Technology Design for Older Adults

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How can technology ENHANCE the lives of older adults... ...by enabling, augmenting, empowering, advancing, energizing, engaging, etc.?

- Develop strategies to match technology support with active engagement
- Balance between technology support, augmentation, replacement
- Develop technologies to challenge and enhance functional capabilities
- Focus on issues of motivation, self-efficacy, integration, engagement, safety, privacy, social connectedness

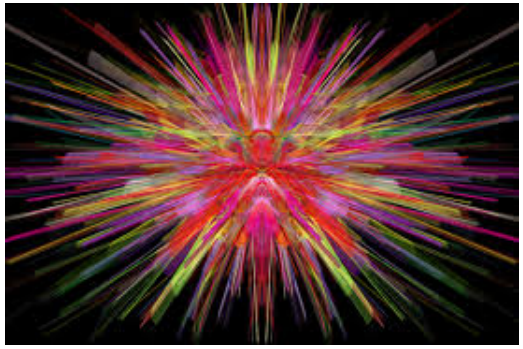
Human Factors and Aging Laboratory: Support Independent (Successful) Aging

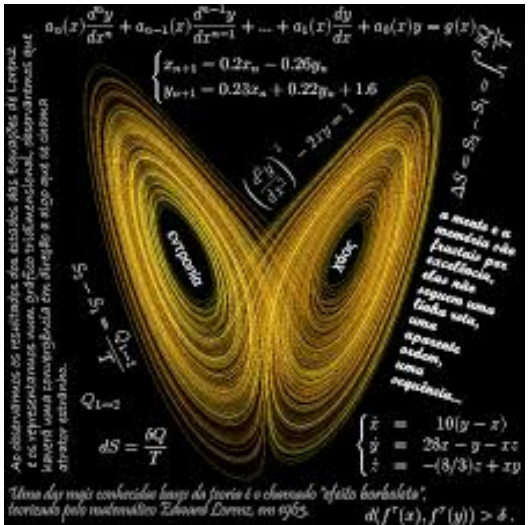
- Allow individuals to function effectively and independently as they age.
- Maintain personal autonomy.
- Retain *and enhance* ability to function in later life.

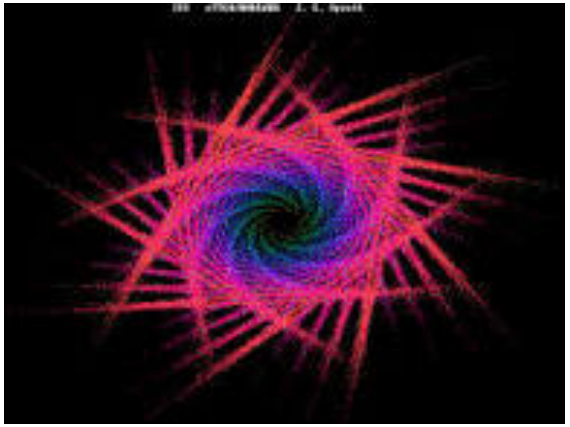
❖ Contributors to healthy aging and are thus laudable goals but challenging to accomplish…

Theme of my remarks….

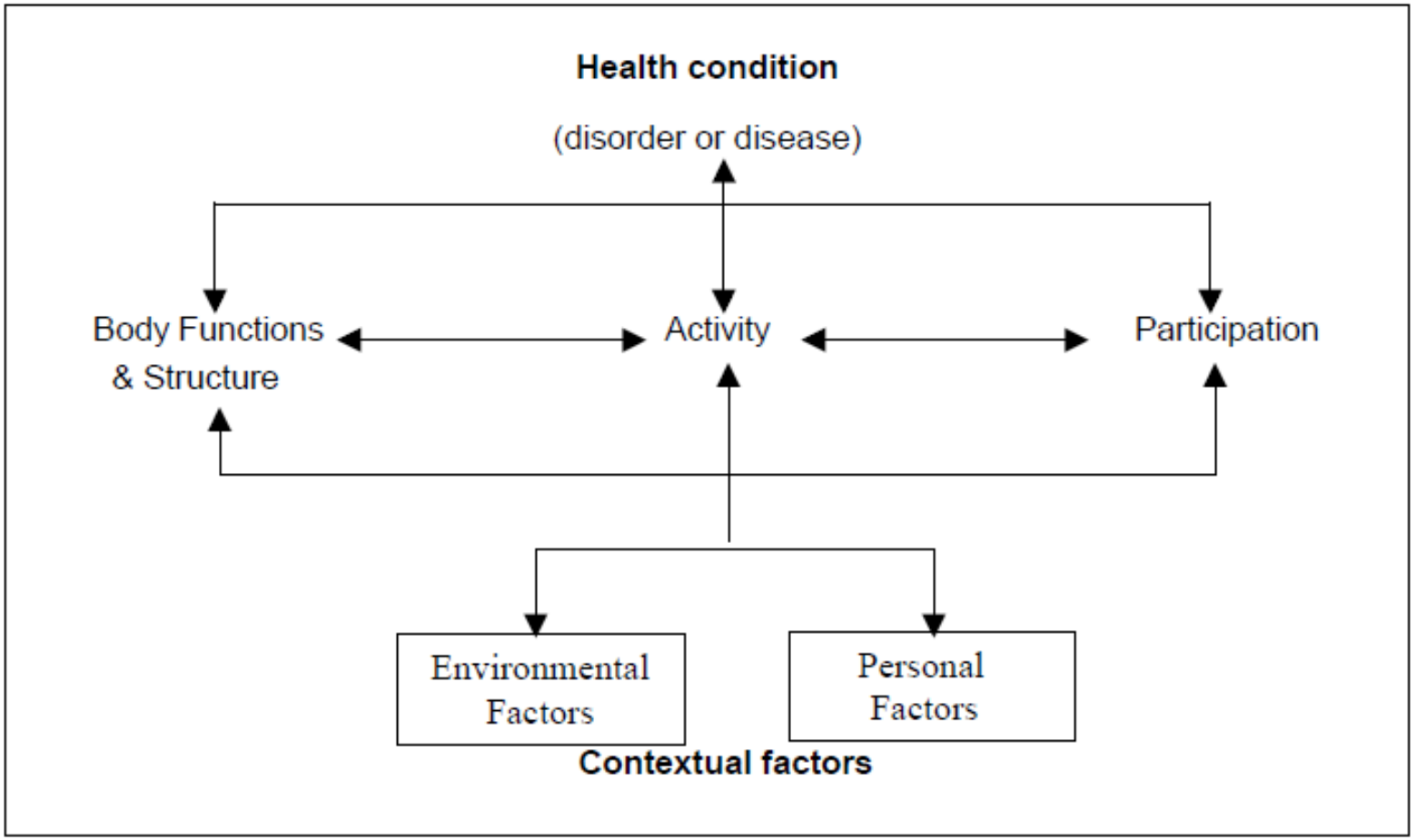
- Embrace the complexity of the problem of designing technology for older adults!



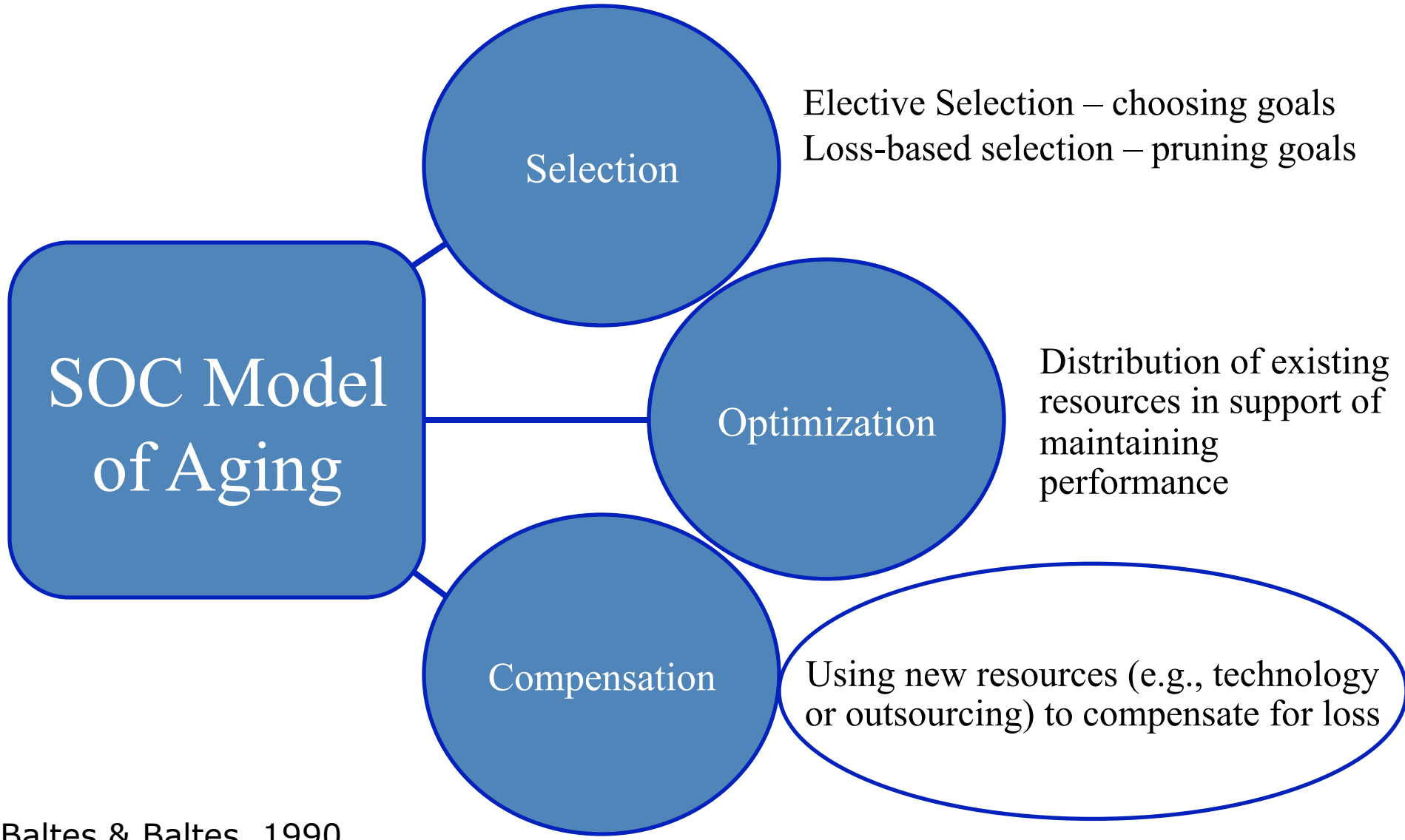




- Guided by World Health Organization's International Classification of Functioning, Disability and Health (ICF)
  - Disability as a continuum
  - Activity and participation as equal goals

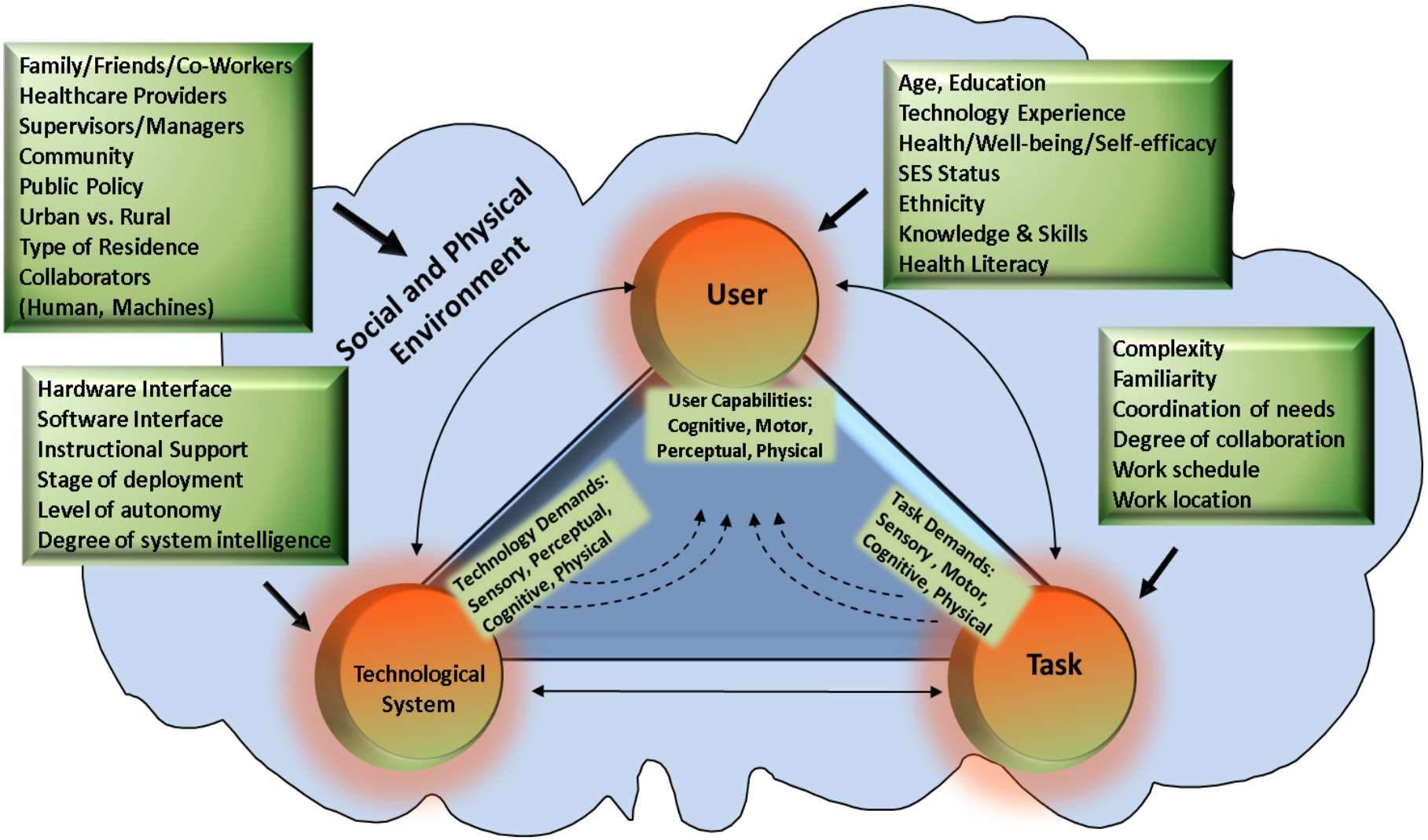


Response to challenges of aging



Baltes & Baltes, 1990

CREATE Model of the Human/Technical System



Fisk, Rogers, Charness, Czaja, & Sharit (2009)

EXAMPLE OF DESIGNING ROBOTS FOR OLDER ADULTS

How do we design robots to support healthy aging?

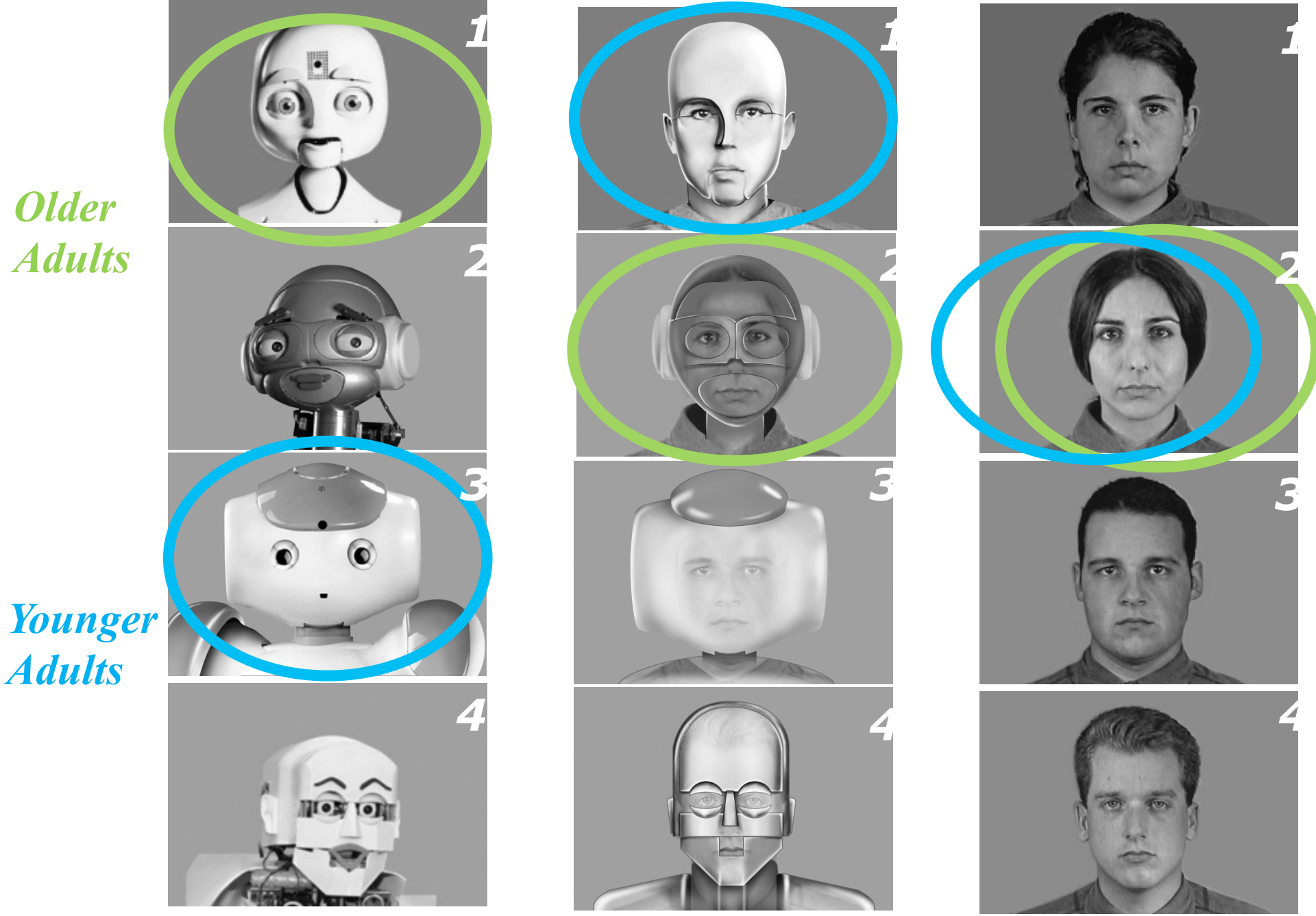
- What do robots need to do?
  - Communicate with humans
  - Perform tasks for/with the person
  - Be trustworthy
  - Provide social support
  - Have an appearance people like

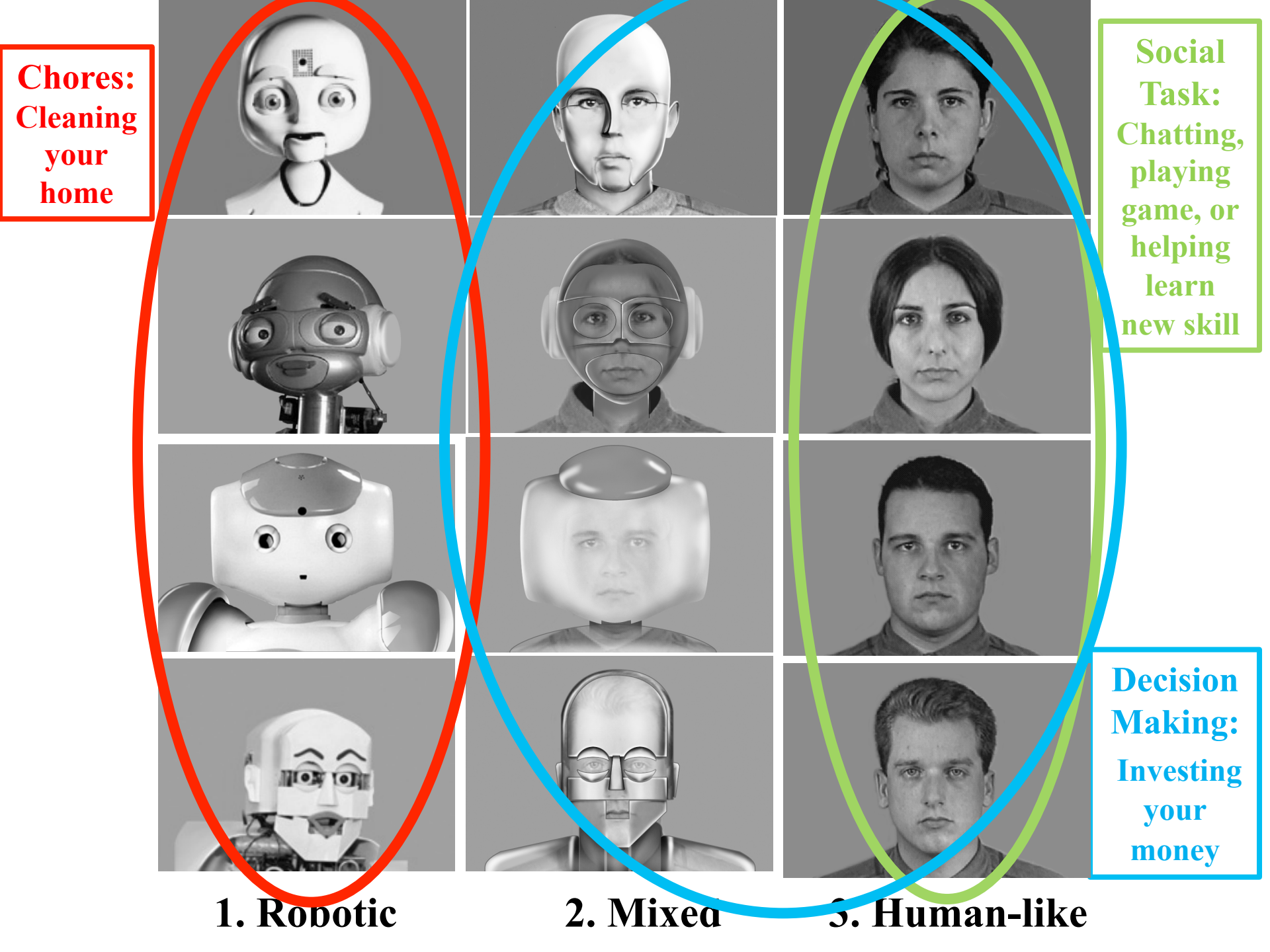
- Multi-faceted problem
- Solution success depends on:
  - understanding older adults' capabilities, limitations, needs, preferences, attitudes
  - involving older adults in process of development and testing

What do people want their personal robots to look like?

It depends…

Prakash & Rogers (submitted)

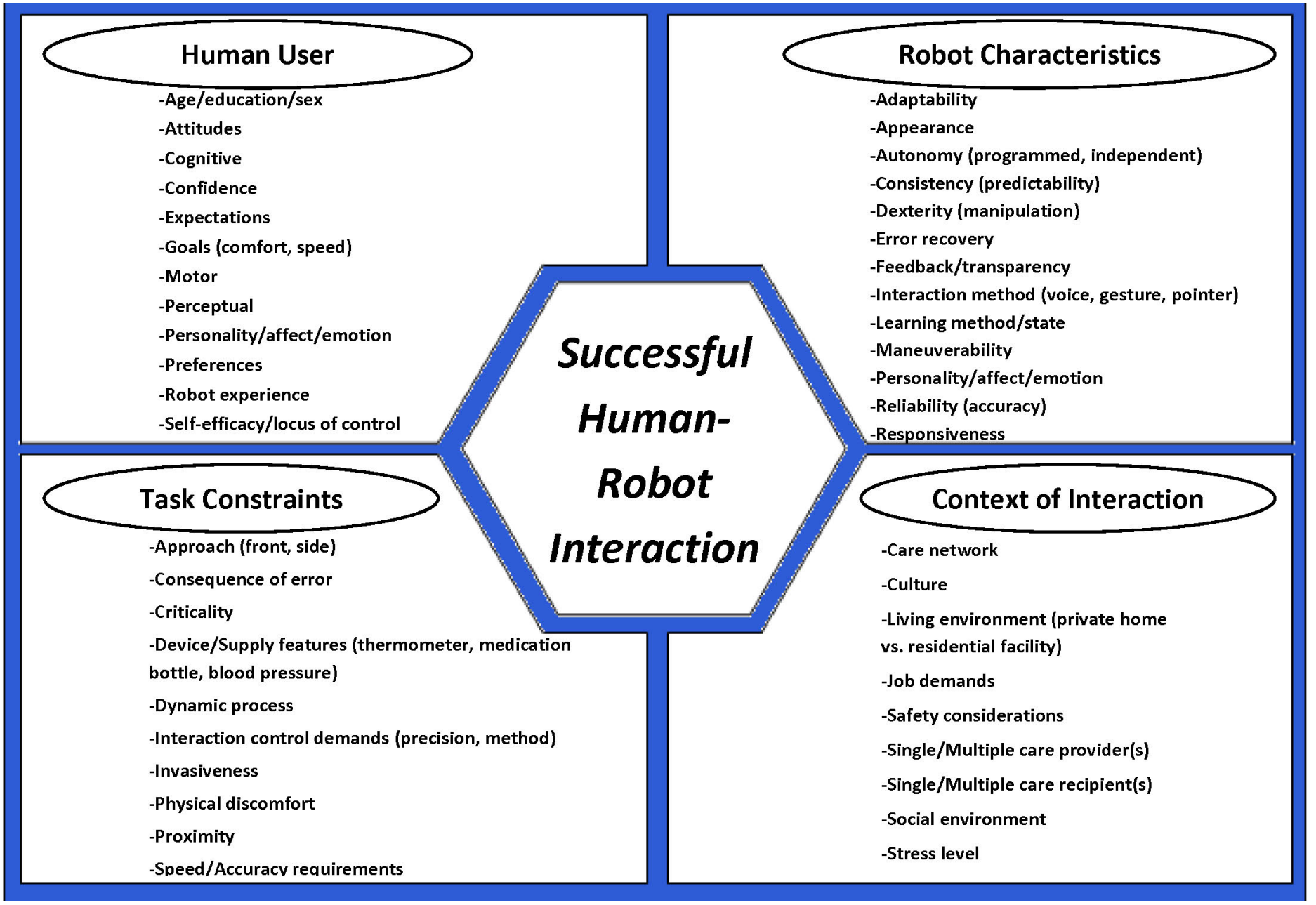

Older Adults
Younger Adults
Robotic
Mixed
Human-like


Chores: Cleaning your home
Social Task: Chatting, playing game, or helping learn new skill
Decision Making: Investing your money
1. Robotic
2. Mixed
3. Human-like

Importance of Appearance

- What people want their robot to look like differs for:
  - Younger and older adults
  - Different types of tasks
- Have to consider the humans and the diversity of human needs and preferences
  - This understanding will facilitate the design of the most appropriate robots that will add to the functional capabilities of older adults

Framework for Human-Robot Interaction in Healthcare Contexts



Human User

-Age/education/sex

-Attitudes

-Cognitive

-Confidence

-Expectations

-Goals (comfort, speed)

-Motor

-Perceptual

-Personality/affect/emotion

-Preferences

-Robot experience

-Self-efficacy/locus of control

Robot Characteristics

-Adaptability

-Appearance

-Autonomy (programmed, independent)

-Consistency (predictability)

-Dexterity (manipulation)

-Error recovery

-Feedback/transparency

-Interaction method (voice, gesture, pointer)

-Learning method/state

-Maneuverability

-Personality/affect/emotion

-Reliability (accuracy)

-Responsiveness

Task Constraints

-Approach (front, side)

-Consequence of error

-Criticality

-Device/Supply features (thermometer, medication bottle, blood pressure)

-Dynamic process

-Interaction control demands (precision, method)

-Invasiveness

-Physical discomfort

-Proximity

-Speed/Accuracy requirements

Context of Interaction

-Care network

-Culture

-Living environment (private home vs. residential facility)

-Job demands

-Safety considerations

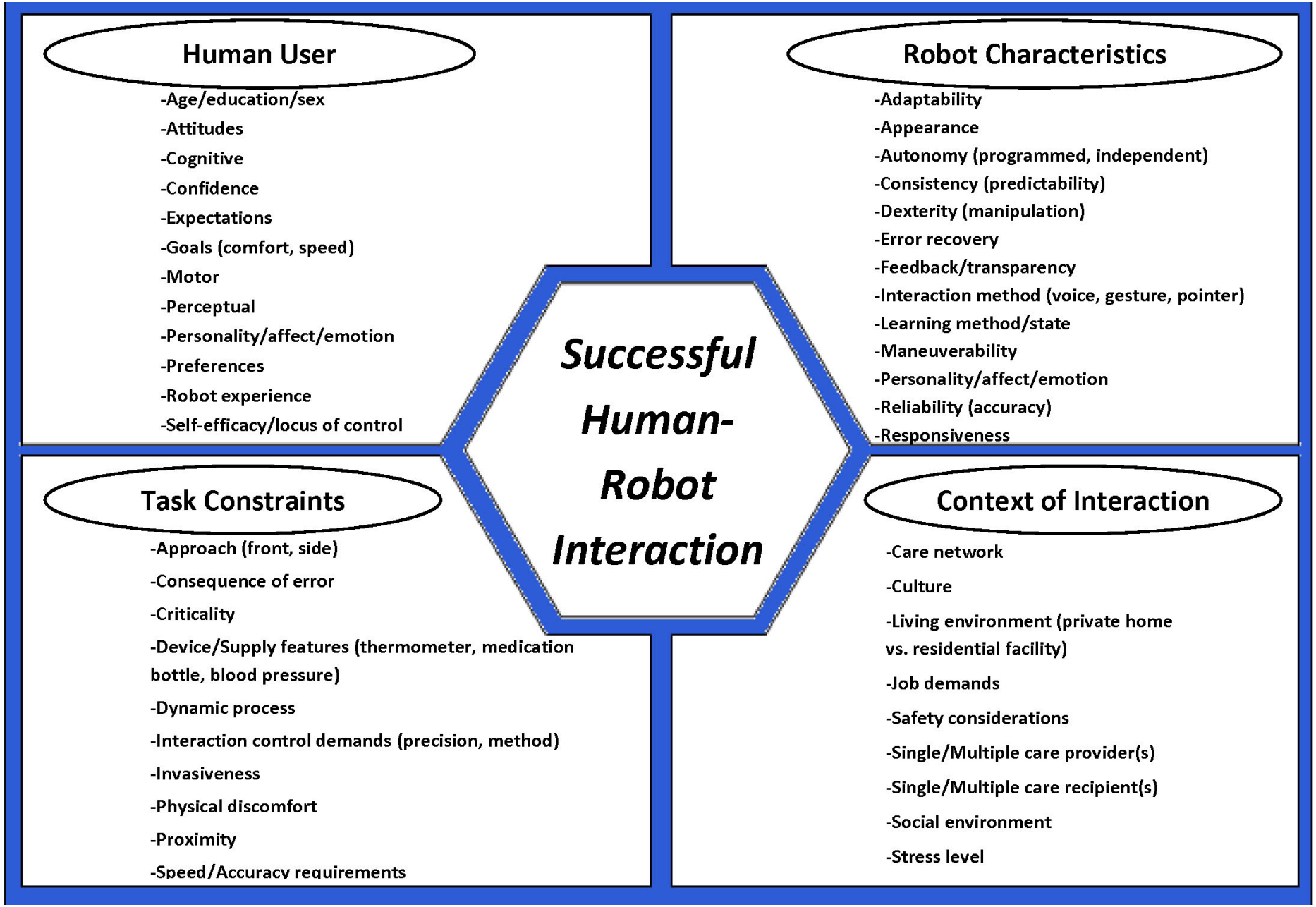
-Single/Multiple care provider(s)

-Single/Multiple care recipient(s)

-Social environment

-Stress level

Framework for Human-Robot Interaction in Healthcare Contexts



Conclusion

- Recognize the complexity of
  - Human-Technology Interaction
  - Human-Computer Interaction
  - Human-Automation Interaction
  - Human-Robot Interaction
- Challenging but solvable problems
  - Need to be guided by theory
    - Systematic and comprehenisve approach
    - Develop generalizable solutions (not technology-specific)

Center for Research and Education on Aging and Technology Enhancement (www.create-center.org)

National Institute on Aging (National Institutes of Health) PO1 AG017211

Technologies to Support Successful Aging with Disability (www.TechSAge.gatech.edu)

National Institute on Disability and Rehabilitation Research (Department of Education) ***Grant H133E130037***