San Francisco, California, USA

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Local
Governments
for Sustainability

Using Technology for Smarter Parking Management

SFpark aims to ensure one available parking spot per block by providing real-time parking availability data to drivers and using demand-response pricing to encourage people to park in underutilized space. This innovative approach helps reduce traffic congestion, increase circulation and mobility, and decrease air pollution from cars cruising for parking.
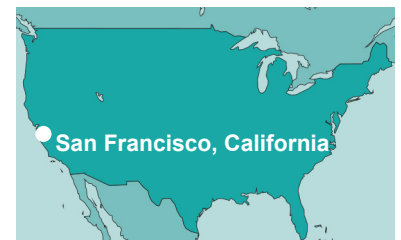
Abstract

Drivers that are cruising for parking in San Francisco are estimated to account for one third of traffic in the city. In addition to contributing to congestion and greenhouse gas emissions, distracted drivers endanger other road users such as cyclists and pedestrians. The SFpark approach seeks to address these issues with better parking management. Administered by the San Francisco Municipal Transportation Agency (SFMTA) and with funding from the Department of Transportation Urban Partnership, SFpark uses real-time data and demand-response pricing to ensure one available parking spot per block at all times. To increase ease of use, updated SFpark meters accept multiple payment types and have extended time limits. 8,200 sensors provide real-time parking availability data for drivers and are accessible via mobile phone app or internet. Demand-response pricing adjusts costs to encourage people to park in underutilized space. Preliminary program results reflect positively on the program and reveal a 29% increase in meter revenue and a 35% decrease in parking citations, although no hard evidence has shown significant changes in parking behavior yet. This innovative solution demonstrates how a local government can tackle parking problems, while maintaining revenue and providing safer and healthier streets for the community.

San Francisco, California

Population
805,235 inhabitants (2010)

Land area
121.393 km2

Municipal budget
U.S. $7.9 billion (FY 2013-2014)

Introduction

It has been estimated that one third of city traffic in San Francisco is caused by drivers circling around the block to find parking, which increases transportation-related greenhouse gas emissions in the city (SFMTA, 2013). The SFpark project introduces an innovative parking management approach, as an important layer of an integrated transportation system, to address this parking challenge. The project uses new technology and policies to provide real-time parking information to drivers and demand-responsive pricing to adjust demand for overused areas. The project aims to provide at least one empty parking spot on every block in order to discourage double parking and dangerous lane changes. SFpark creates a safer environment for all road users, including pedestrians and cyclists, and ensures traffic flow for emergency vehicles and public transit. Local businesses also benefit, as their customers are able to find parking faster and get to their destination. San Francisco is a leader in the field of smart parking and demonstrates how parking management can increase circulation and safety while reducing greenhouse gas emissions.

EcoMobility

San Francisco joined ICLEI in March 1997.

Case Study

San Francisco in Context

San Francisco, California is a major economic and cultural center for the greater Bay Area region. It is the second densest large city in the U.S. and the fourth most populous city in California. The city population is ethnically diverse and the median household income is $72,947, 18 percent higher than the state median (U.S. Census, 2013). The City is well known for its environmental leadership in addressing issues such as waste, greenhouse gas emissions, and energy use.

San Francisco is a multi-modal community that relies on walking, biking, and public transit. Only one percent of the population lives in car-dependent neighborhoods yet vehicular congestion remains a concern (NRDC, 2010). Collisions between motorized modes and pedestrians are not uncommon. Yearly, about 20 pedestrians are killed and an 800 more are injured in San Francisco (SFDPH, 2013).

This newspaper ad for the SFpark launch campaign depicts the program objectives and benefits.

Historically, San Francisco has taken a traditional approach to parking management with parking rates and fines and short time limits to achieve turnover goals. The City manages 28,000 on-street parking meter spaces, 20 parking garages, and 21 parking lots. Meter rates were generally lower than garage rates, which encouraged drivers to find on-street parking (SFMTA, 2011). Parking revenue is extremely important for balancing City budgets but the overall parking management approach was not convenient or efficient. Furthermore, poor parking management contributed to reduced transit speed, distracted drivers circling the block, and led to high rates of double parking. This traffic congestion has safety impacts on other road users. Distracted drivers endanger pedestrians and cyclists, slow down public transit, and impede emergency vehicles. While drivers circle, they also waste time and pollute the air.

SFpark's Innovative Parking Management Scheme uses real-time information and demand-responsive pricing for safer and healthier streets

A Smarter Parking Management Approach

In 2008, the San Francisco Municipal Transportation Agency's (SFMTA) Board of Directors passed a legislation that gave birth to the SFpark project. SFpark required this legislation in order to change parking rates in different parts of the city. This legislation defined the pilot areas and project policies and also enabled the variable rates. The pilot areas, as shown on the map, include Downtown, SoMa, the Embarcadero, Mission Bay, the Mission, Civic Center, the Fillmore, the Marina, and Fisherman's Wharf.

SFpark is managed by SFMTA, an integrated transportation agency founded in 1999 to manage the city's streets more effectively. This entity has a direct reporting relationship with the San Francisco Police Department's traffic enforcement wing. The unique authority of the SFMTA enables the agency's executive leadership to address citywide parking issues with integrated solutions.

This federally funded project uses wireless parking sensors to provide real-time data on parking availability. The pilot project monitors 7,000 metered spaces and 12,250 spaces in City-owned parking garages (SFMTA, 2013a). Real-time parking data is accessible by using a mobile application or over the web. The image [above/below] shows a screenshot of the easy-to-use SFpark app that allows drivers to find available spaces near their destination. In addition to real-time data, SFpark uses demand-responsive parking to adjust meter and garage rates and encourage use of underutilized parking. Demand-responsive pricing helps to shift demand from overused areas and thus ensure access to more parking.
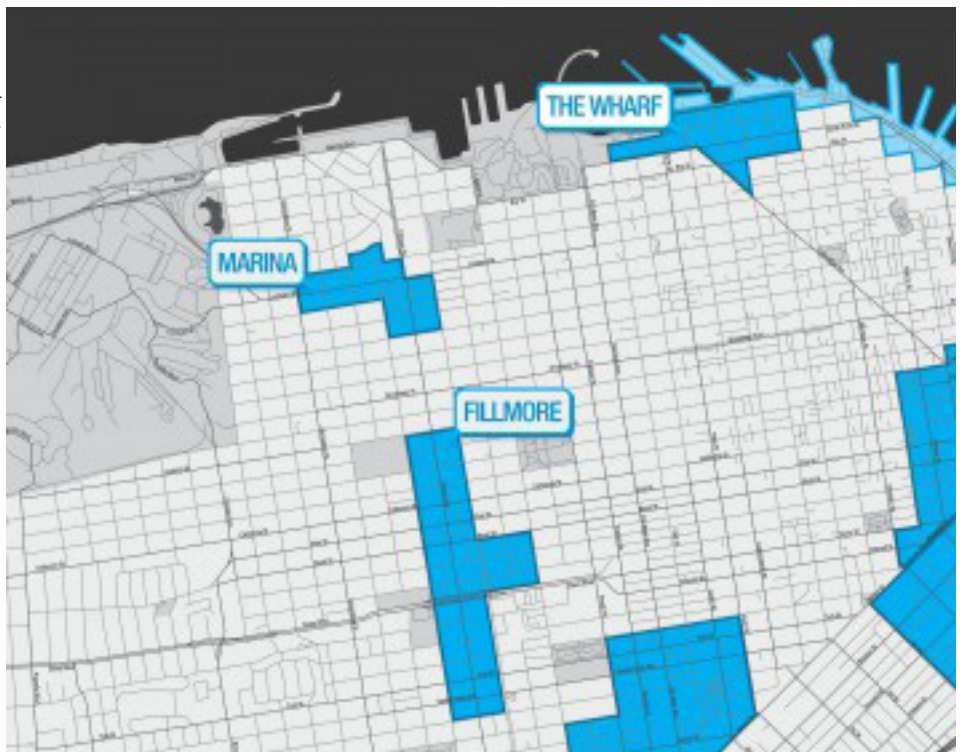

This map shows the SFpark pilot areas.

Technology

This project is unique in using cutting-edge technology, including SFpark meters, SFpark sensors, and SFMTA cards. These devices not only improve parking access control and payment automation, but also provide real-time communication of pricing and availability to mobile/smart phones (International Parking Institute, 2013). Parking sensors are installed in 8,200 on-street parking spaces. In addition to monitoring the 7,000 spaces in the pilot areas, SFMTA monitors three control neighborhoods for baseline data collection (SFMTA, 2013b).

SFpark users can pay with debit or credit cards, coins, and SFMTA parking cards. (IMAGE 4) Similar to the sensors, SFpark meters communicate with the SFpark data warehouse wirelessly (SFMTA, 2013c). This information helps parking coordinators examine when and where parking is either easy or hard to find.

SFMTA uses occupancy data to make demand-responsive rate adjustments for on-street parking meters. The project is using a respond-to-demand strategy instead of the traditional time limit system. The rate is adjusted to ensure eighty percent occupancy per block. It is also varies based on the block and time of day. Price is raised during peak usage periods and is lowered when there is more than eighty percent vacancy. The new meters, unlike the old meters, expanded the time limits from 60-120 minutes to 4 hours and eliminated time limits in some areas. The SFMTA has also extended the time limits when parking meters are enforced to align with business operation time, which extends into the night in some cases. The parking structures managed by the city also help complete this puzzle by providing market rate parking and responding to demand (SFMTA, 2011).
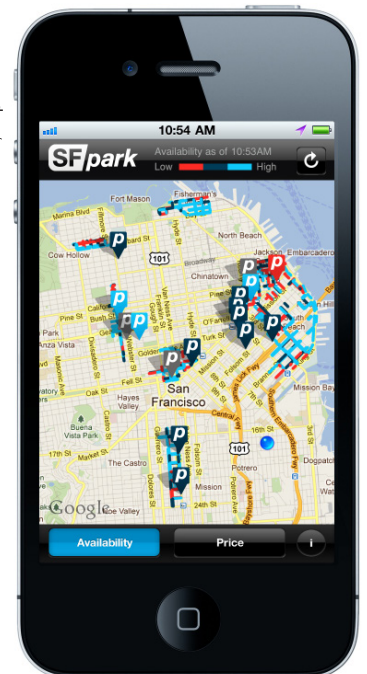
The SFpark app allows users to find available parking and pricing information on their mobile phones.

Key Partnerships

The Port of San Francisco, which manages 1,000 meters along the city's waterfront, partnered in this project. Other project partners include academic advisors and companies that provided technical assistant in project implementation and outcome evaluation (SFMTA, 2011). The detailed list of SFpark partners can be found on the following web link:

http://sfpark.org/about-the-project/project-partners/.

Program Challenges

The program has been challenged by its pricing system and its effect on social equity. A study conducted by Cornel University found that there is a strong correlation between higher parking prices and higher vehicle values, raising the question of whether lower-income drivers are being priced out of some of San Francisco's streets (ITS, 2013).

Complaints about program outreach have been another issue that delayed the project in some neighborhoods. Community members in the Mission neighborhood were angered by the lack of program outreach, and lack of accessible information in languages other than English. Overall, there was a mixed response about the installation of meters in the Mission. In response, SFMTA issued an apology and reached out to neighborhood agencies to improve SFpark outreach efforts (Hernandez, 2012).

The project has also been criticized for not incorporating revenue-sharing, which would give additional revenue to local communities to pay for streetscape improvements. The SFMTA plans to spend the revenue generated on current transportation priorities in city. Given the SFMTA's budget constraints, the agency is keeping the revenues and investing them in public transportation (Simons, 2012).

Another issue is that SFpark can potentially increase the digital divide in San Francisco because one needs access to the Internet or smart phone to take full advantage of this program. SFpark opponents also argue that in some parts of the city, SFpark has actually encouraged the use of car by making it easier to find parking, which has its negative environmental and traffic effects (SFpark.info, 2013).

Finally, preliminary program evaluation shows that the program did not significantly impact parking behavior; and that parking occupancy and length of stay has still not changed markedly (SFMTA, 2011b).

Results

The program is still new and a comprehensive analysis of the outcomes is underway. However, the SFMTA expects the following results from the program (SFMTA, 2011):

- Increased parking availability
- Reduced parking search time and variability
- Reduced double parking
- Decreased long-term on-street parking
- Reduced congestion
- Improved speed and reliability of public transit
- Improved air quality and reduced greenhouse gas emission
- Improved customer satisfaction with SFMTA parking management
- Improved the economic vitality of pilot areas and economic competitiveness of San Francisco
- Improved transit, taxi, pedestrian, bicyclist, and driver safety
- Improved SFMTA's financial sustainability

Source: SFMTA, SFpark website

The preliminary project evaluation in 2011 indicates that the new meters increased gross revenue by 29% during the first half of 2011. This resulted from a combination of accepting credit cards and extending time limits. The program also showed a 35% reduction in parking meter related citations. However, this program did not significantly change parking behavior, as also mentioned as part of the program challenges (SFMTA, 2011b). These preliminary results are important as SFpark is the first parking based congestion management project. SFpark results can help inform other communities to develop better parking management strategies.

SFpark meters accept different payment types for ease of use.

Lessons Learned

Previous experience with metering programs proved valuable. SFMTA's previous experience with the Meter Shop project was extremely helpful for designing the SFpark project (SFMTA, 2011). The Meter Shop program, started in 2002, was a citywide procurement effort to replace old mechanical parking meters with electronic single-spaces meters and multi-space pay stations. This program was successful and generated high revenue. After a decade, the Meter Shop program meter technology became outdated, because spare parts were no longer available and the machines were not designed for credit card payments. The data collected through the Meter Shop program provided the rationale for the SFpark project. The SFpark project is building upon this experience by collecting and analyzing extensive data.

Provide enough time and resources for community outreach. The SF Park project is federally funded so it had a deadline for fund spending. The SF Park project spent an extensive amount of time and budget for fast paced community outreach. However, parking is a very sensitive issue which resulted in community opposition from some neighborhoods. An expanded time frame could potentially help communities to provide input and increase the program acceptability.

The findings of the project indicate that it is **important to provide transparency** in all stages of the project, including revenue spending. In addition, balancing the complexity with simple and clear communication with the public is a key to success.

The use of technology does not always go as planned. Most of the technology used in the project did not meet the expectations of the initial plan. The project implementation process also required more time than planned and was much more complex in terms of providing the infrastructure to make use of the meters.

Varied funding and intellectual resources was key to program success.
A dedicated executive board, the unique organizational capacity of SFMTA, and strong intellectual foundation provided from UCLA set the stage each provided a unique and important perspective for the program. The program was initiated by federal funding from U.S. Department of Transportation's Urban Partnership Program. Metropolitan Transportation Commission, the Bay Area's lead planning and transportation funding body provided additional money to continue the program (SFMTA, 2011).

This project introduced new challenges to SFMTA which required internal consensus building and cultural change in the organization. Specifically, providing real-time data was a challenging task for staff which required a lot of hand coding for different technologies to work together (SFMTA, 2011).

Replication

The SFpark project assumes that parking availability and price are critical factors contributing to vehicle trips. The project expects that market rate parking would not only reduce the congestion but also will impact the mode choice in the long term. If the project reaches its goals, it can be implemented in other large cities that have the parking management infrastructure in place and where people are accustomed to paying for parking. This project provides a new approach to parking management and can also be used as a tool for transportation goals while maintaining its revenue stream. SFpark is also an important test for new meters and public sector ability in data management.

Bringing different stakeholders together would be the first step in developing the project. An executive coalition of parking management entities should work closely to define the inventory of parking, the project scope, and organizational capacity to implement the project. Building a strong relationship with academia and local companies can facilitate the project process. It is important to identify the opportunities for collaboration in order to optimize resource efficiency.

Budget and Finances

SFpark is administered by the SFMTA with federal funding from the Department of Transportation (DOT). The DOT created the Urban Partnership with a $1 billion fund for cities that plan for the most aggressive congestion-relief. Miami, Minneapolis/St. Paul, San Francisco, and Seattle received funding from the Urban Partnership (USDOT, 2013). San Francisco received $19.5 million to fund SFpark, and was required a 20% local match (SFMTA, 2011). In total, the project budget is $23 million and is divided between 13 projects, services, staff time and equipment (SFMTA, 2008).

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