Can That Evidence-Based Practice Be Implemented?

Designing and Supporting Streamlined and Contextually Appropriate Innovations in Behavioral Health

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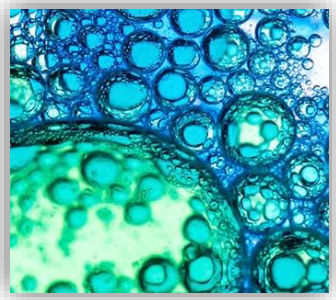

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Send ideas for future topics to:
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Learning Objectives

By the end of this session, you will be able to:

- Recognize key concepts from the field of user and human-centered design
- Apply user-centered design principles to complex psychosocial interventions in health
- Describe methods of evaluating the usability of complex psychosocial interventions

Overview

1. Human/User-centered design (UCD) overview
2. Design and usability for complex psychosocial innovations
3. USE-EBPI methodology for assessing usability

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

-Don Norman

What is Design?

The process of creating or shaping tools for direct human use

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)

Individual Users are Critical to Good Design

"The user is not like me"

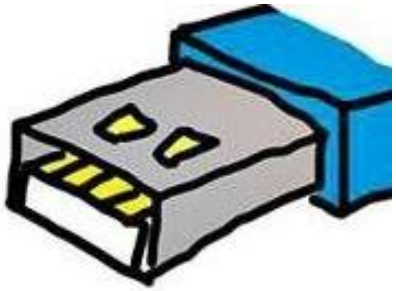
Product developers tend to underestimate user diversity in their design processes

- Base designs on people similar to themselves (Cooper, 1999; Kujala & Matyla, 2000)
- Identification of representative users/user needs can correct this bias (Kujala & Kauppinen, 2004)

Problematic Design is EVERYWHERE

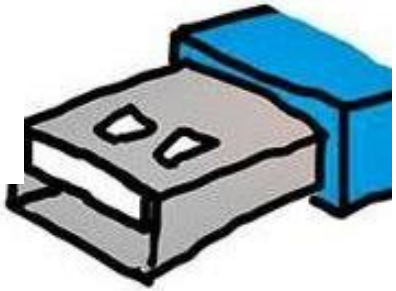
Problematic Design is EVERYWHERE

Up position

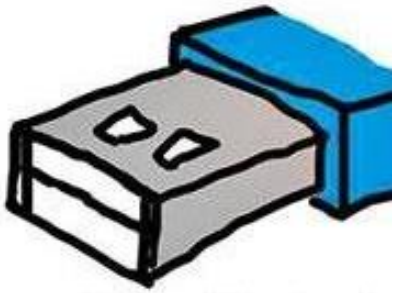


It is a well known fact that you must spin a USB three times before it will fit. From this, we can gather that a USB has three states.

Down position

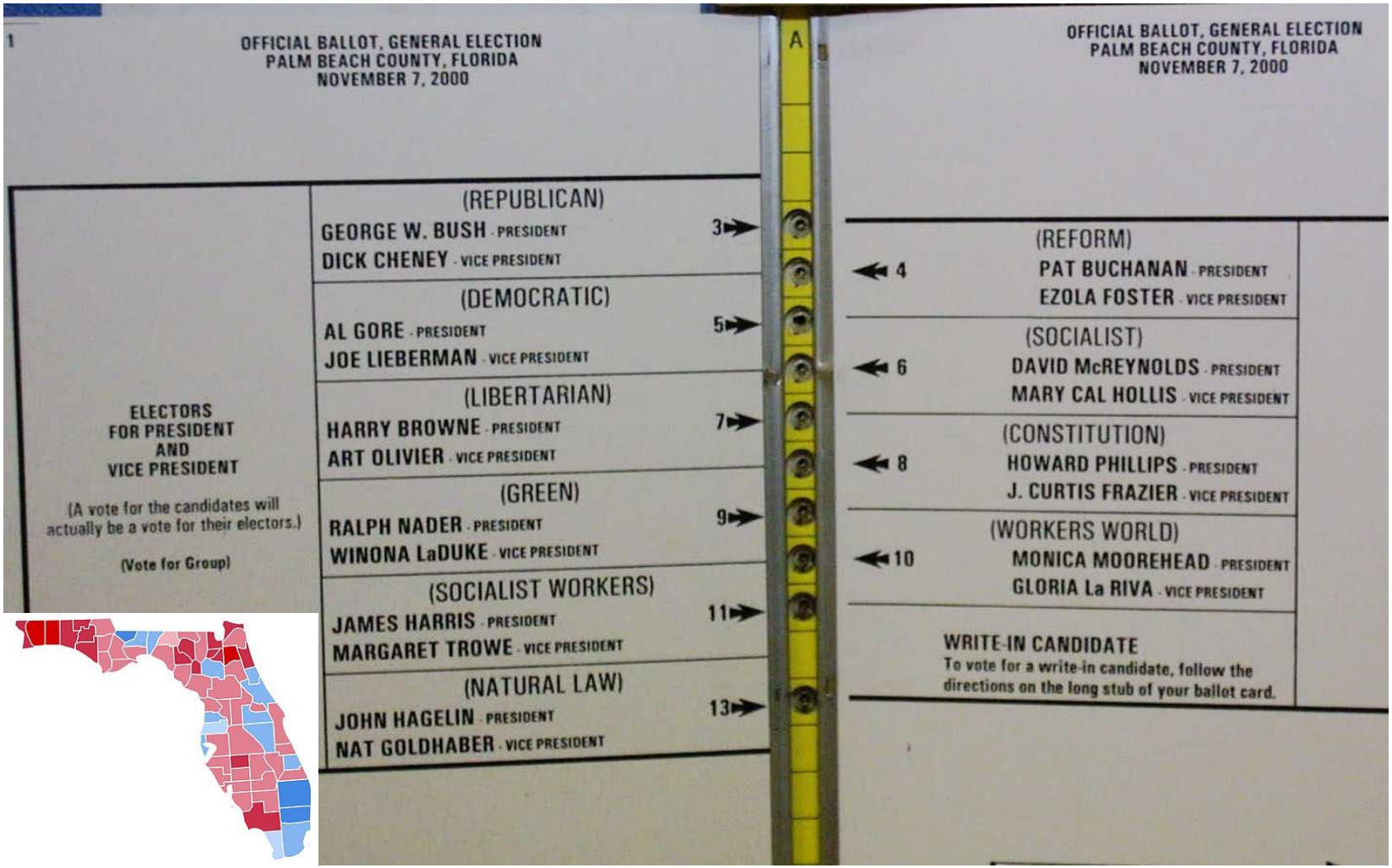


Superposition



Until the USB is observed it will stay in the superposition. Therefore it will not fit until observed – except for in cases of USB tunneling.

Problematic Design can Have Major Consequences



https://commons.wikimedia.org/wiki/File:Butterfly_Ballot,_Florida_2000_(large).jpg

Why is Design so Difficult?

- All design involves tradeoffs
- Good designs are often not obvious
- Humans are unpredictable and illogical
- Humans make errors
- Design relies on process expertise, not domain expertise

Credit to A. Davidson

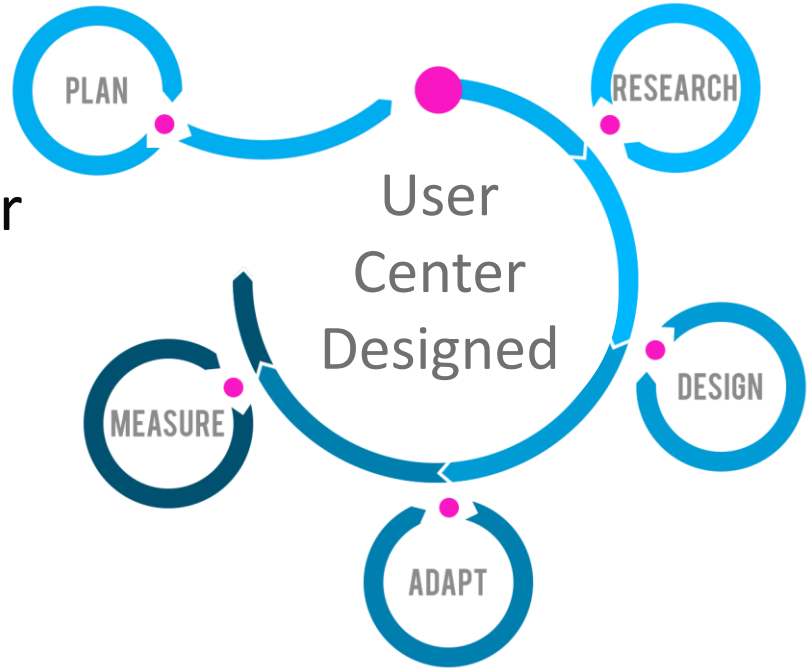
Design Problems Reduce Usability

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, 1998)

Improving Usability with User-Centered Design

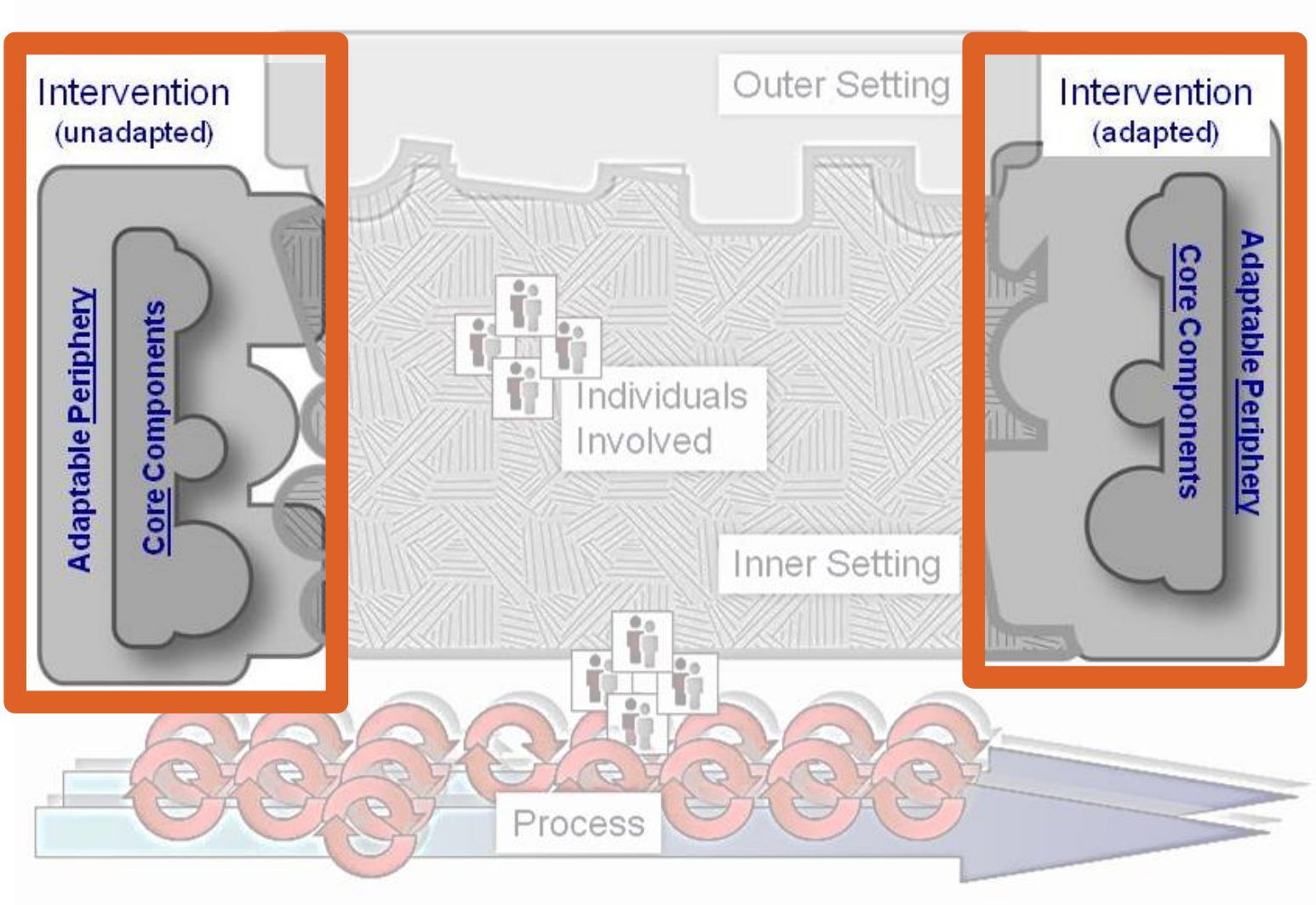
User-centered design (UCD) is an approach to design that grounds the process in information about the people and settings that will use the product.

- Rooted in human-computer interaction, industrial design, & cognitive psychology



Intervention Design & Usability in Behavioral Health

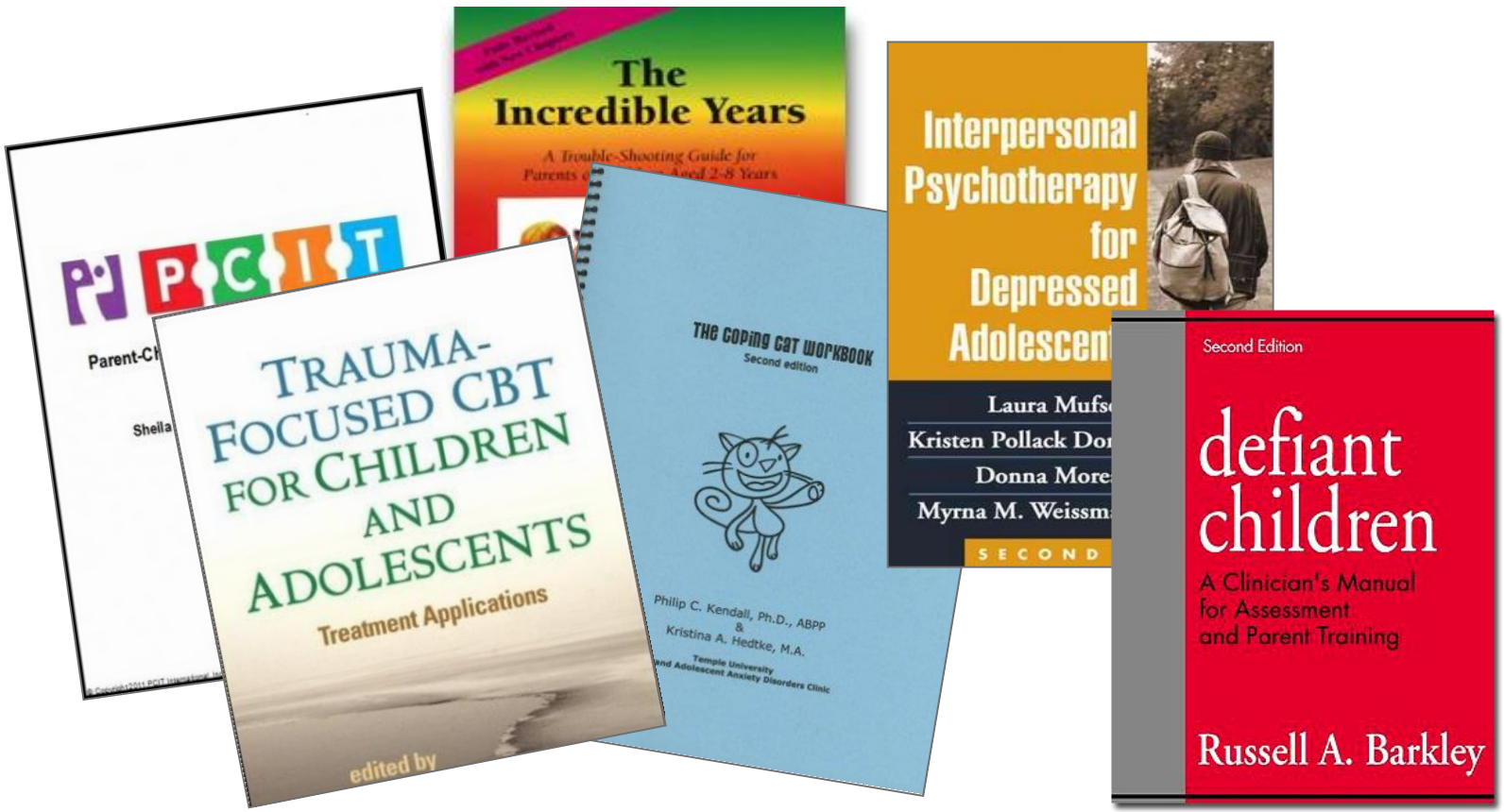
System Level: Intervention



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"
  - Delivery with fidelity
- Robust solutions to well-defined problems

https://www.pinterest.co.uk/pin/224194887670048102/

MH EBPIs are Terribly Designed

- Long (e.g., 12-16+ sessions), often with diminishing returns
- Confining/inflexible
- Complicated/difficult to learn
  - Even harder to learn well (e.g., w/ fidelity)
  - Unclear what parts are important (unpacking studies)

Lyon & Koerner (2016)

MH EBPIs are Terribly Designed

FEATURE CREEP

The misguided notion that somehow more is always better

"The field has generally designed interventions to try to get people to do what experts believe is beneficial and has paid far less attention to what users want or how to fit tools into the fabric of users' lives."

Mohr et al. (2017)

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

Intervention-Level Determinants are Underexplored in Implementation Science

Characterization of ERIC strategies (n = 73) at most likely system level targeted

System Level	# Strategies
Outer setting	32
Inner setting	34
Individual	18
Intervention	**3**
TOTAL	**73**

(Dopp et al., under review)

Design Goals for EBPIs

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.

(Lyon & Koerner, 2016)

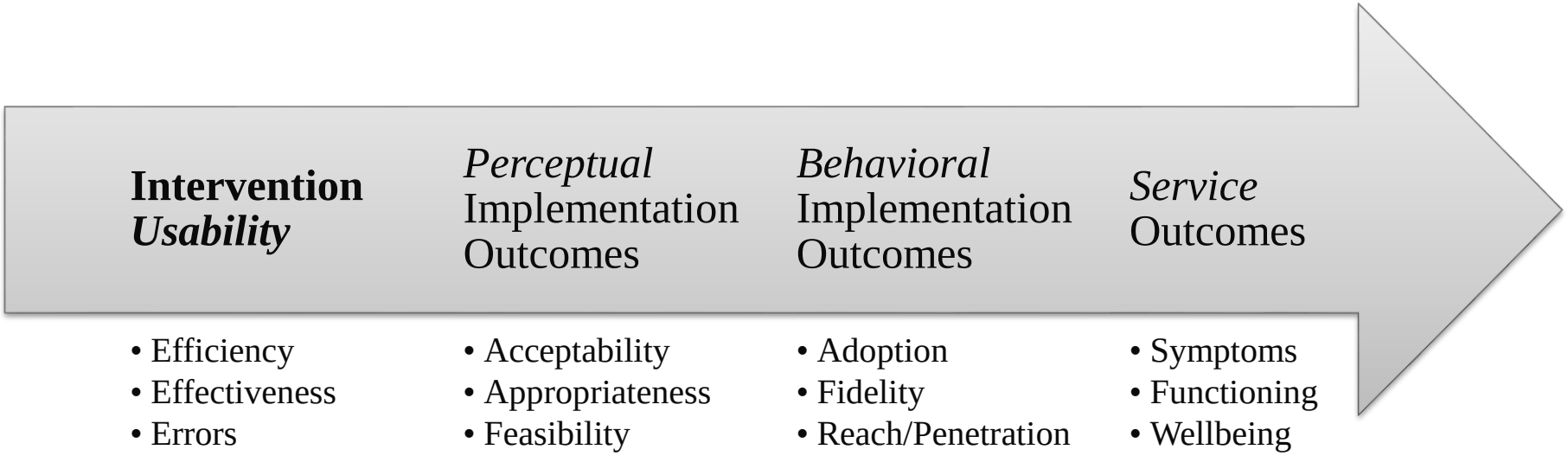
Design Goals for EBPIs (continued)

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.

(Lyon & Koerner, 2016)

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

Relationship of EBPI Usability to Implementation and Service Outcomes…



Lyon & Bruns (in press)

Evaluating the Design Quality of Complex Psychosocial Interventions

Evaluating EBPI Design Quality

"Good design is when someone shows it to you, you say, 'Oh, I see'"

~Don Norman

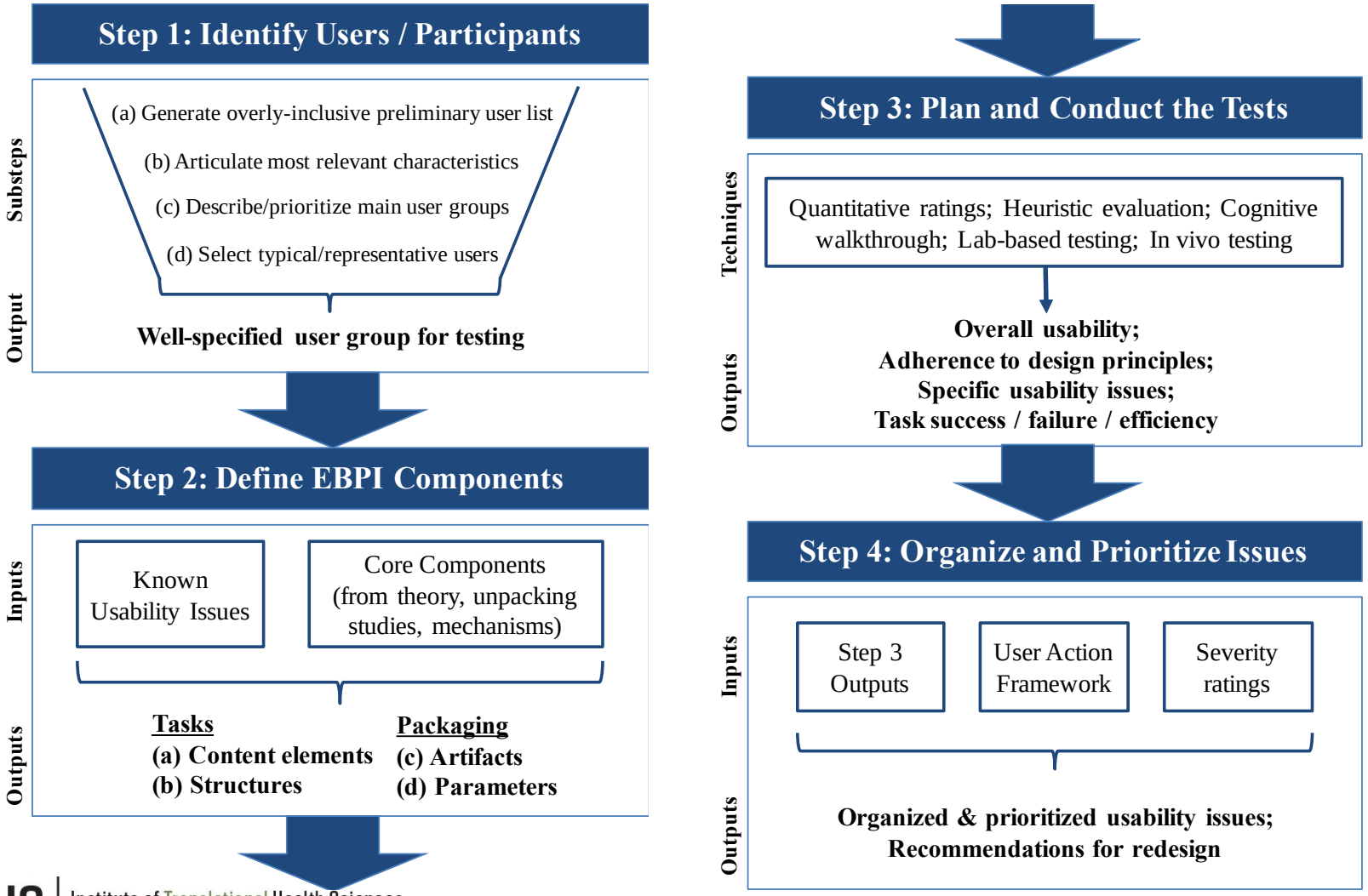
Evaluating EBPI Design Quality

EBPI usability testing allows for…

1. Evaluation of innovation characteristics likely to be predictive of adoption
2. Discovery of the most critical issues that should be addressed in redesign efforts

(Rogers, 2003) &(Lyon & Bruns, in press; Lyon & Koerner, 2016)

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



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Lyon, Koerner, & Chung (under review)

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

1. Identify users/participants

Table 1. EBPI Usability Test Participant Identification Process

1. Generate preliminary user list	☐ Generate an overly-inclusive list ☐ Consider individuals in different roles
2. Articulate most relevant user characteristics	☐ Personal characteristics ☐ Task-related characteristics ☐ Geographic/social/setting characteristics
3. Describe and prioritize main user groups	☐ Articulate primary, secondary, and negative (i.e., non-) users
4. Select typical and representative users for testing	☐ Sample into user subtype strata ☐ Recruit ~6-20 users per test

Lyon, Koerner, & Chung (under review)

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

2. Define EBPI components

Table 2. EBPI Tasks and Packaging Components

		Definition	Example
Tasks	Content elements	Discrete clinical techniques or strategies used in a session	Exposure; Cognitive restricting; Psychoeducation; Agenda setting
	Structures	Processes that guide the selection, organization, and maintenance of content	Team-based goal setting; Measurement-based care; Structured supervision; Intervention algorithms
Packaging	Artifacts	Tangible, digital, or visual materials that exist to support task completion	Intervention manuals; Informational handouts; Job aids; Homework sheets
	Parameters	Static properties that define and constrain the intervention or service "space"	Modality; Prescriptive content sequencing; Session length or length of stay/care episode; Content delivery method; Dosage; Language

Lyon, Koerner, Chung (under review)

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

3. Plan and conduct the usability tests

Recommended Usability Testing Techniques

Quantitative instruments (e.g., IUS)	Heuristic evaluation by experts	Cognitive walk-throughs	Lab-based, scenario-driven user testing (e.g. beh rehearsal)	In-vivo / extended user testing (e.g., A/B testing)

Lowest cost → *Highest cost*

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

4. Organize and prioritize usability issues

Adapted **User Action Framework** for Organizing EBPI Usability Issues.

Step of Interaction Cycle	Core Question	Example Usability Problems
Planning	Can the user understand and/or decide what to do?	☐ Low *conceptual* clarity ☐ No ability to anticipate/avoid errors
Translation	Can the user translate plans into actions?	☐ Insufficient cognitive affordances (e.g., visual cues) ☐ Low *procedural* clarity
Actions	Can the user successfully perform actions within typical use cases?	☐ Awkwardness and fatigue ☐ High task complexity ☐ Low task efficiency
Assessment / Feedback	Can the user understand effects of actions?	☐ Ease of information collection (i.e., accessibility; efficiency) ☐ Timeliness of performance feedback

Lyon, Koerner, & Chung (under review)

Application of USE-EBPI to an Exposure Protocol

Step 1: User identification

- Identified most relevant user characteristics:
  - Experience delivering or supervising exposure interventions (clinicians, supervisors)
  - Anxiety severity (consumers)
- Clinicians identified as the primary user group
  - Novice, intermediate, advanced

Application of USE-EBPI to an Exposure Protocol

Step 2: Define components

- Selected **content elements**: Exposure procedures with client
- Selected **structures**: Subjective units of distress (SUDs; a.k.a., "fear thermometer") ratings
- Selected **artifacts**: Brief exposure guide
- No **parameters** explicitly selected (most were embedded in other components)

Application of USE-EBPI to an Exposure Protocol

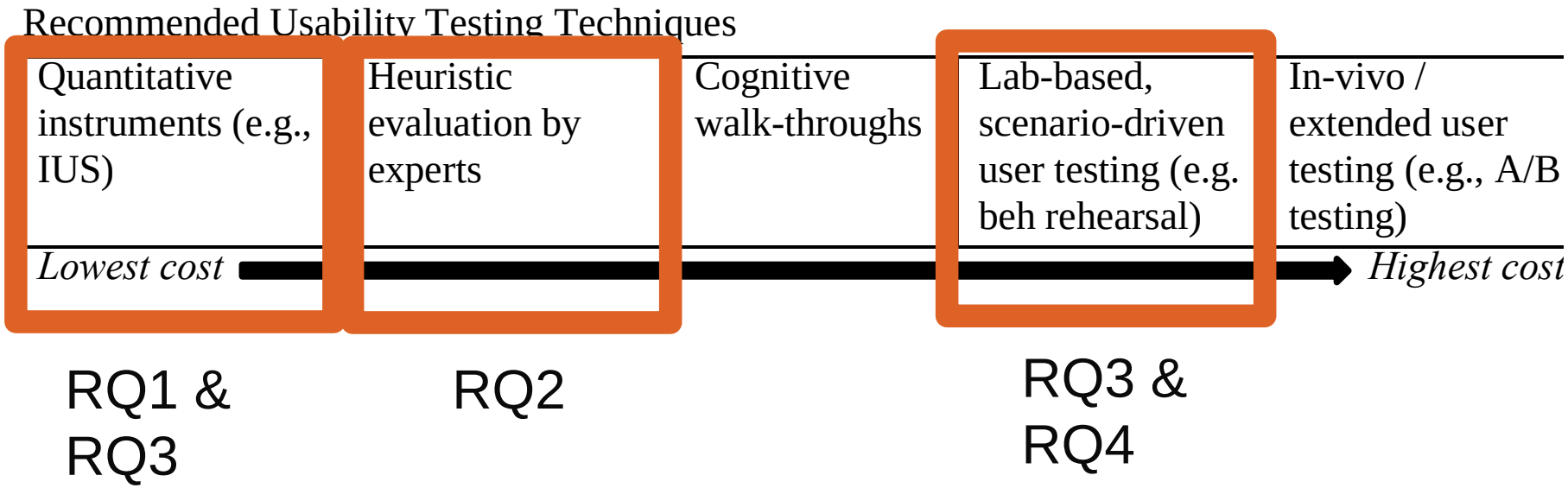
Step 3: Plan/conduct tests

— User testing RQs:

1. What is the overall level of usability of the exposure protocol?
2. To what extent does the protocol align with established usability principles?
3. Does user experience with exposure procedures impact usability?
4. What specific usability issues do users experience when applying the protocol?

Application of USE-EBPI to an Exposure Protocol

Step 3: Plan/conduct tests



Application of USE-EBPI to an Exposure Protocol

Heuristic Evaluation Rubric for EBPIs **(HERE)**

Heuristic Evaluation Rubric for EBPIs (HERE)

Criteria: **Scale (1-10; 1=not at all; 10=extremely)**

1. **Learnability** 1 2 3 4 5 6 7 8 9 10

   The EBPI provides users with opportunities to rapidly build understanding of, or facility in, its use.

2. **Efficiency** 1 2 3 4 5 6 7 8 9 10

   The EBPI can be applied by users to resolve identified problems with minimal time, effort, and cost.

3. **Memorability** 1 2 3 4 5 6 7 8 9 10

   Users of the EBPI can remember and successfully apply important elements of the EBPI protocol without many added supports.

4. **Error reduction** 1 2 3 4 5 6 7 8 9 10

   The EBPI explicitly prevents or allows rapid recovery from errors or misapplications of content.

5. **Low cognitive load** 1 2 3 4 5 6 7 8 9 10

   The EBPI task structure is sufficiently simple so that amount of thinking required to complete a task minimized.

6. **Exploit natural constraints** 1 2 3 4 5 6 7 8 9 10

   The EBPI incorporates or explicitly addresses the static properties of the intended destination context, which may affect the ways it can be used.

7. **Overall assessment** 1 2 3 4 5 6 7 8 9 10

Notes / explanation of ratings:

Application of USE-EBPI to an Exposure Protocol

"Lab-based" testing

- *N* = 10 users (3 novice, 4 intermediate, 3 advanced)
- Pre-testing review of materials
- Remote testing sessions with a facilitator and note-taker

1. "Think aloud" review of artifacts
2. Behavioral rehearsal of exposure procedures
3. Debrief interview
4. Completion of the *Intervention Usability Scale*

(Lyon, 2016)

Application of USE-EBPI to an Exposure Protocol

Step 4: Organize/Prioritize Usability Issues (i.e., results)

- 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)
  - Identified via consensus coding (Hill et al., 2005)
- Priority ratings for each issue: "1" (low priority) and "3" (high priority)
- Assigned stages of the **User Action Framework** (i.e., planning, translating, actions, assessment) to each issue (UAF; Khajouei et al., 2011)

Application of USE-EBPI to an Exposure Protocol

Step 4: Organize/Prioritize Usability Issues (i.e., results)

- IUS range (scale: 0-100): 65-85
- mean = 80.5 (*SD* = 9.56)

Group	IUS score
Novice (n = 3)	77.5 (*SD* = 10.90)
Intermediate (n=4)	77.5 (*SD* = 8.66)
Advanced (n = 3)	87.5 (*SD* = 8.66)

Table 6. HERE Evaluation Ratings

Item	*Mean*	SD
Learnability *The EBPI provides users with opportunities to rapidly build understanding of, or facility in, its use.*	7.33	1.155
Efficiency *The EBPI can be applied by users to resolve identified problems with minimal time, effort, and cost.*	8.33	0.577
Memorability *Users of the EBPI can remember and successfully apply important elements of the EBPI protocol without many added supports.*	6.33	0.577
Error Reduction *The EBPI explicitly prevents or allows rapid recovery from errors or misapplications of content.*	7.67	0.577
Low Cognition Load *The EBPI task structure is sufficiently simple so that amount of thinking required to complete a task minimized.*	6.33	0.577
Exploit Natural Constraints *The EBPI incorporates or explicitly addresses the static properties of the intended destination context, which may affect the ways it can be used.*	5.00	3.606
Overall Assessment	7.33	0.577

Application of USE-EBPI to an Exposure Protocol

Step 4: Organize/Prioritize Usability Issues (i.e., results)

- Task completion of exposure behavioral rehearsal. Failure rates…
  - 2 (of 3) novices (66%)
  - 1 (of 4) intermediates (25%)
  - 0 (of 3) experts (0%)

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

Lyon, Chung & Koerner (under review)

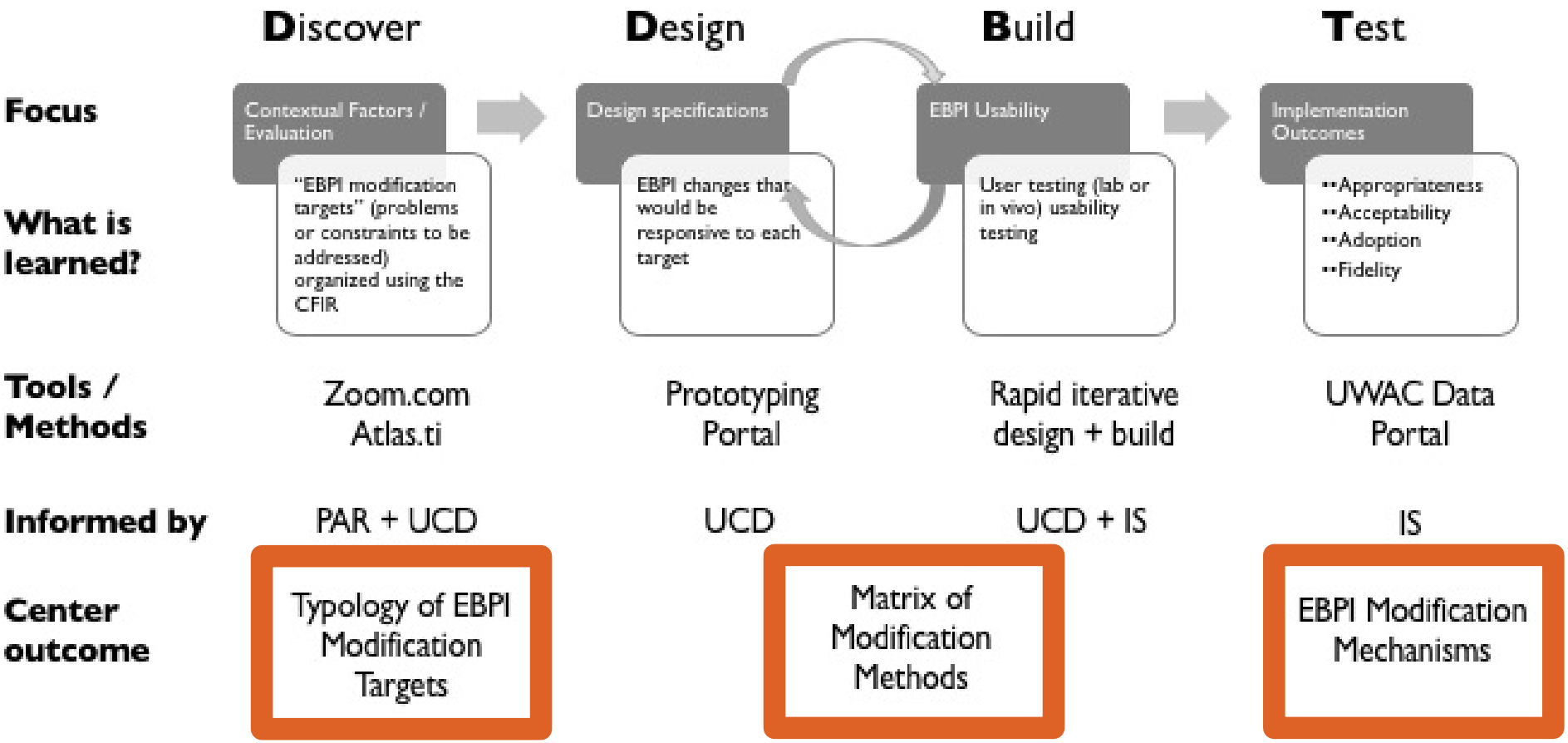
Application of USE-EBPI to an Exposure Protocol

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 regarding 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

Discover, Design, Build, & Test (DDBT) Framework

(P50MH115837; *Overall PI: Arean; Methods Core PI: Lyon*)



Summary

1. Intervention design is an under-explored and under-addressed determinant of implementation
2. User-centered design (UCD) and implementation science share similar goals (i.e., facilitating the use of innovations)
3. USE-EBPI is one method for evaluating the usability of complex psychosocial interventions that may explain adoption issues and drive EBPI redesign
4. Application of UCD in implementation science is just beginning