A Theoretical Framework for Environmental Design Interventions to Support Neurodegenerative Disease Management

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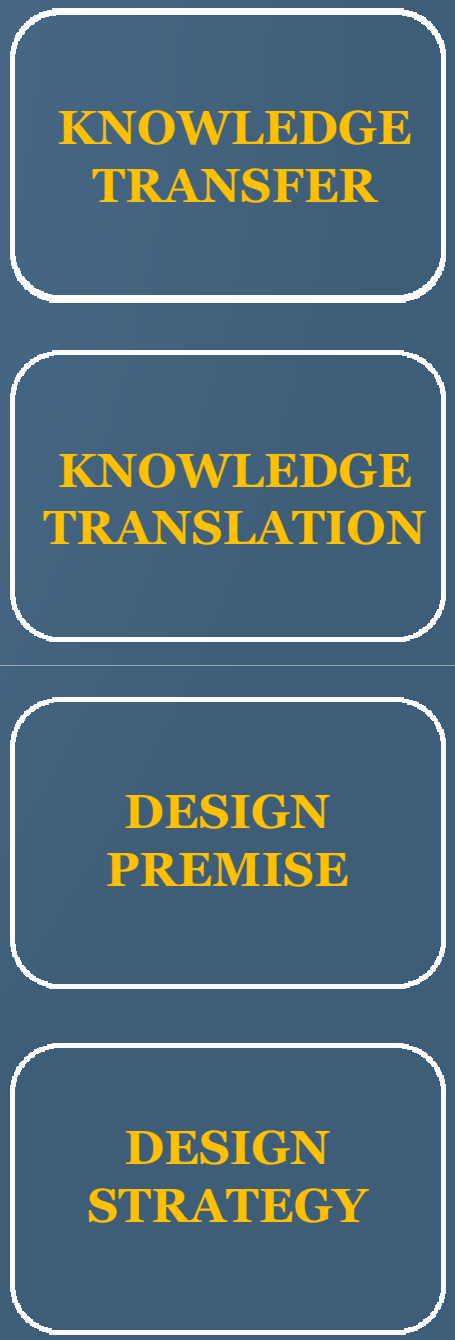


Facts and Futures

- *U.S. Population: 311,000,000*
- *U.S. Population age 45-64: 82,800,000*
- *U.S. Population age 65 and over: 41,400,000*

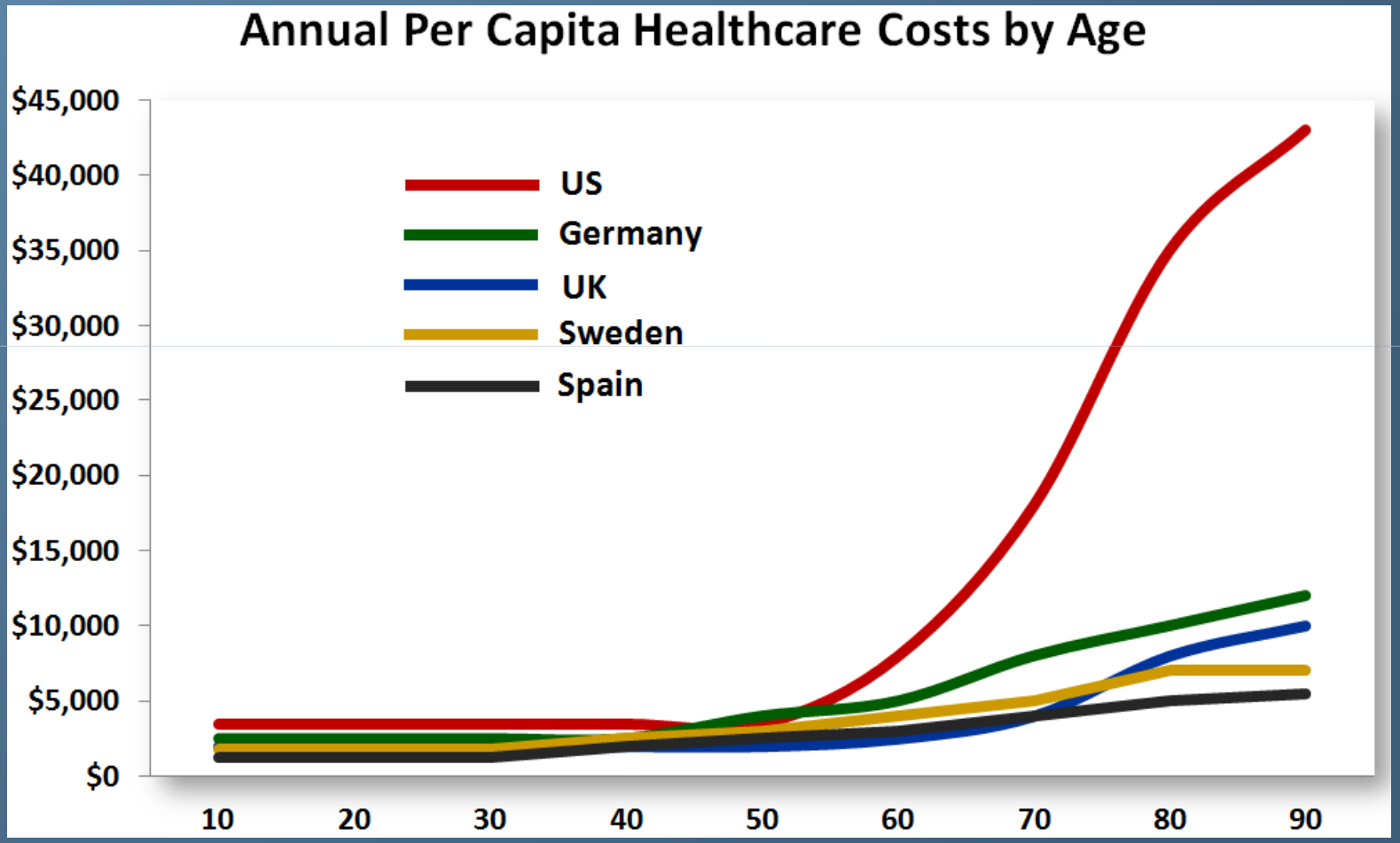
Age 45 and over represents 40% of the U.S. population

census.gov 2010

Every day more than 10,000 will reach the age of 65
Projected to occur every single day for the next 20 years

endoftheamericandream.com

U.S. Health Care Expenditures
18 % Gross of Domestic Product (GDP)



whitehouse.gov

2012 - The Year In Healthcare, forbes.com

Falls:
Leading Cause of Injuries Among Older Adults

- *direct costs to the U.S. health care system $30 billion per year*

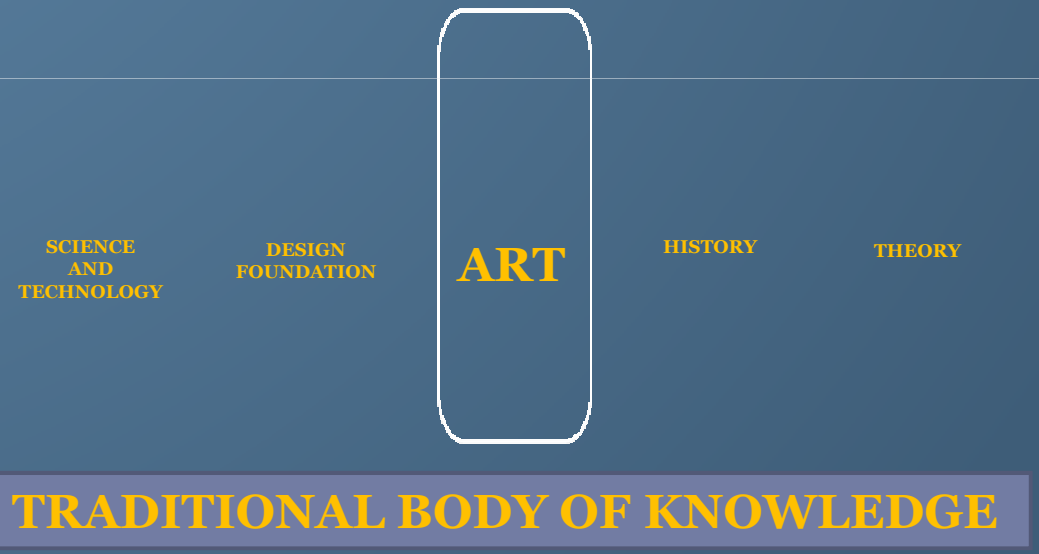
- *indirect costs include long-term disability, dependence on others, lost time from work, reduced quality of life, risk management, legal fees, and settlement awards*

- ***average cost per fall***

  $13,797 - $20,450

Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

Core competencies in professional education and practice grounded in an artistic tradition



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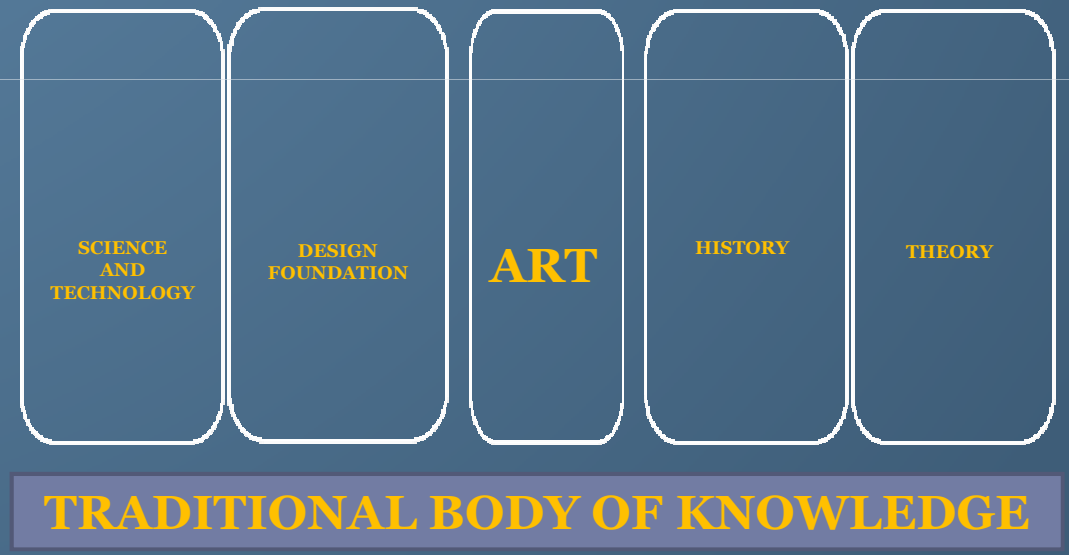

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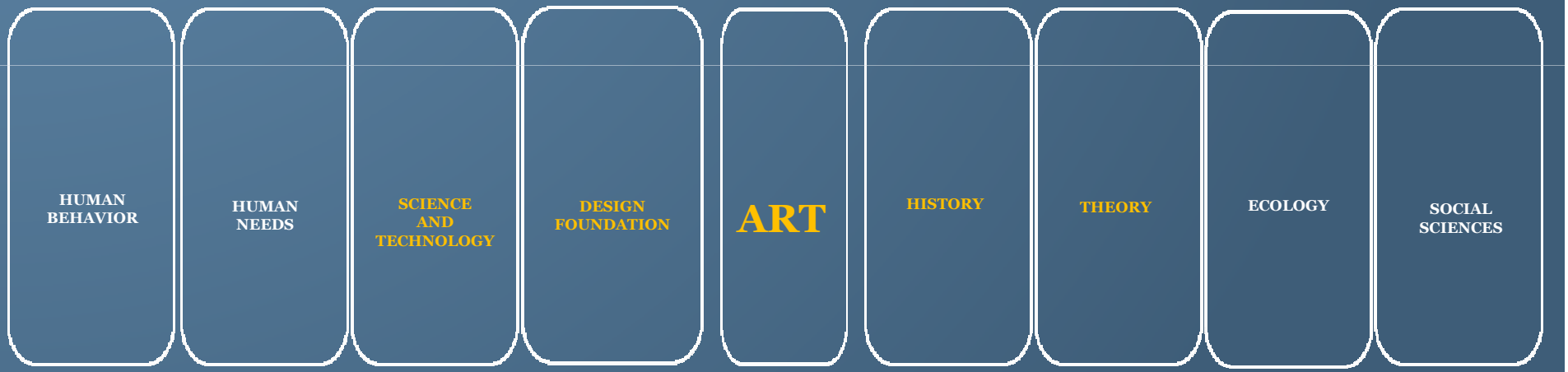
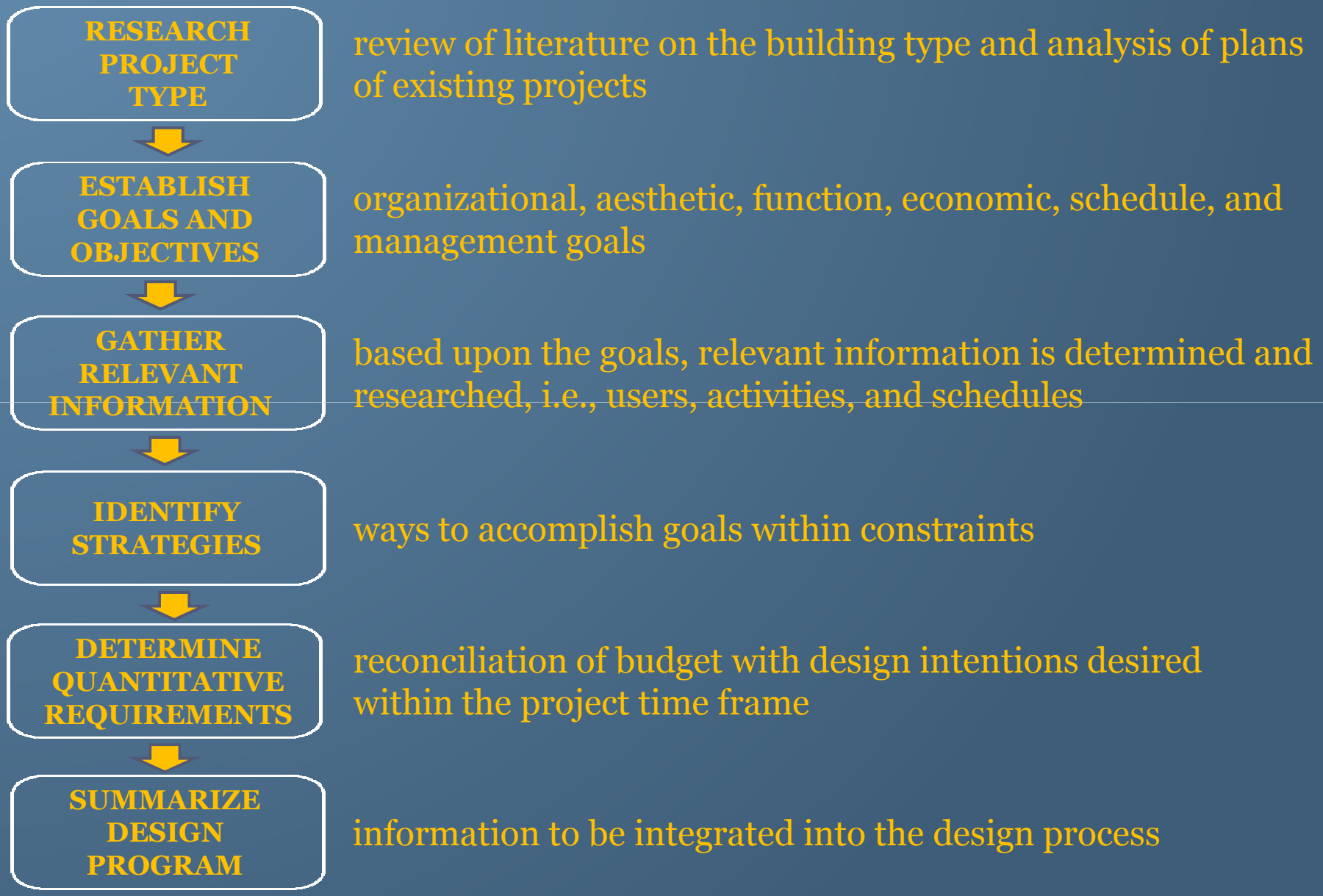


TRADITIONAL BODY OF KNOWLEDGE

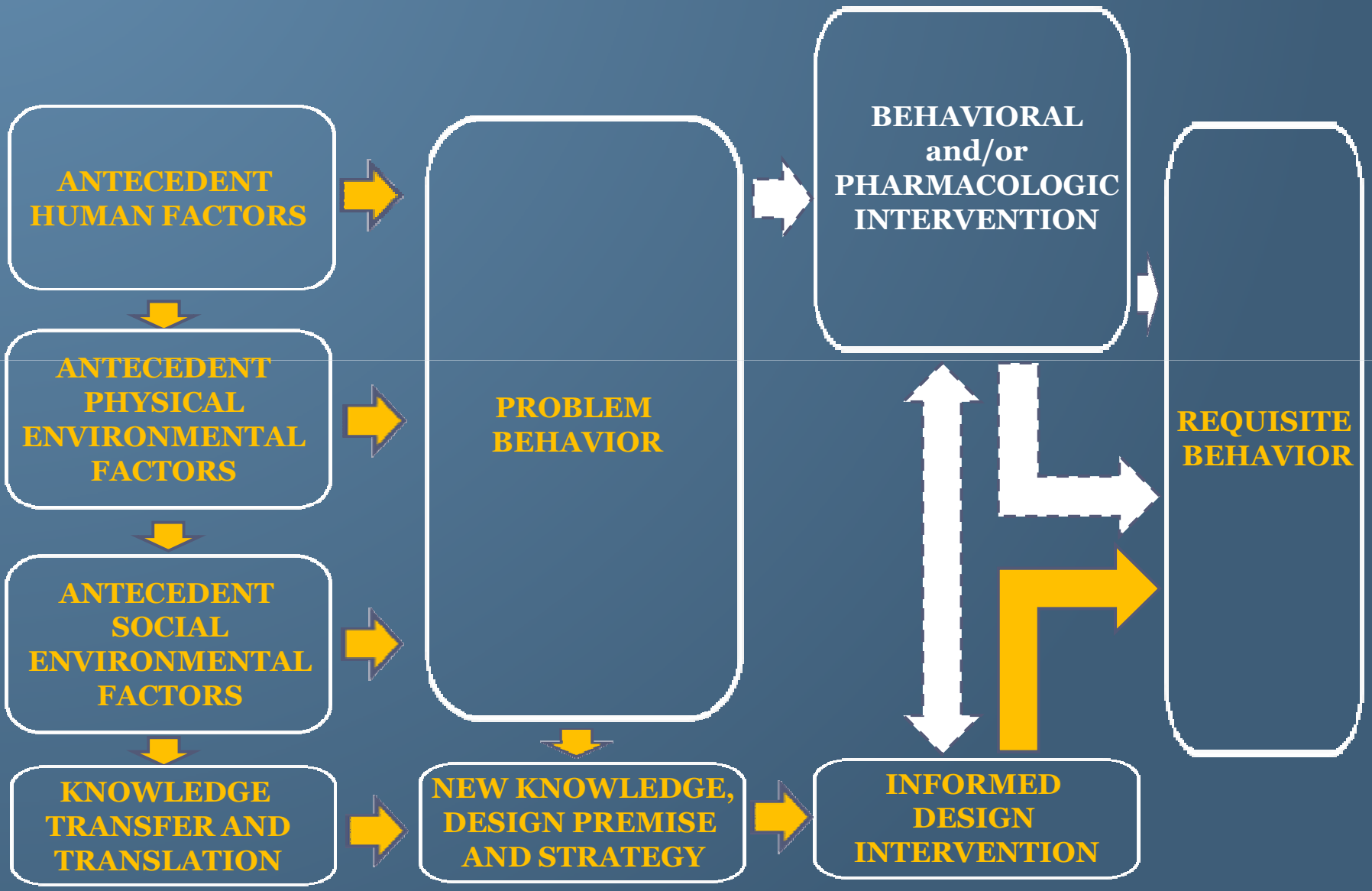
TOWARD 21st CENTURY BODY OF KNOWLEDGE

Adapted from S. Caan, 2014

Essential elements of design programming



Environmental design intervention strategy to support neurodegenerative disease management



DEMENTIA

- *1 Delusions*
- *2 Hallucinations*
- *3 Agitation/Aggression*
- *4 Depression/ Dysphoria*
- *5 Anxiety*
- *6 Elation/Euphoria*
- *7 Apathy/Indifference*
- *8 Disinhibition*
- *9 Irritability/Lability*
- ***10 Aberrant Motor Activity***
- *11 Sleeping And Nighttime Behavior Disorders*
- *12 Eating Disorders*

Adapted from The Neuropsychiatric Inventory
Jeffrey L. Cummings, MD

1. Aberrant Motor Behavior

1.1 PROBLEM BEHAVIOR

- agitation and irritability
- lack of concentration
- difficulty with balance management and falls, postural instability
- restlessness
- wandering
- night wandering and confusion
- slips and falls (common cause of injury and death among the elderly)

1.2 ANTECEDENT HUMAN FACTORS

- aging process
- diminished physical functions
- muscle tension, stiffness or rigidity of the arms, legs, or trunk
- diminished psychological functions
- retinal dysfunction (the increase of both contrast and brightness occurs in the image projected onto their retina)
- psychoactive drugs

1.3 ANTECEDENT PHYSICAL ENVIRONMENTAL FACTORS

- lighting inappropriate to spatial function
- confusing surroundings
- excessive sensory stimulation

1.4 ANTECEDENT SOCIAL ENVIRONMENTAL FACTORS

- excessive demands from family, friends, etc.
- distressing behavior of others
- loneliness/boredom and social isolation

1. Aberrant Motor Behavior

1.5 DESIGN PREMISE

- under daylight condition older adults take more confident steps
- under nightlight condition adults take more cautious steps
- daylight equivalent lighting may help decrease risk of falling

1.6 DESIGN STRATEGY

- design fall preventive milieu that supports balance recovery
- specify high intensity lighting with a highly correlated color temperature emitted by ceiling-mounted luminaires to positively influence restless behavior
- specify floor surfaces to support traction
- specify transitional floor surfaces to avoid abrupt changes in surface friction or surface heights
- integrate clear sight lines to spatial destinations
- specify contrasting colors to enhance depth perception

  integrate combinations of daylight equivalent lighting (fluorescents) to generate diffused light and incandescent single point spot and flood lighting to enhance color, texture and form

Conclusion

- *we spend approximately 90 % of our time inside buildings **
- *building interiors constitute a multisensory experience from which the brain acquires and uses new and retained information to direct behaviors ***
- *neuroscience identifies and explains brain functions relevant to multisensory experience*

* Environmental Protection Agency

** Thomas Albright, Salk Institute

- *interior design interfaces building performance with human performance*

- *design intervention (vs. design interference) to support neurodegenerative disease management requires the transfer and translation of current knowledge to advance toward a health care responsive methodological paradigm*