

# Fix the System, Not the People

## *Using Human Factors to Strengthen QI*

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Quality Improvement Research Conference

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# Introductions



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# Disclosures

No relevant relationships: None of the presenters for this educational activity have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.



# Learning Objectives

1. Recognize common human factors vulnerabilities in healthcare systems that contribute to error and performance variability.
2. Analyze care processes using human factors tools (e.g., SEIPS model, system-focused observation) to identify system-level contributors to outcomes.
3. Differentiate between weaker and stronger improvement strategies and design more effective, system-focused interventions.

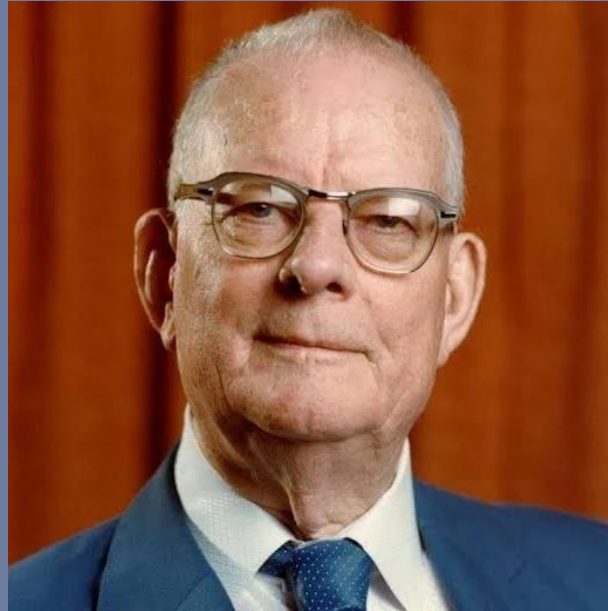


When a QI project struggles, what is the first intervention we usually reach for?

And how many of those rely on people remembering, learning, practicing, paying attention, or trying harder?



For different outcomes, redesign the system—not the people



Your system is perfectly designed to  
get the results you are getting

— W. Edwards Deming



# The QI Journey

## The Problem

Highlight alignment with strategic goals

## Baseline Data

Outcome and process measures

## Identify the Team

Who are the team members?

## Map the Process

How does the process currently take place?

## Cause of the Problem

Fishbone, driver diagram, pareto etc.)

## Develop the AIM statement

SMARTIE (specific, measurable, achievable, realistic, time bound, inclusive, equitable)

## Prioritize Interventions

Impact/Effort, PICK matrix

## PDSA plan(s)

Plan, Do, Study, Act

## Change data and evaluation of results

Adopt, Adapt, Abandon

## Sustain improvement and next step



Safe

Timely

Effective

Efficient

Equitable

Patient Centered

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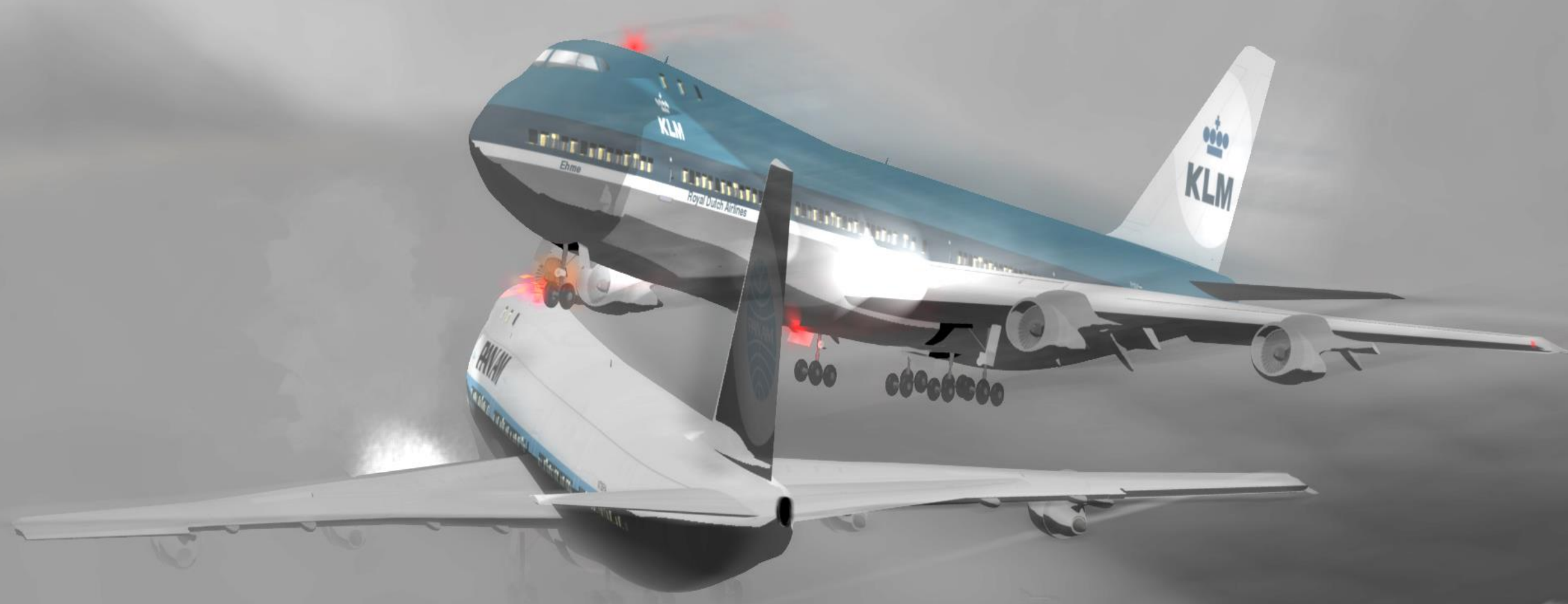
Immersive  
Design Systems



# Human Factors in Aviation







KLM

Ehme

Royal Dutch Airlines

KLM

KLM

# Human Factors

Human Factors is the science and application of how our people interact with their environment, tools/technology, tasks, processes, and organizational factors. It considers human capabilities and limitations.



# Human Factors in Everyday Life

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# A Tale of 2 Elevator Designs



**Elevators 1-4**



**Elevator 5**



# A Design that Requires a Very Cooperative Stranger



# Muscle Memory Meets Bad Design



# Should I stay or should I go?



Sometimes we get it right



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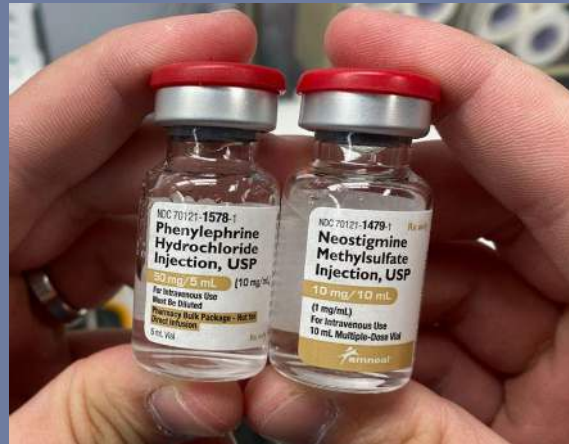
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# Examples of Human Factors Challenges in Healthcare



# Is it easy to make the right choice?



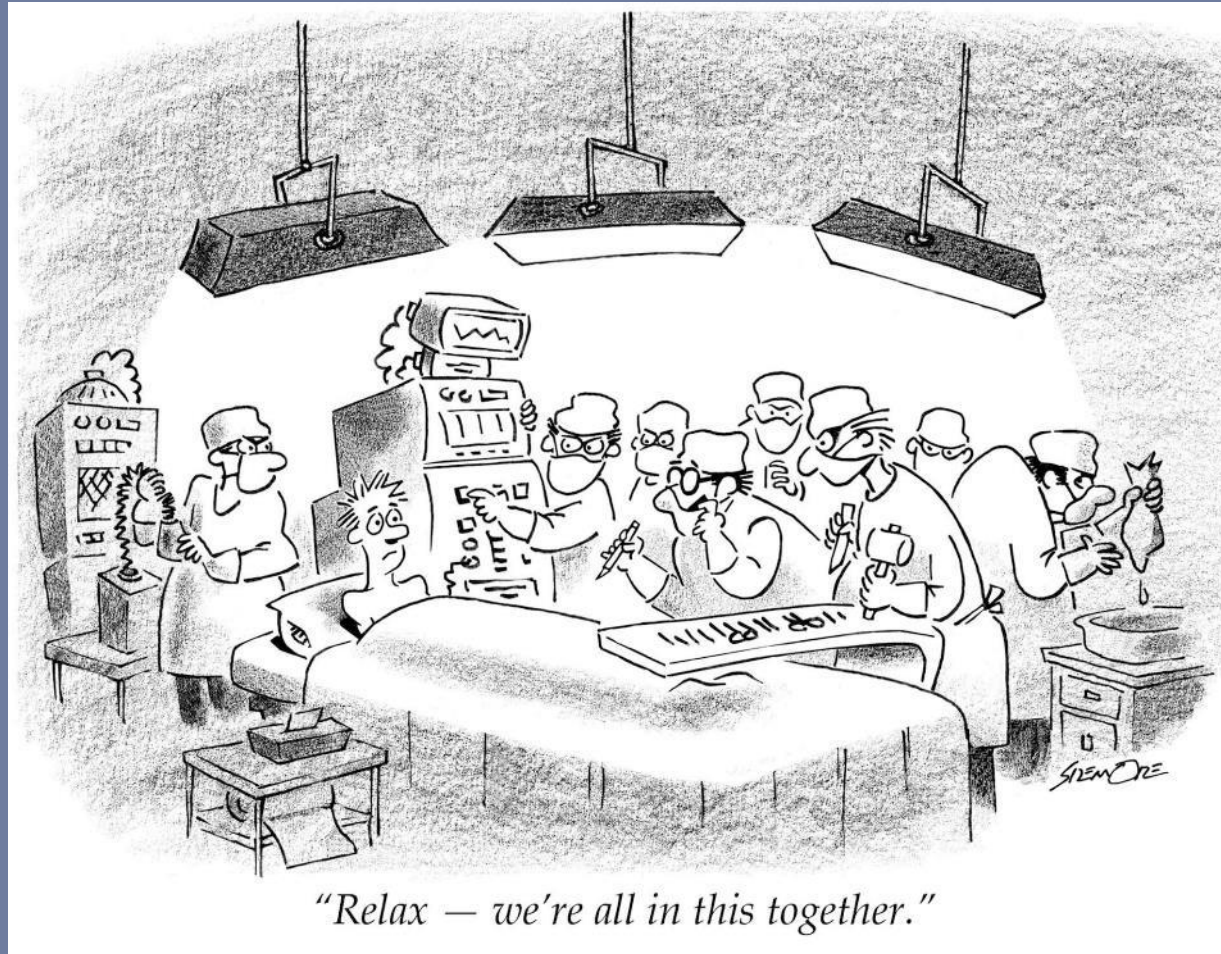
What comes to mind when you look at this?



# What's the diagnosis?



# Teams of experts or expert teams?



# Apparently, Someone Heard “Two”



# Shared Understanding Is Not Guaranteed



# The View From the Bottom



**Two-Challenge Rule**

1  2 

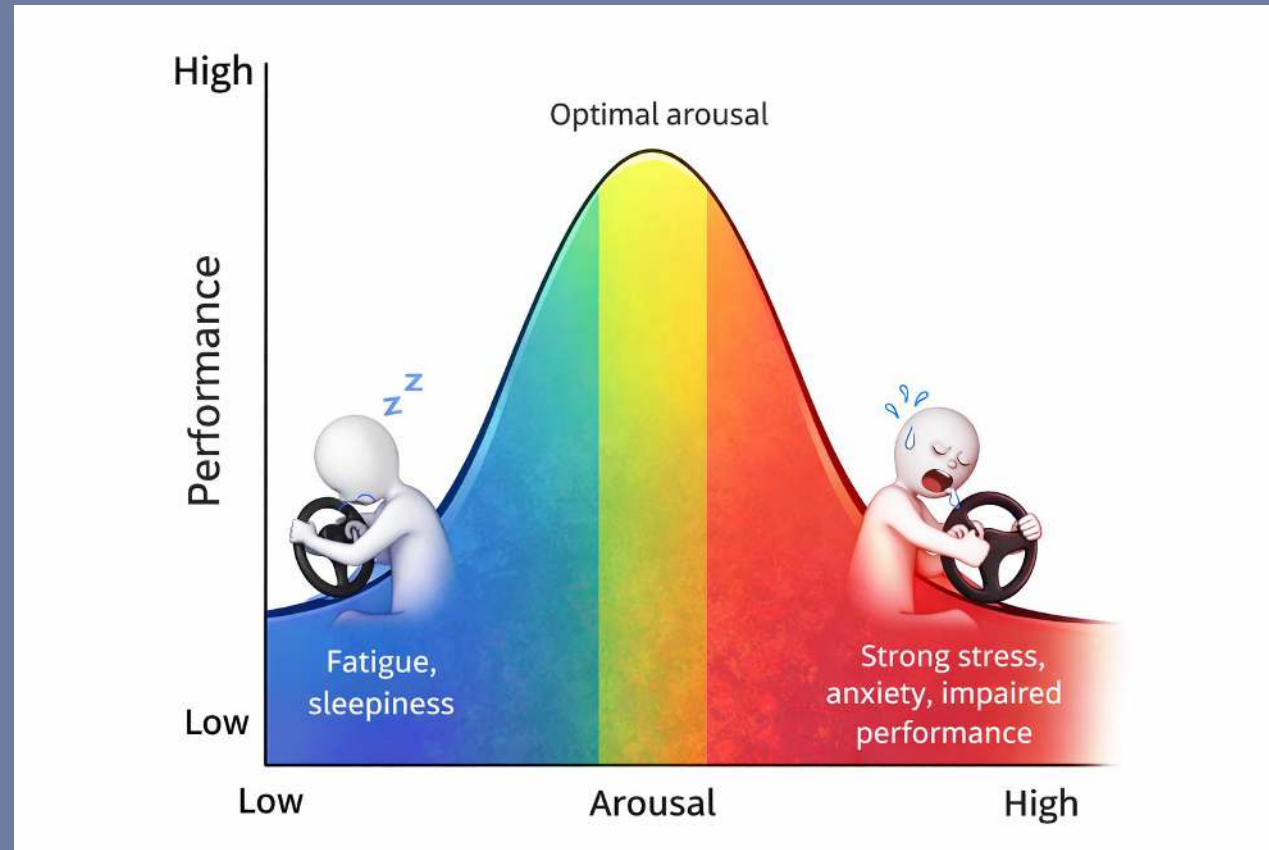
I am **C**ONCERNED!  
I am **U**NCOMFORTABLE!  
This is a **S**AFETY ISSUE!  
*“Stop the Line”*

Adapted from TeamSTEPPS® 2.0. Agency for Healthcare Research and Quality (AHRQ).



# Stress and Burnout

## Yerkes-Dodson Human Performance and Stress Curve



*What could possibly go wrong?*





# Human Factors + SEIPS 2.0

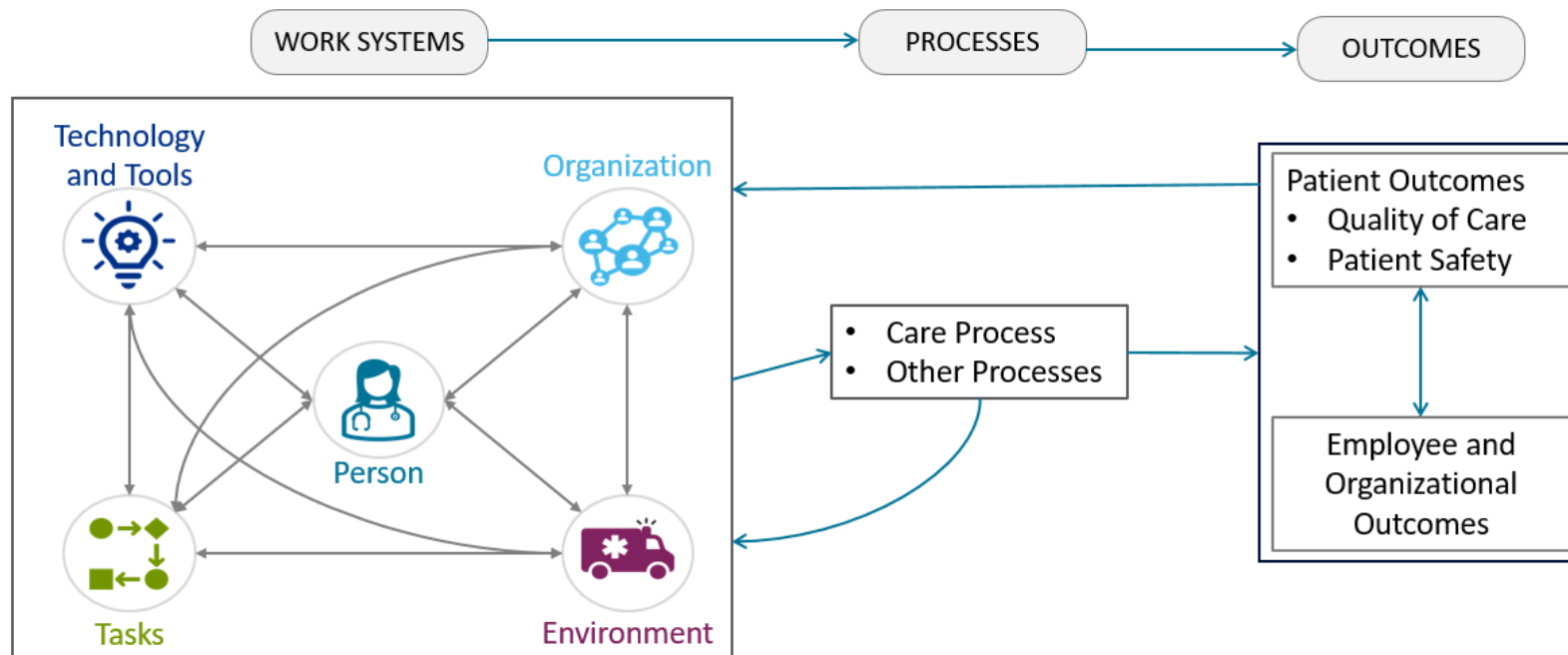


# What is Human Factors and Systems Engineering?

Human Factors is the **science and application** of how our people interact with their environment, tools/technology, tasks, processes, and organizational factors. It considers human capabilities and limitations.

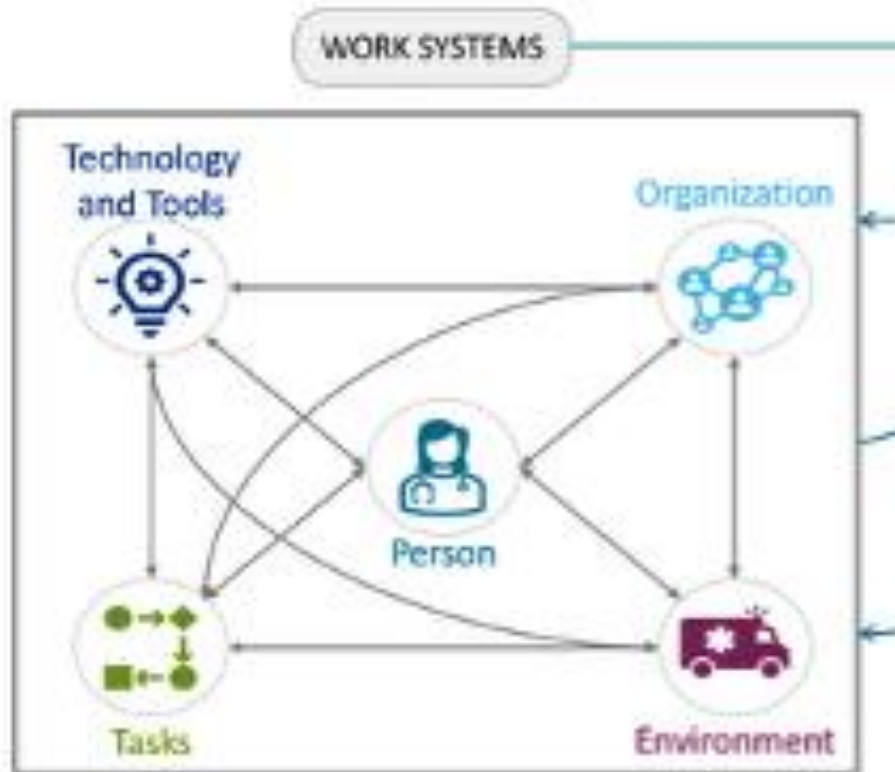
Systems Engineering is a discipline that applies **engineering principles** to the healthcare industry. It uses industrial and systems engineering tools to address a variety of healthcare issues.

Deeply understanding these factors leads to significant improvements in **patient and staff safety, efficiency, effectiveness, and system performance.**



Systems Engineering Initiative for Patient Safety 2.0: Human Factors Model

# SEIPS 2.0 Work System Elements



**Internal Physical Environment-** physical layout, distractions, noise, temperature, lighting, available space. **External Environment:** macro level policy factors, economy etc. outside of an organization.

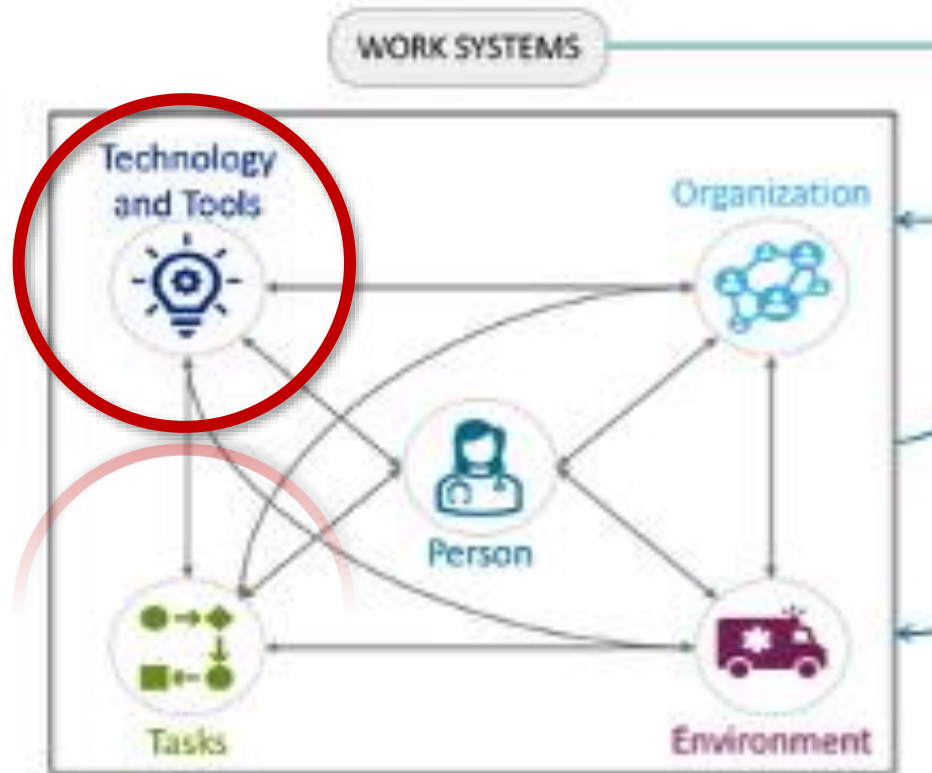
**Tools/Technology:** Objects people use to do their work or that assist them in their work. Consider equipment resources, IT, medical devices and consider their usability, familiarity, level of automation, functionality, portability

**People:** staff/teams, patients, and families- who is affected

**Tasks: roles/responsibilities:** specific actions within larger work process. Consider difficulty, complexity, variety, ambiguity, sequence.

**Organization:** Structures external to the person (but often put in place by people) that organize time, space, resources, activity. Consider: work schedules, culture, training, policies, resource availability.

Changes to the working system...introducing a new Electronic health record...



# Testing a new Electronic Health Record in the Emergency Room



# Proactive Human Factors Usability and Systems Simulation Testing of an EHR: >200 recommendations to improve the design, system and mitigate identified safety threats



IT IN THE ED

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## Using Human Factors and Systems Simulation to Optimize the Usability of a Code Documentation Tool

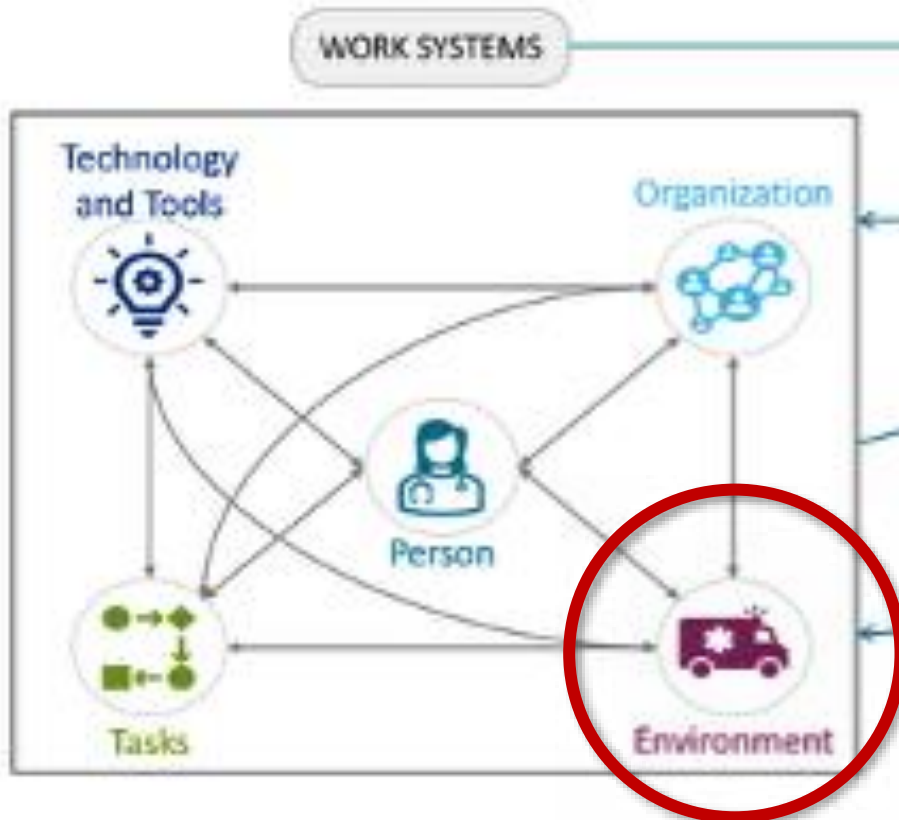
*Susan Biesbroek, MSc,\* Mirette Dubé, RRT, MSc, CPHFH,†  
Jennifer Arnold, MD, MSc, FAAP,† Myrna Chan-MacRae, MSW, MPH,†  
Daniel J. Kats, MD,‡ Lauren Coogle, MD,§ Melanie Swenson, BS,MBA,|| and  
Jonathan D. Hron, MD¶*



# Complex System Interactions: New Physical Environments

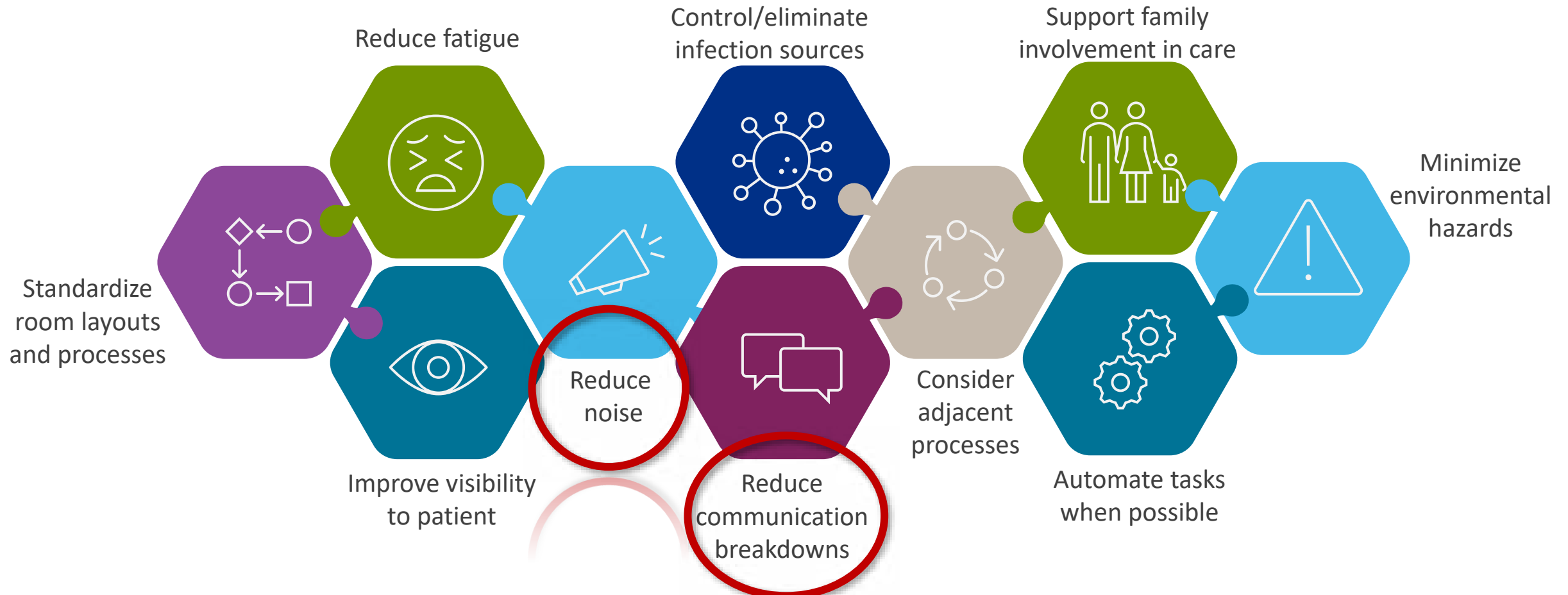
A **perfectly designed space** would be easy and efficient to work in and staff are satisfied with the space.

A **poorly designed space** would be difficult and inefficient, and staff would be frustrated to work in the space.

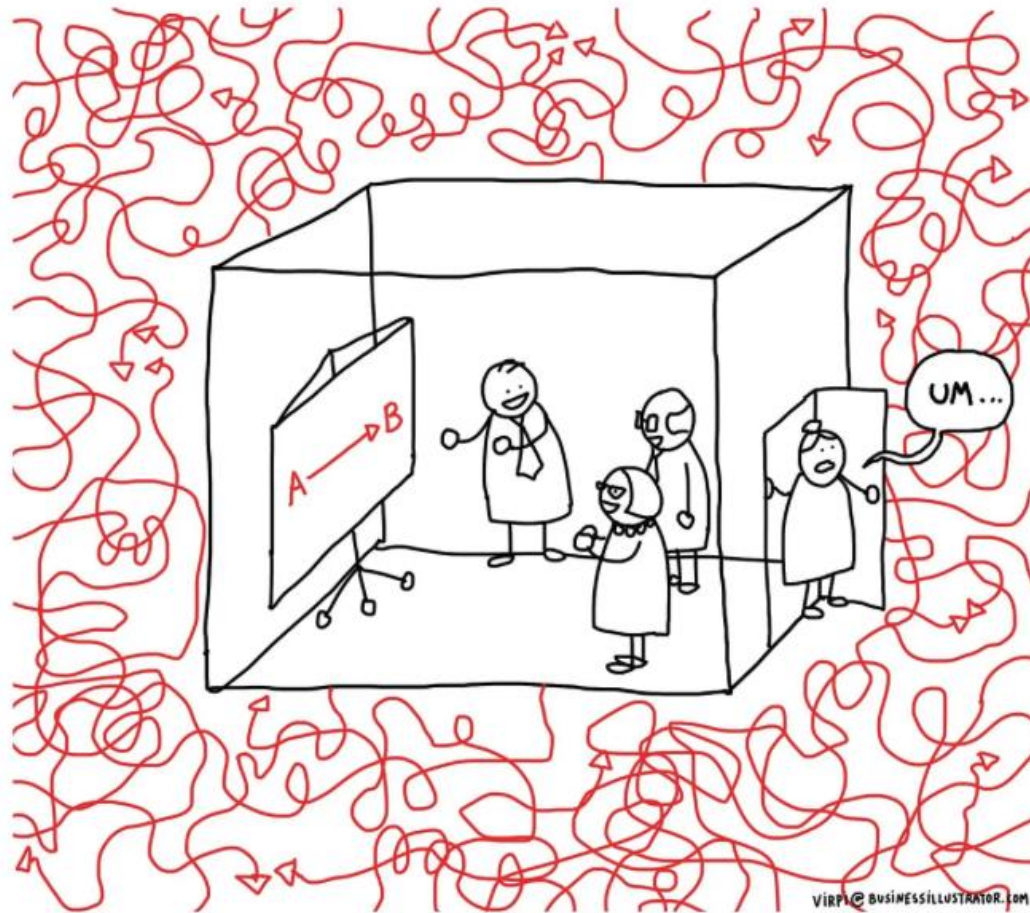


# The Complexity of New Environments: Safe Design Principles

The following outlines ten considerations when designing a healthcare facility, rooted in safe design principles used by the Center for Health Design; developed from the AHRQ. Each represents a way to build defenses, safeguards, and barriers into the system to reduce latent safety threats and potential adverse events.



# Systems Thinking



How systems and subsystems work to support or impede people in their role to provide safe, quality care

- Process of understanding how different parts of a system interact, behave, and influence one another within a whole

# A Tragic Story: Reflecting on potential work system factors using SEIPS

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# Laura's Story



# Activity #1: Apply SEIPS and Systems Thinking

## Refer to Activity #1 Worksheet

- Read about the Laura Levis Case
- Find a partner at your table
- Populate the SEIPS observation worksheet to categorize the possible work system elements that may have contributed to the outcome

## Discuss:

- What were your initial reactions to Laura's story?
- How could a systems approach versus a person's approach to thinking influence your thoughts and response to what happened?
- How did using SEIPS 2.0 influence your perspective?



# Takeaways from Activity #1



# Adopting a Systems Thinking Mindset

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# Activity #2: A closer look at Systems Thinking

Refer too Activity #2 Worksheet

- Form a group of 2-3 colleagues
- Review your 2 specific "Systems Thinking" cards. (Note: all are provided for future reference on the handout "Habits of a systems thinker")

Activity:

After reviewing your 2 specific "Systems thinking" flip cards discuss the following:

- How might these concepts be used in quality improvement and safety?
- Where have you seen this be applied, and what difference did it make?
- How might this help you when looking at a problem in healthcare or in everyday practice?
- Some examples worth considering in your discussion if needed: staffing changes; workflows; new policy; handoffs; throughput, safety events, repeating problems on a unit.



# Habits of a Systems Thinker



The infographic is a 5x3 grid of 15 rounded rectangular boxes, each containing a habit of a systems thinker. The central box (row 3, column 2) is titled "Habits of a Systems Thinker" and features an illustration of two people standing on a globe. The other 14 boxes contain text descriptions and illustrations of various scenarios. At the bottom of the grid, there is a small copyright notice: "Second Edition ©2014, 2010 Systems Thinking in Schools, Waters Foundation, www.watersfoundation.org".

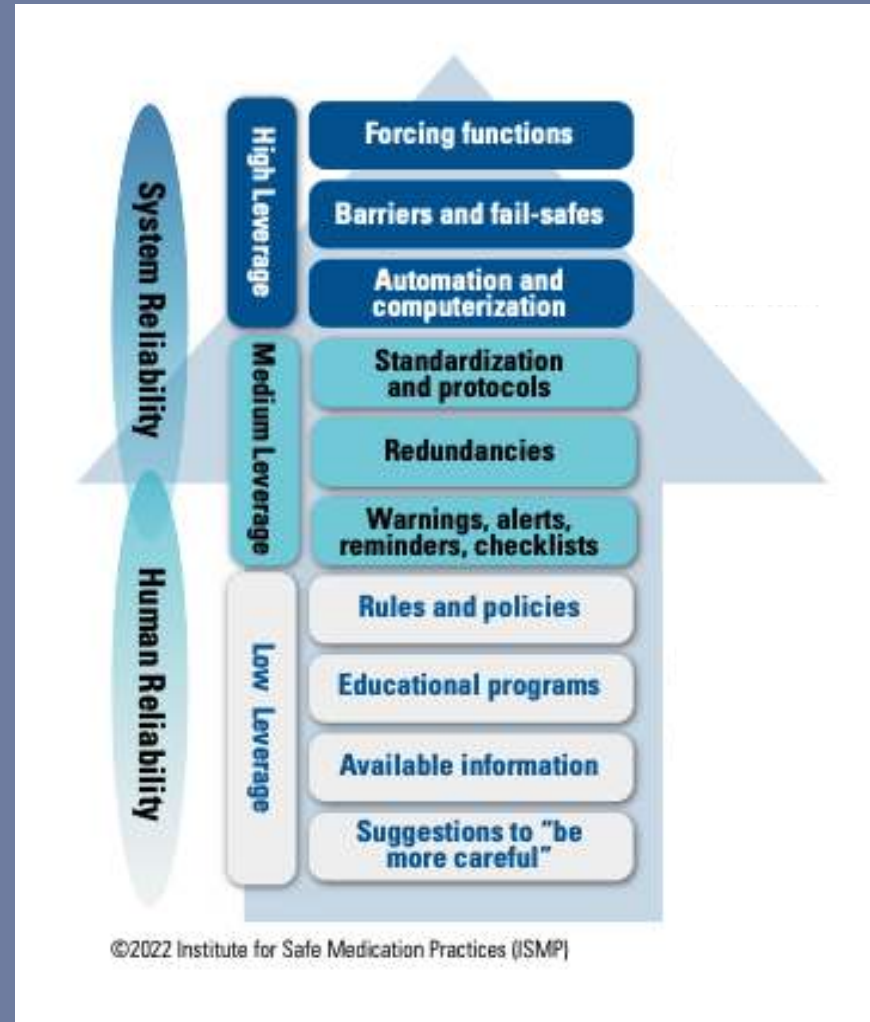
Seeks to understand the big picture 	Observes how elements within systems change over time, generating patterns and trends 	Recognizes that a system's structure generates its behavior 
Identifies the circular nature of complex cause and effect relationships 	Makes meaningful connections within and between systems 	Changes perspectives to increase understanding 
Surfaces and tests assumptions 	<b>Habits of a Systems Thinker</b> 	Considers an issue fully and resists the urge to come to a quick conclusion 
Considers how mental models affect current reality and the future 	Uses understanding of system structure to identify possible leverage actions 	Considers short-term, long-term and unintended consequences of actions 
Pays attention to accumulations and their rates of change 	Recognizes the impact of time delays when exploring cause and effect relationships 	Checks results and changes actions if needed: "successive approximation" 



# Selecting interventions for improvements



# Interventions



# Interventions

<b>Foundational</b> Heavy reliance on human behavior	<b>Supportive</b> Some reliance on human behavior	<b>Transformative</b> No reliance on human behavior
Focus on people <ul style="list-style-type: none"> <li>• Documentation</li> <li>• Training</li> <li>• Multiple checks</li> <li>• Promotional materials (signs, posters, flyers, etc.)</li> <li>• Policy making</li> </ul>	Focus on systems and people <ul style="list-style-type: none"> <li>• Remove distractions</li> <li>• Use of simulation</li> <li>• Cognitive aids (checklists, algorithms, SOPs, etc.)</li> <li>• Standardization</li> <li>• Building in redundancies</li> <li>• Building in detection and alerting mechanisms</li> </ul>	Focus on systems <ul style="list-style-type: none"> <li>• Forcing Functions</li> <li>• Failsafe mechanisms</li> <li>• Automation</li> <li>• Structural changes to work environments or devices</li> <li>• Process redesign</li> </ul>
Reliance on Human Behavior		Reliance on Systems and Structures

Interventions that focus on fixing the systems and structures in which humans work will produce more sustainable results vs. those that rely on human behaviors and decision making

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## Foundational

Heavy reliance on human behavior

### Focus on people

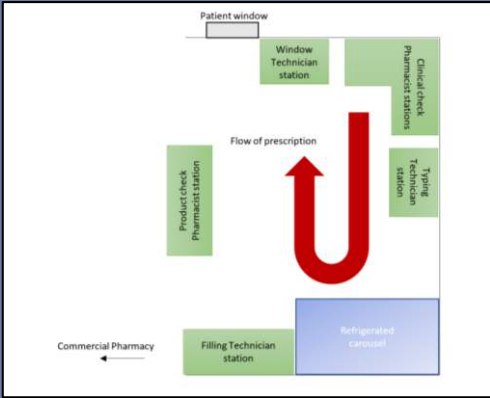
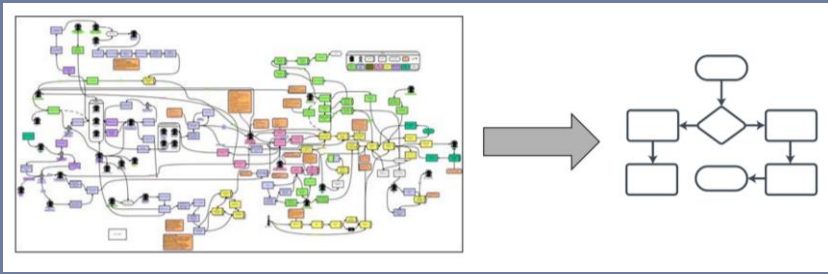
- Documentation
- Training
- Multiple checks
- Promotional materials (signs, posters, flyers, etc.)
- Policy making



“They just didn’t follow our policy!”







**Transformative**  
No reliance on human behavior

- Focus on systems
- Forcing Functions
  - Failsafe mechanisms
  - Automation
  - Structural changes to work environments or devices
  - Process redesign



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# Activity #3: Continuum of Effectiveness from a Human Factors Perspective

Refer to Activity #3 Worksheet

- Form a new group of 2-3 colleagues

Activity:

- Review Table 1: The list of possible interventions that came from a review of the Laura Levis case- after event review
- Map each one to the "Continuum of Intervention Effectiveness"
- Discuss key questions provided on worksheet



# Stop Fixing People Start Designing Systems

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# The Truth about “Human Error”

Five key truths about human beings and errors

1. Human beings are inherently fallible. Error is a normal part of human performance and not a personal failing.
2. In complex systems, error is inevitable. As long as care relies on humans performing safety-critical tasks, mistakes will occur.
3. Training and experience cannot eliminate error. No amount of education can create a perfect, error-free human.
4. “Human error” is never the root cause. It is a starting point for investigation. It is not the conclusion.



# Shifting Safety Upstream with Human Factors and Systems Testing



# Human Factors in Healthcare

## Elements of a Complex System



Tools, Technology,  
and Equipment



People, Roles,  
and Tasks



Environment of Care



Adaptation to  
New Processes



Organizational Factors

*“We cannot change the  
human condition,  
but we can change the  
conditions under which  
humans work”*

-James Reason

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Adopt, Adapt, Abandon

## Sustain improvement and next step



Safe

Timely

Effective

Efficient

Equitable

Patient Centered

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Please Share One Takeaway from this session together...



Thank you for your time  
and engagement!

Mirette and Jeff

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# Let us know your thoughts!

Please click on the link below to complete a brief (3 questions) survey

