No More Circling Around the Block: Evolving a Rapid Ethnography and Podcasting Method to Guide Innovation in Parking Systems

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After many years with little innovation in parking technology, many cities are now exploring new systems meant to improve the use of limited parking real estate, reduce congestion, increase parking convenience, and raise additional revenue. We did an observational study to inform the design of one such novel parking system, and in doing so developed an ethnographic method we call REACT (Rapid Ethnographic Assessment and Communication Technique). REACT uses observational methods to uncover key findings relatively quickly and increases the impact of those findings by communicating them through an engaging video podcast. In this paper, we describe the REACT method and show how we used it to discover several key findings regarding parking practices that changed our team's thinking about the intended customer, highlighted some critical design issues, and revealed unanticipated opportunities for new technology solutions. The video podcasts were extremely well received and ultimately affected the thinking of many more people beyond the original intended audience.

INTRODUCTION

Parking is a little like the weather: Everyone complains about it but no one does anything about it. In many urban areas, looking for parking is not only frustrating and time-consuming, it also substantially increases traffic congestion. Studies indicate that an average of 19-30% of traffic is caused by cars circling around the block looking for parking (Shoup 2006, NYCDT 2008). Some researchers have argued that cities' parking development requirements have inadvertently raised housing costs, led to urban sprawl, and reduced land values (Shoup 1997). Even so, parking services and parking meters have evolved relatively slowly since the first parking meter was installed in 1935 (POM 2011).

Recently, however, cities around the world have begun to experiment with the use of technology to improve the parking experience. The city of Toulouse, France, for example, has made use of sensors embedded in streets to guide drivers to available parking spaces through a cell phone app (Spiegel Online International 2010). In Auckland, New Zealand, drivers can use cell phone texting to pay for parking, get reminders when their time is expiring, and extend the time reserved (Wellington City Council 2011). And U.S. cities such as Los Angeles and San Francisco are initiating efforts to modify the prices of parking spaces

at different times based on demand, known as demand pricing (SFPark 2011, LADOT 2011). These systems are attempting to improve the parking experience for drivers, reduce traffic congestion, attract more customers for downtown merchants, and increase revenue for cities.

Researchers in our organization are building on this momentum by inventing innovative technology-based services to improve urban parking. One service being explored would allow people to reserve on-street parking so they could arrive at a restaurant or an event and park without wasting time driving around looking for a spot. To inform this effort, we were asked to conduct an ethnographic study of current parking practices generally, and specifically to evaluate the viability of the reservations concept from a use standpoint.

This paper describes a series of ethnographic studies we conducted on parking that led us to evolve a methodology within our organization that we are calling Rapid Ethnographic Assessment and Communication Technique (REACT). The two key features of REACT are that (1) it yields insights about a domain of human activity in a relatively short period of time, roughly 4-6 weeks, and (2) those findings are communicated through a self-contained and engaging video podcast that can be viewed by stakeholders on their own schedule from any location. Our experience has been that these podcasts have been surprisingly effective in communicating the results of our analyses to a broad audience, influencing the thinking of the technologists designing parking solutions, and encouraging further investigations. Our aims in this paper, then, are (a) to describe the evolution of the REACT method and (b) discuss how we used it to reveal key insights about parking that are informing our organization's effort to develop parking services technology.

In the following sections, we first discuss our motivation for the REACT method and how it fits in with other ethnographic methods. Next we describe the method and how it evolved over the course of several evaluations. We then go into detail about three key findings about parking that emerged when we used the REACT approach to study urban parking, and describe the impact they had on the project.

RELATED WORK

Our organization has a long history of conducting extensive, in-depth ethnographic studies across many theaters of human experience in an attempt to develop a deep and nuanced understanding of human behavior from the participants' point of view (Jordan & Henderson 1995; Suchman 1987; Szymanski & Whalen 2011; Bellotti et al. 2008). However, these extended projects – some of which have lasted over three years – have unfortunately become rare opportunities. More often we are expected to generate results in a matter of a few months and, more recently, even weeks as clients want results that can immediately be applied to the design of a budding technology. This change in mindset has challenged us to come up with an approach to ethnography that can be executed more quickly and inexpensively while still delivering value to our clients. We have tried to meet this challenge in two ways, by:

1. compressing the investigation and analysis phases of our work, and
2. increasing the impact of the findings.

This challenge of expediting the ethnographic process has, of course, been faced by many other organizations. Beebe (1995, 2001), for example, has written extensively about a Rapid Assessment Process that can be done anywhere from four days to a few weeks. Beebe's approach was designed to help investigators get a quick understanding of a domain so they could figure out the appropriate questions to ask in a survey. The RAP approach accelerates the process by (a) including several investigators who (b) collect data iteratively and (c) triangulate their interpretations to uncover meaningful analyses of a situation from the insider's perspective.

Other rapid approaches to ethnography have been developed to inform the design of new technology. Hughes, et al. (1995) described examples of "quick and dirty" ethnography that can be done more quickly by understanding a domain just well enough to inform developers about issues that will affect the functionality and design of a system. They found that even in an extended three-year study, "the payoff for development came relatively quickly in comparison with social research uses of ethnography."

Millen (2000) provides a nice summary of the techniques ethnographers have used to try to shorten the observation and analysis process, such as relying on various types of field guides as informants, including more than one researcher, carefully selecting the time of data collection for maximum activity, and involving participants in the design process through a variety of structured exercises, such as cognitive mapping, pictorial story telling, scenario analysis, and pair writing (Tedjasaputra & Sari 2005). Another approach is for the investigator to engage in the activity as participants, known as participant observation or autoethnography (Millen 2000, Cunningham & Jones 2005). As discussed below, our REACT approach makes use of many of these same concepts, combined in different ways and with an emphasis on direct observation.

Our second objective – increasing the impact of the work – has also been explored in a variety of ways. Some approaches discussed at EPIC include re-purposing data (Churchill & Elliott 2009), conducting "montage workshops" to give technical partners a sense of ownership over the data (Sondergaard & Entwistle 2009), using novelists' techniques to write more compelling reports (Robinson 2009), and trimming video data down to short "video utterances" to convey to stakeholders common practices within the target community (Cramer et al. 2008). Our approach is in the spirit of Robinson (2009) in that it takes advantage of dramatic techniques to engage the audience, and it builds on the work of Cramer et al. (2008), who found that "the short, pithy format [of video utterances], packed with punch and just a little pizzazz, can effectively convey layers of information, superimposed in time, and the contextual relief for the data gathered." Specifically, we deliver findings in the form of short self-contained "movies," or video podcasts, that tell the story of our findings in a compelling and entertaining way.

Until now, we have generally delivered our findings by writing a report and conducting a workshop with the core client team and, ideally, other client stakeholders. We usually incorporate many video clips in these presentations since they are so effective in giving people a vivid sense of the findings and their implications (Cramer at al 2008). When people attend these presentations remotely, however, we sometimes encounter difficulties in sharing

the video across the network. After the presentation, we provide clients with the report and a copy of our slides, but it has been difficult to embed those videos in the presentation in a way that survives their distribution within the client's company. The file sizes are large and sometimes clients run into problems with format incompatibilities. As a result, those who view the slides later often aren't able to watch those critical videos, and so don't get as deep an appreciation for the findings. In addition, the workshop attendees may not include key decision makers or people who get involved in the project over time, and so the impact of the findings tends to decline, even when they could directly inform ongoing design decisions.

Now with the popularity of video and social sharing web sites such as YouTube, TED.com, Facebook, and others, people have become accustomed to watching short video productions, often in the gaps between other activities. This form of online media has become so popular that is profoundly shifting the way communities of interest communicate and influence one another (Burgess & Green 2009). We have adopted this approach by communicating our findings through an engaging self-contained video podcast that can be posted on a website and watched from anywhere at one's convenience. Further, client members can easily forward the video to others in their organization who may not have been able to attend the workshop or who became involved in the project later.

EVOLUTION OF THE REACT METHOD

We developed the REACT method while working on a project to provide innovative technology-based services for parking. This project had an unusual structure because it had several layers of clients. Our immediate client was a group of engineers within our research organization who were exploring ideas for such services. That group's research was funded by an external client, ACS, a Xerox-owned company that provides parking services for municipalities around the United States, including the processing of parking tickets and meter payments. ACS saw this research effort as a way to broaden and improve its services so it could both expand its business with existing clients and gain new clients. The company was actively bidding on new contracts and hoped to impress its potential clients with our work by showing that ACS was serious about providing services that meet people's real needs. So our efforts were meant to inform (1) our internal PARC research group, (2) its client ACS, (3) ACS' clients, which are municipal parking departments who were ultimately concerned about their clients, (4) citizens who want to park easily and conveniently.

We conducted three investigations in three local cities, Oakland, Palo Alto, and San Francisco, each time producing a video podcast to communicate our findings. The dissemination of those podcasts led to a further investigation in New Orleans done specifically for the benefit of that city's parking officials. With each observation, we modified and refined our approach until we used the New Orleans study to test out our REACT method in full. The following describes the process we ultimately arrived at while also discussing ways it evolved. The process involved four phases: preparation, discovery, analysis, and podcast production and dissemination. The following sections describe the key steps associated with each phase.

Preparation

With a short-term method such as REACT, we can't expect to gain an in-depth understanding of a broad domain, so instead we focus the investigation on activities that directly inform the design of a proposed technology. The goal is to give developers a realistic account of the situation in the field so their inventions will address real, observed needs and be designed to fit in with existing practices. Therefore, a key part of the preparation phase involves working with the client to narrow the focus of the investigation to an appropriate scope, and to set everyone's expectations about the depth of the findings. With the parking project, we did this by learning about the team's ideas for improving parking.

The PARC research team planned to build a prototype parking system that would include smart meters, sensors in the street that could detect when a vehicle was in a parking spot, and a server that could manage meter activity, set pricing, handle payments, and communicate information to users through a web page or cell phone. The team had many ideas for services using this technology, but one they were especially keen to explore would allow people to reserve on-street parking through a website or a mobile phone. The thinking was that people going downtown to dine or shop might be willing to reserve a parking spot ahead of time to avoid the time and hassle of looking for a parking spot and to select a spot close to their destination. We agreed, then, that we would investigate the viability of this on-street reservations concept while also gaining a general understanding of everyday parking activity that might apply to other services they might offer.

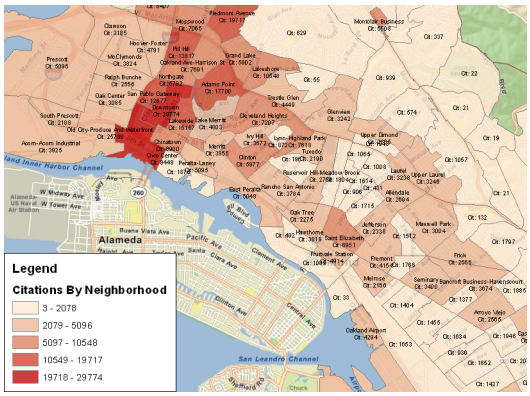

FIGURE 1. Map of Oakland showing parking citations per year by neighborhood.

To prepare, we conducted internet-based research to become familiar with each city's parking regulations and citizen's concerns. If we weren't familiar with the city, we learned about the neighborhoods to determine which areas would be best to observe at which times, and to gain some background knowledge that might help us interpret what we saw in the field. In some cases, the PARC engineers had done quantitative analyses of parking citation data provided by ACS and had generated maps showing which neighborhoods received the most citations, as shown in Figure 1. When these were available, we used them to select the neighborhoods and times to visit. This preparation phase lasted 1-3 days.

Discovery

During the discovery phase, we went to the city and spent anywhere from one to four days collecting information, visiting at least three neighborhoods in each city. In our first investigation in Oakland we spent just one day visiting three neighborhoods to get an initial exposure to the issues involved in parking. In Palo Alto and San Francisco, we conducted intensive observations on one day, spent the next day or two analyzing our observations, and then returned twice more to fill in gaps in our understanding and explore certain issues more deeply. In New Orleans, since we couldn't easily return, we spent four consecutive days in the city -- including both weekdays and weekends and during the daytime and evenings -- and alternated between observing and reviewing our data. Ultimately, we concluded that sufficient data could be collected in a 3-4-day period, separated by intense periods of analysis.

We collected data in four ways, by: (1) observing naturalistic behavior, (2) conducting quick, unstructured in situ interviews, (3) conducting a short, structured intercept survey, and (4) participating in parking activities ourselves. Our emphasis was on collecting observational data, so we spent the bulk of our time standing on streets or in parking garages as we watched drivers parking their cars and using meters, workers making deliveries, and officers issuing tickets. In addition, we conducted many short, impromptu interviews with people as they got out of or returned to their vehicles or after they used parking meters. We also interviewed delivery people and parking enforcement officers as they went about their activities.

In addition to these unstructured interviews, for Palo Alto and San Francisco we developed a four-question intercept survey designed specifically to help us evaluate the reserved parking concept. That survey asked people (1) where they were going, (2) for how long, (3) how long they had looked for a spot, and (4) how far in advance they had planned the outing. If they were willing to talk longer, we asked where they had come from and if they had any comments about parking. The questions were designed to give us a sense of how practical it would have been for each person to reserve a parking space for that outing and how motivated the person might have been to do so. The interview could be conducted in about a minute, which allowed us to engage a large number of people in a short amount of time. (In Palo Alto, we conducted 36 interviews, and in SF we conducted 16.) After each interview, we also noted the location, time of day, number of people in the car, time reserved on the meter, and other relevant aspects of the situation. In New Orleans, ACS was particularly interested in merchants' concerns regarding parking for their customers, so we went into stores and restaurants and conducted brief, unstructured interviews with sales clerks, waiters, and owners. They usually lasted 1-3 minutes, with some as long as 15 minutes if the person was interested in chatting. We ultimately conducted 27 such interviews.

Finally, we also collected data by using parking services ourselves. We drove around different neighborhoods looking for parking, parking in different types of spots, and using different types of meters to pay for parking.

Since the output would be a video podcast, we focused on documenting everything with video, photos, or audio recordings. Usually the two of us conducted observations together,

so one would record the other interviewing a person on the street, using a meter, or parking the car. In some cases, we recorded each other explaining an idea that had been sparked by our observations. When we did split up, we sometimes audio recorded ourselves explaining what we had noticed. In New Orleans, for example, we captured 625 photographs, 49 videos, 14 audio recordings of interviews, and 15 audio notes. Our focus was on collecting data that would make our observations as vivid as possible to others (and to ourselves as we analyzed it).

Analysis

After returning from an outing, we reviewed the photo, video, audio, and survey data and wrote up bullet-point notes to capture all the observations while they were still fresh in our minds. Any observation or insight of any note was captured in a separate bullet point. To prepare for the podcast, we also noted below each bullet the filename of the photo or video supporting it, if any, so we could easily find it later. With audio recordings, we transcribed especially good quotes that might be useful for the podcast and noted the timestamp. Next we reviewed our notes together to decide what further information we needed and where to focus our efforts during the next outing. In many cases we sought information online to fill out our understanding of something we had observed or heard about in the field. For example, after we noticed a surprising number of cars in Oakland with handicapped placards dangling from their windshields, we went online to discover that the city was having trouble with over-use of such placards. The city estimated that it lost $150,000 per year in revenue due to inappropriate use of handicapped placards (Boyd 2009), and a local newspaper reported that 44% of parked cars in the downtown area used such placards (Anrica 2010).

Once we had collected all the data and written up our notes, we used an affinity mapping procedure (Beyer & Holtzblatt 1988) to arrive at our findings. We sorted the bullet-point notes into clusters based on their similarity (with observations potentially included in more than one cluster), and then labeled the clusters to characterize the gist of the related observations. In this way, we allowed the findings to emerge bottom up from the data rather than organizing them based on our initial questions. Still, since one of our objectives was to evaluate the concept of on-street parking reservations, we made sure to cluster all the observations bearing on that concept. Next we wrote descriptions of each cluster, and those became the basis of our script for the podcast. We also selected the best images or recordings to illustrate each of these findings, also to be used in the podcast. The analysis period overlapped with the observation period, but we usually had completed our analysis about a week or so after our last observation session.

Podcast production

Producing the podcast involved (a) writing a script based on our analysis, (b) selecting the visual and audio materials from our observational data and generating new material such as maps and diagrams, (c) recording the script, and (d) supplementing the podcast with additional material such as background music and intro and ending sequences. We used iMovie to generate the podcast because it was easy to get started with, although we eventually started to hit the limits of its capabilities.

In our initial podcast of Oakland, we started simply by generating a set of slides and then speaking about each slide, essentially recording ourselves giving a presentation. We initially tried to speak extemporaneously about each slide, but found our natural speech hesitations and adjustments to be distracting, so then we wrote out our comments and read them in a conversational style. When recording the audio, we alternated short segments between the two of us, both to keep up audience interest and to associate both of us with the project. After our second observation in Palo Alto, we started to think of the podcast more as a video production than a recorded presentation. As such, we found it worked better to first write a script and then fill in the visual material around it. By the time we visited San Francisco and New Orleans, we fully adopted a video production approach and thought about gathering compelling visual content while we were out collecting data.

We started all the podcasts with a basic characterization of the city's layout and neighborhoods, its parking policies, and the types of meters used. We then presented the key findings for that city, focusing on its unique attributes and specifically addressing our findings related to the on-street reservations concept. The last section laid out the key problems we observed that could be addressed with improvements to services or technologies. We didn't restrict ourselves to problems the research team was likely to solve, since we can't always anticipate where innovations will come and since these problems also illuminated practices that might inform the design of other services.

Throughout the production, we tried to make the podcasts both informative and engaging. To do so, we kept them to no more than 15 minutes. (In the case of New Orleans, we had more material, so we broke it up into two podcasts focusing on different aspects of the data.) We used music to signal transitions between sections and to indicate different types of content, such as data vs. potential technology implications. Whenever we could, we used humor to make our points. For example, one clip showed a car parallel parking and getting its wheel stuck *in front* of a concrete barrier meant to protect it from hitting a tree planter (see Figure 2). This scene demonstrated in a humorous way the tradeoffs between providing convenient parking and creating an appealing downtown atmosphere – both components of attracting commercial activity.

FIGURE 2. Scene from a video showing a car getting its wheel stuck in front of a barrier meant to protect it from hitting the planter. The humor of this situation helps keep the audience entertained while still illustrating a serious point.

Once we had completed a draft of the production we uploaded it to Vimeo, a video sharing site, protecting it with a password, and sent a link to the other PARC researchers asking for their feedback. If they made any comments or suggestions, we made modifications and uploaded a final draft. At that point, the team lead forwarded the link to the key contacts at ACS, who then forwarded it within their organization. Although we sometimes watched parts of the podcast with other team members, for the most part dissemination happened asynchronously, with discussions of the implications occurring during team meetings. (Readers can view our podcasts by following the links provided at the end of this paper.)

Once we released the podcasts, we were unprepared for the level of enthusiasm they generated. Team members said they were fun to watch and wanted to tell us how they related to the findings. Several times people approached us to say (in essence), "You know, I've been going into downtown Palo Alto for 20 years and I never noticed ...." followed by a parking activity or policy illustrated in the video. As ethnographers, we are accustomed to getting the opposite reaction ("Isn't that obvious?"), so this type of remark was especially gratifying. Right away we saw how the podcasts had an impact on design meetings, as researchers brought up anecdotes portrayed in the podcasts. When we reminded them about factors that might affect a design decision, they showed an immediate recognition of the concern.

Even though we felt we were still learning the craft of storytelling through video, people told us they were impressed with the production quality of the podcasts, and even more so, that the polished nature of the production lent the findings greater credibility. Although in retrospect this shouldn't have surprised us, we hadn't anticipated it, and the comments reminded us of the importance of presenting findings carefully to minimize the audience's tendency to generalize the claims too broadly. Still, it is encouraging that even with basic video editing skills we could create a podcast that impressed others, and it suggests that this media offers the potential to have an even larger impact with more advanced video production techniques.

Because the podcasts were self-contained and could be easily accessed and forwarded to others, they reached a much wider audience than we expected. Without our realizing it, quite a few people not on the project watched the video and then approached us to tell us their reaction (and inevitably, their parking tales of woe). When a new employee joined the PARC engineering team, he was shown the parking podcasts to help him get up to speed on the project.

But the most powerful evidence of the impact of the podcast format was that it led to the investigation in New Orleans. After we had disseminated the podcasts of the three local cities, unbeknown to us, a manager within the engineering team's organization showed one to parking officials in New Orleans during a visit there. Those officials became intrigued and asked if a study could be done of their city, hoping to get an outsider's perspective on how

residents view the parking situation and how they should focus their efforts to improve customer service. Once that study was done, the leader of ACS' East Coast parking effort asked a half-dozen people in his organization to view the podcast and then held a meeting to discuss how they could apply the findings to their bid for future contracts with New Orleans and other cities. After that, we flew back to New Orleans and met with several key ACS stakeholders to jointly present our findings to the city's parking officials through the podcasts and a discussion. Although we don't know yet how the city will use the findings, the meeting led to a productive discussion about their goals and concerns, and ACS felt it furthered its objective of showing a deep level of commitment to supporting the city's parking needs.

Key Components of REACT

Based on our experience so far, we see the key aspects of the REACT method as follows:

- It is rapid, completed in a 4-6 week period.
- The observations are focused on informing the design of technology or a service by (a) characterizing common practices and (b) identifying key user-level problem areas that could be addressed with either technology or process changes.
- Data collection happens in an iterative fashion, with an initial intensive data collection session followed by a preliminary analysis, followed by subsequent observations to fill out understanding.
- It benefits from the participation of more than one researcher.
- Data is focused mainly on direct observation, supplemented by interviews (in this case, very short and impromptu) and, where appropriate, direct experience by the researchers as users of the system.
- The findings are communicated through a short, self-contained video production (podcast) that highlights key findings in an engaging and ideally entertaining way through the use of memorable anecdotes. The podcasts can be viewed independently at the convenience of the viewer and easily propagated throughout an organization.
- Data collection makes heavy use of a variety of media that are effective in illustrating the findings, particularly photos and video as well as audio recordings of interviews, voice notes, maps, and diagrams.

Because of these attributes, REACT is not suitable for all situations where ethnography might be applied. We believe it is most appropriate in situations where the activity of interest is relatively accessible and somewhat familiar to the researchers, where it is possible to collect and disseminate visual and audio recordings of activities, and where there is a focus on understanding behavior to guide the design or improvement of a product or service. Domains where REACT might be appropriate include the hospitality industry (hotels, restaurants, events), travel, retail, entertainment, and other consumer-oriented settings. We would not expect it to be as successful in domains such as healthcare, for example, where it can take a long time to gain permission to observe the setting and where there are restrictions on recording and disseminating video and images. The rapid observation

approach wouldn't be ideal for a complex workplace setting that is unfamiliar to the researchers, since it may take several visits just to grasp the basics of the workplace procedures. However, in that case it may still be appropriate to communicate the findings through a podcast.

KEY FINDINGS ABOUT PARKING

We now turn to our findings regarding parking revealed through the REACT method. To begin, we first provide background about parking and discuss the concerns that are leading cities to modernize their parking services and that motived ACS' interest. Then we discuss three key findings from our research that influenced the parking project.

A Short History of Parking

The first parking meter, invented in 1933, was motivated by merchants who wanted to increase store traffic by keeping people from parking too long – the same motivation that continues to drive parking policies in many areas today (POM 2011). The first meter was installed in downtown Oklahoma City in 1935 by the Park-O-Meter company. The basic configuration – in which a coin is inserted into a slot, allowing a dial to be turned to set the time allotted – did not change for more than 40 years. The first digital meters appeared in the 1980s, and the next decade saw the arrival of multi-space meters that require the driver to walk to the meter to buy a ticket, which is displayed in the vehicle's windshield. These meters allowed credit card payment, were more robust, provided better accounting, and increased revenue, since people can't use any time remaining on the meter after the previous car leaves a spot (Parking Network 2011).

Today, there are approximately 5 million parking meters worldwide (IPI). Even with this rapid growth, Shoup (1997) estimates that parking is free for 99% of all trips in the United States. He argues that such abundant free parking is a problem because it distorts the true cost of owning a car and feeds the explosive growth of the automobile, which in turn leads to the need for yet more parking. By setting minimum parking space requirements (often based on inadequate or no data), urban planners make developers bear the cost of parking and not the end user, which has led to many hidden costs, including higher housing prices, inefficient land use, urban sprawl, and lower land values (Shoup 1997, 2005; Jakle & Sculle 2004). Shoup (1997) argues that parking rates should be set to achieve 85% occupancy so that anyone who wants a parking spot (and is willing to pay) can find one.

Now that parking systems have continued to evolve, this goal has become easier to achieve. Cities are beginning to install on-street vehicle sensors to measure parking activity, and meters are becoming more sophisticated, allowing for more convenient methods of payment, including bills, credit and debit cards, smart cards, and cell phones (Parking Network 2011). In addition, meters are becoming networked, communicating with a central server that allows parking management systems to set pricing based on hard data about current usage patterns. San Francisco, for example, has rolled out a pilot program called SFpark that provides real-time parking availability information via a web-based system or smartphone application (sfpark.org). Los Angeles' Express Park program will also set prices based on sensor data, aiming for that 85% occupancy rate advocated by Shoup more than a

decade earlier (LADOT 2011). The anticipated benefits of demand-based pricing are increased availability of parking spots at peak times, less time spent looking for parking, reduced congestion and pollution, and a shift among consumers to alternative transportation.

Whether these benefits will be achieved as expected remain to be seen. It will depend in part on the design of such technology, which is why ACS – who will be providing some of these services – asked us to conduct an ethnographic study of parking.

Although our study uncovered many findings that informed various aspects of technology development, we focus our discussion here on three findings that had immediate impact on the project. The first finding revised the research team's thinking about the types of people who would most benefit from on-street reserved parking, the second raised an important design requirement for the meters, and the third highlighted a problem with parking signage that ACS saw as an opportunity for new product development.

On-Street Parking Reservations

When the technologists in our organization conceived of the on-street parking reservations idea, they had in mind scenarios that involved people going downtown to shop or dine out. If people had reservations, they wouldn't spend so much time circling around looking for spots, which would reduce congestion, and they could park closer to their destination. This approach was also expected to appeal to merchants looking to attract customers to their stores, to the point that they might be willing to cover or subsidize the cost of parking for customers who made a purchase (potentially through some automated system via a credit card). We set out to explore whether this concept would address a real need.

During our investigations, we found several problems with this scenario of use, but we found other situations where reservations would solve a pressing problem. First, in the intercept survey in Palo Alto and San Francisco, the majority of people going shopping or dining had decided to come only a few minutes or hours before they arrived, often while already out. In particular, those coming to shop usually didn't plan far in advance and weren't on a schedule that would enable them to arrange a specific arrival time. Even those going to dine often had a fluid schedule more often than we expected. Although people may be willing to plan more carefully for a guaranteed parking spot, these observations gave us reason to question people's receptivity to the reservations concept.

In addition, in some cases parking was easier to find than we expected, particularly in downtown Oakland, even mid-week during the busiest time of day. As we drove around, we never had trouble finding a spot near our destinations, and as we walked around most blocks had at least one or two available spots. This observation made us realize that on-street parking reservations would only be desirable in regions and at times when parking is scarce, which means the system would need to communicate when and where the reservations were in effect (more on this later).

Finally, we saw only limited evidence that merchants would be interested in subsidizing on-street parking. In Oakland, merchants in the busy City Center didn't provide validation

since they believed most people came downtown for work or other purposes, not specifically to shop or dine. In the French Quarter of New Orleans, where parking is extremely limited, we expected more merchant interest but we were surprised that most were not concerned about customer parking. Their clientele mainly consists of tourists who either take taxis from the airport or park at their hotels and then walk around the area. With a few exceptions, most were not motivated to validate parking. This is not to say that the reservations concept wasn't viable in all areas, but if it were designed to appeal to shoppers and diners, it would need to be applied carefully to certain neighborhoods and certain times, and merchants might subsidize it only in certain areas. And again, the system would need to clearly communicate where and when such reservations would be required and when parking would be validated.

In the meantime, our observations revealed a better candidate for reserved on-street parking. In every city, we noticed people rushing out to their cars to feed the meter and then heading back where they came from. When we briefly interviewed them, they said they worked nearby but their employers didn't provide parking, and on-street parking was the cheapest or most convenient alternative. One woman in Oakland who worked for a nearby hotel pointed to a lot nearby that had inexpensive early-bird rates, but she worked the afternoon shift, so she couldn't take advantage of it. Public transportation wasn't ideal for her because every minute spent waiting for the train cost her extra money for her children's babysitter. So even though she spent about $450 a year in parking tickets, she believed on-street parking was still her best option.

A woman in New Orleans said she arrived for her 6am shift an hour early just so she could to find a spot. Even in Palo Alto, where parking is free, employees came out to move their car every few hours since they would get ticketed for staying within a certain zone for longer than two hours. Most of the people we intercepted were low-wage employees whose employers didn't provide or subsidize parking. From these encounters, we concluded that employees were much better candidates for reserved parking because they had regular, predictable routines, they found it frustrating to periodically leave their workplace (sometimes without permission) to feed the meter, and they had to leave extra time to find a parking spot before their shifts each day. Since cities often want to achieve frequent turnover by metering parking, these areas might be off the main shopping streets but still close enough to make them an attractive option for employees.

Another potential user of reserved parking might be delivery people. We saw many trucks double parked so they could get close to their destination for their deliveries. When we spoke to the drivers, they said they frequently got parking tickets but that their companies negotiated a discount rate with the city for all the tickets accumulated each month. Many had scheduled delivery routines, but they stayed for short periods of time, usually 5-10 minutes. Once they were delayed, they were usually behind schedule for the rest of their route.

These use scenarios were quite different from the team's initial expectations, and they had specific design implications. Aside from supporting the 1-2 hour scenario, the system should allow for 5-10 minute reservations for delivery people as well as all-day reservations

for employees. It should also provide an easy way for people to shift a reservation time, and potentially to automatically propagate that time shift through the rest of a delivery truck's route. Ideally, the system might even connect with delivery companies' computer system to automatically make reservations based on assigned routes.

Communicating Dynamic Parking Policies

As we walked around the streets, we noticed many cases where a single parking spot was used for different uses at different times, and those changing policies were communicated in a variety of ways. Examples of time-sharing included spots where no parking was allowed one day a week in the morning for street cleaning (Figure 3), or that were reserved for loading during certain times during the day, both communicated through permanent signs. Temporary signs were used to restrict parking during specific days and hours because of filming, construction, or special events. For example, the Rock and Roll Marathon took place on the Sunday we were in New Orleans, and multiple temporary signs were placed on every block along the entire 26.2-mile route (Figure 3). Some temporary signs were made of cardboard and had fields that were filled out by hand to indicate when and why parking was restricted.

FIGURE 3. Permanent and temporary signs were used to indicate dynamic parking policies due to street cleaning, parades, filming, and a marathon race.

So there seemed to be a need to adjust parking policies dynamically to accommodate different uses at different times and to increase capacity. However, the mechanisms for communicating these changing policies were not always successful. For example, in a busy San Francisco neighborhood where parking was scarce, both the curb and the meter for one parking spot were painted yellow (indicating loading zone), but it also allowed general parking after 12 noon, which was indicated by a sign wrapped around the meter pole that was low to the ground and difficult to see while driving (see Figure 4). A woman who had just parked there told us that she often used that spot since most people didn't realize it was available for parking in the afternoon.

FIGURE 4. Although this space is marked yellow for loading, it is also available general parking after 12:00pm, but this is indicated through an inconspicuous sign wrapped around the meter pole.

Some of the temporary signs we saw had already expired, even as much as a week earlier. Many of the construction signs were very difficult to read while driving by, since the hand-written information was small and often poorly written (Figure 5). Even some of the permanent signs indicated the restricted time periods in small type, and some of those were faded as well. One sign in New Orleans listed 14 different dates and date ranges when parking was restricted for special events (Figure 5). All of these problems made the signs difficult to interpret quickly while driving by.

FIGURE 5. Temporary signs were often difficult to read because they were hand-written in small type, faded, or printed in small type.

These observations highlighted to us the importance of the communication issue, since new concepts such as demand pricing and on-street parking reservations critically depend on drivers knowing the price or the availability of a parking spot as they approach it. If a parking spot looks like it is available, drivers will quickly become annoyed if they find out it is reserved only *after* they park, especially if it requires parallel parking. (We saw many people struggling with parallel parking, and on one busy downtown street that had both diagonal and parallel parking, we timed how long it took to fill empty spots and found that diagonal ones were filled in about one minute whereas parallel ones on the same block stayed empty for an average about 10 minutes.)

In the meantime, we noticed that some meters in San Francisco were especially effective at communicating the parking policy. The whole top section of those meters were brightly colored to reflect the policy of the spot: yellow for loading, green for short-term parking, blue for handicapped, red for large trucks, and a neutral silver for general parking (Figure 6). These were easy to notice from at least a half a block away, and made it easy to for drivers to decide whether the parking spot was appropriate well before they reached it.

FIGURE 6. San Francisco's meter had brightly colored tops, making it easy to identify the policy of the parking space from a distance.

Until that point, the engineers had only preliminary ideas about how to communicate the availability of a parking space that was reserved but not yet filled. The initial idea was to have a small light on the front of the meter that would change between red (reserved for this time), yellow (reservation pending within a short period of time), and green (available). Our observations led us to believe that such a design would not be sufficient, since it would be too small to see from several cars away and it could easily be blocked by other parked cars and trucks. In addition, we saw more than a few cases where people noticed a spot on the opposite side of the street and made a U-turn (legally or not) to get into it. This suggests that the indicator should be visible from both the back and the front. Based on our experience in

San Francisco, we suggested that a better approach would be to use the entire top of the meter to communicate availability. This approach would mean using a material that could change color at different times, perhaps by reflecting the color of a light inside the case. Although this design may not be the one ultimately chosen, the team understood the design requirement to make the indicator easily visible from several cars away in both directions.

Use-Centered Parking Signs

For the New Orleans study, the city asked us to explore ways to improve the customer experience, as the city has a reputation for having a difficult and frustrating parking situation. They also asked us to observe mainly in the French Quarter, where parking is especially limited. When we asked people there about their experiences parking they used words like "chaotic" and "confusing." They often volunteered stories of getting parking tickets for unfair infractions, such as parking too close to another spot when there were no markings on the street. They perceived enforcement to be unpredictable, so they were never sure whether they would get a ticket even if they thought they were parked legally. We set out to understand some of the reasons parking seemed so confusing to these residents.

As we walked around the city, we quickly noticed a few clues. The streets in the French Quarter are narrow, with just enough room for one lane of traffic plus a row of parked cars. Several streets are regularly blocked off to traffic to create pedestrian malls. So parking was very limited, and there is little room to pull over to drop someone off or quickly unload without blocking traffic. One way the city dealt with the limited parking real estate was to divide up the blocks into small sections, some just one or two car lengths long, and assign each section a different type of parking, such as passenger loading, freight loading, cab stands, government officials only, and so on. In addition, some of those sections changed use at different times of the day.

FIGURE 7. Conflicting signs. One says there is no stopping any time to the left of the sign, but the other restricts stopping in both directions only between 7-9am on weekdays.

As a result, most streets had an abundance of parking signs all along the block, often with two or more signs on a pole to explain what was allowed at different times. In some

cases adjacent signs conflicted, such as those in Figure 7, where one sign says you can park to the left after 9am on weekdays whereas the other one says you can never park there.

FIGURE 8. These signs indicate a complicated combination of restrictions, making it difficult to determine quickly whether parking is allowed at any given time.

Other signs didn't conflict but had so many time-based restrictions that it was difficult to tell when you *could* park. For example, Figure 8 shows a set of signs that together allow you to park behind the sign from 6pm to 8am on Mondays, Wednesdays, Fridays, and Sundays, and from 6pm to 12:01am on Tuesdays, Thursdays and Saturdays -- not an easy configuration to interpret while driving by. The signs in Figure 9 indicate that from 7-9am the section is a no stopping zone, then from 9 to 4pm it's a no parking zone, and then from 4 to 6pm there's no stopping again. It implies that you can park after 6pm, but this isn't stated.

FIGURE 9. These signs are organized by restriction rather than by time, and they only imply when parking is allowed.

Through all these examples, we realized a basic problem with parking signs everywhere, not just in New Orleans. The convention with parking signs is to state what is restricted when, but drivers looking for a spot want to know what they *can* do *now*. That is, most signs state what you can't do ("No stopping," "No parking"), or to imply it ("Fire Zone"). They usually communicate what *is* allowed only indirectly by not stating a restriction. Yet drivers have just a few seconds to translate the restrictions into a decision about whether they can park now. New Orleans' complicated signage makes this inferencing process even more difficult, which might lead people to inadvertently park illegally, or at best to figure out their error only after pulling in, either of which would cause frustration.

In our podcast, we suggested that parking signs could be redesigned to be *use-centered* rather than *restriction-centered*. That is, they could be organized by time and state what *is* allowed during each time range. For example, the sign in Figure 9 might be redesigned to look like Figure 10. This way, a driver could look for the current time and check to see the policy. If parking is allowed, it clearly says so. If parking is limited, it states what is allowed (e.g. Stopping Only). Only when no parking activity is allowed does it state the restriction (No Stopping).

FIGURE 10. A proposed redesign of the sign on the left to help drivers quickly determine what they can do right now as they drive by.

Although we had set out to look at parking, we wound up uncovering a problem with the signage, one that applied not just in New Orleans but in most other cities as well. We discovered so many issues with signage that we dedicated a section of the podcast to this topic, discussing such problems as inconsistencies across signs, cluttered signs, arrows that were hard to interpret, and faded, dislodged, or missing signs.

Although we believed these findings would be of interest to New Orleans' parking officials, we were initially concerned that ACS might consider them to be a tangent to their main concern of supporting the backend processing of parking revenue. However, we were pleasantly surprised when ACS reacted with excitement, seeing it as an opportunity to

explore a whole new set of service offerings. As a result, they spent some time brainstorming ideas for services that would address these problems in the future, including dynamic signage and better tracking of damaged signs.

CONCLUSION

Through our investigation of parking, we developed a rapid ethnographic technique for the purpose of informing technology design that uses engaging video podcasts to communicate the findings. We were pleased to discover that even with relatively little observation time, we were able to uncover a rich set of information about parking practices and issues in various cities. We were even more pleased to discover how effectively the podcasts communicated those findings. They were distributed widely and watched frequently and affected the project in both hoped-for and unanticipated ways.

In fact, our clients are pushing us to use the podcasts in yet new ways. When ACS hosted a booth at a parking trade show, they asked us to generate several 2-minute versions of the podcasts, each covering a different topic, which were played in the booth. When the PARC engineering leaders gave a 15-minute presentation on the project at a company all-hands meeting, he asked us to compile about a minute's worth of video to give the audience a flavor of our findings. In addition, our management has found the podcasts to be an effective tool for communicating and promoting our group's ethnography services. It is as if the podcasts are taking on a life of their own. Even though we have been communicating our findings through video for many years, the podcasts have caught people's fancy in a way we have not seen before.

Some of this response may have occurred because parking is a topic everyone can relate to -- and has an opinion about. Still, when we initially told people we would be studying parking, most people jokingly wondered whether we could have chosen a more boring topic. We believe the biggest factor in this enthusiastic response is that the podcasts take advantage of the power of video and dramatic storytelling and package them into an accessible format that can be easily viewed any time anywhere and forwarded on to others.

NOTES[1]

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Parking podcasts

Our parking podcasts can be found at the following locations.

Oakland: http://vimeo.com/17684961 (Password: PARC)

Palo Alto: http://vimeo.com/18095290 (Password: PARC)

San Francisco: http://vimeo.com/19510264 (Password: PARC)

New Orleans, driver's concerns: http://www.vimeo.com/20620933 (Password: PARC)

New Orleans, merchants' concerns: http://www.vimeo.com/20617173 (Password: PARC)