INCOSE
Healthcare Working Group
5th Annual Systems Engineering in Healthcare Conference
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Minneapolis, MN

Let's make stuff better!

Using human factors and qualitative system analysis of healthcare systems to identify opportunities for medical device design

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Director

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Plan

01

Purpose

Share benefits of getting HF involved early (before formative testing)

02

Process

- The players
- Framework
- Methodology
- Stories

03

Payoff

New approach to product development & better fitting products

Agenda

The players
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Stories
Payoff

Hi, I’m Sam Alper!

Human factors and industrial engineering

Deep research background, developed and implemented quantitative and qualitative research methods

Ph.D. in Industrial and Systems Engineering, University of Wisconsin - Madison

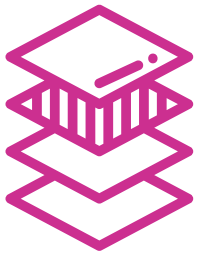
[bōld] adj.
showing an ability to take risks; confident and courageous

FULL-SERVICE UX RESEARCH AGENCY

Creative. Flexible. Research-minded.

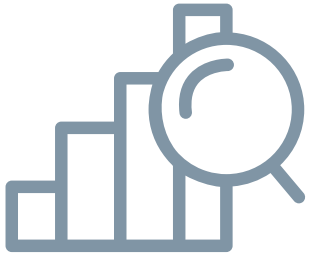
Explore

Understand the unmet needs of your customers



Design & Refine

Get feedback early and often



Measure

Assess current state to focus future development efforts

Self-Service for Patients. Automated for Care Teams. Great for the Bottom Line.

Patients and providers do better together with Wellbe's ConnectedCare™ solutions.

Wellbe delivers the digital solutions providers need to engage the connected consumer:

Guided Patient Navigation for Better Care Journeys

Automated Care to Scale Provider Productivity

Real-Time Insights from Patient-Generated Data

Wellbe wanted to:

- adapt their product to a new context
- delight their client.

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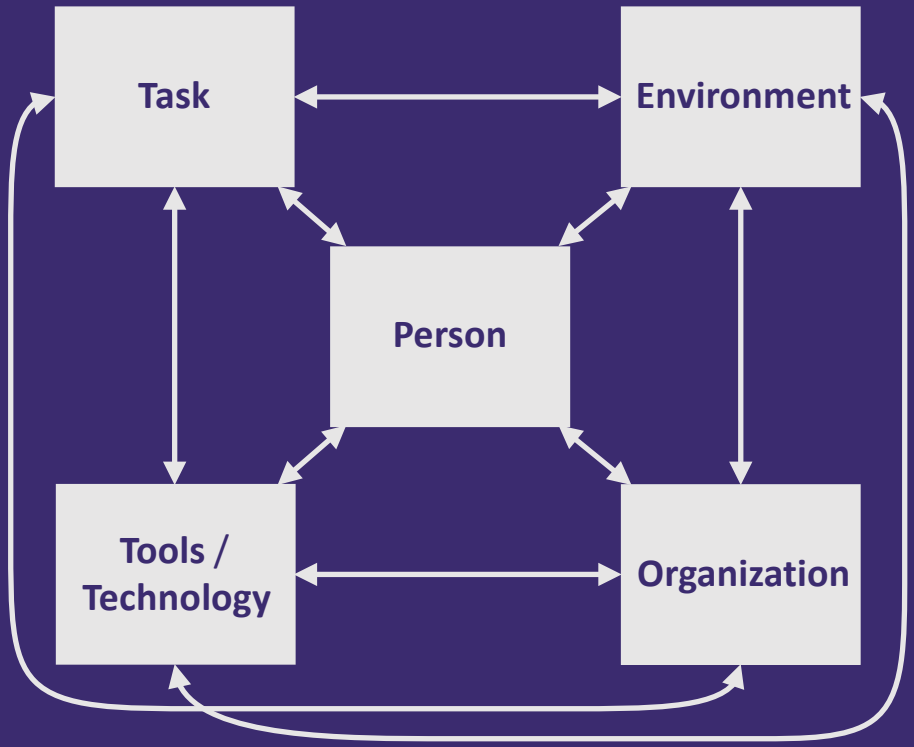
QUALITATIVE DATA COLLECTION

Explore qualitative methods for rapidly gathering information that can inform design

Improved system design

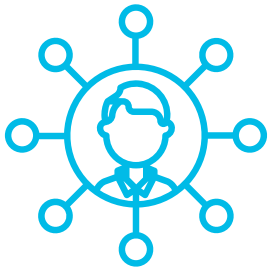
Improved device / tech design

WHAT SHOULD WE LOOK FOR WITHIN A SYSTEM?



Smith, MJ and Sainfort, PC. (1989). A balance theory of job design for stress reduction. International Journal of Industrial Ergonomics. 4(1): 67-79.

WHAT IS MACROERGONMICS?



HUMAN FACTORS / ERGONOMICS

Concerned with the fit between people and the world they live in.

MACROERGONOMICS

A sub-discipline of Human Factors / Ergonomics that is concerned with the fit between people and the organizations of which they are a part.

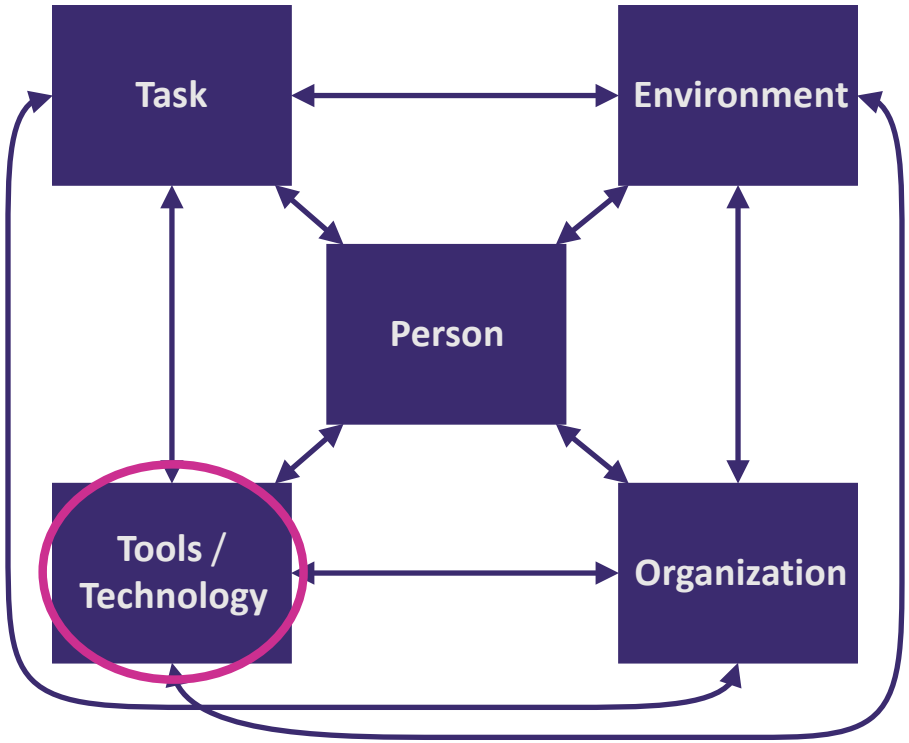
MACROERGONOMICS APPLICATIONS

Work system application

- Find gaps / challenges in work systems
- Determine methods to address those gaps / challenges

Device / tech design guidance

The same gaps / challenges in work systems may be addressed by introduction of a new device or technology



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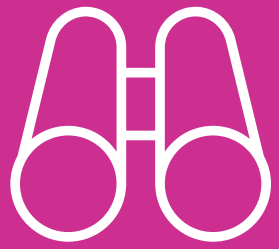
Observations



Enter an environment, record what you see, and experience

- Pros
  - Gather *in situ* information; it's "real data"
  - Get a feel for the environment
  - Information-rich environment

- Cons
  - Time required to get up to speed on the system / process
  - See what presents itself
  - Data recording issues
  - May not be able to ask questions during observations
  - Low-frequency events
  - Capture bits and pieces of the same process multiple times – difficult to merge into coherent whole
  - Time intensive!

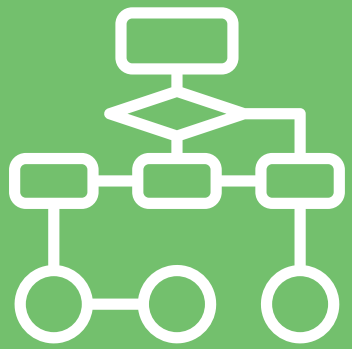
Interviews

Question and answer session with an individual who is native to the environment

- Pros
  - Can prepare questions in advance
  - Ability to ask follow-up questions
  - Increased control over the data collection

- Cons
  - No information on items not asked about
  - Lacks exposure to the “real” environment
  - Difficult to keep up with the interviewee’s narrative speed

Flow-charting interviews



Collaboratively develop a flowchart in real time with the interviewee

- Pros
  - Completeness of data collection is built into the process
  - Speed of interview progresses at the speed the flowchart is built
  - Information is organized in real time; data about different parts of the process can be put into the correct locations
  - Information is validated in real time by the interviewee
  - Gathers a great deal of process information quickly
  - Identification of gaps
  - Allows “foreshadowing” or “feedforward”
- Cons
  - Time consuming to take flowcharts from “first pass” to “edited and ready to share”
  - If not asked for, non-process factors may be omitted
  - Requires interviewer to be comfortable following the flow of the interview

Methodology

- Flow charting interviews
- Observations
- Further flow charting interviews
- Analyze and aggregate data and put together into “clean” flowcharts
- Examine flowcharts for gaps, challenges, safety issues, opportunities for error, opportunities for improvement

Bold Insight

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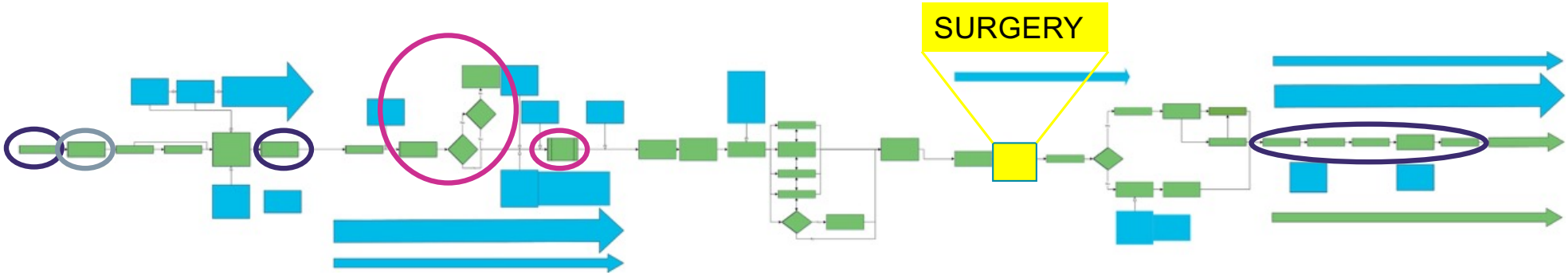
Identifying gaps in healthcare

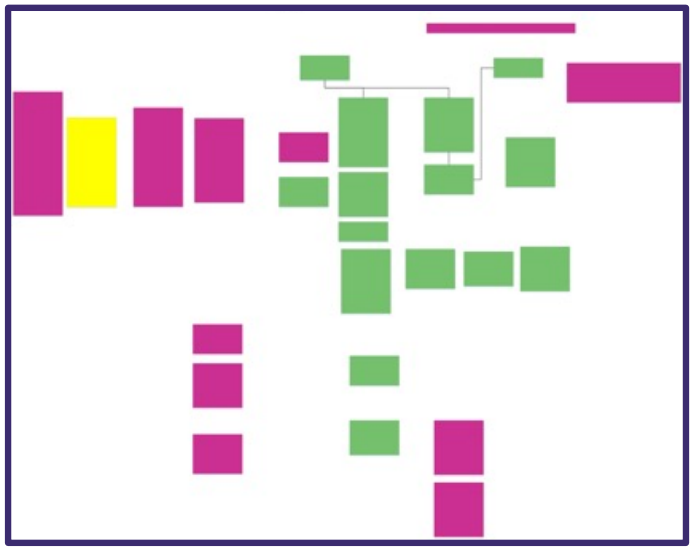
Inform technology design

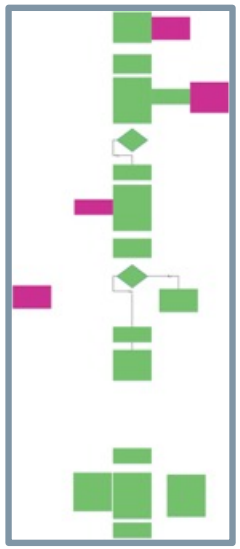
Work with Wellbe

- Goal to inform the design of Wellbe's product
  - How would Wellbe's solution fit into a new space?
  - What opportunities?
  - What challenges?
  - How can Wellbe gain buy-in?
- Hybrid of flowcharting interviews and observations with staff
  - Two days in clinic
  - One day in surgery center

Bold Insight


SURGERY





Other applications

- Healthcare processes
  - Hospital units
    - E.g., General medical surgical, oncology / hematology, NICU, PICU
  - Pharmacies
  - Surgery centers
- Spray foam installation
- Financial advisors
- Sales team’s sales process
- Website development company
- Attorneys
- Sandwich shop
- … and more

Bold Insight

Spray foam installation

Address quality problems

- Quality issues: Re-work was required for >50% of their projects
- Engaged in a process review with project manager using flowcharting interviewing
  - (2) 2-hour sessions
  - Focused on the beginning and end of the process
- Identified human factors issue related to quality checking processes
  - Resulted in a new device to increase quality for the company

Bold Insight

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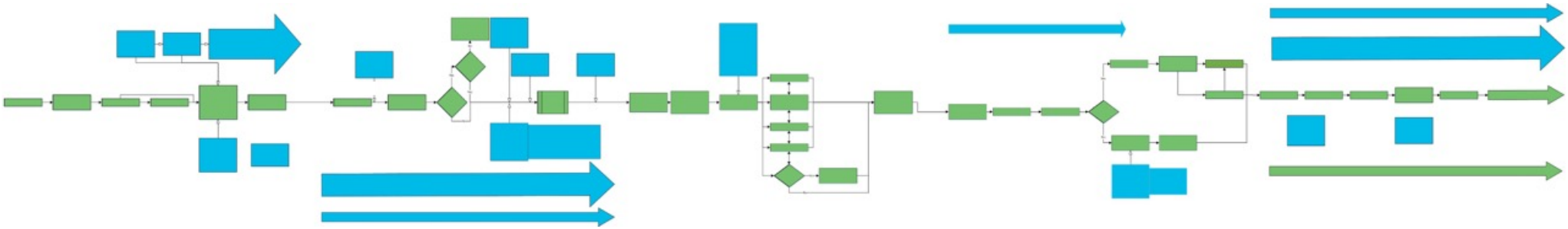

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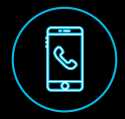
Thank you for attending!
Share your experiences at #HWGSEC

QUESTIONS

We are nerds about research. We love it. We love thinking about it.
Please reach out to Sam Alper for more information about Bold Insight.

boldinsight.com

Sam.Alper@boldinsight.com



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