Dissemination and Implementation (D&I) Science: Context, Health Equity, Adaptations and Their Implications and Opportunities for C3I

Russell E. Glasgow, PhD

Department of Family Medicine, University of Colorado School of Medicine

VA Eastern Colorado QUERI and Geriatric Research Centers, and Adaptation, Fidelity and Tailoring Interest Group

Dissemination and Implementation Science Program of Adult and Child Consortium for Outcomes Research and Delivery Science

ACKNOWLEDGMENTS AND CONFLICTS OF INTEREST

ACKNOWLEDGMENTS

- David Chambers, Ross Brownson, Gila Neta, Borsika Rabin
- University of Colorado SOM - ACCORDS D&I Science Program
- RE-AIM Colleagues

FINANCIAL DISCLOSURE

National Institutes of Health (NIH), Agency for Healthcare Research and Quality (AHRQ), and Robert Wood Johnson Foundation (RWJF) funding on various projects

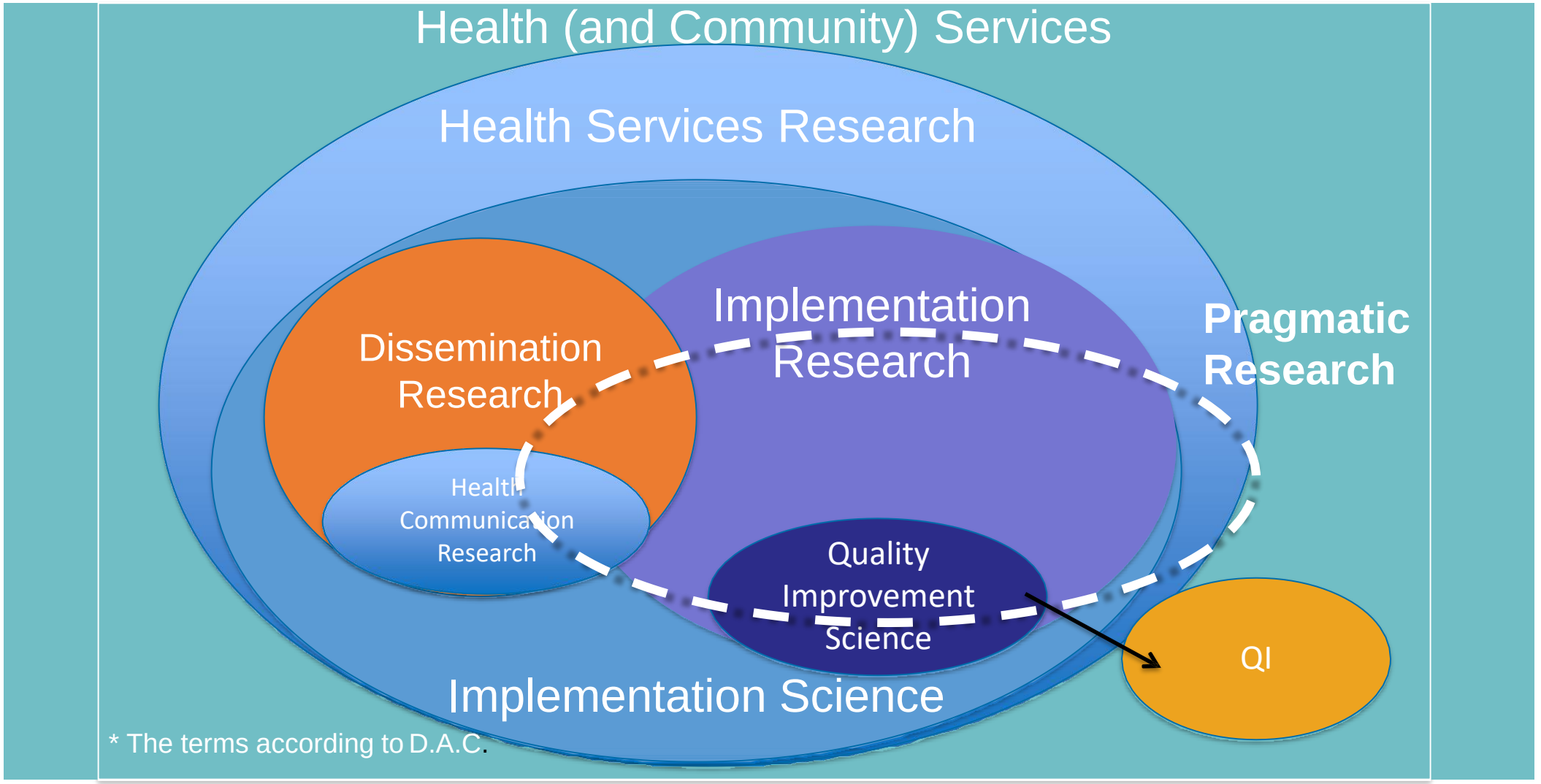
COMPETENCE DISCLOSURE

Knowledge of tobacco use and cessation literature 15- 20 years out of date

LEARNING AND COLLABORATION OBJECTIVES

1) Discuss key and emerging areas in D&I science, with relevance to tobacco cessation
2) Discuss how to evaluate implementation and dissemination in smoking
3) Describe scale-up and scale-out and ways to 'Design for dissemination'
4) Describe new NCI Implementation Science Cancer Centers (ISC3), related Consortium and opportunities for collaboration
5) Sufficient time for Q and A

A BIG TENT OF TERMS (AND OVALS)*



Adapted from Mitchell S, Chambers, D. https://doi.org/10.1200/JOP. 2017.024729;

KEY CHARACTERISTICS OF D&I SCIENCE

Point #	Characteristic	Implication
SYSTEMS PERSPECTIVE		
1	Context is critical	Research should focus on and describe context
2	Multilevel complexity	Most problems and interventions are multilevel and complex
3	Focus on systems characteristics	More emphasis needed on interrelationships among system elements and systems rules
ROBUST, PRACTICAL GOALS		
4	Representativeness and reach	Focus on reaching broader segments of population and those most in need
5	Generalizability	Study generalization (or lack of such) across settings, subgroups, staff, and conditions
6	Pragmatic and practical	Producing answers to specific questions relevant to stakeholders
7	Scalability and sustainability	From outset, greater focus on scale-up potential and likelihood of sustainability

KEY CHARACTERISTICS OF D&I SCIENCE (CONT'D)

Point #	Characteristic	Implication
RESEARCH METHODS TO ENHANCE RELEVANCE		
8	Rigorous	Identify and address plausible threats to validity in context of questions. Greater focus on replication.
9	Rapid	Approaches that produce faster answers
10	Adaptive	Best solutions usually evolve over time, as a result of informed hypotheses and mini-tests with feedback
11	Integration of methods; triangulation	For greater understanding, integrated Quantitative and Qualitative methods are often required
12	Relevance	Relevance to stakeholders should be top priority
FLEXIBILITY		
13	Multiplicity	Encourage and support diverse approaches with the above characteristics (all models are wrong)
14	Respect for diverse approaches; humility	Different perspectives, goals, methods and approaches are needed. Continuing the same existing approaches will produce the same unsatisfactory results.

TOO OFTEN, WE HAVE ASSUMED, "IF YOU BUILD IT…"

AN EVIDENCE-BASED SMOKING CESSATION INTERVENTION (OR PREVENTION, OR DEPRESSION TX) STORY

Even if 100% effective...is only so good as how and whether:

- it is adopted widely and in low resource settings
- Practitioners/delivery staff choose to deliver it
- trained staff deliver it well
- eligible populations, including those at highest risk receive it
- it can be sustained

If we assume 50% threshold for each step…
(even with perfect access/adherence/dosage/maintenance)

Impact: .5x .5x .5x .5 x.5 = 3% overall benefit

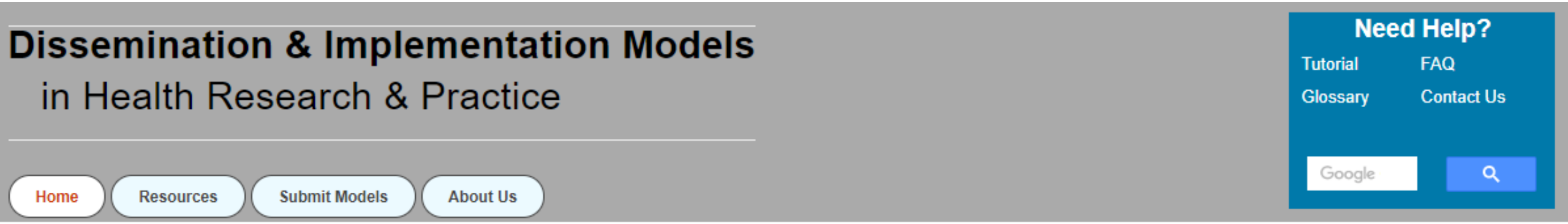
www.re-aim.org Glasgow RE, Vogt TM, Boles SM. *Am J Public Health.* 1999;89(9):1322.
Glasgow RE, et al. *Frontiers Public Health* 2019 7:64. doi: 10.3389/fpubh.2019.00064

D&I THEORIES + FRAMEWORKS ARE AVAILABLE!

- Summarized in Tabak, et al., proliferation of models: 61 reviewed then, now more than 159*! (***many similarities***)
  - 87% used in only 5 or fewer of 596 studies
  - **Context** is critical
  - Focus on external validity
  - Begin with **stakeholders**—take their perspective(s)
  - Find balance between fidelity to EB program and **adaptation** to local setting
  - Unlikely you need to create a new model

Tabak RG, et al. Bridging research and practice. *Am J Prev Med.* Sep 2012;43(3):337-350
*Strifler L et al. *J Clin Epi* (2018) Vol. 100; 92-102

https://www.dissemination-implementation.org



This interactive webtool is designed to help researchers and practitioners (1) develop a 'logic model' or diagram for their research or practice question; (2) select the dissemination and implementation (D&I) Model(s) that best fit(s) their research question or practice problem; (3) combine multiple D&I Models; (4) adapt the D&I model(s) to the study or practice context; (5) use the D&I Model(s) throughout the research or practice process - not just on the aims page; and (6) find existing measures to assess the key constructs of the D&I Model(s) selected.

A few key tips to help you navigate the site:

- In this webtool, the term 'Models' is used to refer to both theories and frameworks that enhance dissemination and implementation of evidence-based interventions.
- We STRONGLY recommend that you begin with either the TUTORIAL or the PLAN section.

Plan | **Select** | **Combine** | **Adapt** | **Use** | **Measure**

“D&I theories are kind of like toothbrushes: Everybody has one and no one wants to use somebody else’s”

Cara Lewis via Anne Sales via ????

Health Equity....need your feedback on most relevant Smoking Cessation equity issues

- Considering context
- Planning programs for dissemination
- Adaptations – cultural and local
- Representativeness and transparent reporting
- Impact of social determinants of health
- Your feedback and opportunities for D&I research

RE-AIM—HEALTH EQUITY IMPLICATIONS

RE-AIM Issue	Disparity	Overall Impact
Reach	30%	70% benefit
Effectiveness	0 (equal)	70% benefit
Adoption	30%	49% benefit
Implementation	30%	34% benefit
Maintenance	30%	24% benefit

Context Issues from a D&I Perspective

- **People exist in the context of culture and places in which they work, live, study and play** *(Take home point #1)*
- Context is multi-level and dynamic
- Adapting for context
- Challenges of studying and understanding context:
  - So many factors…which are most important for which issues, for which settings, for which populations?
  - Need for brief, validated and pragmatic measures

Changing Outer Context
PRISM External Environment (e.g., policy, guidelines, incentives)

FIT among:

- Intervention
- Implementation strategy
- Context

- ----------
- You can't have it all- interactions

Crosscutting issues

- Proportion who benefit
- Representativeness of who benefits
- Reasons: how and why they benefit

- Adaptations made
- Costs incurred

Changing Internal Context
PRISM factors of
- Organizational & Patient Characteristics
- Organizational & Patient Perspectives (values)
- Implementation & Sustainability Infrastructure

Kaiser Permanente Research

Evaluating complex interventions: Confronting and guiding (vs. ignoring and suppressing) heterogeneity and adaptation

October 9, 2018

Brian S. Mittman, PhD

Department of Research and Evaluation, Kaiser Permanente Southern California

Quality Enhancement Research Initiative (QUERI), U.S. Department of Veterans Affairs

Clinical and Translational Science Institute, University of California at Los Angeles

PCORI METHODOLOGY GUIDELINE SCI-3:
SPECIFY HOW ADAPTATIONS TO THE FORM OF THE INTERVENTION AND COMPARATOR WILL BE ALLOWED AND RECORDED

- Researchers should specify:
  - **allowable adaptations** in form and/or function
  - a description of how planned and unplanned **adaptations will be managed**, measured and reported over time
- Any **planned adaptations** should:
  - have a clear rationale
  - ideally be supported by theory, evidence or experience
  - maintain fidelity to the core functions of the intervention
- Upon study conclusion, researchers should provide guidance on:
  - **allowable adaptations, or**
  - **unproductive adaptations**

TYPES OF ADAPTATIONS - CULTURAL, RESOURCES, LOCAL

Focus of Adaptation	Timing of Adaptation (point in the study)		
	Planning	During	Dissemination
Intervention			
Implementation Strategy			
Setting			

EQUITY ISSUES IN EVIDENCE-BASED RESEARCH: *EVIDENCE ON WHAT?* *(TAKE HOME #2)*

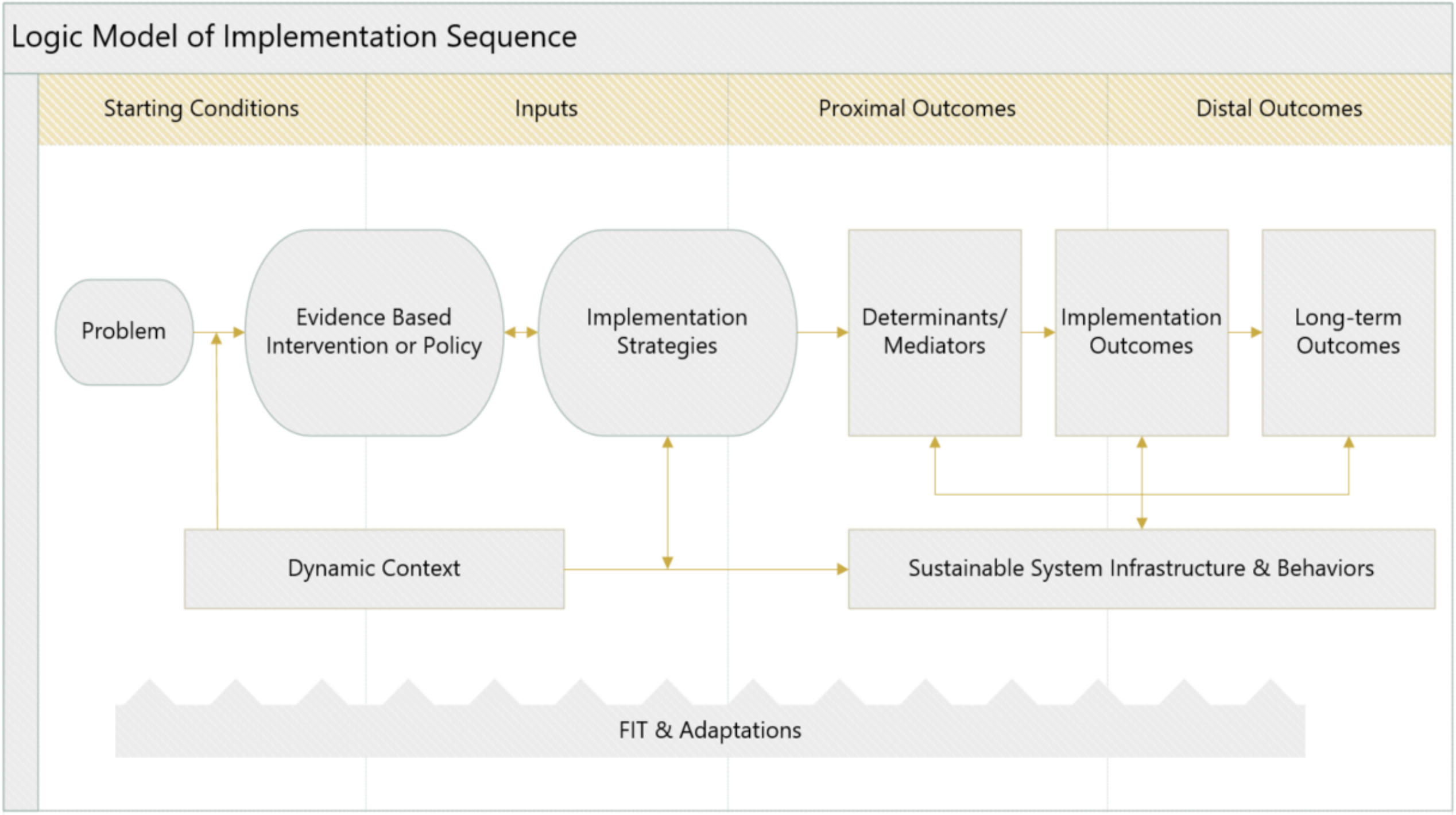
External Validity/Pragmatic Criteria, Often Ignored

- Participant representativeness
- Setting and staff representativeness
- Multi-level context
- Adaptation/change in intervention and implementation strategies
- What outcomes and over what time period
- Reasons for participation and drop out

TYPES OF OUTCOMES IN IMPLEMENTATION RESEARCH (PROCTOR, ET AL., 2011)

Implementation Outcomes	Service Outcomes	Client Outcomes
Acceptability	Efficiency Safety	Satisfaction
Adoption	Effectiveness	Function
Appropriateness	Equity	Symptoms
Costs	Patient-centeredness	(Smoking Cessation)
Feasibility	Timeliness	(Quality of Life)
Penetration		(Long term reductions morbidity and mortality)
Sustainability		

Proctor E, Silmere H, Hensley M, et al. Outcomes for implementation research: *Administration and Policy in Mental Health* [serial online]. March 2011;38(2):65-76.


Logic Model of Implementation Sequence
Starting Conditions
Inputs
Proximal Outcomes
Distal Outcomes
Problem
Evidence Based Intervention or Policy
Implementation Strategies
Determinants/ Mediators
Implementation Outcomes
Long-term Outcomes
Dynamic Context
Sustainable System Infrastructure & Behaviors
FIT & Adaptations

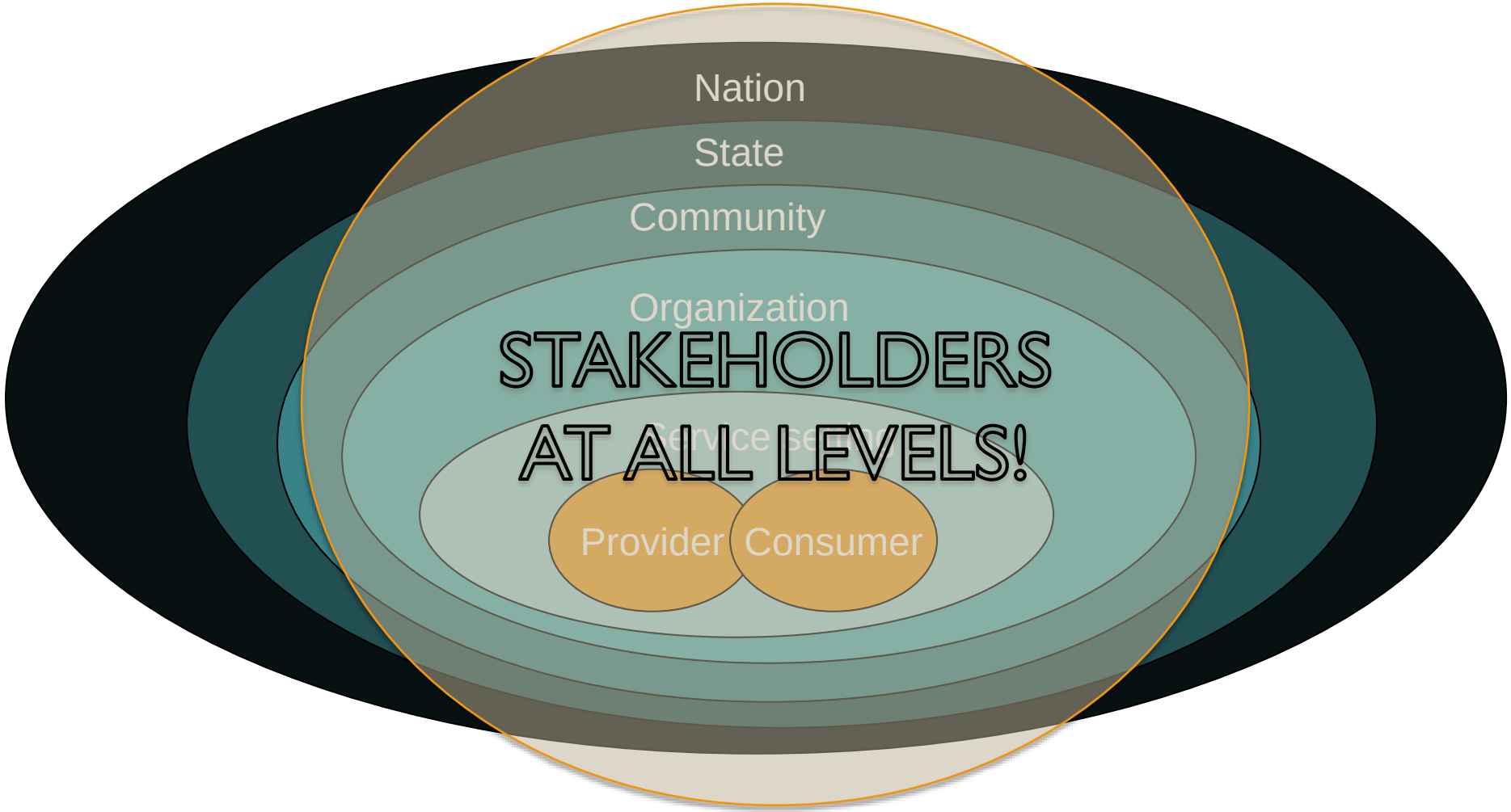
EVALUATION AND REPORTING IN D&I RESEARCH

- Context and Representativeness (Expanded CONSORT)*
- Implementation- including fidelity, adaptation, and variability
- Costs- stakeholder perspective, replication costs, feasibility
- Standards for Reporting Implementation Studies (StaRI)**

*Glasgow, R, et al. *Amer J Prev Med*, 2018. DOI: https://doi.org/10.1016/j.amepre.2018.04.044

**Pinnock H, et al. StaRI reporting standards. *BMJ* 2017;356:i6795 http://dx.doi.org/10.1136/bmj.i6795

DISSEMINATION: SCALE-UP AND SCALE-OUT
CONTEXT DEPENDENT & MULTI-LEVEL FACTORS



…As you scale up decision-making from practice to program to policy, does evidence exist to guide implementation?

DISSEMINATION: WHAT WE KNOW

- Dissemination generally does not occur spontaneously and naturally;
- Passive approaches to dissemination (diffusion) are usually ineffective;
- Single-source prevention messages are generally less
- effective than comprehensive, multi-level approaches;
- Stakeholder involvement in the research or evaluation process is likely to enhance dissemination;
- Theory and frameworks for dissemination are
- beneficial; and
- The process of dissemination needs to be tailored to
- various audiences

Brownson RC, et al. Designing for dissemination among public health researchers..... *Am J Public Health*. 2013;103(9):1693-1699.

DESIGNING FOR DISSEMINATION (D4D): START EARLY!!

- Think about dissemination at the beginning and throughout the project
  - Structures
    - In grant applications, are D4D principles enunciated?
    - Do you have a conceptual model for dissemination?
  - Processes
    - How to engage stakeholders early and often
  - Products
    - How to frame messages, develop brief summaries
  - Systems changes
    - How to shift and fit funder, academic priorities, and incentives

Cohen EL, et al. Designing for dissemination..... *Health Commun.* 2015 ; 30(2): 196–207.

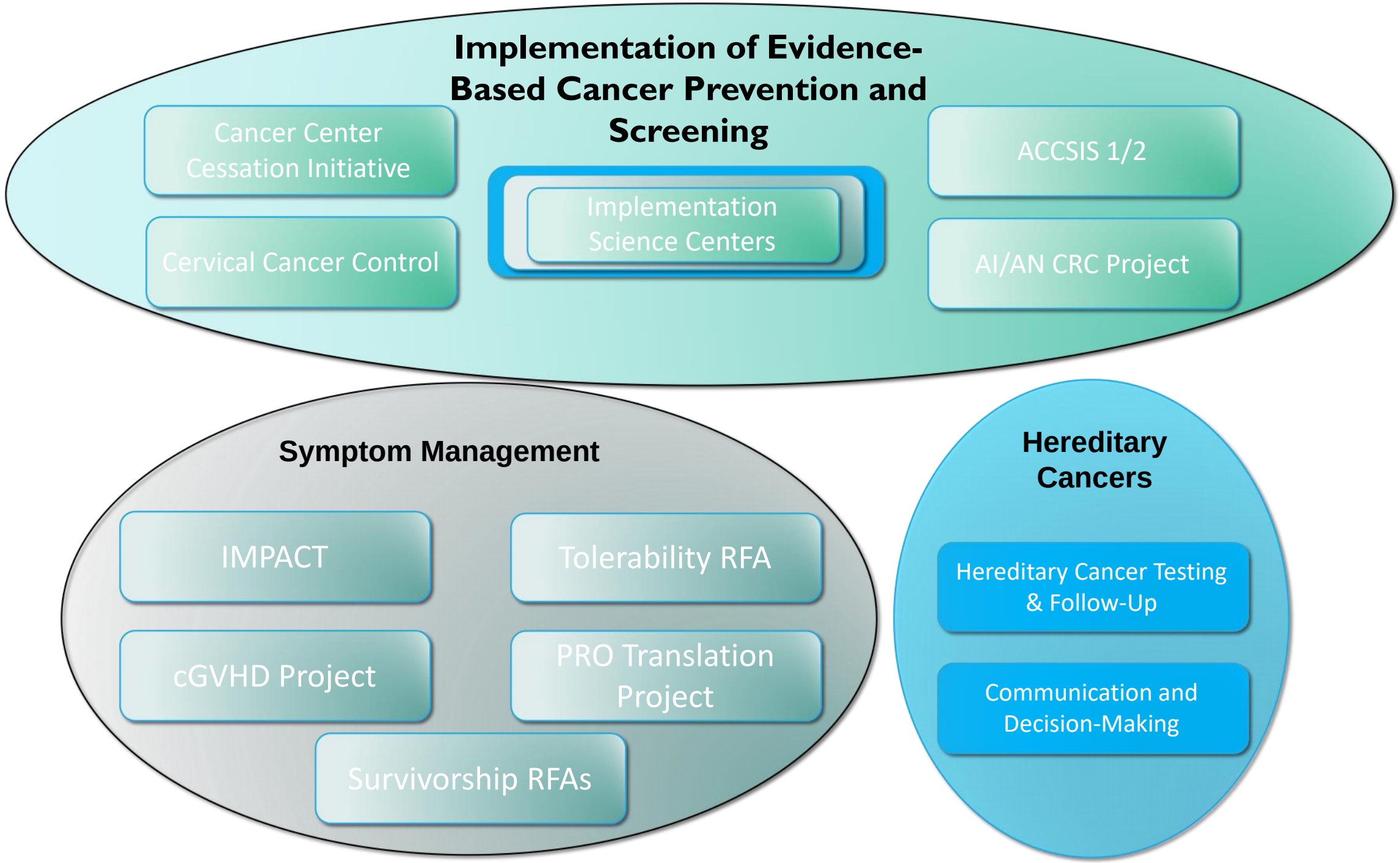
REPLICATION (AND GENERALIZABILITY)

Important to report conditions under which the program was delivered

- To what extent is the program replicable:
  - In similar settings?
  - In different settings?

Bottom Line and **ULTIMATE USE QUESTION**

"What program/policy components are most effective for producing what outcomes for which populations/recipients when implemented by what type of persons using what implementation strategies under what conditions, with how many resources and how/why do these results come about?"


Implementation of Evidence-Based Cancer Prevention and Screening
Cancer Center Cessation Initiative
Cervical Cancer Control
Implementation Science Centers
ACCSIS 1/2
AI/AN CRC Project
Symptom Management
IMPACT
Tolerability RFA
cGVHD Project
PRO Translation Project
Survivorship RFAs
Hereditary Cancers
Hereditary Cancer Testing & Follow-Up
Communication and Decision-Making

Implementation Science Centers in Cancer Control (ISC^3)

The Implementation Science Centers in Cancer Control (ISC^3) Program supports the rapid development, testing, and refinement of innovative approaches to implement a range of evidence-based cancer control interventions. Centers all feature "implementation laboratories" involving clinical and community sites that will engage in implementation research across the cancer control continuum to advance methods in studying implementation and develop and validate reliable measures of key implementation science constructs. These Centers collectively provide leadership for an Implementation Science consortium across this and other Cancer Moonshot^{SM} initiatives.

The Cancer Moonshot^{SM} was designed to accelerate efforts to prevent, diagnose, and treat cancer and achieve 10 years of progress in 5 years.

BLUE RIBBON PANEL RECOMMENDATION G:

Expand use of proven cancer prevention and early detection strategies

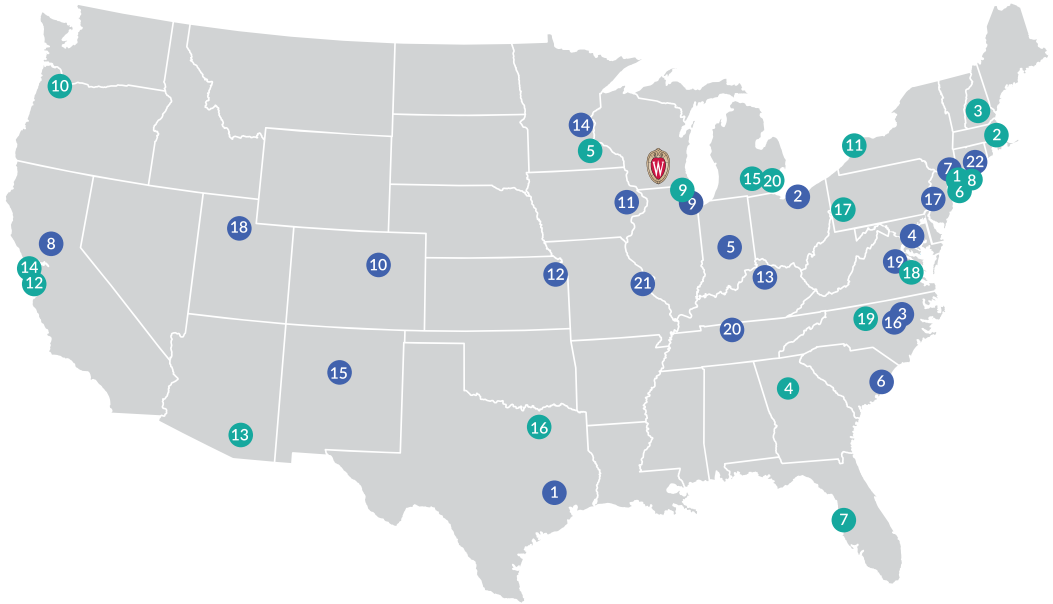
Reduce cancer risk and cancer health disparities through approaches in development, testing and broad adoption of proven prevention strategies.

NCI LEADS: CYNTHIA VINSON, APRIL OH

HTTPS://CANCERCONTROL.CANCER.GOV/IS/INITIATIVES/ISC3.HTML

CANCER CENTER CESSATION INITIATIVE (2017-)

- **NCI Lead:** Stephanie Land
- **Goal:** Administrative supplements to develop tobacco cessation treatment capacity and infrastructure for cancer patients that should lead to the implementation and dissemination of a sustainable tobacco cessation treatment program within the cancer center.
- **Natural laboratory** for understanding implementation of tobacco cessation within cancer center care delivery
- Capturing data on **Implementation strategies** to integrate cessation services
- Coordinating Center: University of Wisconsin Madison (Lead: Michael Fiore)



Cohort 1 (2017-2019)

1. Baylor College of Medicine
2. Case Western Reserve University
3. Duke University
4. Georgetown University
5. Indiana University
6. Medical University of South Carolina
7. New York University
8. University of California Davis
9. University of Chicago
10. University of Colorado
11. University of Iowa
12. University of Kansas
13. University of Kentucky
14. University of Minnesota
15. University of New Mexico
16. University of North Carolina at Chapel Hill
17. University of Pennsylvania
18. University of Utah
19. University of Virginia
20. Vanderbilt University
21. Washington University
22. Yale University

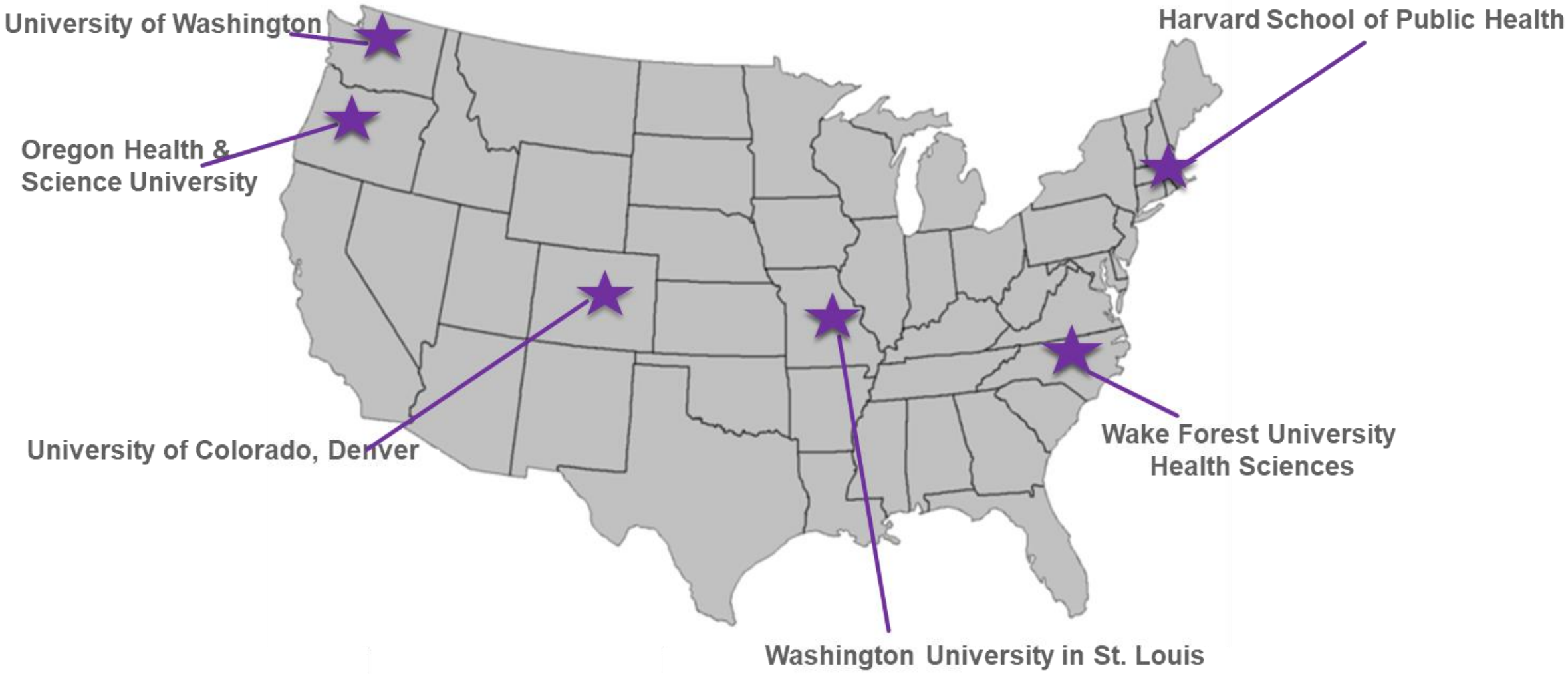
Cohort 2 (2018-2020)

1. Columbia University
2. Dana-Farber/Harvard Cancer Center
3. Dartmouth College
4. Emory University
5. Mayo Clinic
6. Memorial Sloan Kettering
7. Moffitt
8. Mount Sinai
9. Northwestern University
10. Oregon Health and Sciences University
11. Roswell Park
12. Stanford University
13. University of Arizona
14. University of California San Francisco
15. University of Michigan
16. University of Texas Southwestern
17. UPMC Hillman
18. Virginia Commonwealth University
19. Wake Forest University
20. Wayne State University

NIH NATIONAL CANCER INSTITUTE

C3I Coordinating Center
Carbone Cancer Center
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

ISC³ FUNDED SITES



IMPLEMENTATION SCIENCE CENTERS IN CANCER CONTROL (ISC^3)

Center	PI/MPI	Institution
The Implementation Science Center for Cancer Control Equity	Karen Emmons Elsie Taveras	Harvard T.H. Chan School of Public Health
Building Research in Implementation and Dissemination to close Gaps and achieve Equity in Cancer Control (BRIDGE-C2) Center	Jennifer DeVoe	Oregon Health & Science University
Colorado ISC^3	Russell E. Glasgow	University of Colorado School of Medicine
Optimizing Implementation in Cancer Control: OPTICC	Bryan J. Weiner Margaret Hannon Cara C. Lewis	University of Washington
iDAPT: Implementation and Informatics - Developing Adaptable Processes and Technologies for Cancer Control	Kristie Long Foley Thomas Houston Sarah Cutrona	Wake Forest School of Medicine
Washington University Implementation Science Center for Cancer Control (WU-ISCCC)	Ross C. Brownson Graham A. Colditz	Washington University in St. Louis

- **Implementation Science *Consortium* in Cancer** (ISCC; July 10-12, 2019)
  - 107 in-person attendees (72 institutions)
  - 136 online attendees (102 institutions)
- **Goals** identified by participants:
  - Advance implementation science (IS); build capacity; collaboration; articulate and create a vision for IS across Moonshot Initiatives and beyond
- **Future meetings** hosted by Implementation Science Centers:
  - **Wake Forest (Sept 22-23 2020)**; Colorado (June 2021); Seattle (2022)

https://cancercontrol.cancer.gov/IS/initiatives/iscc.html

CONSORTIUM WORKING GROUPS

- 20 projects generated across 7 working groups
- Working groups:
  - Implementation laboratories
  - Rapid cycle designs
  - Economics & costs
  - Technology
  - Equity
  - Policy
  - Precision medicine

ISCC

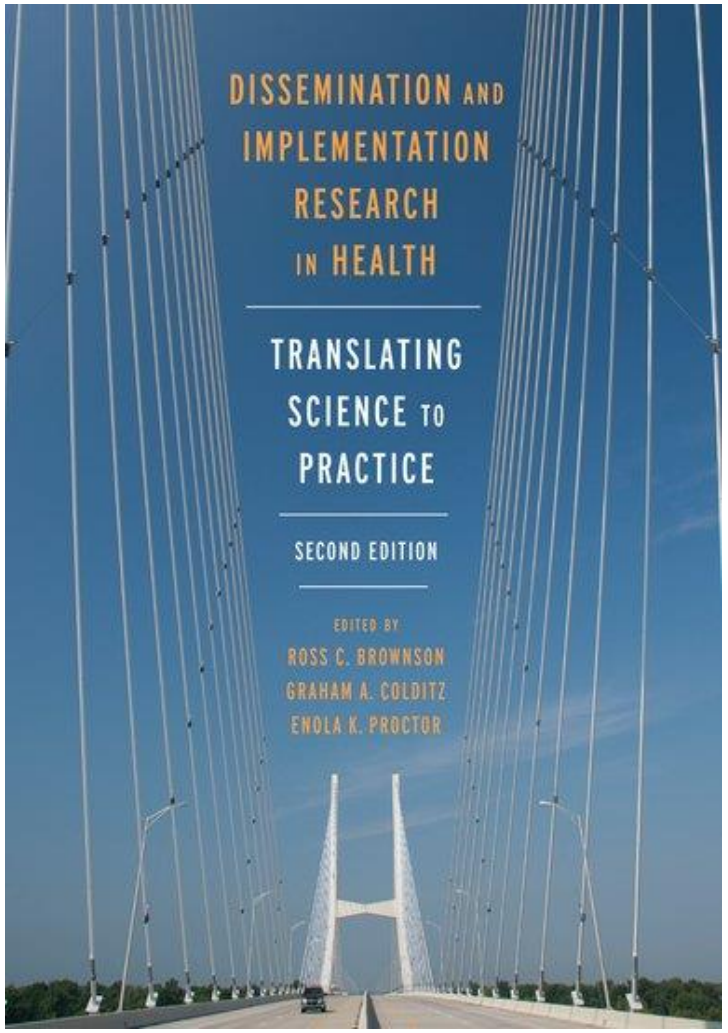
EVERYTHING I KNOW (ABOUT D&I SCIENCE)
(TAKE HOME #3)

Dissemination and Implementation Science is about:

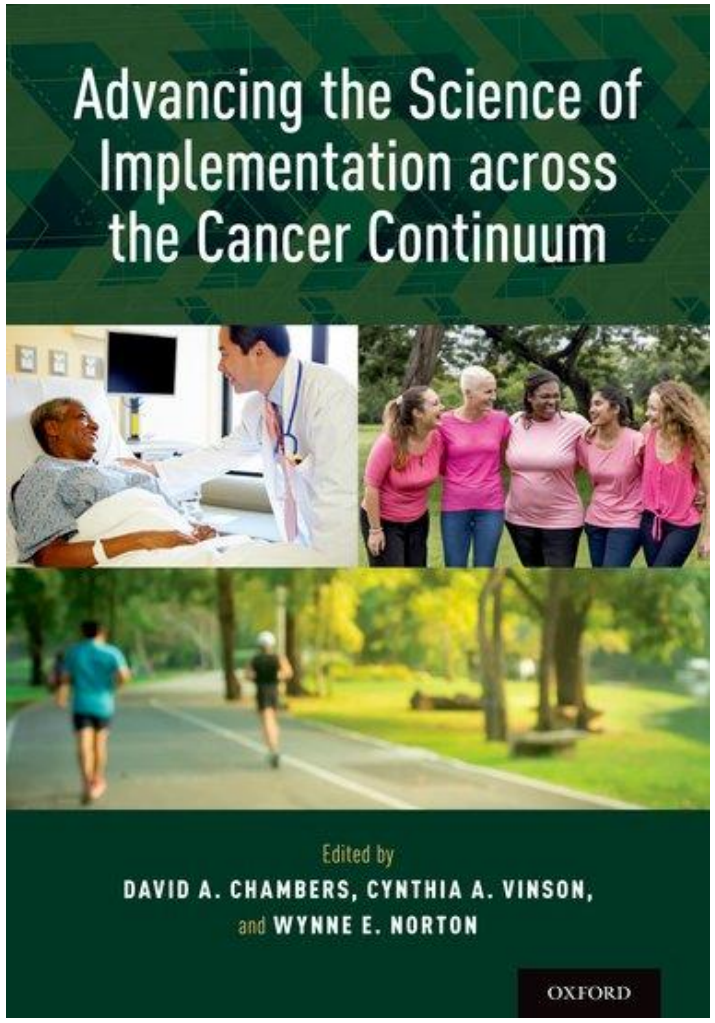
- Multi-level, contextual issues, and external validity
- Relevant, pragmatic models, research methods and measures
- Real world implementation and adaptation (T3 and T4)
- Designing for dissemination, sustainability and equity

(*Normal science (T1– T2) is necessary but not sufficient*)

TEXTBOOKS



OXFORD UNIV. PRESS, 2018



OXFORD UNIV. PRESS, 2019

AND NOBODY CAN USE IT…..

DOES IT STILL MAKE AN IMPACT?

AREAS RIPE FOR EXPLORATION

- *Sustainability* of programs in a changing context
- *Scaling up* practices across different health plans, systems, networks and nations: partnerships
- *De-Implementation*: discontinuing wasteful and harmful practices
- *Adaptation*/evolution of programs over time
- *Adaptive designs* (implementation as an iterative, step-wise approach)
- Integration of D&I and quality improvement

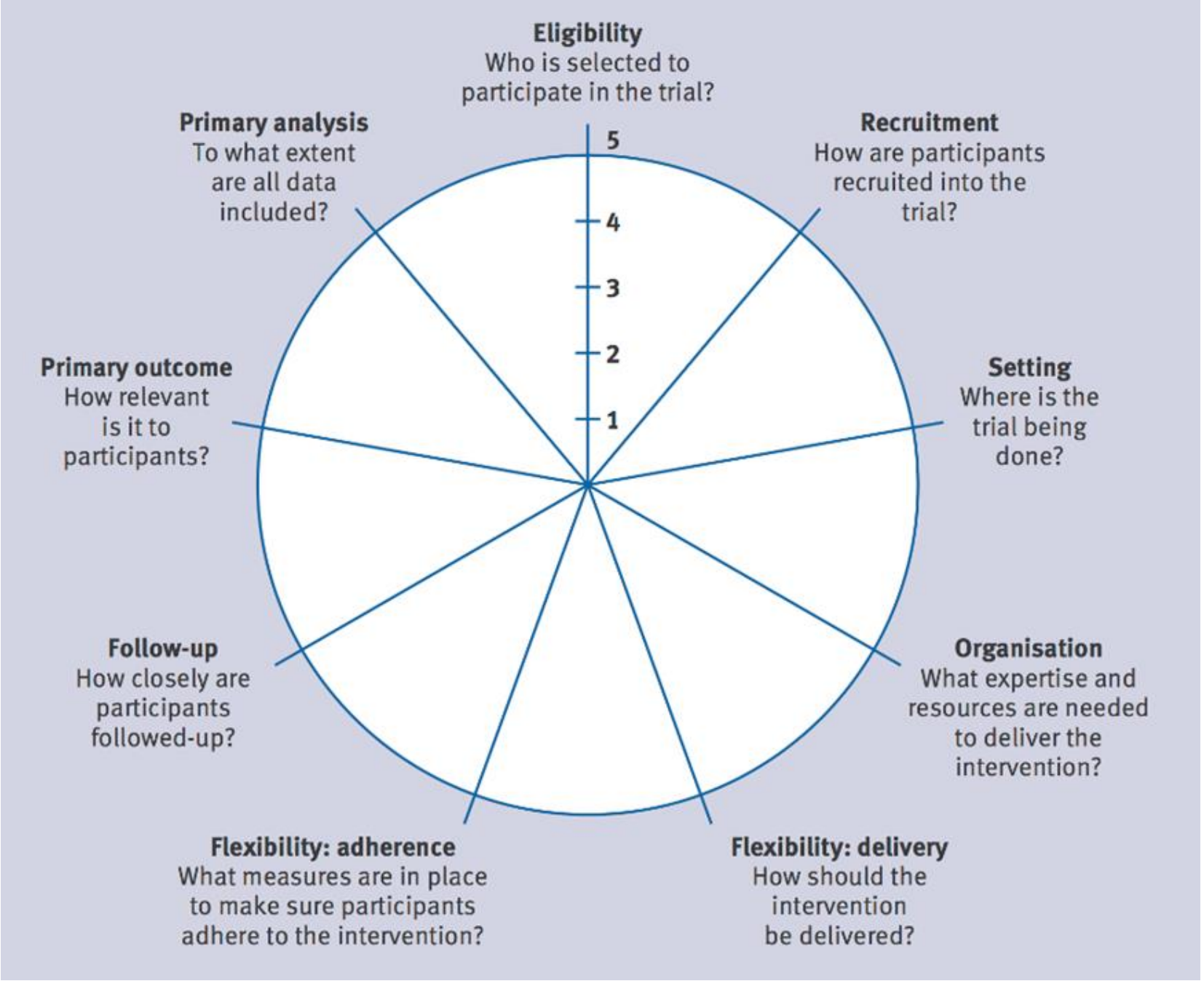
THE 5 RS TO ENHANCE PRAGMATISM, D&I SCIENCE AND LIKELIHOOD OF TRANSLATION

Research that is:

- Relevant
- Rapid and recursive
- Redefines rigor
- Reports resources required
- Replicable

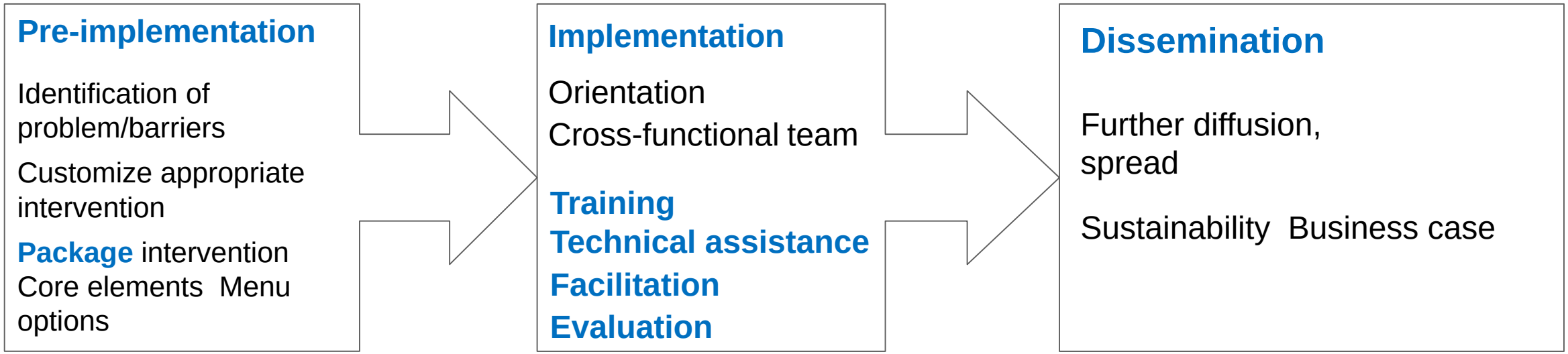
PRECIS-2

PRAGMATIC EXPLANATORY CONTINUUM INDICATOR SUMMARY: A TOOL TO DESIGN PRAGMATIC TRIALS



1 = Very explanatory, 5 = Very pragmatic; Loudon et al., 2015.

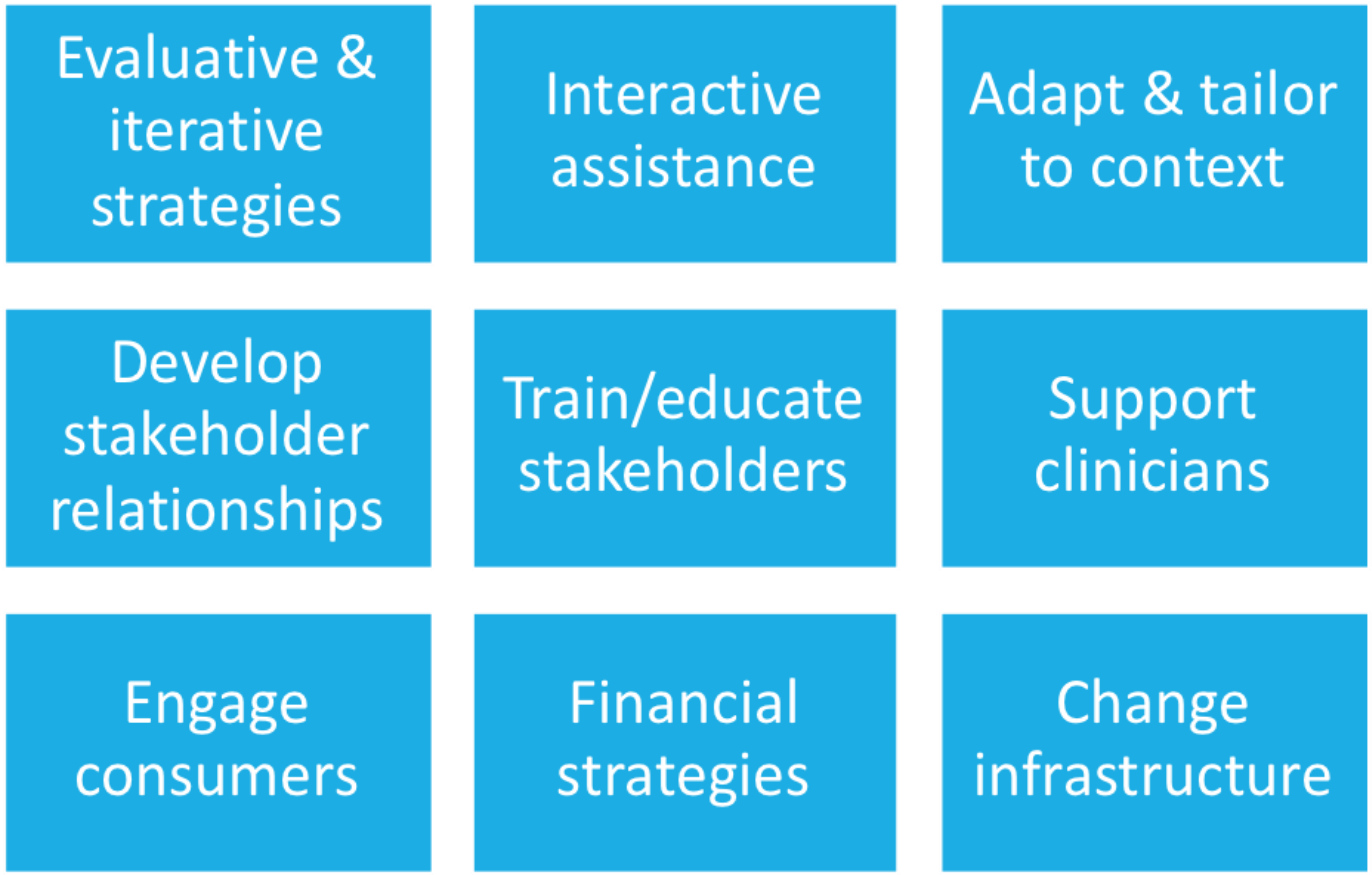
STRATEGY EXAMPLE: ENHANCED REPLICATING EFFECTIVE PROGRAMS (REP) FRAMEWORK



REP was developed by the Centers for Disease Control to rapidly translate HIV prevention programs into community-based settings

Enhanced REP includes additional facilitation based on the PARiHS framework: developing relationships and promoting provider self-efficacy

IMPLEMENTATION STRATEGIES

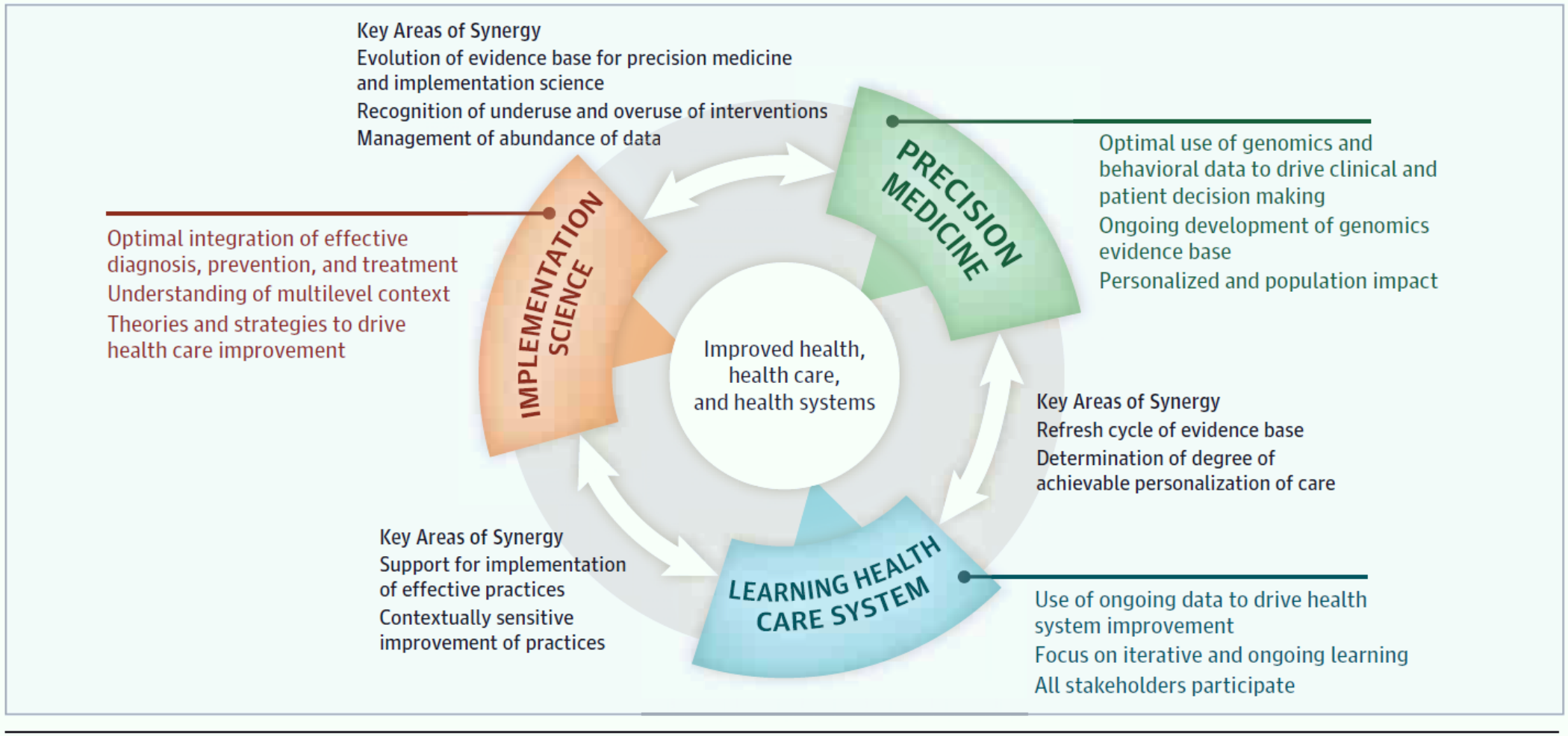


- What barriers are you trying to overcome?
- What resources are you able to leverage?
- Who are your stakeholders?

Powell, et al., 2015.

CONVERGENCE OF PRECISION HEALTH, DIS & LEARNING HEALTH CARE SYSTEMS AND COMMUNITIES

Figure. Contributions of Implementation Science, Learning Health Care System, and Precision Medicine



Chambers DA, Feero WG, Khoury MJ. Conversion of implementation science, precision medicine, and the learning health care system. *JAMA.* 2016, 315: 1941-1942