USER-CENTRED DESIGN APPROACHES TO ENHANCING AUDIT & FEEDBACK IN ONTARIO

@hwitteman Holly Witteman, Ph.D.

Human Factors

- Designing for the way people **are**, not the way **we wish they were**
- **Adapting systems to people**, rather than expecting people to adapt to systems

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Today

- What is **user-centred design**?
- How can we use it to **improve audit & feedback systems**?
- **Examples** from work in Ontario

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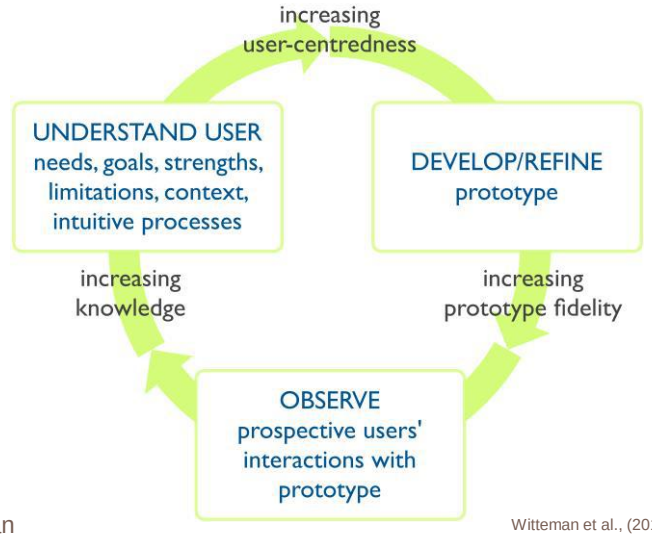
User-Centred Design



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Witteman et al., (2015) *Systematic Reviews*

Related terms

- Human-centred design
- Design thinking
- User experience design
- Goal-directed design
- Co-design
- Co-creation
- Participatory design

User

- Someone who uses something (a technology/system/thing/procedure …)
  - to accomplish a task
  - to accomplish a set of tasks
  - in pursuit of a goal

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Image Credit: Black & Decker, Canadian Tire

Defining & Aligning Goals

- What are my users' goals?
- What are my (research team's) goals?
- **Are these the same?**
  - Yes: good to go
  - No: user-centred design may not be appropriate; project faces significant hurdles, lower chances of success

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Fundamental Tension

- "The psychologists' commitment to name the independent variable that was the secret ingredient in the experiment turned out to be a fundamentally different goal to the designers' commitment to conceive of an intervention that would engage students and teachers alike." –Grocott & Kobori, 2015

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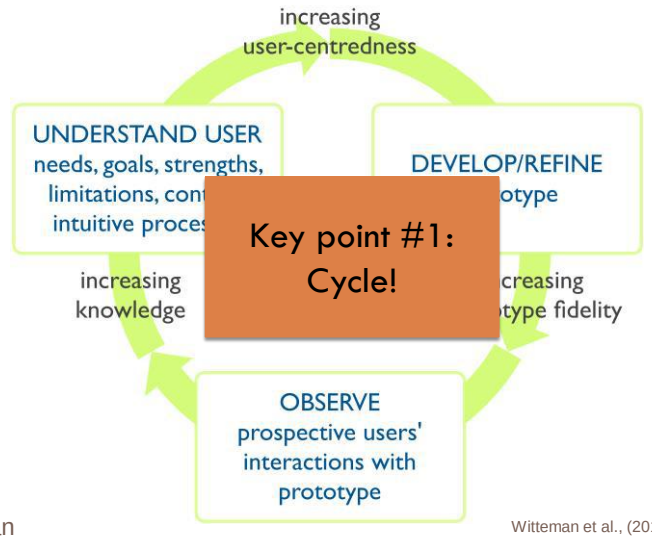
User-Centred Design



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Witteman et al., (2015) *Systematic Reviews*

Similar Cycles (from 10,000 m)

- Knowledge to Action
- Plan-Do-Study-Act
- Agile

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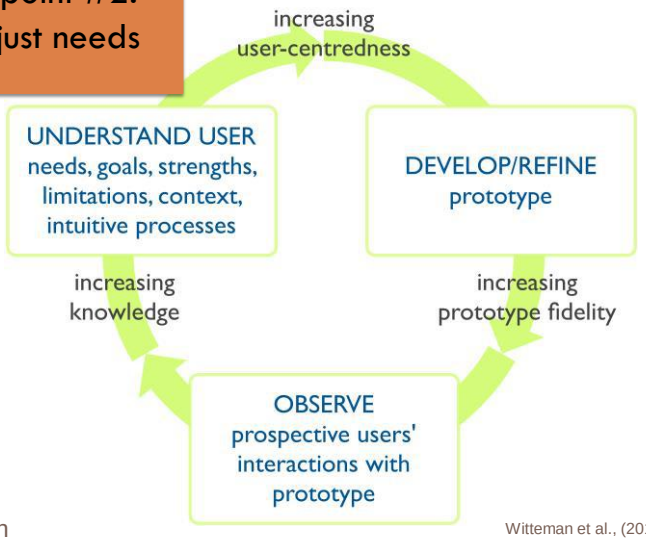
User-Centred Design

Key point #2:
Not just needs



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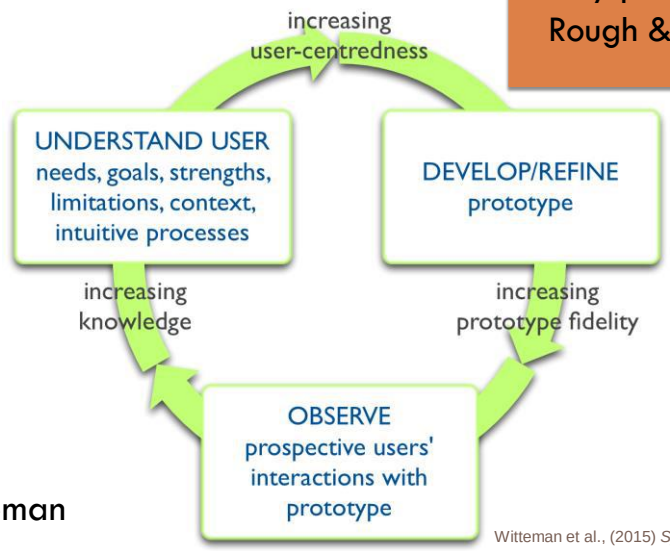
User-Centred Design

Key point #3:
Rough & early



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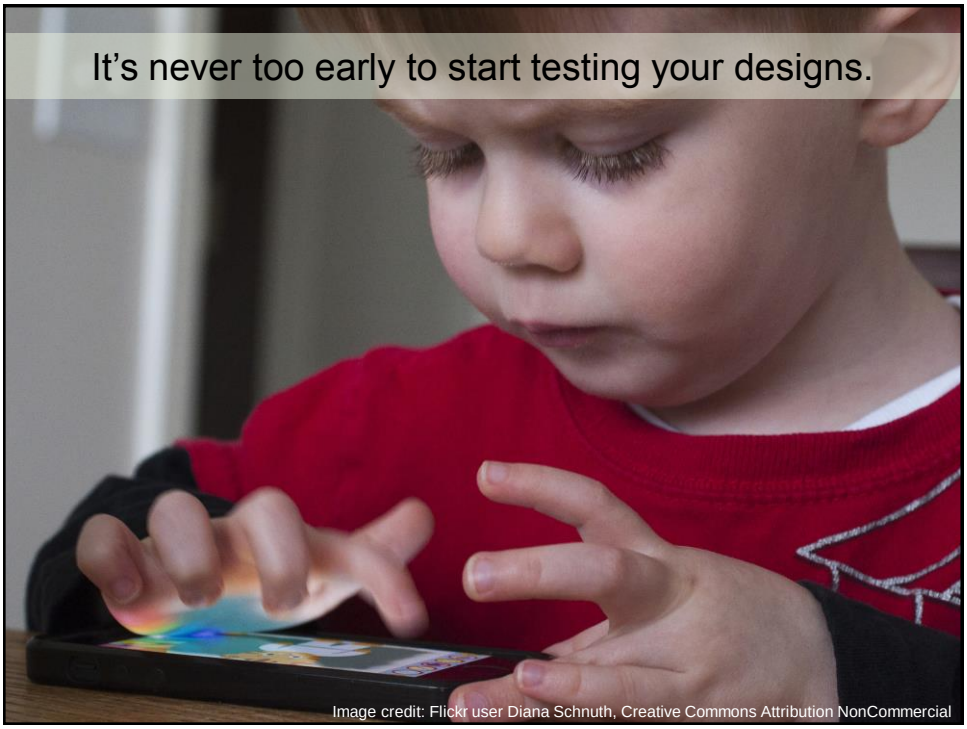
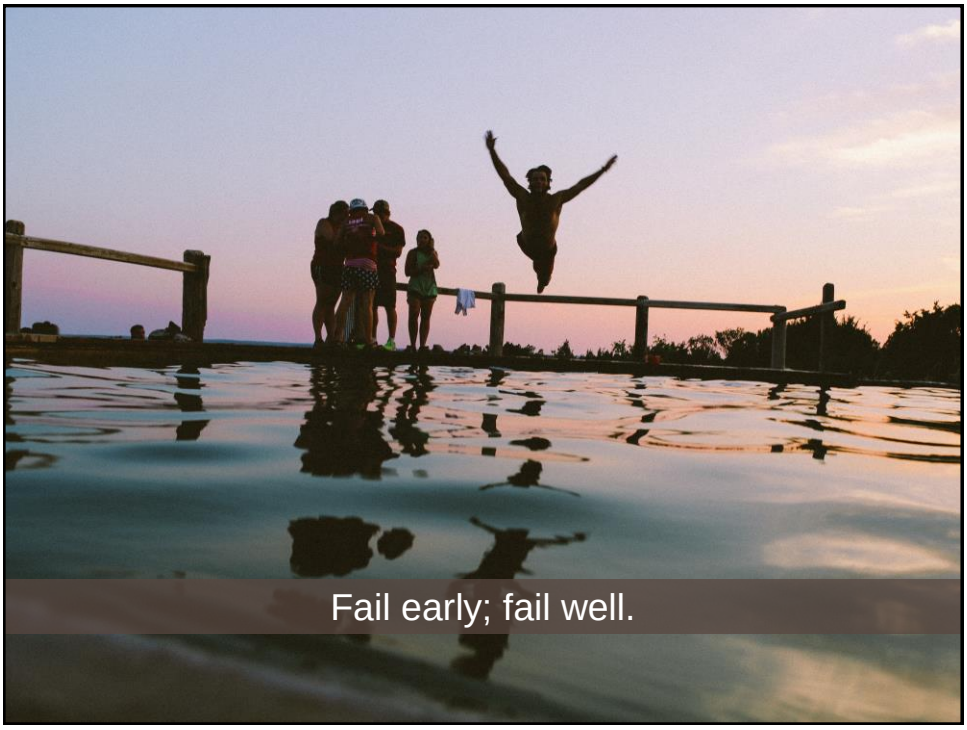
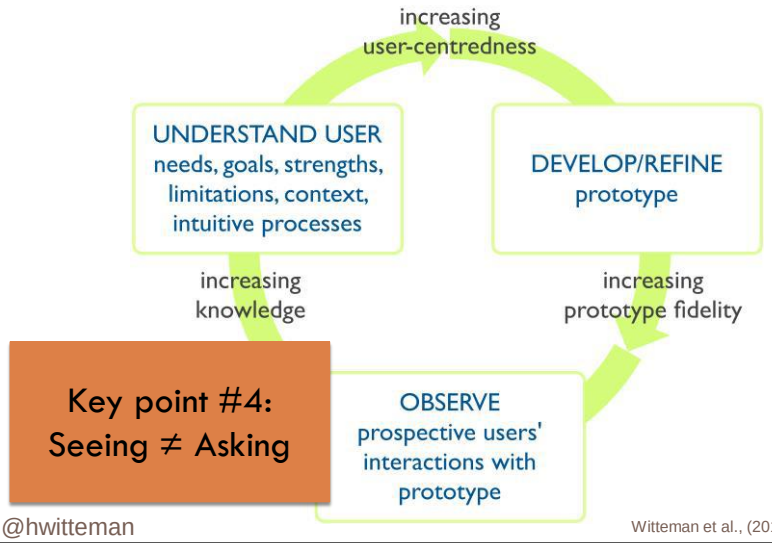


Image credit: Flickr user Diana Schnuth, Creative Commons Attribution NonCommercial



User-Centred Design



Key point #4:
Seeing ≠ Asking

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"If I had asked people what they wanted, they would have said faster horses."

(Henry Ford may or may not have actually said this.)

Photo: Ford Motor Co.

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User Testing Methods

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Image credit: Holly Witteman

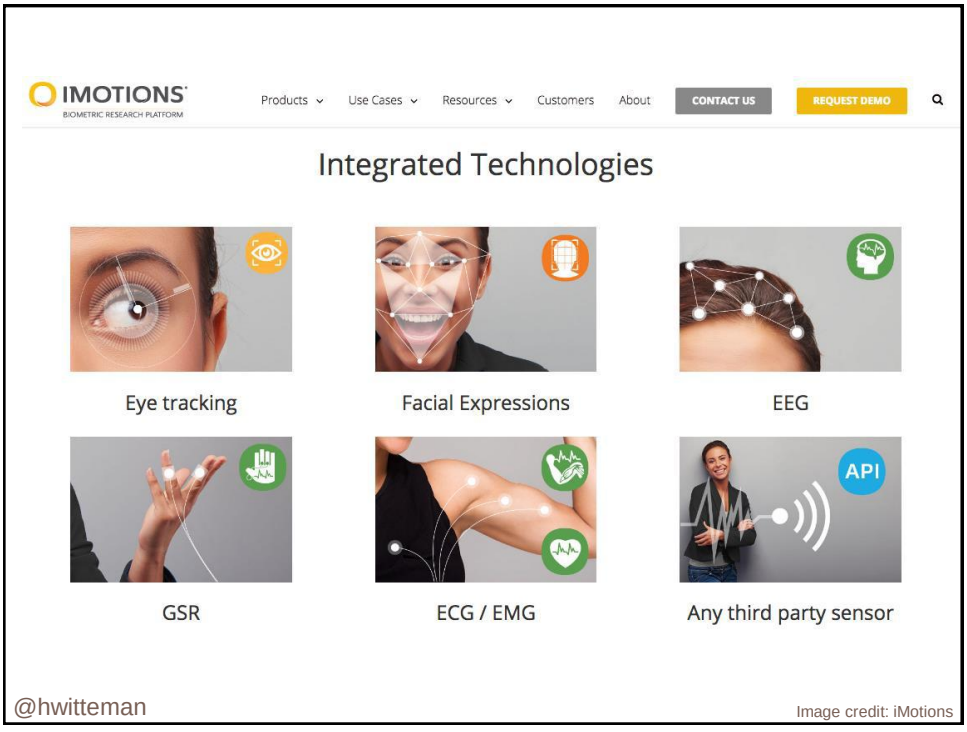

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Image credit: iMotions

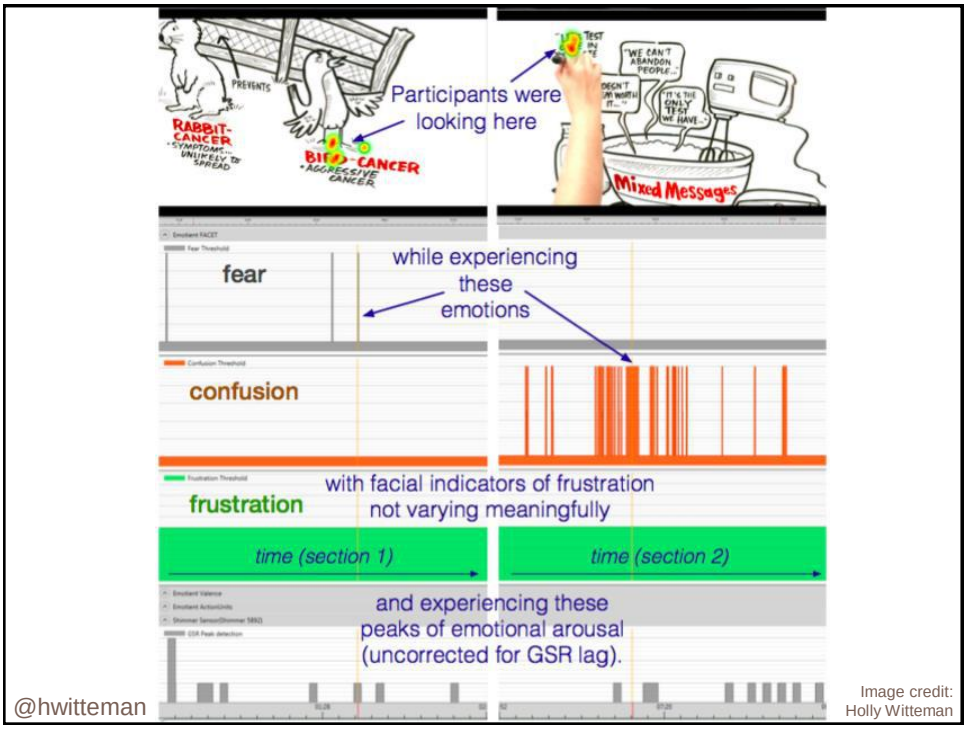

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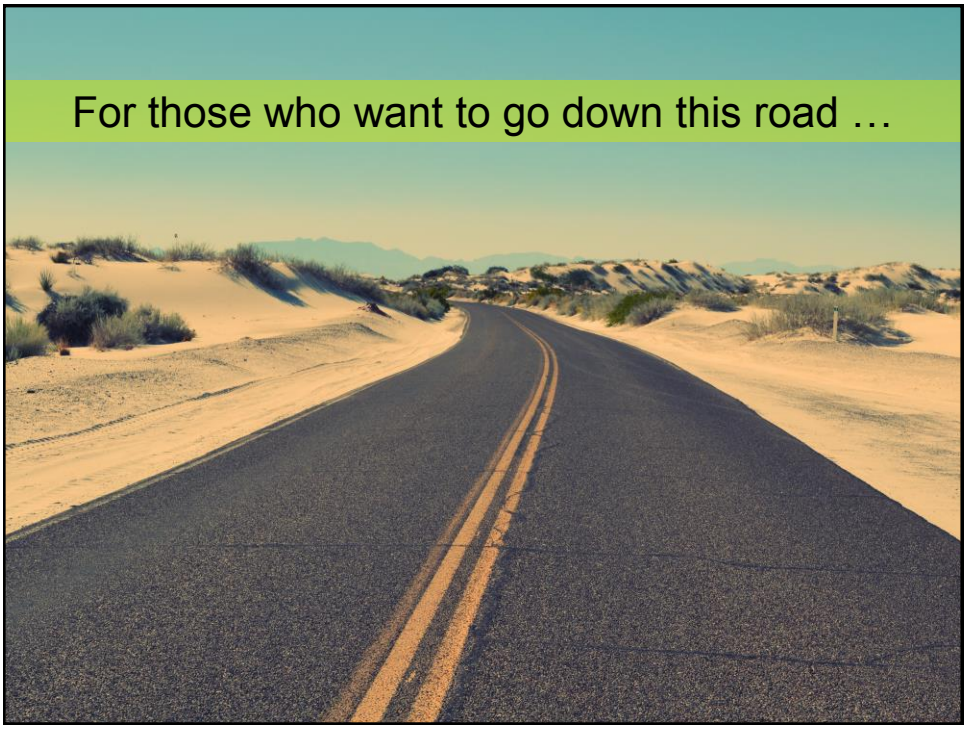
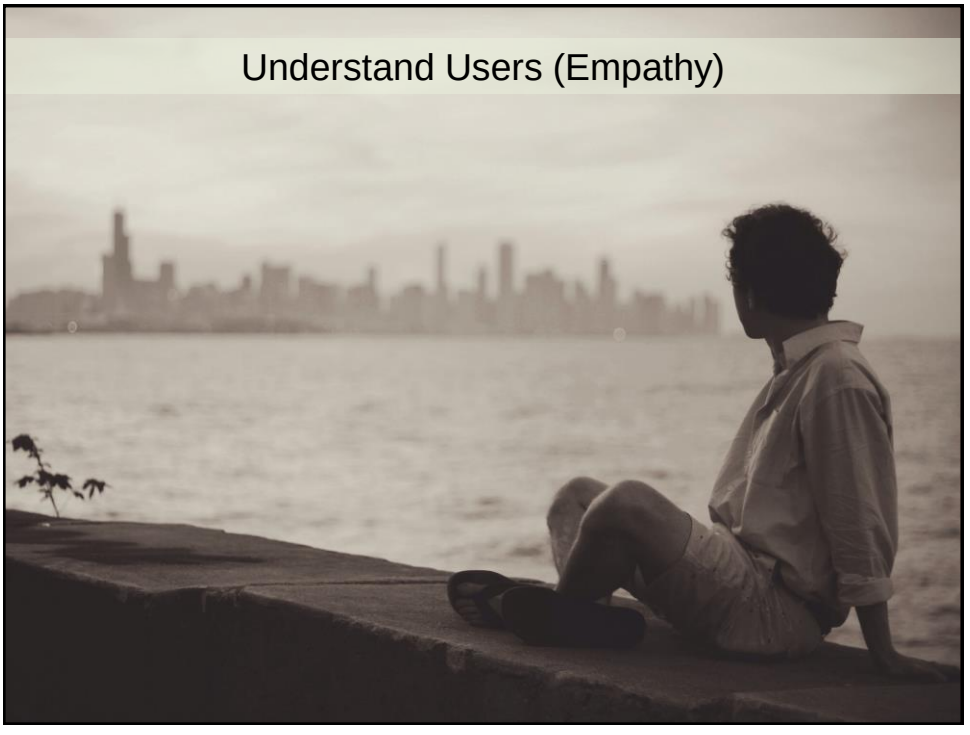
Image credit: Holly Witteman

For those who want to go down this road …



Understand Users (Empathy)



User Research Methods, e.g.:

- Literature
- Interviews
- Contextual Inquiry
- Focus Groups
- Surveys
- Card Sorting
- Mental Models (& Concept Mapping)
- Diary/Camera Studies
- Observation/Shadowing

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Iterative Development

- Start with rough drafts
  - Can be hand-drawn
    - Older evidence suggests that fidelity makes no difference in ability to uncover usability problems (Virzi et al. 1996, Walker et al. 2002)
  - Can start with multiple prototypes
- Gradually increase prototype fidelity
  - Prototype fidelity = how close it is to final version

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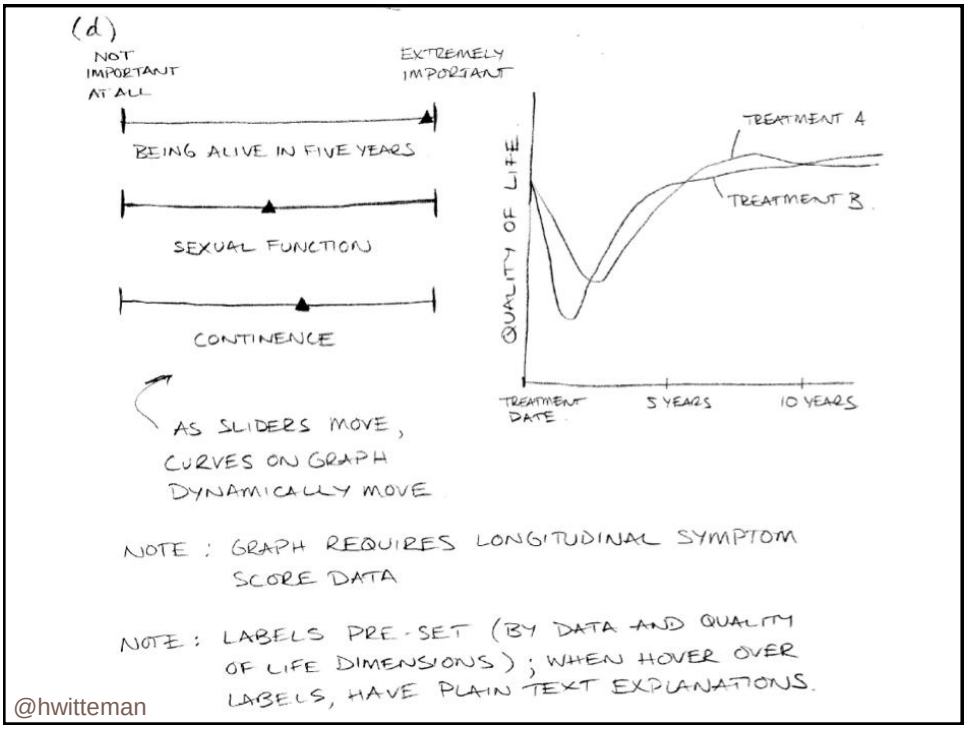

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Participatory Design Workshop

- Also known as a co-design workshop
- Often a half day to a full day
- Gather diverse group **including users**
  - Ideally already have some solid user research
  - Provide materials for prototyping

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Be Aware of Relevant Literature

- E.g., data visualization

1170 IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 18, NO. 7, JULY 2012

Attention and Visual Memory in Visualization and Computer Graphics

Christopher G. Healey, *Senior Member, IEEE*, and James T. Enns

Abstract—A fundamental goal of visualization is to produce images of data that support visual analysis, exploration, and discovery of novel insights. An important consideration during visualization design is the role of human visual perception. How we "see" details in an image can directly impact a viewer's efficiency and effectiveness. This paper surveys research on attention and visual perception, with a specific focus on results that have direct relevance to visualization and visual analytics. We discuss theories of low-level visual perception, then show how these findings form a foundation for more recent work on visual memory and visual attention. We conclude with a brief overview of how knowledge of visual attention and visual memory is being applied in visualization and graphics. We also discuss how challenges in visualization are motivating research in psychophysics.

Index Terms—Attention, color, motion, nonphotorealism, texture, visual memory, visual perception, visualization.

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User Testing

- Basic concept:
  - See how people respond
    - Not asking whether they like it/what they think
  - Fix problems/adjust design accordingly
  - Efficient way to discover problems before launching expensive pilot study or trial
    - You want bad news here, not after the trial is over or you're A&F is implemented
    - Most useful feedback: the feedback you don't want to hear

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User Testing Methods

- Ask
  - Focus groups
  - Interviews
  - Surveys
  - Card Sorting
  - Diary/Camera Studies
  - Expert Review
  - Etc.
- Observe
  - Ethnography
  - Shadowing
  - Recording
  - Think aloud
  - Logfile analysis
  - A/B testing
  - Eye tracking
  - Physiological measurement of emotion
  - Etc.

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  - Logfile analysis
  - A/B testing ← !!!!!!!!!!
  - Eye tracking
  - Physiological measurement of emotion
  - Etc.

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User Testing Methods

- Think aloud (during or retrospective)
  - Useful tricks:
    - "What would you do if I weren't here?"
    - "I didn't program this."
    - "I need your help to find problems."

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User Testing in Audit & Feedback

- Testing: cognitive & affective responses to elements of your design, often content
  - May be more difficult to observe than navigation
  - Good reason to use methods that don't require user to articulate reactions

Logistics

- How many users per cycle?
  - Old rule of thumb 5 (Nielsen 1993, Virzi 1996)
  - May need 5-20 (Faulkner 2003)
  - May not matter, more important to cover all tasks (Lindgaard & Chattratichart 2007)
  - If you can get 10-15 per cycle, probably acceptable
- How many cycles?
  - Varies considerably
  - For major changes, try to plan for 5-8

User Testing: Recommendation

- Table with 5 columns:
  - 1: design element
  - 2: what you want this element to convey (a useful design exercise anyway!)
  - 3: what users understood from this element
  - 4: how this element made users feel
  - 5: other comments, key quotes
- Think of it like hypothesis-testing your design

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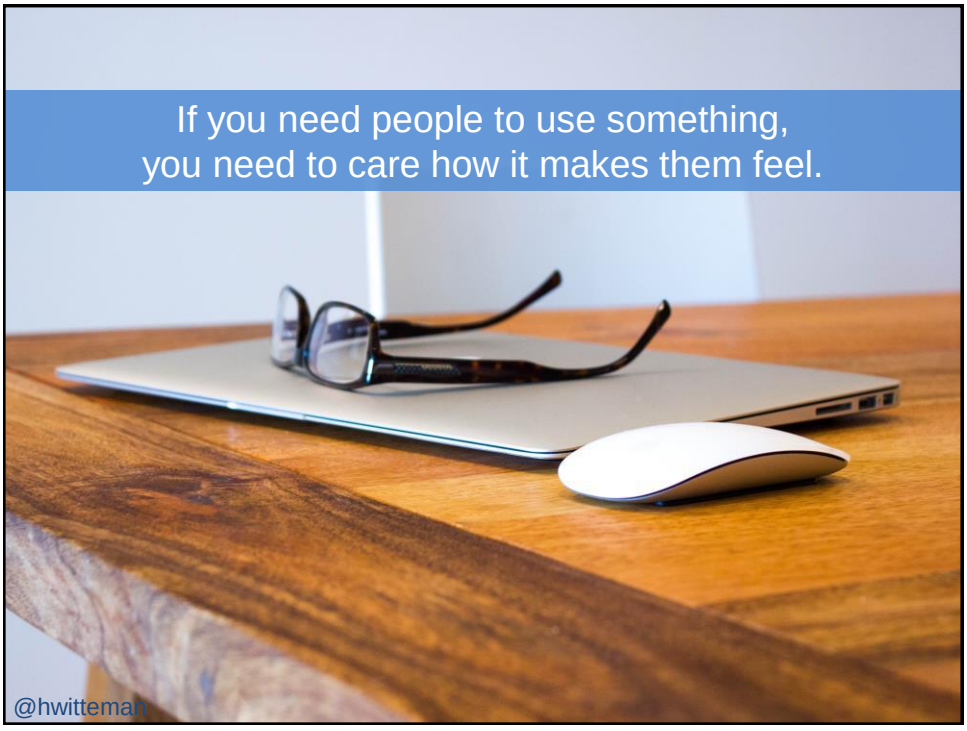

When user testing isn't the right method

- Functionality: standards (various), technical testing
- Accessibility: standards (WCAG 2.0), simulations

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Image credit: http://www.colourblindawareness.org/wp-content/themes/outreach/images/slider/living/traffic-light_p.jpg

Long-Term Care Practice Report – Original

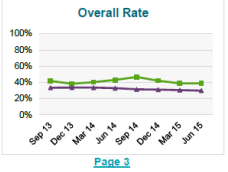
My Dashboard

Data sources: OHIP, ODB, DAD, OMHRS
My LHIN: LHIN X

What are my antipsychotic prescribing patterns?
Data reporting period: July 1, 2013 – June 30, 2015

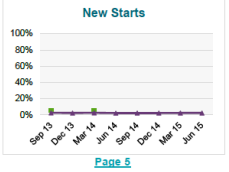
My Residents | Ontario

Overall Rate



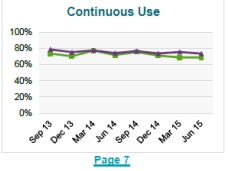
Page 3

New Starts



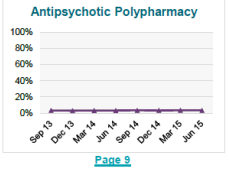
Page 5

Continuous Use



Page 7

Antipsychotic Polypharmacy



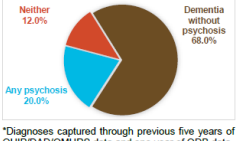
Page 9

For more information on your results, please click on the page-number link located under each graph.
Data are suppressed to maintain confidentiality (shown as N/R).

Who are all my residents?
Data reporting period:
April 1, 2015 – June 30, 2015

150	84
# of Residents	Mean Age
29% | 71%	9%
Male | Female	% New Residents

My Residents with Dementia and/or Psychosis



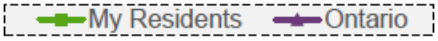
*Diagnoses captured through previous five years of OHIP/DAD/OMHRS data and one year of ODB data.

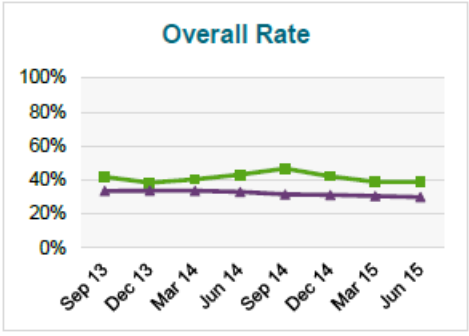
My Dashboard

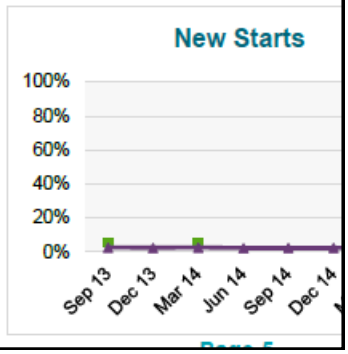
Data sources: OHIP, ODB, DAD, OMHRS
My LHIN: LHIN X

What are my antipsychotic prescribing patterns?

Data reporting period: July 1, 2013 – June 30, 2015





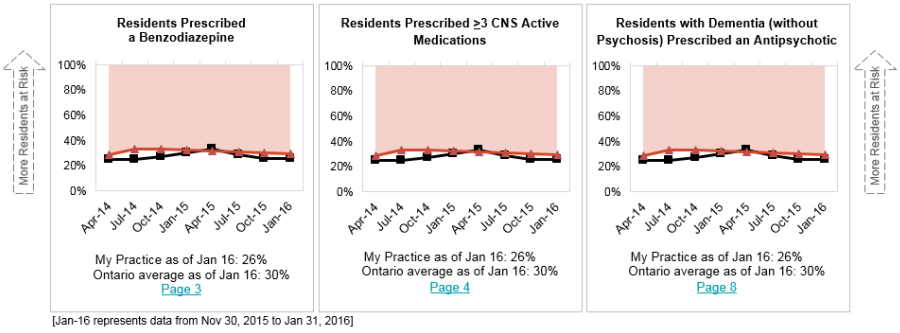


Long-Term Care Practice Report – Redesign

Summary

This practice report provides feedback on certain prescribing practices that may be associated with a risk of harm for your LTC residents when not used appropriately.

How do my prescribing practices compare?



[Jan-16 represents data from Nov 30, 2015 to Jan 31, 2016]

Compared to the Ontario average, 5 fewer residents in my practice are at increased risk of harm from being prescribed a Benzodiazepine.

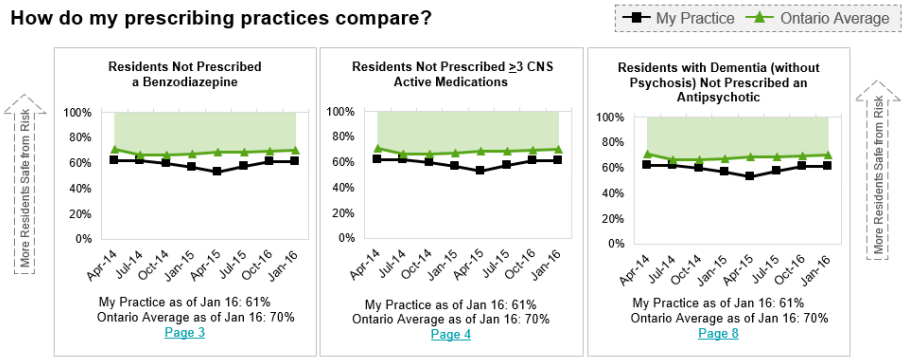
Between November 30, 2015 and January 31, 2016, my LTC practice had 90 residents, with a mean age of 73. 64% were male and 36% were female. 34% were new residents in LTC for less than 100 days.

Long-Term Care Practice Report – Redesign

Summary

This practice report provides feedback on certain prescribing practices where you are ensuring safety for your LTC residents.

How do my prescribing practices compare?



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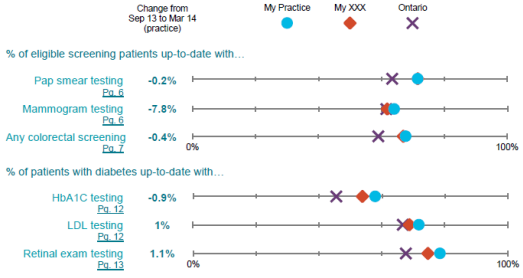
Primary Care Practice Report – Current Version

Dashboard

Data reporting period ending: **March 31, 2014**

My Primary Care Enrollment Model (group type): **XXX**
My Group Number: **Group Ag.**
My LHIN: **LHIN Ag.**
My Rurality Index of Ontario Score: **0 - Major Urban (0 to 9)**

How well are we doing?



Who am I caring for?

Pg. 28

1587	41.4
# patients	Age (mean)
Pg 29	Pg 29

47.3 %	8.7 %
% male	% rurality

What resources are our patients using?

	Change from Sep 13 to Mar 14 (practice)	My Practice	My XXX	Ontario
Less/ Non-Urgent ED Visits (rate per 1,000)* Pg. 19	-6.3	160.0	172.4	148.4

To find out more information about any particular indicator, please click on the page number links located under each indicator

*Adjusted for age, sex and morbidity.

Primary Care Practice Report – Redesign

Future Version: incorporating and building upon evidence

Table. 15 Suggestions for Designers of Practice Feedback and Examples of Implementation Strategies

Suggestion for Designers of Practice Feedback	Examples of Implementation Strategy
Nature of the desired action	
1. Recommend actions that are consistent with established goals and priorities	Consider feedback interventions that are consistent with existing priorities, investigate perceived need and salience of actions before providing feedback
2. Recommend actions that can improve and are under the recipient's control	Measure baseline performance before providing feedback, establish that the action is under the recipient's control
3. Recommend specific actions	Include functionality for corrective actions along with feedback, require recipient-generated if-then plans to overcome barriers to target action
Nature of the data available for feedback	
4. Provide multiple instances of feedback	Replace one-off feedback with regular feedback
5. Provide feedback as soon as possible and at a frequency informed by the number of new patient cases	Increase frequency/decrease interval of feedback for outcomes with many patient cases
6. Provide individual rather than general data	Provide practitioner-specific rather than hospital-specific data
7. Choose comparators that reinforce desired behavior change	Choose 1 comparator rather than several
Feedback display	
8. Closely link the visual display and summary message	Put summary message in close proximity to the graphical or numerical data supporting it
9. Provide feedback in more than 1 way	Present key messages textually and numerically, provide graphic elements that mirror key recommendations
10. Minimize extraneous cognitive load for feedback recipients	Eliminate unnecessary 3-dimensional graphical elements, increase white space, clarify instructions, target fewer outcomes
Delivering the feedback intervention	
11. Address barriers to feedback use	Assess barriers before feedback provision, incorporate feedback into care pathway rather than providing it outside of care
12. Provide short, actionable messages followed by optional detail	Put key messages/variables on front page, make additional detail available for users to explore
13. Address credibility of the information	Ensure that feedback comes from a trusted local champion or colleague rather than the research team, increase transparency of data sources, disclose conflicts of interest
14. Prevent defensive reactions to feedback	Guide reflection, include positive messaging along with negative, conduct "feedforward" discussions
15. Construct feedback through social interaction	Encourage self-assessment around target behaviors before receiving feedback, allow user to respond to feedback, engage in dialogue with peers as feedback is provided, engage in facilitated conversations/coaching about the feedback

Ann Intern Med. 2016;164(6):435-441.

Key takeaways

- Be clear about goals
  - What are they?
  - Whose are they?
- Fail early; fail well (means test early and learn from your tests)
- Likeability ≠ usability

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Further resources

- https://designkit.org (IDEO)
- https://hbr.org/2014/01/a-taxonomy-of-innovation (Luma Institute)
- http://dschool.stanford.edu/ (Stanford, ties with IDEO)
- http://www.usability.gov/ (US government)
  http://www.fusioncharts.com/whitepapers/downloads/Principles-of-Data-Visualization.pdf (Fusion Charts)
- Rocket Surgery Made Easy (book by Steve Krug)

- feel free to reach out: holly.witteman@fmed.ulaval.ca

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