2011 Military Health System Conference

Evidence Based Design

The Quadruple Aim: Working Together, Achieving Success

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26 January 2011

Joint Task Force National Capital Region Medical

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
26 JAN 2011		**00-00-2011 to 00-00-2011**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Evidence Based Design	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
Joint Task Force National Capital Region Medical,8901 Wisconsin Avenue BG 27,Bethesda,MD,20889	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

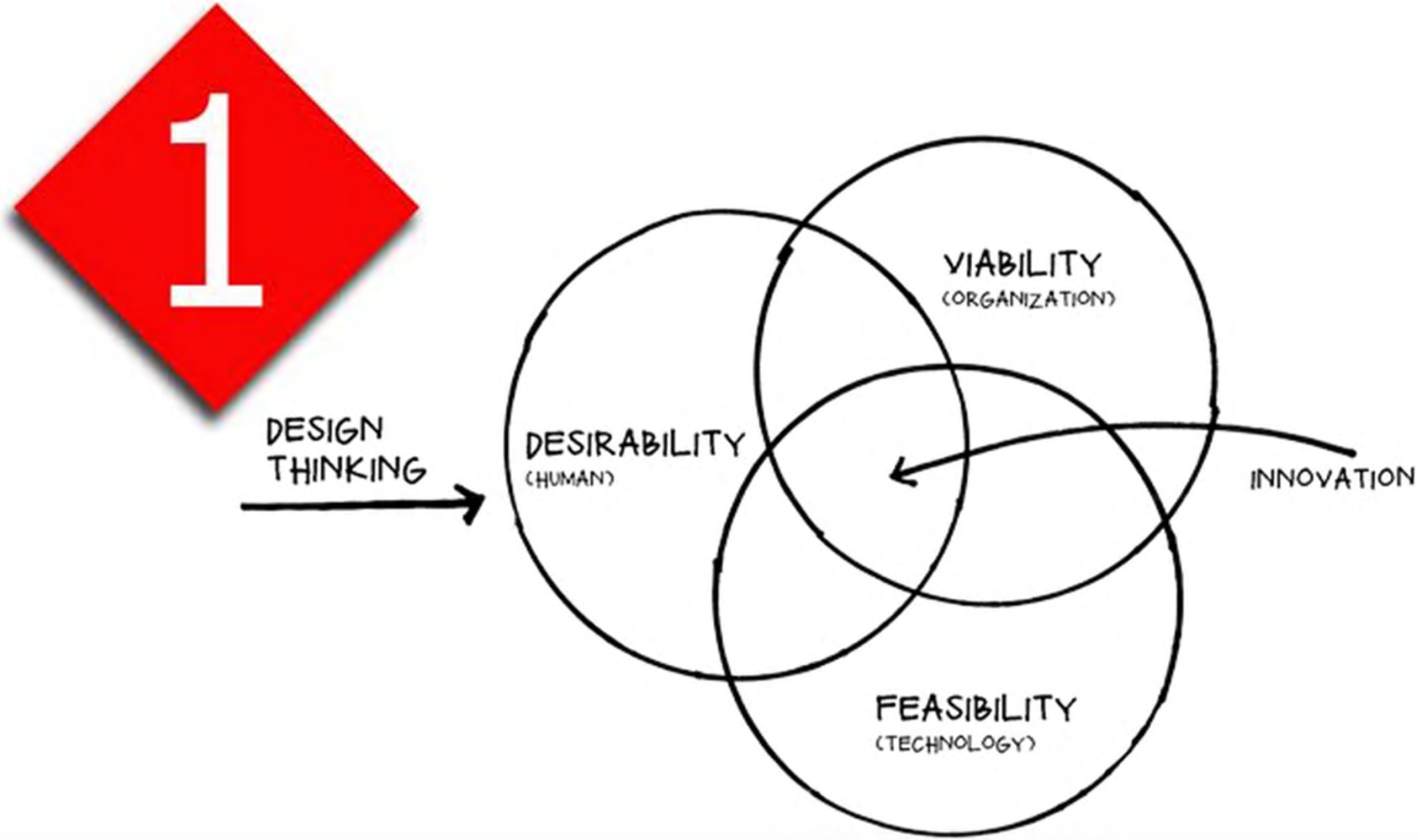
12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
presented at the 2011 Military Health System Conference, January 24-27, National Harbor, Maryland

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**37**	


1
DESIGN
THINKING
DESIRABILITY
(HUMAN)
VIABILITY
(ORGANIZATION)
FEASIBILITY
(TECHNOLOGY)
INNOVATION

Kaiser Innovation Consultancy

Mayo Center for Innovation

How we approach our work

Bring internal and external resources together

Discover and implement solutions

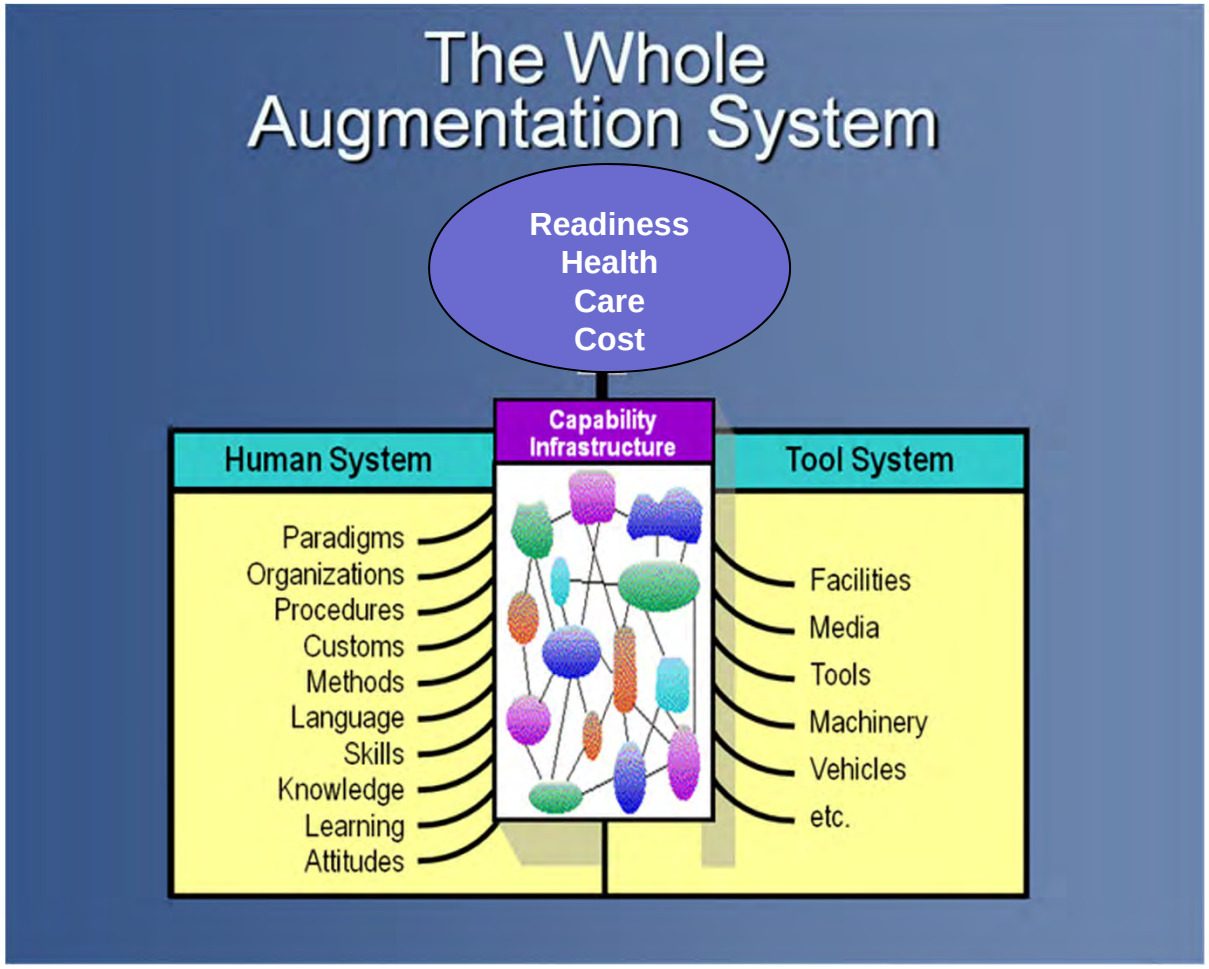
Accelerate the pace of innovation

MAYO CLINIC CENTER FOR INNOVATION

CIMIT

Center for Integration of Medicine and Innovative Technology: A non-profit consortium of Boston teaching hospitals and engineering schools, CIMIT fosters interdisciplinary collaboration among world-class experts in medicine, science and engineering, in concert with industry and government, to rapidly improve patient care.

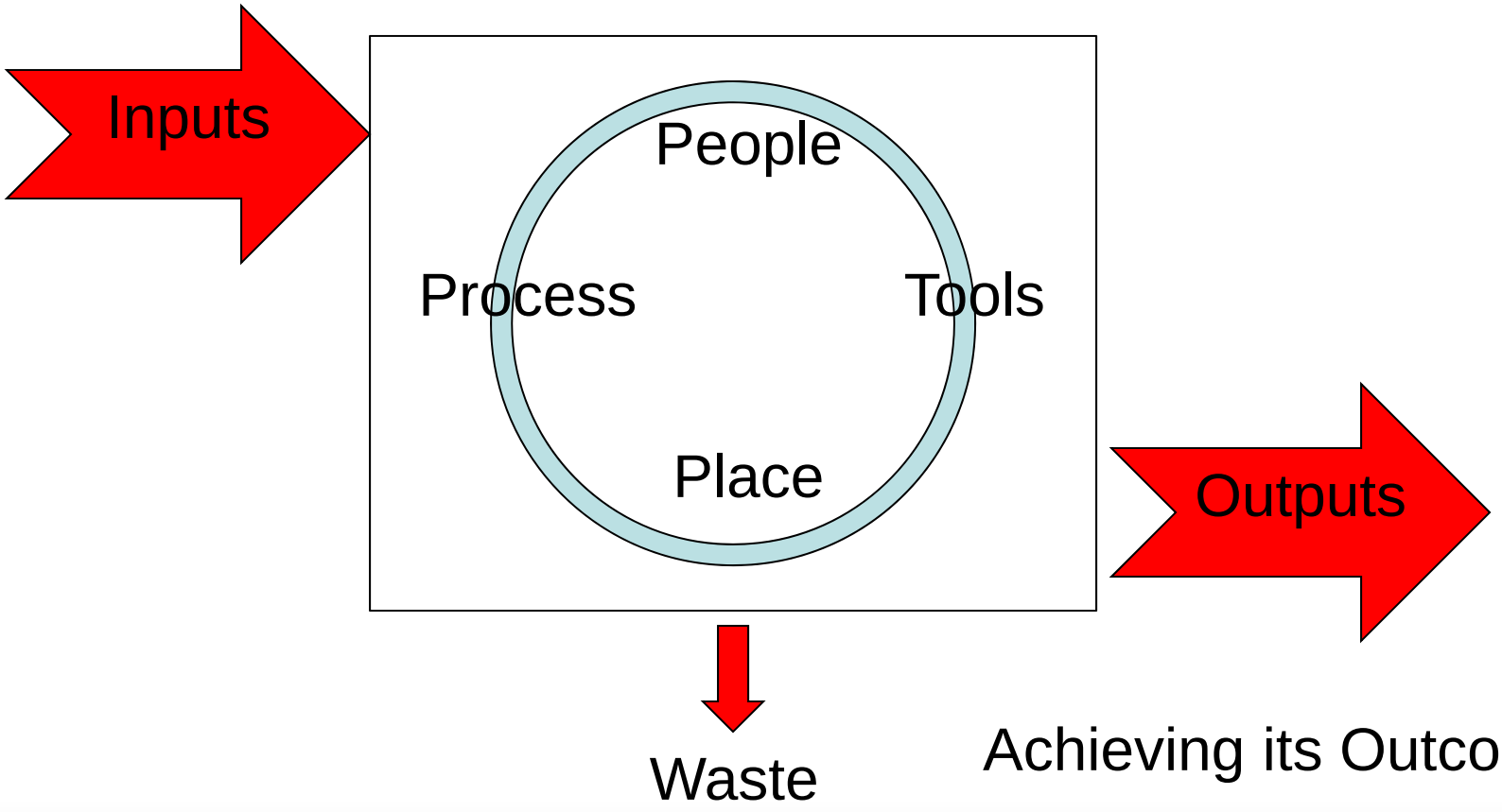
Capabilities from Complexity



Doug Engelbart Institute, "Focus on Capabilities"
http://www.dougengelbart.org/about/focus-capability.html

The Supervisor's View of Work

The work done should be aligned to the organization's purpose and objectives reflecting its vision.




Health and the
Built Environment

Model for Evidence Based Design

- Evidence Based Medicine
  - The Standard of Care.
- Standard of Care
  - Changes and
  - Defines duty: The responsibility to perform to a standard and to abide by rules and regulations.

Continue doing …

Facility Design

Avoid …

- Paternalism
- Standards as lowest common denominator

Account for …

- Evidence
- Change
  - Advances in diagnostics and treatments
  - Disruptive technology
- People

Policy Standards

- Life Safety Standards rooted in fire safety focused on the patient who can not save him/herself from smoke, heat and fire.
- Standards focus on people & processes.
- Standards do not mention Evidence Based Design.
- Reference to IHI …

IHI 2009

INSTITUTE FOR HEALTHCARE IMPROVEMENT

Hospital leaders and boards face a new reality: they can no longer tolerate allowing environmentally preventable patient hospital-acquired conditions such as infections and falls; injuries to staff; unnecessary intra-hospital patient transfers that can increase errors; or increased patient and family anxiety, stress, and length of stay caused by noisy, confusing care environments.

Sadler BL, Joseph A, Keller A, Rostenberg B. Using Evidence-Based Environmental Design to Enhance Safety and Quality. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2009. (Available on www.IHI.org)

IHI 2009

INSTITUTE FOR HEALTHCARE IMPROVEMENT

Leaders need to understand the clear connection between constructing well-designed healing environments and improved health care safety and quality for patients, families, and staff, as well as the compelling business case for doing so. The physical environment in which people work and patients receive their care is one of the essential elements in reducing a number of preventable hospital acquired conditions.

Sadler BL, Joseph A, Keller A, Rostenberg B. Using Evidence-Based Environmental Design to Enhance Safety and Quality. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2009. (Available on www.IHI.org)

IHI 2009

INSTITUTE FOR HEALTHCARE IMPROVEMENT

As part of their management and fiduciary responsibilities, hospital leaders and boards should include cost-effective, evidence-based environmental design interventions in all their improvement programs or risk suffering the economic consequences in an increasingly competitive and transparent environment. Implemented successfully, responsible use of evidence-based design will improve patient safety and quality, enhance workforce recruitment and retention, and produce a significant multi-year return on investment.

Sadler BL, Joseph A, Keller A, Rostenberg B. Using Evidence-Based Environmental Design to Enhance Safety and Quality. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2009. (Available on www.IHI.org)

Health Affairs Policy

HEALTH AFFAIRS

THE ASSISTANT SECRETARY OF DEFENSE

1200 DEFENSE PENTAGON
WASHINGTON, DC 20301-1200

JAN 22 2007

MEMORANDUM FOR COMMANDER, NAVAL FACILITIES ENGINEERING COMMAND
COMMANDER, UNITED STATES ARMY CORPS OF ENGINEERS

SUBJECT: QDR Roadmap and Evidence-Based Design

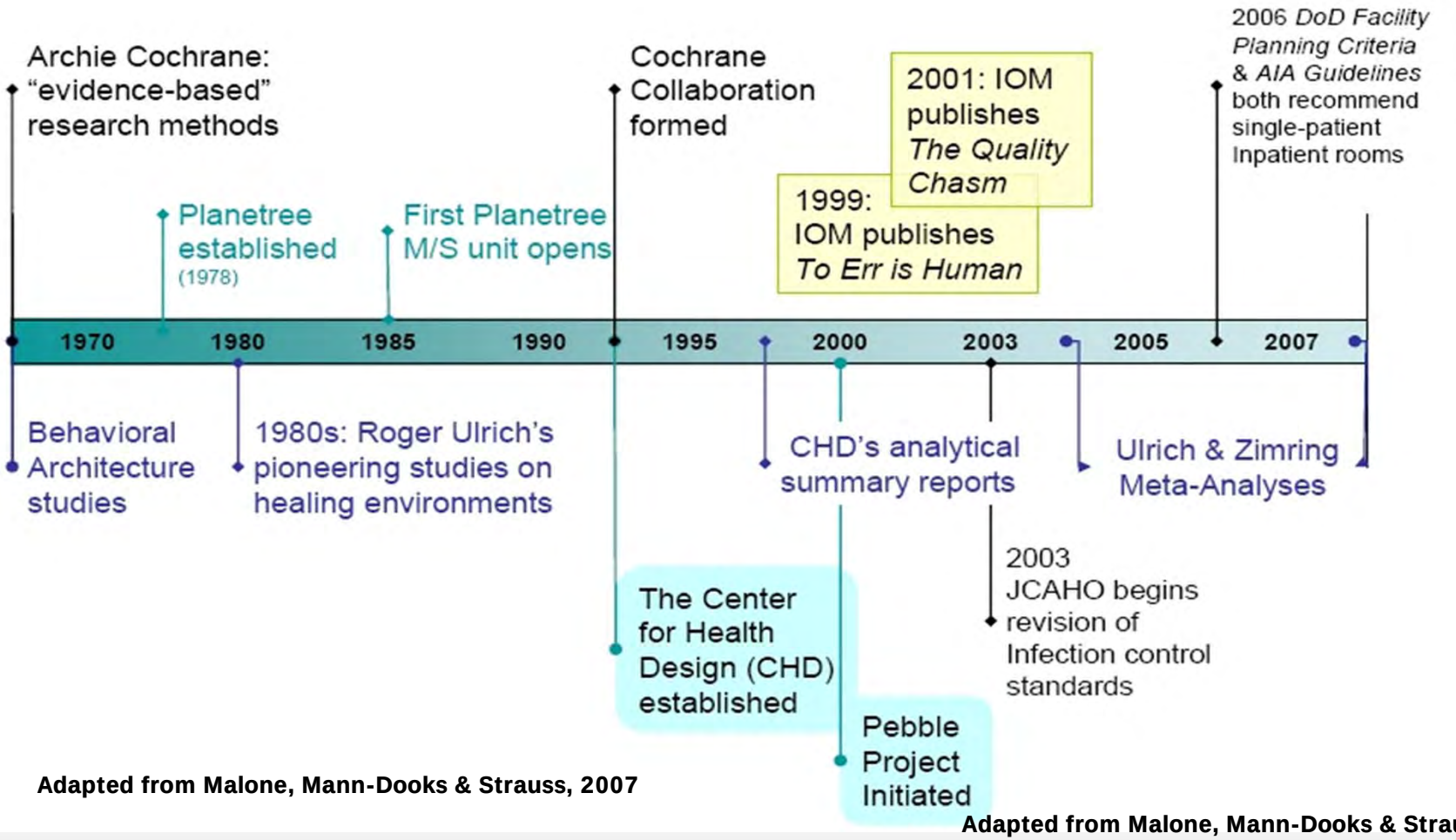
"…I request that you instruct the respective design teams to apply **patient-centered and evidence based design principles** across all medical MILCON construction projects. A growing body of research has demonstrated that built environment can positively influence health outcomes, patient safety and long-term operating efficiencies to include reduction in staff injuries, reduction in nosocomial infection rates, patient falls and reduction in the length of hospital stay…."

3


Healing Environment
Ergonomics
Single Patient Rooms
Noise
Windows
Light
Access to Nature
Positive Distractions
Furniture Arrangements
Air Quality
Flooring Materials
Wayfinding
Building Layout

EBD History

EBD Timeline



Adapted from Malone, Mann-Dooks & Strauss, 2007

Adapted from Malone, Mann-Dooks & Strauss, 2007

Evidence-Based Design is NOT

- An accumulation of anecdotes
- A smorgasbord of trendy features
- Dangerous, stressful and inefficient care processes and care cultures—enclosed in nicer colors and materials

Design Affects Patient & Staff

1. More evidence than expected: 800+ studies
2. A LOT of good evidence is available
3. Many designs make hospitals riskier and more stressful for patients, families & staff

Full report: www.healthdesign.org/research/reports

Effects of Viewing Nature

Post-surgical patients with similar acuity, those with better views enjoyed:

- .76 days *shorter* length-of-stay
- 40% *reduction* in strong & moderate analgesic dosage
- 71% *fewer* negative patient comments

(Ulrich 1984)

Impact of Natural Light

- Patients in Cardiac ICU (Beauchemin & Hays 1998)
  - Women stayed 1 day less in sunnier room
  - Death rate 70% higher in dull room
- Patients exposed to 46% more natural sunlight (Walch et al 2005)
  - 22% fewer analgesics
  - 21% lower drug costs
  - Less pain, stress

- “It is the unqualified result of all my experience with the sick, that second only to their need of fresh air is their need of light …”
- “They [the sick] should be able, without raising themselves or turning in bed, to see out of window from their beds, to see sky and sun-light at least, if you can show them nothing else, I assert to be, if not of the very first importance for recovery, at least something very near it.”

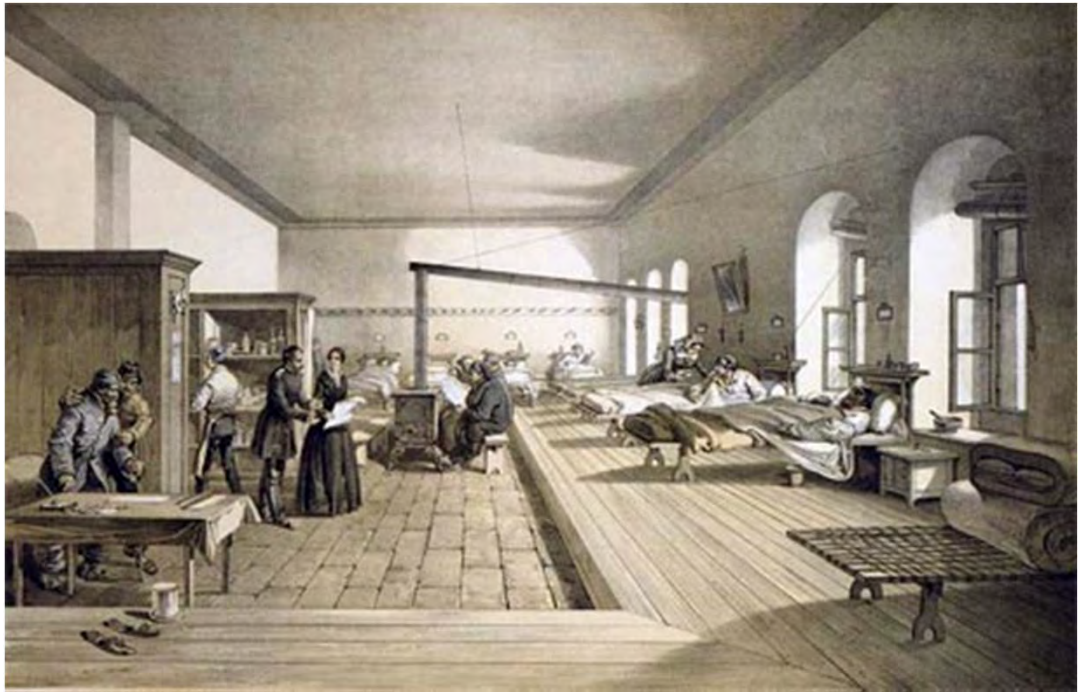
NOTES ON NURSING

What it is, and what it is not

BY
FLORENCE NIGHTINGALE

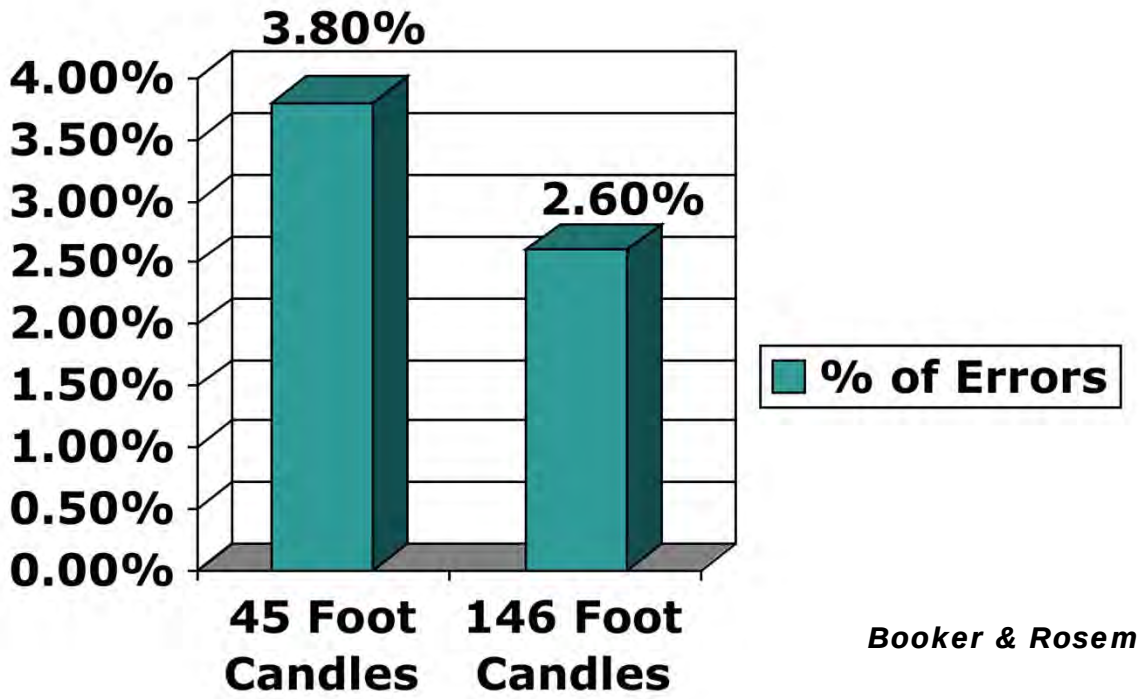
New York
D. Appleton and Company
1860

[First American Edition]



Lighting

Improved Lighting Reduced Pharmacy Errors



Booker & Roseman, 1995

Patient Lifts

Reducing Back Injuries

Costs of patient handling injuries based on cost per injury **prior to ceiling lifts**.

Unit	Direct Cost *	# Injuries	Avg direct cost per injury	Avg indirect cost (2x) **	Total Cost one injury	Avg # injuries per year	Total Annual Cost
Neuro	$222,646.	15 (3 yrs)	$14,843.	$29,686	$44,529	5	$222,645
ICU	$ 95,003	10 (2 yrs)	$9,500.	$19,000	$28,500	5	$142,500
subtotal							**$365,145**

***Direct costs of patient handling injuries only**

**** Indirect costs include light duty salaries, replacement salaries, and training cost**

PeaceHealth Riverbend, OR
Source: Joseph & Fritz, 2006

Actual savings **after** ceiling lifts are installed and used.

Cost reduced by **85%** to **$54,660**

Payback: **2.5 years**

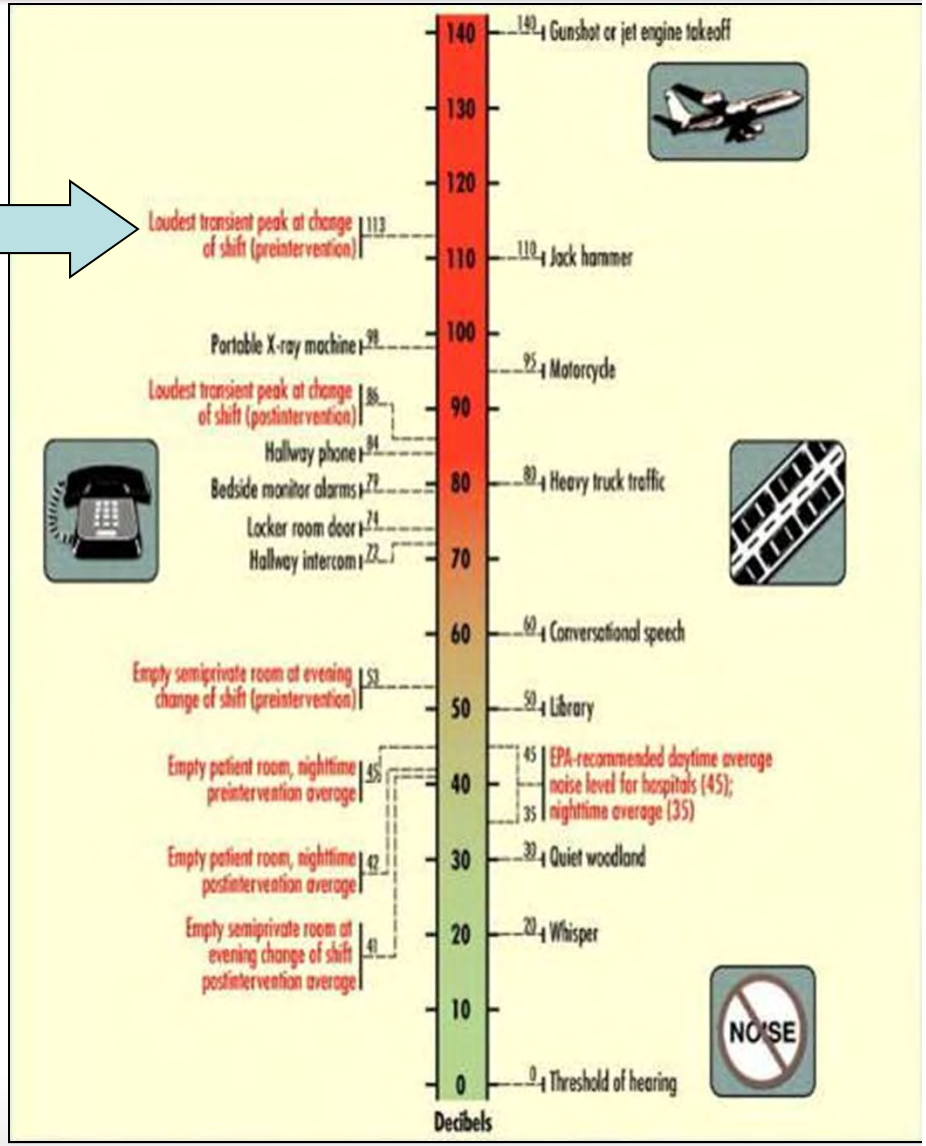
Unit	Direct Cost	# Injuries	Avg direct cost per injury	Avg indirect cost (2x)	Total Cost one injury	Avg # injuries per year	Total Annual Cost
Neuro	$ 43,728	6 (2 yrs)	$ 7288	$14,576	$21,864	3	$ 54,660
ICU	$ 0	0 (2 yrs)	$ 0.	$ 0	$ 0	0	$ 0
subtotal	$ 43,728	6 (2 yrs)	$ 7288	$ 14,576	$ 21,864	3	$ **54,660**

PeaceHealth Riverbend, OR

Noise

Peak noise in patient room during shift change: 113DB!

- Elevates BP, pulse, respiration
- Worsens sleep
- Reduces O2 sat (infants)
- Increases work pressure (staff)
- Erodes speech intelligibility



Research Example

"Influences of Noise on Outcomes in Coronary Critical Care"

Blomkvist, Theorell, Ulrich, Erikson, Hagerman and Rasmanis, 2004

Research Example

STUDY

- Patients: **adults (94) diagnosed with acute myocardial infarction in a coronary critical care unit in a Stockholm hospital**
- Intervention: **Acoustics were improved by periodically changing ceiling tiles from sound-reflecting to sound-absorbing tiles**
- Findings: **During good acoustics patients slept better, had less physiological stress, and a lower incidence of re-hospitalization**

[Hagerman, Rasmanis, Blomkvist, Ulrich, Eriksen, and Theorell, 2005. *International Journal of Cardiology*]

Hand Washing

Design to Increase Hand Washing

Conveniently located sink

Sinks and gel dispensers should be close to staff movement paths

M. D. Anderson
Ambulatory Cancer Center
Houston

Family Presence

- Families want access to patients, caregivers, information
- Clinicians are worried that family members will be bothered by difficult procedures…but family members typically are not
- Family members can reduce falls and errors…if they are present, trained and have the right information

Patient Room

DeWitt

- Several Dual Occupancy rooms
- Limited Privacy
- No defined Family Zone
- Black and white t.v.
- Institutional appearance of walls

FBCH

- All inpatient rooms private
- Furnished to look residential
- Art on walls
- Pull out sofas for overnight guests
- Flat screen t.v., internet access, temp control

Family Centered Design

THE WALL STREET JOURNAL.
THURSDAY, JULY 12, 2007

ICUs' New Message: Welcome, Families

In Units With Critical Patients, Hospitals Ask Loved Ones to Help; Emory Retools for Sleepovers

By Laura Landro
Atlanta

For decades, hospitals tried to keep visitors out of intensive-care units for more than a few minutes at a time. This year, Emory University Hospital here went the other way: It began inviting family members to move into the ward and take a hand in the patient's care.

For three recent weeks, Scott Roberts lived almost full-time in Emory's new neuroscience intensive care unit, which opened in February. After a bone-marrow transplant, his wife, Kristi, was struck by Guillain-Barre Syndrome, a paralyzing nerve disorder that caused her immune system to attack the nerves outside her brain and spinal cord. Kristi, 33 years old, was able to track her husband only with her eyes.


Owen Samuels

Mr. Roberts watched doctors and nurses attend to her ventilator and feeding tubes, relaying feedback to the staff by reading the look in his wife's eyes. Donning a sterile gown and mask to protect her immune system from infection, he helped nurses active members of the health-care team. A wave of recent studies shows that critically ill patients may benefit from having families present. There's even a case to be made, researchers say, for having loved ones present for resuscitation, brain-catheter insertions and other life-and-death procedures.

Earlier this year, the Society of Critical Care Medicine, the largest international society representing intensive-care professionals, recommended that ICUs offer open visiting hours and increase family involvement. "Why would we presume that we can dictate how often or who is allowed to visit during the patient's most trying moments on earth?" says Judy Davidson, a critical-care nurse at San Diego's Scripps Mercy Hospital and lead author of the society's guidelines.

The recommendation comes as hospitals nationwide are set to spend some $200 billion over the next decade to update aging facilities. The result is that many, like Emory, are considering committing the friends-and-family principle to brick and mortar. "There has always been this wall between doctors and families," says Owen Samuels, a neurologist who directs neuroscience critical-care medicine at Emory. "It is high time we take down that wall."

The transition has taken some getting used to. Emory's ICU staffers say they have had to curb the irreverent jokes and banter guests can nap on pull-out sofa beds. Typically, these hospitals bill for standard intensive-care charges, without adding extra fees for lodging.

For decades, U.S. hospitals restricted visitors to general and intensive-care units, in part to protect patients from germs and the stress of multiple visitors. But starting in the 1960s and 1970s, in response to a growing consumer movement, they loosened rules to allow fathers into delivery rooms, and families into intensive-care wards for newborns and children. As a grass-roots movement toward family-centered care gained steam in the 1990s, hospitals began to involve loved ones in a broader range of treatments.

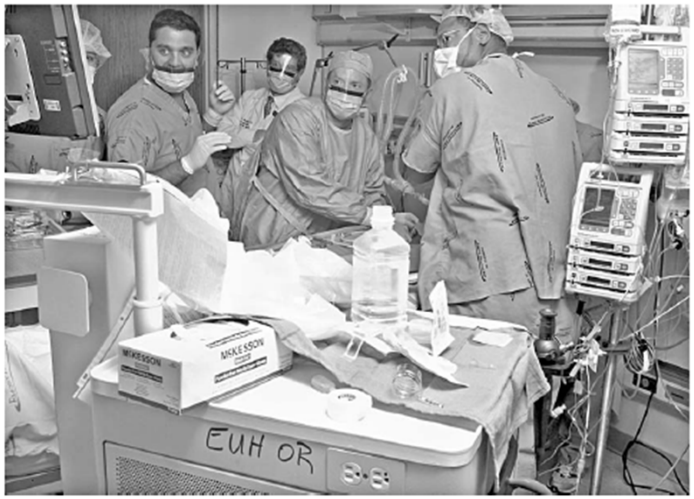
But the units that care for the sickest patients—including the coronary and neurological ICUs—remained behind closed doors. Visitors typically were allowed in for 10 minutes every few hours. Admitting more than five million patients a year, ICUs account for 10% of the inpatient beds but almost 30% of inpatient hospital costs, or $180 billion annually, in the U.S., according to the Society of Critical Care Medicine.

Opening Up

- **What's New:** A new intensive-care unit at Emory University Hospital lets families view life-and-death procedures and stay in in-room family suites.
- **The Background:** ICUs long resisted open visiting hours. But studies suggest that patients benefit when the family is at hand, and it may help loved ones as well.
- **What's Next:** With U.S. hospitals set to spend $200 billion on upgrades over the next decade, more facilities are expected to follow suit.

Emory Neuro ICU

Old



New

Completing the EBD cycle

- MHS research by DoD Patient Safety Analysis Center, Army Public Health Command, Noblis, Georgia Tech and others:
  - Falls
  - Noise and associated stress
  - Patient handling injuries
  - Patient transfers
  - HAI's
  - Patient/Staff/family satisfaction

- Disseminating what we've learned

Please Remember

Design Thinking

Built Environment

3

Evidence Based Design