



Connections

fig 13 – Rosslyn Metro Station entrance and bus zone

It is my sincere hope that public transportation systems will continue to improve, effectively serving their riders and communities, with ridership numbers eventually equaling, perhaps even surpassing, those of other transportation modes. To understand why some transportation companies and/or modes are more successful at recruiting consumers than others, I investigated several outstanding examples of brand and design development within the transportation industry. Weaving relationships between these topics and my own work gave depth to my ideas.

Personal automobiles, privately owned and operated, are the most widely used transportation mode in the United States, and the predominant mode of living in this country supports continued reliance on them. However, as people age they typically become less able to independently use automobile transportation and would especially benefit if public transportation were to become more accessible. Working specifically toward improving life for the elderly is MIT's AgeLab, a collaborative research and development project started by Joseph Coughlin in 1999. Researchers at AgeLab hope to invent products and programs for today's aging adults, who are more active than previous generations, and projected to live longer as well. Transportation research is one of the lab's most challenging undertakings. A December 2001 article in Metropolis quotes Coughlin's thoughts on the subject:

"Transportation is not traveling from point A to point B. It's everything. Before you can do anything, you've got to get there. In most cases transportation for seniors is being able to drive. Our public transportation system is not particularly comfortable for the elderly, and in most places is non-existent. For seniors, being able to drive is independence and freedom. Once you rip those wheels out, they begin to deteriorate both mentally and physically."

These ideas highlight the importance of creating transportation systems that are easy to use not just for the elderly and other challenged users, but for anyone who ever wants to have a job, visit friends and family, shop, or do almost anything else. They also however, highlight the lack of attention designers are giving public transportation. Case in point: instead of working on public transportation innovations, AgeLab researchers are working on creating safer automobiles for seniors that will be intelligently sensitive to their needs. To this end AgeLab's transportation research encompasses the "Miss Daisy" project: a donated VW Beetle adapted to be a driving simulator, that will later serve as a test vehicle for technologies developed by AgeLab (Krasner 2001).

With American lifestyles largely dependent on automobile use, people express a general desire to spend less time in their cars than they currently do. Yet consumers are simultaneously asking manufacturers to create "roomier" vehicles with more amenities capable of providing refuge from the world outside (Roberts 2001). Despite the recent, encouraging media attention toward alternative fuel sources, like electric battery assist and hydrogen fuel cells, sports utility vehicles (SUVs) and light trucks continue to surge in popularity, meaning that for the time being, the average vehicle's mpg rating will continue to drop lower. I researched these roomy vehicles and their cousin,



fig 14 – automobile dealer's lot in Christiansburg, VA
pic 1 – 2003 Jeep ad, tagline: "To a gearhead, this is a centerfold".



Automobiles

the minivan, as well as gas-electric hybrids (selling well in the US) and the high-mpg mini car market (more prominent in Europe than the US), to learn about the reasoning behind people's personal transportation choices.

Of the seventeen million new cars purchased in America during 2000, a third were SUV's and trucks, a percentage that has increased each year since. In 2003 it is estimated that 60% of all new vehicles sold will be SUV's (Roberts 2001). The outdoorsy image and "grab life" attitude (Dodge's slogan is, "Grab life by the horns") of SUV's and light trucks may have won favor with consumers, but these super-sized vehicles are infamous with consumer advocacy groups for safety concerns, and with environmental groups for the amount of carbon dioxide they put into the atmosphere. Federal law mandates that vehicles in the "light trucks" category (which includes most SUV's and pick-up trucks) average 20.7 mpg. This number however represents an average across the entire category, which means that some "light trucks" get as few as 12 mpg, with the majority getting around 16 mpg's. Minivans get higher mpg ratings than SUV's, averaging 22 mpg (U.S. Dept. of Energy 2003), but their image is that of a safe "family vehicle" choice, and they are less popular with consumers because of it.

Marketing their products as virtual "rolling Swiss Army knives" (Roberts 2001, 73), SUV manufacturers navigate environmental and safety concerns by claiming that their vehicles offer far more functionality than just mere transportation. Designed to provide drivers with a personalized environment of home-away-from-home comforts, these super-sized vehicles boast big easy-chair seats, living-room-inspired materials palettes, advanced digital video and audio options, even small appliances and computerized navigation systems. This emphasis on creature comforts has caught on in the automotive industry. Vehicles in other categories, such as the minivans, are emulating the features offered in SUV's in a bid to copy their market success as well.

Industrial designer Joseph Ungari had this in mind when he brought together the design teams at Ford and Maytag to create a remarkable driving experience using "real-world ideas" (Ungari 2001, 60) and functionality to meet consumers "real-world needs" (58). Even though the design team worked with a Windstar minivan, Ungari refrained entirely from using the word "minivan" in the article he wrote about the project for Innovation magazine. Its obvious why he does this. Ungari wants consumers to intellectually desire the Windstar for its smart resourcefulness, emotionally desire its sensory-pleasing extras, and not get hung up on vehicular category trendiness. Designers from Ford and Maytag took a new angle on the automotive experience by "questioning the role of transportation in our lives" (60) in an effort to merge the automobile and small appliance markets into one seamless vehicular "sensperience" (60). Focusing on "today's frustrations" (60), the design team ultimately integrates existing appliance technologies like trash compactors, refrigeration units, central vacuuming, noise-cancelling generators, microwave ovens, even laundry facilities, into the vehicle's interior.

The resultant Windstar Solutions concept vehicle has the ironic twist of providing sub-



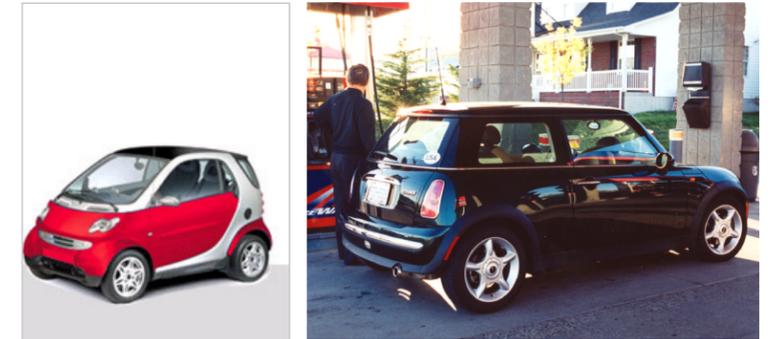
pic 2 – Ford's "Windstar Solutions" vehicle
pic 3 – close-up of the washer/dryer appliance in the "Windstar Solutions" vehicle

stantially more utility than a sport utility vehicle. Inside the modest exterior, refrigerated storage and a microwave liberate passengers from having to eat fast food. A quick load of wash takes care of kids' soiled clothes, and the thoughtful inclusion of central vacuuming makes cleaning up the car a snap. Aware of their market, Ford's Windstar Solutions vehicle was first exhibited at the 2000 Kitchen and Bath Industry Show in Orlando, FL., and then later at the New York Auto Show (Ungari 2001). Ungari thinks that the Windstar Solutions concept vehicle is the soccer mom's fantasy come to life, but is this excess of utility necessary? Should designers really be investing so much time and energy into such novelty luxury projects? Public transportation systems will most likely never be over-designed in the ways that Windstar Solutions is, but in this instance perhaps this is a good thing.

Designed with very different objectives, gas-electric hybrids were first introduced in Japan in 1998, when Toyota unveiled the Prius. Economy-class hybrids created a green niche in the U.S. market in 1999 when Honda introduced its sporty, though widely criticized Insight. The car had a poor electric assist system and about as much stowage space as a styrofoam cooler. The Prius, a 4-door sedan with regenerative braking, an actual trunk, and a highly praised electric assist, arrived stateside in 2000 (Evarts 2000). Also hitting the market are small, extra-high-mpg vehicles that take up less space on roadways, easing air pollution and traffic congestion in urban areas. Available almost exclusively in Europe, many vehicles in this category, like Volkswagen's 90 mpg Lupo, utilize recent diesel technology advances. Cleaner burning HDi direct-injection diesel engines are being featured in some Citroën models, and gasoline direct-injection (Gdi) technology yields about 39 mpg in the mini Audi A2 (Lienert 2003).

Currently America's most popular small-scale car, BMW's Mini Cooper gets 37 mpg. BMW was originally afraid that Americans wouldn't buy the new Mini Cooper when it was introduced in 1997 (Chambers 2001). Today they are coveted. Smaller still, Ford's Ka, created for the European market in 1996, was less bulky and more fuel efficient, averaging 47.9 mpg, while still managing to be attractively designed, setting a standard for the small vehicle market (Ford 1996). The re-use of the Ka's chassis by Marc Newson for his Ford concept vehicle served only to elevate the role of design one more notch (Redhead 2000). Reduced bulk also made possible more creative approaches to vehicle appearances, as demonstrated by Daimler Chrysler's Smart Car introduced in 1998 (Redhead 2000). Designed by Swatch, modular ideas are seen at work in the Smart's interchangeable, thermoplastic granulate body panels. Not only is its appearance customizable by its owner (a process which takes 90 minutes to complete), but it manages to achieve an astounding 57.6 mpg (Plowman 2002).

Given that transportation systems like Metrorail are more concerned with a cost-per-mile operating figure than with extraordinary gas mileage possibilities, innovations like Smart's body panel system will probably never be a public transportation reality. So, in a market where heated cup-holders are considered a necessity by prospective buyers, what should public transportation do to attract and retain a content ridership? Can transit systems compete with luxury transport trends, and should they try to? Run-



pic 4 – Daimler Chrysler's Smart "Passion"
fig 15 – BMW's new Mini Cooper

ning through all of the above examples is a concept that is relevant to public transportation: **the importance and appeal of individual autonomy to consumers**. A **design strategy** that capitalizes on people's desires for personalized control might appeal to, and please, a larger ridership.

Using public transportation is a process in which the beginning steps are as important as the later ones; boarding the correct train means that you will arrive at a station with a street map that will be able to show you how to navigate towards your destination. Similarly, the entrance system components that riders interact with are as important as the transit vehicles they will ride in. **Then why not consider the user's transportation experience holistically when designing transit systems, giving as much focus to litter collection sites as to informational signage?** Jane Priestman knew to do this in 1986 when she became the Director of Architecture, Design and Environment for British Rail and undertook the daunting task of unifying British Rail's jumbled corporate image, which at the time sprawled across 2500 stations (McQuiston 1988).

In her work Priestman used careful design planning, management, and branding strategies to propel British Rail away from its messy public image and toward a new streamlined public image of competent efficiency. By creating a system that itself employed good design principles, it became possible to bring about a full corporate renewal that would continue to self-renew as time passed. Priestman accomplished this by taking her design initiatives from the outside in, addressing the value of design in such seemingly remote concerns such as cleaning and maintenance, even staff morale. **It was her belief that educating British Rail's employees about the importance of keen design sensibilities was key to perpetuating good design management in the long run.** This living sense of her work was especially important for the ways in which it got at the roots of the transit system, rather than just tending to the most visible parts.

Priestman's holistic work ethos also recognized the interdependence of the diverse transit system's components, weaving together all aspects from physical components to environmental conditions, from employee appearances to maintenance techniques. Priestman's clearly articulated design vision became the blueprint for British Rail's corporate culture, which grew from these basic service and design mantras for years. **By positioning transit service as a product rather than letting it be seen as a governmental tax sink, Priestman inextricably linked the system's users to British Rail's operational mode; where a transit system's only real purpose is to serve its ridership.**

Metrorail's brand identity is unified in its uniform station and vehicle architecture, consistent AFCS configuration, and congruent signage. The success of Metrorail's product however is plagued by disjointed information systems, poor user interfaces, jumbled traffic flow and a general lack of technology integration. **Priestman's design management ideas could benefit the WMATA system by organizing these disparate elements, while simultaneously helping employees to feel more valuable in their positions and connected to their place of employment.** Further incorporating rider input, ideas, and

feedback into the design process would have the added positive effect of increasing a rider's sense of autonomy and self-importance when using the Metrorail system.

I was elated when I came across design firm IDEO's work for the Amtrak rail system. The product of IDEO's work was the "Acela"; a passenger-rail system servicing major cities along the East coast of the United States. Though my focus was on a heavy-rail system for commuters servicing only one metropolis, I found IDEO's work to be significantly relevant to my own. **IDEO had placed an emphasis on researching the Amtrak ridership's experiences with the existing train system.** In a sense, the success of the Acela project validated my observational and interactive research approach and techniques.

Faced with a January 2003 congressional deadline, Amtrak had to either pull itself out of the red or be forced to restructure and possibly liquidate (Corporate Design Foundation 2001). **Seeking a redesign of their passenger rail cars Amtrak turned to the talents of IDEO, who quickly realized that Amtrak presented a more holistic problem requiring not just a brand update but an overhaul of customer experience and expectation as well.** After enlisting the help of New York based brand strategy firm OH&CO, the design team began an investigation into all aspects of the Amtrak customer's experience, from trip planning to arrival at a destination. IDEO's design team set about interviewing Amtrak's customers and employees, gathering and storyboarding their experiences, riding trains, and analyzing Amtrak's computer and information systems. The firm also created a full-scale mock-up of a passenger rail car, which they brought into their studio space and worked inside of for the duration of the project (Kelley 2001).

Pulling the collected research findings together, designers at IDEO developed a 10-step picture of the process a typical Amtrak rider goes through:
1. learning, 2. planning, 3. starting, 4. entering, 5. ticketing, 6. waiting, 7. boarding, 8. riding, 9. arriving, and 10. continuing on their way (Corporate Design Foundation 2001).

Prior to happening upon IDEO's list I had developed a similar but shorter list from my ethnographic and observational research for Metrorail's entering and exiting processes (see p.34). The Amtrak rider's process has more steps mainly because a trip on a train is typically longer than one would take on a public transportation system, requiring more planning and financial investment from the rider. Surprisingly, prior to its involvement with IDEO, Amtrak had never connected the pre-ride process with the transportation experience. **Pre-ride planning and wayfinding are similarly significant to Metrorail, whose riders often switch trains and transit networks during a commute. This emphasis is a notable commonality between my list and IDEO's.**

Searching for design opportunities with such a large net of research methodologies had yielded great insight. It was found that the problems Amtrak was suffering were wider-ranging than the company had originally thought. IDEO's response was a design strat-

Trains & Planes: British Rail, Acela, and JetBlue



pic 5 – BR's Hull Station, ticket office and travel center



pic 6 – Acela's cafe car interior



pic 7 – JetBlue’s seatback yoga cards
pic 8 – a page from JetBlue’s website

egy that took the complete experience of riding a train into account. Instead of simply giving Amtrak vehicles a facelift, IDEO developed a new product, the Acela. Information and ticketing systems, station environments and signage, were all redesigned. The resulting Acela project is comprehensive, incisive, and exemplifies good design research values.

Air travel’s high ticket price may make it more financially exclusive than rail transportation in general, but in principal both aim to serve the same population: the public. JetBlue, a discount passenger airline, took the faltering airline industry by stylish surprise when it entered the air travel market in 1999. Specializing in flights within New York State, as well as to and from New York City, JetBlue is an outstanding example of a transportation business reinterpreting standard travel industry models.

Unlike Amtrak’s Acela project, whose strength was industrial design-based, JetBlue’s success is attributable to a tightly coordinated brand image that looks slick and functions well. Brand development utilized focus groups and marketing firms, but direct user research could not be done since JetBlue was starting from scratch. Instead, the collective business expertise of JetBlue’s executives and the leadership of CEO David Neeleman, already with four very successful airline start-ups under his belt, guided the development of the JetBlue concept (Donnelly 2001). User experience may not have been discussed in classic design terms, but passengers’ potential needs and satisfaction singularly guided the development of the brand. All this culminated in JetBlue landing the number two spot among airlines in the Zagat 2001 customer satisfaction survey.

A hip and comprehensive website sets the tone for JetBlue’s customer service, providing convenient on-line ticket sales, route information, schedules, and company anecdotes. JetBlue offers passengers stylish amenities consistent with their brand image, like blue in-flight snack foods [most often blue corn or potato chips], blue leather seats, and free individual screen satellite TV. And last year JetBlue partnered with Crunch Fitness to create “In-flight Yoga”, a creative response to rising public concern about “economy class syndrome,” the condition in which blood clots form in-flight due to the sedentary nature of air travel (Jetblue 2003). A series of four yoga poses, all able to be executed in a seated position, is illustrated and made available to passengers on seatback cards, a format traditionally used to present safety information. To convey all of these innovations to their customers, JetBlue uses slick and humorous advertisements that reflect their smartly hip brand image.

Within the usually drab concept of discount airlines very little consideration is given to design or style beyond minimal safety requirements. These carriers seem to survive on bargain pricing alone, and to cut costs they often fly well-used planes bought from bankrupt airlines and simply refitted with new logos. JetBlue, however, flies only new A320 Airbus planes. Even though the planes are new, flying only one kind of aircraft actually saves money since less employee training is needed, which in turn benefit

customers by keeping fares low and creating a safer fleet of planes.

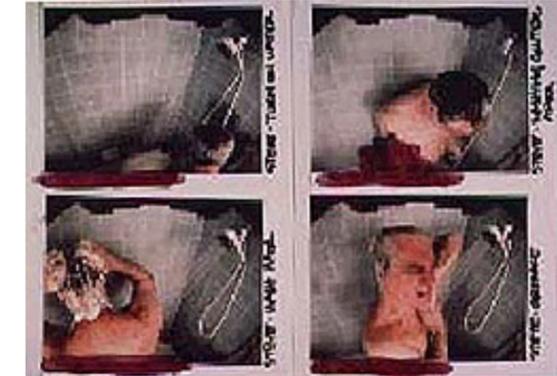
Similar to Priestman’s work with British Rail, Neeleman, recognizing the importance of a workforce committed to maintaining their brand’s integrity, also makes sure JetBlue’s employees were well-trained, well-compensated, and happy. Even in the rough post-September 11th economy the young JetBlue has managed to lower flight costs by an average of \$30 per flight, while continuing to grow its customer base and expand flight routes. Developing Metrorail’s brand image in such creative and economical ways would be a boon to its business.

In order to create a product that works well for its users, a designer must consider more than the physical object during the design process. In the traditional design approach, user-centered methodologies take into account how the user interacts with and is affected by, the object itself. More recently “experience design” methodologies have been embraced by the design community. Focused on creating a deeper, even meaningful relationship between user and object, the experience design model attempts to shape the user’s experiences of and with objects, processes, and environments. Real-world application of these ideas have brought the advent of an “experience economy” with businesses offering their customers a product comprised of some traditional objects, but also environments, sensorial, and temporal factors. The relationship between user and product is enriched by these aspects, and the product is often remembered as an event by the user (Kelley 2001). Experience design acknowledges the importance of the psycho-social dimensions of the product-user experience, known as the “experience needs” of the user (Hudspith 1997). It took the occurrence of two changes within the design community to bring about the idea of “experience design”.

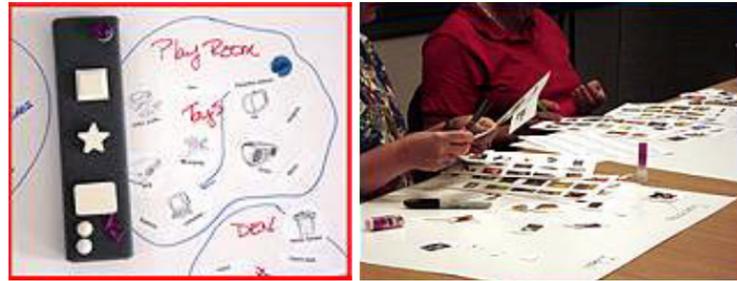
Firstly, an influx of other disciplines into design brought about the emergence of the multi-disciplinary studio, making it possible for companies to offer their clients a more extensive range of services beyond traditional ID skills. Professionals from marketing, engineering, human factors, anthropology, sociology, psychology and other fields began to work together under one roof, providing hybrid services like design strategy, branding, and website development. Clients in turn, came to expect design firms to be capable of problem solving on different levels, thus solidifying the value of a multi-disciplinary studio (Richardson 2001). Then as the Internet blossomed and e-business came into its own, the need for a strong web presence with reliable support became almost as important as the product itself. A firm that could build a consistent brand image/experience across all of the different aspects of a client’s business, and market it too, had an advantage over the rest of the pack (Montague 1999).

The second change was a shift in focus within the design community in how designers think about their jobs. Instead of creating objects for people to use, designers began to work on a broader scale, creating and shaping the circumstances through which

Experience: Product and Methodology



pic 9 – photos from Design Continuum’s research of “the ideal shower experience”



pic 10 – one of Sonic Rim’s velcro modeling tools
pic 11 – Sonic Rim’s clients collage their experiences

an individual would have an experience with an object. It was this interaction, the experience had by the user with an artifact, web interface, or a business itself, that designers became interested in crafting (Richardson 2001). The presence of persons from diverse disciplines in design offices made tackling experience design on this scale possible, i.e., social scientists were able to study why someone would use a product, while human factors specialists revealed the “how” of usage and designers still drew and modeled. Deliverables became less about tangible goods and more about helping clients understand the experience(s) a user would have with their products, and the ways that a holistic design process could shape that experience (Montague 1999).

Some designers feel however, that the predominant idea of experience design is misguided. Elizabeth Sanders of Sonic Rim, Ltd. is one such member of the design community who argues that it is impossible to design an experience given that only one half of any experience comes from the particular situation, while the other half is created by the person having the experience. Even in a designed situation, she points out, each new person brings a unique set of variables into that experience that were not there before, rendering that experience entirely different from any previously had. Sanders is instead an advocate of “Postdesign,” defined as “design for experiencing,” and a “continuous process of discovering possibilities and opportunities with people, that address their needs and aspirations for experience” (E. Sanders 1999, 2002). Through the Postdesign approach, people’s “past, present, and potential” experiences become sources of inspiration and ideation for design. To get at those experiences Sonic Rim uses custom designed “Say, Make, Do” tools to help people communicate their experiences to researchers and designers. Some “Say, Make, Do” methods include collage work, group activities, video diaries, Velcro modeling kits and more. Each tool facilitates expression of the user’s dreams, desires, hopes, and needs (E. Sanders 2002, Martin and Schmidt 2001). By starting the industrial design process at the point of the user’s perspective, it is thought that the artifacts we choose to live with will become both more useful, and usable, to us.

These techniques are intriguing and valid, but were not necessarily practical to execute during the course of this master’s thesis. Instead, the work of this thesis was conducted primarily with a user-centered approach, incorporating social science research that addresses the user’s experience of Metrorail’s entrance system with ethnographic research, videography, and situational analyses. With the subject being a process rather than an artifact, this thesis designs the setting in which the user will have a directed experience. This directed experience will not be the same for all Metrorail riders, but the final entrance process and system designs should provide enough structure to guide users in a consistent way, thus cementing a certain product identity.

Throughout this document members of the general public are referred to as “consumers,” “users,” “riders,” “ridership,” “passengers,” and “customers.” This kind of terminology is used because it does a good job of describing people’s roles in particular instances or scenarios. However not all members of the design community accept this limited “user” vocabulary (Martin and Schmidt 2001). Sanders also writes about

this matter, emphasizing the importance of not reducing people to such roles as “user” or “consumer.” In Sander’s opinion, such generic language masks the aspects that make individuals unique people, which then go unconsidered during the design process (E. Sanders 1999). Such generic “user” terms say nothing of someone’s life experiences, emotions, age, gender, ethnicity, or skills, all of which are important to the consideration of a user’s perspective.

To avoid such pitfalls, this thesis utilizes a broad research base (including photographs, videos, some biographical information about interviewees, storybuilding and more) to enrich the idea of Metrorail’s ridership and create a sense of connection for the reader with that ridership. In the case of Metrorail, the system’s ridership is rich in variety. Designs for such a transit system should give consideration to the generous differences within such a vastly diverse population.

Central to planning and information gathering for users of Metrorail, is signage. Designed by Italian architect Massimo Vignelli in the early 1970’s, Metro’s signage has a distinctly minimal feel. Stations’ exterior entrances are marked with tall pylons that display a station’s name in vertical lettering, topped off with the system’s “M” logo and bands of color designating the line(s) running through the station. Inside, train platforms and line directions are designated similarly with station names listed in order down tall brown enameled sheet metal pylons.

In Metrorail stations, primarily visual signage delivers information about the entrance system to riders. Two-dimensional signage used includes: backlit, printed, and painted signage, as well as signage printed on a transparent material. Pictograms are used to designate phone booths, their wall surfaces doubling as backlit fare charts and maps. Signage lettering is either black or white, with colors used only to indicate rail lines. A small percentage of information is presented in Braille; directions for using the AFCS machines are, but fare charts and maps are not. Information in the form of service and safety updates and advisory notices are broadcast over a public address.

To watch a video of riders using Metro’s signage from the PDF or CD versions of this document, click on the “visual information systems” icon in the lower right-hand corner of this page. If you are reading this document as a printed book and viewing the videos on your computer, select the corresponding title of the CD menu.

Navigating the Metrorail system continues to become more complicated as surrounding neighborhoods and their feeder bus and transit systems develop and expand. The WMATA’s website thoughtfully addresses these issues with trip planning features that allow riders to map their travel routes from start to finish and find information about connecting neighborhood transportation options. As customary as website development has become, not every Metro user has Internet access, or the luxury of advanced planning time. For these users good in-station information systems are essential. Metrorail’s current signage really can’t be as helpful as the web in its static, two-

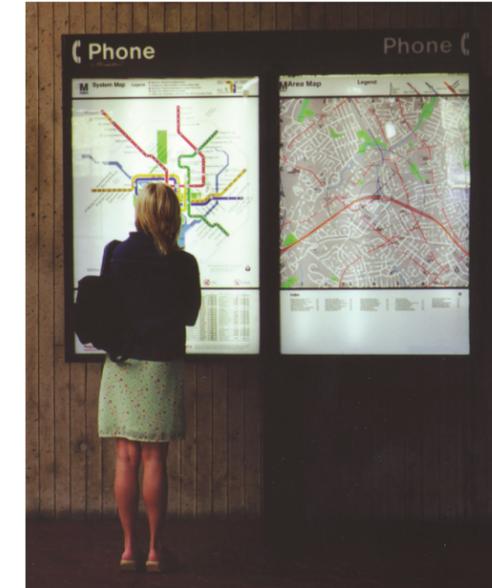


fig 16 – woman reading Metrorail’s system map

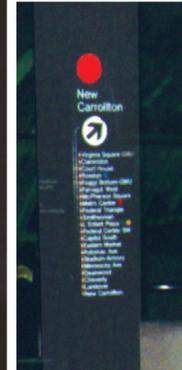
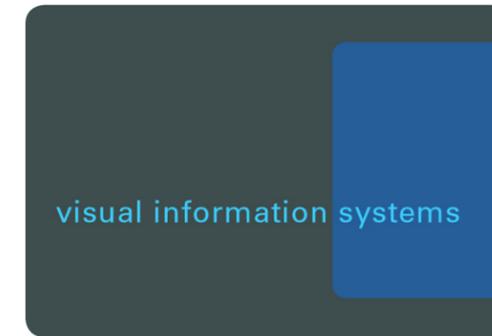
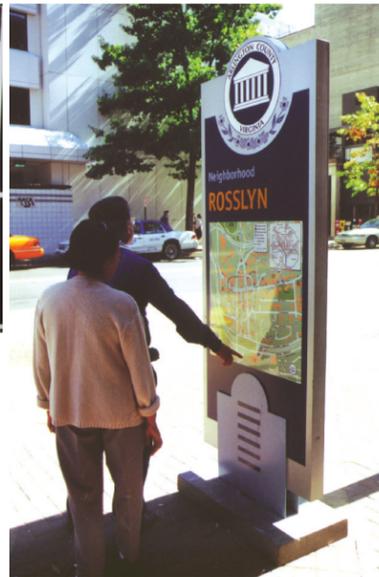


fig 17 – in-station directional pylon displaying station order for the orange line

Signage





clockwise from top left:
 fig 18 – signage at the National Zoo
 pic 12 – Schiphol Airport signage
 fig 19 – a Rosslyn neighborhood map in Arlington, VA
 fig 20 – farecard machine with Braille instructions

dimensional mode.

The current Vignelli designed signage, though elegant in appearance, seems to leave users with questions and the need to confirm their understandings with a person in a position of authority. In a Washington Post On-line forum which took place March 21, 2003, WMATA general manager Richard White acknowledged these shortcomings in his response to a question concerning the lack of directional signage in and around stations. “The current situation goes back to the original design of our Metrorail system” he said, “which relied on a ‘less is more’ approach in terms of signage and other amenities.” (The full text of White’s response appears in appendix A). The open-plan stateliness of Harry Weese’s majestic station architecture might in theory mean that entrances and exits, and signage and equipment in between, could be easily seen. However, in reality, when the ceiling soars a hundred feet overhead and the field of view is fifty feet wide, or more, signage can go unnoticed.

Addressing this intersection of architecture and signage is Netherlands-based sign designer Paul Mijksenaar. Though trained as an architect, he found his true calling in informational graphics and signage. His work ranges from small-scale product labels and airplane safety instructions, to large-scale wayfinding systems for buildings, airports, train stations, and metro systems. In all of his projects Mijksenaar aims to make daily activities more comprehensible through the implementation of intelligible design (Booth 2000). He believes signage should intuitively direct people through a space so that they hardly think about the wayfinding signals that they are using to navigate. The designer’s signage for the New York Port Authority and the three major international airports which feed New York City, for metros in Amsterdam and Rotterdam, and Schiphol Airport, all exhibit this principal (Schnitzer-Reising 2003). Often hired to fix wayfinding problems within existing buildings, Mijksenaar would prefer to work with architects from a project’s onset rather than being hired to mollify situations after the fact (Booth 2000).

It is this cooperation between signage and architecture that Metrorail is now attempting to renegotiate. To create clear signage Mijksenaar uses bold color combinations, like the black on yellow signs he designed for Schiphol Airport, and imaginative pictograms to universally communicate information. There are similarly good examples of graphic symbolism and pictograms in and around the Washington D.C. area. Helpful neighborhood maps and directional signage appear around Metro Stations in the more urbanized suburbs of Arlington, VA, Takoma Park, and College Park, MD. Beautiful and effective pictogram usage can be seen as the Smithsonian Institution’s museums, and at the Smithsonian Institution’s National Zoological Park.

Lance Wyman, designer of the National Zoo’s universally legible graphics and the Smithsonian Institution’s logo and signage, has made a career of designing signage that relates to its setting or environment on an archetypal level. Creating images that reach a population in this way, he says, demands an understanding of the history of a place and the mythologies of its people and their communities (Wyman 1990).

Once designers absorb deeper cultural conditions and the language(s) of that culture, connections can be made between graphic symbolism and the idea of the place in which they are working. Wyman (1990) concludes that successful signage and pictograms should be comprehensible by a multicultural audience, language barriers notwithstanding. These ideas are especially relevant to signage for the WMATA, which operates in an area with a high percentage of resident non-English speakers and international visitors.

Improvements in technology have considerably advanced information access for persons with limited abilities, opening up access to a more diverse user population. Improving Metrorail’s information systems is crucial to resolving its wayfinding issues, especially for users with special needs. Visual signage will always be important, but even Mijksenaar concedes that the future of wayfinding may take a more technological form, like “personalized instructions through mobile phones using satellite positioning” (Booth 2000, 15). Presently applicable technologies include touchscreen interfaces with multi-lingual programming options, audible and tactile interfaces, and wireless technologies capable of transferring information effortlessly between electronic devices. If Metrorail stations were equipped with the necessary infrastructure, the same interactive information format currently available at the WMATA website could help riders at the source and beyond. Wireless data transfer could enable passengers to download schedules and street maps to a number of hand-held computer devices.

The Americans with Disabilities Act of 1990 *did* mandate that Braille language translations be available for sight-impaired persons, however some informational dimensions are not easily communicated with Braille. To convey spatial and pictorial information, for example, tactile graphics and maps must sequentially present layers of discreet information that build upon each other to assist the “reader” in forming a mental image of a place or space. Until recently the major drawback to tactile graphics was the expansive wall space needed to provide the necessary progression of information. Then in 1999 Touch Graphics, makers of graphical tools for the visually impaired, introduced a computerized tactile interface which allows many layers of information to be presented sequentially on a tactile screen (Landau 1999). Color graphics make this interface usable by sighted persons too, and ideal for wayfinding applications in public spaces.

Another successful Touch Graphics product, the “Talking Kiosk,” provides audible wayfinding information to visually impaired users and is accessible across all ability levels; a characteristic essential for public areas with high traffic volumes, like transit systems, and a hallmark of universal design. A talking kiosk installed in 1999 in the Long Island Railroad’s New York terminal facility in Penn Station (pic 15) uses a high-pitched bird song, audible from 150 feet away, to attract the attention of visually impaired persons. This may not work as well for Metrorail however since the noise of the trains entering and exiting a station is difficult to even talk over. Instead, it would be smarter for Metrorail to employ textured floor paths as a directional aid.

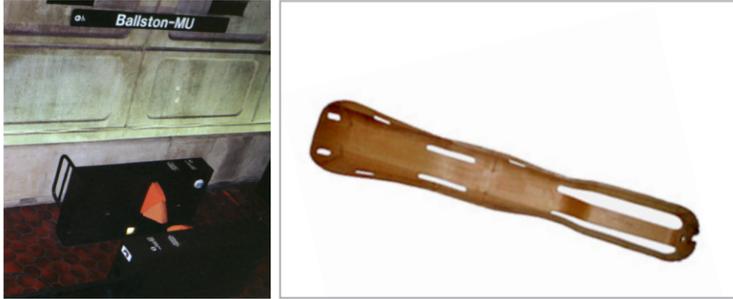
Wayfinding Technology



pic 13 – Motorola V-Series 120c cellular phone
 pic 14 – computerized tactile tablet
 pic 15 – talking kiosk

The Talking Kiosk uses two interface options: touch-sensitive 3-dimensional static tactile maps that play audible comments whenever the user touches a spot with an audio link, and a tactile number keypad based on an automated telephone system. For applications of the Talking Kiosk concept it would be ideal to incorporate the computerized tactile interface into such a unit as well, so that maps, universal symbols, and Braille lettering could be displayed on one dynamic surface. Incorporating technologies like these into Metrorail’s entrance system would improve information access for all users.

Universal Design



clockwise from top left:
 fig 21 – handicap accessible entrance gate on the platform level of the Ballston station
 fig 22 – Eames molded plywood leg splint
 fig 23 – products from Oxo’s “Good Grips” line

This thesis investigates how *all* riders of a mass transit system experience using the automated entrance system. The intention of this thesis was to develop an informed picture of the Metrorail user’s perspective, develop a design strategy from the collective research findings, and communicate design ideas for an entrance system that is universally accessible, while simultaneously preserving the system’s architectural elegance. Anchoring the design ideas presented in this thesis is a desire to see public transportation be universally accessible to all members of the public, because after all, if the public can’t access the transit system what it is really worth?

A product or environment is considered to be “universal” in its design when it can be used by all people to the fullest extent possible, without the use of any assistive devices or extra design elements. In its current incarnation the AFCS is not equipped to handle many of the special needs that Metro riders might have. In accordance with the Americans with Disabilities Act of 1990, Braille lettering provides instructions for use on the farecard machines’ faces, and elevators are available for use by persons with mobility impairments. But the WMATA did not improve its visual information systems. Farecharts, system maps, and street maps, all lack Braille counterparts, audio outputs, or foreign language options.

When a rider does need extra assistance, the only resource available to them is often Metrorail personnel. Presently, when a passenger experiences navigation, trip planning, or farecard purchase difficulties that they are unable to resolve on their own, a Metro employee must assist that individual with their full attention, often having to leave their office/booth to do so. **This heavy reliance on station managers and Metro Police officers to provide assistance to passengers with additional needs does a disservice to all passengers by distracting employees from their most important duties: ensuring the safety and security of Metrorail’s ridership.** It is not surprising that often a rider’s best option for assistance is another rider with more experience or knowledge, though it should be noted that riders with language difficulties or disabilities may find this difficult, if not impossible, to do.

Visible design issues with the Metro system’s existing components can be categorized using terms that describe the nature of a problem, such as physical access, graphic visual hierarchy, and information accessibility. Is this adequately descriptive? Yes, but without using a consistent set of criteria to evaluate each component I ran into the problem of not being able to compare designs, existing and future. I knew what each was like and what its shortcomings were, but lacked a common language of comparison. **Using the Principles of Universal Design (Connell et al. 1997) as a tool for comparison, I was able to uniformly evaluate the different existing AFCS components and potential future entrance system design scenarios.** This brought everything together.

In a perfect world every design scenario would satisfy each of the seven universal design principles well, but **as is often the case when attempting to satisfy the needs of a vastly diverse group of individuals, many needs go unmet and many are resolved unattractively because an adequate and economical solution is not usually the most**

graceful. This point can be observed in the dismal medical and “handicap” product designs that punctuate the already difficult lives of their users. Concern about thoughtlessness in the design of assistive products has been vocalized by many product designers, from the Eameses forward. As a result, products that manage to be both accessible and elegant, like OXO’s successful Good Grips kitchenware, now have a prominent marketplace presence and an increasingly vocal audience.

To show how existing AFCS components and evolving design ideas were evaluated using the seven principles, the gray “check boxes” shown below are continued graphically throughout the document. Fulfillment of a principle is graphically represented with a solid gray square. Failure to satisfy a principle is shown as an unfilled square. This is intended to make the design research and design iteration processes more transparent for the reader.

- Low Physical Effort •**
 The design’s features should require little or no physical effort to use. 1
- Equitable Use •**
 The design is equally usable by everyone and does not privilege one group of users over another. 2
- Flexibility in Use •**
 The design allows people to use the design features in different ways, for example right and left-handed options, slow and fast speeds. 3
- Simple and Intuitive •**
 It should be easy to understand the purpose of each design feature and how to use it. 4
- Perceptible Information •**
 Information should be multi-modal and available in a variety of formats such as written, symbolic, tactile, and verbal. 5
- Tolerance for Error •**
 The design should anticipate the user’s actions and protect them from hazards or danger by providing warnings in a variety of sensory modes. 6
- Size and Space for Approach and Use •**
 The design must have an adequate amount of space appropriately arranged so that anyone and everyone can use it. 7