Abstract

Universal design is about the power of lifting the human spirit beyond the minimum requirements legislated by the Americans with Disabilities Act. In order to ascertain the viability of the Seven Principles of Universal Design (Preiser and Ostroff, 2001), this chapter will develop objective and explicit performance criteria that can be aligned with the traditional three levels of priorities, including: 1. health, safety, security; 2. function, efficiency, work processes; and 3. social, psychological, cultural performance (Preiser, 2003). These can be related directly to control mechanisms common in planning, such as building codes, the life safety code, zoning regulations, design review, tax incentives, and guidance, which have emanated from environment/behavior research over the past 35 years. Due to the paucity of systematic universal design evaluation research (Preiser, 2001), the author proposes to scrutinize case study examples at the planning and urban scale. The underlying theoretical framework is feedback based on and aiming at continuous quality improvements. This is in the expectation that universally designed environments will facilitate their use by a vast majority of people. The chapter will make recommendations for future explorations into the application of universal design at the urban scale, and to the field of planning in general.

Introduction

Universal design has the power to lift the human spirit, especially when environments are designed to truly meet the needs of people who use them. Universal design ranges from inclusive and non-discriminatory design of products, cars, architecture, and urban environments and infrastructure, all the way to information technology/telecommunications.

At the scale of very large facilities, such as airports and university campuses, significant changes occurred after the implementation of the Americans with Disabilities Act in 1991. The results were usually adaptations and quick fixes to make existing facilities accessible to (almost) all.
The image that conjures up the antithesis of universal design is the former TWA Terminal at JFK Airport in New York, which was designed by the famous architect Eero Saarinen. Eventually, the airport had to cover the elegant stairs with ramps because everybody using the airport had to be accommodated. All sorts of people with wheeled conveyances used the ramps: airline pilots with wheeled suitcases, families with strollers, and workers pushing hand trucks on the way to servicing vending machines, not just disabled people in wheelchairs. Post-facto modifications like these ramps compromise the idea of universal design because one should incorporate an inclusive way of thinking and integrative design concepts into projects from the very beginning. Interestingly, the Master Plan for JFK provides for adaptive re-use: the TWA terminal is to be transformed into a conference center.

At the planning and urban scale, the present fight against sprawl (Bruegmann, 2005) and what Kotkin (2006) calls “The War Against Suburbia” seem to ignore the preferences of most Americans. In his book, The City: A Global History, Kotkin observes: “Across a broad spectrum of planning schools and practitioners, suburbs and single family neighborhoods are linked to everything from obesity, rampant consumerism, environmental degradation, the current energy crisis—and even the predominance of conservative political tendencies.” Departing from the traditional subdivision patterns that lack sidewalks and amenities and services that can be reached without getting into the car, new concepts are emerging that integrate mixed-use commercial development with residential housing. These so-called life-style communities have distinct universal design attributes: they permit everybody, including the elderly and persons with disabilities, to frequent the neighborhood center on their own without having to overcome great distances requiring transportation. There are historic precedents for this movement, albeit more all-encompassing new town concepts dating back to the 1960s like the pedestrian- and bicycle-oriented town of Tapiola just outside Helsinki, Finland.

At the national scale of planning, Norway appears to have progressed the most in the world when it comes to the implementation of the concept of universal design throughout the entire country, all the way down to the community level (Bringa, 2001). This includes planning and design school curricula, which must embrace universal design. This indicates that Norway is taking the long-term perspective as far as the well being of its citizens is concerned. There is also great concern for the environment, green building, energy conservation (they have the world’s highest gasoline prices, despite being a major oil producing country), and saving for the future in general.
At the global level, a revolution in information technology, and telecommunications infrastructure in particular, has been occurring in the recent past. This is due to the most ubiquitous and perhaps most universally designed gadget, the mobile phone. Mobile phones have the promise of bridging the real digital divide between rich and poor countries (The Economist, 2005): “Mobile phones are, in short, a classic example of technology that helps people help themselves.” To that effect, a company plans to mass produce a $100 cell phone for markets in the developing world and, it is hoped, for the economically disadvantaged in the U.S. as well.

Overcoming the real digital divide is one of the great benefits of cell phones already mentioned above. Think of the enormous cost of infrastructure investments if one had to build land phone lines in a country such as Africa, or any poor country, for that matter. Instead, people in these countries are using cell phones, a realistic way for poor people to make progress, to connect with the world, and to generate income. Creating a policy of pooling limited resources will allow informal groups to form and share access to the resources the cell phone can reach.

Similarly, in the United States cell phones are enabling socio-economically weaker segments of the population to communicate, access services, and relocate jobs and housing (much more frequently than the average citizen) at a cost that has become much lower than the traditional land line hookups, especially with the multiple-phone family plans that are increasingly available.

On the negative side, mobile phones increase the risk of car accidents fourfold due to distractions, regardless of whether the devices are hand held or hands free. Consequently, a number of states and municipalities have outlawed mobile phone use while driving a vehicle. Needless to say, the problem of distractions caused by cell phones also pertains to pedestrians (Nasar, Hecht, & Wener, 2004).

**Paradigm Shift: From Fixed to Living Systems**

A significant paradigm shift has taken place in the world of business in recent decades (Petzinger, 1999). For hundreds of years the Newtonian paradigm, with its mechanical, hierarchical, and natural resource/capital driven system, prevailed. Supply side domination of the market place used to dictate and limit consumer choices: you can buy your Model-T Ford in any color, as long as it is black. Similarly, in the post-World War II era monotonous housing in suburbs like Levittown, New York assumed that one size fits all.
Einstein’s Theory of Relativity led not only to the development of cybernetics (von Foerster and Poerksen, 1998)—the science of feedback, feed forward, and control—it ultimately evolved into the new paradigm for business: It is alive and it advocates self-regulating systems, as well as feedback-based continuous quality improvement. A military application
resulted in the development of cruise missiles, which can read the terrain and use the feedback to adjust their course toward a target. Similarly, the new paradigm promotes consumer-driven, customized mass production of products, cars, and other commodities like housing. Information is the currency of the day, not extracted minerals or agricultural, industrial, and consumer products. In Silicon Valley and the film industry, and for high tech enterprises like Microsoft, creativity is the driving force. The “chaordic” systems approach, as described by Hock (2005), signifies order in a chaotic world based on non-hierarchical and adaptable principles and governance. The global expansion of the ubiquitous VISA card, the most successful business venture in history, exemplified this. It may well be an appropriate model for planning complex environments that are responsive to an increasingly diverse social, economic, and cultural world.

Gilroy (2006) observed in his obituary of Jane Jacobs:

"Modern planners have contorted Jacob’s belief in hopes of imposing their static, end-state vision of a city."

Gilroy describes this approach as counter to her belief that cities:

“thrive on private initiative, trial-and error, incremental change, and human and economic diversity.”

and further her view that the best communities:

“are diverse, messy and arise out of spontaneous order, not from a scheme [dictating] how people should live and how neighborhoods should look.”

**Universal Design at the Planning and Urban Scale**

Multiple examples of applying universal design principles at the urban scale can be found in the Universal Design Handbook (Preiser and Ostroff, 2001). For instance, this book contains a chapter by Weisman on “Creating the Universally Designed City: Prospects for the New Century”; chapters by Manley and Vescovo on universal design in the urban realm; chapters by Goltsman, Miyake, and Robb on urban landscaping, parks, and national parks; a chapter by Beasley and Davies on sorts and entertainment venues; a chapter by Fletcher on waterfront development; chapters by Grosbois and Steinfeld on transportation; and a chapter by
In the following, this chapter attempts to address universal design by illustrating the “Seven Principles of Universal Design” developed by the Center for Universal Design at North Carolina State University (Story, 2001). The chapter will list and explain the principles; highlight their system performance criteria, and describe their applications at the urban and building scale through select case study examples; outline implications for control mechanisms like zoning and other regulations; and, finally, present ideas for further exploration of relevant issues in the future.

Compared with traditional performance criteria (Preiser, 2003) for planned and designed environments, some of which are codified in life safety and building codes, the principles are lofty ideals and guiding principles that need to become more quantified and operational so that planners and designers can use them in their projects. The following three-level hierarchy of priorities corresponds to degrees of codification as they exist today:

2. Function/Efficiency/Process Performance: Covered by guidelines that may be internal to a community or organization.
3. Social/Psychological/Cultural Performance: Derived from years of research studies on the effect of the planned/built environment on human well being.

**Principle 1: Equitable Use**

“The design is useful and marketable to people with diverse abilities” (Story 2001).

*Equal Access.* This idea speaks to our democratic principle of equality, meaning that everybody should have equal access to built and urban environments. “Provide the same means of use for all users, identical whenever possible, equivalent when not” (Story 2001) promotes equal access to streets and sidewalks, public (and privately owned) buildings, community centers, hospitals, schools and colleges, transportation facilities, urban and national parks, and so on.

*System Performance Criteria.* Provide horizontal pathway systems
which separate travel paths and surfaces from vehicular traffic, thus easing pedestrian and wheelchair movement, either at ground level, above, or underground.

For example, street level crossings of vehicular roadways and pedestrian sidewalks present a complex situation, especially when visually impaired travelers are concerned. Drivers do not obey traffic lights in some cultures. For example, in Brazil the author found drivers racing through red lights at night, while drivers with green lights cautiously approached the intersections and then checked cross traffic before proceeding.

The National Federation of the Blind and the American Council of the Blind have engaged in considerable debate as to whether sound signals at pedestrian street crossings (e.g., buzzers, chirping bird sounds) are effective. The National Federation rejects them and maintains that sound traffic signals are bad, since they can only be found in relatively few locations. They say that what is needed is for the visually impaired to use white canes and seeing-eye dogs. In Japan the approach has been for communities to install both rubberized tiles in the pavement, and sound signals at street crossings.

Different issues arise with skywalk systems. In Minneapolis, where the severe climate forces people inside for much of the winter, the City created an extensive skywalk system that is heavily utilized. On the other hand, in Cincinnati and other U.S. cities with much milder climates, the skywalk systems have been all but abandoned and/or disrupted in various places, thus making them dysfunctional. One reason for this is that skywalk systems can suck pedestrian life out of sidewalks at street level, while at the same time presenting passersby with empty store fronts at the skywalk level. Similarly, the underground passage and mall system works well for Montreal, but in balmy Albuquerque, New Mexico the underground shopping center next to Fountain Square sits mostly empty.

In general, private shopping centers are by definition discriminatory: the owners often use security to remove “undesirables” such as teenagers or other persons just hanging out. This has included our students who were doing observational studies or were trying to conduct surveys of shoppers.

An anecdote about an accessibility paradox: With tourism being a major driver of the economy in Edinburgh, Scotland, the cathedral dedicated to the Patron Saint of the Disabled, St. Giles, is a curious example of inaccessibility. Located on the Golden Mile, and converted into a tourist information center, the cathedral belies its name because its main entrance is not accessible to people with disabilities.

When dealing with an historic structure like St. Giles Cathedral, one
cannot cover the steps with a ramp as was done in the TWA Terminal building referred to above. One will have to figure out equal access, perhaps with clear signage pointing to a side entrance where there is an elevator that can reach all critical levels of the building.

**Principle 2: Flexibility in Use**

“The design accommodates a wide range of individual preferences and abilities.”

*Choices and Adaptability*

This concept provides for adaptive re-use of existing facilities, such as converting lofts into housing or turning hardware stores into churches. At the community scale, it also aims at the creation of a variety of mixed, complementary uses, such as retail and recreation and entertainment in connection with housing (i.e., so-called lifestyle centers) or even more advanced and increasingly popular mixed-use suburban town centers. In “Creating the Missing Hub”, Philip Langdon (2006) characterized these as follows:

“the ingredient missing from many suburbs is a ‘town center’, a place people head to for many different purposes—to shop, dine, visit a library, deliver a package to the post office, take in a movie or a concert, or just to enjoy being in an animated public place.”

*System Performance Criteria.* Better meet increasing demand among people wishing to reside in downtowns and/or in walking/biking distance from their employment locations. Similarly, recognize the growing trend to develop so-called life-style communities, with high density housing in walking distance from shopping and services as well as entertainment and recreation. According to the New Urbanists, an acceptable walking distance range is from 600 feet to about ¼ mile.

Over the years, there have been many attempts at traffic calming in Europe and elsewhere, especially in older cities. Design solutions included roundabouts at street intersections, single lane automobile traffic with on-street parking, planters, places to sit, and so on. The Village at The Streets of West Chester (Ohio) is a new town center currently under construc-
tion. One of its designers, Jeff Raser (2006), characterizes this project as pedestrian-friendly:

“…for all pedestrians, whether able bodied, wheelchair bound, on crutches, in strollers, elderly or youthful.”

According to him, wheelchair ramps and handrails are not enough. A universally designed neighborhood should have narrow streets, easy to cross, bump-outs for “safe harbor for pedestrians to stand on when awaiting their chance to cross, sidewalk ramps to crosswalks that are “well defined with a rectangle of contrastingly colored truncated domes along the back rail of the curb,” and “crosswalks well-marked with texture in the street, like stamped concrete or asphalt.”

An example of a “beyond the beltway community” on the Minneapolis border is Burnsville, Minnesota, with its Excelsior & Grand town center. Ben Garvin of the New York Times (2006) noted:

“The latest thing in suburban development is something very old: city living . . . A handful of suburban areas around Minneapolis-St. Paul have begun ambitious plans to create town centers, with pedestrian friendly sidewalks, condos, restaurants and shops. If it looks like a city, well, it is supposed to.”

Another example of planning for choice and adaptation are sports arenas and stadiums. In recent years there have been federal lawsuits against some major sports arena and stadium design firms, who basically designed according to code. However, they didn’t understand that sight lines can be disrupted when spectators get excited and stand up, blocking the view of a person in a wheelchair. The spirit of universal design is exemplified by arrangements providing for flexible seating and choices in different locations and price categories.

A good example of flexible arena design for spectators with disabilities may be the Nationwide Arena in downtown Columbus, Ohio in which hockey is played. It provides for choices in seating. It has fixed seating and mobile seating, next to which a wheelchair can be pulled up, in various price ranges and seating locations. Meanwhile, in the Schottenstein Arena on the campus at The Ohio State University, and despite the good intentions of the arena planners, sight lines are still disrupted because spectators climb on top of their seats when the action gets wild.
**Principle 3: Simple and Intuitive Use**

“Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.”

**Making Urban Environments Legible and Attractive Through Their Spatial Qualities**

System Performance Criteria: Provide accurate and intuitively understandable directional guidance or markers for planned and designed environments, which in themselves need to be legible with a minimum of confusion at both pedestrian and automobile speeds. Furthermore, devise criteria that apply to persons with different sensory disabilities.

The qualities inherent in good urban design were defined by Kevin Lynch (1960) as focal points for orientation, edges or barriers, places of congregation, and so on. These were visual means to describe and define markers, boundaries, and other spatial features of the urban environment, primarily seen from the perspective of pedestrians. At the speed of automobiles, different mechanisms are at work, such as highly visible destinations like the Transamerica Tower and Golden Gate Bridge in San Francisco; the Opera House or Harbor Bridge in Sydney, Australia; the Wasatch Mountains in Salt Lake City; or the hugely successful harbor front in Baltimore.

Making public parks, playgrounds, and spaces accessible is just as important as the free use of public facilities such as toilets that serve everybody, including the disabled and tourists. In Paris, 400 new and latest model automatic conveniences will be installed, including an exterior tap for drinking water.

**Principle 4: Perceptible Information**

“The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.”

**Redundancy of Sensory Modes in Signage and Way Finding Systems**

System Performance Criteria. Provide for some degree of redundancy among the different senses, especially when one is dealing with emergency egress: signage and signals using sound, light, or even strobe lights. Employ different media, like pictograms, touch, or other means of presenting stimuli or information. Enhance the legibility of essential information using hierarchies of letter sizes, different fonts, colors, and graphic systems.
An example is tactile and visual clues on sidewalks and subway station platforms, as in the case of Japan. These are yellow, rubbery tiles with raised straight lines, which mean “proceed”, or dots, which indicate “stop and re-orient”.

Another example is the use of distance markers and maps with the purpose of creating mental maps in drivers. This is in anticipation of what to expect in making driving decisions, such as turning off of a freeway. One could argue that amber alert signs are true universal design, since they are intended to alert all drivers to traffic conditions that lie ahead or vehicle information on missing persons’ kidnappers.

In transportation facilities such as airports, clarity in signage systems and communication of information essential to the traveler’s direction finding is of utmost importance. For example, when the Dallas-Fort Worth Airport first opened, it was thought that automated trains and video displays of gate information could replace a lot of ground personnel. In reality, once passengers boarded a train was no more feedback on the train’s location in relationship to one’s destination was provided. The loop routes of the trains meant that with no reference to the outside many passengers were disoriented, traveled in circles, were very distressed, and ultimately had to ask for assistance. In recently traveling through that airport, the author was surprised to find personnel at every corner asking, “Do you have a question?” In other words, overkill in technology can result in poor performance and experiences. Similarly, at the Atlanta airport MARTA (the Metropolitan Atlanta Rapid Transit Authority) changed the toll system to tickets which are dispensed from a machine. This was so confusing that MARTA had to post a person at each machine in order to explain how to use it. This is self-defeating: can you imagine a person standing at every machine once it goes system wide?

Large hospitals, frequently accretions of building phases and additions over time, are notorious for confusion and stressful way finding experiences. One such case is Children’s Hospital in Cincinnati, which covers a huge area with no clear indication of where to enter, park, and proceed from there. Accordingly, the hospital developed a color coded building directory and synchronized signage system.

**Principle 5: Tolerance for Error**

“The design minimizes hazards and the adverse consequences of accidental or unintended actions.”

*System Performance Criteria.*

“Make environments secure and safe to use by all” (Story 2001).
In her article “Making Sidewalks Accessible is the Decent Thing To Do”, Deborah Kendrick (2003), who is blind, described that accessible sidewalks are her most important criterion when selecting a place to live. They allow her to access any service, program, or product everybody else uses. Of course, many suburban communities have abandoned the idea (and cost) of building and maintaining sidewalks. Where they do exist in urban areas they need to be free of obstructions, cracked concrete, and other obstacles which might cause a visually impaired person to fall and get injured. As Kendrick put it, sidewalks are

“ribbons of concrete that, when smooth and unobstructed by tree roots and utility lines, bring all citizens, with and without disabilities, into the same employment, education and recreational activities our communities offer”.

Special elevators for emergency evacuations from high-rise buildings are an example of progress being made. “Panel May Recommend Firefighter Elevators,” a recent article in The Wall Street Journal (Frangos, 2005) discussed elevator safety for all building users, including rescue personnel. The article reflects on the commission that is investigating 9/11 and the fall of the twin World Trade Center towers. Why is it that other countries’ building codes in Europe and most of Asia require these lifts, although the rules differ? In the U.S. we not only forbid people to go down in elevators, but firefighters cannot use elevators to go up and help people to evacuate. In 1993 they had to walk up the World Trade Center stairs, which was utterly ineffective. In countries like Malaysia, with the Petronas Tower in Kuala Lumpur designed by Cesar Pelli, such elevators are common. The new Freedom Tower in New York City, designed by SOM, will have such an elevator. To quote June Kailes, a Los Angeles based disability consultant:

“Disability rights activists are strong supporters of the elevators. What we learned from 9/11 and many events before 9/11 is the ability to evacuate multi-story buildings is an issue for a broad spectrum of people who would never identify themselves as disabled, but who couldn’t negotiate so many steps.”

This is true because there are many people who are not necessarily using wheelchairs but have all kinds of mobility problems, and who would find themselves stranded on the 100th floor where they would probably all perish. We have a lot to improve in the area of fire egress from tall
buildings.

Remembering the disastrous evacuation of New Orleans in the aftermath of Hurricane Katrina, one could argue for universally designed disaster evacuation plans for cities and regions that are vulnerable and experience disasters on a recurring basis.

**Principle 6: Low Physical Effort**

“The design can be used efficiently and comfortably, and with a minimum of fatigue.” This principle has to do with inclines and the surface characteristics (e.g., carpeting versus hard floor or gravel).

*System Performance Criteria*

“Find ways to reduce the expenditure of effort and to minimize repetitive actions at all scales of the environment” (Story, 2001).

An example of affordable and accessible mass transportation is a rapid transit system that has been developed that uses dedicated high speed lanes in Ecuador and Brazil. Bus stations have ramps on either side. After entering and paying, one is level with the floor of the buses—meaning that they can be emptied and filled up rapidly. There is no delay for paying or being in a wheelchair. This is a universally designed rapid transport system that is appropriate for those countries that cannot afford subways.

When it comes to individualized public transportation (i.e., taxis), London is considered the most accessible city in the world. All new taxis have to have foldout ramps, which take a few seconds to put in place. All older model taxis have to have one of these ramps in the trunk. In addition, the taxis are very comfortable, with high ceilings and multiple seat configurations. For example, one can put a seatbelt around one’s wheelchair in order to secure it. On the other hand, the subways (called “the tube”) are not accessible at all except for the recently built Jubilee Line.

At the building scale Zipf’s famous “Human Behavior and the Principle of Least Effort” (Zipf, 1949) clearly applies. Festinger’s (1950) classic socio-metric study, “Social Pressures in Informal Groups”, explored how post-WWII GI Bill MIT student housing demonstrated how the amount of effort implied in overcoming distance and height (number of floors) proved critical in the establishment of acquaintance and friendship patterns among residents. Another multi-stairway investigation (Hanyu and Itsukushima, 2000) found that increased expenditure of effort resulted in reduced use.

Finally, as was pointed out in connection with evacuation elevators
above, residential elevators are essential for a variety of groups with disabili-
ties, whether wheelchair-bound or not. A new generation of more affordable elevators using the suction principle that can accommodate wheelchairs is coming on the market (Daytona, 2006).

**Principle 7: Size and Shape for Approach and Use**

This principle and category clearly does not apply to the urban and planning scale when interpreted in its original meaning: the limits the human body and dimensions place on the accessibility of counters, shelving, appliances, dispensers, controls, electrical outlets, door handles, and other critical items. Therefore, in considering the goal of “Access for All” at the urban scale, different concepts come into play.

*System Performance Implications.* The elements that are critical for a city to be livable refer to “accessibility” from the perspective of pedestrian distances in neighborhoods in high density cities like New York. In Manhattan most necessary daily services—shopping, the library, churches, and entertainment—are within a mile’s walking distance from one’s apartment. Lewis Mumford testified to this in his 1979 film classic, “Toward a Humane Architecture” (Meehan, 1991). In short, in this type of community the operating principle is integration, not separation of uses, and, implicitly, zoning approaches. Building “Livable Communities” in the interest of maintaining independence for seniors is also strongly advocated by the American Association of Retired Persons (AARP). The common elements of this include: “affordable and appropriate housing, public transportation, community services, nearby shopping and medical services, job opportunities, and recreation” (Novell, 2006).

An example of this is current inner-urban redevelopment schemes in the U.S. in which mixed-use zoning calls for high-rise buildings with residential floors at the top, a hotel underneath, office uses below that, retail at the street level, and, finally, parking underground.

Many precedents exist in Japan, such as at both Tokyo and Nagoya Stations. Mixed-use towers have been built with office zones, hotel zones, and restaurant zones, as well as retail shopping centers.

1. The Marunouchi Building in Tokyo connects to the Japan Rail Station and the city blocks being redeveloped around it via a system of underground shopping arcades and tunnels, which are fed by the traffic that is generated by hundreds of thousands of passengers passing through
the station every day. Two remarkable features distinguish this building, which was fully leased only months after its opening in 2003 while there was a glut of office space in Tokyo. First, it has a huge atrium space, open to the public, which is used for exhibits and public gatherings. It is, in fact, a window to the community, welcoming the public for lunchtime concerts and other events. Second, at the top level of the tower a viewing floor is open to the public at no charge. In short, the building has become a destination in Tokyo—a public place in private property.

2. The JR (Japan Rail) Tower in Nagoya utilizes the air rights above Nagoya Station and contains a mix of uses that is similar to the Marunouchi Building in Tokyo, plus a Marriott Hotel. What is most unusual is a buzzing Sky Mall 13-15 floors above street level, a concept that would never work in the U.S.

At a smaller scale, and in the suburban context of the U.S., many of the continuously growing communities outside the beltway are playing catch-up with the increasing need for community infrastructure and support facilities, like community centers. An example is the Lakota Schools in West Chester, Ohio. Recent high schools were planned with the “Main Street” concept in mind—a large, long space primarily used as student break areas, but also for community events such as public fairs and gatherings.

Field Evaluations at the University of Cincinnati

While the Seven Principles of Universal Design have been devised as ideals and general guidelines, almost like the Ten Commandments they lack specificity and operational utility. This is the reason for a continuing series of field-based evaluations of all kinds of facility types in a course called “Universal Design” offered in the curriculum of the School of Architecture and Interior Design at the University of Cincinnati. Field learning and universal design evaluation exercises are an important component (Preiser, 2001). We have carried out evaluations of the university campus, the International Airport, the public library system of 42 branches, supermarkets, banks, hospitals, the Contemporary Art Center, and other facilities. We found that many of these facilities, despite meeting the ADA guidelines and regulations, are not accessible.

The class checked out brand-new campus buildings, such as the one-stop center where students register, pay, get assistance, and so on. It was
found that if one pushes the door opener button, by the time one gets to
the door it is already closing again. No one field tested it. What is needed
is a post-mounted button that one can push and get through the door
right away. This is an example of a building that was one year old and not
properly designed.

Thus, when planning such buildings integrative thinking needs to be
used from the start, literally making the built environment a level playing
field.

**Ideas for Future Exploration**

Future research will need to clarify advantages, disadvantages and
cost implications of the following:

1. Investigating level versus underground and aboveground street
crossings. This includes aboveground (second story) skywalk bridges ver-
sus underground concourse and connector tunnels systems, like the one
in Montreal, Canada referred to above. Another interesting variant is the
system of arcades in Melbourne, Australia, which fills the inside of city
blocks with shopping, restaurants, and other people-intensive uses.

2. Assessing the viability and implications of promoting adapt-
able buildings and facilities, as well as mixed-use zoning, which combine
commercial land use with community services, shopping, and residential
housing. This includes downtown revitalization, including the conversion
of department stores, office buildings, and lofts to residential use; upgrad-
ing centers of older suburbs like Hyde Park and Clifton in Cincinnati;
and the proliferating new town centers in today’s suburbs in more than 60
locations in the country.

3. Developing signage control ordinances that regulate permissible
locations, sizes, and other parameters of signs in public spaces.

4. Devising special ordinances permitting tactile signage systems
in sidewalks and platforms of stations. Developing globally usable signage
for sports venues like the Olympics using pictograms, for example.

5. Investigating how universal design principles can be applied to
people movement in general, as well as the mitigation and aftermath of
disasters in particular.

6. Establishing realistic distances that pedestrians, the elderly,
children, and wheelchair users can master under various conditions (e.g.,
weather, temperature, traffic density). This should also be extended to
such venues as amusement parks, where covering great distances, waiting
for rides, entering rides, dealing with crowds, as well as accessibility of toilet rooms and eating establishments are important. Making potential experiences the same or similar for all is most desirable, like dipping one’s feet into fountains.

**Epilogue**

It is hoped that this paper has demonstrated that universal design holds the potential for humanizing environments both at the general planning and urban scales, especially if the political will exists to focus various aspects of urban planning on inclusive planning for all. To quote Kotkin (2006) again:

“It is time politicians recognized how their constituents actually want to live. If not, they will only hurt their communities, and force aspiring middle-class families to migrate ever further out to the periphery for the privacy, personal space and ownership that constitutes the basis of their common dreams.”

**Universal Design Handbook: A Resource**

Many questions about universal design can be answered by Preiser and Ostroff’s (2001) Universal Design Handbook. It contains chapters on conceptual frameworks and policies for universal design at the building, community, and global scales, as well as case studies from around the world. The back cover of the Universal Design Handbook contains a CD with the Americans with Disabilities Act Guidelines (ADAG), and other helpful materials. One can download these and use them to determine what provisions are relevant to specific design projects. However, one needs to reemphasize that universal design is intended to transcend the ADA, which usually addresses only minimum requirements and dimensions.

**Acknowledgements**

For the conceptual basis of this paper (i.e., “Feedback, Feed Forward and Control”) I am indebted to my mentor, the late Dr. Heinz von Foerster. A world renowned cyberneticist, he was Professor Emeritus and founding director of the Biological Computer Laboratory at the Univer-
sity of Illinois, Urbana, IL. Thanks are owed to Elaine Ostroff, without whose expertise and global network in the field of universal design the Universal Design Handbook could not have been created.

References


Raser, J. (2006). The Village at The Streets of West Chester. Personal Communication of May 2. jraser@glaserworks.com