

Measuring Community Environmental Barriers

to Mobility, Activity and Participation

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RERC on Wheeled Mobility

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GA Tech



International Classification of Functioning, Disability & Health

- Developed by World Health Organization (WHO) to describe and measure health and disability.
- Provides a mechanism to document the impact of the environment (social & physical) on an individual's activity and participation.
- Can Do vs Do Do
 - Environment accounts for differences between capacity (i.e., what an individual can do) & performance (what an individual actually does).

The logo for the International Classification of Functioning, Disability, and Health (ICF) is centered on the slide. It features a stylized caduceus (a staff with two snakes and wings) in the background, overlaid with the letters 'ICF' in a large, bold, white font. The logo is set against a dark blue background with a faint, repeating pattern of the WHO emblem.

ICF

Structure

ICF

Classification

**Part 1:
Functioning
and Disability**

**Part 2:
Contextual
Factors**

Parts

**Body
Functions
and Structures**

**Activities and
Participation**

**Environmental
Factors**

**Personal
Factors**

Components

**Change in
Body
Functions**

**Change in
Body
Structures**

Capacity

Performance

**Facilitator/
Barrier**

not
classified
because of
the large
social and
cultural
variance
associated
with them

*Constructs/
qualifiers*

**Item
levels:
1st
2nd
3rd
4th**

**Item
levels:
1st
2nd
3rd
4th**

**Item
levels:
1st
2nd
3rd
4th**

**Item
levels:
1st
2nd
3rd
4th**

**Item
levels:
1st
2nd
3rd
4th**

*Domains and
categories at
different
levels*

Problems with ICF Classification of Environmental Factors

1. Classification system of environmental constructs does not identify measurable attributes that impact activity & participation.
2. Assessment of environmental constructs as barriers or facilitators is based on classification, not measurable attributes of a construct.
3. Assessment of environmental qualifiers (magnitude of barriers and facilitators) will not inform meaningful environmental intervention.

1. Environmental Constructs are not Measurable Attributes

Table 1.
An
Overview
of the ICF

| Part 1: Functioning and Disability | | | | |
|------------------------------------|--|--|--|---|
| Components | Body Functions and Structures | Activities and Participation | Environmental Factors | Personal Factors |
| Domains | Body functions Body structures | Life areas (tasks, actions) | External influences on functioning and disability | Internal influences on functioning and disability |
| | Change in body functions (physiological) Change in body structures (anatomical) | Capacity Executing tasks in a standard environment Performance Executing tasks in the current environment | Facilitating or hindering impact of <u>features of the</u> physical, social, and attitudinal world | Impact of <u>attributes</u> of the person |
| Positive aspect | Functional and structural integrity | Activities Participation | Facilitators | not applicable |
| | Functioning | | | |
| Negative aspect | Impairment | Activity limitation Participation restriction | Barriers / hindrances | not applicable |
| | Disability | | | |

Person vs. Environment Constructs

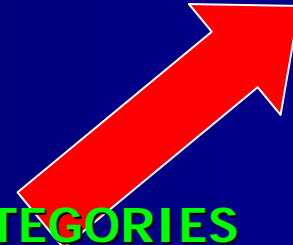
Person

- Gender
- Age
- Other health conditions
- Coping style
- Social background
- Education
- Profession
- Past experience
- Character style

Measurable
ATTRIBUTES



CATEGORIES



Environment

- Products
- Close milieu
- Institutions
- Social Norms
- Culture
- Built-environment
- Political factors
- Nature

2. Barriers and Facilitators Based on Classification of Features

ENVIRONMENTAL FACTORS

CHAPTER 1 PRODUCTS AND TECHNOLOGY

e160 Products and technology of land development

e1602 Products and technology of urban land development

FEATURES

Products and technology in urban land areas as they affect an individual's outdoor environment through the implementation of urban land policies, design, planning and development of space, such as kerb cuts, ramps, signposting and street lighting.

3. Qualifiers will not Produce Meaningful Interventions

PART 3: ENVIRONMENTAL FACTORS

- *Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives.*

*Qualifier in environment:
Barriers or facilitator*

| | |
|---------------------|----------------------------|
| 0 No barriers | 0 No facilitator |
| 1 Mild barriers | +1 Mild facilitator |
| 2 Moderate barriers | +2 Moderate facilitator |
| 3 Severe barriers | +3 Substantial facilitator |
| 4 Complete barriers | +4 Complete facilitator |

| <i>Short List of Environment</i> | <i>Qualifier barrier or facilitator</i> |
|---|---|
| e1. PRODUCTS AND TECHNOLOGY | |
| e110 For personal consumption (<i>food, medicines</i>) | |
| e115 For personal use in daily living | |
| e120 For personal indoor and outdoor mobility and transportation | |
| e125 Products for communication | |
| e150 Design, construction and building products and technology of buildings for public use | |
| e155 Design, construction and building products and technology of buildings for private use | |
| | |
| e2. NATURAL ENVIRONMENT AND HUMAN MADE CHANGES TO | |

Environmental Factors can be coded in relation to each construct individually (The first option is preferable, since it identifies the impact and attribution more clearly).

Measurable Attributes of Environmental Constructs

Body Functions
&
Structures



Activities
&
Participation



Environmental
Factors



Constructs/
Qualifiers

Functions
Structures



Independent

Capacity
Performance



Measurable Attributes
Dependent

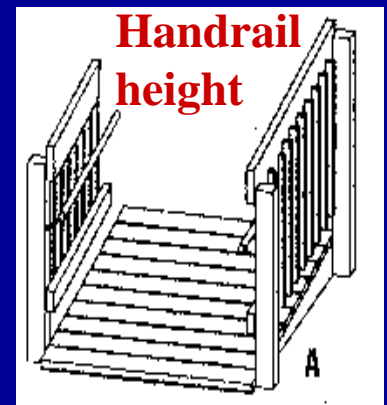
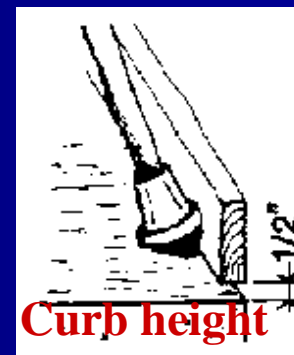
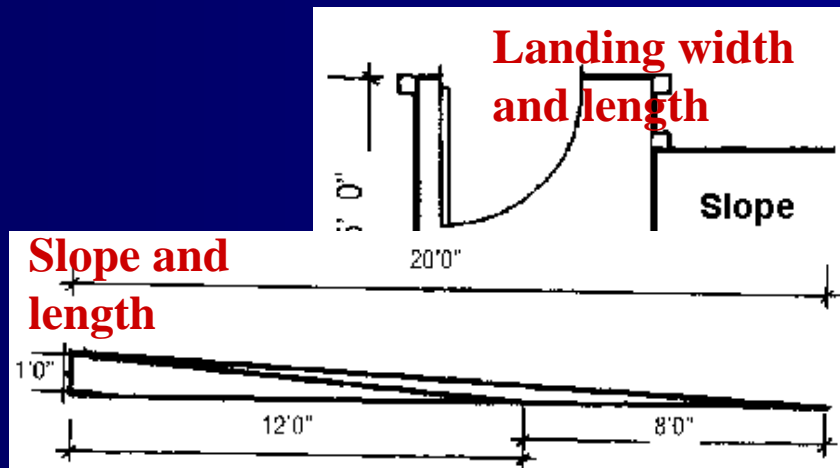
Barriers
Facilitators



Independent

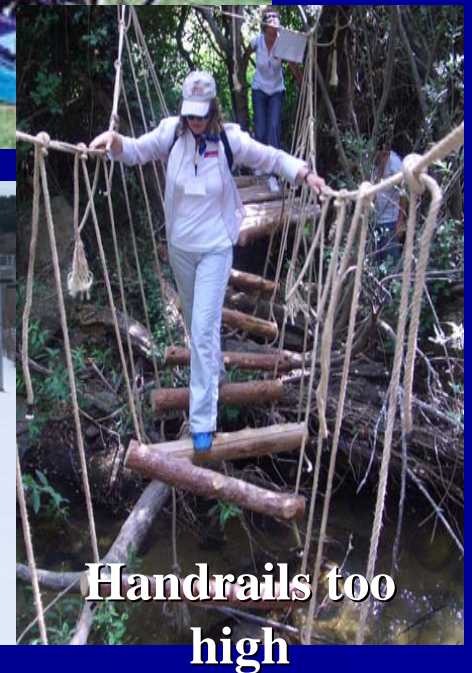
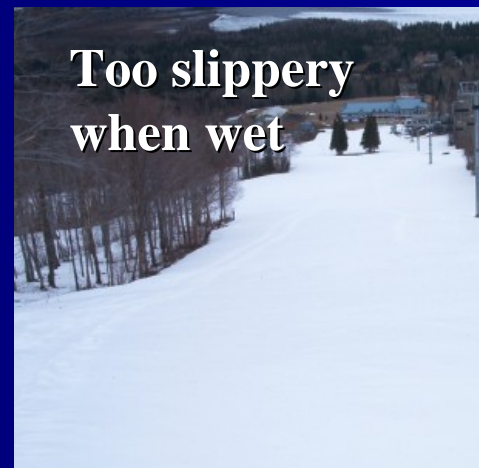
Environmental Features vs. Attributes

- Feature (n) = product, device, equipment, room/space [e.g. RAMP e1602]
- Attribute (adj) = characteristic or description of a feature, such as height, length, width, color, texture



Ramp
Attributes

Ramp Attributes Can Act as Barriers

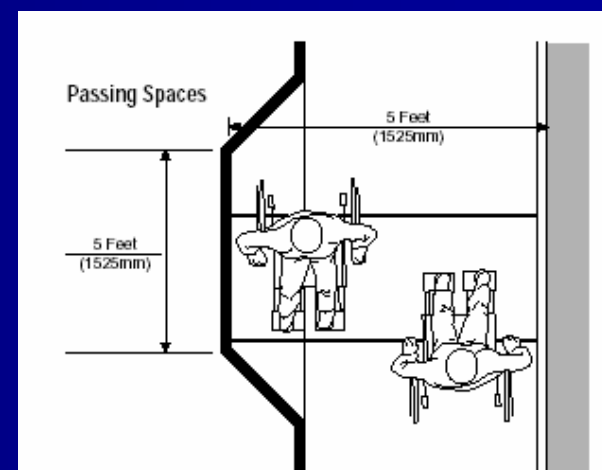


Measurable Attributes of the Physical Environment

| Space | Product | User Interface |
|--|---|--|
| <p>Entry width, threshold height</p> <p>Size</p> <p>Layout (location of fixtures and amenities)</p> <p>Systems locations (traffic/ped signals, lighting, plumbing)</p> <p>Surface materials/finishes</p> <p>Ambient conditions</p> | <p>Type (description/specs)</p> <p>Size/Dimensions</p> <p>Hardware configuration/ location</p> <p>Force required to activate, engage, operate, lift, or move</p> <p>Materials/finishes (type, texture, color, visual contrast)</p> <p>Auditory/visual signals</p> | <p>Type (description)</p> <p>Size</p> <p>Location</p> <p>Operation characteristics (distance, direction)</p> <p>Materials/finishes</p> <p>Cognitive requirements</p> |

Environmental Attributes that Impact Community Mobility (Regulated by ADAAG)

- Minimum 36" walkway
- 5' square passing area every 200'
- No max slope or requirement for landings if sidewalk follows grade of street
- Max cross slope = 1:50
- Obstacles – street furniture
- Pedestrian rights of way in development



Other Attributes that Impact Community Mobility



Street width
Traffic density/speed
Intersection design
Timing of lights
Perceptions of crime
Visual distractions

Other Attributes that Impact Community Mobility



Condition of walkways



Continuity of walkways

Measuring Barriers to Community Mobility



Specific Aims

- Identify, classify, and quantify real and perceived environmental barriers to wheeled mobility in the community;
- Determine impact of environmental barriers on wheeled mobility performance; and
- Determine the impact of barriers to wheeled mobility on community participation using objective data from field observations and validated self-report participation instruments.

Research Design

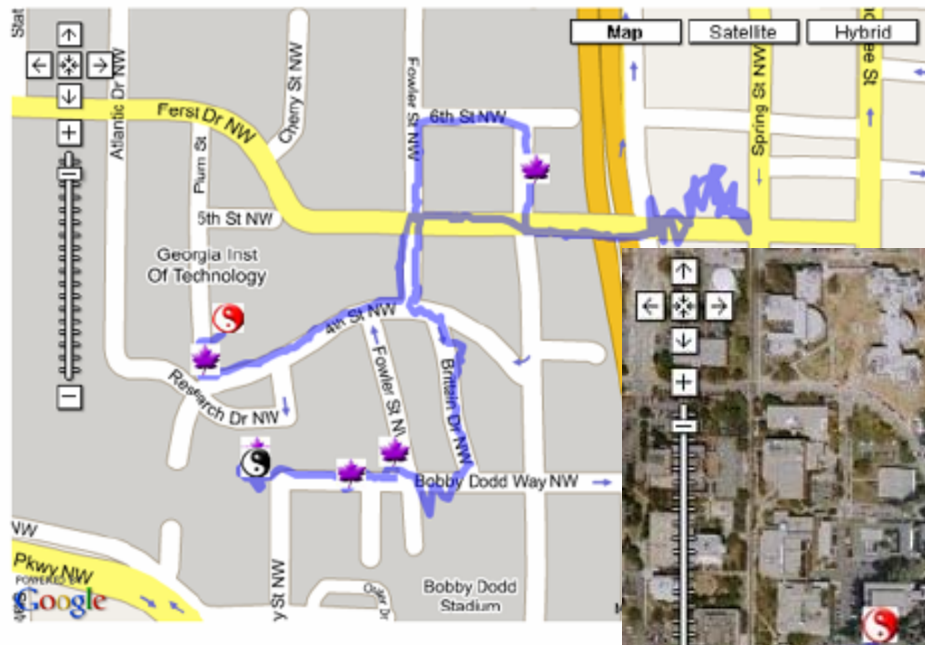
- Phase 1. Set Route Protocol
 - Descriptive study of environmental characteristics that impact wheeled mobility to specific destinations.
- Phase 2. Free Roam Protocol
 - Descriptive study of the impact of environmental barriers on activity patterns and participation. Subjects will be asked to document barriers at destinations of their choice over a week's time..

Measures

| Aim | Measure | Instrument |
|---|---|---|
| Characteristics that affect mobility | 1. Photograph/location of barrier 2. Distance, slope 3. Self report: timing of lights, traffic, & weather conditions, type & condition of surfaces, crowds, crosswalk/street design | GPS/camera phone GPS phone/Heart rate monitor Voice file from phone |
| Impact on mobility performance | Exertion Self report Exertion/Pain Self report | Heart rate monitor Borg CR10 Open-ended |
| Impact of barriers on participation (Free Roam) | Self-report | Participation instruments (CPPRS) |

Trip Information

Trip Information

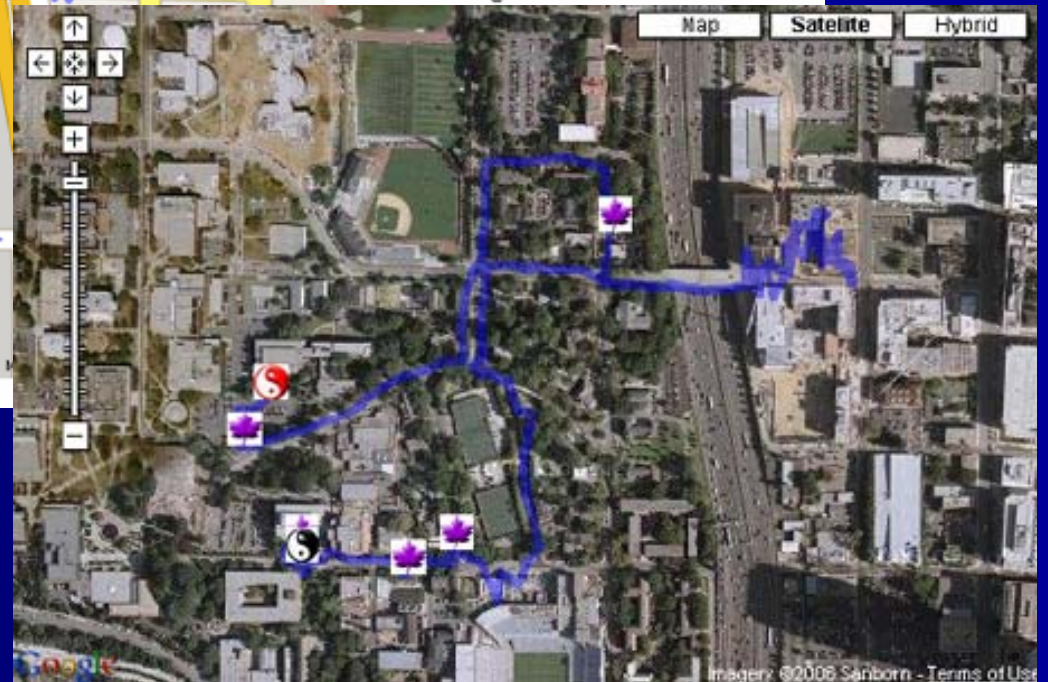


Map Details

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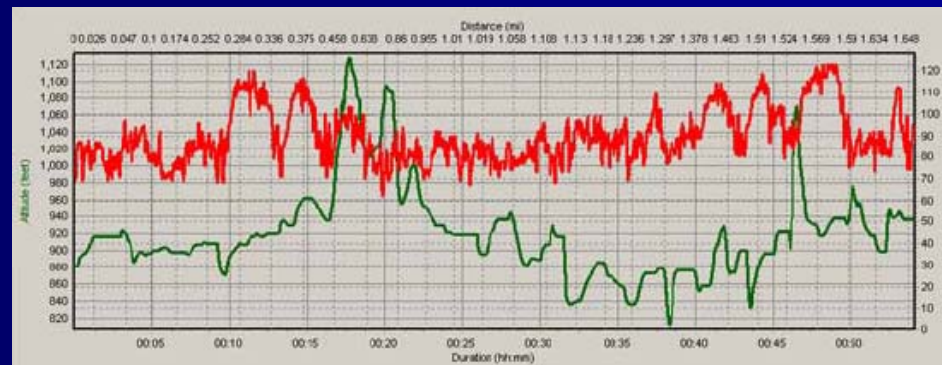
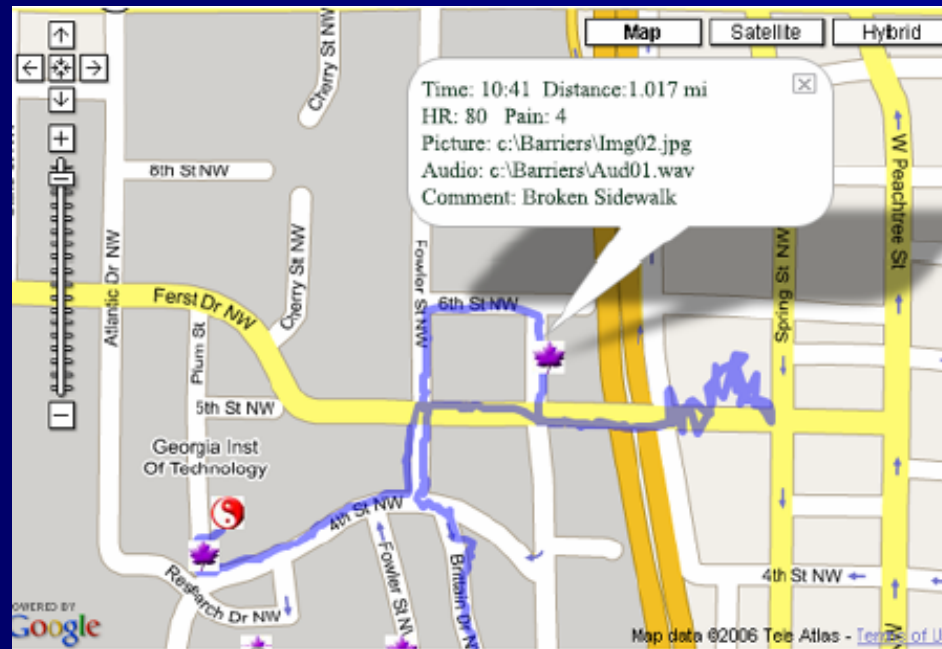
Trip Number: 1

- Barrier Flags
- Comment Flags
- All Flags



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Trip Information



Removing Barriers can Save Lives

SHADES

By Mark Carlson



Thank you

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