

## **“Universal Design, Beyond the ADA: An Introduction to Creating Inclusive Buildings and Places”**

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What follows is the complete set of lecture notes that accompanies the slide show created by Elaine Ostroff and Leslie Kanes Weisman titled “*Universal Design, Beyond the ADA: An Introduction to Creating Inclusive Buildings and Places*” © 2004. This script, which may be downloaded and printed separately, was developed for use with the slide only version of the show by those who want to present it as a “lecture” on a large screen to a group of people, for example by a faculty member in a design studio or lecture hall, or by those in professional workplaces, or government and community based organizations. Notes are numbered to match the numbers on the slides.

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1. “*Universal Design, Beyond the ADA: An Introduction to Creating Inclusive Buildings and Places*” was developed for the Universal Design Education Online website by Elaine Ostroff and Leslie Kanes Weisman © 2004.

Universal Design Education Online (UDEO) supports the teaching and study of universal design. This teaching unit was funded in part through a grant to the Center for Universal Design from the National Institute on Disability and Rehabilitation Research (NIDRR) of the US Department of Education. UDEO is conducted jointly by The Center for Universal Design in the College of Design at North Carolina State University; the IDEA Center in the School of Architecture and Planning, University at Buffalo, the State University of New York; and the Global Universal Design Educator’s Network.

2. This slide presentation is organized into three parts.

- Part I places universal design in the historical context of its origins within the civil rights movement; explains how dramatically changing global demographics have made the need for universally designed places and products essential today; and describes the relationship between universal design and sustainable design.
- Part II defines and explains seven principles that articulate universal design performance criteria, and illustrates each principle with several examples of universally designed products and environments.
- Part III introduces a new building assessment tool, the “*Universal Design Building Survey: Incorporating the ADA and Beyond in Public Facilities.*” This survey is the first of its kind to integrate accessibility requirements, universal design principles, and sustainable design performance criteria.

3. Sir Winston Churchill said, after World War II, as he argued for the rebuilding of Parliament: “We shape our environments and they shape us.” Churchill correctly understood that the built environment is not neutral or value free. It is an active shaper of human identity and daily life. It can either enhance people’s ability to function well or diminish it. Buildings that confuse us and that add stress to our experience are disabling environments. Buildings that add to our sense of competence and comfort are enabling environments.

Whether it is buildings or products, the outcome of bad design is always frustrating at best. We have all experienced packages that defy our ability to open them, as seen in the image in this slide of a woman trying to open a music CD with her teeth.

Universal design challenges problematic designs like this familiar example by striving to create aesthetically beautiful and environmentally sensitive buildings, places and products that are empowering, comfortable, accessible, and suitable for a very wide spectrum of people. Even though advocates of universal design recognize that it is nearly impossible to design all things for all people, the ultimate objective is to be as inclusive as possible.

4. Elaine Ostroff has defined universal design this way:

*“Universal Design is an approach to design that honors human diversity. It addresses the right for everyone--from childhood into their oldest years -- to use all spaces, products and information in an independent, inclusive, and equal way. It is a process that invites designers to go beyond compliance with access codes -- to create excellent, people centered design.”*

5. In this slide, the late Ron Mace, the architect who has been called the “Father” of universal design, is pictured on the left, boarding a kneeling bus using his wheel chair. This is an example of how good design can foster people’s independence and inclusion. In comparison, the school bus shown on the right provides a complex, awkward wheelchair lift that draws attention to the wheelchair user, in this image a teenaged boy, and requires the other passengers to wait while the driver operates the device.

6. Pictured in the 3 images in this slide is the surface rapid-transit system that was designed over 30 years ago to address the ballooning population in Curitiba, Brazil. It is considered a model of urban planning that minimizes automobile use through a convenient and affordable public transit system. The bus-trains provide easy access to everyone via the tube platforms that allow many people to enter and exit. The fares are paid on the protected platform. This is an example of a low-cost, effective, fully accessible transportation system.

Having just introduced what universal design is about, it is appropriate to proceed by explaining what universal design is not about.

7. There are four common misconceptions that people often have about universal design. Each of these myths will be clarified in turn.

**Myth 1: Universal design is just another term for accessibility and ADA standards.** This is simply not true. Universal design is not a euphemism for accessible or “barrier free,” design. It is not about minimum legal standards. Perhaps the confusion often arises regarding the difference between the terms “accessible” and “universal” design because the origin of the universal design movement resides in the pioneering actions and achievements of the disability rights movement. Briefly referencing some of the most important milestones in the history of civil rights in the United States will further explain.

8. In democracies like the United States, the government guarantees all citizens certain rights and freedoms, as well as equal opportunity and legal protection from discrimination. When these promises are not realized, social protest movements like Civil Rights, Women’s Rights, and Disability Rights arise to opposed injustices and inequalities. These movements usually begin by seeking to eliminate discriminatory practices through the courts or through legislation that imposes fines and penalties. For example, the precedent for desegregation came from Brown vs. The Board of Education, the famous 1954 US Supreme Court ruling that declared the maintenance of separate public schools for black and white children unconstitutional because it violated the children’s 14th

amendment rights by separating them solely by the color of their skin into unequal and inferior schools.

9. Almost a decade after the Brown decision, in March of 1963, the struggle for civil rights by African Americans culminated in an historic march on Washington, DC. in which the Reverend Martin Luther King gave his mesmerizing and now famous “I have a dream” speech at the Lincoln Memorial, pictured in the two images on the right in this slide. In the top photo we see Reverend King, in the bottom photo a view of the throngs of people holding signs from their states, including a huge banner that reads “Pennsylvania marches for jobs and freedom.” A year later the Civil Rights Act of 1964 became the first of the major civil rights statutes, prohibiting discrimination on the basis of race, religion, national origin and sex, but not disability. The Voting Rights Act and the Fair Housing Act followed in 1965 and 1968.

10. These Civil Rights Acts established the foundation for Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990 (known as the ADA). Section 504 was the first civil rights law to prohibit discrimination toward people with disabilities by recipients of federal funds. Finally, access to employment, education, buildings and communities was seen as a civil right and not a government benefit. Separate but equal facilities could not exist under the guise of good will or charity. Although the law was signed in 1973, the regulations required to implement Section 504 were not issued for four more years until 1977, and only in the face of angry and persistent testimony, sit-ins and protest marches organized by the American Coalition of Citizens with Disabilities. The most significant protest was in San Francisco where people with disabilities occupied the Health, Education and Welfare regional building for 21 days

The two photographs on the slide show people from San Francisco who brought their protest to Washington, DC. On the upper right, several people using wheelchairs are getting out of a truck that they used to get from the airport to the US capital, seen in the background. On the lower right, three protestors seated in their wheelchairs, and a sign language interpreter, are speaking at a DC rally.

Section 504 laid the foundation for the American’s With Disabilities Act of 1990 that mandates accessible design in public accommodations today. The ADA spells out legally enforceable minimal technical design standards that allow many individuals with disabilities the opportunity to gain access to buildings, programs and activities. The goal of removing obstacles in the built environment for people with disabilities meant that for the first time, accessible design was recognized as a condition for achieving civil rights.

11. Legally mandated requirements for accessible design, framed within a civil rights context, provide a vital basis for autonomy and opportunity. However, to date, attention by architects and interior designers to the minimum technical standards set forth in the ADA regulations and other similar guidelines, has frequently happened after the design phase, creating add-ons such as back door access with the addition of ramps, mechanical lifts, and reconfigured toilet rooms. These after-the-fact compliance-oriented approaches have rarely produced visually inspiring architecture and public spaces, or equity for all users. Although the laws provide invaluable protections, they have too often had the unintended consequence of diminishing attention to the creative potential of design to enhance everyone's experience through design that anticipates human diversity and seamlessly integrated solutions. In other words, it is perfectly possible for a building to succeed in meeting the ADA design requirements, but to fail in terms of the goals of universal design!

Universal design moves beyond the “letter of the law” that fosters social change through the threat of legal remedies such as fines for non-compliance, to the “spirit of the law” which emphasizes ethics and values, and promulgates systemic changes in attitudes, behaviors, and institutional structures. It is within this spirit of the law that the Universal Design Movement emerged in the late 1980’s. Universal designers realize that we must be proactive in what we design because policies and practices that are seemingly gender, race, and ability “neutral” have historically perpetuated separate and unequal housing, schools, neighborhoods, and workplaces. Universal design advocates want designers’ imaginations – not just their grudging compliance.

**12. The second myth about universal design is that it is just for older, disabled people.** Some times universal design is thought to be the same thing as life span design or transgenerational design. These “age-centered” approaches to designing products and environments take into consideration the changes in physical and mental ability experienced by the human body over time, as a normal part of aging. However, to date, advocates have only focused on the needs of the aging population, while the needs of children and adolescents have been largely neglected.

Universal design encompasses but goes beyond both accessible and lifespan design by considering the comfort, accessibility and practical needs of the vast array of different ages, cultures, and lifestyles that use products and buildings and that actually exist in communities. Universal design recognizes that all of us -irrespective of gender, race, class, age, size, or ability - develop, grow, and change both physically and intellectually throughout our lives. And at any point in our lives, personal self-esteem, identity, and well being are deeply affected by our ability to function in our physical surroundings with a sense of belonging, comfort, independence, and control.

**13. The third myth about universal design is that it is ugly and costs more.**

When designers do not consider accessible and universal design requirements as a basic consideration, these add-on elements are often ugly and will cost more. BUT – when these issues are integral to the design process they have minimal if any cost implications. Moreover, universal design is not about “style.” It does not suggest or determine a particular formal aesthetic result. When well implemented, universal design is virtually invisible, unnoticeable by most people, except that it is more convenient, safe, and physically and emotionally accessible.

14. As shown in the image in this slide, the inclusion of automatic doors in buildings like grocery stores, lumber yards, and garden centers allow people with shopping carts to safely and conveniently enter and exit without using their hands. But automatic doors work equally well for people using wheelchairs, and those carrying large packages and pushing baby carriages. By increasing the number of users whose needs are being addressed in a single design solution, universal design encourages an integrated approach, rather than multiple separate solutions. It helps eliminate the need for special features and spaces, which for some people, are often stigmatizing, embarrassing, different looking and usually more expensive.

Airport restrooms provide another recognizable example. Many people, especially people of large stature, head straight for the big stall designated for disabled people because most people are unable to comfortably fit themselves and their carry-on luggage into the small, cramped, so-called “regular” stalls. (And everyone is warned not to leave luggage unattended at any time!) Rightfully, non-wheel chair users feel uncomfortable about using an accessible stall because they may be depriving someone who cannot use any other stall. But what would happen if all bathroom stalls were wider? Everyone would benefit through enhanced comfort and convenience; and there would not be a need to use the extra wide stall that accommodates people who use wheelchairs

**15. The fourth and final myth about universal design is that only a small percentage of people benefit from it, so why bother?** Although there are millions of people all over the world with visible disabilities, there are millions more with hidden disabilities all of whom are adversely affected by the environment. How many people wear contact lenses or glasses to correct imperfect vision? How many have hip, knee or lower back pain and problems with lifting? How many suffer from allergies or asthma? How many have hearing that is less than perfect? How many people have age-related physical and sensory limitations? How many people are affected by ambient conditions that make it impossible to see or hear?

As the previous slide illustrated, everyone benefits from human-centered, inclusive design. Elevators and lifts that provide alternatives to long flights of stairs, clean air that is free from allergens and toxins, print on the labels of consumer products that is big enough to read by most people, intercom systems in train stations and airports that actually allow one to hear and understand important announcements, are welcomed and appreciated by everyone. Good design reduces stress and promotes health, personal empowerment, and well-being.

16. The need for inclusively designed buildings, places and products is made all the more important today by the soaring and unprecedented growth and longer lifespan in the global aging population. These changing demographics have led to a dramatic increase in the numbers of people with age-related disabilities such as dementia, mobility, hearing, and vision impairments.

The photo in this slide of a grinning older man talking on his cell phone is from the cover of a UK Design Council publication, *Living longer: the new context for design*. Roger Coleman, the author, emphasizes the challenges for designers "...to create products and services that work up and down the age range...to rethink the way we construct the world we live in, and ensure that it works equally well for young and old. Not only will our elders benefit now, but we will benefit in the future, as will our children and our children's children."

Today and in the future, as the percentage of older people continues to grow, there will be a concomitant growth in business opportunities to develop products and buildings that are designed to meet the needs and lifestyles of this large segment of the population. Many cutting edge companies are already taking advantage of this phenomenon.

17. For example, the interior of Lear Corporation's ergonomically designed prototype for a transgenerational car called the TransG™ accommodates a broad range of users, from people who are small and have less strength, to users who are older and larger in size. The TransG interior, illustrated in the image on the left in this slide, contains seats that swivel out at a 45 degree angle to make the awkward task of exiting and entering easier by allowing the occupant to use both legs while sitting or standing. Also included, seen in the middle image, is a four-point seat belt, which is safer and more comfortable, and reduces the strain from twisting that is typically experienced when putting on a conventional three-point seat belt. The TransG's modular sliding rear cargo system, shown on the right, enables users to load and unload large and heavy objects with ease.

18. At a much larger scale, does your community accommodate people of all ages? The example shown in this slide does. The Chuo Silver Zone Complex, located in Akita Prefecture in Northern Japan, seen in an aerial view on the left, combines a residential facility with medical services for older adults, and a large, centrally located recreation center that is open to all community members. The center contains a swimming pool, seen on the right, workshops, a tearoom, a play space for children, and exercise rooms. The combination of housing and recreational facilities brings people of all ages together and minimizes the social isolation of the older residents. And the climate

controlled enclosed walkways that connect the buildings allow people to walk from one place to another in comfort and safety regardless of weather conditions.

19. It's happening now - designing for inclusion at every scale:

- Urban planning
- Landscape architecture
- Architecture
- Industrial design
- Exhibit design
- Graphic design
- Electronic & information technology
- Instructional design...

20. Thus far this presentation has described the relationship between universal design, civil rights, and the needs of the global aging population. The Third and final relationship to be briefly discussed is how universal design and “green” or sustainable design in architecture relate to each other. In the United States architects began to develop a consciousness about the dramatic impact that constructing buildings has on the earth's energy and other natural resources in the counterculture era of the 1960's. Today ecology is a well known field, most people understand the irreplaceable value of biodiversity, and virtually all architecture students are taught to approach site planning and building design with a consideration of sustainable design principles.

21. Although it may not yet be apparent to most advocates or practitioners of universal design or sustainable design, the two are deeply connected to each other, and also to human health, environmental health, and social justice. Extensive research has now fully documented that poor people and people of color, in urban and rural areas alike, have borne a disproportionate burden of environmental pollution and degradation – from living in neighborhoods near toxic waste sites, to living in substandard housing with lead based paint, rat and insect infestation, poor sanitation, and inadequate heat. Consequently, these populations have higher instances of blood lead levels in children, respiratory disease like asthma, and certain cancers, than does the population as a whole.

In addition, public buildings that subject us to unhealthy air - through inadequate ventilation systems and the off gassing of volatile organic compounds from furniture, carpeting, plastic countertops and cleaning products - make us less healthy and less productive than we are capable of being. Sick building syndrome costs societies tens of billions of dollars each year in medical bills, absenteeism and lost worker productivity. Healthy buildings, social justice and environmental protection are inseparable from each other. And they are also inseparable from universal design's mandate to create products, buildings and communities that promote health and prevent illness.

22. Part I of this presentation can be summarized by four points that Leslie Kaner Weisman has used to define the meaning and significance of universal design:

1. Universal design upholds the fundamental democratic principles of non-discrimination, equal opportunity, and personal empowerment.
2. Universal design looks beyond the “letter of the law” that fosters social change through the threat of legal prosecution for non-compliance, to the “spirit of the law” which emphasizes ethics and justice, and promulgates systemic changes in attitudes, behaviors, and institutional structures.

3. Universal design is not a style, but rather a values-based, human-centered framework for design decision making based on an ethic of inclusiveness that honors and celebrates human differences across the spectrum of age, gender, race, culture, and ability.
4. Universal design is a mandate for human and environmental health that recognizes the interdependence among all of humanity, the natural world and the products of human design, including the built environment.

How then, does this definition manifest itself in universally designed buildings and products? How do designers know when they have achieved universal design?

23. To answer these questions, a team of experts gathered together in the mid 1990's at the Center for Universal Design at North Carolina State University, supported by a grant from the US Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR). Their goal was to develop a set of principles that could guide the design process, allow the systematic evaluation of existing designs, and assist in educating both designers and consumers about the characteristics of more inclusively useable products and environments. The group developed seven general principles of universal design with brief definitions and related guidelines for each, that are in most cases, applicable at all scales – from the design of hand-held objects and signage systems, to architecture and community planning. The Principles have been translated into numerous languages and used all over the world. They have been applied to educational theory and learning techniques and to the development of social services.

24. The seven principles of Universal Design are :

- 1. Equitable Use**
- 2. Flexibility in Use**
- 3. Simple and Intuitive Use**
- 4. Perceptible Information**
- 5. Tolerance for Error**
- 6. Low Physical Effort**
- 7. Size and Space for Approach and Use**

We'll look at them one at a time

**25. Principle 1: Equitable Use: The design is useful and marketable to people with diverse abilities.**

Guidelines:

- A. Provide the same means of use for all users: identical whenever possible; equivalent when not.
- B. Avoid segregating or stigmatizing any users.

26. Can everyone use the same entrance? On the image on the right in this slide you see the former entrance to the Wellesley college library, with an ugly, stigmatizing metal ramp laid over the front stairs. Not a very attractive or welcoming entry! On the left, the renovated entrance of the library is a good example of universal design because the landscaping eliminated the need for stairs and created a gentle grade that everyone can use.

27. Does the design provide the same means of use for everyone? The height adjustable drinking fountain seen in these two images offers choice for children, adults, wheelchair users and people of very tall and short stature to individualize the drinking height and become part of the larger public.

Unlike “accessible” solutions that segregate users by providing two fountains side by side - one for standing and one for seated users - this universally designed democratic solution offers the same opportunity to all people.

28. Do accessible features blend well with the site and building design? The images in this slide are of the award winning Barus & Holley Addition to the engineering laboratories at Brown University. The architect, Payette Associates, created a 'front door,' seen on the right, that gave identity to the Engineering Department and resolved an awkward 10' grade change, by using an extraordinary curved glass automatic door, jewelry-like railings, and an acid-etched and colored concrete ramp. The image on the left shows the high clearstory windows that pull natural light deep into the interior halls, classrooms and labs, providing excellent task lighting and reducing energy consumption. All spaces in the addition are accessible. The design resonates with excitement and enhances the quality of life of faculty, students and visitors.

29. Do accessible features blend well with the site and building design? Erick Mikiten is the architect for the 12 unit apartment project for low income seniors shown in this slide. The neighbors were originally opposed to the idea until they saw his Craftsman style drawings that fit into the neighborhood context. On the left is the front of the house with its generous porch and undulating picket fence. The middle image is a computer drawing of the wrap around outside ramp that goes from the 2nd floor, around the community room to the ground. On the right is the interior entrance hallway, with stepped windows providing natural light. There is an elevator to the left of the stairs. The jurors for this affordable housing design award noted: "The architect demonstrated keen insight into accessibility needs seamlessly incorporated into beautiful design ... If this were to be judged without the accessibility program requirements, it would still be strong architecture."

30. Can you create a zero-step entrance so people can visit each other? The three images on the top of this slide demonstrate “visitability”, a concept that’s being integrated into both single and multifamily housing all over the world. The idea is simple - all houses should have one entrance without any steps, and all interior doors should be 32 inches clear. That means that people with mobility impairments that may require using an assistive device like a walker or wheelchair, can be part of the community, not isolated in their own accessible home. It also means that people can age in place; if they acquire a physical disability, their home will still work for them. On the left is a house in Shelby Township, Michigan designed by Christopher Gobbel with a zero-threshold graded entrance. In the middle image a little boy using a wheelchair is going to a birthday party. The birthday girl in her party hat welcomes him at the door. On the right you can see that “visitability” can happen as well in a mountain cabin designed by Ron Mace. The dirt path has stabilizer mixed in to keep it firm and level. Access doesn’t have to be about asphalt.

31. Can everyone in the audience see and hear the action? The image on left in this slide is Bradford Woods, an amphitheater located in Martinsville, Indiana, universally designed so that all of the areas are usable by everyone –from the audience seating and the stage area itself, to the backstage area and lighting control panels. The design provides clear sight lines for everyone in the audience whether seated or standing, and the fixed seats can be flipped up to allow people using wheelchairs, scooters, strollers, or wagons to sit anywhere throughout the entire space. The decision of where to sit is determined by the user, not limited by the design of the structure. Another example is McCoy Stadium in Rhode Island, with accessible seating integrated throughout the large stadium.

32. Does the design appeal to and engage all users? At Ibach Park in Oregon, pictured on the collection of images on the right, Susan Goltsman of Moore, Iacofano, and Goltsman, has designed

an award winning historically themed play area that integrates children of varying abilities. A stream - water in some places and a blue resilient safety surface in others, symbolizes the Tualatin River, the city's most important geographical feature. Children touch an infrared pole to activate the water flow, which then trickles down from a large blue chute into a boulder lined channel in a retaining wall that is at grade on one side, allowing kids to wade into the stream, and at waist level on the other so that children in wheelchairs can reach into the water. The adjacent archeological dig is dominated by a large mastodon rib cage with one rib missing to allow wheelchair access. The sandy digging area in the background contains a platform for wheelchair transfers. In the photo on the left, the multi-leveled fountain designed by Carol Johnson, also seamlessly affords both standing and seated children the opportunity to play with the water and each other.

33. Does the design promote health and sustainable community life? The creation of Piers Park in Boston, shown in this image, transformed a derelict historical site along the river's edge into a fully accessible and beautifully designed six-and-a-half acre Public Park and boating facility that has renewed community pride and served as the catalyst for additional neighborhood renewal. The small images on the slide illustrate the park's many recreational and leisure activities that promote health and fitness, from long promenades for walking and jogging to playgrounds, boating and ice skating. Once a toxic brownfield, the park's construction eliminated contaminants from the soil and incorporated recycled materials into the design. To ensure barrier-free access to the boating facility during normal tidal elevations, the designers used a fixed platform with two floating gangways to allow accessibility during all tide stages.

**34. Principle 2. Flexibility in Use: The design accommodates a wide range of individual preferences and abilities**

Guidelines:

- A. Provide choice in method of use.
- B. Accommodate right or left-handed access and use.

35. Provide choice in method of use. This photo illustrates a building entrance that offers a ramp and stairs, providing equitable use and a choice of entry method. While essential for a wheelchair or stroller user, a long ramp may be too fatiguing for an ambulatory older person and stairs may also be the choice of someone in a hurry who can walk.

36. Are there choices for getting around the site? HOK was the architect and landscape architect for the Minnesota Federal Reserve Bank, seen in the two images in this slide, which overlooks the Mississippi River from a 9-acre historic site. From the start, accessibility issues were integral to every aspect of the urban design solution. On the left you can see the gently sloped brick walkway with seating along the way. People can also walk on the grass. On the right the plan shows the major pedestrian access routes to the river.

37. Does the park seating accommodate individual preferences? On the right, a child using a wheelchair joins people seated on a wooden park bench, a mother with a baby in a carriage, and two adults using a very high bench with arms to support sitting and standing. In the multi-sensory Garden in Osaka's Ryokuchi Park depicted in the image on the left, seating alcoves surrounded by water are provided with benches and sufficient clear floor space for people using either a wheelchair or scooter.

38. Can most employees use the workspaces? On the left a woman is using the height adjustable chemistry work station that also works for shorter or seated people. On the right, this drawing

illustrates a universally designed workplace, highlighting the equipment controls and communication devices.

39. Does the furniture adapt to people's needs and abilities? The person in this slide uses an adjustable sit-stand desk that enables him to work in a variety of sitting or standing positions.

40. Can the design be used by left and right-handed people? The scissors pictured in the image on the right are used by grasping the non-slip rubber grip handles and pulling back the spring-loaded orange switch. They can be easily used by right or left handed people, and individuals who have low hand strength or arthritis. Seen on the left is one of the main staircases at Chuo Silver Zone Complex. In addition to the standard stairway width, a third handrail is installed with approximately 30 inches between handrails so users can steady themselves by using either their left or right hand and so that those requiring additional support may use both hands. Lights have been installed at foot level for safety. The level landing halfway up the run gives people the opportunity to rest before proceeding; and seating is installed on the top landing.

41. Does the design work well for children, adults and older people? The modular sink on the left and toilet on the right easily adjust to accommodate the height of a standing or sitting user, allowing access by a small child, a tall adult or a wheelchair user. The arms on the toilet can be separately flipped out to assist with a right or left handed wheelchair transfer, or to provide support for people who are unsteady. The toilet seat itself can be flipped up against the wall to facilitate cleaning the floor

**42. 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.**

Guidelines:

- A. Eliminate unnecessary complexity
- B. Be consistent with user expectations and intuition
- C. Accommodate a wide range of literacy and language skills

43. Is it easy to understand? Can you make it work? The photo in this slide illustrates a welcome design of the back of a computer with color-coded plugs and receptacles that simplify installation.

44. Can you figure out how to use this fare machine? In Barcelona, the MAE ticket vending machine, shown in these two slides, incorporated several universal operating features into a touch screen that includes options for four languages, voice output, and easy navigation for blind users with simplified menus and controls. All functions require using only four buttons. Clear space at the base of the machine is provided so that wheelchair users can pull up close.

45. Is it simple to use by most people? The Sony IT-G1000 phone depicted in the two images in this slide is simple to use and offers both auditory and visual feedback through a built-in speakerphone and large visual display. The image on the left shows the phone's large, high-contrast buttons and numbers that are useable by people with visual impairments and differently sized hands.

**46. Principle 4. Perceptible Information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.**

Guidelines:

- A. Use different modes for redundant presentation.
- B. Maximize legibility of essential information

47. Use different modes for presentation and maximize legibility. The Honeywell thermostat seen in these two images provides tactile, visual and audible cues and instructions. The numerals and arrow pointer are oversized and high contrast; the clear outer ring cover has 3 dimensional indices that allow tactile feedback for users who may be blind and who rely on counting the degree increments to set the temperature. The knob is coarse-knurled for secure gripping, and the thermostat can be positioned on the wall at any height for standing and seated users.

48. Does the environment help you find your way? These large banners are on the second and third stories perpendicular to the façade. They predominantly display the building's identity even several blocks away.

49. Are there redundant cues in the environment for wayfinding? There are few places more guaranteed than air terminals to make us feel lost, confused and stressed. Pictured in the images in this slide is the Raynes Rail installed in the Charles de Gaulle Airport in Paris, France. Designer Coco Raynes created a wayfinding system that is intrinsically functional and multi-sensory but also compellingly attractive in design and stunningly executed. Upon entering the terminal, the yellow raised floor markings can be followed visually, by foot or wheelchair, and make a sound when tapped. The terminal is introduced with a simplified, tactile floor plan, on an information table angled to permit wheelchair access. The multilingual audio units in the rail are activated by photo sensors that do not require any physical strength or motor control. Even when screaming for attention in bright yellow, the handrails have no handicapped stigma. All travelers benefit from this quality of attention to the critical role of orientation in public transit hubs.

50. In the photo on the right in this slide, the Raynes Rail system is seen being used by a man holding a white cane in his right hand, and using his left hand to lightly touch the inside of the rail. This installation is in The National Museum of Columbia in Bogota. At room entrances, the multilingual audio unit in the handrail and a tactile map are used to introduce the collection and to present the floor plan and layout of the exhibits and note the distance between them. The map elements are high contrast as well as tactile so both sighted and non-sighted visitors may share in the experience. Raynes also designed the multi-sensory museum exhibit, seen on the left that depicts two tactile etched glass portraits of Simon Bolivar at different ages. Below each picture is both written and Braille text. The audio commentary presents the paintings within their historical context and offers excerpts of Bolivar's writings.

51. Is the information legible? At Brookfield Zoo a large-print visitor map provides general zoo information and specific access information for people with disabilities. The large and high-contrast type is easier reading for all visitors, and shapes are used to identify items for people who are more visual, who are color blind, or non-English speakers. The map also identifies level walkways and entrances, good for parents pushing strollers and people with conditions that limit mobility.

**52. Principle 5: Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.**

Guidelines:

- A. Arrange elements to minimize hazards and errors.
- B. Provide warning of hazards and errors.
- C. Provide failsafe features.

53. Are unexpected level changes that could cause an accident avoided? This photo of a library in San Francisco shows people entering an atrium lobby with a large skylight. People are drawn to look up, and often stumble on the 2 steps. The steps have been edged with striped tape to mitigate the problem created by design.

54. Can you work safely with toxic fumes? Being able to breathe is part of universal design. This photo is of a young man standing and painting a mural. To his right is an extraction hood that filters noxious fumes from the air. It was developed in collaboration with the Millay Colony for the Arts, to make the art studios more usable by artists with disabilities, but it benefits everyone.

55. How can you tell when the water is hot? Charles Floyd's design addresses this challenge. These three photos show a young child washing her hands at a bathroom sink (left), an older woman using the faucet at a kitchen sink (middle), and on the right his design of a faucet with a strip of special material at the tip designed to change color according to the water's temperature, blue for cold, red for hot.

56. Is it safe to handle? Allegro Cookware is designed with round bottoms to fit standard round heat sources and square lids so two of the corners create natural pouring spouts. Handles located on the other two corners of the pot align and interlock with the lid handles, providing safe and balanced handling. The flat lids contain steam vents designed to prevent "boil-overs" and injuries caused by steam, and to allow safe and easy straining and draining while cooking.

**57. Principle 6: Low Physical Effort: The design can be used efficiently and comfortably, with a minimum of fatigue.**

Guidelines:

- A. Allow user to maintain a neutral body position.
- B. Use reasonable operating forces.
- C. Minimize repetitive actions.

58. The Leviton rocker switches on light fixtures and lever handles on doors and faucets, shown on the left, are much easier to use than toggle switches and round door knobs and faucets for children, those who have problems with grip or dexterity, and when you don't have your hands free because you are carrying packages. Window Ease™, seen on the right, is a retrofit product that can be installed on any window. It has been designed so the operating crank is low, within reach of most users, seated or standing, and requires minimal force to turn. Because of its intuitive design, it can be used by people three years of age and older with little or no instruction.

59. Can you easily reach and use home products? The front-loading washer and dryer seen on the left in this slide, have up-front controls and are elevated on a platform, to minimize lifting, and facilitate easy reach into each appliance by both standing and seated users. It also minimizes stooping and bending for standing users. Pictured on the right, is an adaptable base cabinet in which the door panels can be easily removed to provide knee space under the sink for a wheelchair user or someone who is more comfortable doing dishes while seated. With this simple design, food preparation, cooking, and clean up can be shared and enjoyed among family members of all ages.

**60. Principle 7. Size and space for approach and use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.**

Guidelines

- A. Make reach comfortable to all components for any standing or seated user.

61. Is there room to maneuver? The model kitchen at the GE New Home Essentials/Living Center, seen in this slide, has clear floor spaces and knee spaces that offer ease of movement and maneuverability for users in wheelchairs or scooters and room for several people to share in meal preparation.

62. Is there space to examine the art exhibit, or retail products? On the left a woman with a guide dog and a small child look at the building exhibit; on the right a woman is looking at a book while standing in front of a book display.

63. On the left a man is sitting on the log retaining wall for an elevated campsite. The wall creates a bench that is a good height for transferring from a wheel chair. On the right, the long gangway allows easy movement onto boats at high and low tides.

64. Are children considered? Can they see and reach things comfortably? These two photos from the Lighthouse International building in New York City illustrate a door that has circular windows at two higher and lower heights and a toilet room for children with lowered sinks and a large mirrored wall usable by both adults and children

65. Today the world looks very different than it did 100 years ago. People are living longer and surviving better. Potential consumers of design who may be functionally limited by age or disability are increasing at a dramatic rate. These populations are no longer an insignificant or silent minority. The current generation of children, baby boomers entering the early years of older age, older people, people with disabilities, and individuals inconvenienced or limited by health or life circumstance, constitute a market majority. All of these constituencies and indeed, all members of the human family, deserve to be recognized and respected. Buildings, products, services, and programs must be designed to serve an increasingly diverse clientele. Universal design markets usability not disability! Universal design provides us with a blueprint for designing a world fit for all people – a world in which all people matter.

66. Postscript: PLEASE TELL US WHAT YOU THINK!

Thank you for viewing our PowerPoint presentation on universal design. We would be most interested to learn how and why you used this educational tool, and to get your ideas about how we might improve it. We have provided a short evaluation form as a separate, downloadable file in Part IV of this teaching unit for that purpose. We hope you will take a moment to help us by filling it out and returning it to us as an E-Mail attachment at [elaine@ostroff.org](mailto:elaine@ostroff.org) and [weisman@northfork.com](mailto:weisman@northfork.com) or [weisman@njit.edu](mailto:weisman@njit.edu).

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## 67. PHOTO CREDITS

Adaptive Environments, Boston, MA

*Excellence in Universal Design: Great Places Fit for People 2003 Awards Program*

Brookfield Zoo, Brookfield, IL

Center for Universal Design at North Carolina State University, Raleigh, NC  
*Exemplars of Universal Design*  
*Universal Design File*

Concrete Change, Atlanta, GA

Design Council UK, London, England

HolLynn D'Lil

Charles Floyd

Nick Hayes

HOK, New York, NY

IDEA Center, State University of New York at Buffalo, Buffalo, NY

Erick Mikiten, Architects, Berkeley, CA

James Mueller

*Workplace Workbook 2.0* (Amherst, MA: HRD Press) 1992

Abir Mullick

James J. Pirkl,

*Transgenerational Design* (New York: Van Nostrand Reinhold) 1994

Rhode Island Governor's Commission, Providence, RI

Eleanor Smith

Edward Steinfeld

Universal Designers & Consultants, Takoma Park, MD

*Images of Universal Design*

United States Department of Justice, Washington, DC

## **CITATIONS**

Roger Coleman, *Living longer, the new context for design* (London, England: UK Design Council) 2001

Elaine Ostroff, "Universal Design Practice in the United States," *Universal Design Handbook*, W. Preiser and E. Ostroff, eds. (New York: McGraw-Hill) 2001

Elaine Ostroff, *National Endowment for the Arts Universal Design Meeting Report* (Washington, DC: NEA, Office of AccessAbility) 1999

Leslie Kanes Weisman, “Creating the Universally Designed City: Prospects for the New Century,” *Universal Design Handbook*, W. Preiser and E. Ostroff, eds. (New York: McGraw-Hill) 2001

Leslie Kanes Weisman, “The Social Basis and Role of Universal Design as a Builder of Democracy” *National Endowment for the Arts Universal Design Meeting Report* (Washington, DC: NEA, Office of AccessAbility) 1999

## KEY RESOURCES

The Principles of Universal Design are available online at [http://www.design.ncsu.edu:8120/cud/univ\\_design/princ\\_overview.htm](http://www.design.ncsu.edu:8120/cud/univ_design/princ_overview.htm).

Adaptive Environments: [www.adaptiveenvironments.org](http://www.adaptiveenvironments.org)

US Department of Justice ADA Home Page: <http://www.usdoj.gov/crt/ada/>

ADA and Information Technology Technical Assistance Centers: <http://www.adata.org/>

Center for Universal Design: <http://www.design.ncsu.edu:8120/cud/>

IDEA Center: <http://www.ap.buffalo.edu/idea/>

Universal Design Education Online: [www.udeducation.org](http://www.udeducation.org)

US Access Board: [www.access-board.gov](http://www.access-board.gov)

68. The “*Universal Design Building Survey: Incorporating the ADA and Beyond in Public Facilities*,” is a tool for evaluating existing public buildings from a human-centered perspective. It is primarily designed for use by design educators, students and design advocates with no experience, or a beginning to moderate level of experience with universal design and accessibility codes; but it will be informative for architects, planners, facilities managers; occupational therapists; government official, community groups, users of public buildings; and all those interested in enhancing the quality of people’s experience of public spaces and places across the spectrum of age and ability.

69. The overarching purpose of this survey is fourfold:

1. To improve the usefulness and appeal of existing public buildings through promoting universal design awareness and practices
2. To help people identify physical barriers that can be removed and design problems that can be redressed in public facilities;
3. To raise awareness about the differences between a minimally code compliant building, and one that is universally designed.
4. To begin to explicate the relationship between sustainable design and universal design principles.

70. The survey prompts users about what to look for when evaluating a public building of their choosing, by asking a series of questions that, by inference, identify barriers and suggest design improvements. Although one person can do the survey, it is quicker and easier if two or three people work together as a team. The results will be more informative and practical if people with disabilities participate. The time it should take to complete the survey will vary dramatically with

the scale and complexity of the building being evaluated and the knowledge of those doing the evaluating. Large and multifunctional buildings may require dividing the building into areas that can be surveyed by different people

When using this survey, all you will need is a copy (available for viewing, downloading and printing in Part III of this teaching unit), a clipboard, pencils and pens, and a metal measuring tape at least 15 feet in length. Although not required, it may be helpful to have floor plans of the building with you, and a film or digital camera that can be used to document important features that may need to be reviewed later.

71. The survey contains

- a cover sheet (page 6)  
The cover sheet asks you to jot down some basic information about the building (location, type of public accommodation, users, etc.).
- a building inventory sheet (page 7)  
The optional building inventory sheet provides a listing of specific places and spaces. The Building Inventory Sheet is especially useful when preparing to evaluate large scale and/or complex buildings and sites with multiple spaces.
- the evaluation form (pages 8-35)  
This is the main part of the survey
- and a summary page (page 36)  
The summary page contains questions that will help you formulate your conclusions and suggestions for both readily achievable improvements that address accessibility requirements as well as more universally designed solutions.

**72. The Building Survey Form is organized into four major sections that follow the typical spatial sequence people experience upon:**

- (A) approaching and entering a building;
- (B) finding their way around inside;
- (C) using various interior rooms and spaces; and
- (D) using “building services” such as restrooms, drinking fountains and telephones.

73. Under each of these four sections there are five one word titles that condense the 7 principles of universal design into 5 categories of evaluation criteria:

*Inclusiveness, choice, clarity, safety, comfort and a 6th category called accessibility (which refers to the ADA legal standards for accessible design).*

Under each of these six categories are related questions that you can answer with *Yes, In Part, No or NA (not applicable)*. Survey questions that consider both universal and sustainable design performance criteria are noted with asterisks (for example the last question under Choice on page 9). There is also space provided on the form after each question to make notes about your answers, record your specific observations, and make recommendations. (You should use the back of the pages if you need more room to write).

74. All of the information pertaining to the *Universal Design Building Survey* contained in this section (Part III) of the PowerPoint presentation is also included in the survey document itself. To view, download, and print the survey, please go to Part III of this teaching unit.

After reviewing the document, if you do decide to use it, we would be most interested in your feedback and ideas about how we might improve it. We have provided a short evaluation form as a separate, downloadable file in Part IV of this teaching unit for that purpose. We hope you will take a moment to help us by filling it out and returning it to us as an E-Mail attachment at [elaine@ostroff.org](mailto:elaine@ostroff.org) and [weisman@northfork.com](mailto:weisman@northfork.com) or [weisman@njit.edu](mailto:weisman@njit.edu).

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