PERFORMANCE FUNCTIONING CATEGORIES OF PERSON-CENTERED ASSESSMENT

The Performance Functioning Categories presented herein are based upon the World Health Organization's, redefined ICF, The International Classification of Functioning, Disability and Health 2002 document. The ICF 2002 document provides a standard language and framework for the description of health and health-related states in the context of measuring functioning in society as a factor of their level of health in a physical and metaphysical sense. We have selected the WHO's ICF document as a foundation for assessing user and building performance as the ICF 2002 breaks down conventional societal barriers on a global scale, and presents a framework for straightforward examination of the human within the built, environmental and social context.[1]

1. COGNITIVE FUNCTIONS:

i. LIMITATIONS IN INTERPRETING INFORMATION

As the global community becomes smaller through technology, trade, and the removal of cultural barriers, information exchange and sharing becomes more vital. Worldwide, regardless of context, a large number of people experience difficulty in interpreting information, principally as a result of literacy levels and cognitive reasoning. The increase or terrorist events and exposure to them by global communications and reporting is also seeing an increase in Post-traumatic Stress Disorder (PTSD). Examples may include: children at various age levels, people without basic literacy skills, people who speak a language different from the one being used in a particular context, cultural differences, the aged members of a culture, persons exposed either first hand or through exposure to information concerning traumatic events, and persons with cognitive, psychiatric, or learning impairments. The results of reduced cognitive functioning can include: confusion, disorientation, and the inability to function without queues in emergency situations. Individuals who have difficulties interpreting information may also have difficulty in exchanging information with others.

[1] World Health Organization, ICF 2002(International Classification of Functioning, Disability and Health), © 2002 WHO, Geneva, Switzerland.

Potential Environmental Problems that can influence Cognitive Functioning:

- Wayfinding and user signage
- Information displays that are not usable by all
- Complicated controls – controls that are not intuitive to the user and require a high level of acuity and awareness to operate
- (PA) Public Address systems and auxiliary services not available for all users
- Emergency announcements or temporary messages that cannot be understood by all users (which can cause anxiety and fear resulting in psychological and physiological changes in perception and that can lead to alarm or panic levels)
- Unfamiliar or incongruous iconography language
- Contextual Triggers that may set off a PTSD episode causing the user to be unable to function.

2. SENSORY FUNCTIONS (functions related to the eye / ear):

i. VISION:

The World Health Organization (WHO) currently estimates that there are nearly 37 million blind people worldwide and an additional 124 million who have vision so poor that normal life is impossible. 28 million of them do not need to be. 90% of the blind and visually impaired live in developing countries where access to quality eye care is limited."[2]

In the United States, 8.3 million Americans are legally blind. Blindness or low vision affects 3.3 million Americans age 40 and over, or one in 28. This figure is projected to reach 5.5 million by the year 2020. The study reports that low vision and blindness increase significantly with age, particularly in people over age 65. People 80 years of age and older currently make up eight percent of the population, but account for 69 percent of blindness. The study provides the most robust and up-to-date estimates available of the burden of visual impairment. It was sponsored by the National Eye Institute (NEI), part of the Federal government's National Institutes of Health (NIH). [3]

In developing countries unnecessary blindness has been connected to the following: cataract, glaucoma, corneal scarring, diabetic retinopathy, river blindness (onchocerciasis), trachoma and childhood blindness.[4]

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[2] Orbis International, http://www.orbis.org, 2005

[3] Vision Loss from Eye Diseases will increase as Americans Age, National Institutes of Health, October 2004, http://www.nei.nih.gov/news/pressreleases/041204.asp

[4] Orbis International, http://www.orbis.org, 2005

Every day, our eyes process millions of stimuli, both simple and complex, providing the input our brains need to paint a picture of our environment. The complex process of vision involves gathering, directing, focusing and translating light into images. The eye is an intricate structure composed of delicate tissues and blood vessels, some solid, some liquid, some viscous gel. And each part of the eye is susceptible to disease or injury. [5] While the reduction in light reaching the retina deteriorates with age, and a typical 80 year old person needs three times the amount of light for tasks needed by a typical person in their 30s, allergens are also a leading cause of reduced or low functioning vision. [6]

Potential Environmental Problems that can influence Visual Functioning:

- Insufficient lighting (for example, low natural and artificial lighting levels; changes in natural lighting levels during a standard day cycle and during different seasons of the year cycle;
- Sudden change from light to dark (gradual transition is necessary)
- Insufficient contrast differentiation of colors and elements (contrast necessary for proper differentiation)
- Temporary changes or disruptions to of a familiar environment (for example, changes in walkways and corridors, routes used in daily routines, etc.)
- Low olfactory and auditory functioning that results in the inability to learn or remember a space, spatial orientation or context
- Controls with complex visual directions or prompts
- Visually unclear information displays (for example, signs and Wayfinding, elevator panel buttons, visual information in small print or not in multiple or pictogram languages, etc.)
- Specific Age Related Problems: Glare; unable to differentiate colors and contract; long transition time needed when going from light to dark, or from near to far (distant).

ii. HEARING:

Hearing impairment is the most frequent sensory deficit in human populations, affecting more than 250 million people in the world. Consequences of hearing impairment include inability to interpret speech sounds, often producing a reduced ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation and stigmatisation. It may be worsened by some medical conditions such as hypothyroidism, diabetes, and possibly hyperlipidemia, among others. [7]

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[5] John Hopkins Medicine, 2005, http://www.hopkinshospital.org/health_info/Eyes/

[6] National Eye Institute, Facts about the Cornea and Corneal Disease, April 2005, http://www.nei.nih.gov/health/cornealdisease/index.asp#3

[7] Mathers, Colin; Smith, Andrew; Concha, Marisol, Global Burden of Hearing Loss in the Year 2000, ©WHO Geneva 2003.

Most congenital and childhood onset hearing loss is included as sequelae to various disease and injury causes already included in the Global Burden of Disease Study. Examples include otitis media, meningitis, rubella, congenital anomalies and non-syndromal inherited hearing loss. Adult-onset hearing loss was not separately analyzed in the original Global Burden of Disease for 1990.[8] The leading causes of adult-onset hearing loss are presbycusis (age related hearing loss) followed by noise-induced hearing loss. This paper reviews global data on hearing loss among children and among adults, and estimates the global burden of adult-onset hearing loss. In addition, it provides estimates of the prevalence of hearing loss among children and adults at various levels of severity.[9] The results of reduced auditory functioning can include: confusion, disorientation, and the inability to function without queues in emergency situations. Individuals who have difficulties hearing vibratory information may also have difficulty in exchanging information with others.

Potential Environmental Problems that can influence Auditory Functioning:

- Information is presented only audibly without visual information support
- Insufficient acoustics in built spaces and subsequent sound/vibration reverberations makes it difficult to absorb intelligible information, warnings or cautions during emergencies, or maintain or participate in communication
- Low lighting levels impact ability to lip read
- Emergency intercoms, hotline aids, and other emergency devices are not equipped with visual signals and interactive controls
- Intercom door-opening devices that do not have visual controls

3. VOICE AND SPEECH FUNCTIONS:

i. DIFFICULTY INTERPRETING INFORMATION

As the global community becomes smaller through technology, trade, and the removal of cultural barriers, information exchange and sharing becomes more vital. Worldwide, regardless of context, a large number of people experience difficulty in interpreting information, principally as a result of literacy levels and cognitive reasoning. Examples may include: children at various age levels, hearing and speech impairments, people without basic literacy skills, people

[8] Epidemiology and Burden of Disease, WHO Geneva (GPE/EBD)

[9] Mathers, Colin; Smith, Andrew; Concha, Marisol, Global Burden of Hearing Loss in the Year 2000, ©WHO Geneva 2003.

who speak a language different from the one being used in a particular context, cultural differences, the aged members of a culture, and persons with cognitive, psychiatric, or learning impairments.

The results of reduced communications functioning can include: confusion, disorientation, and the inability to function without queues in emergency situations. Individuals who have difficulties interpreting information may also have difficulty in exchanging information with others.

Potential Environmental Problems that can influence Interpreting Information and Functioning:

- Information displays that are not usable by all
- Ordering a meal, requesting a basic service, finding a restroom or architectural landmark
- Wayfinding and user signage
- Complicated controls – controls that are not intuitive to the user and require a high level of acuity and awareness to operate or require the ability to speak, or speak the native language to use successfully
- (PA) Public Address systems and auxiliary services not available for all users
- Emergency announcements or temporary messages that cannot be understood by all users (which can cause anxiety and fear resulting in psychological and physiological changes in perception and that can lead to alarm or panic levels)
- Lack of familiar or iconographic language for street signs, landmarks, directions, etc.

4. CARDIOVASCULAR AND RESPIRATORY FUNCTIONS:

i. RESPIRATORY / CARDIOVASCULAR:

Asthma is a controllable but not curable disease. The World Health Organization (WHO) says 100 to 150 million people around the world are asthmatic and the number is growing by 50% every decade. It causes 180,000 deaths a year.[10] Asthma is a chronic, inflammatory lung disease characterized by recurrent breathing problems. People with the disease suffer "attacks", or acute episodes, when the air passages in their lungs narrow and breathing becomes difficult.

[10] BBC News UK Edition (web), Asthma, January 8, 2004, http://news.bbc.co.uk/1/hi/health/medical_notes/233033.stm

Potential Environmental Problems that can influence Cardiovascular and Respiratory Functioning:

- Poorly maintained HVAC systems resulting in unhealthy Indoor Air Quality conditions and SBS (Sick Building Syndrome)
- Combined off-gassing of interior finish materials, products, and equipment (for example, carpets, wall-coverings, furniture, and other building materials).
- Allergens from natural and man-made products (substances to which some people are allergic) such as pollens, foods, dust, mold, feathers, or animal dander (small scales from animal hair or feathers);
- Respiratory infections such as colds, flu, sore throats, and bronchitis;
- Weather such as very cold air, windy weather, or sudden changes in weather;
- Too much exertion such as running upstairs too fast or carrying heavy loads;
- Emotional stress such as excessive fear, anxiety or excitement;
- Irritants in the air such as dirt, cigarette smoke, gases, and odors;

ii. STAMINA / CARDIOVASCULAR:

Stamina and cardiovascular functioning can be limited for persons unable to walk long distances, climb stairs without extreme difficulties due to mobility impairments or cardiovascular disease and limitations, people with intermittent fatigue and chronic fatigue, shortness of breath; hyposthenia; chronic obesity; and people with a range of cardiovascular disease or limitations.

Potential Environmental Problems that can influence Cardiovascular and Stamina Functioning:

- Substantial walking distances without resting places; stairs; lack of handrails, grab bars, and other supports;
- Excessively high or excessively low temperature variables depending on climate and context.
- Poor respiratory functioning.
- Emotional stresses such as excessive fear, anxiety or excitement that can result in lowered physical stamina.
- Disorientation at a particular place due to excessive fear, anxiety or excitement.

5. MOBILITY

i. DIMENSIONAL EXTREMES:

Dimensional extremes can significantly impact performance and functioning in the physical environment. The extreme short to the extreme tall person will perform and function differently in any given context; chronically obese people (sometimes with accompanying shortness of breath) have dimensional needs that will allow them to greater perform and function in different contexts. *Children → adults → elders.*

Potential Environmental Problems that can influence Functioning within Dimensional Extremes:

- Substantial walking distances without resting places; stairs; lack of handrails, grab bars, and other supports at usable heights and locations;
- Excessively high or excessively low temperature variables depending on climate and context.
- Poor respiratory functioning.
- Entering and exiting spaces and places, for example, doors, opening heights, etc.
- Location, size or scale of information displays, operating mechanisms, openings, and other "standard fixtures" such as telephones, drinking fountains, urinals, bank windows, cafeterias, chairs, bus seats, etc.
- Participation in public events in theaters, stadium type seating, balconies, lines of sight, etc.

ii. LIMITED USE OF UPPER LIMBS AND EXTREMITIES:

Difficulty Lifting and Reaching, and Inability to Use Arms and Shoulders (Upper Extremity Impairment) can impact performance and functioning in the built environment. As we look towards 2010, the frequency in developed countries by persons who experience one or another type of Repetitive Stress Injuries (RSI) or who are diagnosed Repetitive Motion Syndrome (RMS) is growing due to workplace repetitive tasks related to using computers and other types of equipment. Such injuries are also known as *Cumulative Trauma Disorders* (CTDs), *Work-Related Upper Limb Disorders* (WRULDs), and *Occupational Overuse Injuries.*[11] There are additional categories of people who have limitations of upper extremity usage, they include but are not limited to: people who have limited use of their arms and

[11] RSI-UK: UK-specific information on Repetitive Strain Injury, http://www.ability.org.uk/Repetitive_Strain_Injuries.html, 2005

shoulders; persons who have paralysis or suffered a stroke; people who are ambulatory or use a wheelchair; people with loss of mobility as in paraplegia or quadriplegia; people whose use of upper extremities or reach is limited by some other factor such as using crutches, loss of balance, shortness, or being in a wheelchair; people who may have frequent spasms, the person whose arms are full of groceries, books and bags, or a small child. Census 2000 counted 49.7 million people with some type of long lasting condition or disability. They represented 19.3 percent of the 257.2 million people who were aged 5 and older in the civilian non-institutionalized population — or nearly one person in five. Within this population, Census 2000 found: 21.2 million (8.2 percent) with a condition limiting basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying. [12]

Potential Environmental Problems that can influence Functioning with Limited Use of Upper Extremities:

- Hardware, controls, and operating mechanisms that require the use of upper limbs (water fountains, telephones, doors, elevators, etc.). Location and height of these items may also limit their useability.
- Excessively high or excessively low temperature variables depending on climate and context.
- Entering and exiting spaces and places, for example, doors, door opening forces, etc.
- Communication through computer use, writing, etc.
- Cultural exchanges, for example, shaking hands with another as a gesture of respect.

Difficulty Handling or Dexterousness: People who cannot grasp, pinch, twist, or lack adequate motor skills with their upper extremities.

iii. LIMITED AGILITY, BENDING, COORDINATION, AND ABILITY FOR HEAD MOVEMENT:

Individuals with reduced reaction time and prevalence of fainting, dizziness, or poor balance may not function to their potential. Elderly people who may move slowly, deliberately and unsteadily may not function to their potential. People with stability disorders who may need supports and rest areas may not function to their potential. These problems

[12] US Census: Disability Status 2000, US Census Bureau Information Brief March 2003. The estimates are based on responses from a sample of the population conducted by the US Census Bureau 2000. As with all surveys, estimates may vary from the actual values because of sampling variation or other factors. All statements made in this report have undergone statistical testing and are significant at the 90-percent confidence level, unless otherwise noted.

also accompany other disabilities such as in coordination, mobility limitations and para-, quadri- and hemiplegia (strokes).

Potential Environmental Problems:

- Substantial walking distances without resting places; stairs; lack of handrails, grab bars, and other supports
- Heavy weight doors with door opening forces > 5lbs.
- Revolving doors, elevator doors which close rapidly, and automatic doors
- Escalators
- Crosswalk signals set for 70th percentile or 240 ft./min. or faster (While most people move 300 ft./min, many elderly individuals and small children move 150 - 180 ft./min.).
- Stairs and inclined slopes of surfaces.
- Remote parking spaces or lengthy routes of travel.
- Exterior and interior surface materials that are smooth not textures, polished not non-slip, textured but irregular or in disrepair
- Excessively high or excessively low temperature variables depending on climate and context.
- Entering and exiting spaces and places, for example, doors, door opening forces, etc.

iv. LIMITED USE OF LOWER EXTREMITIES:

Census 2000 counted 49.7 million people with some type of long lasting condition or disability. They represented 19.3 percent of the 257.2 million people who were aged 5 and older in the civilian non-institutionalized population — or nearly one person in five. Within this population, Census 2000 found: 21.2 million (8.2 percent) with a condition limiting basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying. [13] Over 1.6 million Americans use wheelchairs, and an unknown but growing number use scooters, canes are the most common mobility aid. Statistics from the WHO were not available.

Difficulty In Using Lower Extremities: People who walk with difficulty due to disability, stroke, age, and who may use mobility aids (canes, walkers, crutches); people who have prosthetics; people who shuffle, limp, drag feet; people who have difficulty sitting, bending, kneeling.

[13] US Census: Disability Status 2000, US Census Bureau Information Brief March 2003. The estimates are based on responses from a sample of the population conducted by the US Census Bureau 2000. As with all surveys, estimates may vary from the actual values because of sampling variation or other factors. All statements made in this report have undergone statistical testing and are significant at the 90-percent confidence level, unless otherwise noted.

Potential Environmental Problems that can influence Functioning with Limited Use of Lower Extremities:

- Ground surfaces and changes in surface elevation including curbs and walkways.
- Stairs and inclined slopes of surfaces.
- Remote parking spaces or lengthy routes of travel.
- Exterior and interior surface materials that are smooth not textures, polished not non-slip, textured but irregular or in disrepair
- Toilet and bathing facilities
- Seating in theaters, stadiums be they furnished or natural, for example, amphitheaters.
- Location of controls and hardware
- Lack of handrails
- Excessively high or excessively low temperature variables depending on climate and context.
- Entering and exiting spaces and places, for example, doors, door opening forces, etc.

Inability to Use Legs and Feet: People who do not walk due to disability include, but are not limited to the following: wheelchair users; people with limitations of upper extremities and trunk coordination, limitations of stamina, sensory loss, etc. Functioning and performance may also be impacted due to physiological dysfunction such as sitting for long periods of time (our bodies are designed to operate perpendicularly); excessive hydration or dehydration (keeping kidneys flushed), overactive bladder problems, sitting sores, and burns.

Potential Environmental Problems:

- Remote parking spaces or lengthy routes of travel
- Limited space for maneuvering and minimal clearances, such as aisles, doorways, etc.
- Stairs and inclined slopes of surfaces.
- Exterior and interior surface materials that are smooth not textures, polished not non-slip, textured but irregular or in disrepair
- Toilet and bathing facilities
- Seating in theaters, stadiums be they furnished or natural, for example, amphitheaters.
- Location of controls and hardware
- Lack of handrails
- Excessively high or excessively low temperature variables depending on climate and context.
- Entering and exiting spaces and places, for example, doors, door opening forces, etc.

6. INTERPERSONAL INTERACTIONS AND RELATIONSHIPS:

This Functional Category focuses on interpersonal and environmental relationships with other persons that an individual might encounter while experiencing a building, place, or space.

i. Traveling with a Child – when traveling with children be they toddlers or children under 12 years of age, attention may be focused on the child instead of the environment. Young children may present additional functional challenges including carriages, need for changing rooms, verbal irritability that results in crying, screaming, or yelling, and child safety.

ii. Traveling with another Person – when traveling with another person, the individual experience of a building, place or space, may be compromised due to interaction with the other person (i.e. talking while moving through a building or space, focus on the other person's enjoyment of the experience).

iii. Traveling with a Group of People – when traveling with a group of people the experience of a place may be more about the group interaction dynamic than whether the space is performing to the needs of all members of the group.

iv. Traveling with a Group of People w/ children - when traveling with a group of people the experience of a place may be more about the group interaction dynamic than whether the space is performing to the needs of all members of the group. When the dynamic of children are combined in this category the additional challenges of carriages, need for changing rooms, verbal irritability that results in crying, screaming, or yelling may challenge the built environment beyond reasonable performance measures.

v. Traveling with Elders – traveling with elders can offer many of the challenges associated with other Functional Categories. The added functional dynamic is the person's focus on the elder as they navigate through and experience the environment and their safety in doing so.

7. LEARNING AND APPLYING KNOWLEDGE:

Learning and applying knowledge of your own experience of a building, place, or space, can be a rewarding experience within the diverse age and ability spectrum. Human nature allows humans the ability to absorb experiential information and to process that information as a means to comprehend and experience the human's relationship to the environment and surrounding to their full potential. In many of the Functional Categories, impairments have been identified that can challenge the diverse age and ability spectrum of persons. The importance of this measure of performance is to draw attention to the complex nature of human experience and to stress the varying levels at which

people learn and process experiential information dependent on *Functioning* and *Disability*. [14] The following are examples of ways in which an individual may learn and apply that learned knowledge in the experience of a building, place, or space.

i. Acquiring your way around a building, neighborhood, or city
ii. Acquiring a working knowledge of wayfinding systems and patterns
iii. Acquiring an understanding of mass transit systems in relationship to landmarks and known places
iv. Acquiring understanding of place through climate and terrain
v. Acquiring understanding of place through social institutions, attitudes towards all persons, and laws
vi. Acquiring understanding of phenomenological experience of place
vii. Acquiring new ways to communicate to all persons (be they young, old, or disabled)

[14] IBID