



Evidence Based Standards

Edward Steinfeld, *ArchD*

Clive D'Souza, *PhD*

Jonathan White, *MArch*

May 12, 2014

Introduction

- Knowledge translation – bringing the results of research to application in development activities, e.g. design, management, policy
- Evidence based practice gaining importance in professional fields
- Has received little attention in the field of universal design
- EBP could improve adoption of universal design

Objectives

- Use a case study to demonstrate the value of knowledge translation activities
- Identify lessons that can be learned from the case study

Context of the Case Study

- Revision of national consensus standard on accessible design (ICC/ANSI A117.1)
- Focus on the clear floor space required for wheeled mobility devices (WMD) – a key “building block” of the standard
- Based on research from the 1970’s – probably out of date
 - Changes in wheelchair technology
 - Improved medical technology and rehabilitation
 - Increasing size of the U.S. population
 - More diverse WMD population

Research Study

- “Anthropometry of Wheeled Mobility Project”
- Funded by two federal agencies – NIDRR and the U.S. Access Board from 1999-2010
- Large sample (N=500)
- Sophisticated research methods
 - 3D data collection
 - Portable collection methods
 - Tested thoroughly for accuracy and reliability
 - Methods endorsed by other experts and participants
 - Interactive data base to “mine” the findings
- Published in peer review journals and presented at conferences

Methods



Structural measurements



Reach measurements

Methods



L-turn maneuver



180 degree maneuver

Interactive Database

The screenshot displays the AnthropDB software interface, which is used for managing and analyzing data from a database of wheeled mobility users. The interface is divided into several panels:

- Demographic Information:** A table showing details for Participant ID 223, including age (24 years), years with disability (4 years), mobility device type (Manual), gender (Male), handedness (Right), and disability type (Spinal Cord Injury).
- Supplementary Information:** A section with thumbnail images of a person in a wheelchair from various perspectives (front, side, back, and other views).
- 3D Model:** A large 3D rendering of a person sitting in a wheelchair, with a vertical axis on the right side of the grid ranging from 0 to 150.0 cm.
- Histogram:** A bar chart showing the distribution of data for a selected structural dimension (Left Ancestral Breadth). The x-axis represents the dimension value, and the y-axis represents frequency. Statistics provided include: Mean: 359.1491 mm, Median: 359.3833 mm, Std Dev: 39.9996 mm, Percentile 0: 241.59, and Sample Size: 357 nos.
- Class View:** A tree view showing the hierarchical structure of the database, including categories like CChildFrame, CChildFrameGroup, CChildFrameIndov, CChildFile, CChildRecord, CChildData, CChild, CChild_Arm, CChild_ArmLower, CChild_ArmUpper, CChild_Base, and CChild_Cords.
- Terminal/Log:** A window at the bottom left showing system output and error messages, such as "normal block at 0x01700400, 498 bytes" and "Direct sleep complete."
- Current Population Summary:** A summary box at the bottom right providing demographic and clinical details for the current population, including gender (Male/Female), handedness (Right/Left), age (18 to 99 yrs), mobility device type (Manual/Power/Chair/Scooter), and various disability types.

Initial Interaction with the Committee

- Sent report to all members
- Provided links to our website on the project
- Invited to lecture on the findings
- Compared results to international standards
- Problems with acceptance
 - Didn't understand research, e.g. sampling, statistics, reliability
 - Few read the report or chose to ignore it
 - Could not translate metric dimensions into Imperial units
 - Complained we were not being “inclusive” by talking in scientific terms

Revised Strategy

- Membership on the committee
- Forged alliances
- Submitted formal proposals according to set procedures
- “Task forces” for “off line” discussion and recommendations
- Q&A in small groups
 - In depth analyses for each proposal
 - Graphic presentation in form similar to the standards
 - Imperial as well as metric dimensions
 - Presented findings as an “accommodation model” – percent included/excluded by any criteria
- Gained acceptance and support for our proposals
- Eventually accepted the CFS proposals with modifications

Graphic Presentation of Findings

Clear Floor Space

Design Guidelines for People Using Wheeled Mobility Devices



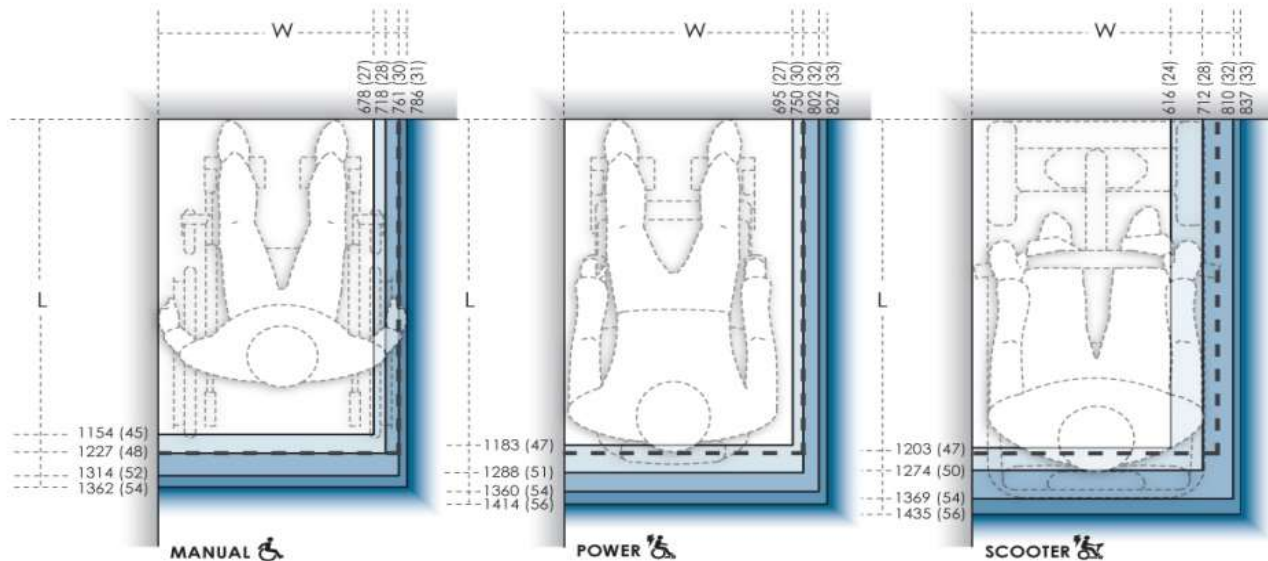
MANUAL, POWER, & SCOOTER

MINIMUM CLEAR FLOOR SPACE REQUIRED

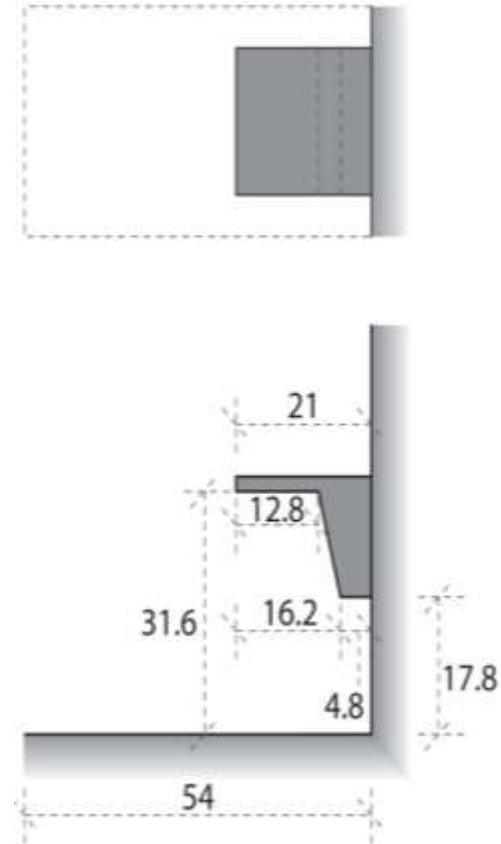
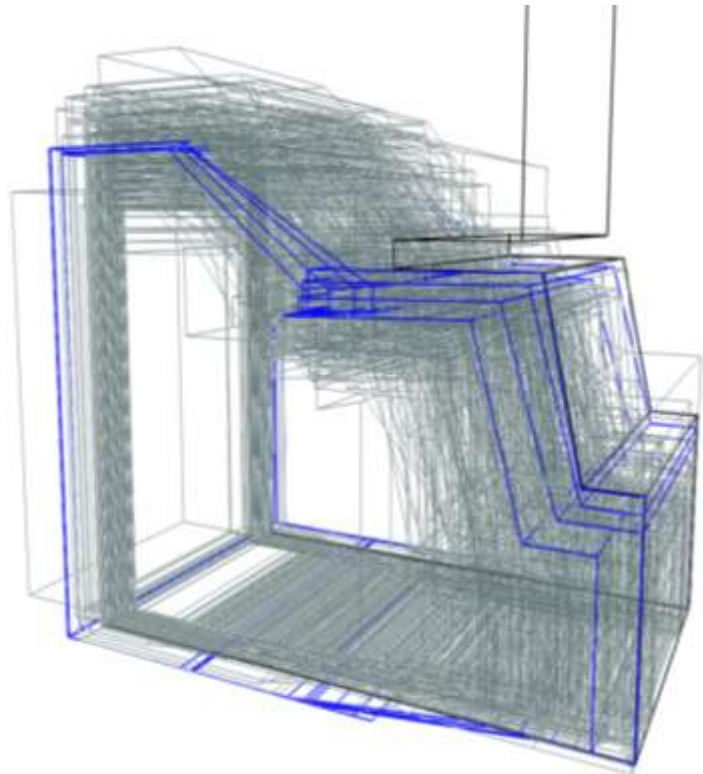
W = floor space width, units: mm (in.), L = floor space length, units: mm (in.)

percent accommodated		MANUAL	POWER	SCOOTER
		276 participants	189 participants	30 participants
< 50%	50%	W: 678 (27) L: 1154 (45)	W: 695 (27) L: 1183 (47)	W: 616 (24) L: 1203 (47)
≥ 50% & < 75%	75%	W: 718 (28) L: 1227 (48)	W: 750 (30) L: 1288 (51)	W: 712 (28) L: 1274 (50)
≥ 75% & < 90%	90%	W: 761 (30) L: 1314 (52)	W: 802 (32) L: 1360 (54)	W: 810 (32) L: 1369 (54)
≥ 90% & < 95%	95%	W: 786 (31) L: 1362 (54)	W: 827 (33) L: 1414 (56)	W: 837 (33) L: 1435 (56)
≥ 95%				

----- = ADA-ABA requirement of 1220 (48) x 760 (30)



In Depth Analysis



Maximum bounding envelopes for power wheelchair users at the 50th, 75th, 90th, and 95th percentile (left) and dimensions in inches for the 95th percentile envelope (right)

Lessons Learned

- Present research results to decision makers in a form that is familiar to them, e.g. 2D illustrations for US Standards, formal proposals
- Use graphic presentations that illustrate the impact of alternative decisions, e.g. accommodation models
- Engage the stakeholder community – “feel their pain” and become part of the community
- Be prepared to address cost implications of proposals

Conclusions

- By learning the perspectives of the stakeholders we will be more effective in the future
- We identified additional research and development needs by being directly involved in the standards development process
- Need to demonstrate better models for standards – research on knowledge utilization
- Need to get more researchers involved, e.g. our professional association (RESNA)
- Manufacturers and developers are now approaching us because they realize we have the knowledge they need



Center for Inclusive Design & Environmental Access

School of Architecture & Planning

State University of New York at Buffalo

114 Diefendorf Hall | 3435 Main Street

Buffalo, NY 14214 – 3087

+1 (716) 829.5899

tel: arced@buffalo.edu

email: idea.ap.buffalo.edu

web:

connect:

