

# The Physical Environment as an Independent Measure:

## A Framework for Understanding the Role of Environmental Attributes in Activity and Performance Outcomes

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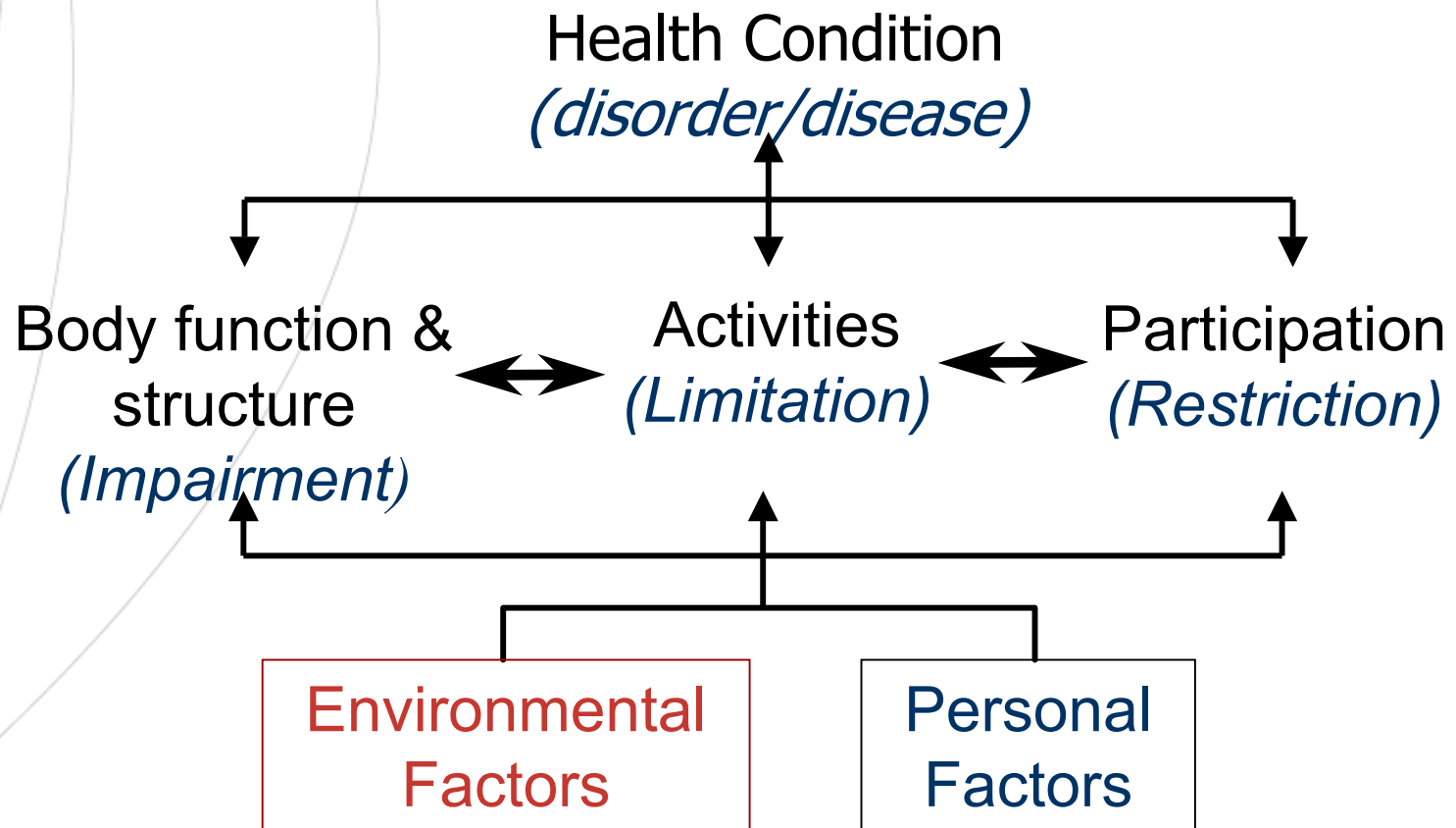
12th Annual North American Collaborating Center Conference on ICF

**LIVING IN OUR ENVIRONMENT:  
The Promise of ICF**

**JUNE 5 to 7**

Vancouver, British Columbia (Canada)

# ICF: A Mechanism to Describe the Impact of the Environment on Activity and Participation

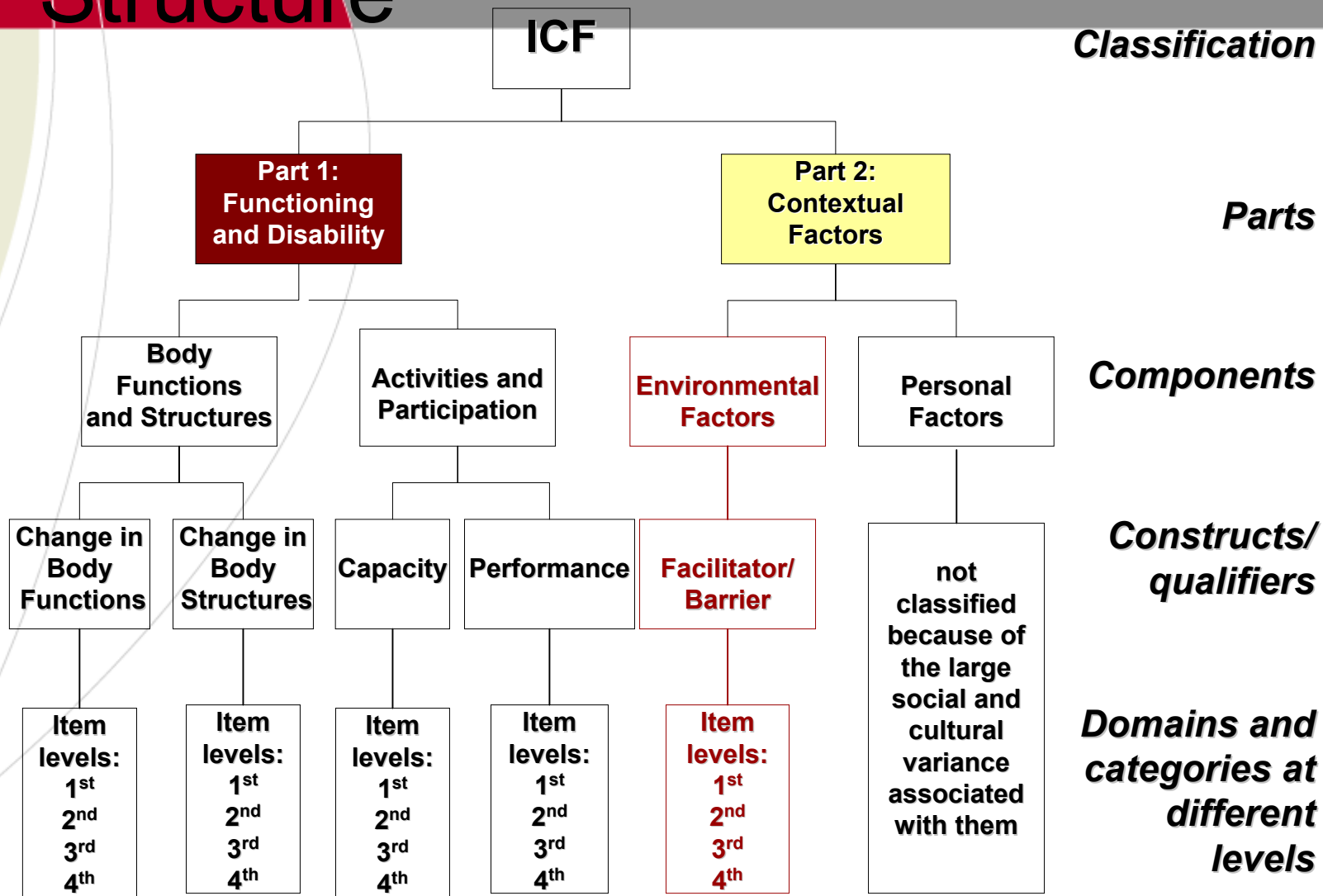


# Can Do versus Do Do

- Context (**Personal** and **Environmental** factors) accounts for differences between capacity (i.e., what an individual can do) & performance (what an individual actually does).



# ICF Structure



# Environmental Factors: Flaws in the ICF Model

1. Environment is treated as a dichotomous variable
  - **Features** versus **Attributes**
2. Environment is deterministic
  - **Independent** versus **Interactive**
  - **Information** versus **Intervention**

# 1. Environment is not a Dichotomous Variable

Measurable constructs that directly impact activity and participation are not identified

ENVIRONMENTAL FACTORS

└─ CHAPTER 1 PRODUCTS AND TECHNOLOGY

└─ e160 Products and technology of land development

**e1602 Products and technology of urban land development**

## FEATURES

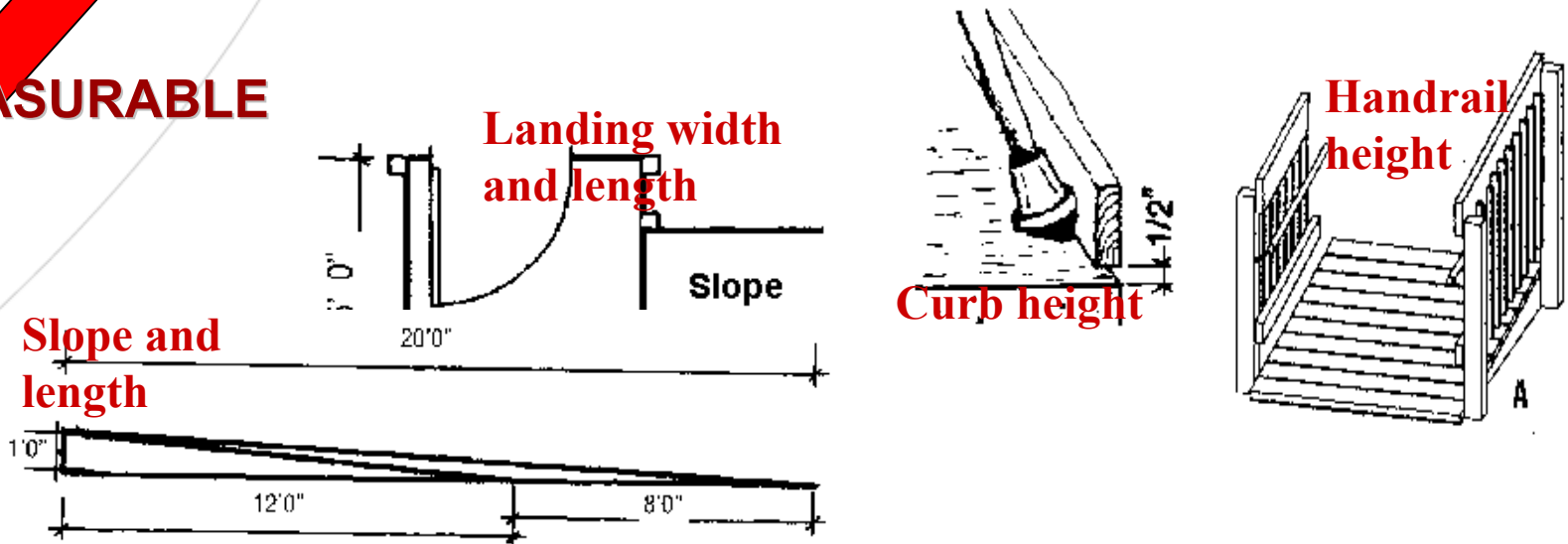
Products and technology in urban land areas as they affect an individual's outdoor environment through the implementation of urban land use policies, design, planning and development of space, such as kerb cuts, ramps, signposting and street lighting.

# Features vs. Attributes

NOT  
MEASURABLE

- **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

MEASURABLE



# All Constructs are not Created Equal

Unlike other components of the classification system, environmental factors are not identified as measurable attributes that contribute directly to activity and participation.

Part 1: Functioning and Disability				
Components	Body Functions and Structures	Activities and Participation	Environmental Factors	Personal Factors
Domains	Body functions and 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 features of the physical, social, and attitudinal world	Impact of attributes of the person
Positive aspect	Functional and structural integrity	Activity Participation	Facilitators	not applicable
Negative aspect	Impairment	Activity limitation Participation restriction	Barriers / hindrances	not applicable
	Disability			

**MEASURABLE** (over Body Functions and Structures)

**MEASURABLE** (over Activities and Participation)

**NOT MEASURABLE** (over Environmental Factors)

**MEASURABLE** (over Personal Factors)

**Table 1. An Overview of the ICF**

# Personal Factors

## Person

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

**Measurable  
ATTRIBUTES**



## Environment

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

**CATEGORIES  
(not even  
features)**



# Possible Framework of Physical Environmental Attributes

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

## 2. Environmental Factors are not Deterministic

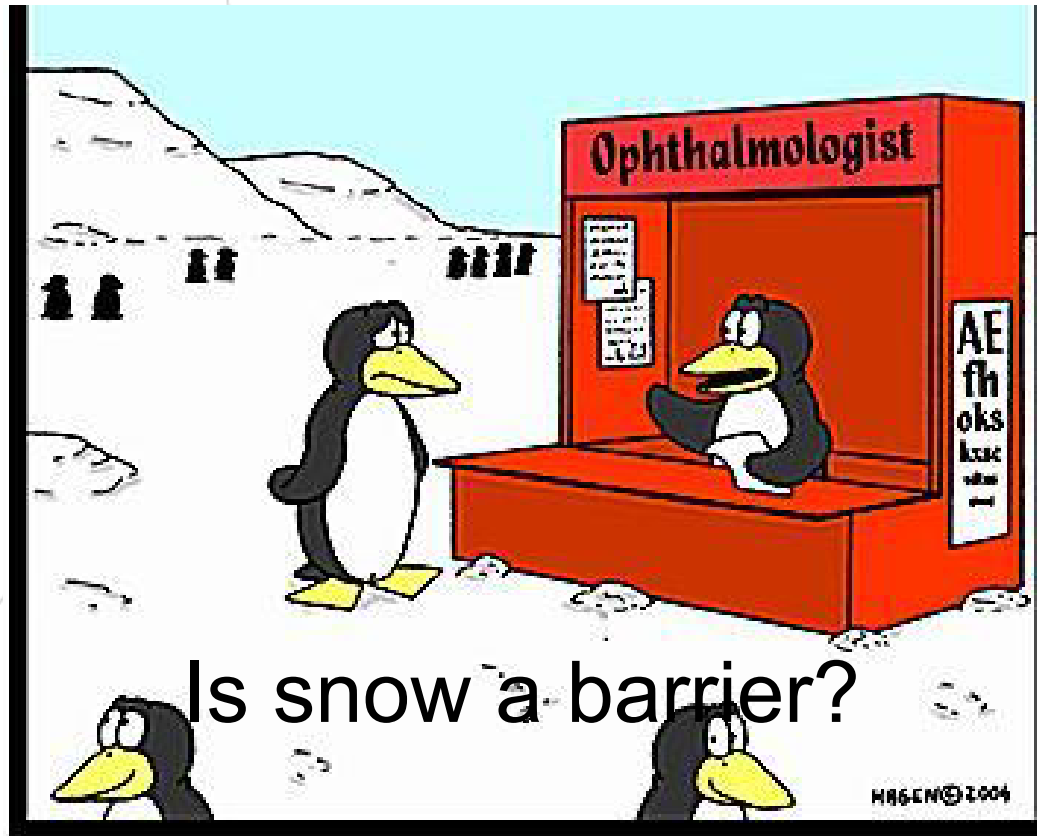
### i. Independent versus Interactive

- i. Environmental factors, **independent** of other factors, are not barriers or facilitators.
- ii. Barriers/facilitators are situational and exist by virtue of the **interaction** between body function/structure and environmental attributes.

### ii. Information versus Intervention

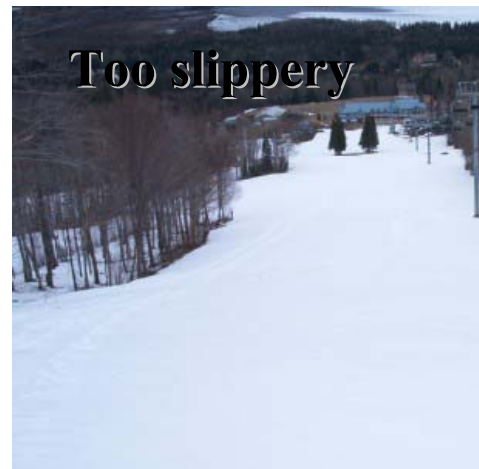
- i. Qualifiers based on environmental features will only produce general **information** about the magnitude of barriers or facilitators.
- ii. Objective measures of relevant environmental attributes is needed produce effective environmental **intervention**.

# i. Independent vs. Interactive



Don't worry Sir, being colour-blind  
is not much of a problem around here...

# Environmental Attributes Can Act as Barriers or Facilitators



# Even Facilitators can be Barriers to Participation



# ii. Information vs. Intervention

## 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  
1 Mild barriers  
2 Moderate barriers  
3 Severe barriers  
4 Complete barriers

0 No facilitator  
+1 Mild facilitator  
+2 Moderate facilitator  
+3 Substantial facilitator  
+4 Complete facilitator

<i>Short List of Environment</i>	<i>Qualifier barrier or facilitator</i>
<b>e1. PRODUCTS AND TECHNOLOGY</b>	
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	

# Magnitude of Barriers Does not Inform Environmental Intervention

- Environmental factors can be coded in relation to each construct or overall.
- The former is preferable, since it identifies the impact and attribution more clearly.

**HOW?**

ENVIRONMENTAL FACTORS

CHAPTER 1 PRODUCTS AND TECHNOLOGY

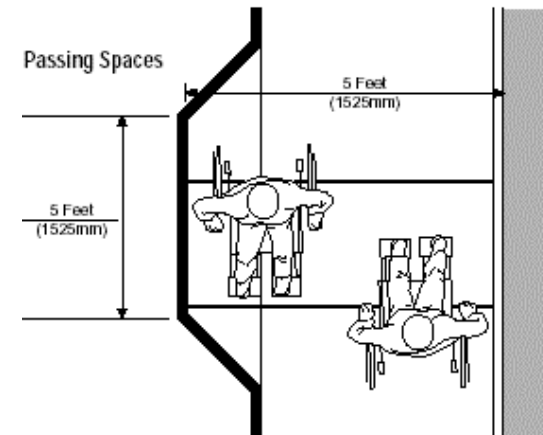
e160 Products and technology of land development

## **e1602 Products and technology of urban land development**

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# Effective Interventions Require Objective Environmental Measures

- **Example:** Attributes of Physical Environment that Impact Community Mobility
- Attributes Regulated by ADAAG
  - Width of walkway
    - Minimum 36" clear walkway
    - 5' square passing area every 200'
  - Slope of walkway
    - No max slope or landings if sidewalk follows grade of street
    - Max cross slope = 1:50
  - Location of street furniture



# Other Attributes that Impact Community Mobility Interventions



Street width  
Traffic density/speed  
Intersection layout  
Timing of lights  
Distance to destination  
Perceptions of crime  
Visual distractions

# Other Attributes that Impact Community Mobility Interventions



**Condition of walkways**



**Continuity of walkways**

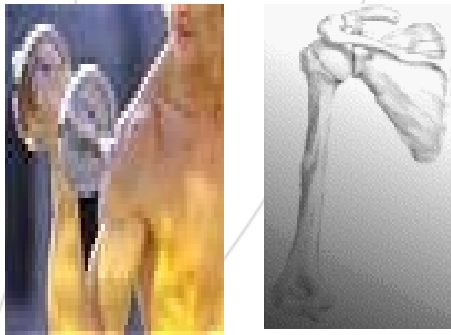
# Conclusions

- Lack of understanding of environmental factors is a common problem in the public health arena
- Studies have reported no or insignificant interactions between the environment and health outcomes based on presence/absence of features, not their relevant attributes
  - Example: Gill, T.M., Williams, C.S. & Tinetti, M.E. (2000). Environmental hazards and the risk of nonsyncopal falls in the homes of community-living older persons. *Medical Care*, 38, 1174-1183
  - Used checklist of environmental features such as throw rugs, rather than attributes (e.g., floor materials, transitions between surfaces, glare on surfaces, lighting levels, etc. )



# Role of Environmental Factors

## Body Functions & Structures



**Functions  
Structures**



## Activities & Participation



**Capacity  
Performance**



## Environmental Factors



**Barriers/Facilitators  
Attributes**



**Barriers/Facilitators**

# Implications for ICF



- Understanding the impact of the environment requires adoption of a framework that identifies, classifies and quantifies its activity- and participation- relevant attributes
- Environment is not deterministic, it can only provide opportunities for activities to occur
- Applications
  - Understanding environmental impact on health outcomes;
  - Meaningful measurement of barriers and facilitators;
  - Identification of needs for environmental modifications and meaningful environmental interventions;
  - Policy decisions



# Thank you

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