



Usability

- ▶ **ONC's Unified Understanding**
 - ▶ and the
 - ▶ **Value of SHARP C**

Joe Bormel, MD, MPH
Tuesday, March 25, 2014



ADVERSITY

THAT WHICH DOES NOT KILL ME POSTPONES THE INEVITABLE.

Abdominal Pain



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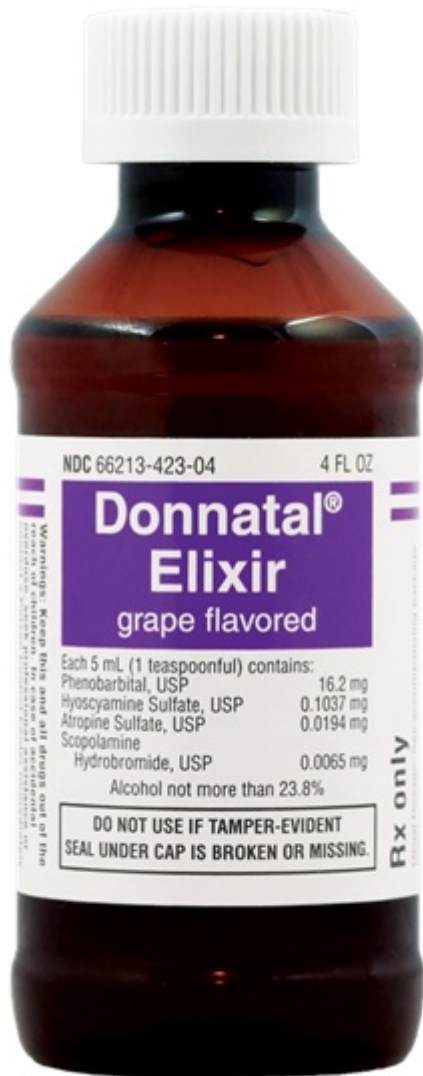


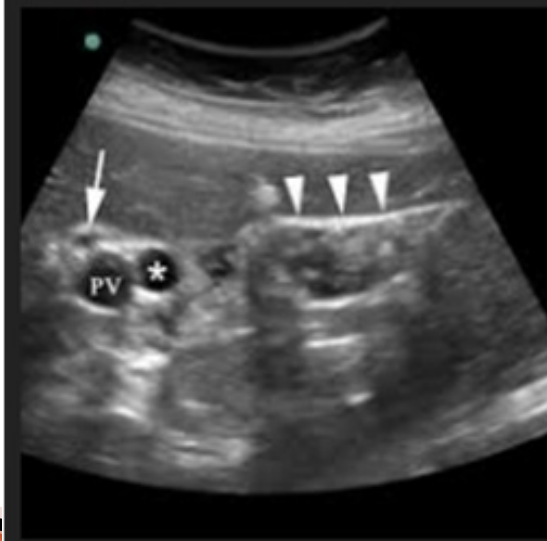
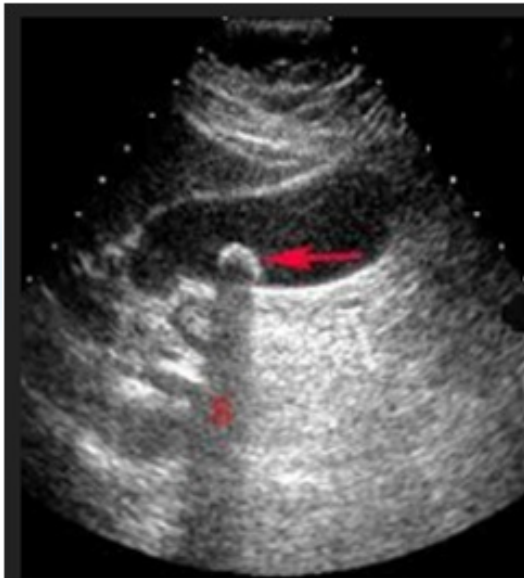
Just about everybody at one point or another will experience [abdominal pain](#). Most of the causes are not serious and can be readily diagnosed and treated. However, pain can also be a sign of a serious illness. It's important to be able to recognize symptoms that are severe and know when to call a doctor.

What Are the Most Common Causes of Abdominal Pain?

Whether it's a mild [stomach](#) ache, sharp pain, or stomach cramps, abdominal pain can have numerous causes. Some of the more common causes include:

- ◆ [Indigestion](#)
- ◆ [Constipation](#)
- ◆ Stomach virus
- ◆ Menstrual cramps
- ◆ [Food poisoning](#)
- ◆ [Food allergies](#)
- ◆ [Gas](#)
- ◆ [Lactose intolerance](#)
- ◆ [Ulcers](#)
- ◆ Pelvic inflammatory disease
- ◆ Hernia
- ◆ [Gallstones](#)
- ◆ Kidney stones
- ◆ Endometriosis









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Usability travels with Safety



What is Usability?

Usability is "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use"

- ISO 9241

The Two Bins of Usability

User Experience (UX Design)

User Interface Design

Displays and Controls
Screen Design
Clicks & Drags

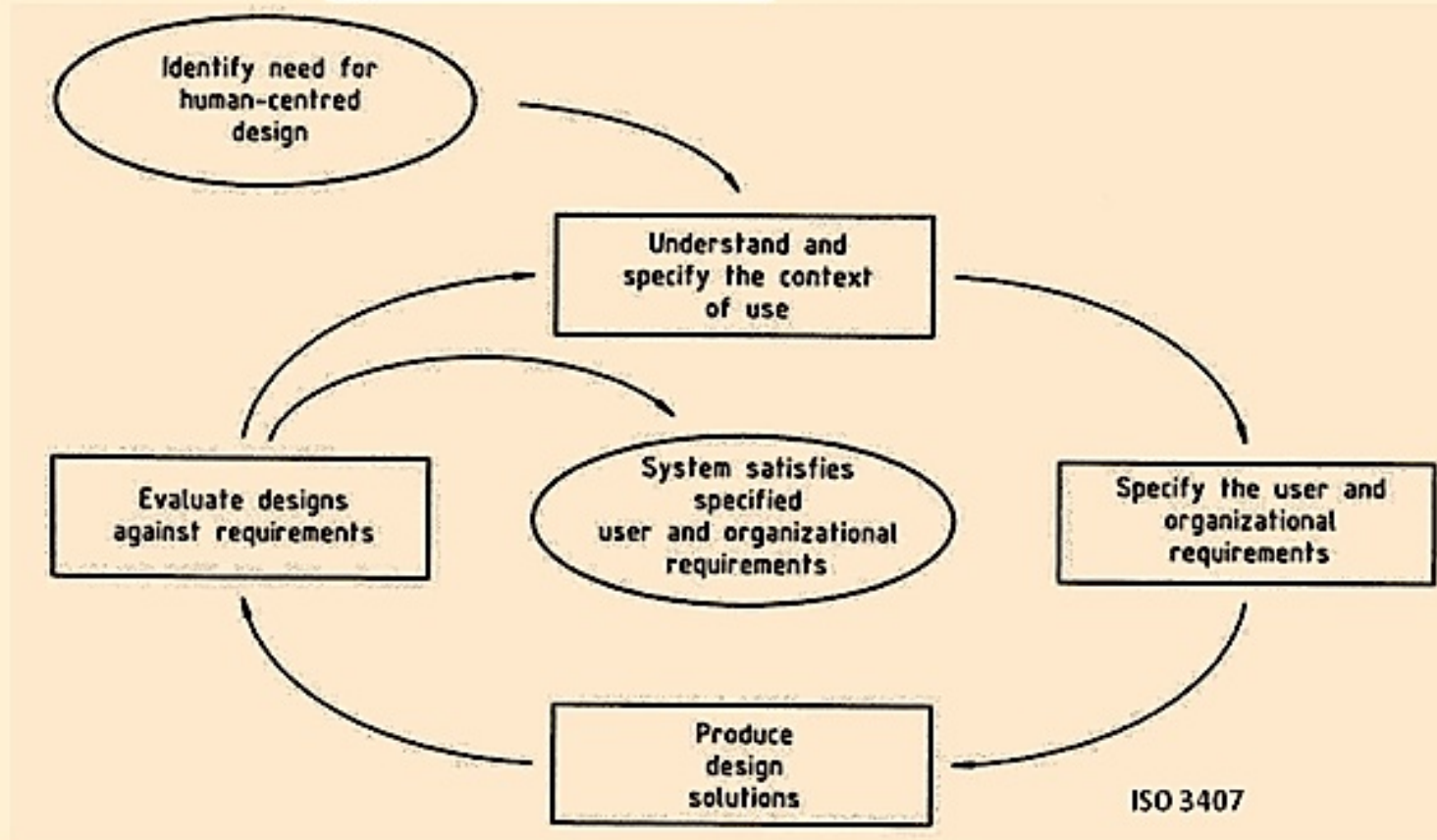
Cognitive Task Support

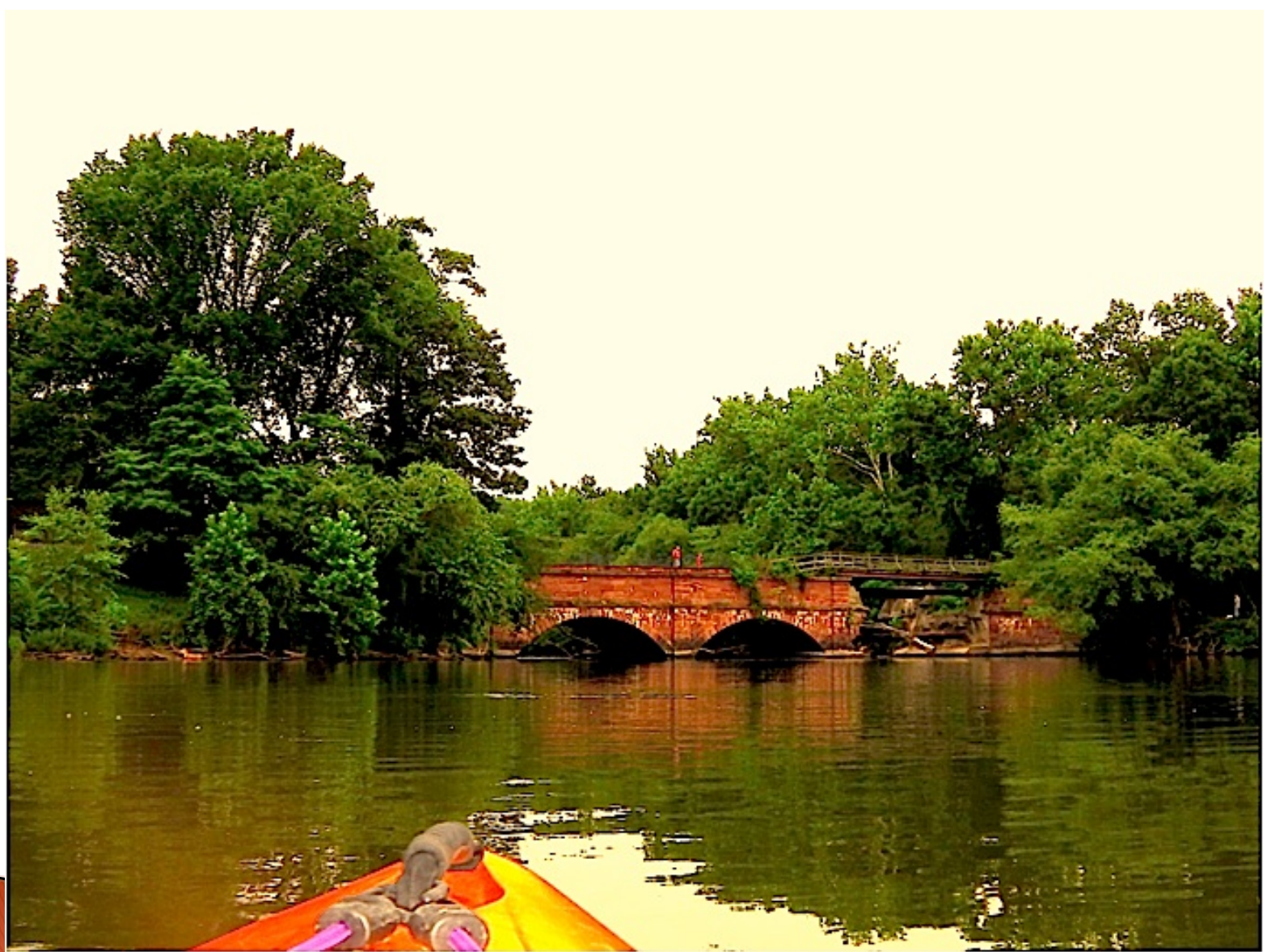
“Workflow Design”
Data Visualization
Functionality

Usability and User Centered Design

- **Usability:** Extent to which a product can be used by specified users to achieve specified goals with **effectiveness, efficiency** and **satisfaction** in a specified context of use

- **UCD**









A MORE REALISTIC CHESS

Because the world is not just black and white

Rather than being the main instigators of an accident, operators tend to be the inheritors of system defects..... Their part is that of adding the final garnish to a *lethal brew* that has been long in the cooking.”

James Reason, *Human Error*, 1990

Standard PCA Parameters for Opioid <u>Naïve</u> Adult Patients			
	morphine	HYDROmorphone	fentaNYL
1x (single strength)	1mg/ml	0.2 mg/ml (200 mcg/ml)	10 mcg/ml
Loading Bolus	2 mg	0.4 mg (400 mcg)	20 mcg
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Number of Clinician Boluses Per Hour	1	1	1
PCA Dose	1 mg	0.2 mg (200 mcg)	10 mcg
Lockout	10 minutes	10 minutes	10 minutes
Total Drug Over Time	Optional	Optional	Optional
Max Number of Patient Demand Doses Per Hour	Optional	Optional	Optional
Basal	Not recommended for starting PCA		

What creates or destroys Usability?

Reference Usability Model

Sociotechnical Contexts of Usability



Workplace

Reference Usability Model

Sociotechnical Contexts of Usability



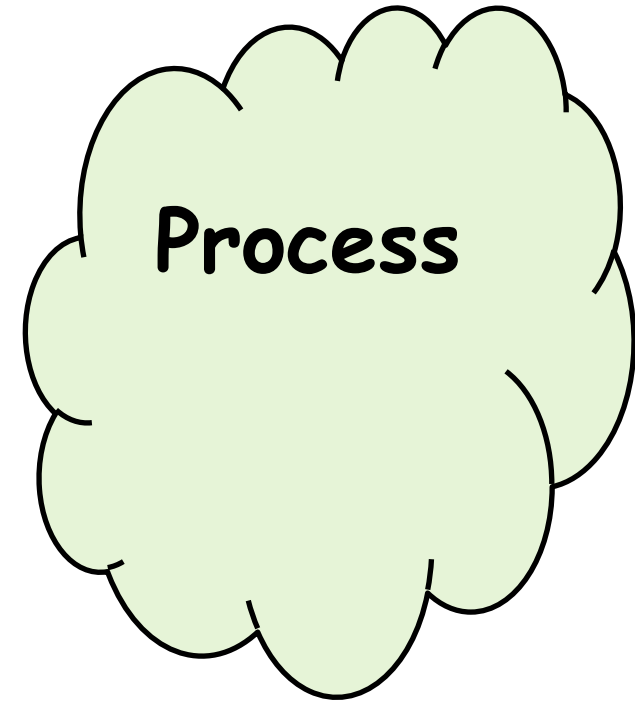
Reference Usability Model

Sociotechnical Contexts of Usability



Reference Usability Model

Sociotechnical Contexts of Usability



Workflow

- ▶ Workflow modeling Methods
- ▶ <http://nvlpubs.nist.gov/nistpubs/ir/2014/NIST.IR.7988.pdf>

Integrating Electronic Health Records into Clinical Workflow: An Application of Human Factors Modeling Methods to Ambulatory Care

Sventlana Z. Lowry
Mala Ramaiah
Emily S. Patterson
David Brick
Ayse P. Gurses
Ant Ozok
Deborah Simmons
Michael C. Gibbons

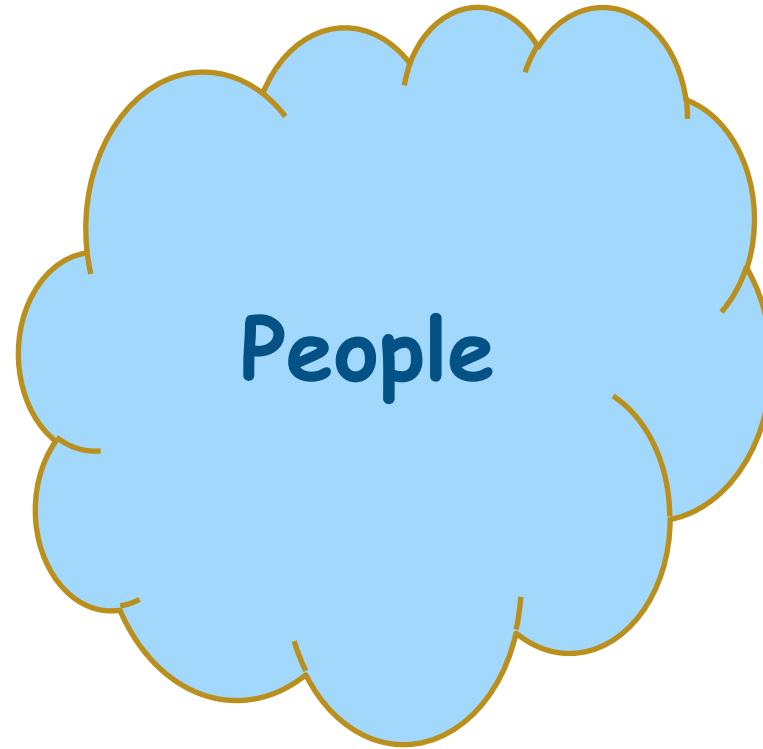
<http://dx.doi.org/10.6028/NIST.IR.7988>

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce



Reference Usability Model

Sociotechnical Contexts of Usability



Know Your Brain, Transform Your Performance

Your Brain at Work

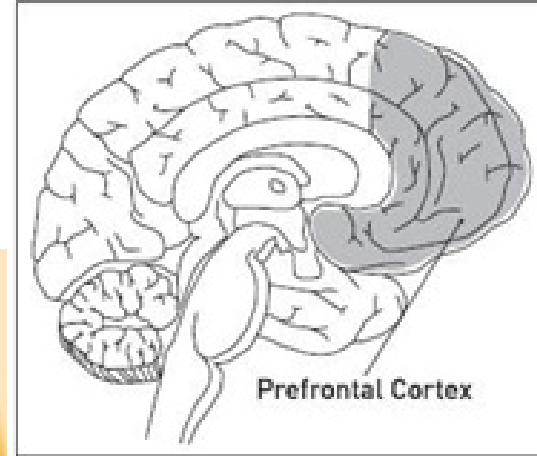
STRATEGIES FOR OVERCOMING
DISTRACTION, REGAINING FOCUS, &
WORKING SMARTER ALL DAY LONG

David Rock

Foreword by Daniel J. Siegel, M.D.

Some Things to Try

- Think of conscious thinking as a precious resource to conserve.
- Prioritize prioritizing, as it's an energy-intensive activity.
- Save mental energy for prioritizing by avoiding other high-energy-consuming conscious activities such as dealing with emails.
- Schedule the most attention-rich tasks when you have a fresh and alert mind.
- Use the brain to interact with information rather than trying to store information, by *creating visuals* for complex ideas and by listing projects.
- Schedule blocks of time for different modes of thinking.



THINKING,
FAST AND SLOW

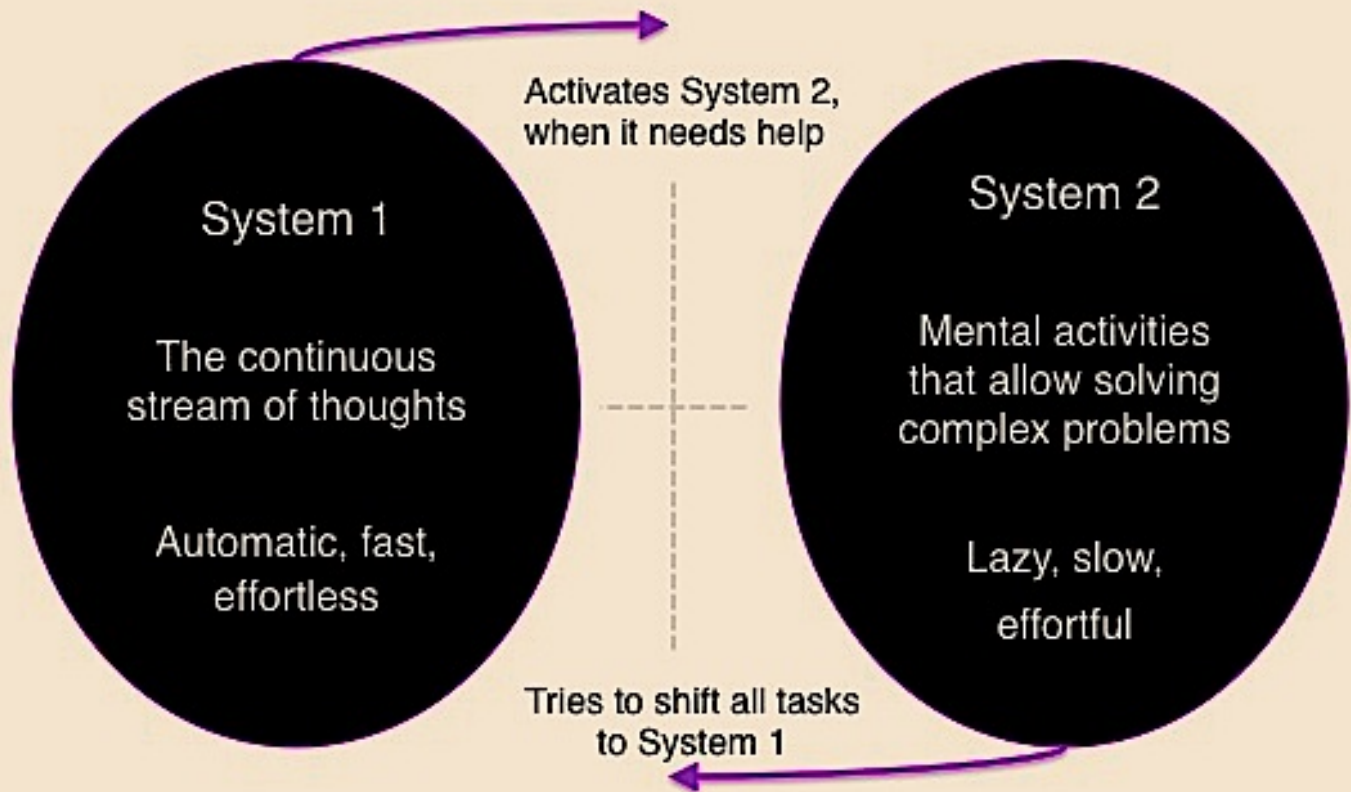


DANIEL
KAHNEMAN

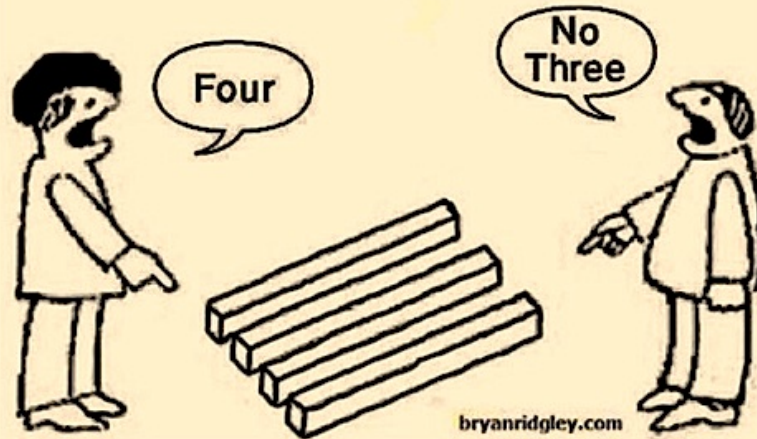
WINNER OF THE NOBEL PRIZE IN ECONOMICS

What it does

Adjectives



Reality can be so complex that equally valid observations from differing perspectives can appear to be contradictory.



PERSPECTIVE

Just remember, whatever side you're on the other person is right too.

"A landmark contribution to humanity's understanding of itself."
—The New York Times Book Review

THE RIGHTEOUS MIND

WHY GOOD
PEOPLE ARE DIVIDED
BY POLITICS AND
RELIGION

JONATHAN
HAIDT



"Your mother and I are separating because I want what's best for the country and your mother doesn't."

FIGURE 13.1. Why Manichaeans think they are divided by politics. ([photo credit 13.1](#))

People don't adopt their ideologies at random, or by soaking up whatever ideas are around them. People whose genes gave them brains that get a special pleasure from **novelty**, variety, and diversity, while simultaneously being less sensitive to signs of threat, are predisposed

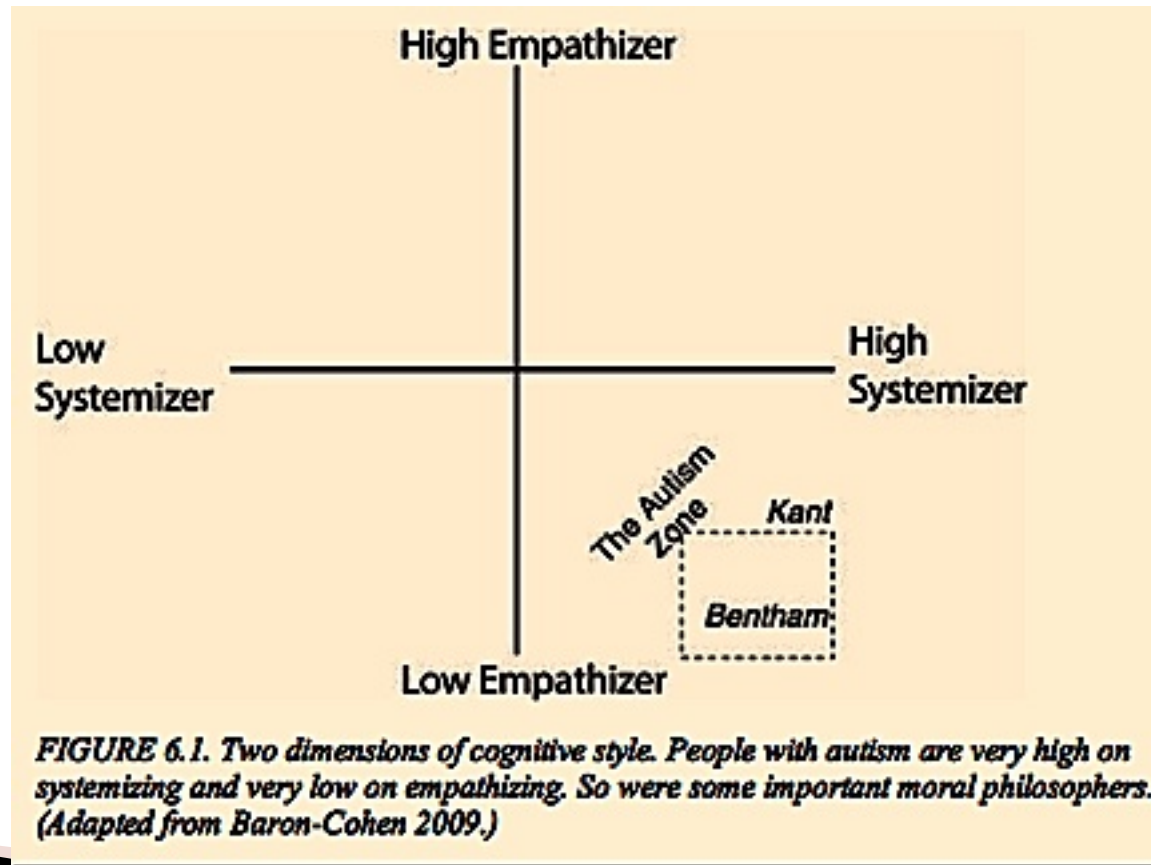
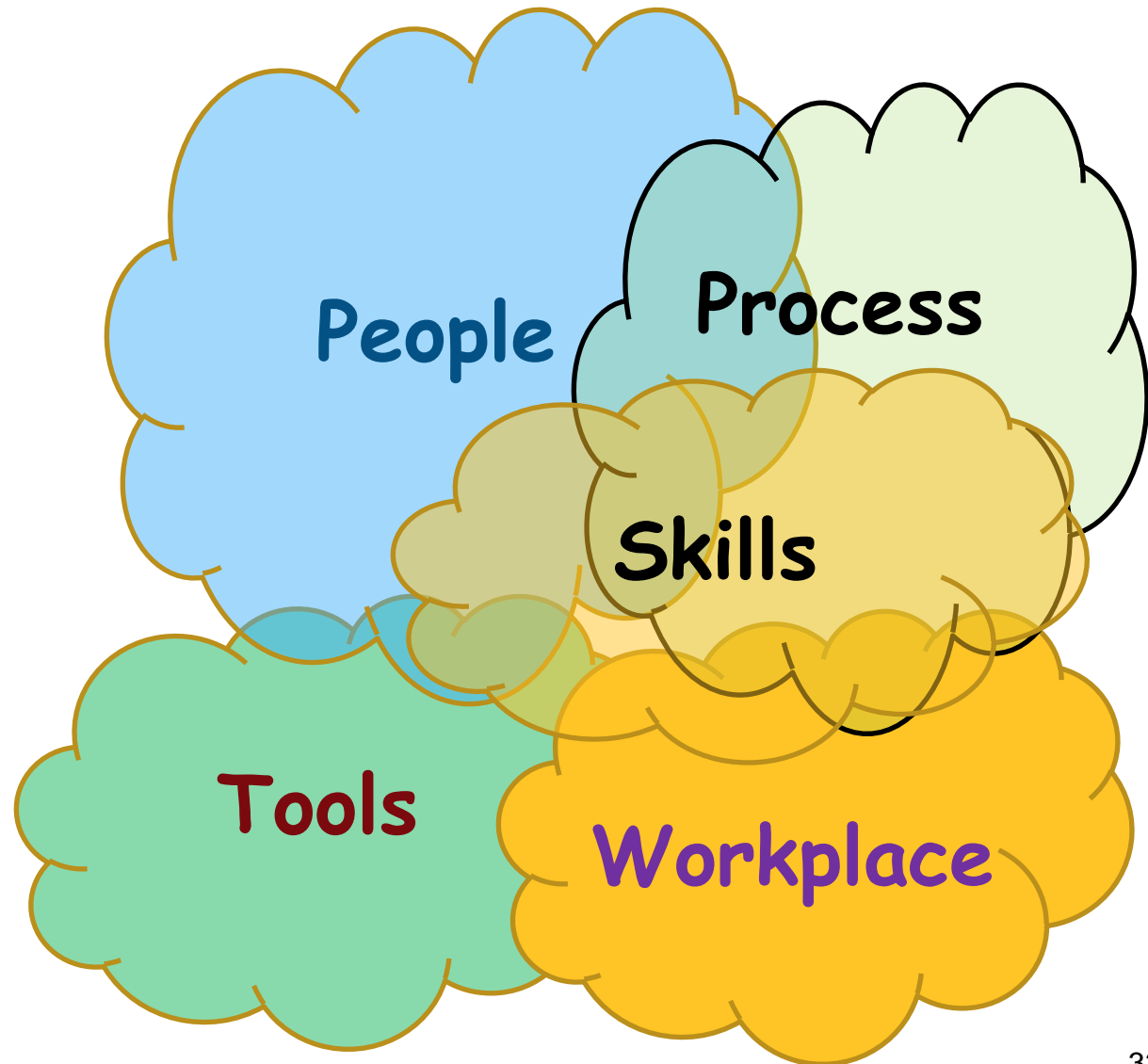


FIGURE 6.1. Two dimensions of cognitive style. People with autism are very high on systemizing and very low on empathizing. So were some important moral philosophers. (Adapted from Baron-Cohen 2009.)

Flavor of the Frustration

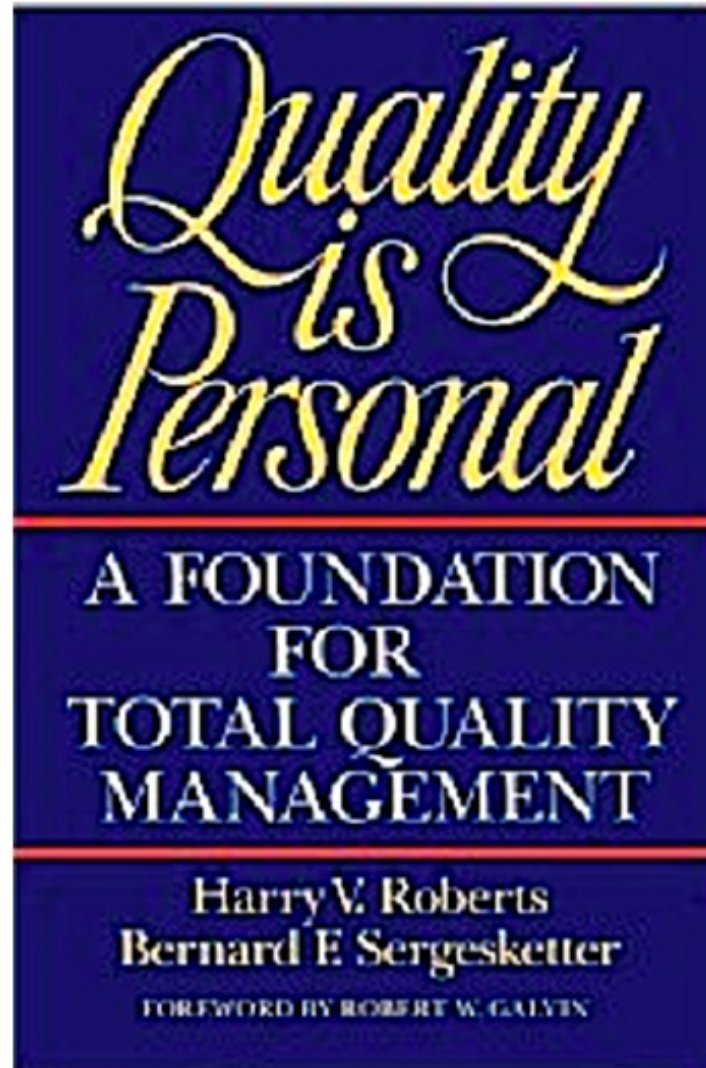
- “Every Screen’s got 50 different things, you know, that are changing. It slows me down. So, I do a lot of my charting at night...But, the problem is I’m spending more hours doing it than I would have before. We have XXX, which you have to be careful of, because I just [dictated] a ‘Patient’s prostate is bothering him’ and it turned out ‘Patient’s prostitute is bothering him.’ You really have to read careful, because I can end up going to court with that stuff.”
 - Primary care physician





MAGIC

Usability Is ... Personal



Usability Requires Experimentation

Lesson from Twinlist: a little bit of visualization can go a long way!

From: Krisanné Graves (<mailto:Krisanne.Graeves@uth.tmc.edu>)
Sent: Friday, November 22, 2013 11:23 AM
To: 'Krisanne Graves'; Amy Franklin; Dean F. Sittig; Jiajie Zhang; Trevor Cohen; Jorge R. Herskovic; Carmen Elliott; Hua Xu; Adam Wright (awright5@partners.org); Ben Shneiderman (ben@cs.umd.edu); Catherine Plaisant (plaisant@cs.umd.edu); Keith Butler (keith.a.butler@gmail.com); Robert A. Greenes (greenes@asu.edu); Reider, Jacob (HHS/ONCIT); Morton, Alicia (HHS/ONC); Davide Sottara; Charles, Dustin (HHS/ONC); Belden, Jeffery L.; Muhammad F. Walji - UT Houston; Helwig, Amy (HHS/ONCIT); Lana Lo (svetlana.lowry@nist.gov); Bormel, Joseph (HHS/ONCIT); AHRQ Johnson, Todd
Cc: Pettis, Luciana
Subject: SHARPC Project Leaders Meeting
When: Occurs the first Monday of every 1 month effective 1/6/2014 until 3/31/2014 from 2:00 PM to 4:00 PM Central Standard Time
Where: Webex and Teleconference TBA

Account Location: Webex and Teleconference TBA
When: Occurs the first Monday of every month
From: Bormel, Joseph (HHS/ONCIT) on behalf of

1 Adam Wright (awright5@partners.org)
2 AHRQ Todd Johnson TAB
3 Alicia Morton (HHS/ONC)
4 Amy Franklin
5 Amy Helwig (HHS/ONCIT)
6 Ben Shneiderman (ben@cs.umd.edu)
7 Carmen Elliott
8 Catherine Plaisant (plaisant@cs.umd.edu)
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10 [Dean F Sittig](mailto:Dean.F.Sittig@hhs.gov)
11 Dustin Charles (HHS/ONC)
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13 Jacob Reider.....(HHS/ONCIT)
14 [Jeffery L Belden](mailto:Jeffery.L.Belden@hhs.gov) TAB
15 [Jiajie Zhang](mailto:Jiajie.Zhang@hhs.gov)
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18 Keith Butler (keith.a.butler@gmail.com)
19 Krisanne Graves
20 Lana Lowry (svetlana.lowry@nist.gov)
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23 [Robert A Greenes](mailto:Robert.A.Greenes@asu.edu) (greenes@asu.edu)
24 Trevor Cohen

Usability Requires Learning

Research/Experimentation, Prototyping, Testbeds, Scenarios



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The Free Encyclopedia

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Contents
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Article

Talk

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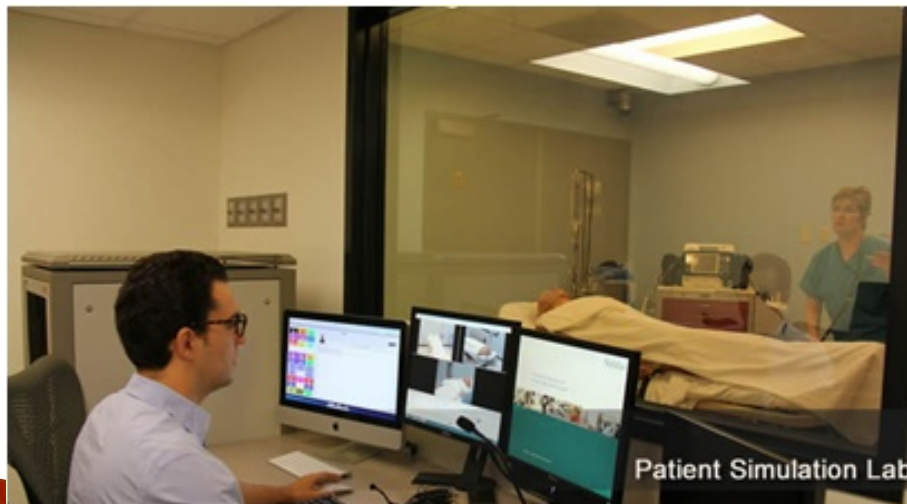
Edit

View his

Self-experimentation

From Wikipedia, the free encyclopedia

Self-experimentation refers to the very special case of single-subject *scientific* experimentation experiment on her- or himself. Usually this means that the designer, operator, subject, analyst, and the same. It is a special case of single-subject research.



A GUIDE TO PROTOTYPING

	RAPID PROTOTYPING	LIVE PROTOTYPING	TECHNICAL PROTOTYPING	PILOT
Question answered	What are the different ways we could solve this problem?	Does our message and solution resonate in the market?	Can the problem be solved in this specific way?	Are the economics attractive enough to justify scaling?
When to employ it in the product-development process	Early, to explore many ways to achieve a goal and periodically during the mid-phase to explore ways to deliver a specific feature or value driver.	Midway, to rigorously explore market appeal once a specific opportunity area has been identified.	When technical feasibility is in question or when the function has been identified but the specific means is yet to be determined.	Late, as a final check to tweak details before launching at scale.
Fidelity (i.e. the degree to which a prototype reflects a polished and finished product)	Low	Just enough for the product to appear real in the marketplace.	High enough to prove feasibility.	Very high. Pilots require a working solution and are often more polished than the scalable versions to overcome initial market awareness challenges.

SOURCE DAVID AYCAN AND PAOLO LORENZONI

HBR.ORG

March 17, 2014, The future of Prototyping is now live

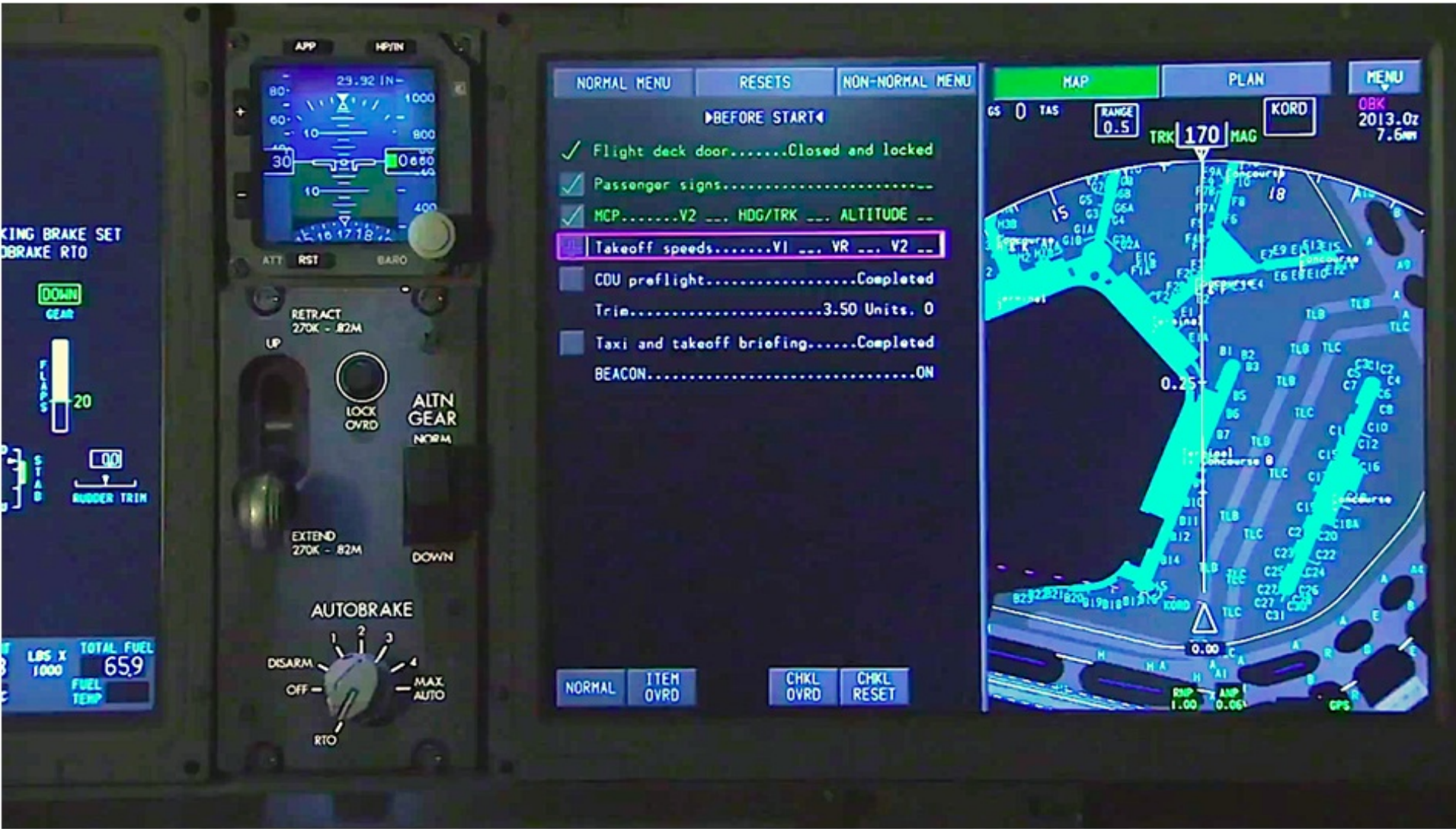
Learning Requires Liberty



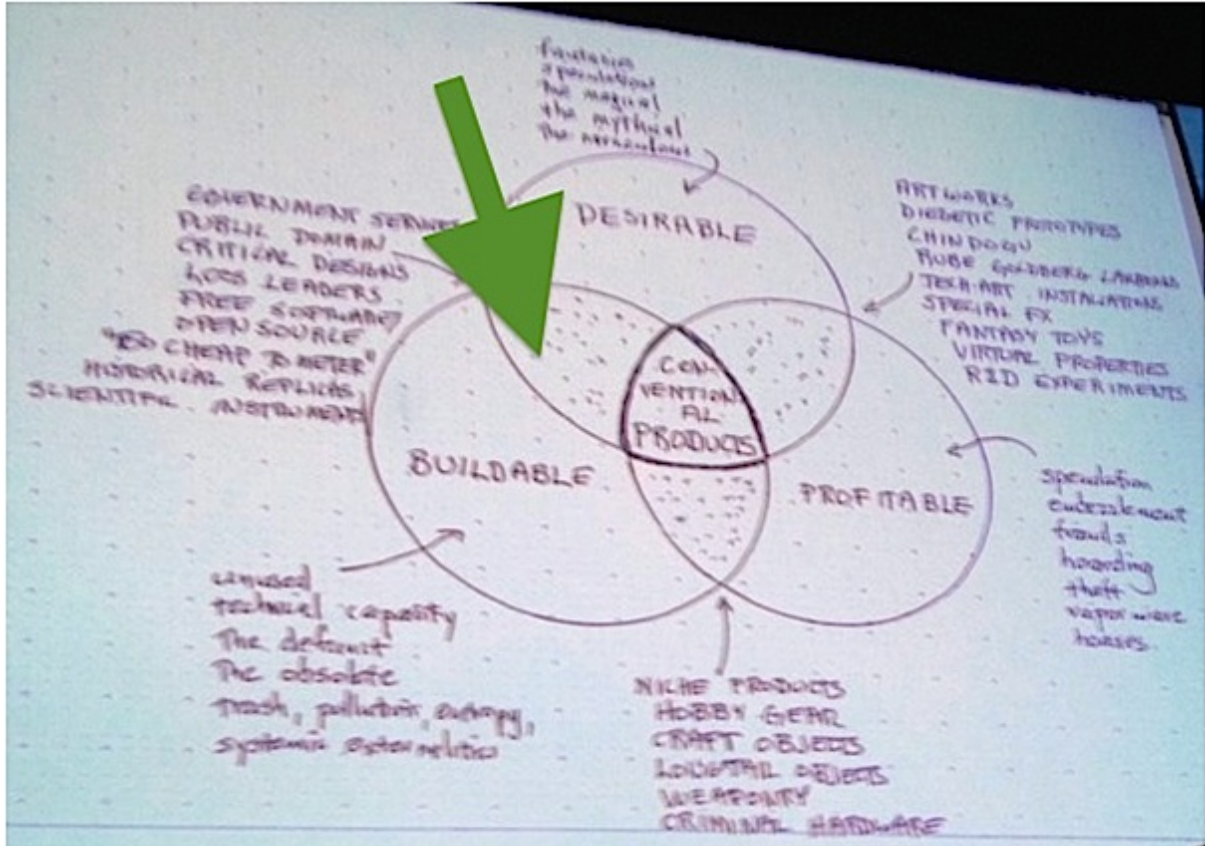
**“Any society
that would
give up a little
liberty to gain
a little security
will deserve
neither and
lose both.”**

-Benjamin Franklin

Adaptive Checklists



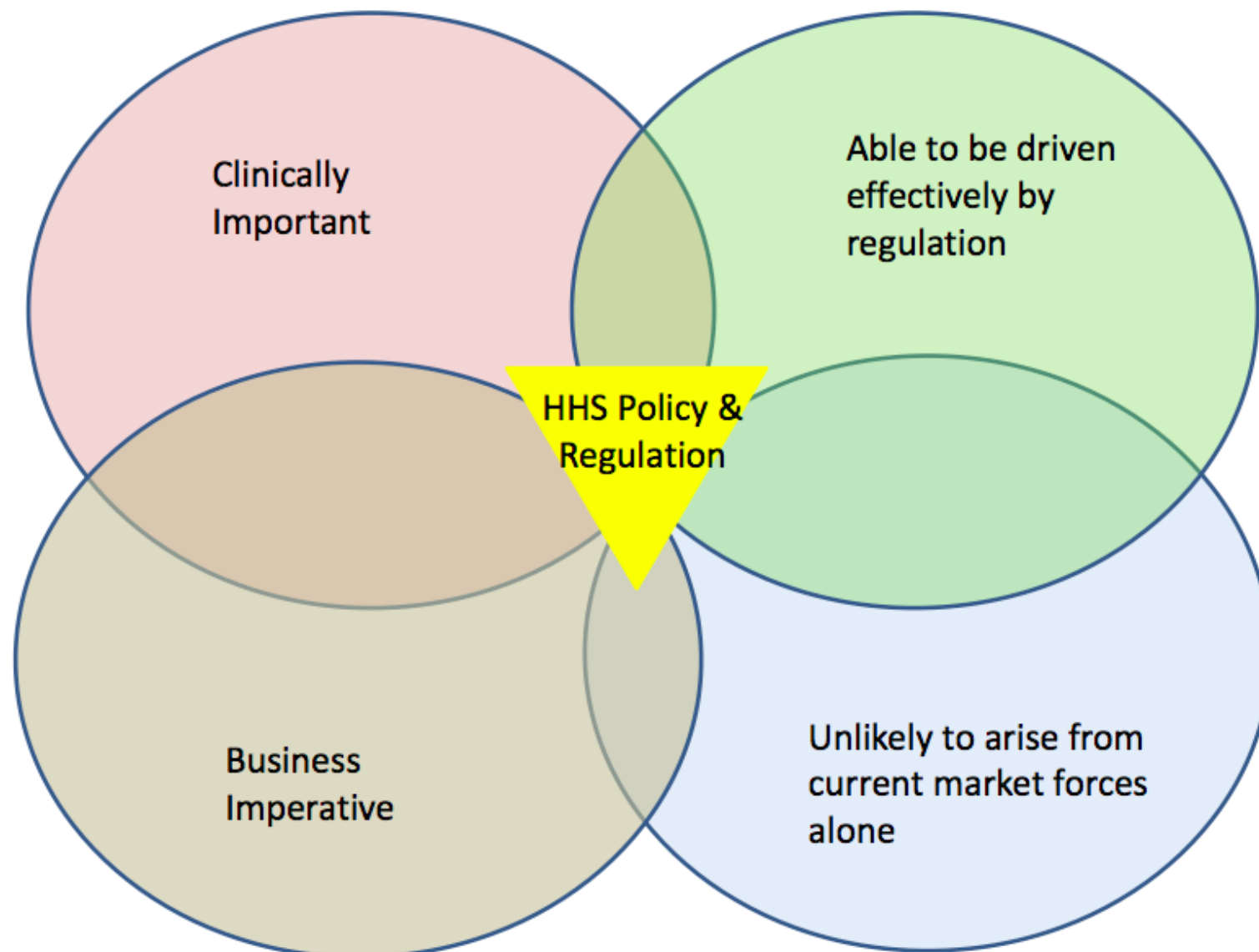




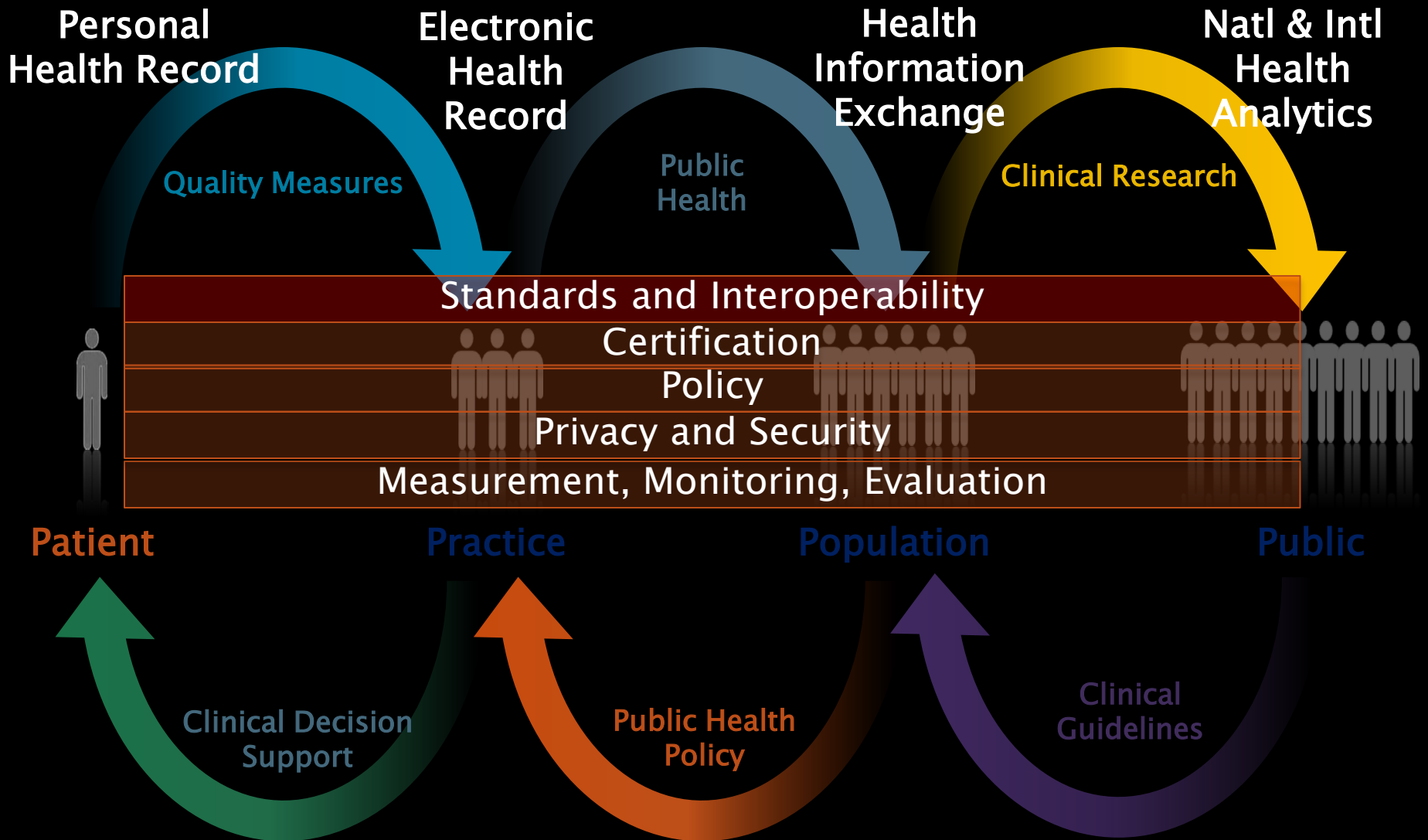
Optimum Strategic Position for ONC to Leverage its Regulatory Authority for Change



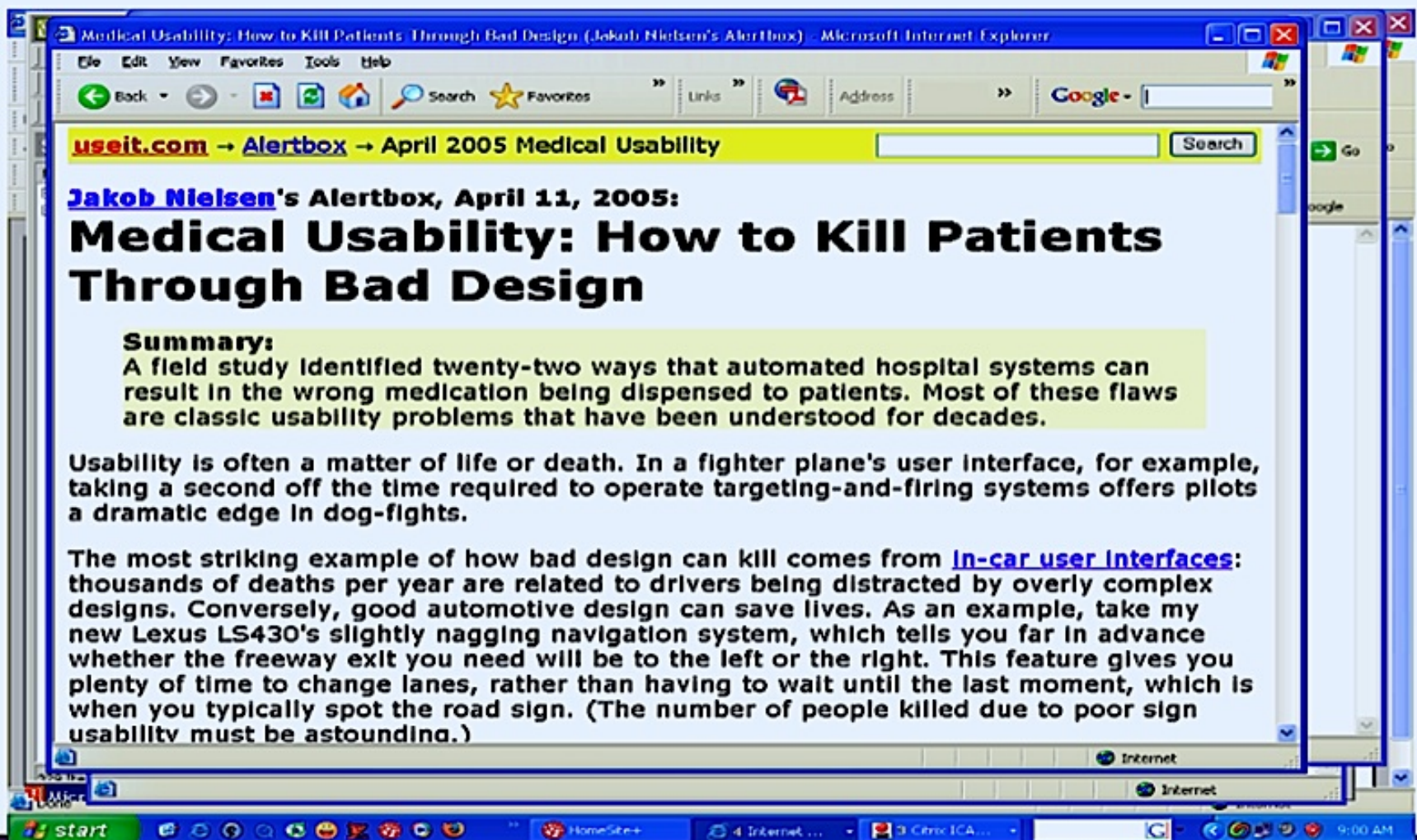
Health IT Policy Committee
A Public Advisory Body on Health Information Technology
to the National Coordinator for Health IT



The Learning Healthcare System



Usability in Healthcare



The screenshot shows a Microsoft Internet Explorer browser window. The title bar reads "Medical Usability: How to Kill Patients Through Bad Design (Jakob Nielsen's Alertbox) - Microsoft Internet Explorer". The address bar contains "useit.com -> Alertbox -> April 2005 Medical Usability". The main content area features the following text:

Jakob Nielsen's Alertbox, April 11, 2005:

Medical Usability: How to Kill Patients Through Bad Design

Summary:
A field study identified twenty-two ways that automated hospital systems can result in the wrong medication being dispensed to patients. Most of these flaws are classic usability problems that have been understood for decades.

Usability is often a matter of life or death. In a fighter plane's user interface, for example, taking a second off the time required to operate targeting-and-firing systems offers pilots a dramatic edge in dog-fights.

The most striking example of how bad design can kill comes from [in-car user interfaces](#): thousands of deaths per year are related to drivers being distracted by overly complex designs. Conversely, good automotive design can save lives. As an example, take my new Lexus LS430's slightly nagging navigation system, which tells you far in advance whether the freeway exit you need will be to the left or the right. This feature gives you plenty of time to change lanes, rather than having to wait until the last moment, which is when you typically spot the road sign. (The number of people killed due to poor sign usability must be astounding.)

The browser's taskbar at the bottom shows the Start button, several open applications (HomeSite+, 4 Internet..., 3 Citrix ICA...), and the system clock displaying 9:00 AM.

- ▶ Goal:
 - ▶ To define and validate standards
 - ▶ that facilitate the emergence of systems and services whereby CDS interventions
 - ▶ can be shared or accessed
 - ▶ by any healthcare stakeholder
 - ▶ via an importable format or via a CDS Web service.
- Outcome: → enable CDS sharing at scale

Pilot Partnerships –
HeD Use Case 1

EHR	Pilot	Content Supplier
<i>Design Clinicals</i>	<i>Order Set – Heart Failure</i>	<i>Zynx Health</i>
<i>Allscripts</i>	<i>Rule – NQF 068 (Million Hearts)</i>	<i>newMentor</i>
<i>Allscripts</i>	<i>Rule – San Diego Pertussis</i>	<i>CDC</i>
<i>VA</i>	<i>Documentation Template – UTI</i>	<i>Wolters Kluwer Health</i>

Knowledge and the Learning Health System

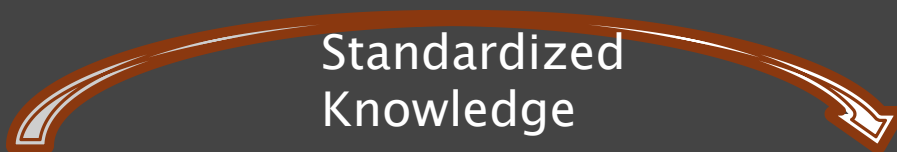
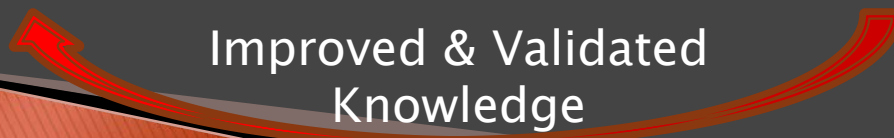
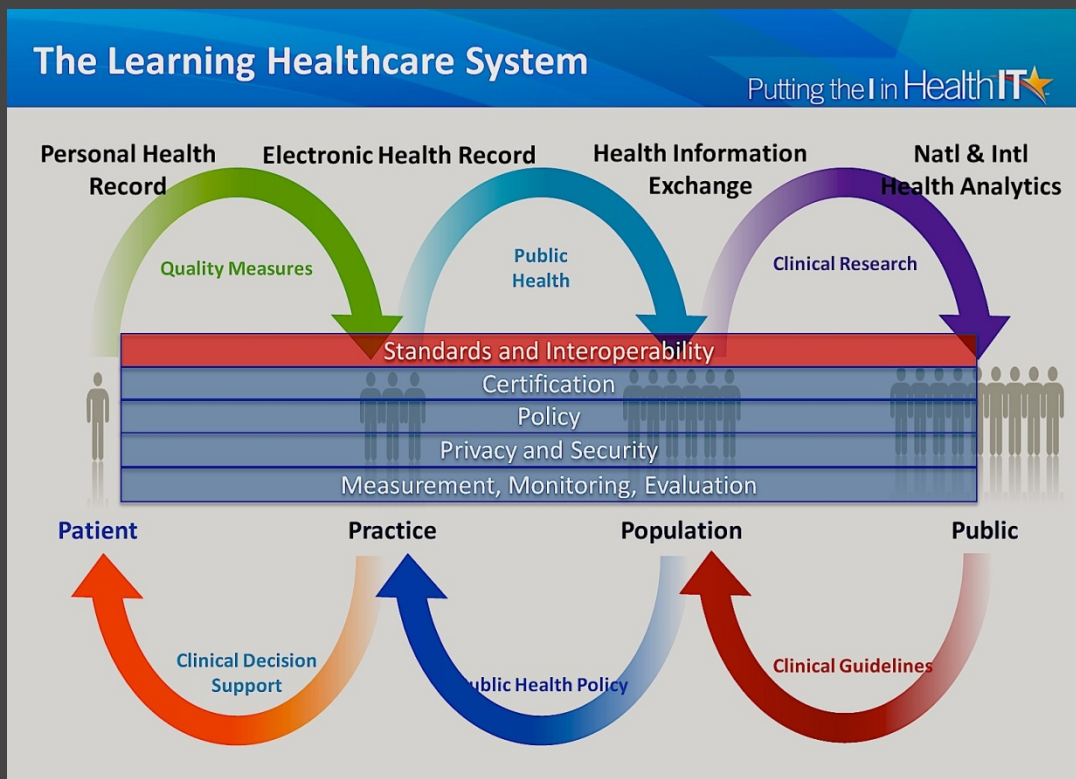


Table 1: Standard PCA Parameters for Opioid Naïve Adult Patients

Standard PCA Parameters for Opioid Naïve Adult Patients			
	morphine	HYDRMORPHONE	fentaNYL
1x (single strength)	1mg/ml	0.2 mg/ml (200 mcg/ml)	10 mcg/ml
Loading Bolus	2 mg	0.4 mg (400 mcg)	20 mcg
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Lockout	10 minutes	10 minutes	10 minutes
Total Drug Over Time	Optional	Optional	Optional
Max Number of Patient Demand Doses Per Hour	Optional	Optional	Optional
Basal	Not recommended for starting PCA.		

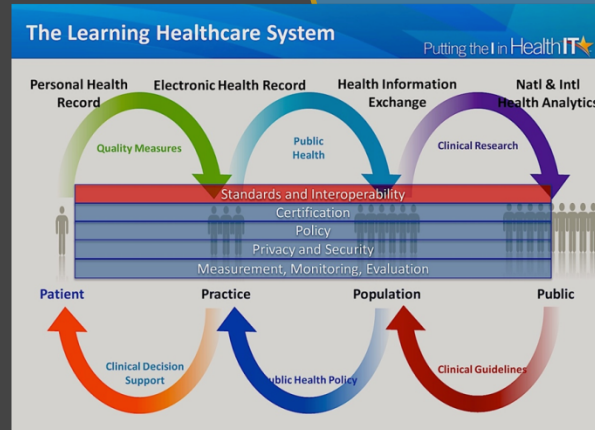


Standardized Knowledge

Table 1: Standard PCA Parameters for Opioid Naïve Adult Patients

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Improved & Validated Knowledge



People

Process

Skills

Tools

Workplace

Thank You

- ▶ **Joe Bormel, MD, MPH**
- ▶ ONC Office of the Chief Medical Officer
 - ▶ Joseph.Bormel@hhs.gov