

Prevention through Design: Healthcare

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Sustainable
HOSPITALS



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Sustainable Hospitals Program

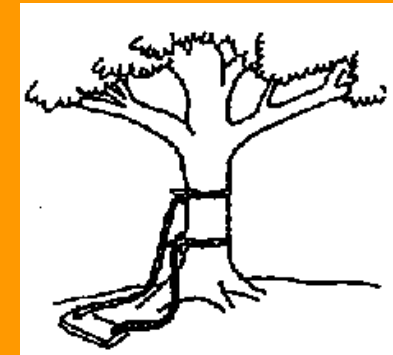




**what marketing
suggested**



**what management
approved**



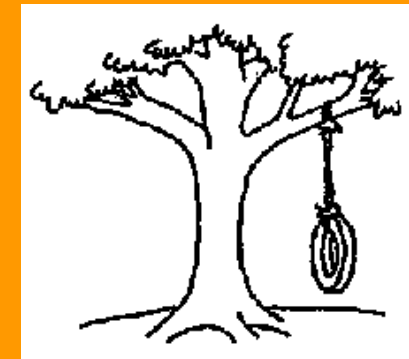
**as designed by
engineering**



**what was
manufactured**



**as maintenance
installed it**



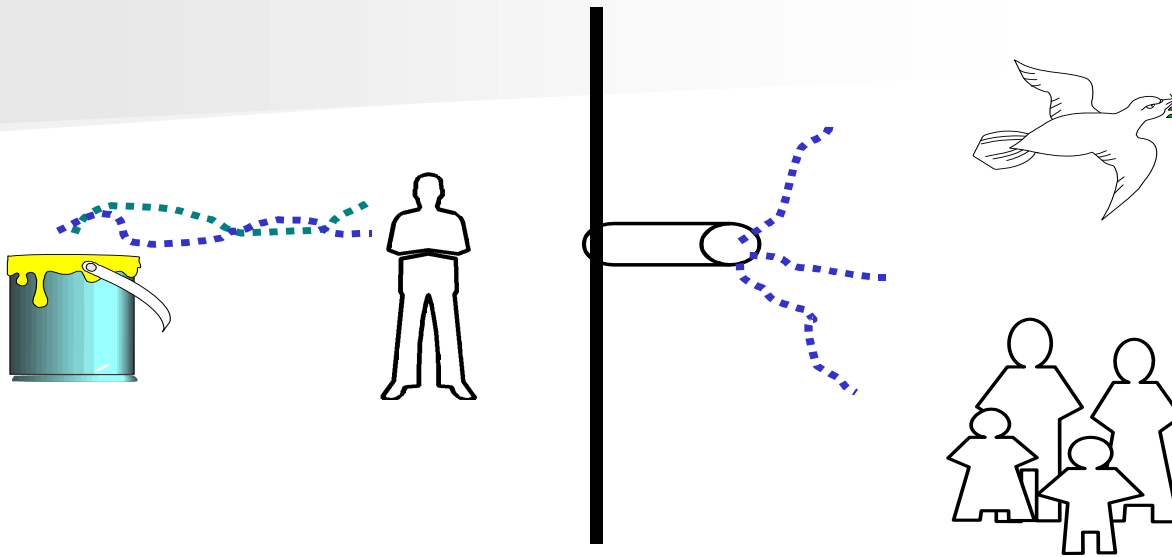
**what the customer
wanted**

References: <http://www.uoregon.edu/~ftepfer/SchIFacilities/TireSwingTable.html>
<http://www.businessballs.com/treeswing.htm>

Hierarchy of Controls:

best interventions are at the source vs. “end-of-pipe”

“Designing out” the hazard is the best prevention



Source - Receptor Model for
Occupational Hygiene & Pollution Prevention

Scope of Workplace Design

- **Product**
 - product designers, developers
- **Production Process**
 - industrial designers & engineers,
 - occupational hygienists & safety professionals
- **Built Environment**
 - architects,
 - design- build engineering
 - construction

Prevention through Design in Medical Products

NOW
YOU SEE IT.



NOW
YOU DON'T.



PROTECT YOURSELF AND OTHERS-
USE SHARPS WITH SAFETY FEATURES

BE PREPARED. Anticipate injury risks and prepare the patient and work area with prevention in mind. Use a sharps device with safety features whenever it is available.

BE AWARE. Learn how to use the safety features on sharps devices.

DISPOSE WITH CARE. Engage safety features immediately after use and dispose in sharps safety containers.



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DISCLAIMER: Mention or depiction of any company or product does not constitute endorsement by CDC.



http://www.cdc.gov/sharpsafety/pdf/sharpsafety_poster3.pdf

Product Design

Lifting Equipment



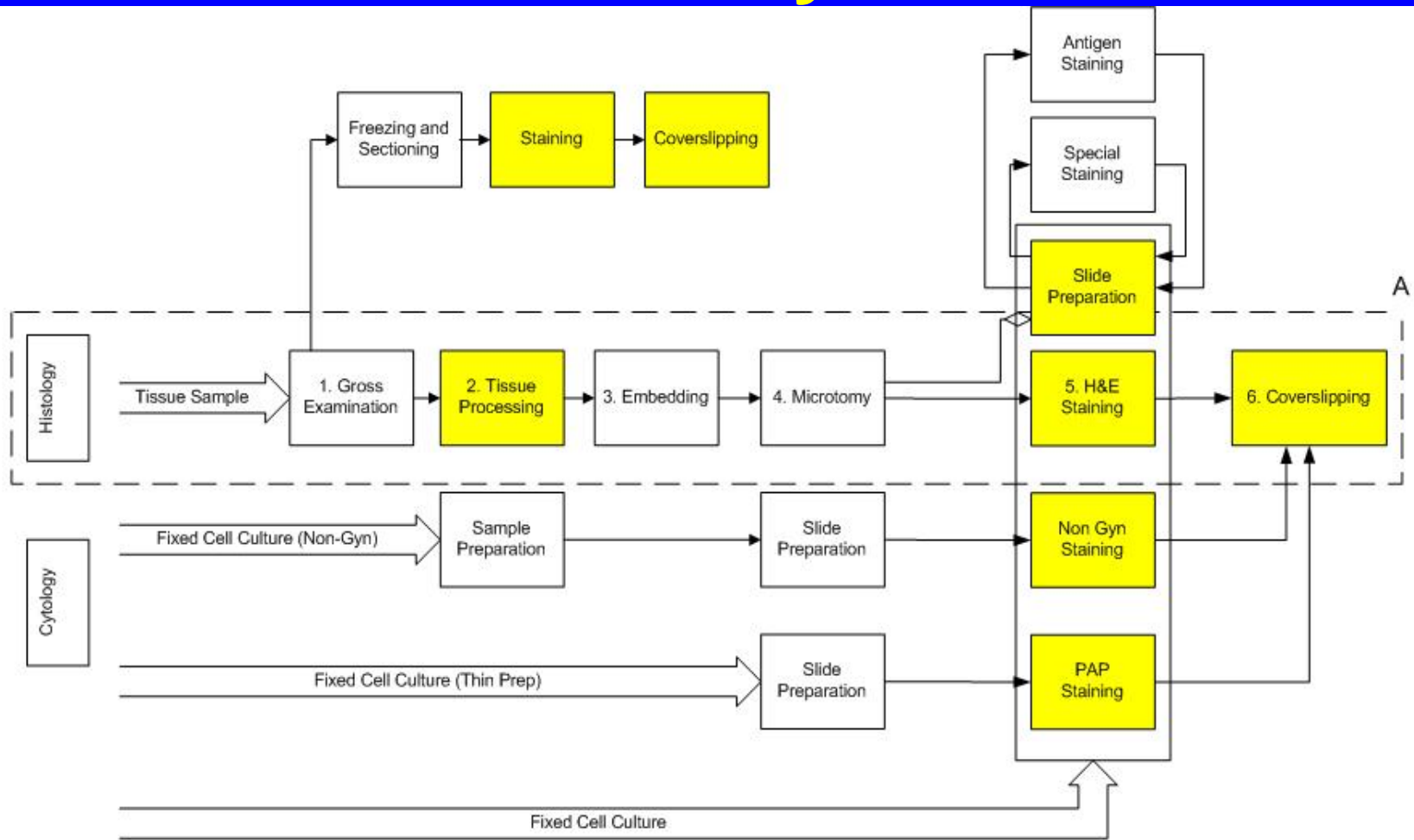
Total Body Lift



Sit-Stand Lift

<http://www.invacare.com>

Redesigning histopathology to eliminate xylene



^A Process highlighted with dotted line is detailed in Figures 3 and 4

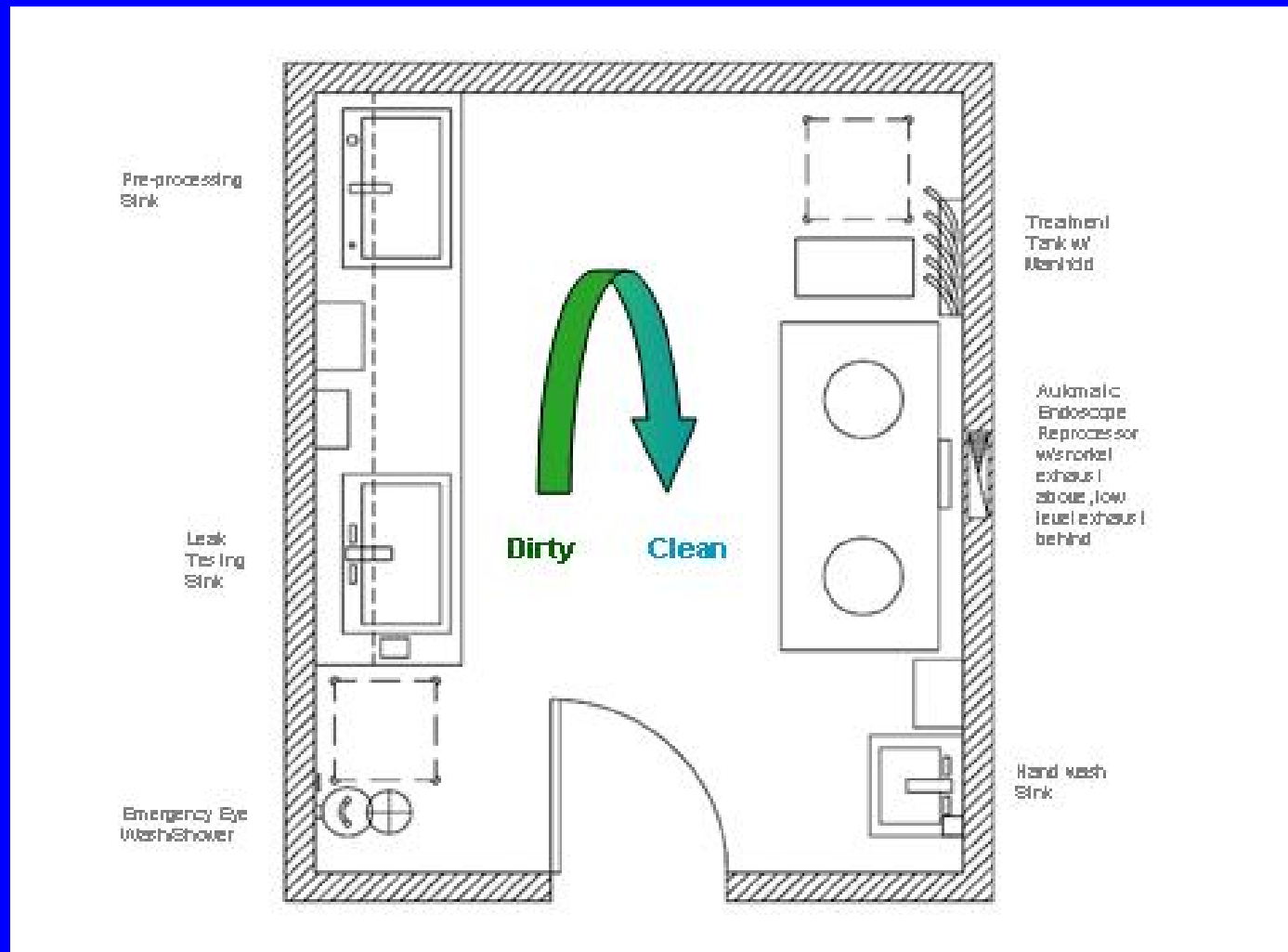
Source: Quinn M, Fuller T, Bello A, Galligan C; JOEH, April 2006

The Need for Room Re-Design



Architectural Design of Endoscopy Suites

Source: Kaiser Permanente







PROJECT
SHARRP

Product-User

Moving from a culture of blame to safety integral to design

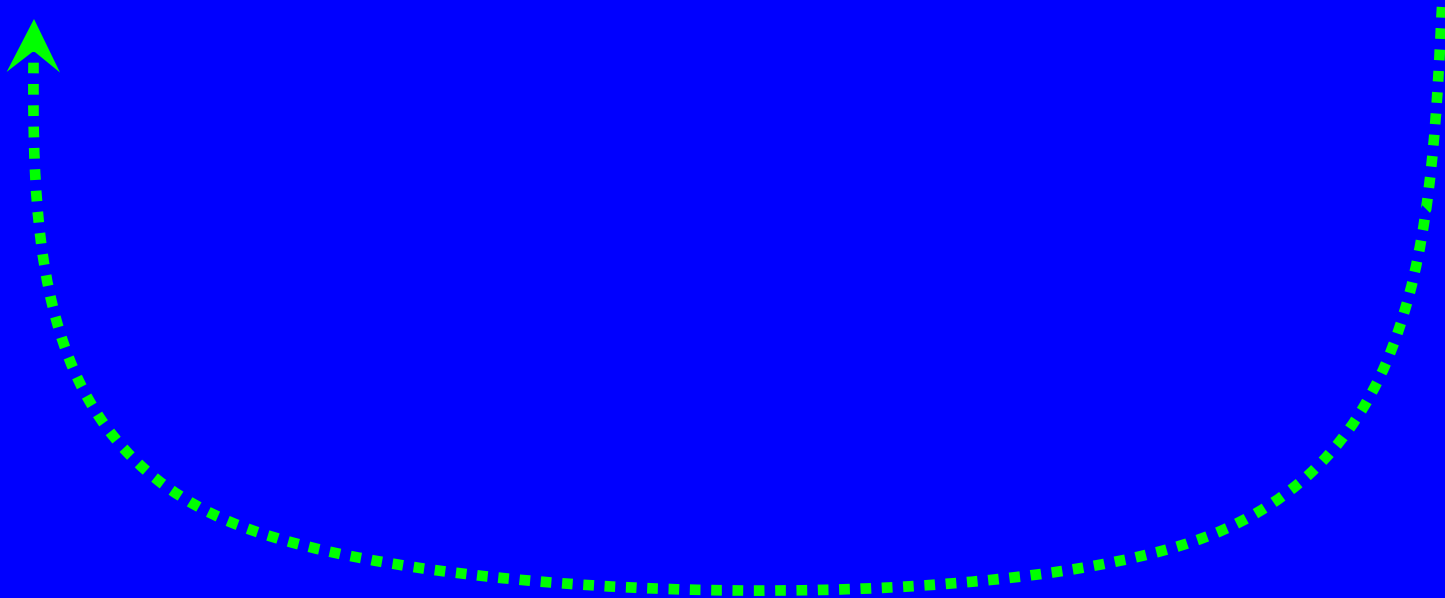
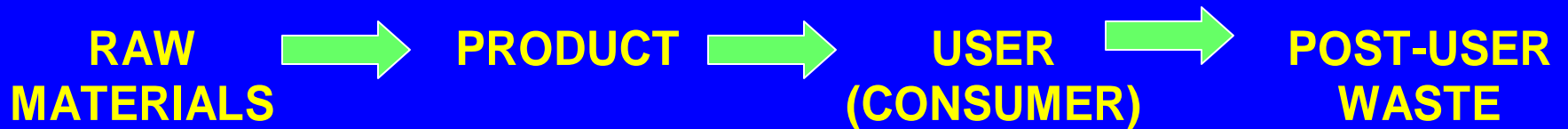
*“An overfilled sharps container is nobody’s fault but
our own ...*

*... you get your assignment in the morning and you’re
thinking OK, I’ve got my sharps and you get the
laboratory stuff you need but then when you go to use
the [sharps container] and you’re already at the patient’s
home... and the container is full and won’t close....*

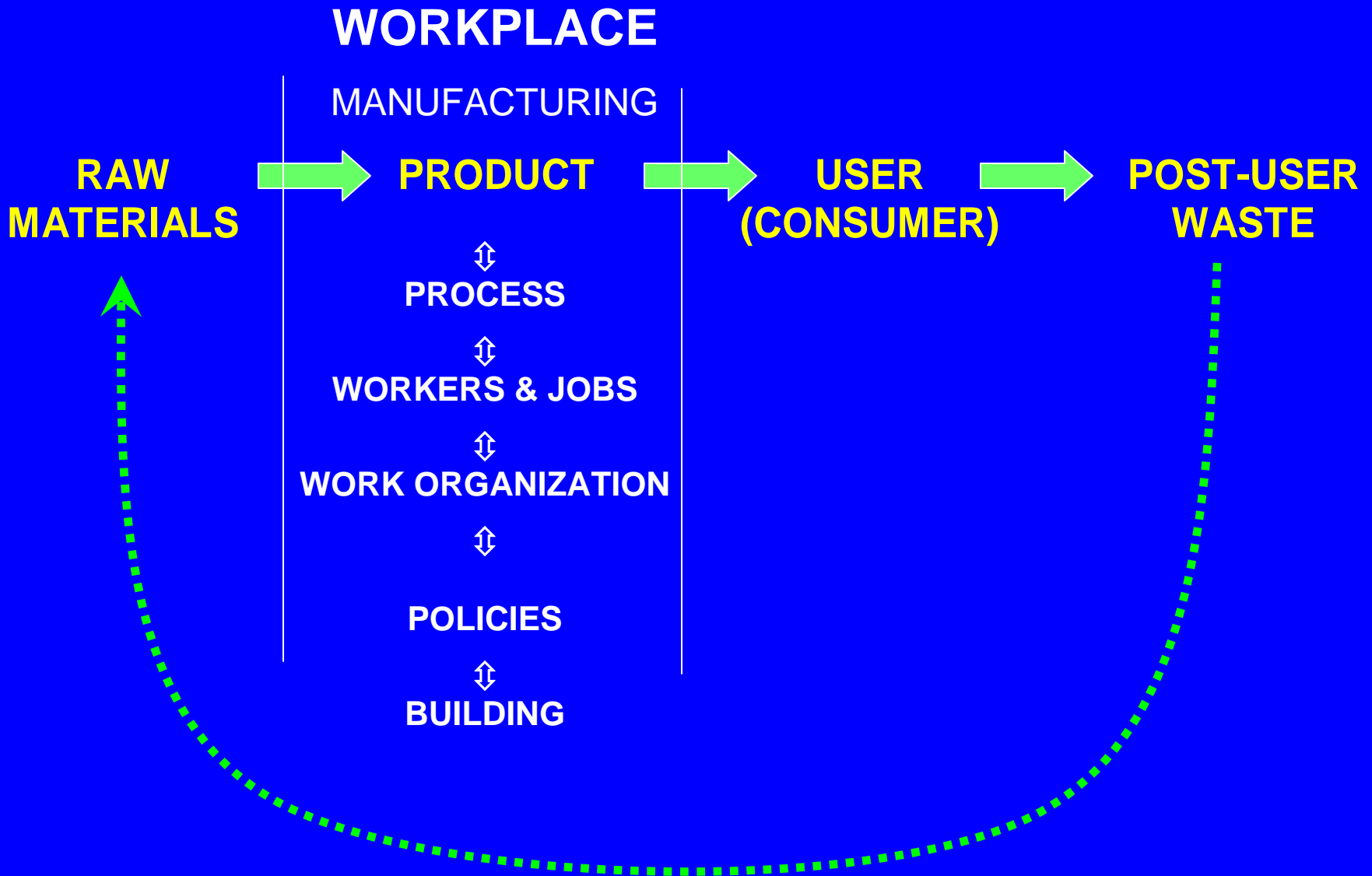
*[my colleague] is smart, she has a backup [disposal
container], I don’t.”*

Markkanen et al., JOEM 2007

Basic Product Design Path



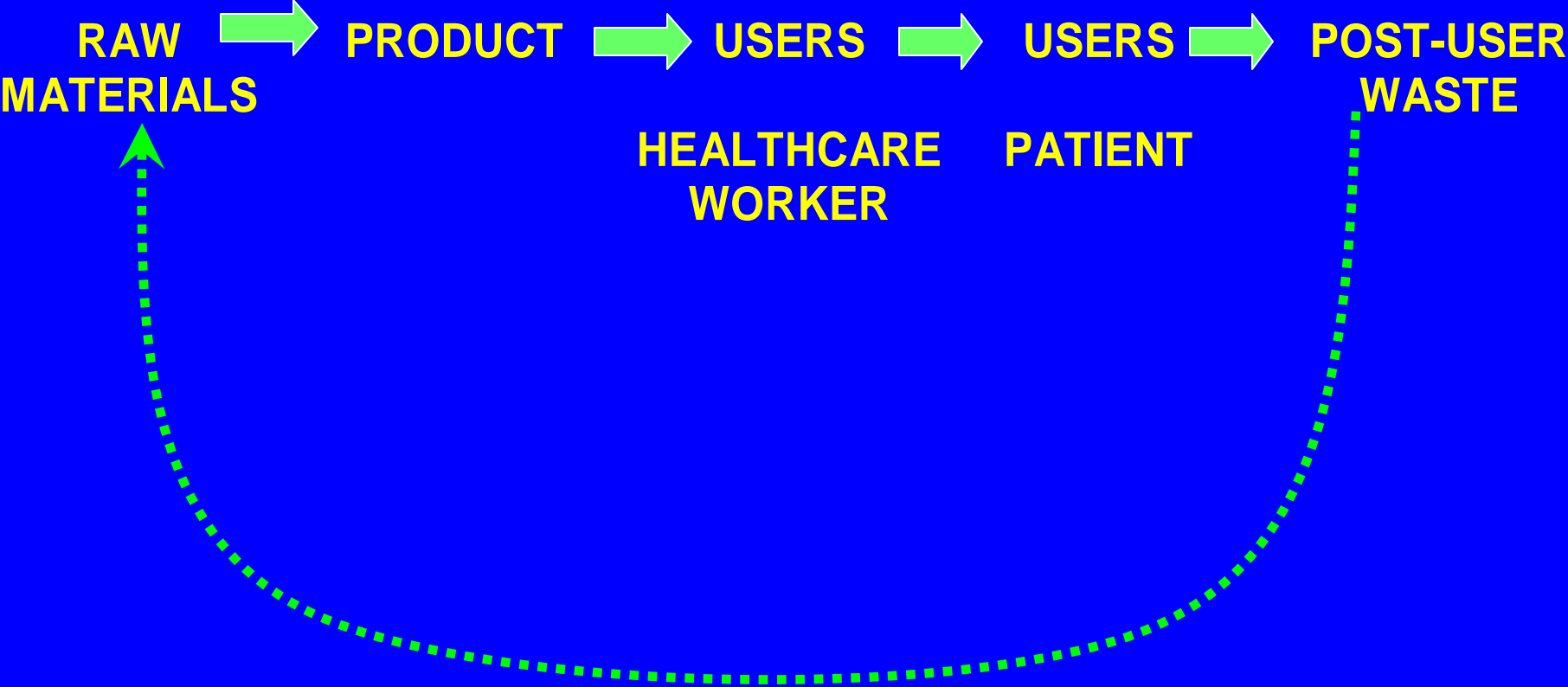
Incorporating OSH into product design



IN HEALTHCARE

WORKERS & PATIENTS ARE USERS

WORKPLACE WORKPLACE
MANUFACTURING HOSPITAL



OSH & Healthcare Design

WORKPLACE

WORKPLACE

MANUFACTURING

HOSPITAL

RAW MATERIALS

PRODUCT

USERS

USERS

POST-USER WASTE

HC WORKER

PATIENT



Design in Healthcare

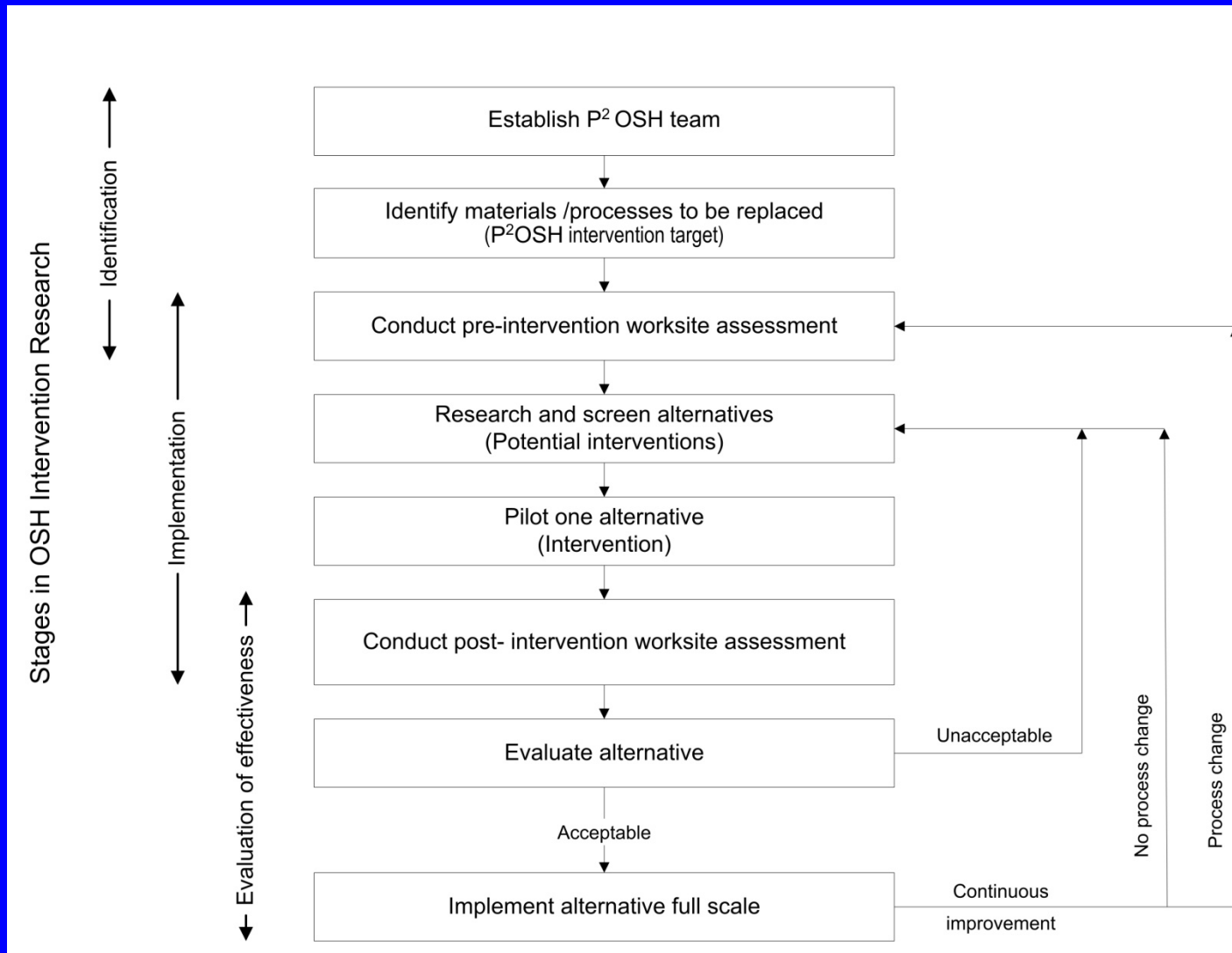
- Must account for complex nature & organization of work, in context of patient care
 - **Patient – Worker—Environment:**
considered together as design parameters
 - **Otherwise new designs may shift risks**

Design for P² – OSH

Quinn M, Fuller T, Bello A, Galligan C; JOEH, April 2006

Design Intervention	Why?	P² impacts	OSH impacts
Xylene → aliphatic fixative	worker irritant symptoms	↓ chemical waste	↓ odor, headaches ↓ skin irritation ↓ toxicity
Mercury reduction	water pollution	↓ water pollution	↓ spill hazards ↓ toxicity
Wet chemical film → digital imaging	new technology	↓ chemical waste ↓ water use ↓ plastic waste	↓ chemicals ↓ repetitive motions ↓ awkward postures ↓ lifting ↑ VDT hazards ↑ job loss
Formaldehyde → glyoxal	water pollution	↓ water pollution	↓ toxicity ↓ odor ↓ skin irritation
Conventional → microfiber mopping	water conservation/ musculoskel strain	↓ water use ↓ chemical use	↓ mus-skel. strain ↓ infection potential

Product-Process Re-Design



Source: Quinn M, Fuller T, Bello A, Galligan C; JOEH, April 2006

Lessons: Products & materials

- HC worker & OSH Professionals not viewed as having a role in design
- Info about alternative designs:
 - **scarce**
 - **unavailable in a form that HC Workers can use**
- OSH professionals well-positioned to participate in design teams, but need expanded training

Lessons: work org & policies

- Successful design & implementation involves a social process as well as technical
 - **Work org effects the type of design & how it will be implemented**
 - **Commitment needed at all levels of the HC organization**
 - **Easier for managers to engage in innovation & solutions, than control only**

Lessons: built environment

- Design can reduce HC workers risk AND enhance productivity, recruitment & retention AND patient safety:
 - Infectious agents
 - Indoor air-related illness
 - Musculoskeletal injuries
 - Human factors hazards
 - Lighting fatigue, accidents

Thank you!