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Ward, Paul

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The human factor:
Implications for professional development and patient safety

Paul Ward

University of Huddersfield

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Overview

- Some context / background

- Human factors and (system) behavior change

- Some lessons learned and tools for change

1. Some context (Me)

Skilled Performance in Complex Applied Domains of Practice

- Human Factors (Macrocognitive) : Human-Systems Perspective
  - Goals are ill-specified, conflicting, and/or changing
  - Information is limited & incomplete
  - Dynamic and complex
  - Multiple agents / teams
  - High stakes
  - High stress / workload
  - Uncertainty
  - Time pressure

"I fell back on my training…
…I didn't think, I just acted"

Essential ingredients of expert performance?
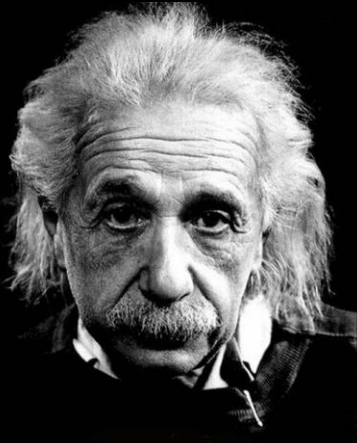
"The only real valuable thing is intuition...

...a feeling for the order behind the appearance"

Intuitive Decision Making

"...When there isn't time to weigh up all your options, what do you do?"

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Sensemaking and Situation Assessment:
*"Get inside the other pilot's head
—to predict what they will do next"*

Skilled Performance
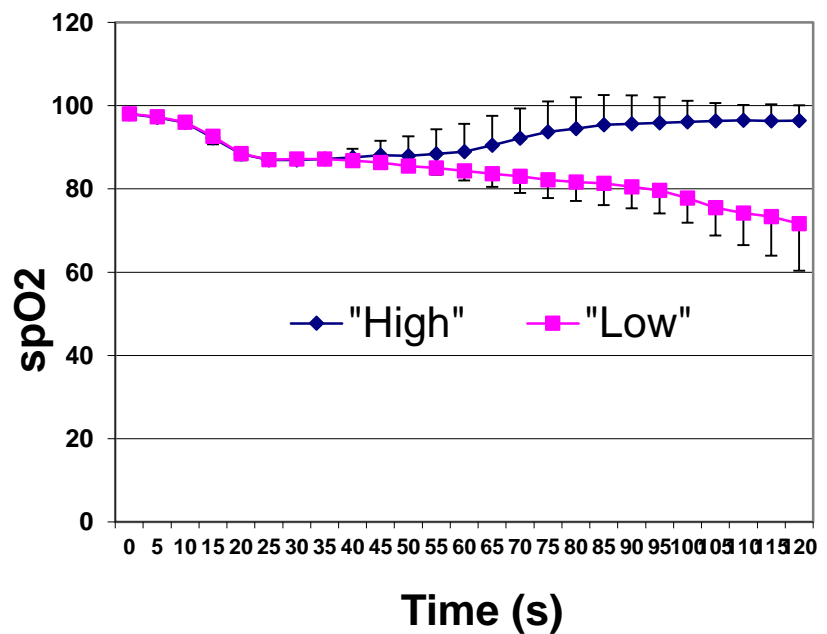
2. Human Factors and (System) Behavior Change

Human Factors?

- The application of scientific and psychological inquiry to the interface of humans with real-life, complex systems, *specifically* for the purposes of changing behavior through design
  - …or improving performance, safety, security, health and/or well-being

Human factors approaches per se have been addressed in a piecemeal manner within infection prevention and control...

However, this has tended to take place in a vacuum...

...the time has come to strengthen infection prevention and control capacity and capability by embedding human factors principles, methods, expertise and tools...

To... develop [better] interventions [we suggest a] review of infection prevention measures through a human factors lens.

The Health Foundation
Inspiring Improvement

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Human Factors, Error & Risk

- HF is about *identifying* and *minimizing* errors and *managing* risk (e.g., preventative design):
  - Undesired in/action
    - E.g., Failure to act / inappropriate action
  - Unintended
    - E.g., Intend to act one way, but…
  - Unacceptable
    - E.g., Planned… mistake/violation

HOSPITALS MAY BE HAZARDOUS TO YOUR HEALTH

"To err is human…"

*Institute of Medicine Report (*also see CDC)

- 5% of hospital admissions experience some type of adverse error, 30% of which cause consequential harm
- Half-a-million people in the U.S. were harmed by preventable medical errors last year
- 2 million hospital patients and 1.5 million long-term care patients are infected by the hospital each year. Most of these are preventable!
- 100,000 deaths result from preventable medical harm each year
- 7000 deaths in the U.S. each year are caused by preventable medication errors
- 1.5 million preventable *medication* errors cause harm in the U.S. each year.
- Medical errors cost the U.S. $17-$29 billion a year
- *Medication* errors in hospitals alone cost $3.5 billion a year
- Increased hospital stays from drug-administration errors cost patients 8 to 12 more days, $16-24K more dollars!

Why do we err?

- Healthcare professionals don't go to work intending to
  - 'Err'
  - Spread infection
 - Harm people

Humans are rarely the sole cause of error

- Error-likely situations predispose humans to err
  - Technological and system design often not human-centred
- Task complexity exceeds human limits / capabilities and/or requires 'workarounds'
- Every practitioner is different!
  - Cognitive, skill-based, experiential, physiological, emotional, psycho-social, organizational processes

Healthcare is a complex system

- Healthcare systems are imperfect systems (Dekker, 2011)
    - A perfect (infection prevention) system / plan presupposes…
        - Currently available practices, plans & solutions (e.g., guidelines) will <u>always</u> work in <u>all</u> situations
        - All we have to do is implement 'the perfect protocol/plan'
- Healthcare systems have many parts
    - Humans (patients, practitioners, teams, organisations, policy makers), infrastructure, technology, agents, artifacts (protocols, procedures, policies, guidelines), medicine, etc.

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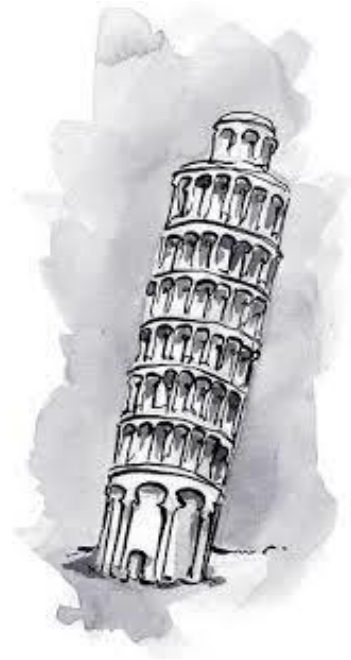
Are current healthcare systems brittle or resilient in terms of IP?

- "epic3": Strong focus on changing *human* rather than system behavior!
  - Education, audit, surveillance, feedback, guidance, etc.
- Fitting humans to (imperfect) designed systems is an outdated view of human factors
- In complex systems, humans are often the glue that hold things together
  - Under pressure
  - Through practice at all levels of an organization
  - by adapting to change and unanticipated circumstances
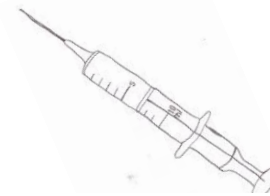
Blunt end

Sharp end

Are current healthcare systems brittle or resilient in terms of IP?

- Dramatic reduction in MRSA bloodstream infections and Clostridium difficile!

Rate of C.Difficile Infections

MRSA/MSSA infections

Source: Health Protection Scotland
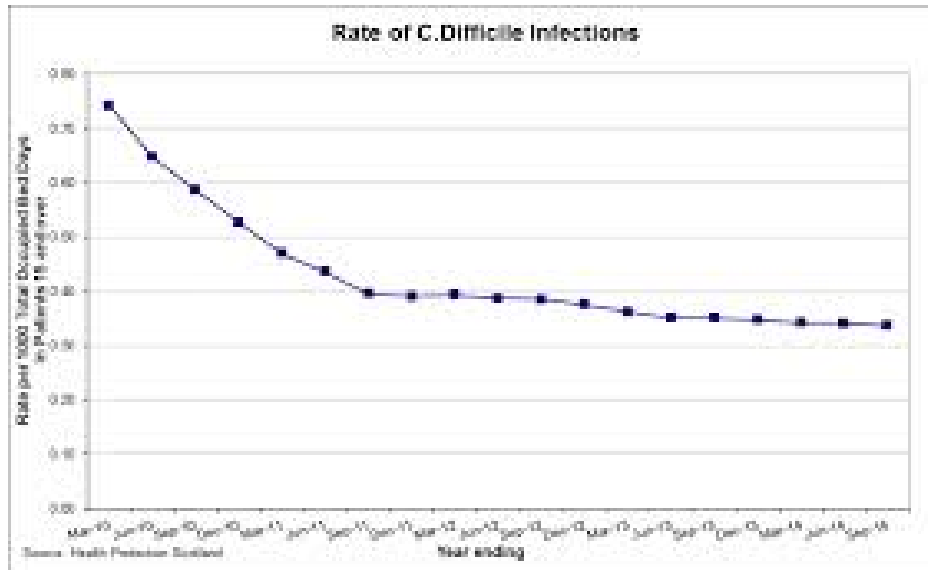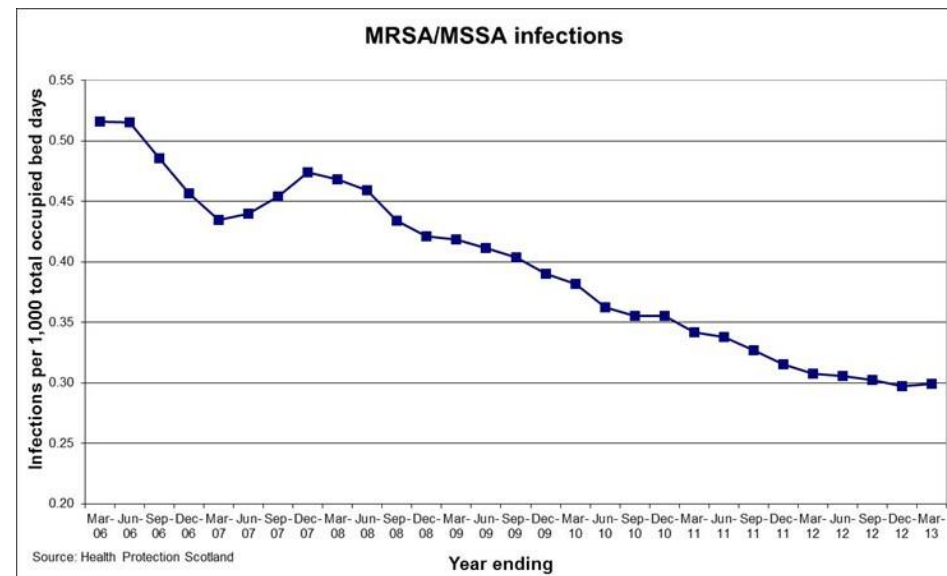
Are current healthcare systems brittle or resilient in terms of IP?

- Despite excellent progress...
  - Healthcare associated infections (HCAI) continue to present risks to users
  - HCAI dilute advances made in treatments

                                                            (epic3)

3. Some 'behavioral' tools for change

HF Lessons Learned #1:

Change the 'system' not just the human

Nudging people through design

- Nudging is a way of designing 'the system' to constrain individuals to produce the desired behavioral outcome.

- Human-centered design (Norman & Draper, 1986)
  - Focus on supporting practitioner needs, rather than requiring them to 'fit' to system (quirks)
  - Exploit human capabilities and avoid pitfalls of their limitations

http://www.jnd.org
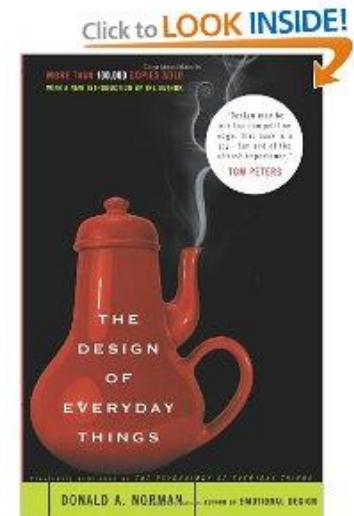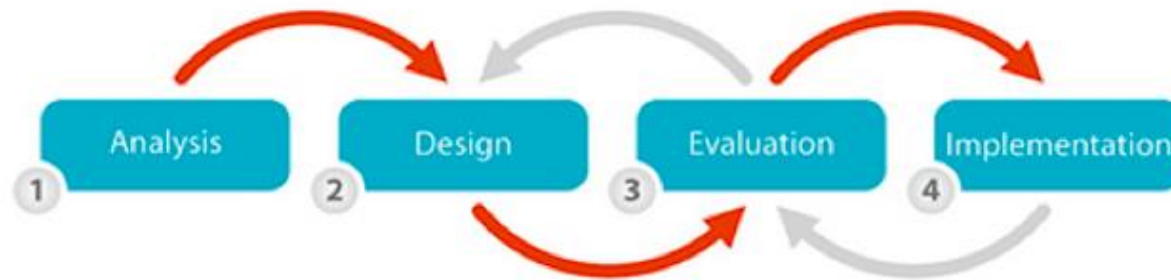
HF Lessons Learned #2:

Good 'design' can *nudge* people toward desired behaviors

UK Gov. Nudge Team

- MINDSPACE & **EAST**
  - **E**asy
    - Use defaults, reduce hassle, simplify messages simple
  - **A**ttractive
    - Attract attention, design rewards/sanctions effectively
  - **S**ocial
    - Social norms, embed in social networks, encourage commitment to others
  - **T**imely
    - 'Prompt' when needed, consider immediate costs/benefits, plan!

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http://www.behaviouralinsights.co.uk

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HF Lessons Learned #3:

'Message design' can nudge people to make certain choices

Framing the message

- Nudging sexually active young adults to use condoms (Cokely & Garcia-Retamero, 2011)
  - Brochure focused on prevention (or detection/screening)
    - Framed as 'benefits of adopting' the healthy behavior and reduced chances of infection (positive)
    - Framed as 'costs of failing to adopt' the healthy behavior and increased chances of contracting the disease (negative)

Framing the message

- Framing messages positively *(as gains or benefits)*:
  - We are more likely to engage in prevention behaviors
    - E.g., Condom use
- Framing messages negatively *(as losses or costs)*:
  - We are more likely to engage in detection behaviors
    - E.g., STD screening

HF Lessons Learned #4:

Don't use a one-size fits all approach!

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Nudging can be ethically expensive!

- Nudging is effective BUT
- It can reduce thoughtfulness about/during the decision process
  - Decreases 'informed' decision making!
- *Ironically, nudging could create the kinds of conditions that are most prone to errors, slips and lapses!!*
    - e.g., People doing things where they don't have to think that hard (e.g., skilled practitioners doing well-practiced routines/procedures in familiar situations)

HF Lessons Learned #4:

Design to win, not just to avoid failure!

System Performance Improvement = [Reducing Error] + [Increasing Insights]

(Klein, G., 2013)

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Insights?

Seeing
What Others
Don't

The Remarkable Ways
We Gain Insights
....

"No one has taught me more about the complexities
and mysteries of human decision-making than Gary Klein."
—MALCOLM GLADWELL

GARY KLEIN

- Triggers?
  - Classic: Impasse
  - Connection: Spot implications; be curious; see coincidences
  - Contradiction: Find inconsistencies

- What it takes to gain new insight?
  - Abandon old mental models (classic)
  - Add new supplementary mental models (connection)
  - Rebuild existing mental models (contradiction)

- Results?
  - Changes in understanding;
    - the way you think, feel, see, desire, act

INFORMATION – NEW/OLD KNOWLEDGE
THOUGHTFULNESS - REFLECTION - FEEDBACK

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HF Lessons Learned #5:

Feedback is king!

But what, how, when, who, where, & why matter!!

The irony of absent feedback in prevention

- Event rate (e.g., # possible infections) is perceived to be lower than actual!
  - > Perceived need for prevention strategy is low
  - > Non-compliance with / removal of prevention strategy

- Domains where feedback is absent often result in similar levels of performance between experts and novices (despite experiential differences)

What kind of feedback 'should' create effective infection prevention?

- Useful feedback is rich, meaningful, specific, and task-relevant
  - Based on mentoring or expert instructional guidance
  - Challenges the learner and stretches their skill, particularly on tough/rare cases

- Feedback should be tailored to the practitioner's needs and capabilities

- Find a balance between intermittent, constant and no feedback to optimize (rather than inhibit) behavior change

"Never mind a book on how to improve myself. I need a book on how to improve every one else in my life."

Effects of feedback(?) on IP

- Small to moderate effects of feedback on professional practice
  - When individuals have low compliance with recommended practice, higher **intensity** audit and feedback is associated with greater effectiveness (lower risk)

- Nature of feedback given is highly variable
  - "Any summary of clinical performance over a specified period of time"
    - Feedback given to individuals
    - Feedback given verbally <u>or</u> from a supervisory source
    - Feedback was moderate-prolonged in nature

THE COCHRANE COLLABORATION®

(Jamtvedt et al., 2007)

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HF Lessons Learned #6:

Resilient systems are safe/better systems

What is resilience?

- The art of managing the unexpected

- Preparedness to cope with and adapt to surprises

- The ability to recover from challenges or disrupting events

(Hollnagel, Woods et al, 2006, 2013/15)

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What can be done to increase resilience?

1. Build in ability to recover from error more easily
   - Build in redundancy without diffusing responsibility

2. Keep updating your view of risk – even when things 'look safe'
   - Stay curious, open-minded and take on others' perspectives
   - Invite doubt—use disconfirmation strategies

3. Past success is not a guarantee for future safety
   - Adaptive strategies need to remain adaptive not become routine!
   - So, build in adaptive capabilities and skills

4. Invest in safety when it is most difficult (e.g., limited resources)

5. Use Resilience as a fourth management variable
   - Better (safer), faster, cheaper… and more resilient

Changing the culture to increase resilience

- Balance accountability with learning—make them compatible
  - Audit vs. (useful) feedback
- Accountability is a judgment call, often made…
  - without the specific operating context <u>OR</u>
  - with limited knowledge of the complexity of effective practice in a noisy world
- Build a just culture to increase accountability
  - Increase no. of cases from which you can learn/improve
  - Don't get trapped by drawing a distinct line between acceptable and inacceptable behavior
  - Reduce anxiety about who gets to draw the line on your behavior
  - Assess the ways in which you deal with incidents to avoid inhibiting openness
    - Protect safety data from undue external probing
    - Avoid stigmatism/penalties, offer peer support, use independent safety staff

resilient SAFETY culture

"WE BELIEVE THIS APPLIES TO ALL DISCIPLINES:

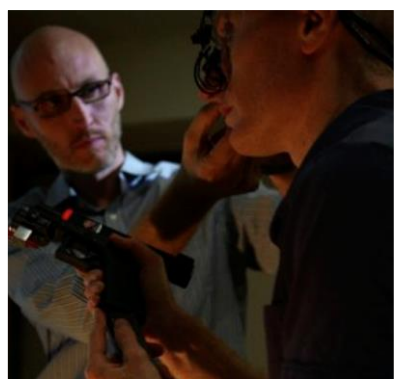"IF YOU THINK GOOD DESIGN IS EXPENSIVE, YOU SHOULD LOOK AT THE COST OF BAD DESIGN"

DR. RALF SPETH, CEO JAGUAR

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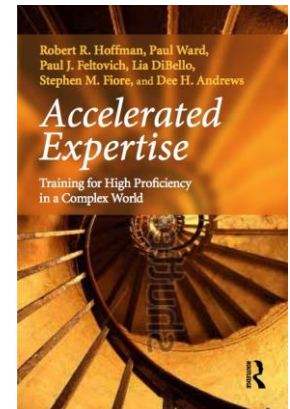## Inspiring tomorrow's professionals

Paul Ward

Professor of Applied Cognitive Psychology
Director, The AC$_2$E Group

*School of Human & Health Sciences
University of Huddersfield*

p.ward@hud.ac.uk

01484 471124

www.facebook.com/theacelab
www.linkedin.com/in/ACEProfessor/
@ACE_Professor

Robert R. Hoffman, Paul Ward,
Paul J. Feltovich, Lia DiBello,
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