Cassie the puppy
INCLUSIVENESS

UNIVERSAL DESIGN

ACCESSIBILITY

AND

THE AMERICANS

WITH DISABILITIES ACT
PERCEPTION is the core problem
How the community sees accessibility
How the community sees accessibility
How architects see accessibility

- code compliance
How architects see accessibility

- code compliance
- focussed on wheelchairs
How architects see accessibility

- code compliance
- focussed on wheelchairs
- emphasis on toilet rooms
How architects see accessibility

- code compliance
- focussed on wheelchairs
- emphasis on toilet rooms
- minimum = maximum
How architects see accessibility

How does that fit into their world?
How architects see accessibility: minimum = maximum
How architects see accessibility: minimum = maximum?
School Mobility Case

Inaccessible routes and barriers are marked in red on the diagram. The diagram shows the parking and entrance areas and various route heights, including +0 ft, +1.5 ft, +3 ft, +4.5 ft, and +6 ft. The locations labeled include the Classroom, Gymnasium, Cafeteria, Office, and Former Entrance.
School Mobility Case

Accessible routes
Inaccessible routes
Barriers
School Mobility Case

but does this work?

accessible routes

inaccessible routes

barriers
School Mobility Case: Legal yet not effective

Social isolation: if you had to use the blue routes?

Practicality?

.accessible routes
.inaccessible routes
.barriers
Prevalence of disability among non-institutionalized people ages 65 to 74 in the United States in 2011

Prevalence Rates: Age 65 to 74 years (%)
25% of population has a disability by age 74
(www.disabilitystatistics.org 2011 report)

Prevalence of disability among non-institutionalized people ages 65 to 74 in the United States in 2011

Prevalence Rates: Age 65 to 74 years (%)

- Any Disability: 25.6%
- Visual: 4.1%
- Hearing: 9.1%
- Ambulatory: 16.0%
- Cognitive: 5.5%
- Self-Care: 4.7%
- Independent Living: 8.3%
25% of population has a disability by age 74
(www.disabilitystatistics.org 2011 report)

Prevalence of disability among non-institutionalized people ages 65 to 74 in the United States in 2011

Prevalence Rates: Age 65 to 74 years (%)

1.5% of population uses a wheelchair
(2005)
(www.census.gov/prod/2008pubs/p70-117.pdf)
How architects see accessibility vs. reality of disability statistics

- code compliance
- focused on wheelchairs
Universal Design: meeting broader challenges - door operator case study
Universal Design: meeting broader challenges - door operator case study

Power Door Operator Locations

Where now? Going beyond the standards...
Universal Design: meeting broader challenges - door operator case study

Power Door Operator Locations

HALLWAY

SIDEWALK

Where now? Going beyond the standards...
Where now? Going beyond the standards...
Universal Design: meeting broader challenges - door operator case study

Power Door Operator Locations

Where now? Going beyond the standards...
Power Door Operator Locations

Where now? Going beyond the standards...
Where now? Going beyond the standards...
Power Door Operator Locations

Where now? Going beyond the standards...
Where now? Going beyond the standards...
Seven Principles of Universal Design

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

Importance of redundant information: visual and aural, for example, as with transit information which is presented on the PA system as well as on the reader board.
Bear in mind the range of expression of each disability:

- full hearing
- hard of hearing
- deafness
Seven Principles of Universal Design

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
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

**Universal Design is a richer subject than white canes and 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 don’t always apply well in design fields.
Perhaps follow them up...
Universal Design: Four Questions to Test a Design

• **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 durable over time?**
  - Can it accommodate change through flexibility, adaptability, or adjustability?
• Welcoming?
• Is it too “special”?
• Does it make a spectacle of those who use it?
• Is it socially isolating?
Universal Design: Extending the Inclusiveness Concept

- Welcoming?
- Is it too “special”?
- Does it make a spectacle of those who use it?
- Is it socially isolating?
- Is it architecturally delightful? Beauty as a characteristic of Universal Design
309 Operable Parts 309.1 General. Operable parts shall comply with 309. 309.2 Clear Floor Space. A clear floor or ground space complying with 305 shall be provided. 309.3 Height. Operable parts shall be placed within one or more of the reach ranges specified in 308.

309.4 Operation. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N) maximum. EXCEPTION: Gas pump nozzles shall not be required to provide operable parts that have an activating force of 5 pounds (22.2 N) maximum.
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Pattern:
Can the control be operated with a closed fist?

Many standard plumbing, electrical, and hardware controls can be. However, others can't, in particular door knobs, thumb latch locks, faucets that require grip, and so forth.
Integrated Design to solve multiple problems simultaneously through an integrated team

Who: Integrated design team
Owner: professional staff
End users

Design team
architect
engineers and other consultants

Contractor

Ed Roberts campus, Berkeley, CA
Universal Design: Hearing

PATTERNS:

Protection from Fire
Provide visual alarms as part of the main fire alarm system. Provide bed shakers in sleeping areas.

Assistive Listening Systems
Provide personal amplification systems in all assembly areas and all areas with amplification systems.

Excellent Communication Acoustics
Design the room acoustics to maximize sound quality for all. In rooms designed for discussion, design for two-way acoustics. In rooms limited to presentation, maximize for presenter-receiver acoustics. In office environments, control ambient noise.

Line of Sight
Seeing is doubly important for people with hearing impairments. With diminished sound, communications, safety, and much else depends of visual connection.
Universal Design: Hearing - Why some rooms sound better than others?

HEARING PATTERNS
- Fire Protection
- Assistive Listening
- Communication Acoustics
- Line of Sight
Universal Design: Hearing

Example: acoustics

- Social isolation of deafness
- Importance of acoustics to hard-of-hearing (most of us at some point in our lives)
- Importance of excellent communication acoustics and line of sight in learning environments
- Importance of acoustics for people who are blind, who use echo-location (hearing echoes, as does sonar) and other auditory cues
- Universal appreciation of acoustical delight

full hearing  hard of hearing  deafness
Universal Design: Hearing

HEARING PATTERNS

Fire Protection

Assistive Listening

Communication Acoustics

Line of Sight
Universal Design: Hearing

- Hearing Patterns
- Fire Protection
- Assistive Listening
- Communication Acoustics
- Line of Sight
Universal Design: Hearing

- Hearing Patterns
- Fire Protection
- Assistive Listening
- Communication Acoustics
- Line of Sight
Universal Design: Hearing

HEARING PATTERNS
- Fire Protection
- Assistive Listening
- Communication Acoustics
- Line of Sight
Universal Design: Hearing

Which letters carry meaning in words?

Vowels? Consonants?

Evidence:
Universal Design: Hearing

Which letters carry meaning in words?

Vowels?  Consonants?

Evidence:
Universal Design: Hearing

A graph showing sound volume in dB against frequency (low to high sounds). The graph includes letters for speech sounds such as "e", "j", "m", "a", "r", "o", "p", "ch", "g", "k", "t", "f", "s", and "th".
Universal Design: Hearing and Typical Classroom Performance

Sound Volume in dB

- 90
- 70
- 50
- 30
- 10

Frequency (low to high sounds)

- 20
- 200
- 2,000
- 20,000

- all vowels
- most consonants
- carpet
- cheap ceiling
Universal Design: Hearing and Typical Classroom Performance

- inexpensive mineral ceiling tile
- concrete masonry walls
- glue-down carpet or composition tile
Universal Design: Hearing and Good Classroom Performance

Sound Volume in dB

- 90 dB: all vowels
- 70 dB: most consonants
- 50 dB: carpet
- 30 dB: cheap ceiling
- 10 dB: good ceiling
- 20 dB: good wall panels

Frequency (low to high sounds): 20, 200, 2,000, 20,000 dB
Full acoustic design is much more complex:
• placement of absorptive material
• shaping of the room to increase beneficial reflections
• specific performance of each material
• HVAC noise
• control of noise transfer through walls, floor, and ceilings
Standard solution to grade change:
Pick a ramp from the building code or from the ADA Standards.

Results are seldom beautiful and sometimes don't work well for almost anyone. And if you try to build it at the maximum slope (1:12), it will almost invariably end up too steep.
Standard solution to grade change:
Pick a ramp from the building code or from the ADA Standards.

Results are seldom beautiful and sometimes don't work well for almost anyone. And if you try to build it at the maximum slope (1:12), it will almost invariably end up too steep.

Why can’t a ramp be
• beautiful to look at?
• a delight to travel on?
• effective for all who use it?
Universal Design: Mobility - We all use ramps
Universal Design: Mobility - We all use ramps
Integrated Path

Make sure that accessible routes are a meaningful main route used by all to prevent social isolation and to enhance wayfinding.

Low Slopes / Short Ramps
Keep slopes at 5 percent or less except for short ramps (up to 12 - 15 feet long).

Shortest Path
Make accessible routes a direct and as short as possible (within the context of Low Slopes / Short Ramps). This suggests integrating grade changes into the direction of desired travel and avoiding back-and-forth ramps.

Easy Climbs
Total vertical ascents of more than about four feet can be very tiring for many people. Avoid them or provide alternative means (such as an elevator).
Is it possible to use 5% slopes to create walks that connect levels without making people loop back and forth?

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

Universal? Welcoming? Effective? Durable?
Universal Design Case: Design Integration at HEDCO Restrooms

- Entrance
- Lobby
- Cafe
- Elev
- Courtyard
- Learning Commons
Universal Design Case: Design Integration at HEDCO Restrooms

- Entrance
- Lobby
- Cafe
- Elev
- Courtyard
- Learning Commons
Universal Design Case: Design Integration at HEDCO Restrooms
Universal Design Case: Design Integration at HEDCO Restrooms

courtyard

cafe

entrance

lobby

elev

learning commons

M W
Universal Design Case: Design Integration at HEDCO Restrooms

**Mobility:** No-door (airport-style) toilet rooms have no entry barriers

**Vision:** Auditory cue of water sounds guides users to the restrooms
Problem:
Poor acoustical design puts too much toilet noise into the entrance lobby.
Result: Doors are retro-fitted, making access more difficult.

<table>
<thead>
<tr>
<th>Universal?</th>
<th>Welcoming?</th>
<th>Effective?</th>
<th>Durable?</th>
</tr>
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</table>
Universal Design Case: Mobility, Johnson Hall entrance

MOBILITY PATTERNS
- Integrated Path
- Low Slope/Short Ramps
- Shortest Path
- Easy Climbs
Universal Design Case: Mobility, Johnson Hall entrance

MOBILITY PATTERNS
- Integrated Path
- Low Slope/Short Ramps
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Easy Climbs
Universal Design Case: Mobility, Johnson Hall entrance

MOBILITY PATTERNS
Integrated Path
Low Slope/Short Ramps
Shortest Path
Easy Climbs
Universal Design Case: Mobility, Johnson Hall entrance

Solution: Create a new entrance to lower level.
18” drop, straight 5% slope, closest entrance to parking

MOBILITY PATTERNS
Integrated Path
Low Slope/Short Ramps
Shortest Path
Easy Climbs
Universal Design Case: Mobility & Wayfinding, Lawrence Hall
Universal Design Case: Mobility & Wayfinding, Lawrence Hall
Universal Design Case: Mobility & Wayfinding, Lawrence Hall
Universal Design Case: Mobility & Wayfinding, Lawrence Hall
Universal Design Case: Mobility, Lawrence Hall
Universal Design Case: Mobility, Lawrence Hall

Social Isolation:
If this is your only route to studio, how would you feel?

<table>
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MOBILITY PATTERNS
Integrated Path
Low Slope/Short Ramps
Shortest Path
Easy Climbs
Universal Design Case: Mobility & Wayfinding, Lawrence Hall
Universal Design Case: Mobility, Lawrence Hall

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

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

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

- Universal?
- Welcoming?
- Effective?
- Durable?
Universal Design: Mobility and Emergency Egress

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

MOBILITY PATTERNS
Integrated Path
Low Slope/Short Ramps
Shortest Path
Easy Climbs
Universal Design: Mobility and Emergency Egress
Universal Design: Mobility and Emergency Egress

EVACUATION MAP
3075 ADELINA ST
EXIT STAIR DOWN

FLOOR 2

Call 9-911
Fire / Police / Medical.
In case of an emergency, activate fire alarm. Alarm will sound as a three-pulse electric horn. Strobe lights will flash. Public address system will be used for announcements. Listen for instructions. Persons with disabilities shall proceed to the ramp and exit the building or to the nearest stairwell and await assistance.
Universal Design: Mobility and Emergency Egress
Universal Design: Mobility and Emergency Egress

- Glazing for visibility from outside
- 5-foot radius of space for turning
- Enough room for at least two wheelchairs
- Robust, fire-resisting construction
- Recessed fire-resisting doorset with glazed vision panels at high and low levels
- Doors can be easily opened by person with disability
- Evacuation Chair
- Fire Extinguisher
- Intercom System
Universal Design: Mobility and Emergency Egress

Tools:

Fire sprinklers

Pre-planning

Cell phones

Areas of rescue assistance

Evacuation elevators

... and others
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 Pattern

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: Safe Crossings

- Orthogonal (90 degree) elements for straight paths
- Sound cues
Universal Design: Curb Ramps - Mobility vs. Vision?

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Also, enhancement of auditory cues with pavement textures

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
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Universal Design: Vision on Broadway

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

Shorelines

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

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

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Test for high reflectance contrast by photographing in black and white

full vision  limited vision  blindness

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
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
Effective Shorelines
90 Degree Corners
Visual Contrast
Universal Design: Vision at the Health Center

Nice building!
Universal Design: Vision at the Health Center

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Universal Design: Vision at the Health Center

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Universal Design: Vision at the Health Center

VISION PATTERNS
- No Protrusion Hazards
- Safe Crossings
- Effective Shorelines
- 90 Degree Corners
- Visual Contrast
Universal Design: Vision at the Health Center

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
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Universal Design: Vision at the Health Center

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Universal Design: Autism

HEDCO Building
College of Education
University of Oregon
Universal Design: Autism

HEDCO Building
College of Education
University of Oregon

AUTISM PATTERNS
Controls & Adjustments
Soft Light & Colors
Subdued Prints
User Testing
Universal Design: Four or Five Concepts to Test a Design

• **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?
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  – Does it give the impression of disability-based discrimination?

• **Will the design solution be durable over time?**
  – Can it accommodate change through flexibility, adaptability, or adjustability?

and...
Universal Design: Conclusion

DON'T BE STUPID!

N.B: This is in no way a comment on any person, present or past, who has every worked as or for the Dean of the School of Architecture and Allied Arts at the University of Oregon. This image has been placed here to demonstrate to architecture students the importance providing vertical transport, in the form of elevators, at or near the main entrance of a building. In the example in the AAA Dean's Office shown above, what appears to be a round white column is in fact the hydraulic piston of an elevator added in the 1990's. It was designed at the right horizontal location but it only served upper floors, which is (to be blunt) stupid. If you still don't get it, send me a note and we'll talk about it sometime.
Add slides re fire safety:
evacuation maps & preplanning
fire sprinklers
areas of rescue assistance
strobe alarms
auditory alarms
rescue elevators
new ADA >> IBC requirements
role of cell phones and need for cell phone service
Acoustics for the hard of hearing

Sound Volume in dB

Frequency (low to high sounds)

20  200  2000^136  20,000
Acoustics for the hard of hearing

Sound Volume in dB

Speech

20  200  2,000  20,000
Frequency (low to high sounds)
Universal Design: Hearing

Sound Volume in dB
90
70
50
30
10

Frequency (low to high sounds)
20
200
2,000
20,000

Sound Volume in dB

- 90 dB: all vowels (e, o, a, i, m, j)
- 70 dB: most consonants (r, ch, t, p, g, k, f, s, th)

Frequency (low to high sounds)
Classroom materials of high sound absorption placed at ceiling/wall intersections, combined with carpet to reduce noise at the source, have the maximum effect on reinforcing speech in a classroom or seminar room. This approach works for the primary presenter and also for enhancing discussions.

Diagrams above from www.nonoise.org for use in teaching at the University of Oregon.
Universal Design Case: Mobility, Cascade Courtyard
Universal Design Case: Mobility, Cascade Courtyard
Universal Design Case: Mobility, Cascade Courtyard

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

Universal? Welcoming? Effective? Durable?
Universal Design: Vision at Knight Law Center

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
Universal Design: Vision at Knight Law Center

VISION PATTERNS
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Universal Design: Vision at Knight Law Center

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Universal Design: Vision at Knight Law Center

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Universal Design: Vision at Knight Law Center

VISION PATTERNS
No Protrusion Hazards
Safe Crossings
Effective Shorelines
90 Degree Corners
Visual Contrast
HILYARD COMMUNITY CENTER was designed with particularly effective input from the disability community.