Human Factors:
How do Humans Interact with AI/ML Devices?

Patient Engagement Advisory Committee
Artificial Intelligence and Machine Learning
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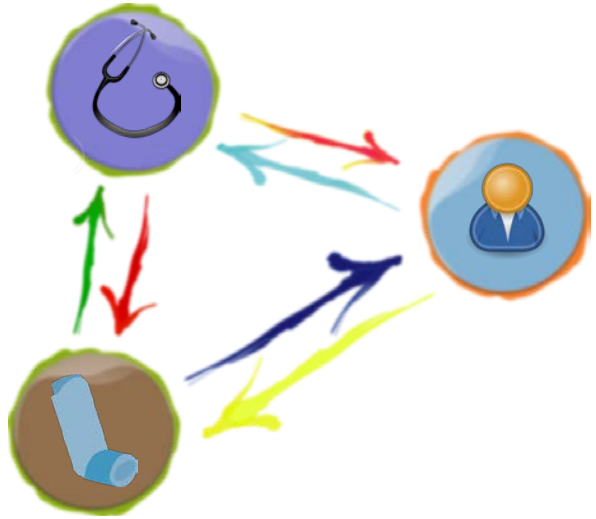
What is Human Factors (HF)?

Human factors is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.



International Ergonomics Association (IEA)

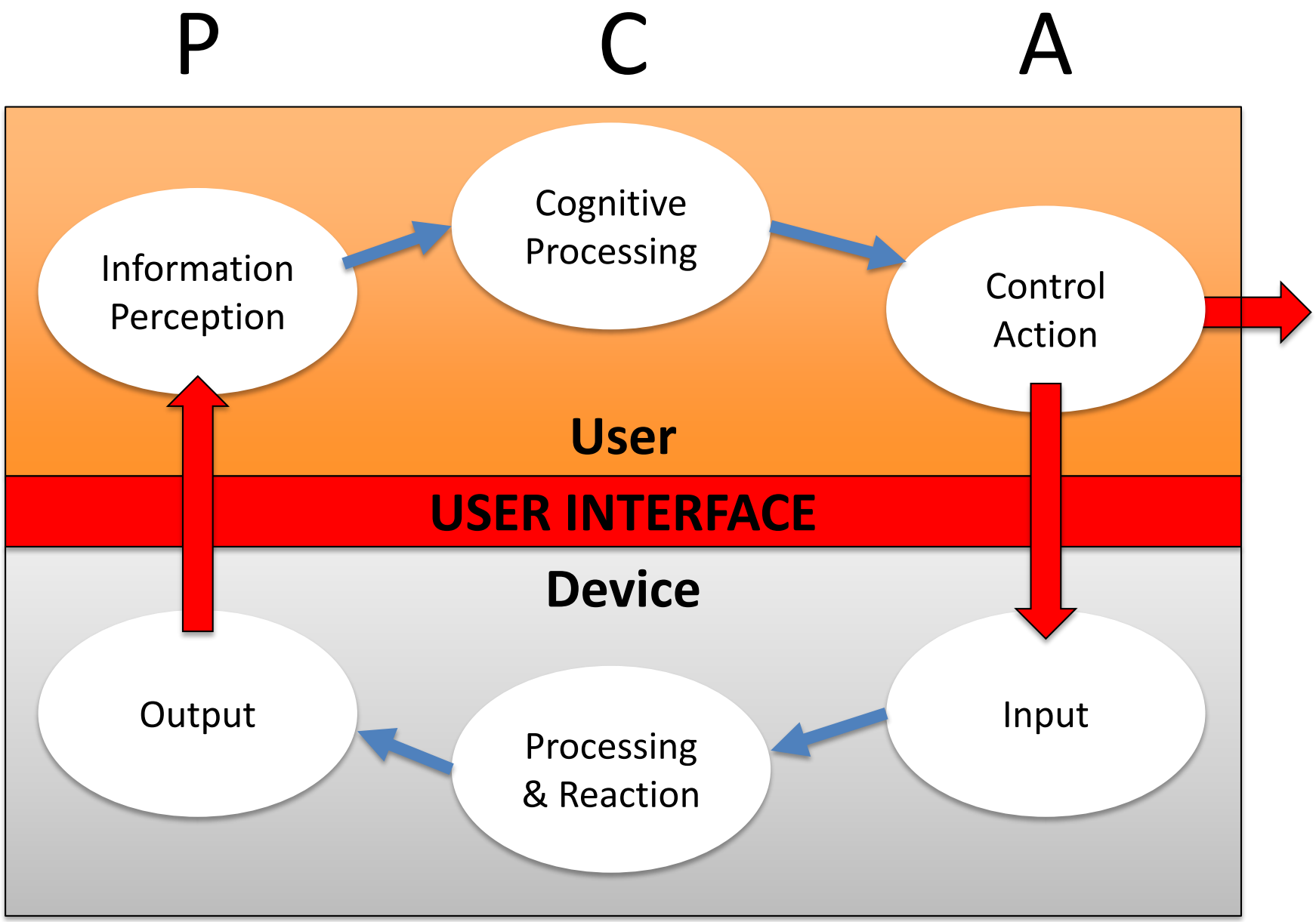
Goals of incorporating HF

- Adhere to regulatory requirements
- Provide the best possible user experience
- Combat the medical error problem[1]
  - Reduce risk of use errors resulting in harm or compromised medical care

[1] www.ncbi.nlm.nih.gov/books/NBK225187

P C A

PERCEPTION COGNITION ACTION



Adapted from Redmill and Rajan, 1997

Use-related risks with AI/ML devices

- Skill degradation → decline in device user's ability to seek or process information, make decisions, or execute on choices due to automation

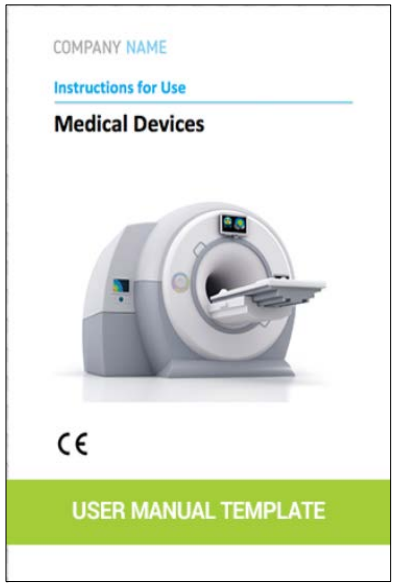
- Automation bias → the tendency for users to exhibit greater trust in information from AI/ML technology without verification

- Automation mistrust → user does not trust the output of a system and assumes manual control or decision-making responsibilities

Use-related risk mitigation/control

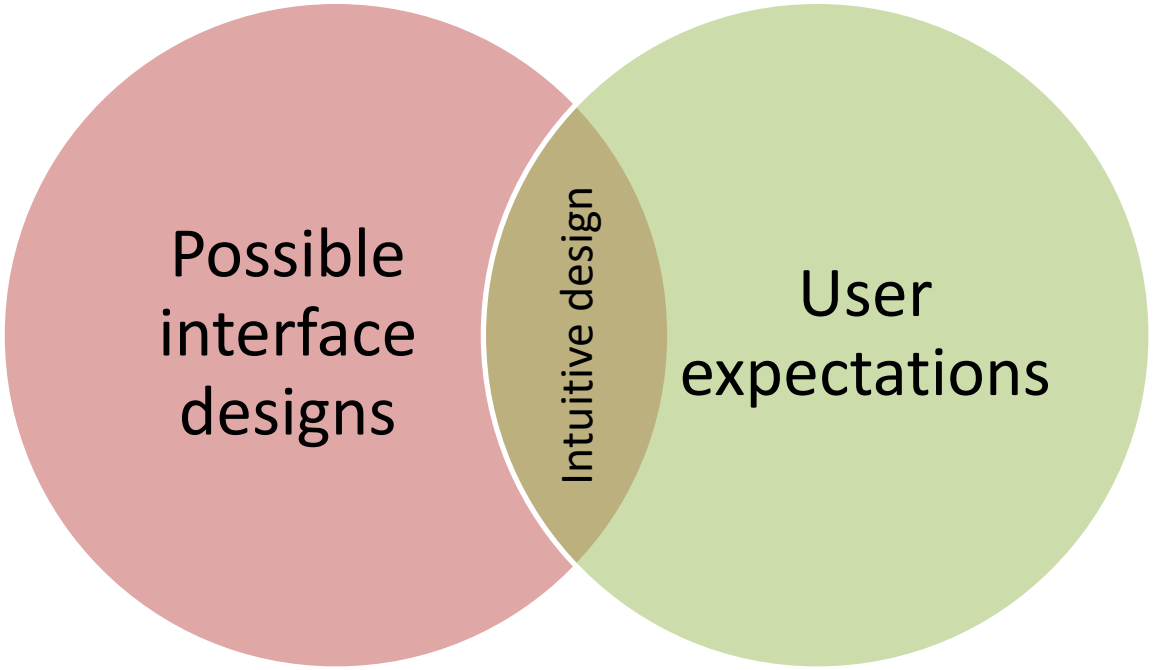
Safety by design

Protective measures



Information for safety

Human Factors Process Flowchart



EIGHT STEPS TO AN INTUITIVE UI

STEP	DEFINITION	ACTIVITIES	WHAT TO AVOID
Discoverability	Finding features when needed	Make starting point obvious; initial samples	Poor layout, too many competing options
Affordance	Suggests how to perform the action, eg. button	Use visual metaphors, consistency	Unnecessary real-world decorations
Comprehensibility	Meaning and effect of elements are understood	Use simple language, explicit terms	Jargon, need for memorisation
Responsive feedback	Clear, immediate indication of state, results	Show success or failure of action	Colour confusion
Predictability	Foresee results before action; meet expectations	Consistency with user mental models	Confusion due to surprising results; side effects
Efficiency	No unnecessary interaction or repetition	Clustering based on usage; defaults	Poor layout and sizing, incorrect defaults
Forgiveness	Preventing mistakes; easy recovery	Reduce impact and likelihood of mistakes	Focusing only on the 'happy path;' no margin for error
Explorability	Use without fear of getting lost or making mistakes	Confirm destructive actions	Unclear navigation model

Intuitive Design: Eight Steps to an Intuitive UI by Everett McKay

Human Factors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