ACCESSIBLE ALABAMA

INFO BRIEF

# Technology for Independent Living

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## Overview

In June 1999, with its decision in *Olmstead vs. LC (527 US 581),* the United States Supreme Court extended the protections of Title II of the Americans with Disabilities Act of 1990 (PL 101-336) to ensure that individuals with disabilities receive necessary services beyond institutional walls in communities of their choice. The newly codified "right to community living" served as a catalyst for the development of strategies to increase "appropriate" living options for individuals with disabilities that were inclusive yet low cost. Since the early 1960s, housing professionals have typically known that building designs that were accessible to the greatest number of users maximized the return on their investment (American Standards Association, 1961). The opportunities created through Olmsted for individuals with disabilities to achieve community self-sufficiency enabled the theories of universal architecture to be explored within the context of people with disabilities and their emerging housing needs.

This issue brief summarizes the key tenants of universal design theory and examines how newly available home automation technology is increasing residential independence for some individuals with significant physical limitations. To ensure access for individuals with complex physical limitations, customization beyond the capabilities of most available retail systems is still required. Policy perspectives are also provided to suggest ways in which housing providers, human service professionals, and individuals with physical limitations can begin to fill the unmet need that remains.

## Universal Design (UD)

The idea of Universal Design was first introduced by Ron Mace, of North Carolina State University in the late 1990s, to define the movement toward general accessibility of newly-erected structures. This idea that new structures offered universal access to address the varying abilities of their patrons was considered progressive at the time.

POLICY PERSPECTIVE The movement toward Universal Design shifts responsibility for accessibility and assistive technology from the individual with a disability to a cooperative effort among all members of society for developing "alternatives to suit many different people's needs."

Over time, the definition has expanded to include, "The creation of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Campbell, 2004; Imrie, 2012; Mace, 1998)." The scholarship of Mace and others who have followed consistently highlights seven key principles of Universal Design philosophy:

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- EQUABILITY of design suggests that the item is useful and marketable to people with diverse abilities. Such products provide the same means of access for all users. Means of access should be identical whenever possible and equivalent when not. Equitable designs also avoid segregating or stigmatizing any users. Provisions for privacy, security, and safety should be equally available to all users. Lastly, design aesthetics are appealing to a broad spectrum of users, including individuals who may require equivalent access.

- FLEXIBILITY of design assumes that the design accommodates a wide range of individual preferences and abilities. These designs provide choice in methods of use including the ability to access the device using either the left or right hand. Flexibility also involves the degree to which the item adapts to the user's pace. Lastly, these designs facilitate the individual's accuracy and precision even for those with the most complex disabilities.

- Designs are SIMPLE AND INTUITIVE if procedures to use the item are easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. Simple and intuitive designs eliminate unnecessary complexity. Performance is repeatedly consistent with user expectations. The device is accessible to users with limited literacy or English proficiency. In addition, information is arranged consistent with its importance. Lastly, intuitive designs provide effective (usually continuous) prompting and feedback during and after task completion.

- PERCEPTIBILITY requires that the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. This is accomplished through the implementation of multiple modes (pictorial, verbal, tactile) for presentation of essential information. This involves providing adequate contrast between essential information and its surroundings, thereby maximizing "legibility" of content. Perceptive designs also differentiate elements in ways that can be easily described in user guides or built-in tutorials. Lastly, easily perceptible designs provide compatibility with a variety of techniques or devices used by people with sensory limitations.

- TOLERANCE FOR ERROR means that the design minimizes hazards and the adverse consequences of accidental or unintended actions. Designs with a high tolerance for error arrange elements in a way that minimizes hazards and errors for most used elements, most accessible and hazardous elements eliminated, isolated, or shielded. Such designs also provide warnings of hazards and errors with fail safe features. High tolerance designs discourage unconscious action in tasks that require vigilance.

- Designs that require LOW PHYSICAL EFFORT can be used efficiently and comfortably with minimal fatigue. These designs allow the user to maintain a neutral body position. Such devices require reasonable activating force from the user, while reducing the need for repetitive actions without prolonged exertion.

- PROPORTIONALITY assumes that appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility. Proportional designs provide a clear line of sight to important elements, which are in comfortable reach of both seated and standing users. Interfaces accommodate variations in hand and grip strength. Lastly, the overall layout provides ample space for the use of assistive devices and simultaneous operation by personal assistants.

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# Technologies Available and Barriers to Equal Access

Environmental control technology has greatly expanded its market share over the past decade. These innovations continue to create opportunities for individuals with significant physical disabilities to experience increased autonomy, independence and productivity at home.

## HOME AND PERSONAL AUTOMATION

- Several systems in mass production and available for retail compatible with common mobile operating systems include: Iris, Google Home, and Amazon Echo.
  - User interface assumes an individual can navigate touchscreen proficiently, but this can also create a barrier for individuals with visual impairments and mobility impairments that involve decreased extremity function.
    - Need for alternative input devices can offset any savings from mass production.
    - Hands-free (voice and facial recognition) options cannot be calibrated sufficiently to be effective for some individuals, for example:
      - Individuals with irregular speech patterns and/or decreased breath support,
      - Individuals with poor head/neck control, and
      - Individuals with high level spinal cord injury.
  - For the individuals most in need of this technology to benefit from it, there is still a great degree of evaluation and customization that must take place.

## CUSTOM SYSTEMS APPROACH

- Individualized evaluation, production and installation requires a capital investment of more than $10,000 per unit but most often includes:
  - A capacity for extensive customization, and
  - Customer support for expansion or evolving needs:
    - Equipment supports self-sufficiency over time without a recurring expense.
      - Scalability is more achievable when the system is provided by a specialized environmental control contractor.
        - Equipment repair and replacement are typically included in the initial unit cost
        - Additional expenses only incurred when features are added.

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# Future of Assistive Technology in Home Design

## POLICY PERSPECTIVE

Until there is a recognition, that environmental control technology for individuals with disabilities is not a one-size-fits-all proposition, support of environmental control technology as a feasible option for people with significant disabilities, must be done with an acknowledgment of the barriers that still exist. To overcome these limitations, a substantial investment of both real and human capital is required.

Despite the limitations, there are three key factors that will continue to propel the growth of technology enhanced home design for individuals with functional limitations:

- Increased market demand from the ever-growing aging population who wish to mature at home with dignity and in style.
  - Streamlined by the relative ease of software development for mobile and fixed operating systems.
- Projects that were once only the purview of major software companies can now be undertaken by freelance developers using open source coding at a much lower cost.
  - Open-source language can be of great benefit to individuals with alternative access needs,
    - Qualified technicians are now able to develop code that enables most operating systems to be interfaced with hardware that was previously considered disability specific technology,
    - Highly specialized kinesthetic tracking technology is now a feature available to the public, and
    - Integration of facial recognition technology into the latest version of iOS.
  - Creates space for assistive technology professionals to focus talent and resources on the development of higher end technologies that allow individuals with significant physical disabilities to interact with their environment
    - Supported community living is readily achievable.
      - Research and development partnerships are being cultivated that will allow individuals with augmentative communication needs to also control their environment using the same communication platform.

## POLICY PERSPECTIVE

*Continued investment in these collaborations is critical to empowering individuals with the most complex disabilities to exercise their right to live in communities of their choice. Such a commitment increases the number of environments that are considered "appropriate" and "least restrictive" (Olmstead v. L. C. 1999).*

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## REFERENCES

American Standards Association. (1961). *American standard specifications for making buildings and facilities accessible to, and usable by, the physically handicapped*, (1st ed.). New York: American Standards Association. Retrieved from https://archives.library.illinois.edu/erec/University%20Archives/1606017/Box1/final_version_american_standard_specifications_oct_31_1961.pdf

Campbell, D. M. Will (2004). Assistive technology and universal instructional design: A postsecondary perspective. *Equity & Excellence in Education, 37*(2), 167-173.

Imrie, R. (2012). Universalism, universal design and equitable access to the built environment. Disability and Rehabilitation, 34(10), 873-882. doi:10.3109/09638288.2011.624250

Mace, R. L. (1998). Universal design in housing. *Assistive Technology, 10*(1), 21-28. doi:10.1080/10400435.1998.10131957