



Leveraging user-centered design to harmonize interventions, contexts, and implementation strategies

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Agenda

- Overview of implementation science
- User-centered design in implementation research
- Case example in AYA cancer care to highlight:
 - Usability testing
 - Ethnographic contextual inquiry
 - Prototyping interventions and implementation strategies

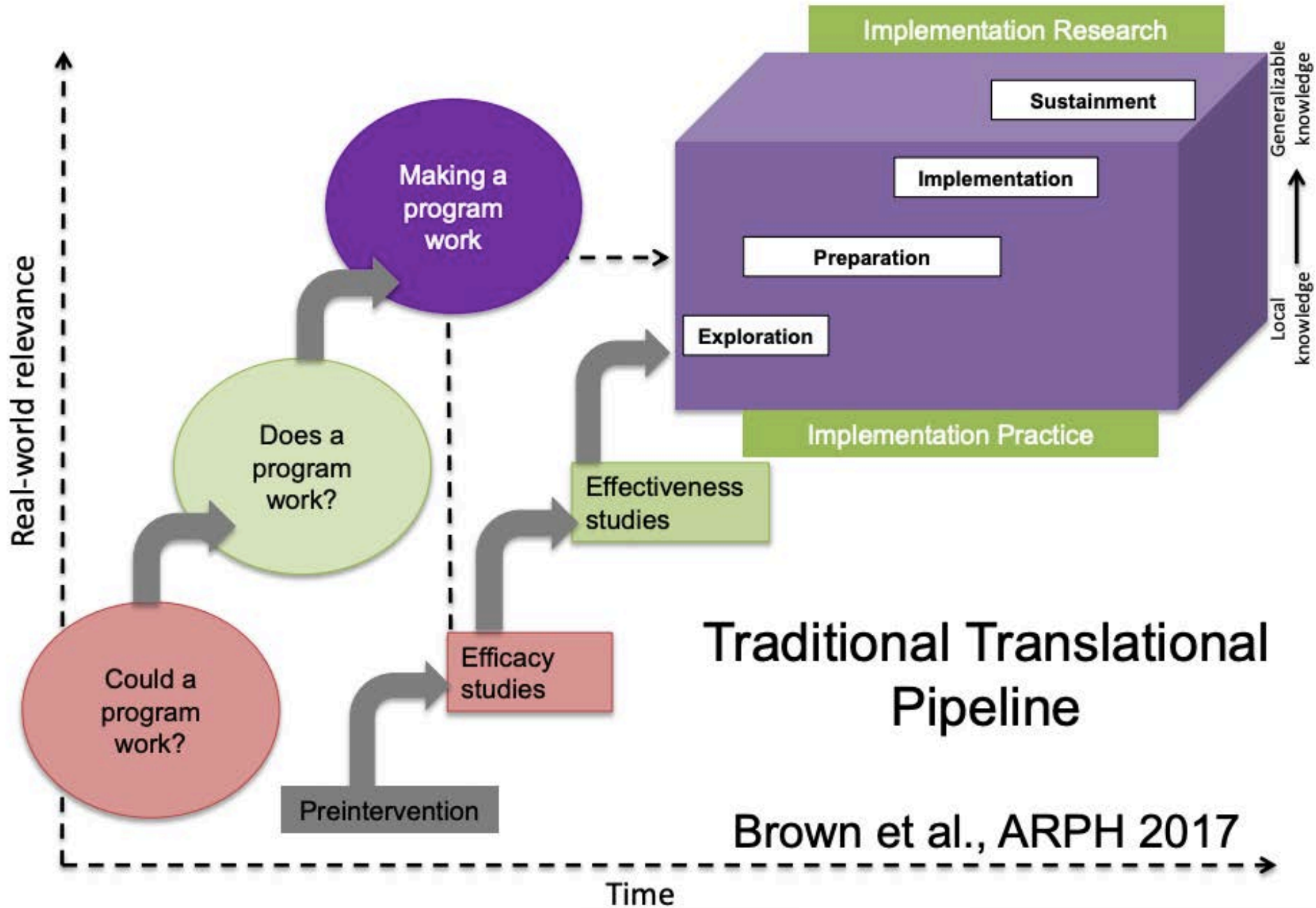
Implementation Science

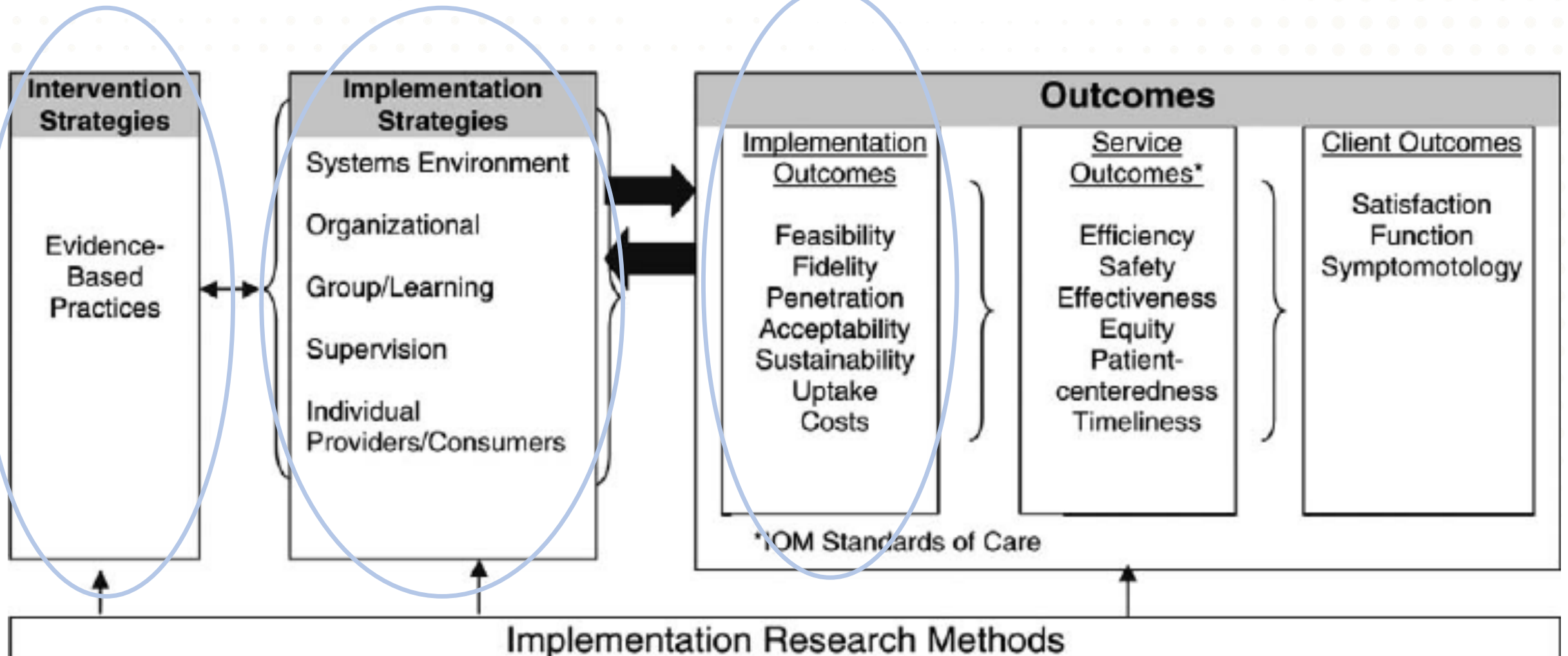
Research-to-practice gap



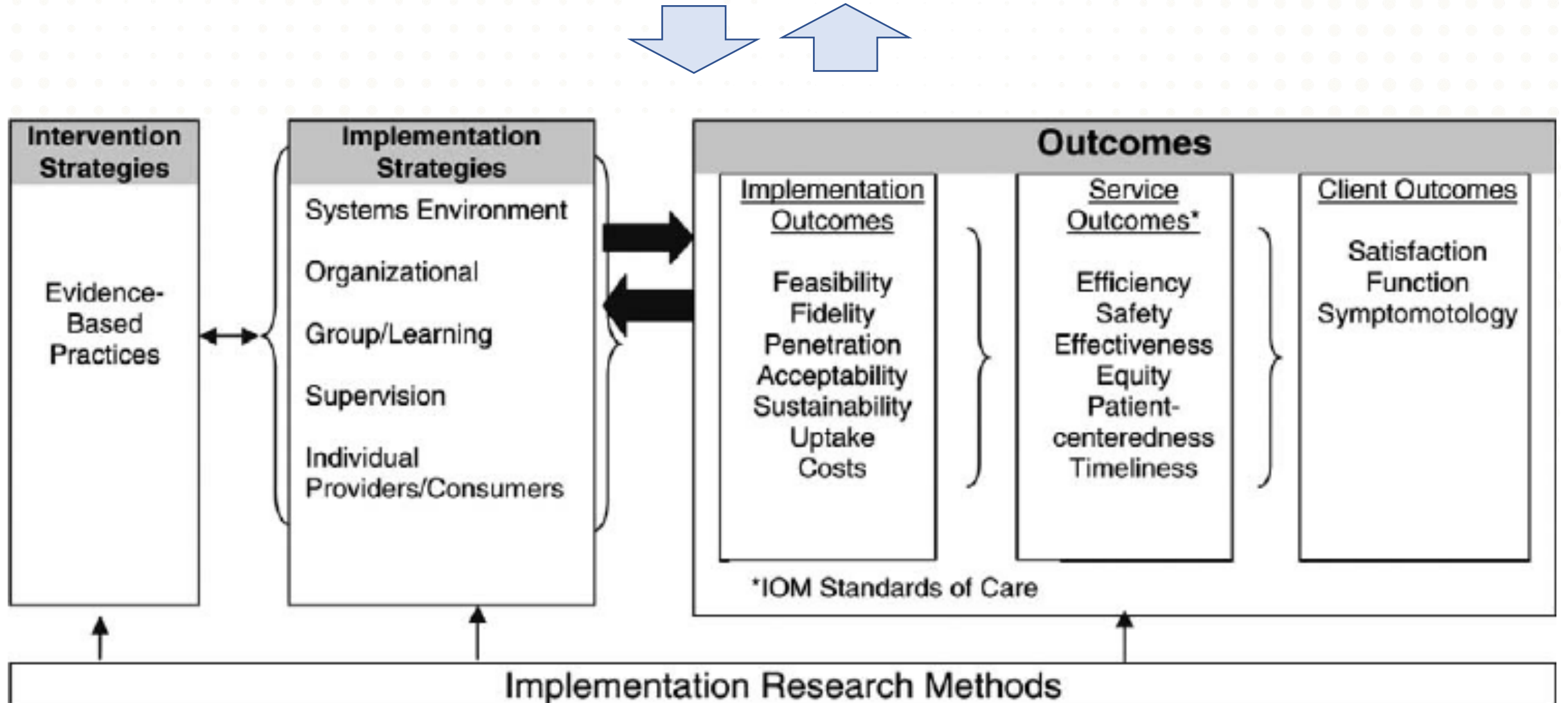
Implementation science

- The scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services (Eccles & Mittman, 2006)





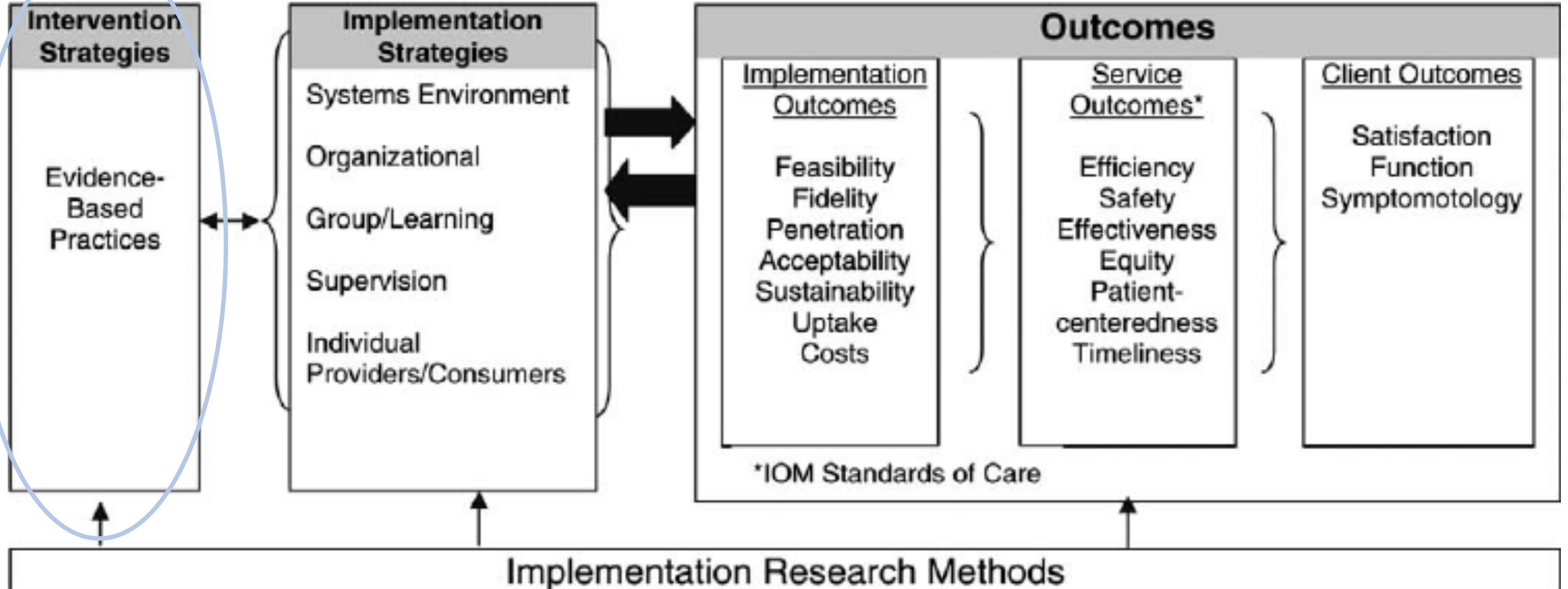
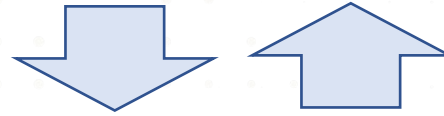
Context



Context

Individuals	Inner context	Outer context
<ul style="list-style-type: none">● Knowledge and beliefs about the intervention● Self-efficacy● Individual stage of change● Individual identification with the organization● Etc.	<ul style="list-style-type: none">● Structural characteristics● Networks and communication● Culture● Implementation climate● Readiness for implementation● Etc.	<ul style="list-style-type: none">● Patient needs and resources● Cosmopolitanism● Peer pressure● External policies and incentives● Etc.

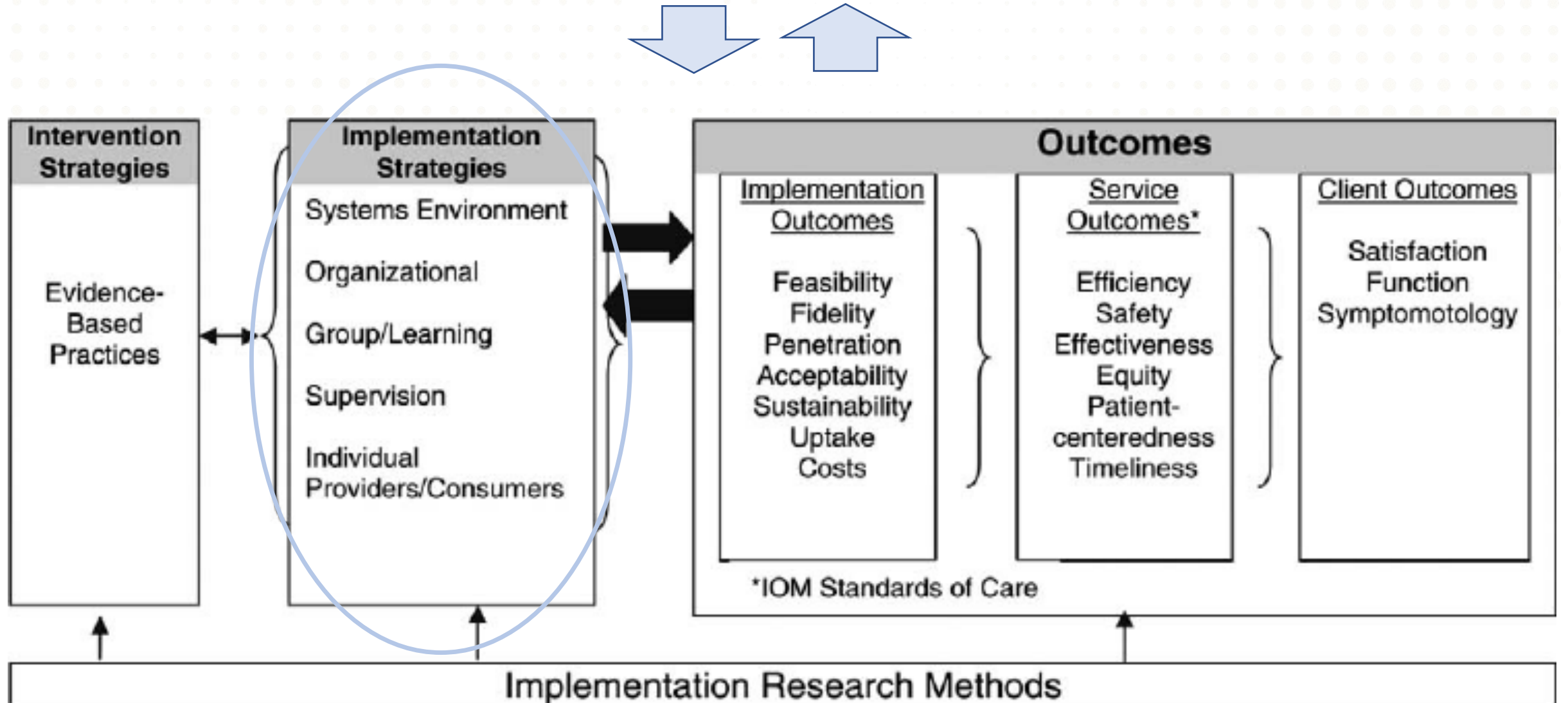
Context



Interventions

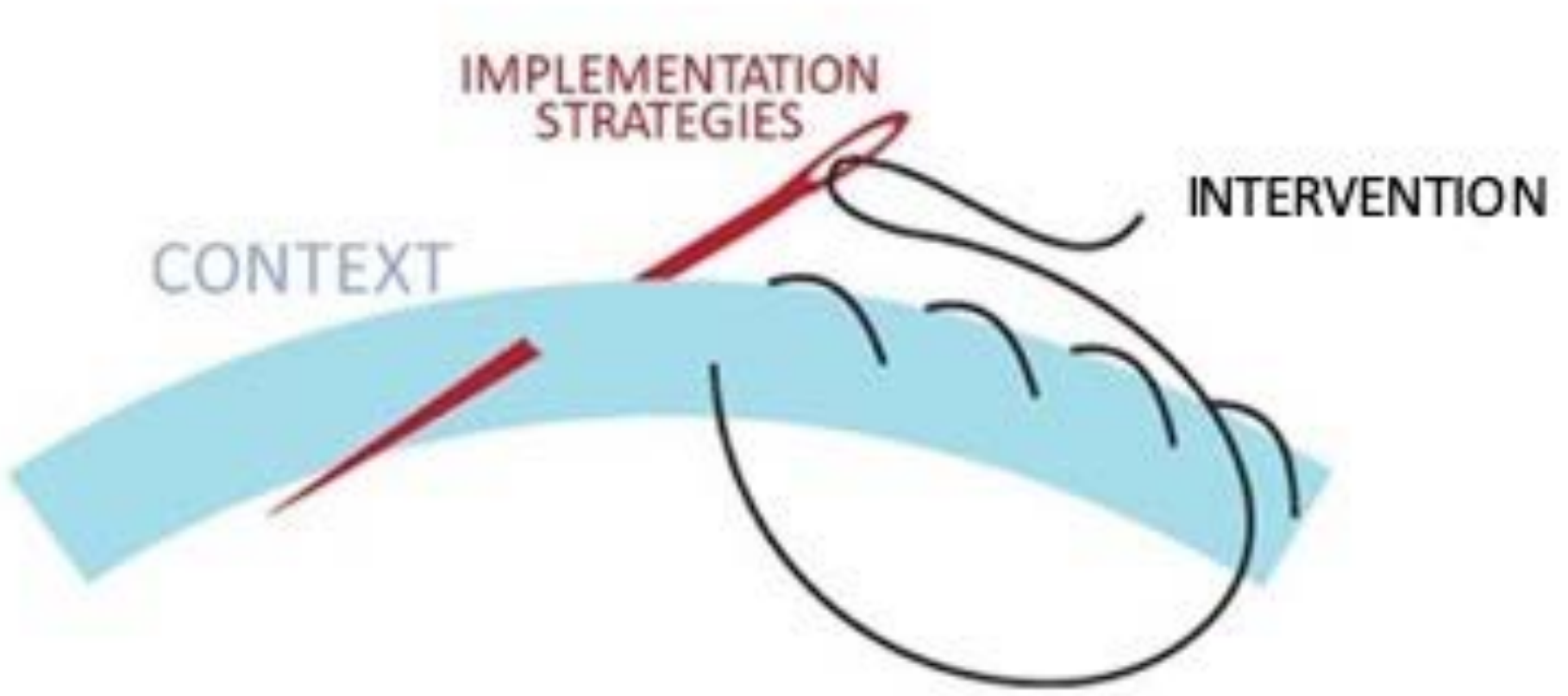
- Implementation often challenged by poor intervention-context fit
 - Need methods for considering the complex interplay between intervention and context
- There is no implementation without adaptation
 - Need methods to inform systematic intervention adaptation (i.e., methods for "meeting")

Context



Implementation strategies

- “More is better” approach may burden stakeholders
 - Need approaches for identifying minimally necessary implementation strategies
- Modest effect sizes may reflect misalignment with intervention or context
 - Need methods for tailoring implementation strategies to intervention + context (i.e., methods for “meeting”)

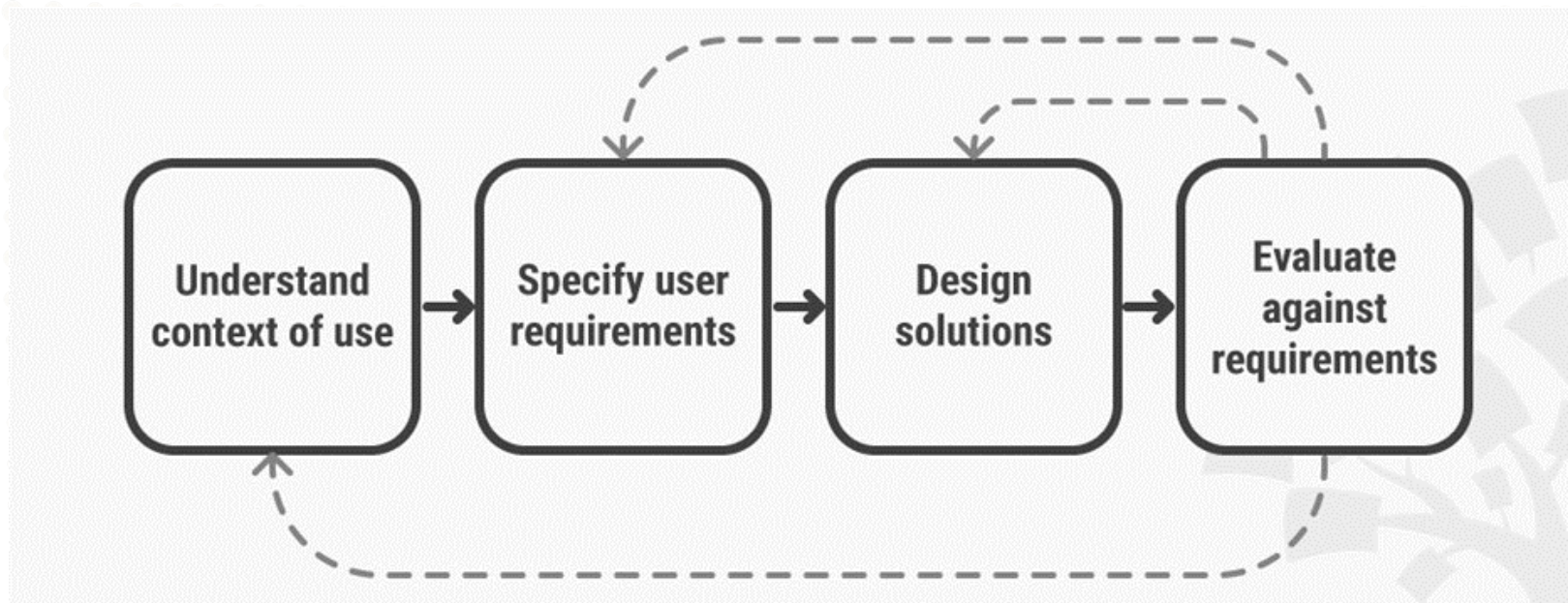


User-centered design

Applications in implementation science

What is user-centered design?

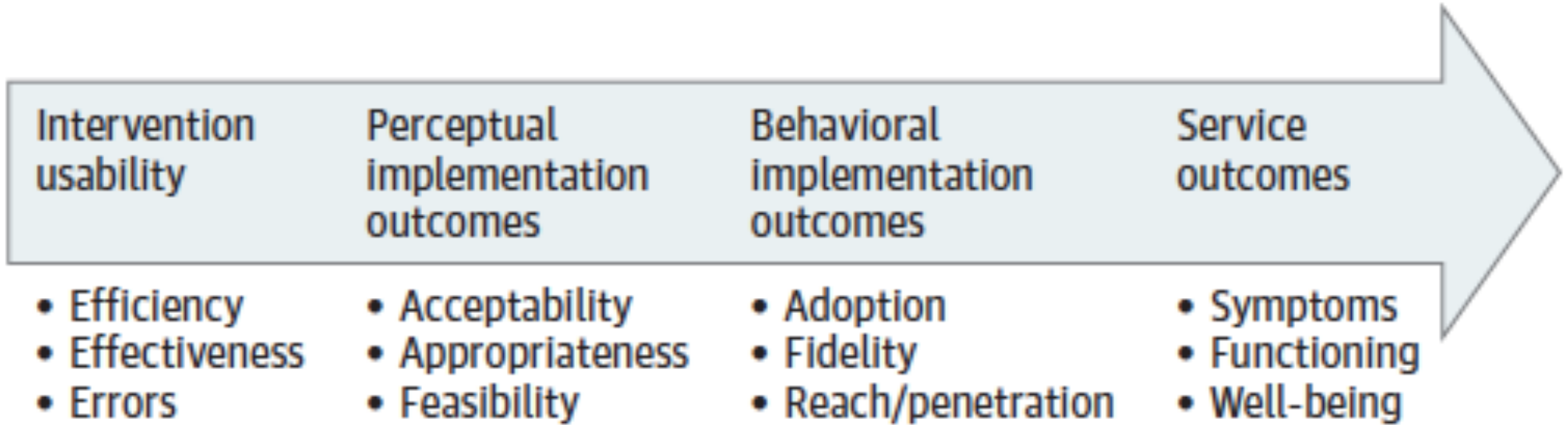
- A collection of methods and principles to guide the development of innovations which are responsive to the needs and constraints of their users and contexts of use

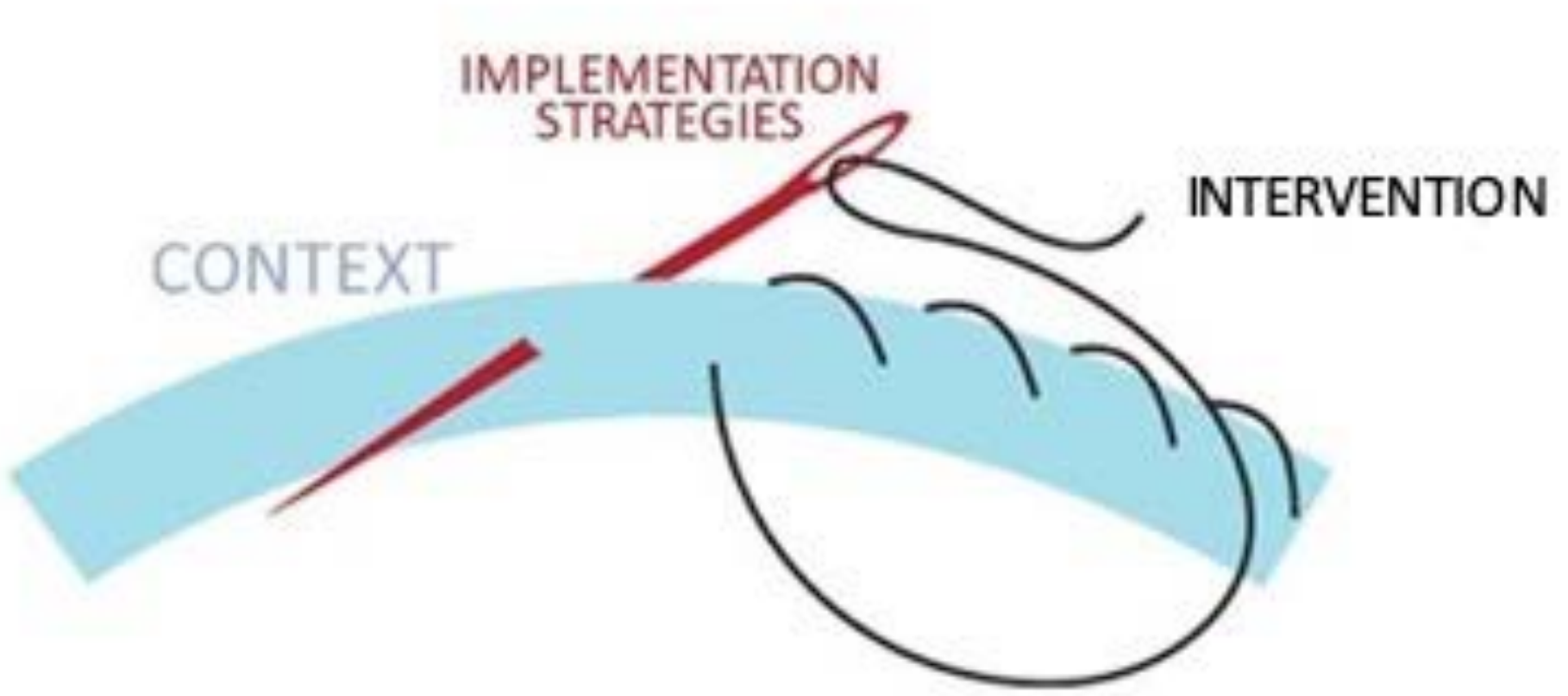


User-centered design outcomes

- Usability: ease with which users (e.g., patients and providers) can use an intervention in practice
- Usefulness: extent to which an intervention does what it is intended to do

Usability






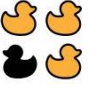

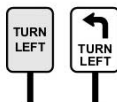
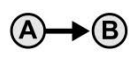
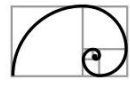




Intervention (the thread)



- Selecting interventions that are appropriate for users and their context
 - E.g., System Usability Scale
- Redesigning interventions to better fit users and their context
 - E.g., usability testing; heuristic evaluation

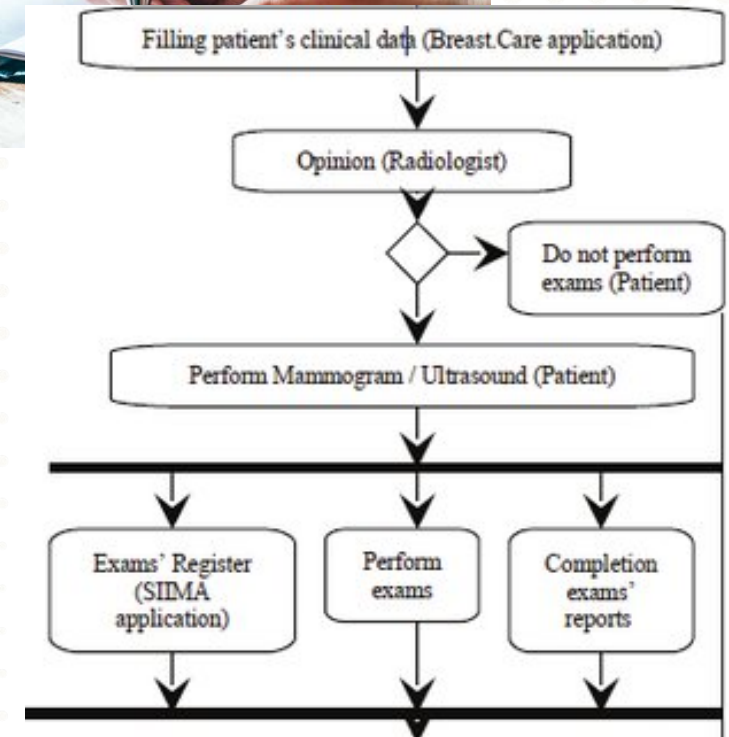
The System Usability Scale Standard Version		Strongly Disagree					Strongly Agree				
		1	2	3	4	5	1	2	3	4	5
1	I think that I would like to use this system frequently.		0	0	0	0	0	0	0	0	
2	I found the system unnecessarily complex.		0	0	0	0	0	0	0	0	
3	I thought the system was easy to use.		0	0	0	0	0	0	0	0	
4	I think that I would need the support of a technical person to be able to use this system.		0	0	0	0	0	0	0	0	
5	I found the various functions in this system were well integrated.		0	0	0	0	0	0	0	0	
6	I thought there was too much inconsistency in this system.		0	0	0	0	0	0	0	0	
7	I would imagine that most people would learn to use this system very quickly.		0	0	0	0	0	0	0	0	
8	I found the system very awkward to use.		0	0	0	0	0	0	0	0	
9	I felt very confident using the system.		0	0	0	0	0	0	0	0	
10	I needed to learn a lot of things before I could get		0	0	0	0	0	0	0	0	

 Visibility of System Status 1	 Match Between System & Real World 2	 User Control And Freedom 3	 Consistency And Standards 4	 Error Prevention 5
 Recognition Rather Than Recall 6	 Flexibility And Efficiency of Use 7	 Aesthetic And Minimalistic Design 8	 Help Users With Errors 9	 Help And Documentation 10

Context (the fabric)

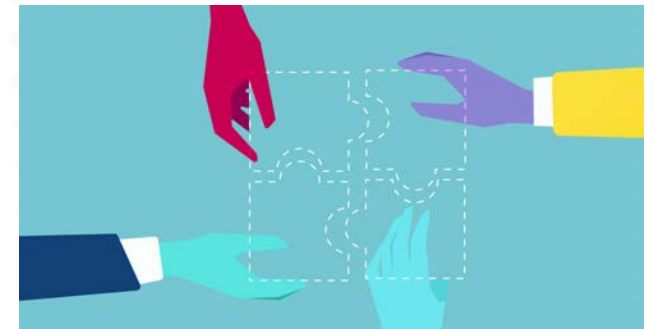


- Assessing context
 - E.g., contextual inquiry; diary-keeping
- Preparing context to promote receptivity to intervention
 - E.g., workflow mapping



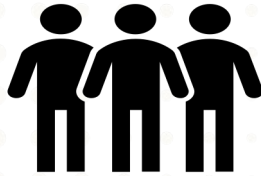
Implementation strategies (the needle)

- Anticipating needed implementation strategies based on context assessment
 - E.g., design team workshops
- Selecting strategies that are appropriate given intervention and context
 - E.g., CWIS
- Tailoring/designing strategies for intervention and context
 - E.g., co-creation sessions with users



Case example in AYA cancer care

Background



**AYAs with
unmet
needs**

Barriers to use

- Awareness; beliefs about compatibility
- Information overload



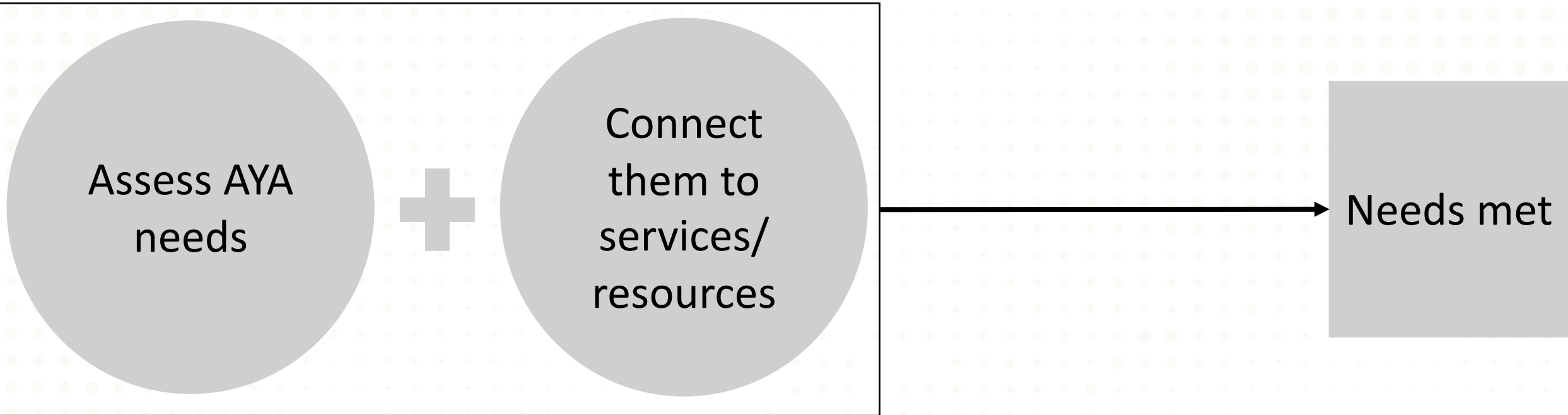
**Care
coordination**

- Navigating multiple providers, complex system

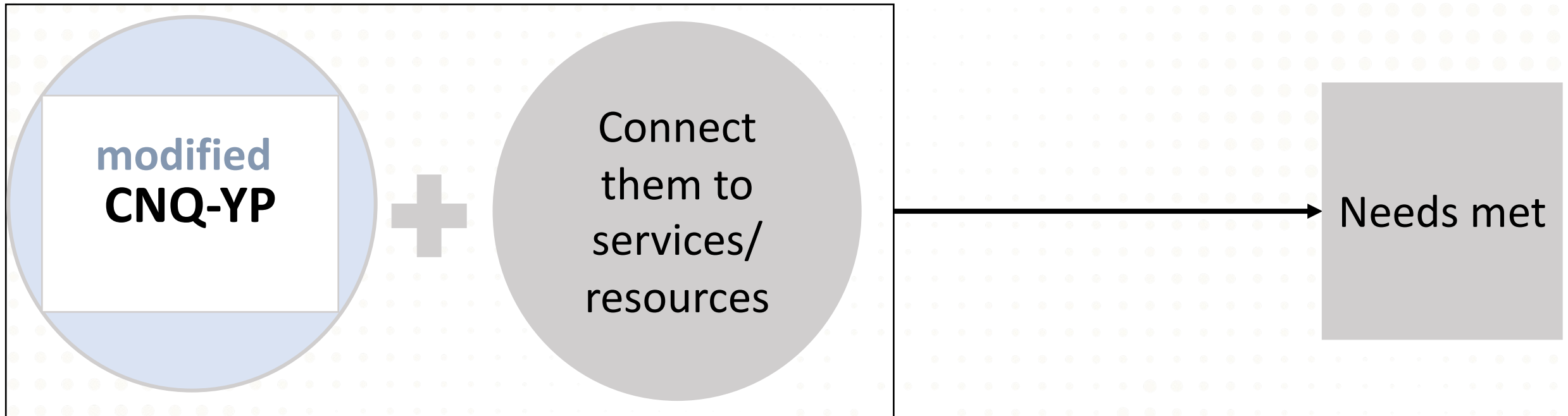
**Cancer
program
services**

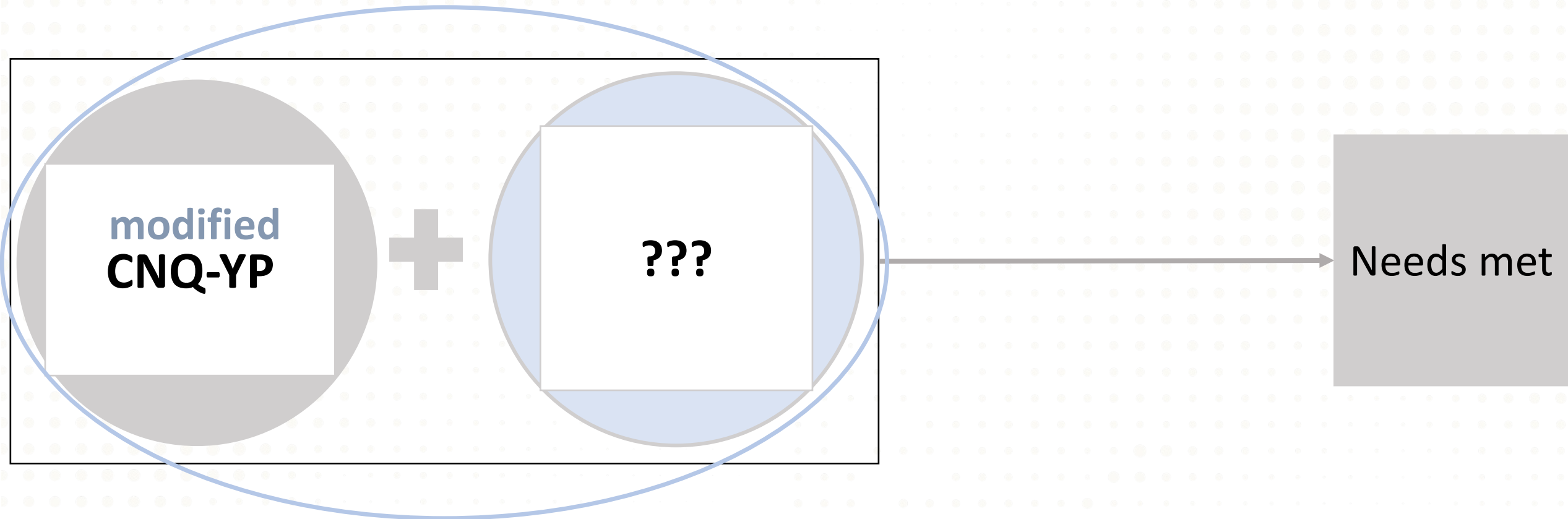
- Limited bandwidth
- Hesitance to raise concerns without prompting

Care coordination



Care coordination





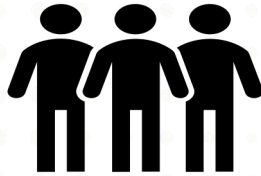
AYA Needs Assessment & Service Bridge (AYA NA-SB)

Barriers to care coordination

- AYA-level barriers
- Staffing and resource constraints

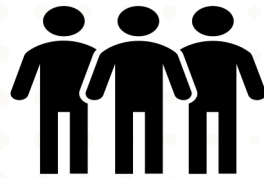
~~• Difficulties communicating across multiple disciplines~~

- “Turf wars” between pediatric and medical oncologists



**AYAs with
unmet
needs**

**Cancer
program
services**



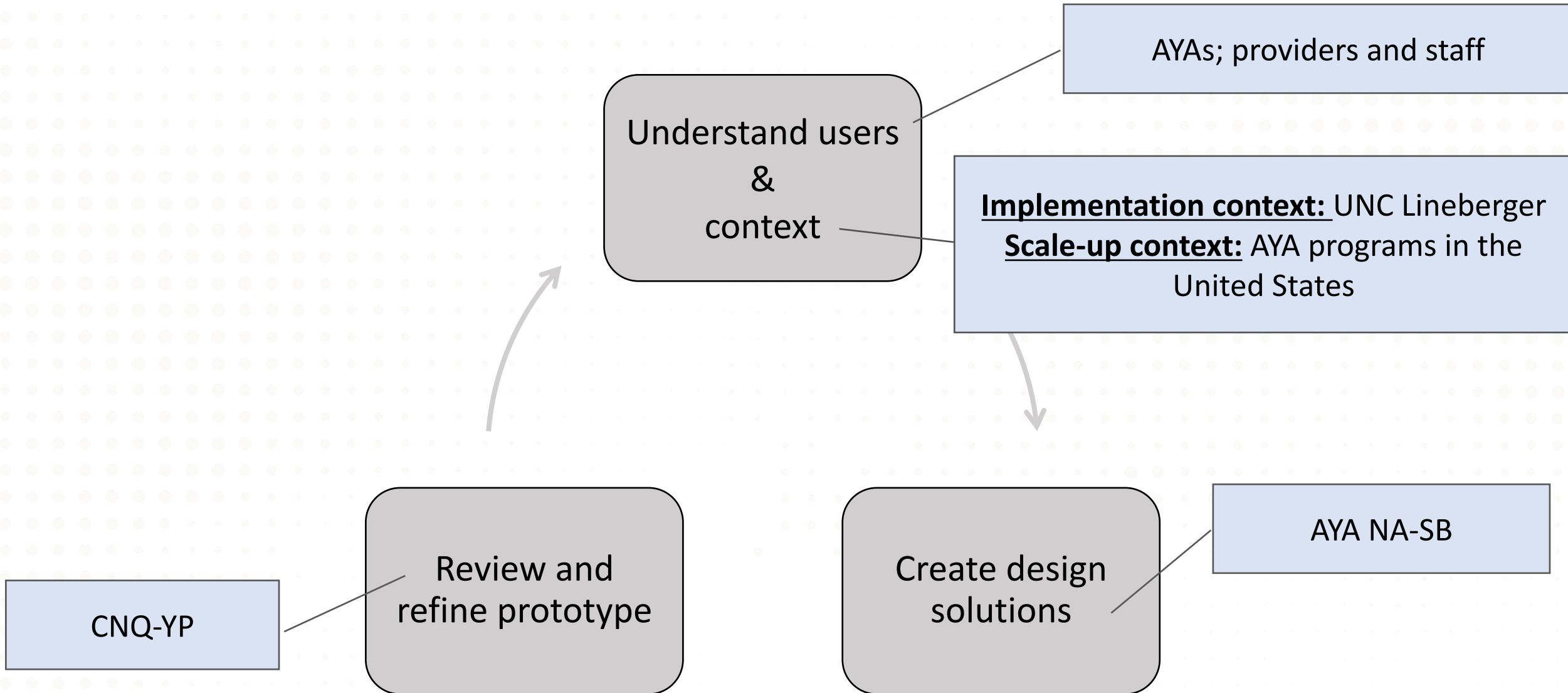
**AYAs with
unmet
needs**

AYA NA-SB

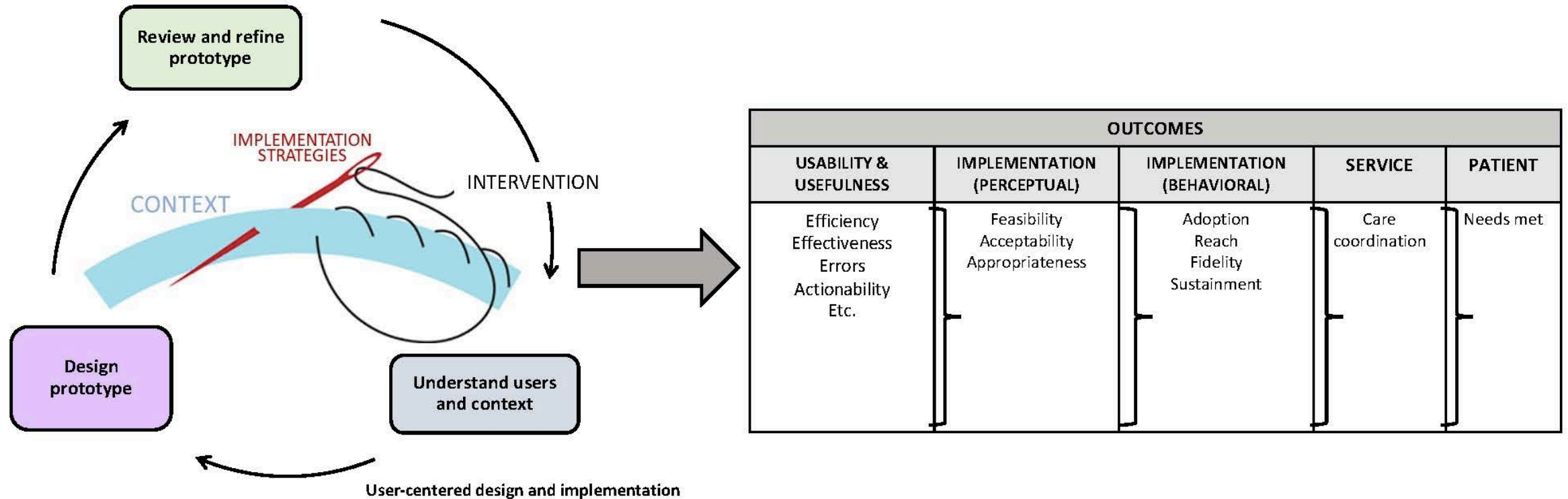
**Cancer
program
services**

**User-
Centered
Design**

Conceptual model



Conceptual model



Aim	Approach
1. Review & refine the CNQ-YP	<p style="text-align: center;"><u>Usability Testing</u></p> <ul style="list-style-type: none"> ● AYA Survey ● Cognitive interviews with AYAs ● Concept mapping with providers
2. Understand users & context	<p style="text-align: center;"><u>Ethnographic contextual inquiry</u></p> <ul style="list-style-type: none"> ● Guided tours with AYAs and providers from UNC ● Semi-structured interviews with provider from outside of UNC
3. Design AYA NA-SB and implementation strategies	<p style="text-align: center;"><u>Design Team Workshops</u></p> <ul style="list-style-type: none"> ● Workshop #1 ● Workshop #2

Design team



- Me
- Providers (n=6+)
- AYAs (n=5)
- Others pulled in, as needed

Intervention

(the thread)

Reviewing user interactions with prototype



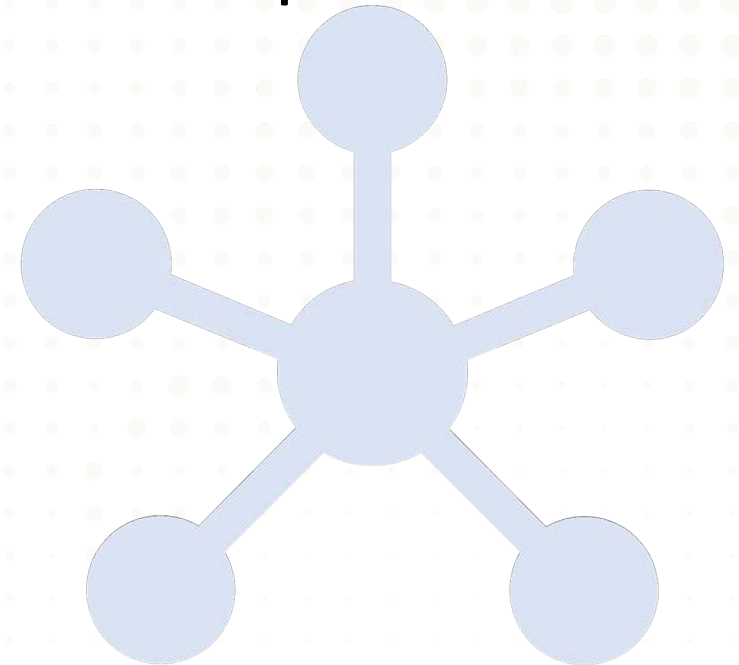
- AYA survey
n=70 AYAs



- Cognitive interviews
n=5 AYAs



- Concept mapping
n=26 providers

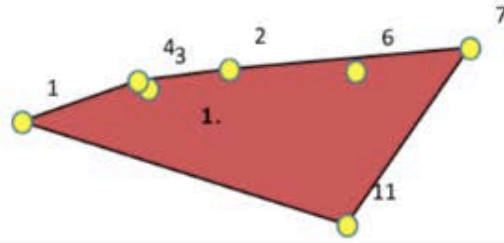


Refining prototype



CLUSTER 1

10-cluster solution

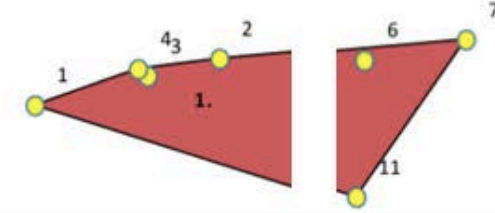


1	Cancer treatment staff telling me about my diagnosis
2	Cancer treatment staff telling me about the short-term side effects of treatment
3	Cancer treatment staff telling me about the long-term side effects of treatment
4	Cancer treatment staff telling me what will happen when treatment finishes
6	Cancer treatment staff telling me about how my treatment is working
7	Cancer treatment staff telling me my test results as soon as possible
11	Cancer treatment staff telling me what to do if I noticed a particular side effect

12-cluster solution

Same as 10-cluster solution

14-cluster solution

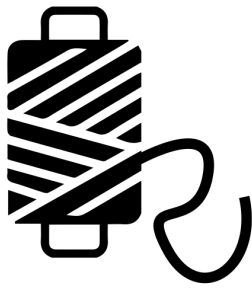


1	Cancer treatment staff telling me about my diagnosis
2	Cancer treatment staff telling me about the short-term side effects of treatment
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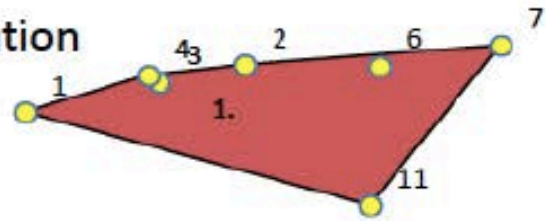
Changes made to the CNQ-YP



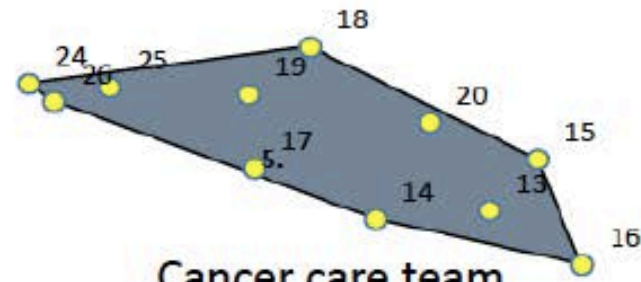
- 25 items removed; 18 added; 22 revised
- Reframed item wording to ask about help “wanted” rather than help “needed”
- Anchored all items to current needs and eliminated redundant content stemming from the original CNQ-YP’s multiple periods of reference
- Collapsed CNQ-YP’s response scale from 5 options to 3 and added a “not sure” option
- Revised sequencing based on “follow up domains”



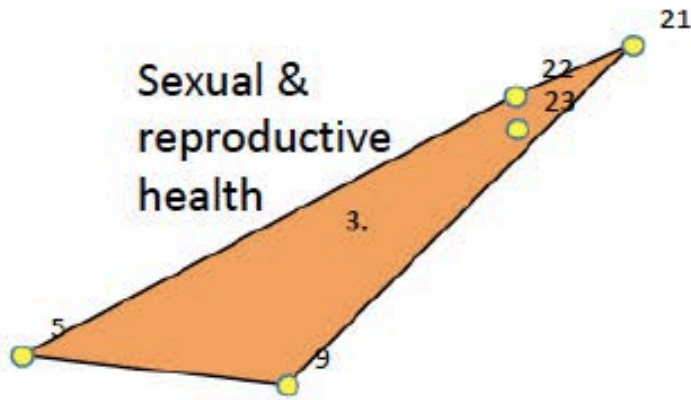
Information



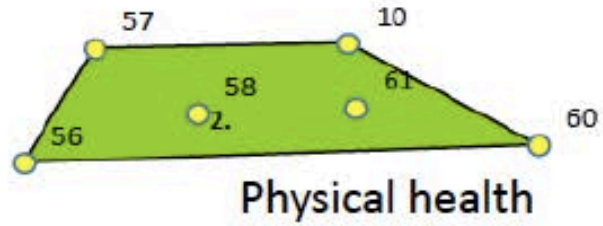
Cancer care team



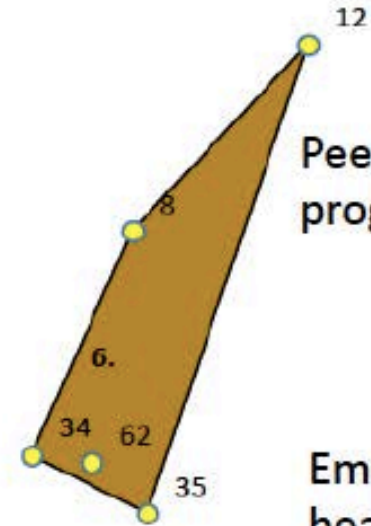
Sexual & reproductive health



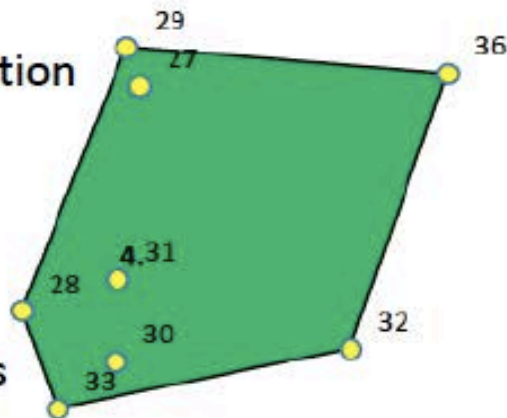
Physical health



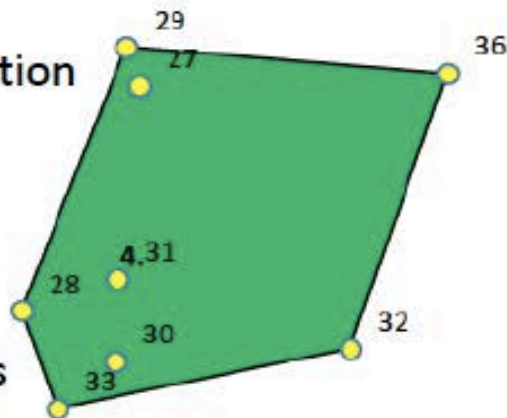
Peer support & programming



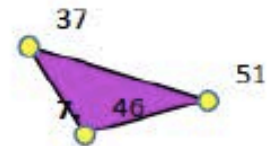
Work & education



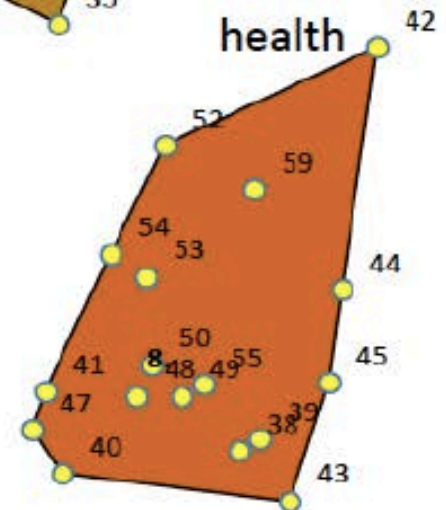
Finances and everyday needs

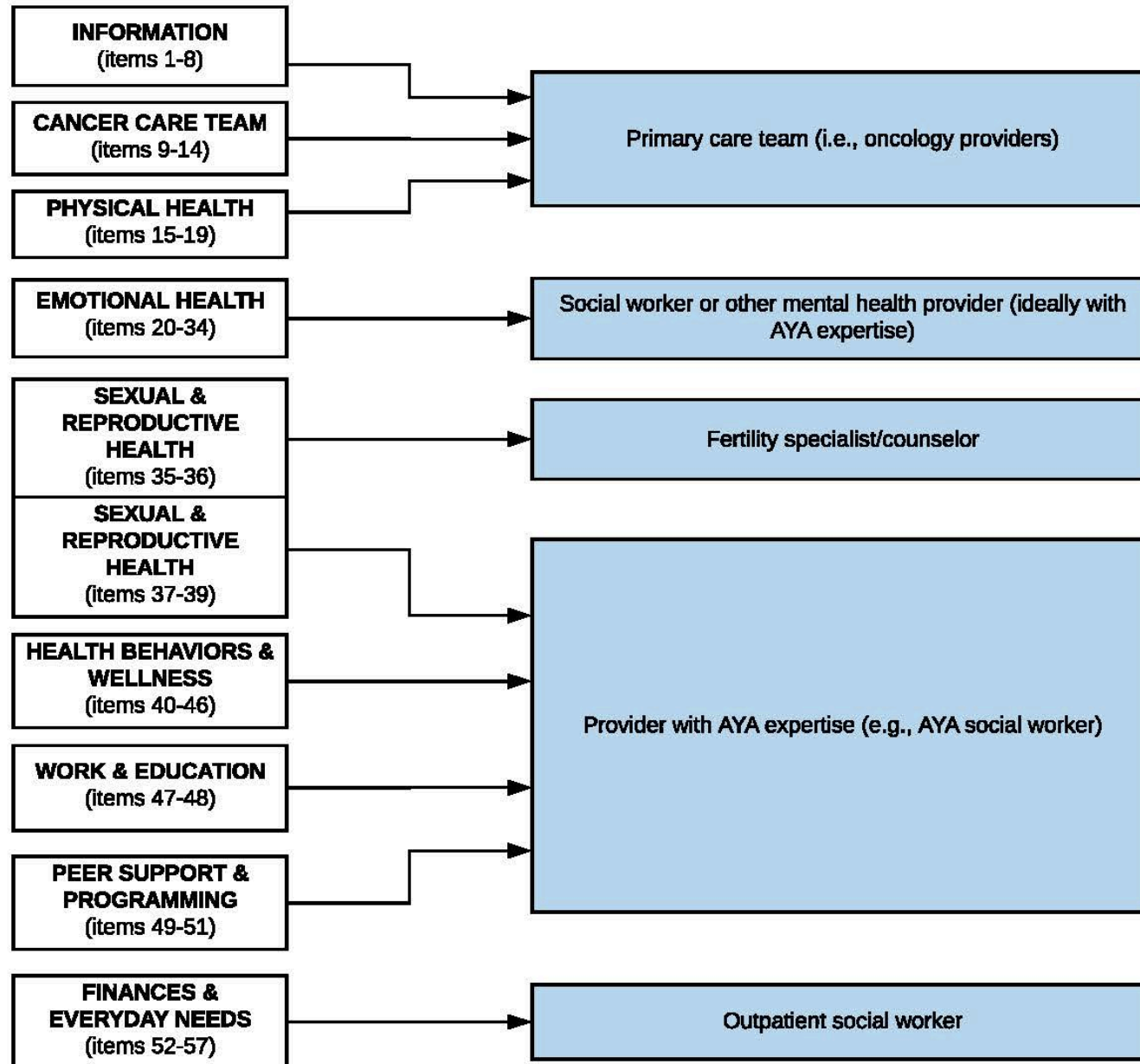


Health behaviors & wellness



Emotional health





1. INFORMATION

I want more information about:		Agree	Somewhat agree	I have enough information about this concern	Not sure
1	My cancer diagnosis				
2	The short-term side effects of treatment				
3	The long-term side effects of treatment				
4	What will happen when treatment finishes				
5	My disease status				
6	My test results				
7	What to do if I have side effects from my treatment				
8	How my genetics may or may not have impacted my diagnosis and treatment				

2. CANCER CARE TEAM

I want my cancer care team to do a better job of:		Agree	Somewhat agree	My cancer care team is doing this already	Not sure
9	Respecting me as an individual, not just a cancer patient				
10	Offering to talk to me in private, without my family or friends				
11	Explaining what they were doing in a way I can understand				
12	Encouraging me to ask questions				
13	Engaging me in decision-making about my treatment and respecting my decisions				
14	Asking me about my treatment concerns				

3. PHYSICAL HEALTH

I want more help with:		Agree	Somewhat agree	I have enough help with this concern	Not sure
15	Managing pain				
16	Managing my medications				
17	Managing physical side effects of treatment				
18	Managing feeling tired/ fatigued				
19	Managing loss of walking ability				

Context

(the fabric)

Identifying contextual factors



Domain	Example Questions (for providers/staff)
User group characteristics	<ul style="list-style-type: none">• What is your role in caring for AYAs with cancer?• What experience do you have with cancer needs assessment tools or asking AYAs about their needs?
User tasks	<ul style="list-style-type: none">• Given your current task load, would you be able to administer a needs assessment to all AYAs?<ul style="list-style-type: none">• When? As part of which task?
Technical & physical environment	<ul style="list-style-type: none">• Where do you currently record information about needs expressed by AYAs? (In the electronic health record? Is it easy to find?)
Organizational environment	<ul style="list-style-type: none">• Does your institution support the establishment of systems or processes specifically for AYAs?• How do you communicate with other providers in your institution?

Contextual factors → usability requirements



Ethnography finding	Requirement for AYA NA-SB
AYAs are tech-savvy and use a broad range of technologies to manage their cancer	Electronic delivery of AYA NA-SB should be considered.
AYAs' appointments are long and exhausting; there are multiple periods of "deadtime" when they are waiting	If delivered in person, AYA NA-SB should be delivered to AYAs during appointment "deadtime".
When diagnosed, AYAs are often in shock and in high distress, and may not know what their needs are yet	AYA NA-SB should not be administered immediately upon diagnosis.
Providers use the EMR to document and communicate about AYAs' needs.	In the future, AYA NA-SB should interface with EMR.

Usability requirements → context modifications



AYA r


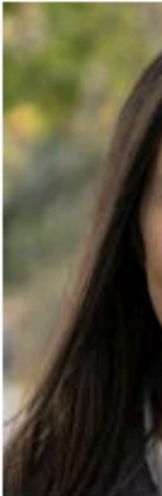
From who

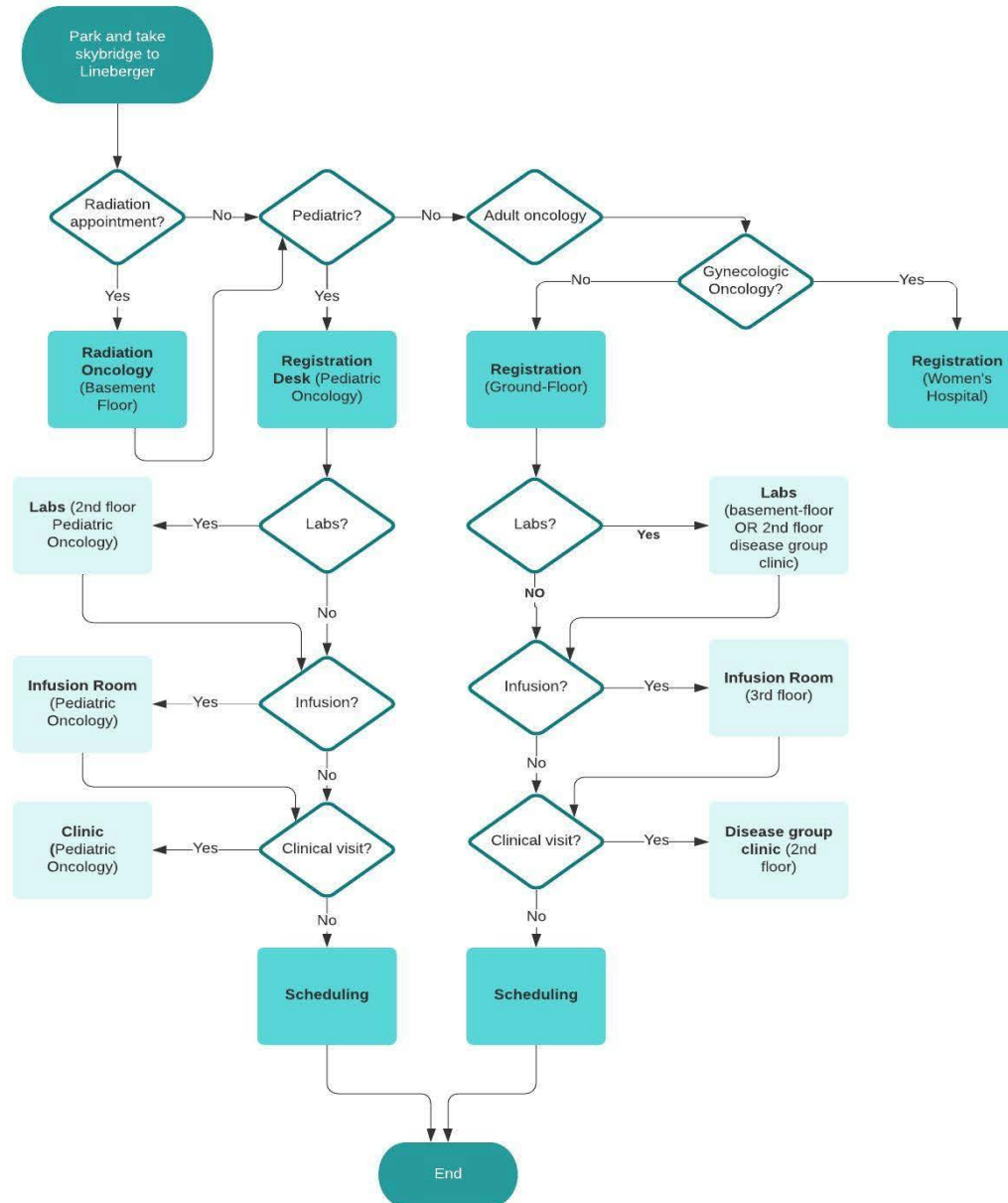
Where:

When:

How often

How (in w



schedule with some
 vision until
 (i.e., frequent inpatient

via
 nic)
 (oral chemotherapy)
 ent every 3 months

Changes made to context

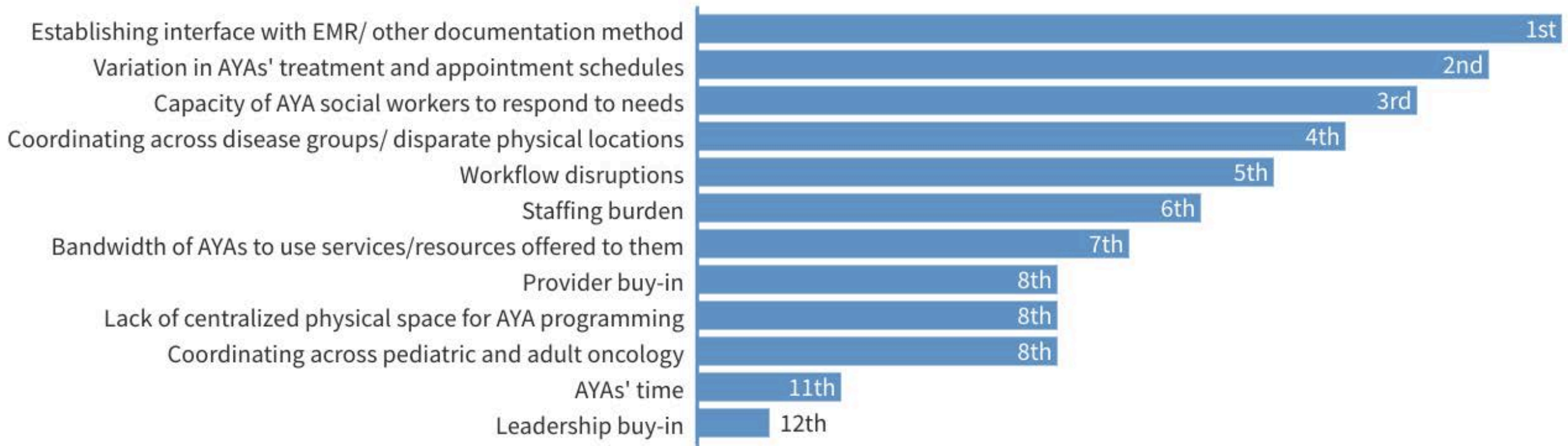
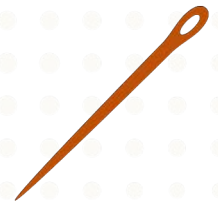


- Workflow
 - AYA nurse practitioner to introduce NA-SB during initial consultation
 - AYA social worker to review NA-SB with AYA during subsequent follow-up visit and initiate referral pathways
 - AYA program director to provide administrative support
- Communication/ documentation
 - AYA to receive link to NA-SB via patient portal message prior to visit with social worker
 - AYA social worker to record initiated referral pathways in EHR note (initially)
- Technology
 - NA-SB to be administered via REDCap (initially), requiring provider interface with REDCap

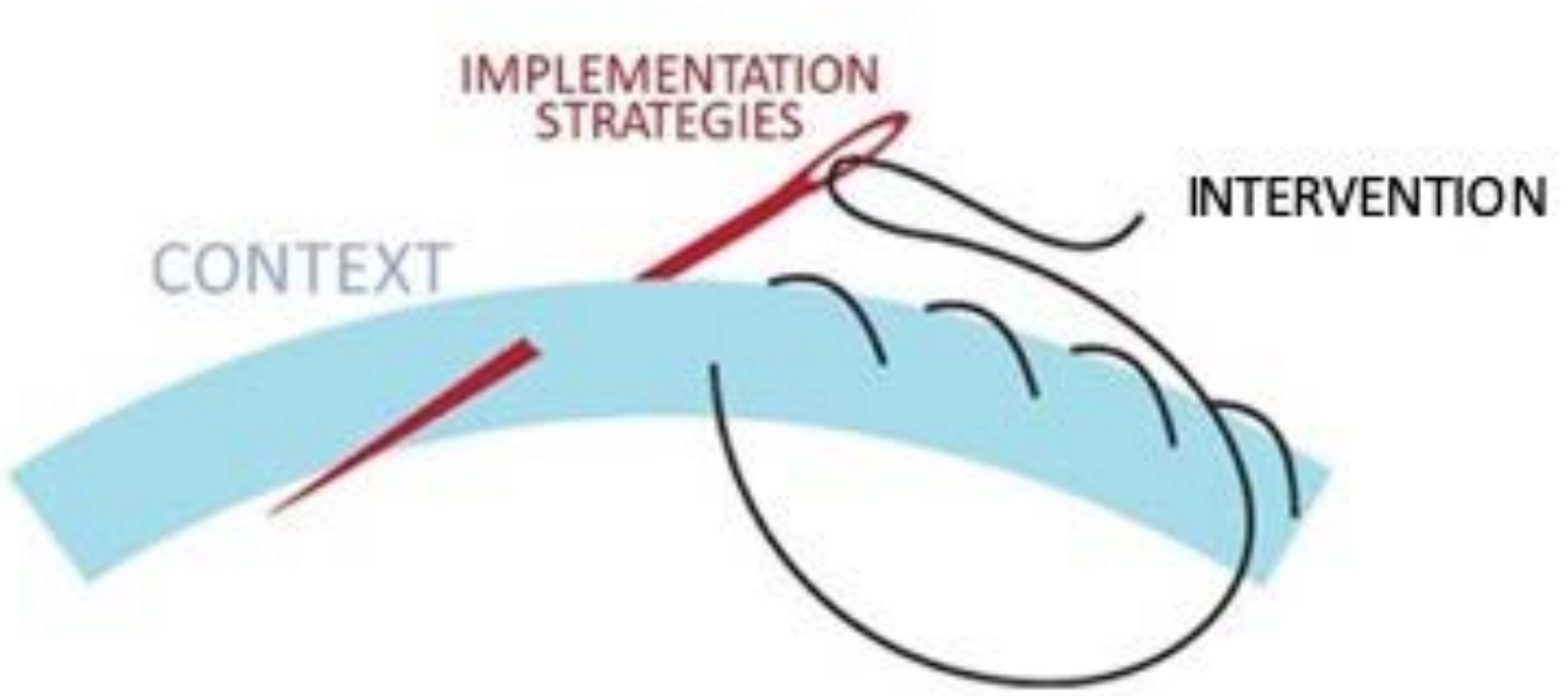
Implementation strategies

(the needle)

Anticipating implementation strategies



Discussion



Usability testing

Benefits	Challenges
<ul style="list-style-type: none">• Identifies usability and usefulness issues with intervention at any point in development• Provides valuable source data for design team prototyping workshops	<ul style="list-style-type: none">• Making decisions about who counts as a user and which individuals represent users more broadly
<ul style="list-style-type: none">• Can be done with small number of participants	<ul style="list-style-type: none">• Prioritizing divergent feedback from different user groups• Requires multiple iterations to use it effectively

Ethnographic contextual inquiry

Benefits	Challenges
<ul style="list-style-type: none">• Elicits in-depth data on users, their tasks, and their context	<ul style="list-style-type: none">• Can be time intensive
<ul style="list-style-type: none">• Particularly helpful for understanding the multilevel, non-rational, or difficult-to-quantify contextual processes influencing implementation and sustainment	<ul style="list-style-type: none">• Large amounts of data generated can be cumbersome to analyze and interpret• Requires the researcher to be nimble as they move through the participant's context without being overly intrusive
<ul style="list-style-type: none">• Sheds light on the differences between what people say and what people do• Provides valuable source data for design team prototyping workshops	<ul style="list-style-type: none">• Participants must be sampled carefully so as not to sacrifice all breadth of information for depth• Can position the researcher in difficult or emotionally charged situations, bringing us face-to-face with the hardships faced by the populations we study

Design team prototyping workshops

Benefits	Challenges
<ul style="list-style-type: none">• Engages users in analysis to promote a shared understanding of context	<ul style="list-style-type: none">• Presenting project data in a way that is digestible to design team members
<ul style="list-style-type: none">• Provides platform and methods (e.g., translation tables, storyboards, personas, scenario of use) for translating contextual data into intervention adaptations, context modifications, and implementation strategies.	<ul style="list-style-type: none">• Weighing the importance of user feedback with the feasibility of design solutions
<ul style="list-style-type: none">• Builds buy-in among prospective users	<ul style="list-style-type: none">• Inexpert application of UCD methods may lead to ‘feature creep,’ in which new ideas are incorporated into the intervention without careful consideration and evaluation of the effects of the added features

Next steps

- NA-SB
 - Pilot underway
 - Additional refinement
 - Scaling up to diverse health systems
- User-centered design in implementation science
- Ethnography to study implementation context

Questions?

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