BRIDGING THE LAST MILE: A STUDY OF THE BEHAVIORAL, INSTITUTIONAL, AND ECONOMIC POTENTIAL OF THE SEGWAY HUMAN TRANSPORTER

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ABSTRACT

Public transportation systems are comprised of extensive bus networks, light rail, and heavy rail extending to most major destinations. However, efficient transit station access is often limited. In the U.S., a more comprehensive approach is needed that offers a range of integrated "door-to-door" mobility services that enhance connectivity, provide customer flexibility, and potentially increase transit ridership. The Segway Human Transporter (Segway HT) is an innovative mobility device that could provide such a demand-responsive, easy to use tool to link home, work, and other activity destinations via transit. This paper outlines a Segway HT pilot research project that explores safety and training issues and transit feeder service demand. This research will provide answers about consumer acceptance, safety, land use, parking impacts, and market niche potential. Year One of the project will focus on developing a stronger understanding of consumer, stakeholder, legal, institutional, and safety/training issues pertaining to Segway HT use. Year Two consists of the deployment and study of a controlled pilot demonstration in which a shared-use Segway HT rental model would be tested in conjunction with transit and work locations. The success of the Segway HT as a transit connectivity device depends on cooperation among the public and private sectors, particularly in the areas of safety (e.g., user training and bystander impacts), land use, legislation, consumer acceptance, and market approaches.

Key Words: Segway HT, Safety, Shared-Use Vehicles, Door-to-Door Connectivity, Market

INTRODUCTION

Access to transit stations from home, work, recreation centers and other destinations is often challenging, creating a barrier to transit ridership and overall system efficiency. At many transit stations, dedicated parking is limited and fills up early each workday. Transit stations in more urban settings have limited or no dedicated parking, and patrons driving to the station must rely on street parking. Pedestrian access to transit stations falls off dramatically at distances greater than one-half mile *(1).* Bicycles increase the distance that an individual can travel to the station, and some transit agencies improve access options with bike friendly policies, such as bike lockers and racks on transit vehicles. Shuttles, providing fixed route, fixed schedule services offer another method to increase transit station access *(2).* However, viable shuttle services are limited to situations where enough people from a nearby location require access to the same destination (e.g., transit station) on similar schedules. For many potential patrons, transit station access may be possible for one trip end, but difficult at the other.

Innovative solutions to increase transit station access expand the potential transit ridership population. Programs that have already been implemented to increase transit station access include bicycles, electric bicycles, carsharing, and personal neighborhood electric vehicles. (For more information, see *3, 4, 5, 6,* and *7*).

Another mobility device that might improve transit station access is the Segway Human Transporter (HT). The Segway HT, brainchild of Dean Kamen, was unveiled in 2001, to accolades regarding its technological achievement and skepticism about its safety and overall

benefits. The Segway HT is a self-balancing, two-wheeled electric mobility device in which the operator stands upright and steers the vehicle utilizing weight distribution and a hand control. The purpose of the proposed research and pilot demonstration project described here is to test the hypothesis that the Segway HT can safely enhance connectivity to transit stations, increase transit ridership, and offer a demand-responsive mobility option for running errands throughout the day. The authors will also examine a second hypothesis: that an economically viable Segway HT rental model can be developed at transit stations and work sites.

To test these hypotheses, a transit-based Segway HT pilot demonstration is planned to launch in 2004 at a suburban Bay Area Rapid Transit (BART) District station in Northern California. In 2003, researchers will investigate Segway HT consumer response, safety/training needs, and institutional issues. This paper describes the project's research goals and methodology along with expected data and rental models that might apply beyond the pilot. A background overview of the Segway HT, current test applications, and Segway Limited Liability Corporation (LLC) legislative activities are also discussed within the context of the proposed pilot project.

THE SEGWAY HUMAN TRANSPORTER: BRIEF OVERVIEW

This section includes an introduction to the Segway HT device and vision, current pilot projects, and legislative efforts to authorize sidewalk use.

Segway: The Vision and Specifications

Dean Kamen invented the Segway HT as a transportation device that might replace short-range automobile trips. Mr. Kamen is a self-taught physicist, engineer, and an inventor of other devices that combine public benefit and sophisticated engineering, such as drug and insulin pumps, heart stents, and a stair-climbing wheelchair *(8*).

The Segway HT, designed for use by the general population, incorporates principles of stability, safety, flexibility and operational ease. According to Kamen, it was designed to "look, act and feel like a pedestrian." Kamen's vision for the device is to increase personal mobility in public spaces and to address environmental issues associated with exclusive automobile reliance. In Kamen's words, "cars are great for going long distances, but it makes no sense at all for people in cities to use a 4,000 pound piece of metal to [move their 150 lb. bodies]"*(9*). To summarize, his objectives include use of the Segway HT to move people and goods more efficiently, replace short automobile trips, assist individuals in connecting to their community, and encourage public and alternative transportation use.

The Segway HT has a lightweight frame and can respond quickly to human interaction. The rider stands on a platform, eight inches from the ground, which is located between two parallel wheels. The rider shifts his or her weight to control forward or backward motion. An adjustable shaft connects the platform with a handlebar that contains the turn control. It weighs 83 pounds and has a "footprint" of 19 x 25 inches. Its mobility range is 11 to 17 miles per charge, and the batteries can be re-charged in four to six hours with an 100- to 220-volt outlet. The Segway HT's balancing and electrical systems include built-in redundancies to enhance safety. These two elements work together, allowing the user to operate the device.

Several Segway HT models have been designed for use in a variety of applications. The "e" series is used to carry cargo (e.g., in a warehouse), and the "i" series is for distance and more rugged terrain (e.g., sidewalks and grass). The majority of test applications today employ the "e" series in commercial and larger-scale governmental applications (described below). The Segway

pilot project described in this paper would likely test the "i" series model. (See Figures 1 and 2 below for a picture of each model).

FIGURE 1: Segway HT e-Model

FIGURE 2: Segway HT i-Model

Current Segway HT Pilot Projects

Launched in late-2001, the Segway LLC marketing strategy was initiated with a series of demonstration applications highlighting its many potential commercial uses. These pilots evaluate how the Segway HT can be used to increase business and governmental agency productivity. This strategy also provides maximum visibility for the Segway HT in a variety of controlled venues. The initial tests were conducted in warehouse applications requiring agility and capacity to move heavy materials. Next, the Segway HT was introduced in controlled working environments within several federal agencies. At present, the U.S. Postal Service and National Park Service are evaluating the Segway HT in several pilot demonstration programs. Other tests include the city of Atlanta (visitor education), GE Plastics (improving worker productivity), and Georgia Power (various plant applications). Many of these pilot programs are still in operation. Table 1 (below) outlines current and past test demonstrations, locations, dates, applications, and evaluation objectives.

The planned Bay Area Segway HT-BART District pilot research and demonstration project—sponsored by the California Department of Transportation (Caltrans) and evaluated by the University of California's Partners for Advanced Transit and Highways (UC PATH) program—would be the first consumer-based study of Segway HT linked to a broader transportation system. Furthermore, this program would be the first to deploy and test the viability of a Segway HT mobility service model (e.g., individuals and employers would rent HT units on an hourly/monthly basis).

TABLE 1: Segway HT Pilot Demonstration Projects

Application	Organizations/ Locations	Dates	Evaluation Objectives
Manufacturing & Distribution	**GE Plastics** Burkeville, AL; Mt. Vernon, IN; and Selkirk, NY **GTI Spindle, NYSEG, NHPS, Walbridge Aldinger, Delphi, and Georgia Power** Various cities, Georgia	December 2001 to Present	▪ Safety and productivity gains ▪ Indoor and outdoor applications ▪ Improve daily efficiency ▪ Meter reading and inspect natural gas lines ▪ Meter reading ▪ Large plant mobility monitoring ▪ Plant transportation
Law Enforcement & Emergency Personnel	**Police Departments** Atlanta, GA; Boston, MA; and Manchester, NH **Emergency Medical Services (EMS)** Boston EMS, Boston, MA MedExpress, Alexandria, LA	December 2001 to Present April 2002 to July 2002 November 2002 to Present	▪ Law enforcement applications: security, traffic, pedestrian flow management practices, officer-public accessibility, urban navigation, emergency response ▪ Testing security, range, and performance ▪ Evaluate access to patients where conventional means result in delay
Postal & Delivery Services	**United States Postal Service** Tampa, FL; Bronx, NY; Chandler, AZ; Norman, OK; Memphis, TN; and San Francisco, CA	January 2002 to Present	▪ Efficiency, safety, ergonomics, cost savings, time and physical demand reductions ▪ Evaluate a range of diverse factors: climate, terrain, and route length
Municipal Transportation	**Atlanta Regional Commission & Ambassador Program** Atlanta, GA **Toledo Port Authority** Toledo, OH **City of Chicago** Chicago, IL **Seattle Fleets & Facilities** Seattle, WA	April 2002 to Present September 2002 to Present September 2002 to Present October 2002 to Present	▪ Urban applications, efficiency and navigation of short trips, transit linkages from suburban stations ▪ Meter reading ▪ Security patrols at Midway and O'Hare airports; Transportation, Water, and Parking Departments ▪ Fleet reduction, meter reading ▪ Zoo maintenance
Parks & Recreation Services	**National Park Service** Grand Canyon, AZ and Washington, D.C.	May 2002 to Present May 2002 (only)	▪ Productivity, patrol, mobility, and environmental impact reduction
Leisure	**Disneyland EPCOT, Animal Kingdom, and Disney Cruise Lines** Orlando and Lake Buena Vista, Florida	September 2002 to Present	▪ "Campus" navigation, consumer demonstrations ▪ Productivity and mobility ▪ Concessions and security

Legislative Developments

The initial pilot projects with private sector and governmental agencies (listed above) provide an opportunity for Segway LLC to better understand behavioral response and policy issues relevant to commercial deployment. Segway HT's attributes (e.g., self-balancing capability, lightweight frame, human width, turning and stopping features) can enable its use in several possible settings, including private industrial facilities, campuses, federal lands, and public roadways and sidewalks. Nevertheless, Segway HT human factors studies are needed to document user response and bystander safety, as well as training requirements in multiple environments prior to widespread deployment.

Generally motorized vehicles are not allowed on sidewalks. Segway LLC argues that this device is unique from bicycles and scooters, offering unprecedented agility, flexibility, and safety features for sidewalk use. In 2001, Segway LLC embarked on its legislative strategy to enable local jurisdictions to individually decide if they would grant Segway HT use on sidewalks in their communities.

The first step toward Segway HT sidewalk approval was adoption of national legislation that legalized sidewalk and public path uses on federally funded roadways. This legislation (Senate Bill 2024) defined the Segway HT as a new vehicle class: an "electric personal assistive mobility device," separating it from other motorized vehicles such as scooters and motorcycles, which cannot be operated on sidewalks. If passed, this bill would enable Segway HT's use on federal trails and pedestrian walkways. Many states and local jurisdictions are considering Segway HT use on sidewalks in their communities. At present, 32 states (as of November 2002) have adopted legislation that would permit Segway HT use on sidewalks with municipal approval. Furthermore, four additional states are considering similar legislation (see Table 2 below).

TABLE 2: State Legislative Activity

State	Legislation	Date Signed Into Law
North Carolina	Session Law 2001-487	December 15, 2001
New Jersey	Assembly Bill 3984	January 8, 2002
New Hampshire	Senate Bill 385	February 15, 2002
South Dakota	House Bill 1211	February 24, 2002
New Mexico	House Bill 298	March 5, 2002
Utah	House Bill 281	March 18, 2002
West Virginia	Senate Bill 682	March 17, 2002
Idaho	House Bill 550	March 22, 2002
Virginia	House Bill 905	March 22, 2002
Missouri	House Bill 1270	March 26, 2002
Indiana	Senate Bill 401	March 27, 2002
Washington	Senate Bill 6316	March 29, 2002
Kansas	House Bill 2663	April 1, 2002
Arizona	Senate Bill 1193	April 4, 2002
Florida	House Bill 261	April 11, 2002
Iowa	Senate Bill 2192	April 11, 2002
Oklahoma	Senate Bill 1473	April 15, 2002
Wisconsin	Senate Bill 393	April 18, 2002
Nebraska	Legislative Bill 1105	April 22, 2002
Maine	Legislative Document 2018	April 22, 2002
Vermont	Senate Bill 297	May 1, 2002

Tennessee	House Bill 2539	May 10, 2002
Maryland	House Bill 869	May 16, 2002
South Carolina	House Bill 4954	May 20, 2002
Rhode Island	House Bill 7271 and Senate Bill 2585	June 15, 2002
Delaware	House Bill 473	June 30, 2002
Pennsylvania	Senate Bill 1225 (as amended)	July 4, 2002
Missouri	Senate Bill 1016	July 9, 2002
Minnesota	House Bill 2882	July 18, 2002
Ohio	Senate Bill 321	July 25, 2002
Arkansas	Senate Bill 100	July 31, 2002
California	Senate Bill 1918	September 26, 2002
State	**Pending Legislation**	**Expected Date**
Massachusetts	House Bill 5127	Early 2003
Washington, D.C.	Bill 14-0550	Early 2003
Illinois	House Bill 5610	Early 2003
Connecticut	Senate Bill 422	Early 2003

Governor Davis approved California's bill (SB 1918) on September 26, 2002; however, it does not become effective until March 1, 2003. Its goal, as with other states, is to legalize Segway HT use in pedestrian environments pending municipal approval regarding time, place, and manner of operation within their jurisdictions. In the proposed Segway HT-BART pilot demonstration project, affected local governments would authorize its use on local sidewalks and paths. The next section provides an overview of the research and planned pilot project.

RESEARCH AND SEGWAY HT-BART PILOT DEMONSTRATION: AN OVERVIEW

In this section, the authors discuss the research goals and design, methodology, and proposed research and pilot project overview.

Research Goals and Design

UC PATH researchers are working with the California Department of Transportation, Segway LLC, and the BART District to design and implement a research program that:

- Evaluates safety of other low impact modes of transportation (e.g., scooters, bikes, skates);
- Informs ongoing safety and training research at Segway LLC pertaining to the HT;
- Develops an understanding of stakeholder and consumer perceptions of the Segway HT;
- Conducts a feasibility study for a suburban (and possibly urban) BART pilot demonstration; and
- Deploys and evaluates the Segway HT in shared-use application(s) linked to transit (as appropriate).

The research includes two distinct phases and possibly a third phase, which could be initiated based on Phase I (Scoping and Feasibility Analysis) and Phase II (Suburban Transit Pilot Demonstration) findings. Phase I includes: a literature review of other low impact modes of transportation (e.g., bikes and scooters) safety and usage studies, as well as input and review of Segway LLC human factors studies focusing on safety and training; focus groups to document consumer and stakeholder perceptions of the Segway HT (e.g., use and safety issues for users and bystanders); and a feasibility study of a suburban BART station demonstration location (e.g., Pleasant Hill). (A more detailed review of Phase I research steps follows below.)

This initial study will result in a stronger understanding of Segway HT safety concerns, and how this device might best be introduced to enhance transit connectivity in a suburban location. Building on lessons learned about Segway LLC safety and training studies and Phase I findings, Phase II would implement and evaluate a pilot demonstration of the Segway HT in a shared-use rental application linked to transit and employers in a suburban location. Following Phases II, a final study phase could be added to test the Segway HT in a rental model in an urban BART environment. The Phase III (Urban Transit Pilot Demonstration) design and rental approach would build on lessons learned from the previous research phases.

The Segway HT research project goals include gaining a stronger understanding of:

- Safety and training issues associated with the Segway HT;
- Consumer and stakeholder attitudes about the HT, including safety and overall consumer response. (This research will inform ongoing safety research being conducted by Segway LLC.);
- Land use, legal, and institutional issues affecting HT use on public sidewalks;
- Segway HT as a mobility device to increase transit connectivity; and
- Shared-use rental models.

Phase I: Scoping and Feasibility Analysis

Phase I is focused on studying Segway HT safety and implementation issues and developing a feasibility analysis for a suburban transit pilot demonstration, linking the Segway HT to a BART station and local employers (and possibly residences). Research goals include gaining a stronger understanding of other low impact transportation modes, Segway HT safety/training issues, consumer and stakeholder perceptions, and legal and institutional parameters affecting Segway HT use in communities and linked to transit. Phase I research includes:

- A literature review on safety and transit connectivity issues pertaining to other low impact mobility devices, such as scooters and bicycles;
- A literature review exploring critical land use, legal and institutional factors affecting the use of the Segway HT on public sidewalks and roadways;
- A summary of lessons learned from previous and ongoing Segway HT pilot programs;
- Input and review into Segway LLC human factors studies related to safety and training;
- Focus groups with consumers and stakeholder groups to explore attitudes about safety and Segway HT use;
- A series of meetings with stakeholders (e.g. municipalities, transit, employers, bicycle and pedestrian advocates) to understand concerns and methods for maximizing benefits of the Segway HT; and
- A feasibility study for the planned Phase II research pilot program, employing the Segway HT in a shared-use rental program linked to transit and work sites (and possibly local residences). This step includes design of the rental model, contracts with a rental agent at the BART station and employers/residents, strategies for selecting human subjects, the user training program, and program marketing strategies.

Phase II: Suburban Segway HT-BART Demonstration and Evaluation

The second phase of the Segway HT research program involves a pilot demonstration project to gain real-world knowledge about how the HT would function in a shared-use rental service. The purpose of the pilot demonstration is to assist researchers in gaining information about safety issues, user behavior, consumer acceptance, Segway HT performance, societal impacts and a HT rental model. The Phase II pilot demonstration project would incorporate lessons learned during from Phase I research effort including safety studies, user behavior, and consumer and stakeholder acceptance. Below the authors outline the current vision for the suburban pilot implementation, a possible site and rental vendor, and the evaluation methodology.

Pilot Project Implementation: Overview

The implementation phase includes identifying employers to participate in the program, targeting employees at each work location, developing an internet-based system for member reservations at participating employers (as needed), establishing locations for storage and recharging, and training participants on use and care of the Segway HT.

To fully investigate the range of uses in employment settings, the Segway HT would be tested in a variety of applications throughout the day. There would be two primary user groups in this study (and rental model): commuters at the workend and employees during the day. Each morning, a specific group of trained employees would take BART to the station, check out a reserved Segway HT from the rental vendor, and ride the device to work. Once at the office, the Segway HT would be available to a larger group of employees for off-site meetings, errands, or lunch appointments. At the end of the day, the commuter would ride the Segway HT back to the transit station, where it is stored and recharged. Additional groups, such as residents who live near the BART station, could be added during the pilot demonstration, if appropriate. If local residents were added, they would have access to the Segway HT on evenings and weekends.

Employment locations would be chosen to test the Segway HT using the following criteria: over one mile distance from the transit hub; an employment pool large enough to support Segway HT day and commuter use; and interest in the HT as a mobility device for their work and leisure trips. Recruitment of enthusiastic and committed employers would be a vital component of the implementation; this will be explored as part of the Phase I feasibility study. A primary objective of this pilot would be to involve and study employees who were not able to use transit to commute on a regular basis prior to this program.

At each employment site, a reservation system for using the Segway HT would be developed in conjunction with participating employers. A safe and secure storage system would be deployed in conjunction with Segway LLC, a rental agent at BART, each employment site, and local municipalities. The Segway HTs would be visible and secure during commute hours. The units would be stored and recharged overnight in a covered facility, if they are not in use by homebased users on evenings and weekends. In addition, the Segway HTs would display signage indicating that they cannot be operated without a smart access key to discourage theft.

Each individual enrolled in the Segway HT pilot would be trained in accordance with a methodology tested and approved by Segway LLC and the project partners. All pilot participants would be required to complete training. Before individuals could commute with the Segway HT, they must be comfortable reserving, riding, and securing it at their employment site, in the community, and at BART. This training, combined with a pilot user manual, would be important for user safety and research understanding.

Potential Suburban Transit Location

The Pleasant Hill BART station (see Figure 3 below) has been identified as a likely candidate for the Phase II pilot demonstration. Pleasant Hill is located in the East San Francisco Bay Area. The residential population is approximately 27,000. There is significant business development surrounding the BART station, and the downtown area is approximately two miles from the BART station. The sidewalks are wide and not heavily utilized.

FIGURE 3: Pleasant Hill BART Station and Surroundings

This station is located in Contra Costa County and is surrounded by the communities of Pleasant Hill, Concord, and Walnut Creek and would allow for the investigation of the Segway HT in different jurisdictions. Because the business district is expanding near this station, it also provides an ideal location for increasing BART ridership with commuters who would have traditionally driven to work in the Pleasant Hill Area. There is limited bus and shuttle service in the area, and the device could serve as an efficient feeder service from BART to the office. Employers in the Pleasant Hill Area are located near retail and commercial businesses, providing a mixed-use venue to test Segway HT use during the day. In Pleasant Hill, there are also opportunities to expand to the residential population, who could use the Segway HT as a commuter device on evenings and weekends. Finally, a trail system exists that connects the BART station to local neighborhoods, which could be used for traveling to the station.

Potential Rental Operator

A potential Segway HT rental vendor for the planned BART suburban pilot demonstration could be Star Retail. This for-profit organization operates a concession at the Pleasant Hill BART station and is currently planning to expand to other stations. Star Retail sells coffee, sandwiches, reading material, and sundries and rents movies from a compact, enclosed stand at the BART station. An automatic teller machine (ATM) is also available at the Star Retail facility. The business is staffed during the day, especially during commute hours. There is space available at this location to display, store, and re-charge Segway HT units. This operation could provide researchers the opportunity to evaluate a Segway HT rental model as a means to distribute HTs

to transit riders, commuters, and local residents at selected transit stations. A minimum of 15 HT units would be deployed by Star Retail at the BART Pleasant Hill station location, if selected.

Evaluation Methodology

The Phase II evaluation would include four main components: 1) pre- and post-pilot focus groups of Segway HT users; 2) detailed "before and after" questionnaires and travel diaries; 3) a bystander survey; and 4) a rental model assessment to provide input into viability and marketing. Data would be analyzed to assess modal shifts, parking impacts, safety (i.e., users and bystanders), and overall community perceptions. Lessons learned from this pilot would be reported at the conclusion of the research and may be used to inform the design of a Phase III pilot demonstration phase in an urban location.

Local businesses and employees would be recruited for program participation, as well as possible residents. Information about willingness-to-pay for the Segway HT as a short-range mobility device would assist in determining the appropriate rental cost structure for the demonstration and insights about its use beyond the pilot phase. Additional issues to be explored include: safety perceptions of users and bystanders, including appropriateness of training program; how individuals envision using the Segway HT in the pilot and beyond; whether they are willing to pay for the service; and duration of program participation. Data on Segway HT response (i.e., how it is used, how often it is used, comfort zones, etc.) and on-street reaction (i.e. interactions with non-users, cars, pedestrians) to the Segway HT also would be collected and analyzed.

As mentioned above, surveys of Segway HT users would be conducted "before and after" the pilot demonstration. Specific information about the demographics of the user population, commute and mobility patterns before and after Segway HT introduction, and overall consumer and community response; bystander perceptions; and a rental model assessment (e.g., costs, training, and marketing) would be incorporated into the final analysis. Other issues that could be evaluated by Segway LLC during the pilot program include human factors, such as individual size, weight, and agility; necessary training for safe operation; and the impact of environmental factors such as weather and temperature on use.

Phase III: Urban Pilot Demonstration

A third phase of the Segway HT pilot demonstration project will be conducted if the analysis during Phase I and II indicates that an urban transit connectivity pilot would be beneficial. This phase would operate similarly to the suburban pilot, with the same data collection methodology. The research questions and data analysis would be adjusted to account for the specifics of an urban environment, including sidewalks with heavy usage and more compact urban structures. In addition to commuter and business membership in this pilot demonstration, there may be an opportunity to expand use to local residents.

CONCLUSION

Increased access to transit stations could increase ridership, reducing the number of single occupancy vehicles on the road and the associated negative impacts, such as congestion and air pollution. To the extent that increased access can be accomplished without additional parking lots, which are costly and land intensive, benefits could multiply. The Segway Human Transporter could provide door-to-door connectivity between transit stations and home, work, and other destinations.

Segway LLC developed a legislative strategy to define the Segway HT as a device that can be used on sidewalks. National legislation has passed, and individual states are currently in the process of considering the Segway HT for sidewalk use. Segway HT testing is continuing in a variety of commercial and governmental applications nationwide. The proposed research pilot in California would be the first to demonstrate the HT as a transit connectivity device.

The proposed research program involves two key phases. The first phase includes an investigation of other low impact modes, safety issues, and stakeholders/consumer attitudes about the Segway HT and a feasibility study of a transit pilot demonstration. The second phase includes a suburban pilot demonstration and evaluation. A final phase may be added to test the HT shared-use rental model at an urban BART location. The Segway HT-BART District research pilot would test the hypothesis that this device can safely increase personal mobility for short-distance trips and serve as a transit feeder service. Local businesses would subscribe to the service, so their employees could use the Segway HT to travel between the BART station and their offices, as well as for personal and work errands during the day. Issues addressed during the Segway pilot include: safety (for the user and surrounding pedestrians), operational issues on public sidewalks, role in facilitating modal transit shifts, overall performance, consumer perceptions, and security.

The goal of this pilot demonstration research is to provide answers about Segway HT as a safe mobility device that can provide linkages to transit, work, and other activity locations. Specifically, this research will assist in understanding consumer response to the device, safety and training issues, modal choice and land use impacts, and the sustainability of a HT short-term rental model.

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