Sunday is Family Day

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This paper explores the transitions between "my-time" and "your-time," between different social roles, and between different technological contexts. We used shadowing, voice-mail diaries and semi-structured group interviews to investigate the limits of seamless mobility. We identified an interesting behavior we call a "peek": a quick look ahead in order to prepare for transitions. We also found that people are able to able to infer a lot from very little contextual information, and we argue that technologies designed for the above transitions therefore should rely on a few, well-chosen pieces of presence/awareness data, rather than exhaustive information. As a guide to invention and design, this study underlines the need to recognize our users' intelligence. Instead of making applications that anticipate what users wants to do, we suggest providing information that is relevant and clear enough that users can take a glance at it and decide for themselves how to proceed.

Introduction

In a world with nearly constant access, many businesses are increasingly interested in eliminating the remaining technological boundaries, providing what Motorola calls "Seamless Mobility," what Cisco calls the "Connected Life," and what Katz and Aakhus call "Perpetual Contact." But between "my-time" and "your-time," between different social roles, and between different technological contexts, there are transitions. For people surrounded by technology, transitions are often created by the shift in attention and activity imposed by an in-coming call, e-mail, IM, etc. Technological boundaries to these incoming communications are being eliminated, but people are creating boundary mechanisms to manage the shifts (from screening calls to turning off the technology). This paper describes research conducted to explore the implications of boundaries for constant, or always-on, connectivity.

As part of Motorola Labs, we study and develop new communication technologies, focusing on enhanced and on ambient communication. For us, always-on connectivity raises important questions for our designs. Literature in sociology, psychology and anthropology introduce theories about the roles of technologies in structuring interactions, changing etiquette, and mediating the apprehension of space and time. But there is little that addresses

the mundane circumstances of anytime, anywhere connectivity, and how transitions are organized by the active creation, manipulation, and elimination of boundaries.

Methods

To gather data on these questions, we shadowed four participants (all of them married, working adults) for a day. We followed them from the morning prior to leaving for work, throughout the workday, and back to their homes, not leaving until after dinner. We asked questions about the transitions we observed and interviewed them at the end of the day. The same participants were re-recruited to leave voice-mail diaries about their communications and interruptions, for five additional days. Finally, we conducted three semi-structured group interviews with a total of 18 participants. In the interviews we gave examples of transitions and boundaries we had observed in the first four participants' lives, and asked people in the groups to recall and describe their own behaviors under similar circumstances.

We used a team-based form of grounded theory analysis, and together we extracted observations and behavioral descriptions from the data, identified patterns in the items, and named and described those patterns. As a team we examined the data (field notes, photos, and recordings) and identified the items for analysis. We were guided in this process by LeCompte and Schensul, focusing on "events, behaviors, statements, or activities that stand out because they occur often, because they are crucial to other items, because they are rare and influential, or because they are totally absent despite the researchers' expectations," (p.150). We then began to put these items together into groups or categories, a dialectical process of "comparison, contrast, and integration" (ibid. p. 155) during which the patterns we discuss here emerged. To efficiently organize these patterns as a team, we used an affinity-like post-it chart (see Beyer and Holtzblatt pp. 154-163). Here we followed Bernard: As the categories emerged we would "pull all the data (that is, exemplars) from those categories together and compare them, considering not only what [items belong] in each emerging category but also how the categories are linked together," (p. 608).

Because this was a very small-scale, qualitative study, there are a number of caveats that should be kept in mind when reading the analysis. While we had the opportunity to observe participants in professional occupations, the very fact that they were able to let someone shadow them during the day means they have flexible jobs that admit more permeable boundaries. Furthermore, although the methodologies used were good for exploratory and preliminary research, the creation and maintenance of boundaries in everyday life is a ripe area for ethnomethodological approaches such as lengthy mounted-camera video-taping and conversational analysis. Many of the places where transitions and boundaries may play a role are however difficult to gather data in: salons, bars, stores, and at the houses of family members, for example. These are the places that would require more innovative data collection procedures, or a much more extended time of observation. For

these reasons, we want to remind the reader that the findings reported here are suggestive, not conclusive.

Findings

In broad strokes, the daily lives of our primary participants, Emily, Lenny, Linda, and Matthew (names have been changed) all conform to the same basic pattern. They all start the day with a breakfast. They go to work, where their jobs require them to work with computers, check email, and make and receive phone calls. Nearly all of them also have personal or family matters that they take care of while at work. After work they all watch a bit of TV in the evening before going to bed.

Although this may sound mundane, these are the structures within which our participants live their individual lives. As we observed their day-to-day activities, we also noted the significant differences, and witnessed particular and interesting events that make them more than interchangeable data points.

FIGURE 1 Our participants at work.

Emily's Story

Emily is the curator of a historical museum in the Chicago suburbs. Since the fundraiser for the museum left, Emily has taken on those responsibilities as well, and she must juggle the work of two jobs in the three days a week she works at the museum. She is in her late thirties, with two children at home, a boy and a girl.

Emily is scheduled to work today, and when the first author arrives in the morning she is waiting for the babysitter. Her husband has already left, and she is feeding her children. When the babysitter arrives, Emily gets ready to leave, letting the babysitter know that she will be available for calls or even if they want to come see her at the museum.

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The drive to work takes her less than 5 minutes. Once in her office, Emily immediately starts going through her e-mail. She goes directly to her work inbox, where she has a number of unread e-mails, both personal and professional. Emily performs a first pass, opening each of the e-mails, deleting some and closing the others without replying. She explains she is assessing "what I have to do today." She is looking for urgent e-mails that need to be addressed right away, e-mails that can be handled quickly, and e-mails that will take time or effort to respond to. She will reply to the "easy" ones first, saving the ones that are more work for later.

After getting an overview of her e-mail, Emily goes back and opens a couple of e-mails that she replies to quickly. Second are the e-mails about her child's baseball team; she is organizing a picnic and must create a list of who has confirmed attendance and what they will be bringing. This takes quite a bit of time, but she finishes the list and sends out an e-mail to all the parents of the team.

Emily goes on to address e-mails about an art show she judged, interspersing writing replies with phone calls to fellow judges. In between e-mails and calls, she remembers she needs to send thank-you notes to museum donors and retrieves a file with donation information from a nearby filing cabinet. Emily writes a number of thank-you notes, one of which is to a friend and includes a personal reference to a previous outing as well as the formal thank-you.

Work associated with responding to e-mails and writing thank-you notes takes most of Emily's day, but many other things are going on as well. Sometimes Emily is taking calls about donations, sometimes she is interrupted by deliveries, and other times she is interrupted by volunteers who are coming in to work and need the keys that Emily keeps in her desk. Phone calls are usually screened by her employee, who answers the phone and lets Emily know who is calling and why. On this day the museum is closed, but there is still quite a bit of activity. By the end of the day, Emily still has unreturned calls and unresolved issues.

The doorbell rings several times. (The museum is housed in a historical home.) Each time, Emily anticipates who is at the door and buzzes them in without getting up and going downstairs. In one telling example, she hears the doorbell and says "This must be [our contractor], he's supposed to meet with [my colleague] today." She then buzzes him in, and a few seconds later he passes her office and calls in a "hello." At noon she has lunch with her colleagues.

Near the end of the day, Emily calls her husband to find out if he can pick up the kids and take them to a family photo shoot. Her husband calls her back and they arrange to swap cars. When he is almost there she goes down to the parking lot to make sure he can jump in her car without delay.

At the end of the day, Emily drives home from work. Now in her husband's car, she re-tunes his radio from sports to classical and leaves it there "to get his goat." Her husband gets home a few minutes after she does with their children, and Emily reminds him to call his mom to wish her happy birthday. The children also talk to their grandmother, and Emily nags her son to sing "Happy Birthday" to his grandmother in Hebrew. After the call they decide to order out for dinner. They eat at the dining room table, and Emily explains they never have the TV on during dinner. After dinner Emily and her husband will get their children ready for bed, then watch a little news and get ready to start another day.

Lenny's Story

Lenny is a self-employed entrepreneur in his fifties. He and his wife, Susan, run multiple businesses together, but he spends most of his time on his mortgage company.

In the morning, Lenny works from home, notarizing documents from his clients. He chats with his wife about the morning news and entertainment shows, drinking coffee until he has to leave.

He heads to one of his clients' house for an appointment. On his way there, his daughter calls him, asking for money. She is out of work, so every few days he helps her out with cash. If she had called a few minutes later, he wouldn't have answered, because he doesn't take personal calls while he is with clients. This client talked to one of his colleagues yesterday, and he heard from her that it didn't go well. The client is having second thoughts about the terms of the loan. While Lenny is going through the papers with the client, his colleague calls; she wants to hear how it has gone. He addresses her by a different name, so the client won't realize whom he's talking to. The client signs the loan.

On his way out, Lenny's cell phone chirps—his wife is wondering where he is. Using the phone's walkie-talkie feature, he calls her back: "Yeah, Seven of Nine?" He uses his pet name for her, after the *Star Trek* character who is also "efficient, smart, and sexy." He lets her know that he'll soon be at the office, which helps her plan the schedule. He also tells her about his daughter asking him for money. He asks his wife to get some from the ATM. Later on, Lenny's daughter drops by, picks up the money, and takes off.

For most of the afternoon, Lenny and Susan talk on the phone, receive faxes and access databases on the computer. This is a busy day for them. When there is less work, they often go out to garage sales. It's a hobby and a way to save money.

While waiting for a fax to come in, Lenny goes to take some merchandise out of his van for one of his other businesses. Coming back, he talks to his wife about a block party happening this weekend. His sisters are in town, and they need a ride for the event. While Lenny is usually available to work on weekends, there are some events he is not willing to miss for his job. This party, an annual tradition, is one of them. Finally the fax comes through, and Lenny rushes off to make his next appointment.

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When Lenny goes out on distant appointments like this, he sometimes takes the opportunity to visit friends in the area. These tend to be old friends that he doesn't get to see much because his wife doesn't much care for them. He usually doesn't tell her about it, and if she calls him he will fib about where he is. This time, however, Lenny is going straight to his appointment and straight back, and when she calls to check that they're still on schedule he has no reason to lie. The frequent contact with Susan is comforting to him, and even though the call is for a business purpose, it has a personal tone.

By the time he is done, it is already time to hurry to his next, and final, appointment for the evening. No time for dinner! His wife has prepared the papers while he was out, and he picks her up on the way. They do the final client visit together, picking up some food on the way. Although it has been a long day, it was not out of the ordinary. The rest of the week will probably be more of the same. As he puts it: "Our life is our work. And when we're not doing that, we're doing garage sales."

Linda's Story

Linda is a married woman in her forties with no children. She works as a real estate agent, and also is a jewelry designer with her own studio and web-based business. Linda depends greatly on her husband, a lawyer, and incorporates his help in both her real estate work as well as her efforts in jewelry design and sales. Indeed, she told the authors about requesting her husband's help over the weekend: "I had to go find this place for one of the friends of the developer, […] I had my husband drive so I could look."

In the morning on this weekday, Linda is reading her e-mail at home alone. Her husband is gone, but her kitty is there. First thing in the morning she gets a phone call from her mother's doctor and must sort out an insurance matter. Linda eats breakfast while reading e-mail and surfing the web. She spends approximately 3 hours pulling down home listings that she wants to look at with her clients. On days when she has an open house her schedule is much more hectic, but today her phone does not ring even once.

Linda puts together a bundle of papers, including the listings she just printed, and is now ready to leave. Linda drives directly to her real estate office, which is approximately 45 minutes from her home.

The office is empty except for Linda, which is typical because her colleagues are out in the field. She checks voice mail, but has none. Linda then puts a CD in her CD player and starts to make copies of some paperwork for a friend of hers. This person is a former client and friend, but the paperwork is not related to their work together. Linda is doing him a favor since he has introduced her to new clients. "One hand washes the other," she says.

Linda's boss arrives while she is making the copies. When her boss leaves, she finishes her task and checks her voice mail again. There are still no messages, and with little

to do in the real estate office, and no appointments today, she decides to go to her studio and make some jewelry.

The studio is a long way from the realty office, and a quick lunch is in order. Back on the road, Linda looks for "For Sale" signs and takes notes in a small notebook, indicating the address, real estate company and, if she can, the phone number of the client. She will try to call them directly to find out if they want to switch realtors.

Once in her studio she checks her jewelry business e-mail account, only to find she has no orders. She then attempts to take pictures of her latest creation. She wants to use these photos on her website, to sell the jewelry, so she spends over an hour trying to get the "right" shot. Unable to take a picture she is satisfied with, she decides she will get her husband to come to the studio and take the photos for her, and she puts the camera equipment away.

Linda then takes out her jewelry-making equipment, puts on a CD, and spends the next two hours making earrings. Around 6 o'clock, Linda is ready to return home, so she cleans up her studio, checks her e-mail again, and leaves. Waiting for her is her kitty cat, who wants to be fed, and not long after her arrival her husband gets home. They leave to go to a restaurant for dinner, which is their regular habit, and they plan to "watch a little TV" after they get back from dinner.

Linda finds out later in the week, and informs us via the voice-mail, that both her phone number on her real-estate site as well as her e-mail address on her jewelry website were wrong. Little wonder she was so rarely interrupted with other things to do.

Matthew's Story

Matthew is in his thirties, with a wife and a nine month old son. He works downtown as the sales manager for a series of reference books. His is mainly an office job, though he sometimes has to travel.

After Matthew has showered and dressed, he checks his cell phone for messages. There aren't any this morning. He eats a quick breakfast, and then takes the car to work. He parks the car in an underground garage and walks a couple of blocks to the building where his company is located. On his way up, he says hello to a couple of co-workers.

Booting his laptop computer, Matthew launches the email application and his Internet browser, pointing it towards the webcast of a sports radio station. He listens to his voice mail messages. Then it is time to check his email. Most of his communication is done by email, so this is a major part of his work-day. He has a couple of dozen messages in his inbox. A few of those are personal messages or mass mailings, which he deletes. The rest are work-related. He looks quickly at each message to see which ones are urgent, then goes back and replies to those.

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For most of the morning he is dealing with his email, mostly writing replies, sometimes looking up information that is being requested. After a couple of hours he goes down to the street for a smoke. He doesn't bring his phone, so he is completely out of touch for these few minutes. That's OK, though; his job involves few things so urgent they can't wait for a couple of minutes. The most serious thing would be if there was an emergency with his son, but in that case the babysitter would call his wife, anyway.

During lunch hour, he browses the web for sport scores and other matters of personal interest. He keeps activities like this to his lunch break (except for the web radio that plays in the background throughout the day) in order to focus on his work. Two people in his department were fired for spending too much time chatting with Instant Messaging applications on the job.

In the afternoon, Matthew makes a call to a former colleague, in order to get his computer transferred to a new hire who is starting next week. Since they are also friends, they talk for a bit about fishing, and about laying some bets on an upcoming game. In order to resolve the computer issue, Matthew needs to talk to the tech department, but he can't get through on the phone. He sends the receptionist an email instead, because he knows that she will read it while she's still talking on the phone, and therefore respond to him sooner.

An incoming email catches his attention. He reads it over a couple of times and chuckles. Then he picks up the phone and calls one of his colleagues, who was also cc'ed on the message. When she answers, she is already laughing: "Can you believe this guy?" is the first thing she says. Because she knew that it was Matthew calling, and because of the shared context of the email they both just received, she could tell in advance what the call is about.

Just as Matthew is walking out of his office to go home, the phone rings. He pauses, but doesn't pick up, waiting for it to go to voice mail. He then listens to the message. Although he wanted to "see if there's an emergency," he didn't want to take the risk of getting involved in a lengthy conversation at the end of the day.

When he gets home, it's a bit early for dinner, so he does some work in the garden. His wife comes home about half an hour after him, having picked up their son at the daycare. Sometimes, when they can get a babysitter, the two of them go out for dinner. That's one of the few times he won't take calls, although he brings his cell with him in case of emergency.

In the evening he watches a bit of television. There's no baseball game on that interests him tonight, so he flips between a couple of different shows. He checks his voicemail and email for messages before going to bed, but there is nothing so urgent it can't wait until tomorrow.

Discussion

In the stories of our participants' everyday, we find many examples of transitions: In location, roles, attention, activity, and so on. Most interesting to us were the transitions that involved technological boundaries (e.g. faxes can only be received at the office), or attempts to establish personal boundaries (e.g. not having a private phone call in the presence of business contacts) by controlling technology. The purposes for and circumstances around people's everyday transitions resist simple classification. The rules are dynamic and flexible, rather than absolute, and they require frequent negotiation. People are adeptly making use of both the possibilities and the limitations of technology as it suits their needs.

Anticipating transitions

One of the interesting behaviors we identified is something we call a "peek." A peek is a quick look beyond the boundary into "what is coming my way." For example, when Matthew checked his e-mail before going to bed, even though he was not going to deal with most of it until the next day, he was peeking ahead. This demonstrates the main purpose of peeking: He peeked at his e-mail in order to figure out which incoming communications had to be addressed immediately and which could wait. In this way, peeks help people control the transitions in their daily lives.

Both Matthew and Emily started their work-day by opening and scanning each of their e-mails, then went back to those messages later in order to respond. A person from the group interviews explained that she liked Outlook's "New Mail" pop-up for this same reason: It provides a peek at what she will need to deal with later.

In her voice mail diary, Emily told us a story that a number of people in our group interviews identified with. She was reading to her son when her friend called. She did not want to stop reading in order to talk, but she took the call, allowing her a peek at who was calling and why, and when she was finished reading to her son she called her friend back. In the interviews, people described having similar experiences. They explained that in many cases this peek allows them to judge whether or not the incoming communication is urgent, like when Matthew paused on his way out of the office to make sure the incoming phone call was not about an emergency. Usually, "urgent" means a family emergency.

In all of the cases just described, peeks not only allowed communications from others permeate boundaries, but also enabled boundary maintenance. Our participants used their peeks to determine whether or not it was the right time or right place to deal with incoming communications, and this gave them the opportunity to put off some of them until a better time. The circumstances of a right time or right place varied considerably not only between participants but for each participant as well, and peeks were part of how participants determined, in each case, whether or not there *was* a better time and place.

Mundane Everyday Life

Despite finding examples of peeking in the literature (e.g. using the answering machine to screen calls), we have not seen it called out as a class of behaviors in its own right. The notion of peeking, when promoted to a conceptual category, allows us to notice the similarities between behaviors that might previously have been considered unrelated. Researchers in the field can explain these activities with one convenient concept; and with further investigations of peeking, theorists may develop a richer description. Also, having identified this behavior allows us to target it explicitly in our design. Finally, it helps us predict the acceptance of technologies we create by making it apparent when our designs meet people's peeking predispositions.

Controlling transitions

In general, our participants transitioned readily and frequently between work and personal activities. Emily organized a family photo shoot from work, Lenny notarized documents over breakfast, and Matthew checked his email before going to bed and checked sport scores from his office. Linda regularly asks her husband to help her with her various work activities. In some cases, it became impossible to distinguish between the two roles. Calls between Lenny and his wife serve both to schedule their work, and as a way for them to keep in touch during the day (as demonstrated by his use of a pet name for her). When Emily sends a thank-you note to a donor who is also a close friend, she writes a short note saying how nice it was to go to the race track with him the previous week.

We also saw cases where people tried to maintain boundaries between work and home. Matthew did so in both directions, deferring personal activities to after work or to a lunch break. And while he might take a work call at home, he usually would not deal with the matter until the next time he was at the office. Said one of the participants in our group interviews: "I tell my clients: 'If I'm awake, my phone's on.' But people started calling at 7:30, 8 in the morning […] and they were waking me up. So I've actually made a point to turn it off at night and not turn it on until 10 the next morning. […] I don't think there's anything that can't wait until 10 o'clock in the morning."

There seems to be a few very specific situations that people protect from work. Although Lenny makes a point of always being available for his clients, he made a special exception for the annual block party, which it has become his tradition to attend. For Emily it is spending quality time with her children, reading to them or doing other things together. In the group interviews people brought up situations with the whole family together. Like one participant put it: "Sunday is Family Day."

We began the study with the assumption that we would find simple and discrete boundaries, for instance between work and home life, which would be important to respect if people were to accept Seamless Mobility. We had anticipated creating prototypes of communication applications that established and maintained boundaries; technological insulation from undesirable transitions. What we found, however, was people controlling their transitions in ways that were appropriate for them: they did not need a technological

solution. We now believe it is crucial, especially in presence and awareness applications, to design in a way that allows people to control their own transitions, instead of providing that control for them.

Negotiating transitions

We have already discussed some of the methods by which people control the transitions in their everyday lives, such as peeking, but this description may have left the impression that it is something that happens in simple, predictable ways. However, in reality the unique features of each situation are crucial to determine how people deal with it.

When Matthew decided to send a receptionist an email instead of trying to get through on the phone, he made a common transition from voice to text, and from synchronous to asynchronous communication. The reasoning behind this apparently routine decision is quite complex. It was an urgent matter, which couldn't wait. He expected the line to stay busy for some time, but knew that the receptionist would see his email even while she was talking on the phone (thus exploiting the fact that phone and email is not integrated into a single task queue). Therefore, she would get back to him as soon as possible. In another case when he couldn't reach a potential client, on the other hand, he did not switch from phone to email, because that communication required a more personal touch.

For an even more notable example, one of the people in our group interviews told us that when he went to the beach on a Sunday, he felt no need to bring his cell phone. The only people who would call him on a weekend were his friends, who were also going to be at the beach! His friends' plans for the weekend would not normally be relevant for predicting whether he would get calls or not, but in this particular case they were.

Another man told us in one of the group interviews that he does not always answer calls from his wife when he is at home , but always does when he is traveling because then they must be important. His behavior depends not just on his current location and activity, but on what his wife knows and how she thinks. It is because she ***knows*** that he is traveling that her calls are more likely to be important than when she knows that he is home.

Context is an important factor that influences how people handle transitions. However, the relevant context can not be described in simple terms like location and the status of the immediate environment. Dourish (2004) proposes a view of context which "is particular to each occasion of an activity or action. Context is an occasioned property, relevant to particular settings, particular instances of action and particular parties to that action." We have observed, within our own company, that many designs for perpetual contact tend to encompass every possible bit of information about others in the users' contact lists. We argue that it is not necessary to provide people with comprehensive contextual information, for someone who already knows a good bit about other people in their social group is able to infer a lot from very little information.

Conclusion

Seamless mobility does not mean that there will be no limits on or control over the transitions in everyday life. People create and negotiate rules for when they transition from one context to another. Also, boundaries are often manipulated and permeated in the process of maintaining them.

In some of the novel communication forms we are creating, we are including systems to let users peek ahead by such means as invitations and enhanced presence information. For example, our lab created a presence/awareness prototype that allows people to see when their friends and family are "on their way," allowing them a "peek" at what is to come so they can prepare by finishing up their current work or heading out to meet them.

Also, we know that there are boundaries people cherish, because they mean a man can have a beer with his buddies without the wife finding out, or a daughter can make "Happy Birthday" a little more special by having her son sing it to his grandmother in Hebrew. However, since people's desires for boundaries often differ, the boundaries need to be socially negotiated. In order to ease the face-work of these negotiations and gloss over conflicting interests, a degree of ambiguity and plausible deniability is useful (Aoki and Woodruff 2005). Many applications today aim to tell others the whole story: exact location, unambiguous presence, even mood. As many of our colleagues try to create sensors to detect such information, and technology to automatically make sense of it and distribute it, we wonder about the rewards of this approach. In contrast, our recent prototypes make use of concepts such as plausible deniability, tactical ambiguity and deliberate agnosticism, in order to make space for people's own stories.

As a guide to invention and design, this study has underlined the need to recognize our users' intelligence. Instead of making applications that anticipate what a user wants to do in every particular situation, we try to provide information that is relevant enough and clear enough that the user can take a quick peek at it and decide how to proceed. A good example of how we are applying this finding is in the creation of a prototype, built after this study, which allows people to see the history of certain of their friends' activities. This prototype does not provide individual information, only aggregated data for the group as a whole. However, people who know the individuals in the group can parse the information and infer whom each piece of information relates to.

For Motorola and its vision of Seamless Mobility, it is important to understand the navigation of boundaries through anticipating and controlling their transitions. Our findings all point in the same direction. People do not need technology to maintain boundaries, but they **use** technology in artful ways to manipulate them. Empowerment comes from control, but an action not only needs to be technically possible, it has to be socially acceptable. This

study has led us towards a design philosophy in which we support the pragmatic realities and social conventions that people currently use in their mundane daily transitions, imposing neither boundaries nor boundlessness. By this ongoing effort, we can build seamless mobility without leveling the features of the everyday social landscape.

Notes

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