suggests that individuals continue carry interactional

needs as they move in time and space. The interactional needs stems from the spatiotemporal narratives that they carry out as they move in time and space. The interactions can be co-present (here) and distant (there). Also, the interaction can be contemporaneous (now) or past (then). Furthermore, the interactions can be driven for social driver or anthropological driver. Taken together, we present a framework as shown in figure 5.

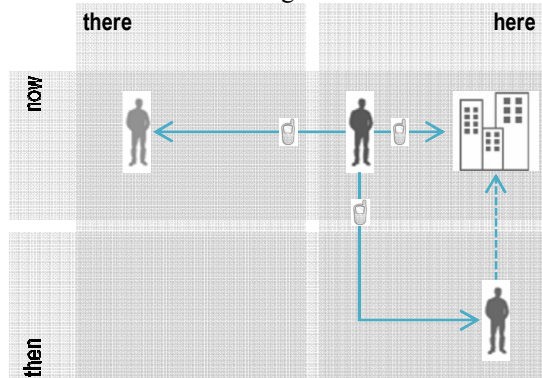


Figure 5. Emergent Distributed Narratives

Third, as we construct our spatiotemporal narratives as we move around in time and space, our narratives are always constructed and told in the context of others'. The interaction with others' narrative can be intentional or coincidental. The interactions between narratives can be transformational, complementary, dialogical or just nominal. The sphere of interaction boundary between individuals on the go used to be often limited by the physical proximity. For example, we talk to someone walking next to us. We see billboards on our commuting path as drive home from work. An important aspect of mobile technology is that it allows individuals to control the size of the sphere. It can be used to expand as we can reach out others using mobile phones or receive information about a distant building which is out of my sight but yet near by commuting path. But, technology can be also used to shrink the size of the sphere of interaction. For example, when an individual put on noise canceling headset with his MP3 player on an airplane, he essentially closed down the interaction sphere so that others cannot interfere with his own private narrative of the journey. Ironically, one can experience the expansion and shrinkage of the sphere of interaction of narratives simultaneously. For example, one can engage extensive conversation with her friend over a mobile phone, while ignoring the others who sit next to her on a subway.

Fourth, the support for mobility then requires more than simple geographic information or location-based services. We do not simply move around. We interact as we move around. Therefore, the mobile services

need to provide support this various needs for interactions as we move in time and space. Much of past research on mobile computing and commerce has focused on the features and services that are designed to meet the social needs through interaction with other people who are near or in distance. We need more work to better understand the design needs to support our anthropologist mode of being. This requires us to interact with surrounding places, signs and symbols. Also, it requires us to interact with people who live and used to live here. We also need better understanding on the sojourner mode of being as well. This requires a interaction between the task-goal and place. Both of these modes of being require an integration between digital information infrastructure and physical infrastructure [21]. This is also requires a development of new ontology of spatiotemporal narratives so that we can effectively digitize them and mediate them using technologies.

Finally, the most important implication here is the emergent and distributed nature of spatiotemporal narrative we create in and around physical places as we move in time and space. As each individual creates his or her own spatiotemporal narrative, they participate the construction of a collective narrative about the place and the community. Just as the narratives of the members of a family constitute the story of the family, our own individual spatiotemporal narrative that we construct becomes an element of collective narrative that we (as a community) create. In the past, these collective narratives were told in the form of oral stories handed down over generations. Yet, we are seeing increasing evidence that we construct different kind of collective narratives about places using modern mobile technologies. Web services like Google Map, Flickr, TagMap and Google Earth, allows individuals to post their pictures, their stories and their experiences related to particular location. Taken together, these are stories being told – in a very public form. They are emergent and distributed. And, they are mediated through digital technologies. We believe we will more such collective form of spatiotemporal narratives or services that support or leverage them in a near future as technology becomes more mature and stable.

Mobile devices have evolved from a functional non-aesthetic device into a personal information and communication devices. We believe mobile tools will need to evolve (and in some cases have already started evolving) into tools to support emergent distributed spatiotemporal narrative of everyday experiences. These devices and services will have to work simultaneously in physical and virtual worlds. It will need to support mobility and our experience place as social and collective experiences.

7. References

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