Integrating human-centered design and implementation science to improve the accessibility and effectiveness of mental health services

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Overview

1. Implementation gap & innovation complexity
2. Human-centered design (HCD) overview
3. The design and usability of complex psychosocial innovations
   - Client-facing interventions
   - Implementation strategies
4. Methods for assessing usability of interventions and implementation strategies

The First Research-to-Practice Gap?

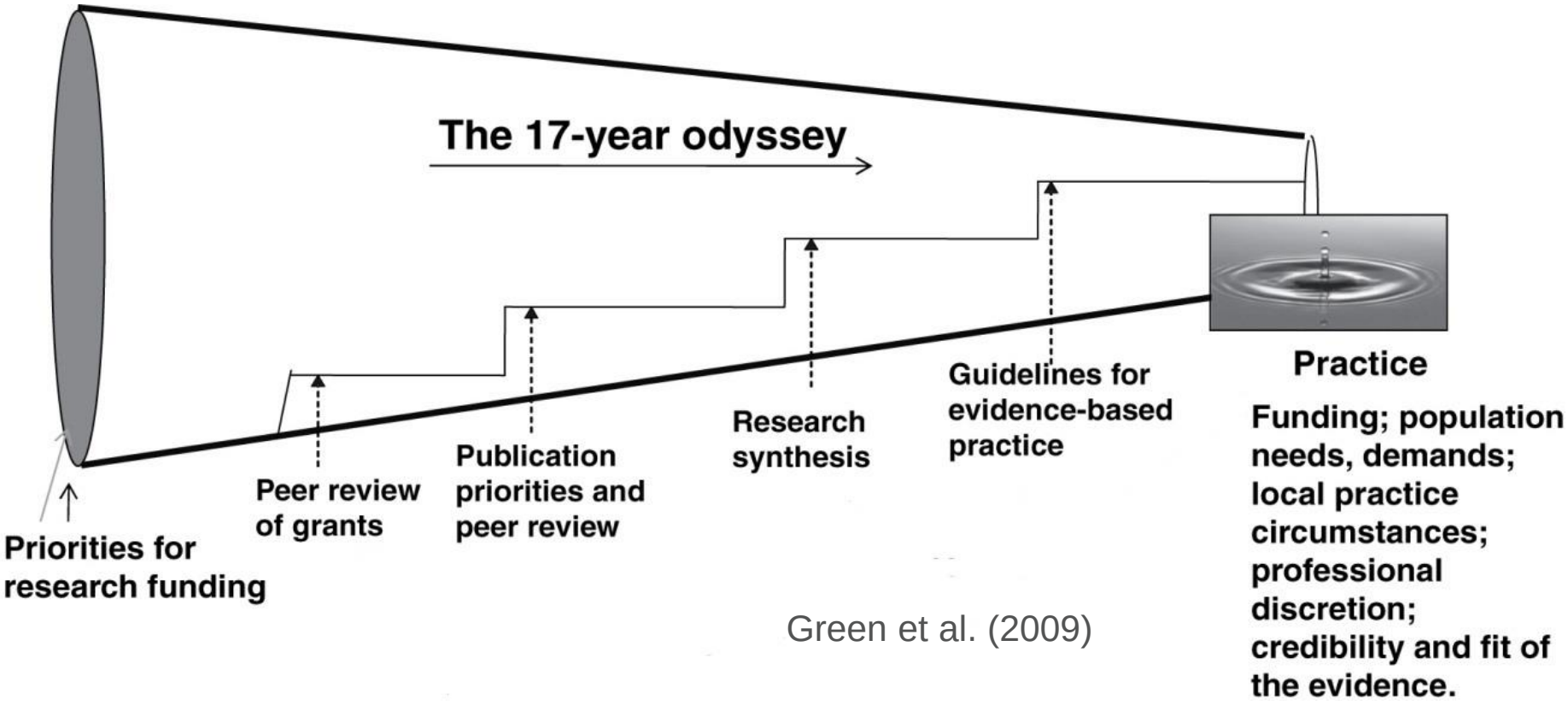
- Lemon juice was shown to be effective in preventing scurvy in 1601.
- Not introduced into sailors diets on ships until 1795!!

194 year research-practice gap!

Slide stolen, most recently, from Byron Powell

There is a longstanding implementation gap in health services (*and most other fields*)…

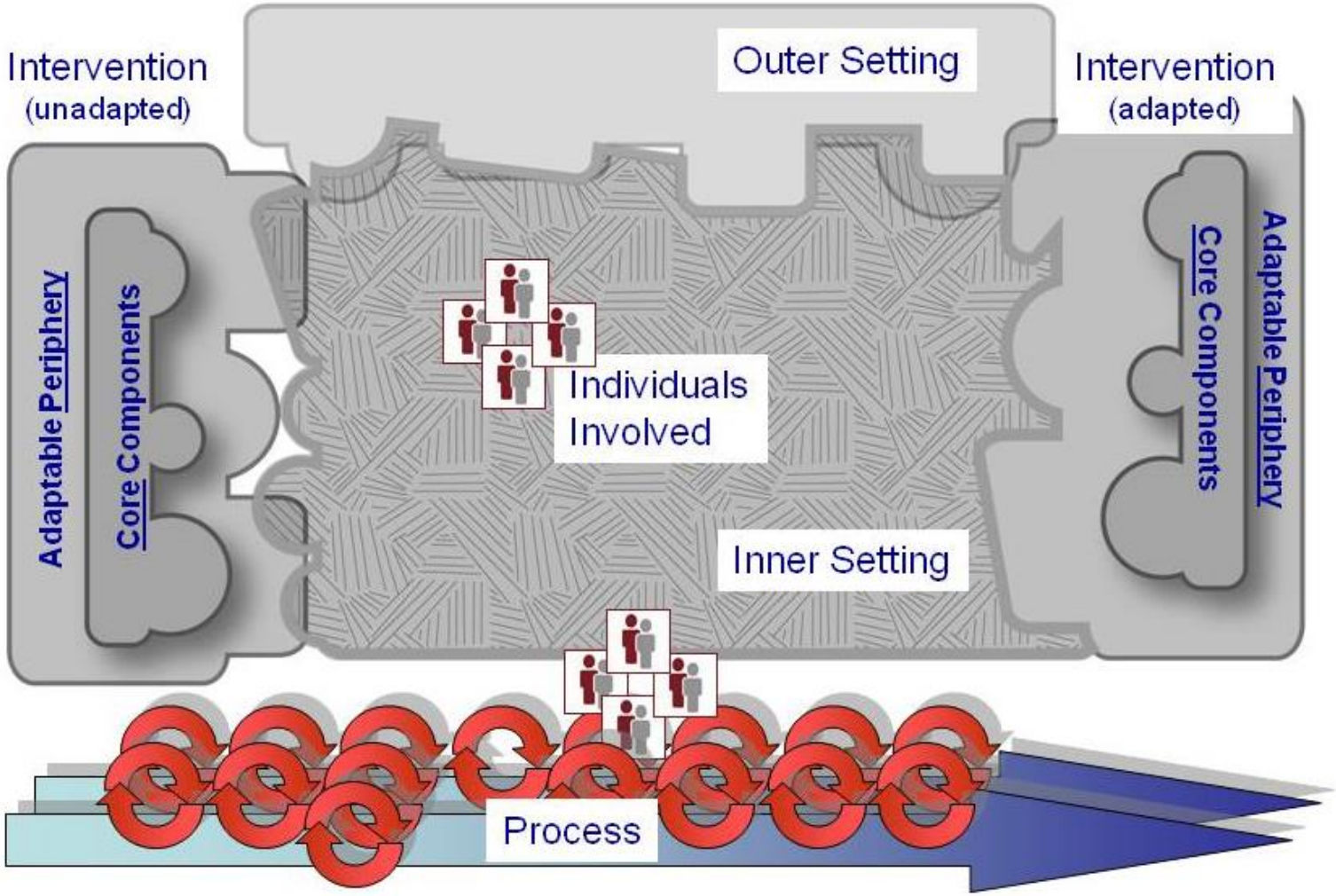
- **Benefits of decades of research to routine service have been negligible**
- It takes **17 years** for just 14% of original research to benefit practice (Balas & Boren, 2000)



Green et al. (2009)

Implementation science: the scientific study of methods to promote the systematic uptake of research findings …into routine practice (Eccles & Mittman, 2006)

Implementation science has tasked itself with addressing this gap, via multilevel frameworks…



(Consolidated Framework for Implementation Research [CFIR] Damschroder et al., 2009)

Implementation science has tasked itself with addressing this gap, via implementation strategies…

Powell *et al. Implementation Science* (2015) 10:21
DOI 10.1186/s13012-015-0209-1

IMPLEMENTATION SCIENCE

RESEARCH Open Access

A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project

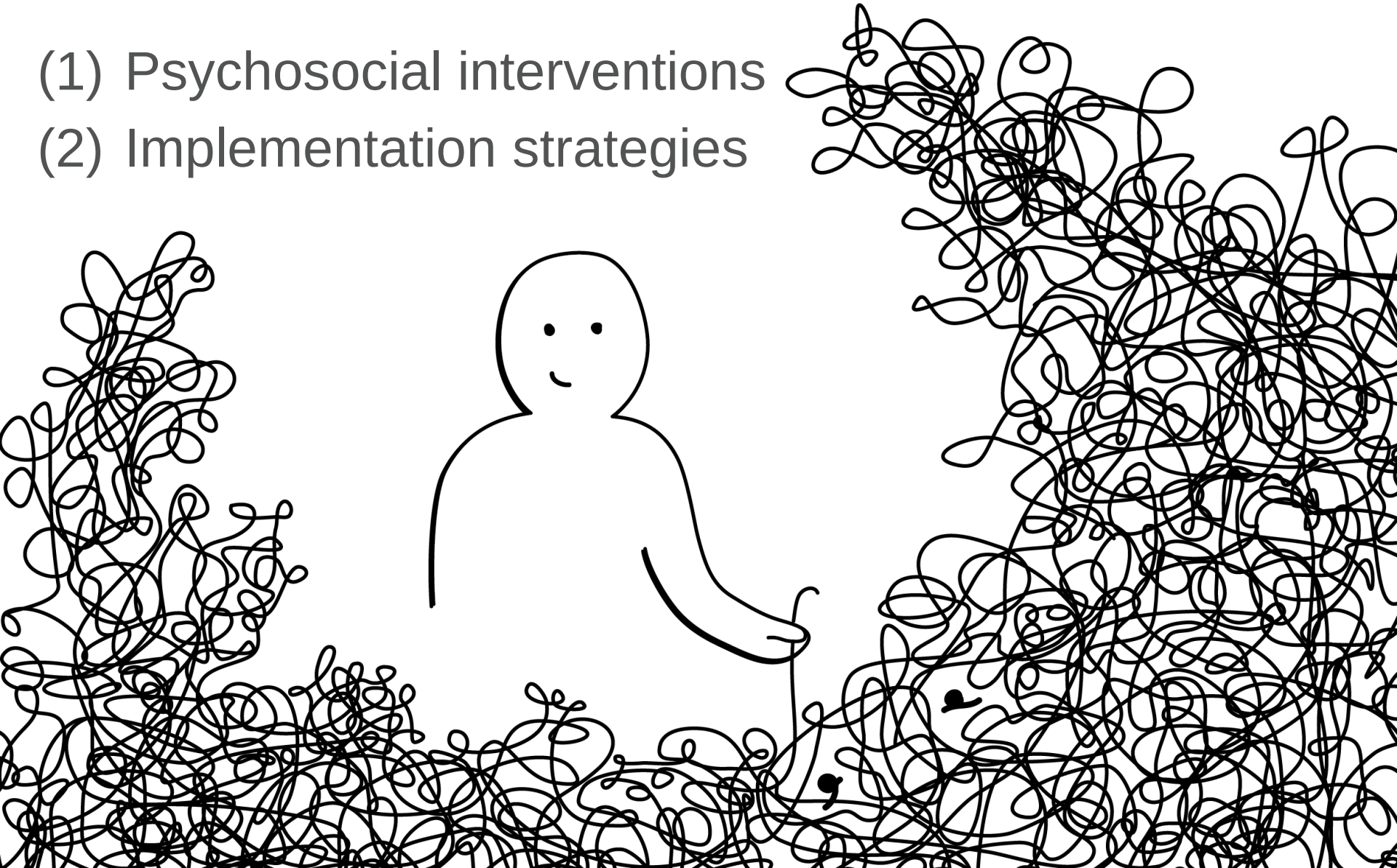
Byron J Powell[1*], Thomas J Waltz[2], Matthew J Chinman[3,4], Laura J Damschroder[5], Jeffrey L Smith[6], Monica M Matthieu[6,7], Enola K Proctor[8] and JoAnn E Kirchner[6,9]

An implementation strategy is a "method or technique used to enhance the adoption, implementation, and sustainability of a clinical program or practice" – Proctor, Powell, & McMillen (2013), p.2

Progress has been slow due, in part, to the complexity & usability of our service and implementation solutions

(1) Psychosocial interventions

(2) Implementation strategies



What is Design?

The process of creating or shaping tools for direct human use

“Logic is wonderful, but it doesn’t describe real behavior. When we are designing…we need to design for real people.”

Don Norman

There is no such thing as “no design”

“The alternative to good design is bad design, not no design at all. Everyone makes design decisions all the time without realizing it.”

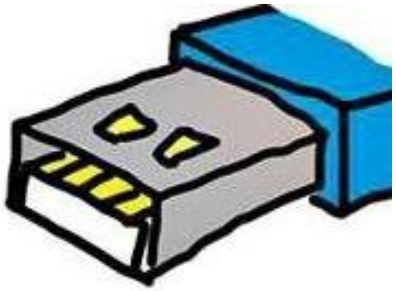
Douglas Martin (1990)

Problematic Design is EVERYWHERE

Problematic Design is EVERYWHERE

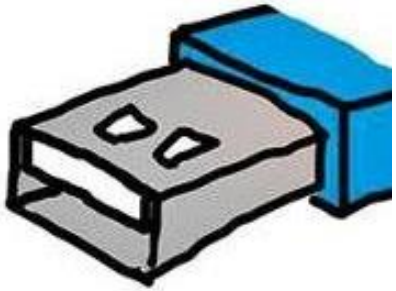
Problematic Design is EVERYWHERE

Up position



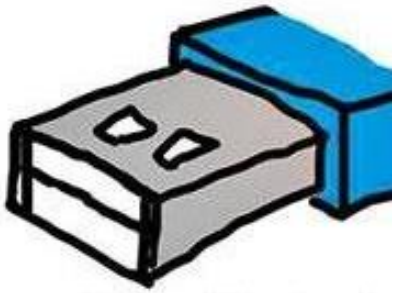
It is a well known fact that you must spin a USB three times before it will fit. From this, we can gather that a USB has three states.

Down position



Until the USB is observed it will stay in the superposition. Therefore it will not fit until observed - except in cases of USB tunelling.

Superposition



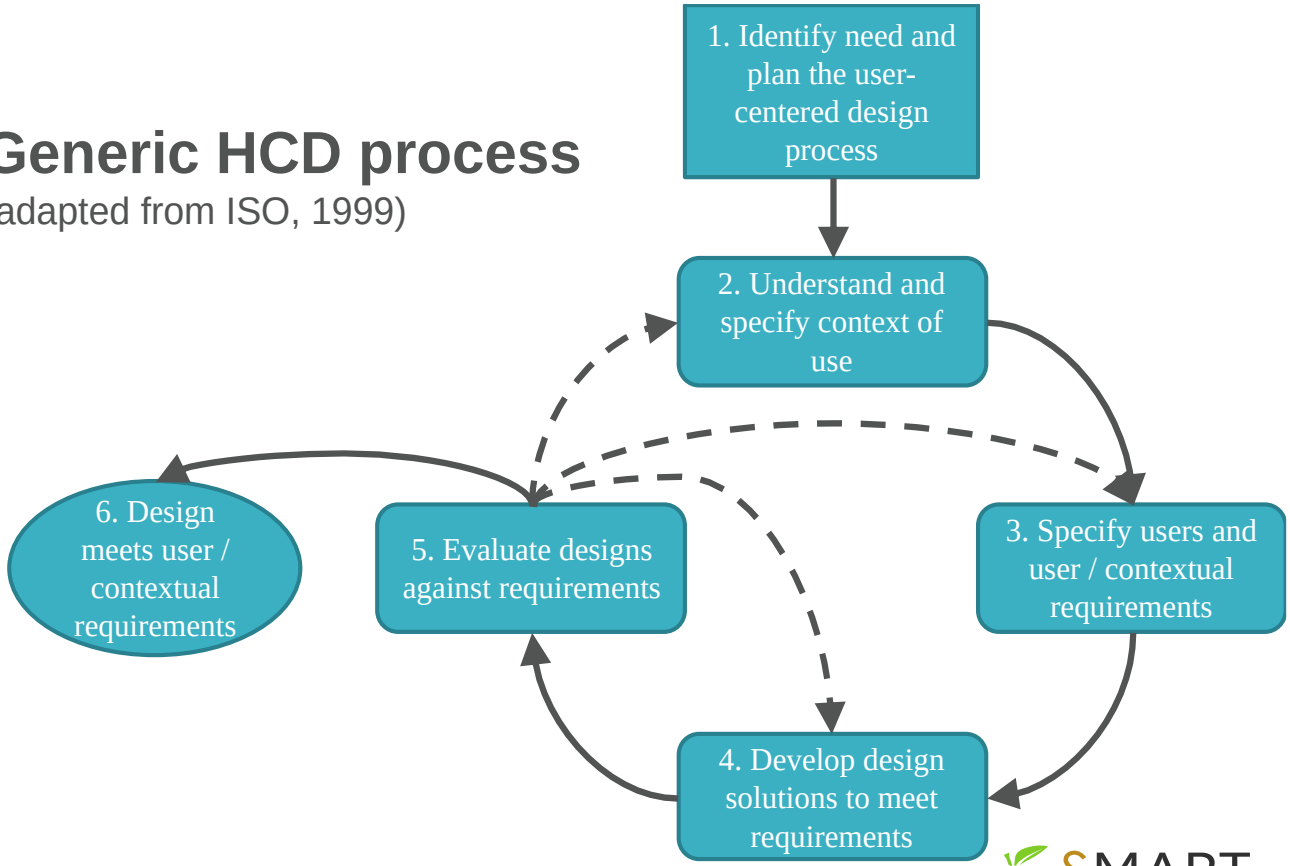
Design Problems Reduce Usability

Usability: the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction (International Standards Organization, 1999)

Improving Usability with Human-Centered Design

- **Human-centered design (HCD)** is an approach that grounds the product development process in information about the people and settings that will use the product.

Generic HCD process
(adapted from ISO, 1999)



Many health services research products (HSRPs) benefit from intentional (re)design

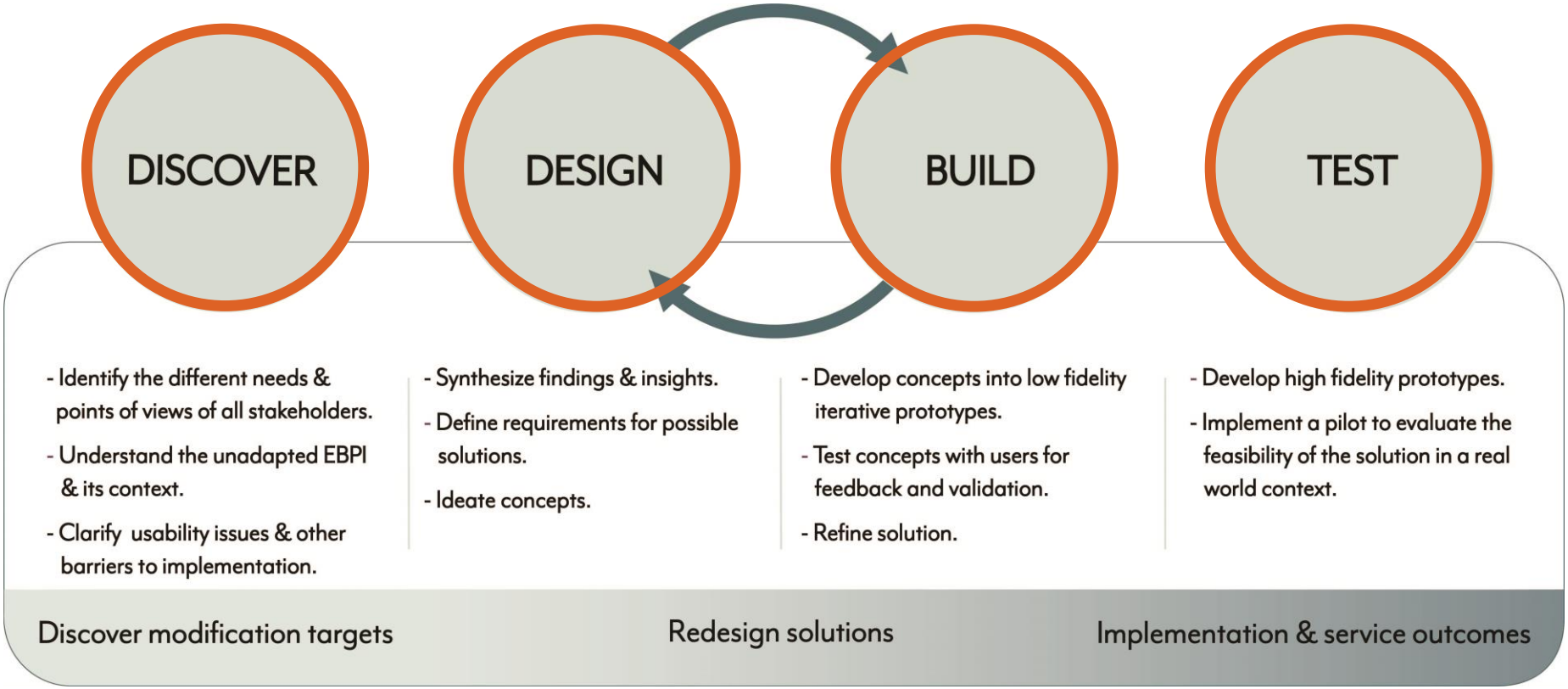
Typical focus of HCD efforts

Primary focus for redesign at UWAC & SMART (*may or may not* involve tech)

Health services research product (HSRP)	Definition	Examples
Digital technology	A broad range of technologies to support users (most typically clinicians or clients) in changing behaviors and cognitions related to mental health and wellness.	• Devices and wearables • Clinical decision support tools • Digital therapeutics • Mobile health apps
Evidence-based psychosocial intervention (EBPI)	Interpersonal or informational activities, techniques, or strategies that target biological, behavioral, cognitive, emotional, interpersonal, social, or environmental factors with the aim of reducing symptoms of these disorders and improving functioning or well-being (Englund, Butler, & Gonzalez, 2015)	• Parent training protocols • Cognitive behavioral therapy • Applied behavior analysis
Implementation strategy	Methods or techniques used to enhance the adoption, implementation, and sustainment of a clinical program or practice (Proctor et al., 2013)	• Initial training meetings • Post-training consultation • Leadership training for implementation • Clinician motivation enhancement

Lyon, Dopp, Brewer, Kientz, & Munson (under review)

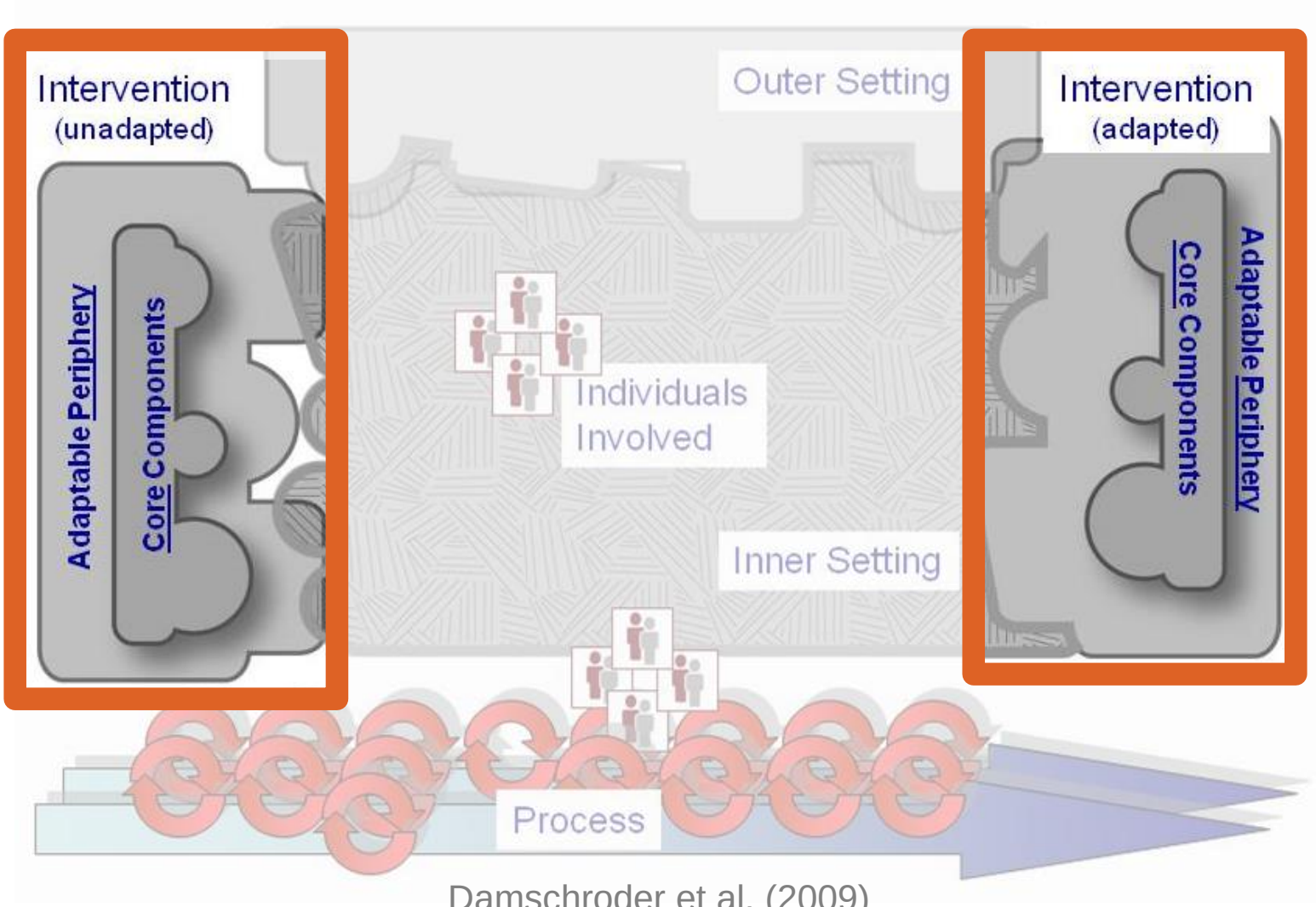
Leveraging HCD to improve implementation via better-designed innovations: *DDBT Framework*



- Currently being applied across 15 UWAC-funded studies

Lyon, A. R., Munson, S. A., Renn, B. N., Atkins, D. A., Pullmann, M. D., Friedman, E., & Areán, P. A. (in press). Human-centered design to improve implementation of evidence-based psychotherapies in low-resource communities: UW ALACRITY Center Methods Core protocol. *Journal of Medical Internet Research.*

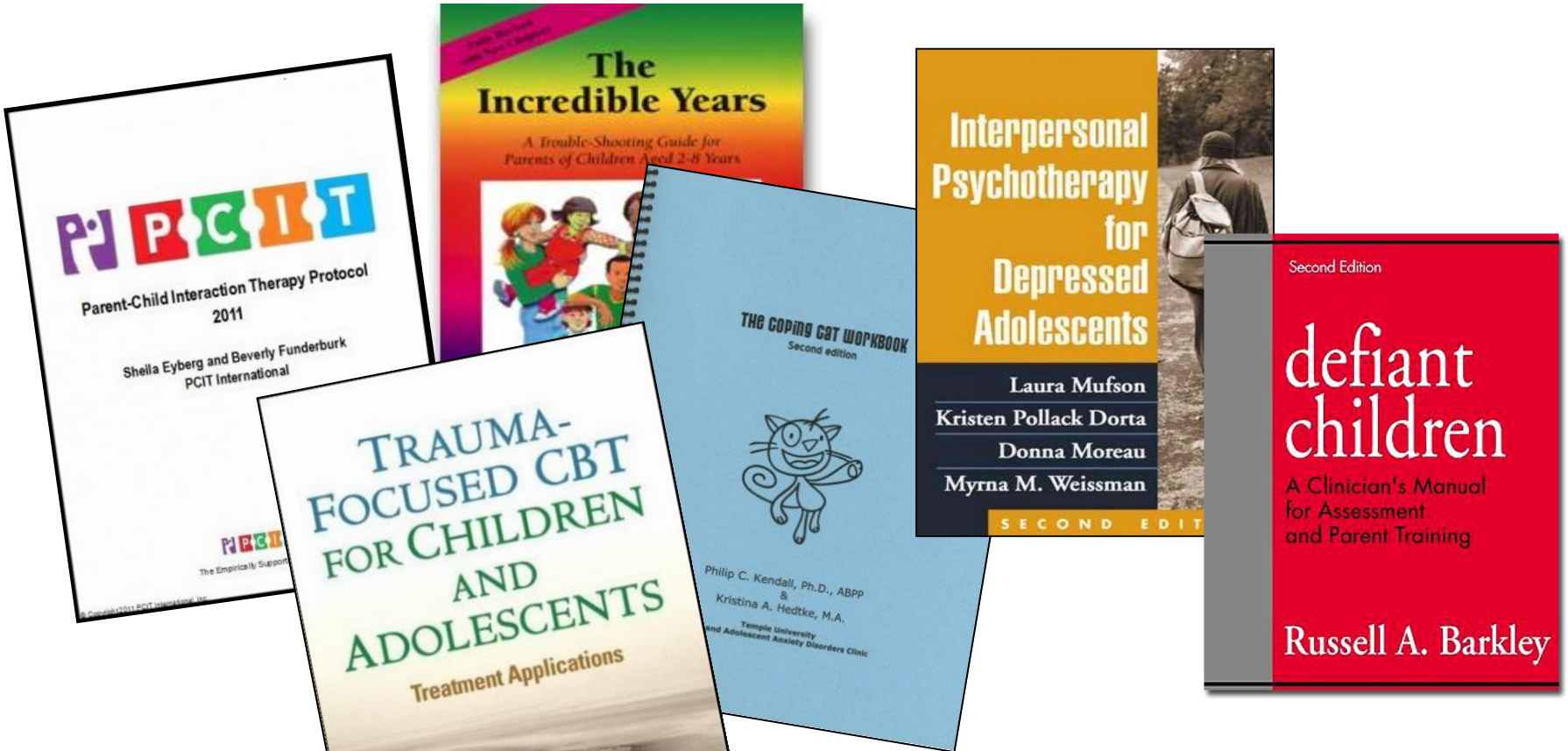
System Level: *Intervention (i.e., EBPIs)*



Damschroder et al. (2009)

EBPIs Dominate the D&I Landscape in MH

- Most MH research exists at the level of individual evidence-based psychosocial intervention (EBPI) manuals (Chorpita et al., 2007; Garland et al., 2008)



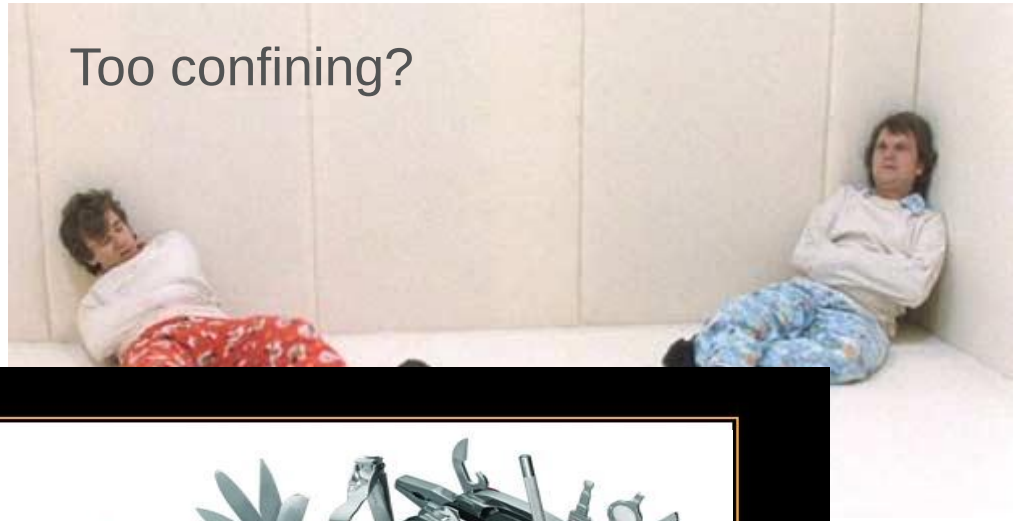
MH EBPIs are Well Engineered

- Emphasize technical “correctness”
  - (i.e., delivery with fidelity)
- Robust solutions to well-defined problems

MH EBPIs are TERRIBLY Designed

Long, Complicated, and Difficult to Learn

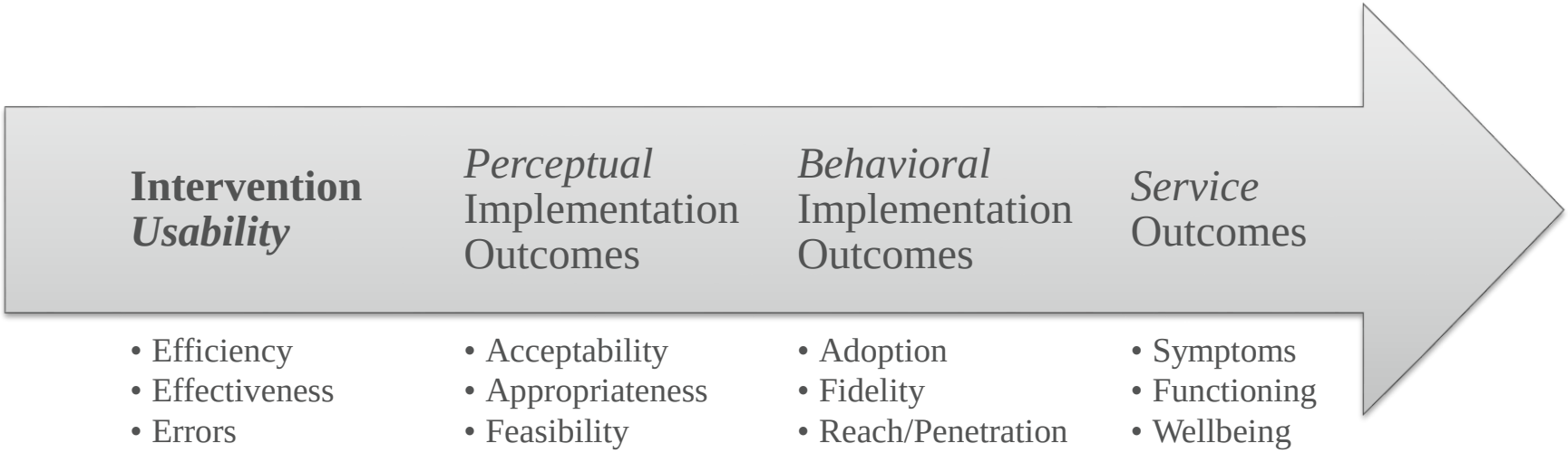
Too confining?



OVERdesigned

Intervention Usability is a Key "Upstream" Determinant of Implementation Outcomes

Relationship of Intervention Usability to Implementation and Service Outcomes…



Lyon, A. R., & Bruns, E. J. (2019). User-Centered Redesign of Evidence-Based Psychosocial Interventions to Enhance Implementation—Hospitable Soil or Better Seeds?. *JAMA psychiatry, 76(1),* 3-4.

Design Goals for EBPIs
(Lyon & Koerner, 2016)

Principle	Description
(1) Learnability	Well-designed EBPI should provide users opportunities to rapidly build understanding of, or facility in, their use.
(2) Efficiency	Minimize the time, effort, and cost of using the EBPI to resolve identified problems.
(3) Memorability	Users can remember and successfully apply important elements of the EBPI protocol without many added supports.
(4) Error Reduction	Prevent or allow rapid recovery from errors or misapplications of EBPI content.

Design Goals for EBPIs (continued…)

(Lyon & Koerner, 2016)

Principle	Description
(5) Satisfaction / Reputation	Be viewed as acceptable and valuable, especially compared to alternative products available within the larger mental health marketplace.
(6) Low cognitive load	Simplify task structure or the number of steps in order to minimize the amount of thinking required to complete a task.
(7) Exploit natural constraints	Successful designs should incorporate or explicitly address the static properties of an intended destination context that limit the ways a product can be used.

Intervention-Level Determinants are Underexplored in Implementation Science

- SIRC Instrument Review Project (IRP) (Lewis et al., 2015)
  - Only **19** instruments addressed intervention characteristics
    - *Inner setting:* **90** instruments
    - *Individual:* **98** instruments
  - **0** instruments addressed **DESIGN QUALITY & PACKAGING**

SIRC
SOCIETY FOR IMPLEMENTATION RESEARCH COLLABORATION

Evaluating the design quality of EBPIs

“Good design is when someone shows it to you, you say, ‘Oh, I see.’”

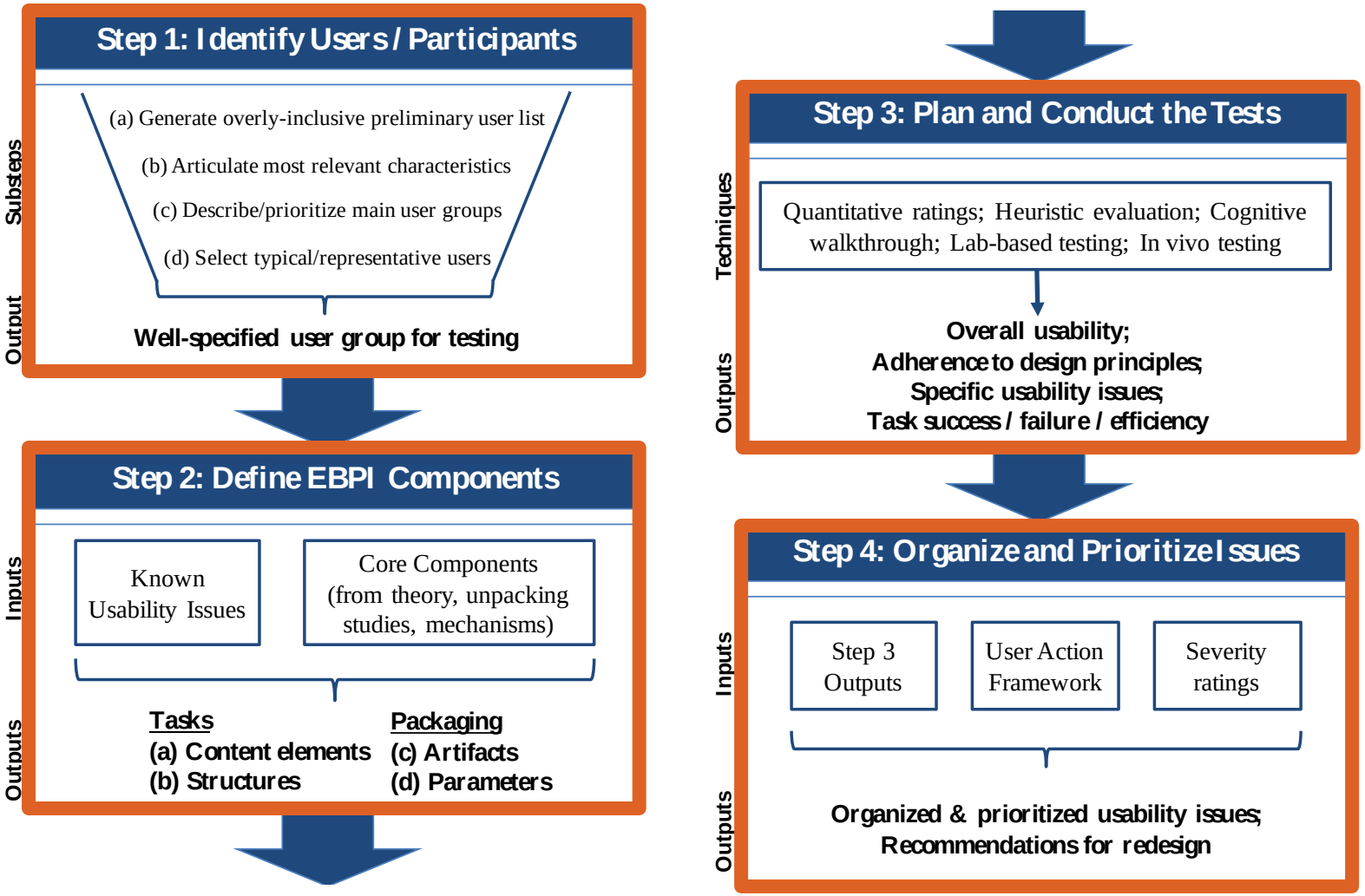
Don Norman

Evaluating EBPI Design Quality

EBPI usability testing allows for…

1. Evaluation of innovation characteristics likely to be **PREDICTIVE OF ADOPTION** (Rogers, 2003)
2. Discovery of the most critical issues that should be addressed in **REDESIGN EFFORTS** (Lyon & Bruns, 2019; Lyon & Koerner, 2016)

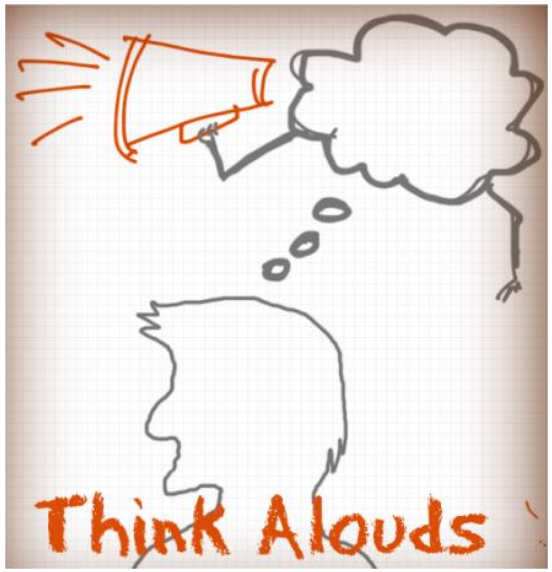
Usability Evaluation for Evidence-Based Psychosocial Interventions (USE-EBPI)

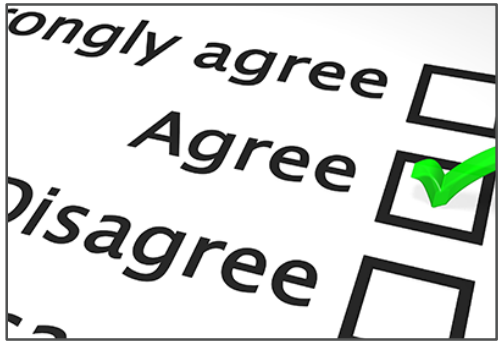


Lyon, Koerner, & Chung (under review)

Example Application of USE-EBPI to an *Exposure Protocol for Anxiety*

"Lab-based" testing (*n* = 10 users, stratified by experience)





Intervention Usability Scale (IUS; Lyon, 2016)

Usability issues: *aspects of the intervention which make it unpleasant, inefficient, onerous, or impossible for the user to achieve their goals in typical usage situations* (Lavery et al., 1997).

- “1” (low priority) to “3” (high priority)
- Organized via User Action Framework

Table 7. Categorization and Rating of Usability Problems

Average Rating / User Type	Usability Problem	Step of UAF Impacted P | T | A | F
3.0	Contraindicated behaviors are ambiguous	X X
3.0	Failure to block contraindicated behaviors	X
2.5	Signposting	X X X X
2.5	Unclear Processing detail	X X
2.5	Lack of feedback on accuracy of hierarchy level	X X
2.0	Insufficient support of exposure planning	X X
2.0	Unclear purpose/rationale	X X
2.0	Omission of key content	X X
1.5	Failure to highlight therapist barriers	X
1.5	Insufficient feedback for success	X
1.5	Lack of troubleshooting for family/system issues	X X X
1.0	Habituation is unclear	X X X
1.0	Developmental level is unclear	X

Legend

P – Planning

T – Translation

A – Actions

F – Feedback

- novice

- intermediate

- expert

Filled circle=user experience issue

Mean IUS score: **80.5**

Lyon, Koerner, & Chung (under review)

Application of USE-EBPI to an Exposure Protocol

- **Example redesign recs:**
  1. Clearer labeling of information within exposure guide
  2. More explicit supports to identify and avoid contraindicated behaviors when delivering exposure (e.g., reassurance)
  3. Directions and example scripts for processing exposures
  4. Build in feedback loop / guidance re appropriate exposure difficulty
  5. Design abbreviated version of procedures to account for limited time and/or explicit guidance on exposure opportunities outside of the office

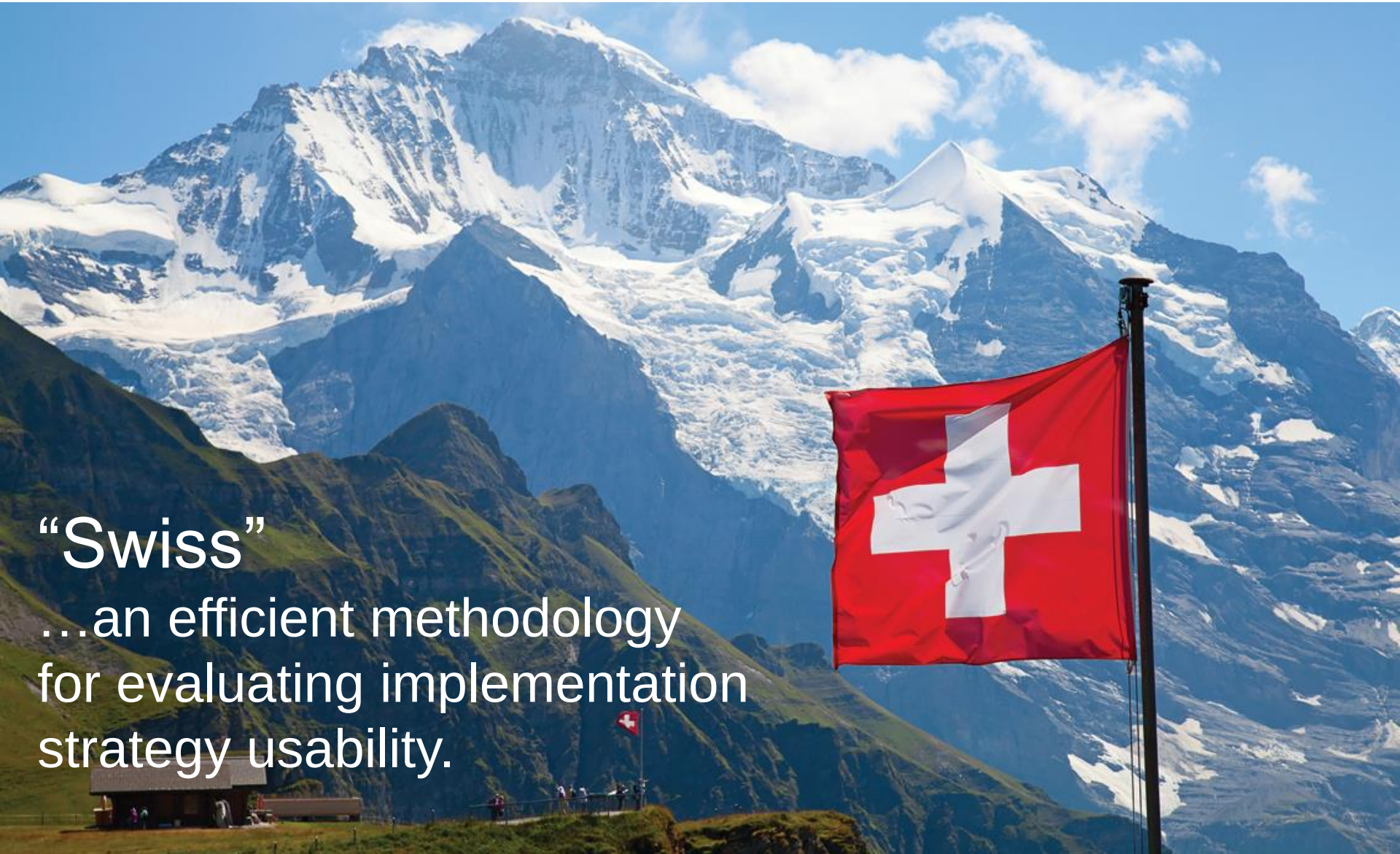
Evaluating the design quality of implementation strategies

Implementation strategies *also* are complex psychosocial interventions in need of (re)design

Implementation strategy complexity varies, but multifaceted and multi-level strategies are common (e.g., Aarons et al., 2017; Glisson & Schoenwald, 2005; Kilbourne et al., 2007)

- Many strategies are **BULKY / EXPENSIVE / NOT ALWAYS USABLE** by implementation practitioners and other stakeholders

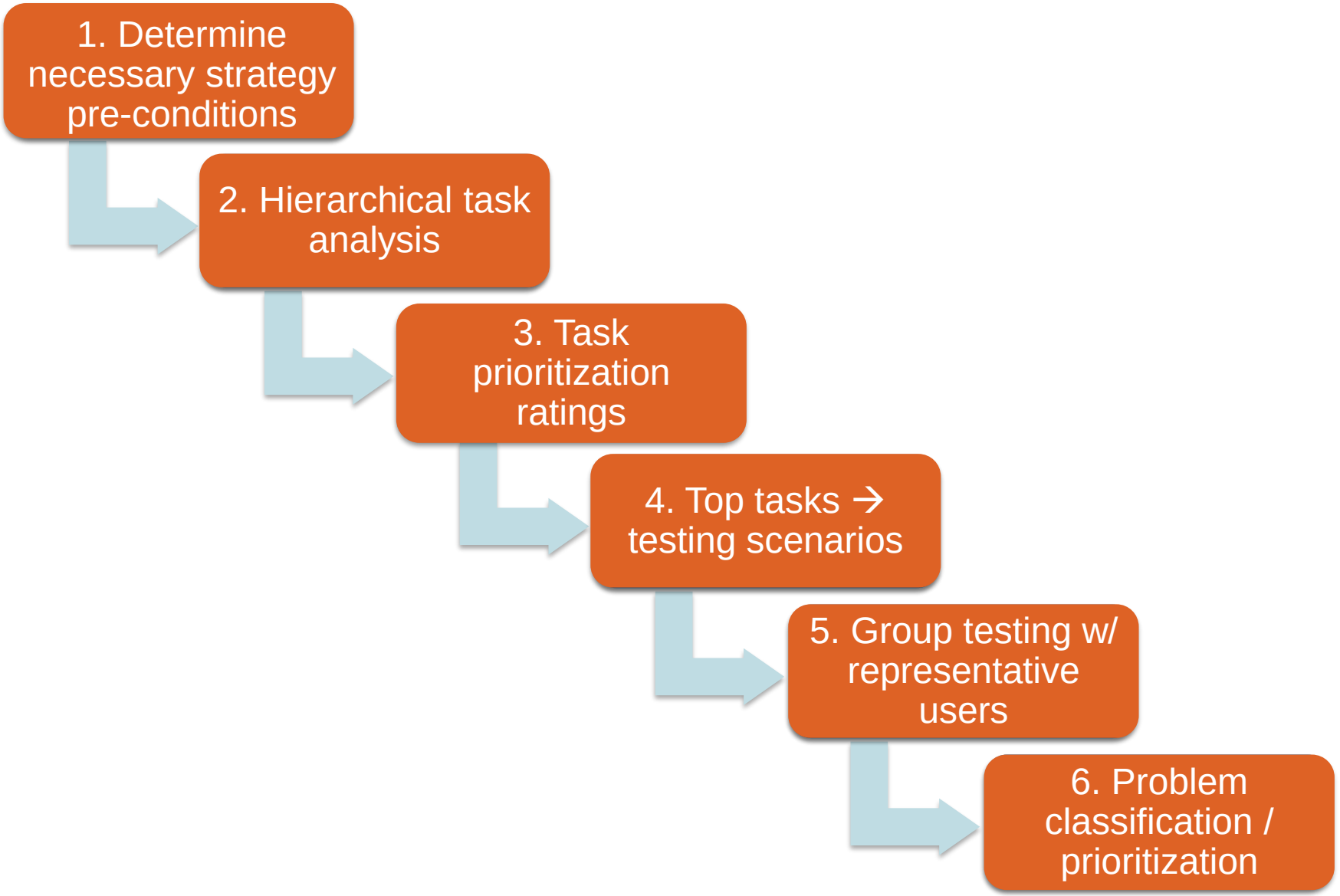
Cognitive Walkthrough for Implementation Strategies (CWIS) (Lyon, Coifman et al., in prep)



CWIS: Example application to *post-training consultation procedures*

- Post-training consultation is a cornerstone implementation strategy (Herschell et al., 2010)
- CWIS Study Procedures
  - Part of a larger project to develop an online training + consultation program for *measurement-based care*
  - Applied CWIS to **REFINE REMOTE POST-TRAINING CONSULTATION PROTOCOL** (live calls & msg. board)
  - ***n* = 10** school-based clinicians (90% female, 70% Caucasian, 2-18 yrs in role)
    - Group CWIS walk-through procedure
    - Administered Implementation Strategy Usability Scale (ISUS)

CWIS Steps


1. Determine necessary strategy pre-conditions
2. Hierarchical task analysis
3. Task prioritization ratings
4. Top tasks → testing scenarios
5. Group testing w/ representative users
6. Problem classification / prioritization

Scenario	Task		Participant Ratings of Anticipated Task Success										Very confident in success
			1	2	3	4	5	6	7	8	9	10	
1	1-1	*knowing what to do*											50%
		doing it											30%
		learning you did it successfully											30%
2	2-1	*knowing what to do*											40%
		doing it											20%
		learning you did it successfully											40%
	2-2	*knowing what to do*											30%
		doing it											10%
		learning you did it successfully											50%
3	3-1	*knowing what to do*											90%
		doing it											50%
		learning you did it successfully											70%
	3-2	*knowing what to do*											70%
		doing it											60%
		learning you did it successfully											70%
	3-3	*knowing what to do*											50%
		doing it											30%
		learning you did it successfully											40%
4	4-1	*knowing what to do*											40%
		doing it											10%
		learning you did it successfully											70%
5	5-1	*knowing what to do*											60%
		doing it											30%
		learning you did it successfully											60%
	5-2	*knowing what to do*											70%
		doing it											30%
		learning you did it successfully											30%
6	6-1	*knowing what to do*											80%
		doing it											60%
		learning you did it successfully											50%
	6-2	*knowing what to do*											80%
		doing it											60%
		learning you did it successfully											80%

Step 5:

Example Results from group testing of a coaching protocol

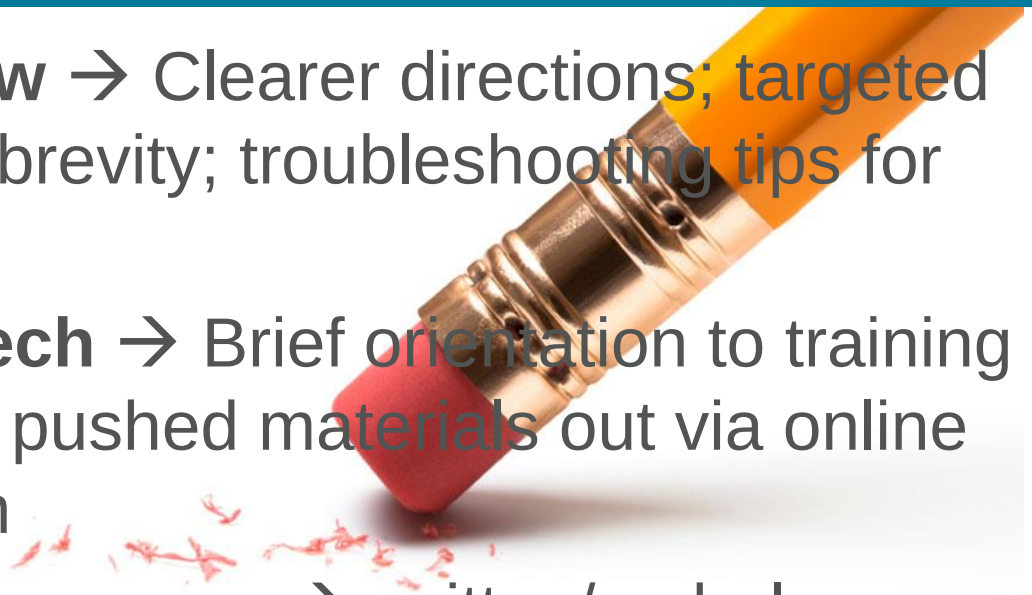
- Very small chance of success
- Small chance of success
- Probable chance of success
- Very good chance of success

Mean ISUS score: **71.3**

Step 6 Example Results: Identification / Classification

P	Usability Issue	U	H	S	C	F	T
3.0	Danger of discussion *overflow*		X			X	
3.0	Problems multitasking with technology				X		
2.7	Difficulties / worries about performing well under pressure				X		
2.7	Consultation time might not fit contextual constraints			X			
2.3	Difficulty translating know. to beh. for case presentation	X			X		
2.3	Inadequate supports to evaluate solution effectiveness		X				
2.3	Susceptibility to technology accessibility issues	X					
2.3	Inadequate consultation engagement structures				X		
1.3	Consultation & assessment timing incompatible	X		X			
1.3	Some terminology confusing / inaccessible						X
1.3	Feedback misaligned for some providers/contexts	X					
1.0	Difficulties saving / accessing prob. solving plan	X					

CWIS-driven *redesign* decisions



- **Discussion overflow** → Clearer directions; targeted praise for consultee brevity; troubleshooting tips for consultants
- **Multitasking with tech** → Brief orientation to training platform; Consultant pushed materials out via online consultation platform
- **Performing under pressure** → written/verbal case presentation examples; set clear expectations; Created collaborative, safe atmosphere via video calls, etc.
- **Time + context constraints** → rank-ordered time slot selection; group calls < 1hr; brief make-up sessions

Summary

1. Innovation design is an under-explored and **UNDER-ADDRESSED DETERMINANT** of implementation success
2. Human-centered design (HCD) and implementation science share **SIMILAR GOALS** (i.e., facilitating the use of innovations)
3. Emerging methods can efficiently (e.g., w/ small samples) evaluate the usability of complex interventions that may **EXPLAIN ADOPTION ISSUES** and **DRIVE REDESIGN**
4. Application of HCD in implementation science is **JUST BEGINNING**

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Sometimes

beats

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