

Responding to New Trends Through a Usability Approach

By David Levinger & Maggie McGehee

A key to connectivity between transit modes and systems is superior design and usability. Seamless connectivity — that is, the type of connectivity that passengers don't even notice — should be the goal of all transit systems. This article develops connective responses to today's challenges and trends for transit operations.

Do you recognize what just hit you? It's called the "Peak-Boom" generation, and you need to be prepared. Americans are choosing transit in record numbers due to peak oil costs, baby boomer demographics, and new community trends. These Peak-Boom mode-switchers have high expectations for your transit systems. Why you should embrace them and their needs, and what you can do to succeed.

Public transit exists, by definition, to serve the public. For transit leaders in the 21st Century, this purpose remains the same, but the approach must adapt to meet new realities. Our "public" is

shifting, both in terms of demographics and in sheer numbers of customers, and the global concerns of climate change and energy policy are becoming more local every day. If transit will continue to attract new riders, serve these expanding markets, and still provide value to existing passengers, community and public transit agencies everywhere will need to adapt.

Luckily, all of these challenges can be addressed, not only by spending more money and time, but by finding ways to use both more effectively. The goal is to provide added value to the public and greater efficiency for your systems by striving to improve "transit usability." First, a look at the changes ahead.

New Trends Challenging Transit Operations

Peak Oil

As a transit leader, you are already too aware of rising fuel costs. Whether the world is reaching or has passed the

peak of oil availability and production, it is clear that demand is on the rise, supply is declining, and prices will continue to reach jagged new peaks. Efficiency in vehicle gallons per mile, budgeting, and route planning are all crucial to keeping your transit service operational.

For the communities you serve, increased energy costs are spurring higher prices in every staple of living. This peak oil generation — and all generations to come — will be changing established norms by making new decisions about consumption, living arrangements, where to work, and how to travel between these places. Long-time vehicle drivers — many of whom may have eschewed, feared, and even mocked transit in the past — become new customers of public transportation in the quest to escape the costs of filling their tanks.

Attracting these new riders puts agency decision-makers in a bit of a trap at a time when they can't escape



rising costs. What emerges is a balancing act in which one must weigh adding new or cutting existing service, raising fares or maintaining lower passenger-approved prices, and striving to serve existing passengers while attending to the new ridership.

The Aging Baby Boom

Though peak oil has been long predicted, the rapid spike in prices caught most Americans by surprise. By contrast, another major period beginning to descend upon us has led industries from medicine and building construction to appliance manufacturing and the media to revamp their product lines and business models. The Baby Boom generation is moving into their 60s, and they are adapting to changing needs, abilities, and finances. Older adults already turn to public transportation when they can no longer drive, and the boom means even greater numbers. This shift in rider demographics may be difficult for fixed route systems to absorb, especially in suburban and rural communities where routes and stops are fewer and farther between.

For many of our aging community members riding transit can be physically challenging, even in America's best capitalized urban systems. These challenges include boarding or stepping down from large vehicles, maneuvering and seating oneself on a moving vehicle with fixed seating, and deciphering small type on timetables and signage. Transit agencies thus face an intimidating rise in paratransit operations costs with demographic shifts alone. There are even predictions that economic conditions alone will suffice to push older drivers into a voluntary switch, but directly from driving to riding paratransit. This stands to further swell the ranks of those requesting higher-tier service. It is incumbent on those managing fixed-route systems to absorb as much of this new demand as possible. Doing so, they will need to infuse new thinking into their approaches to vehicle outfitting, information, and service. Additionally, they stand to make their systems operate better for everyone.

Our Peak-Boom future

These two major trends will bring a significant wave of new riders and

older adults to public transit. New passengers will include people of every age and economic group, and bring entire families from parents taking children to day care to children traveling to school on their own. Indeed, the two trending populations will often overlap, as life-long drivers from the Baby Boom try public transportation for the first time, facing an often confusing and frankly frightening prospect for them while also dealing with new limitations in vision, hearing, and physical ability. Public transit agencies in communities of all sizes, within diverse geographic and climate contexts, and of all levels of current service must adapt in order to accommodate these new and older adult riders, while continuing to serve core long-time transit customers.

How do new riders become seasoned riders? Once a person begins using a transit system for the first time, whether they've moved to a new home, a new community, or have never taken transit before, the mysterious becomes routine, and routes, fare structures, and general operational procedures become habit. And already seasoned riders quite often are novices again when they must navigate new routes, make transfers, or adjust to a new or temporary disability. All riders will become senior, seniors will become more senior, and everyone facing growing costs of living will be using transit for more types of trips. Whenever passengers map a new route, seek out a different stop, or must climb into coaches with increasing difficulty, they essentially face an entirely new and different transit system.

Fortunately, though these complex and mutually-complicating challenges may seem to contradict, all of them – shrinking budgets, growing transit demand, and new and aging passengers – may be addressed by paying new attention to transit usability. By making your service more attractive, comfortable, and above all easy to use, you will see increased efficiency in time, operations, and expenditures.

What is Transit Usability?

Usability emerged as a field and a professional practice in the 1980s and '90s, and it can be credited with the present ubiquity of computer



use. Usability is a concept that encompasses psychology, physiology, and operational efficiency, but in a way that brings human values and justice to products and systems. Usability was brought to us by cognitive scientists, behavioral researchers, and industrial designers, and it has been honed in the hands of technology professionals striving to improve human-computer interaction. They consider the range of abilities, level of experience, and different approaches to understanding among the diverse population of customers who use a particular computer program.

Usability arose as a field out of the older science of human factors. Human factors emerged in World War II to address functional problems in hybrid man-machine systems. This field worked to reduce operator error in cockpits, nuclear power plant control rooms, and other mission-critical contexts. Usability has expanded the scope of human factors beyond its post-WWII focus on performance and safety to include additional dimensions of user satisfaction.

Functional Value vs. Use Value

“How can it be important if I've lived without it until now?”

Don't let these be your famous last words. The value of a transit system is not only tied to the functional value of moving people from point A to point B. In recent decades, transit promoters increasingly emphasize the use value riders derive in terms of time and cost savings, environmental footprint, and even social benefits. It is typical for

systems to be created because of their functional value, but they ultimately succeed in a competitive market place because of a combination of price, promotion, and usability. While transit has spent enormous sums on price subsidies and promotion, it has provided scant resources to improving usability.

Aspects of Usability

The function value and use value of a system arise out of four key aspects of that system:

1. **Ease.** Is the system or product easy to use? What difficulties do new users face when trying the product for the first time? Are there different challenges for experienced users? Transit example: Are your timetables legible and easily decipherable? How do people who have never seen a schedule figure it out? Can passengers use the tools your agency provides to successfully design routes from A to B, and feel confident when transferring?
2. **Effectiveness.** How well does the system help users complete a task? Does the product serve as a valued tool that serves its purpose well? Transit example: Do routes operate on time and on predictable schedules? Can passengers make their desired trips in a reasonable amount of time? Do timetables, websites, and signs give customers confidence that they know when and where they will arrive?
3. **Comfort.** Do users feel safe, secure, and relaxed when using a product? Does any physical pain or awkwardness occur at any point during its use? Transit example: Do bus stops feel safe and secure for all passengers, and at different times of day? How do passengers of different heights and physical strength feel when sitting on your vehicles' seats? Is getting off or boarding difficult or embarrassing for any customer?
4. **Aesthetics.** Simply, does the product appeal to users? Is it visually and tactilely appealing? How does using the system



affect all five senses? Transit examples: Are vehicles clean, outside and inside? Do the vehicles' temperature, fabrics, and hand-holds feel good? Are there any unpleasant smells, glaring lights, or blaring audio systems?

Each of these four characteristics influence the way people feel when using a product. For transit agencies, these usability criteria affect how passengers feel about choosing to ride transit, and influence emotions during the ride as well as opinions on the system in general. Usability is important not only to passenger experience, but also influences the way the public in general feels toward your agency, and can affect everything from boardings and vandalism to voting outcomes and support for crucial tax investment and fare increases.

Achieving Usability

Perhaps counter-intuitively, the best indicator that you have achieved a usable product will be when your customers don't notice that you have done anything at all. Key leaders in usability – Donald Norman from psychology and Doug Englebart and Alan Kay from technology – emphasize that good design is invisible, while design failures will be obvious. Failures cause confusion, inefficiency, and frustration, while success may achieve “only” content customers and smooth service.

For example, Donald Norman writes in “The Design of Everyday Things” that truly usable objects require no instructions and no written signs. These products are pleasantly easy to

use. Though now considered outdated technology, items such as telephones that once required only that we pick up the receiver and dial a number, and calculators that display only digits and simple arithmetic signs, are usable by anyone who understands math or telephone numbers. By contrast, the telephone on your office desk today or the cell phone in your pocket may offer thousands of features, but require a manual to figure out how to make simple calls. Similarly, and even more simply, a door with a looped handle that is grasped by placing your fingers around a bar instinctively leads you to “pull.” If a door has such handles on both sides, you will feel confused as you stand on the “push” side pulling on it. Many of us have the experience of pulling on a push door day after day at our places of business, schools, or shopping destinations. Where you see signs reading “PUSH” above handles, this is a clear indicator of a failed design.

Usability's Scientific Method: User Testing

The best way to begin creating an enjoyable and efficient user experience is, quite simply, to watch and listen to people using your system. Those of us who are immersed in building and planning a system are actually the least qualified to identify what is confusing or difficult about that system. That's why asking an expert computer user for help understanding how to do something so often leaves you feeling stupid — what makes sense to them usually is complete Greek to the novice. When you know a product inside and out, you automatically know how it works. Instead, when striving for usability, it is crucial to recruit a spectrum of participants, representing

all age groups and all abilities, as well as seasoned customers and novice users. Each group may find different problems that suggest quick solutions. As in the example above, if you observe person after person approach a “PUSH” door and pull on its handle, you will quickly see the benefit of replacing the handle with a flat push-plate. The science of usability enables us to find improvements in things that may seem trivial if viewed as an isolated event, but which can become significant, systemic irrationalities when extrapolated to a large number of users or over the course of time. A small change can eliminate a source of thousands or millions of minor frustrating, embarrassing, and difficult moments that interrupt daily lives.

Carried out over an entire system, user testing is a powerful method to build a popular and satisfyingly simple product by making small individual changes. Since its inception, user-centered professionals have moved their way earlier into the design process, enabling them to prevent problems in the first place, in addition to fixing them. Today, software companies invest weeks to months observing volunteers trying to use a new program, noting how and when they make errors, which tasks are most popular or most common, and where questions and frustrations arise. The most common actions and most important features of a new computer program or Website, telephone or calculator, should not require much (or even any) thought on the part of the users.

For transit agencies, your product encompasses every aspect of your service and operations, from timetables and information sheets to vehicle designs and route planning. User testing would thus involve observing children, teenagers, adults, and seniors, both seasoned and brand-new riders, as they use your service. Such research could begin immediately by viewing tapes from on-vehicle or in-station monitoring cameras and noticing which mistakes people make over and over again. Your drivers, too, are a fount of information regarding the same questions they receive and errors they correct often. If you wish to conduct a formal transit usability study, participants would be asked to complete a variety of tasks from the beginning to the end of a transit trip.

These might include:

1. finding the agency’s website or customer service number
2. planning a route “from A to B”
3. reading arrival and departure times on a timetable and on schedules at bus stops
4. walking to a given stop
5. boarding the vehicle
6. paying the fare
7. finding a seat, and riding safely and comfortably
8. requesting a stop
9. making transfers (both walking between stops and staying at the same stop)
10. navigating a transit station
11. making a return trip.

In each of these steps, you will discover vehicle seats and stairs that make riding difficult for seniors or children, schedules or descriptions that are impossible for new riders to decipher, transfer points that trip up even the most experienced passenger, and the questions most commonly asked of your drivers. Each of these findings should be considered a necessary fix – or else yours may be a transit service that only serves young adults, or only makes sense for consistent daily commuters, or is only patronized by those with no other option but to accept the frustrations.

It is not enough to directly ask a customer what they like and don’t like about your service. Someone who uses a product every day, like you as the creator, becomes blind to the little difficulties, irritations, and mistakes-and-corrections necessary to cope with poor design. In the context of a transit system, your seasoned passengers may complain about overcrowding or lateness on routes as they fill up, but they may not mention that they spend a minute every morning deciphering a timetable that is difficult to read. They may complain about a fare raise, but not mention the hassle of looking up the fare level on different routes, at different times of day, or when making transfers, because they are so accustomed to the added effort. These are the confusing and complicated aspects that most deter potential new passengers, and may lead those who try

to make the switch to transit to go back to their vehicles after a few days of missed runs or frantic hunts for extra change.

Because there are many facets to using a system, usability is by necessity a field that embraces multiple types of expertise, including attention to perception and cognition, physical ability and disabilities, and graphic and industrial design. As a transit leader facing novice, older, and simply increasing numbers of riders, you will benefit from the interest and expertise of partners from public health, safety, and ADA; advocates for age, income, and social equity; and neighborhood groups, residents, and municipal leaders seeking to make their communities sustainable and livable for the Peak-Boom generations of today and years to come. Above all, your most important partners are your passengers. They are the reason for your existence as a transit agency, and will provide your core group of supporters and sources of information

The Importance of Usability

Most people prefer usable computers to unusable computers, but a transit system is very unlike a computer. The nature of product differentiation, revenue streams and competition is very different from products developed for sale in the market place.

Most transit systems function as monopolies, but that does not mean that they do not have competition. Peak-Boom riders are accustomed to



higher levels of usability with other products and services, and are not likely to just forgive you because you're offering an excellent and affordable service – it's likely they will have the hubris to ask you to recast your definition of excellent.

The standing debate in communities across the U.S. over the decision to invest in light rail or expanded bus service is in large part a debate over usability. The higher cost of infrastructure for fixed-route service is often accompanied by larger investments in service connectivity, way-finding signs, passenger seating, information systems, route maps, and waiting areas. But usability is not about just pouring more money into a higher quality of service, it is about designing a system from the outside-in, from the user's or rider's perspective. Though some aspects of light rail may be preferable to bus service, there are many elements of bus service that can be designed for equal or even superior usability. One implication of usable bus service could be that the promised land of light rail might have a weaker grip on the imagination of the existing bus riders.

Americans are passionate about their private automobiles, sometimes to the point of becoming irrational. There are also transit riders in this country who have become adapted to the dysfunctional aspects of our transit systems. The dysfunctional or broken parts of our transit systems serve as a crutch that props up the irrationality of the automobile-centric way of life. Certainly, it is increasingly costly and unsustainable to use the private auto as one's sole mode of transportation. As gas, parking, and highway space become more scarce, the use-value of the private auto is in decline. As transit systems embrace the rationality of usability principles and practices, it stands to cast an even larger shadow on the irrationality of our romance with the automobile.

High Stakes

In a public transit agency, the stakes are much higher than they are for private company making a product. A recent study of pedestrian safety by University of Washington researcher Anne Moudon showed that transit stop locations correlate with a higher likelihood of pedestrian



fatalities on streets in King County, Wash. The transit system is not liable or responsible for the death of these people. Nevertheless, this information has implications that usability could improve the way in which passengers, local street designers, and transit work together to understand and reduce hazards.

Second, the economics of transit are a very high stakes game. The Mobility Education Foundation promotes the statistic that the life-long savings potential represented by operating a car is over \$4 million. To the extent that passengers are comfortable enough to sell their car and depend upon transit, they could reduce their annual transportation expenditures by over \$7,000. Usability-focused companies are able to command a much larger price in the market place. A recent analysis of the Apple iPhone estimated that Apple is achieving as much as a 100 percent profit on each sale. The appreciation that a transit agency stands to earn for providing highly usable service that enables transportation savings can only translate into voter approval for new funding and for transit-friendly elected officials.

On the flip side, growth in demand for and operating costs of paratransit service threaten to overwhelm the budgets of transit agencies. Some communities have begun intensive training programs for prospective older adult transit riders as one strategy to reduce growth in paratransit demand.

An equal investment in usability approaches to “design in” higher usability could integrate with and increase the impact of such efforts.

Finally, one of transit's virtues lies in the manner that it reaches out into all parts of a community. A transit system reflects the broader values of society. For many people in the U.S., riding the bus is still unthinkable from a status perspective. Usability confers respect and connotes a well-being that permeates beyond the action that it facilitates. In this way, a more usable transit system constitutes a public benefit that can become a symbol of well-being for your larger community. Just as Peak-Boom riders can be the most vociferous usability critics, they will be your biggest promoters when you get usability right.

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