UNIVERSAL DESIGN - UNIVERSAL DELIGHT:

INCLUSIVENESS

AND THE

AMERICANS WITH DISABILITIES ACT

Product Design 340
8 May 2017
design

accessibility

discrimination
inclusiveness
effectiveness
social justice
universal design
OWNERS: ADA standards & mobility

PERCEPTION is the core problem
Community view of accessibility
Community view of accessibility
Architects’ view of accessibility

- code compliance
Architects’ view of accessibility

- code compliance
- focussed on wheelchairs
Architects’ view of accessibility

- code compliance
- focused on wheelchairs
- emphasis on toilet rooms
Architects’ view of accessibility

- code compliance
- focused on wheelchairs
- emphasis on toilet rooms
- minimum = maximum
Architects’ view of accessibility

How does that fit into their world?
Case Study: School in a Snowy, Icy Part of Oregon

Architects’ view of accessibility: minimum = maximum

inaccessible routes

barriers
1990s: ADA & compliance
Parking & Entrance
accessible routes
inaccessible routes
barriers

Architects’ view of accessibility: minimum = maximum

Case Study #2:
School in a Snowy, Icy Part of Oregon
Architects’ view of accessibility: minimum = maximum

but does this work?
Social isolation: if you had to use the blue routes?

Practicality?
### Prevalence of disability among non-institutionalized people of all ages in the United States in 2015*

<table>
<thead>
<tr>
<th>Disability Type</th>
<th>%</th>
<th>MOE</th>
<th>Number</th>
<th>MOE</th>
<th>Base Pop.</th>
<th>Sample Size</th>
<th>Sample MOE</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Any Disability</td>
<td>12.6</td>
<td>0.05</td>
<td>39,996,900</td>
<td>154,970</td>
<td>317,480,100</td>
<td>3,075,864</td>
<td></td>
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<tr>
<td>Visual</td>
<td>2.3</td>
<td>0.02</td>
<td>7,297,100</td>
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* Note: Children under the age of five were only asked about Vision and Hearing disabilities. The Independent Living disability question was only asked of persons aged 16 years old and older.

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Statistics: percentage of US population with disabilities
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~1.5% of population uses a wheelchair (2005)  
(www.census.gov/prod/2008pubs/p70-117.pdf)
Architects view of accessibility vs. disability statistics

- code compliance
- largely about mobility
- focused on wheelchairs
- emphasis on toilet rooms
- minimum = maximum
Universal Design: door operator example
Universal Design: door operator example

Power Door Operator Locations

HALLWAY

SIDEWALK
Universal Design: door operator example

Power Door Operator Locations
Power Door Operator Locations

Universal Design: door operator example
Power Door Operator Locations

Universal Design: door operator example
Universal Design: door operator example

Power Door Operator Locations
Universal Design: meeting broader challenges - door operator case study

Power Door Operator Locations
Where now? Going beyond the standards...
1. **Equitable Use:**
The design is useful and marketable to people with diverse abilities.

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

3. **Simple and Intuitive:**
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

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

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

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

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.

(from http://www.design.ncsu.edu/cud/univ_design/princ_overview.htm and other sources)
1. Equitable Use:
The design is useful and marketable to people with diverse abilities.

Guidelines:
1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
1b. Avoid segregating or stigmatizing any users.
1c. Provisions for privacy, security, and safety should be equally available to all users.
1d. Make the design appealing to all users.

UNIVERSAL DESIGN = UNIVERSAL BEAUTY
1. **Equitable Use:**
The design is useful and marketable to people with diverse abilities.

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

**Guidelines:**
2a. Provide choice in methods of use.
2b. Accommodate right- or left-handed access and use.
2c. Facilitate the user's accuracy and precision.
2d. Provide adaptability to the user's pace.
1. Equitable Use:

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

3. Simple and Intuitive:
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Guidelines:
3a. Eliminate unnecessary complexity.
3b. Be consistent with user expectations and intuition.
3c. Accommodate a wide range of literacy and language skills.
3d. Arrange information consistent with its importance.
3e. Provide effective prompting and feedback during and after task completion.
1. Equitable Use:

2. Flexibility in Use:

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

4. Perceptible Information:
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**Guidelines:**
4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
4b. Provide adequate contrast between essential information and its surroundings.
4c. Maximize "legibility" of essential information.
4d. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
4e. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.
Seven Principles of Universal Design

[Ronald Mace, et al., Center for Universal Design, NCSU]

1. Equitable Use:
2. Flexibility in Use:
3. Simple and Intuitive:
4. Perceptible Information:
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

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

Guidelines:
5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
5b. Provide warnings of hazards and errors.
5c. Provide fail safe features.
5d. Discourage unconscious action in tasks that require vigilance.
1. Equitable Use:

2. Flexibility in Use:

3. Simple and Intuitive:

4. Perceptible Information:

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

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

Guidelines:
6a. Allow user to maintain a neutral body position.
6b. Use reasonable operating forces.
6c. Minimize repetitive actions.
6d. Minimize sustained physical effort.
1. Equitable Use:

2. Flexibility in Use:

3. Simple and Intuitive:

4. Perceptible Information:

5. Tolerance for Error:

6. Low Physical Effort:

   The design can be used efficiently and comfortably and with a minimum of fatigue.

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:

7a. Provide a clear line of sight to important elements for any seated or standing user.
7b. Make reach to all components comfortable for any seated or standing user.
7c. Accommodate variations in hand and grip size.
7d. Provide adequate space for the use of assistive devices or personal assistance.
Universal Design is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability. An environment (or any building, product, or service in that environment) should be designed to meet the needs of all people who wish to use it. This is not a special requirement, for the benefit of only a minority of the population. It is a fundamental condition of good design. If an environment is accessible, usable, convenient and a pleasure to use, everyone benefits. By considering the diverse needs and abilities of all throughout the design process, universal design creates products, services and environments that meet peoples' needs.

Simply put, universal design is good design.

[National Disability Authority (Ireland) http://universaldesign.ie/What-is-Universal-Design/]
Bear in mind the range of expression of each disability:

full hearing  hard of hearing  deafness
Bear in mind the range of expression of each disability:

full hearing  hard of hearing  deafness

full vision  limited vision  blindness
Bear in mind the range of expression of each disability:

- Full hearing
- Hard of hearing
- Deafness
- Full vision
- Limited vision
- Blindness
- Mobility aids:
  - None
  - Handrails
  - Canes
  - Crutches
  - Walkers
  - Wheelchairs
Seven Principles of Universal Design

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(from http://www.design.ncsu.edu/cud/univ_design/princ_overview.htm and other sources)

These can be hard to apply across all design fields. Perhaps follow them up...
Universal Design: Four Questions

- **Is it universal?**
  - Is it designed for a wide range of abilities and needs?

- **Is it effective?**
  - Does it actually work for the specific needs?
  - Has it been tested or at least reviewed by representatives of a wide range of users?
  - Is it supported by research, design standards, or other sources?

- **Is it welcoming and inclusive?**
  - Does it feel natural and comfortable for all users?
  - Does it discriminate unnecessarily on the basis of ability?
  - Does it give the impression of disability-based discrimination?

- **Will the design solution be appreciated over time?**
  - Is it “loveable”? Is it delightful for all users?
  - Can it accommodate change through flexibility, adaptability, or adjustability?
Universal Design: Inclusiveness

- Welcoming?
Universal Design: Inclusiveness

• Welcoming?
• Is it too “special”?
• Welcoming?
• Is it too “special”?
• Does it make a spectacle of those who use it?
• Is it socially isolating?
• Welcoming?
• Is it too “special”? 
• Does it make a spectacle of those who use it?
• Is it socially isolating?
• Is it delightful? Beauty for all as a characteristic of Universal Design
Universal Design Case: Mobility and way finding
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Social Isolation:
If this is your only route to studio, how would you feel?

<table>
<thead>
<tr>
<th>Universal?</th>
<th>Welcoming?</th>
<th>Effective?</th>
<th>Durable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it universal?</td>
<td>Is it welcoming? Does it feel natural and comfortable for all users? Does it discriminate unnecessarily on the basis of ability? Does it give the impression of disability-based discrimination?</td>
<td>Is it effective? Does it actually work for the specific needs? Has it been tested or reviewed by representatives of a wide range of users? Is it supported by research, design standards, or other sources?</td>
<td>Will the design solution be durable over time? Can it accommodate change through flexibility, adaptability, or adjustability?</td>
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MOBILITY PATTERNS
- Integrated Path
- Low Slope/Short Ramps
- Shortest Path
- Easy Climbs
Universal Design Case: Mobility and way finding
Universal Design Case: Mobility

- Universal?
- Welcoming?
- Effective?
- Durable?

MOBILITY PATTERNS
Integrated Path
Low Slope/Short Ramps
Shortest Path
Easy Climbs

keyed lock
Universal Design: Vision

PATTERNS:

No Protrusion Hazards
Avoid items that protrude more than 4" above 24" (ADA Standards = 27") so that blind and low vision users are safe

Safe Crossings
Design vehicular areas with clear separation from pedestrian areas, either
- curbs at 1:12 slope, or
- 3' band of tactile pavement, or
- bollards with 3' maximum gaps

Effective Shorelines
Provide consistent edges to guide cane users and others
- vertical edges such as walls and curbs, or
- textural contrasts such as pavement to planting, or concrete to gravel, or paving type, and
- provide visual contrast along shorelines as appropriate

90 Degree Corners, No Curves
Provide clear circulation to enhance imageability
  Avoid curves and angles, use a rectilinear organization for circulation

Visual Contrast
Use light/dark contrast to emphasize stair hazards, shorelines, etc.
Universal Design: Vision - no protrusion hazards

PATTERNS:

No Protrusion Hazards
Avoid items that protrude more than 4" above 24" (ADA Standards = 27") and below 80” so that blind and low vision users are safe.
Universal Design: Mobility - We all use ramps
Universal Design: Curb Ramps - Mobility vs. Vision?

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Universal Design: Curb Ramps - Mobility vs. Vision?

VISION PATTERNS
No Protrusion Hazards
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Universal Design: Curb Ramps - Mobility vs. Vision?

VISION PATTERNS
- No Protrusion Hazards
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Universal Design: Curb Ramps - Mobility vs. Vision?

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Universal Design: Vision on Broadway

VISION PATTERNS
No Protrusion Hazards
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- No Protrusion Hazards
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Universal Design: Vision on Broadway

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Test for high reflectance contract by photographing in black and white
Universal Design: Vision - Lane Transit Station

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Vision Patterns
- No Protrusion Hazards
- Safe Crossings
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- 90 Degree Corners
- Visual Contrast
Universal Design: Vision - Lane Transit Station

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
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- 90 Degree Corners
- Visual Contrast
Universal Design: Vision - contrast guides stairs

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast

SFMOMA
Snøhetta
Universal Design: Vision - contrast guides stairs

**PATTERNS: Visual Contrast**

Use lighting and form, with contrast accents at top and bottom stair treads, to provide guidance and safety for as many people as possible.

**VISION PATTERNS**
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
PATTERNS: Visual Contrast

Use lighting and form, with contrast accents at top and bottom stair treads, to provide guidance and safety for as many people as possible.
Universal Design: Vision at building entrances

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Universal Design: Vision at building entrances

VISION PATTERNS
No Protrusion Hazards
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Universal Design: Vision at building entrances

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Universal Design: Vision at building entrances

VISION PATTERNS
- No Protrusion Hazards
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- Visual Contrast
Exercise #1: light control
Exercise #1: light control
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The design is useful and marketable to people with diverse abilities.

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• **Is it welcoming and inclusive?**
  - Does it feel natural and comfortable for all users?
  - Does it discriminate unnecessarily on the basis of ability?
  - Does it give the impression of disability-based discrimination?

• **Will the design solution be appreciated over time?**
  - Is it “loveable”? Is it delightful for all users?
  - Can it accommodate change through flexibility, adaptability, or adjustability?
Exercise #2: door knobs
Exercise #2: door knobs

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Exercise #2: door knobs

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Exercise #3: mini-blind controls
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Exercise #3: mini-blind controls

• Is it universal?
  – Is it designed for a wide range of abilities and needs?

• Is it effective?
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  – Has it been tested or at least reviewed by representatives of a wide range of users?
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• Will the design solution be appreciated over time?
  – Is it “loveable”? Is it delightful for all users?
  – Can it accommodate change through flexibility, adaptability, or adjustability?
Exercise #4: car radios
Exercise #4: car radios
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Exercise #4: car radios

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Exercise #4: car radios

• Is it universal?
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  – Does it feel natural and comfortable for all users?
  – Does it discriminate unnecessarily on the basis of ability?
  – Does it give the impression of disability-based discrimination?

• Will the design solution be appreciated over time?
  – Is it “loveable”? Is it delightful for all users?
  – Can it accommodate change through flexibility, adaptability, or adjustability?
Exercise #5: telephones
Exercise #5: telephones
1. Equitable Use:  
The design is useful and marketable to people with diverse abilities.

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

3. Simple and Intuitive:  
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

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

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

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

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.

(from http://www.design.ncsu.edu/cud/univ_design/princ_overview.htm and other sources)
Exercise #4: car radios

- **Is it universal?**
  - Is it designed for a wide range of abilities and needs?

- **Is it effective?**
  - Does it actually work for the specific needs?
  - Has it been tested or at least reviewed by representatives of a wide range of users?
  - Is it supported by research, design standards, or other sources?

- **Is it welcoming and inclusive?**
  - Does it feel natural and comfortable for all users?
  - Does it discriminate unnecessarily on the basis of ability?
  - Does it give the impression of disability-based discrimination?

- **Will the design solution be appreciated over time?**
  - Is it “loveable”? Is it delightful for all users?
  - Can it accommodate change through flexibility, adaptability, or adjustability?
Parting thought #1
Parting thought #2

As proposed by the project sponsor.

As specified in the project request.

As designed by the senior analyst.

As produced by the programmers.

As installed at the user’s site.

What the user wanted.
Fred Tepfer
(with contributions from
Olivia Asuncion,
Molly Rogers, and
many others)

http://pages.uoregon.edu/ftepfer/access/