

An Overview of Dissemination & Implementation Science in Clinical & Translational Research

Bethany M. Kwan, PhD, MSPH
Director of D&I, CCTSI
Investigator & D&I Scientist, Adult & Child Center for Outcomes Research & Delivery
Science (ACCORDS)
Associate Professor, Department of Emergency Medicine, University of Colorado School
of Medicine

August 16, 2023

Presentation at the CCTSI CU-CSU Summit



Dissemination and Implementation (D&I) Science

The study of translating research to practice

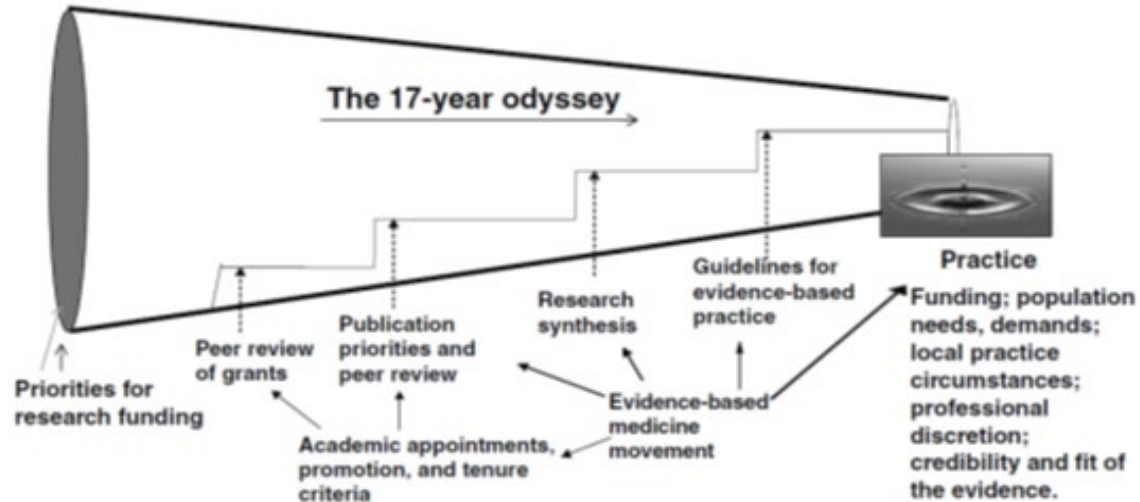


Figure 1

The conceptualization of the production and transfer of knowledge from research to practice and policy usually assumes a pipeline in which the vetting of the research through successive screens assures the quality of the research delivered to practitioners and policy makers, but it does little to assure the relevance and fit of that research to the needs, circumstances, and populations of those practice or policy applications. From Reference 48 with permission.

Green, L. W., Ottoson, J. M., Garcia, C., & Hiatt, R. A. (2009). Diffusion theory and knowledge dissemination, utilization, and integration in public health. *Annual review of public health*, 30, 151-174.

D&I Definitions

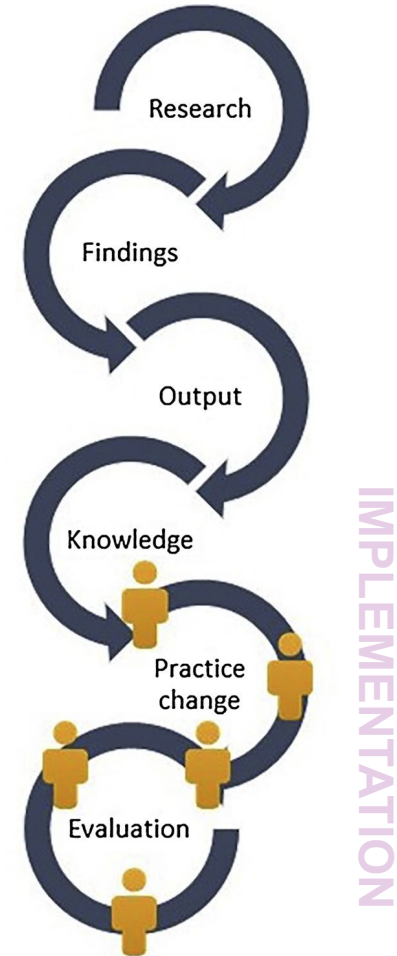
- Evidence-Based Intervention: Interventions with proven efficacy and effectiveness
- Dissemination is an active approach of spreading evidence-based interventions to the target audience via determined channels using planned strategies
- Dissemination research is the systematic study of processes and factors that lead to widespread use of an evidence-based intervention by the target population
- Dissemination strategies describe mechanisms and approaches that are used to communicate and spread information about interventions to targeted users.



Rabin BA, Brownson RC. Terminology for dissemination and implementation research. Dissemination and implementation research in health: Translating science to practice. 2017 Nov 10;2:19-45.

Definitions

- Implementation is the process of putting to use or integrating evidence-based interventions within a setting.
 - Implementation research seeks to understand the processes and factors are associated with successful integration of evidence-based interventions within a particular setting (e.g., worksite, school, clinic).
 - Implementation strategies are the systematic processes or methods, techniques, activities, and resources that support implementation of evidence-based interventions in practice.



T1-T4 Continuum

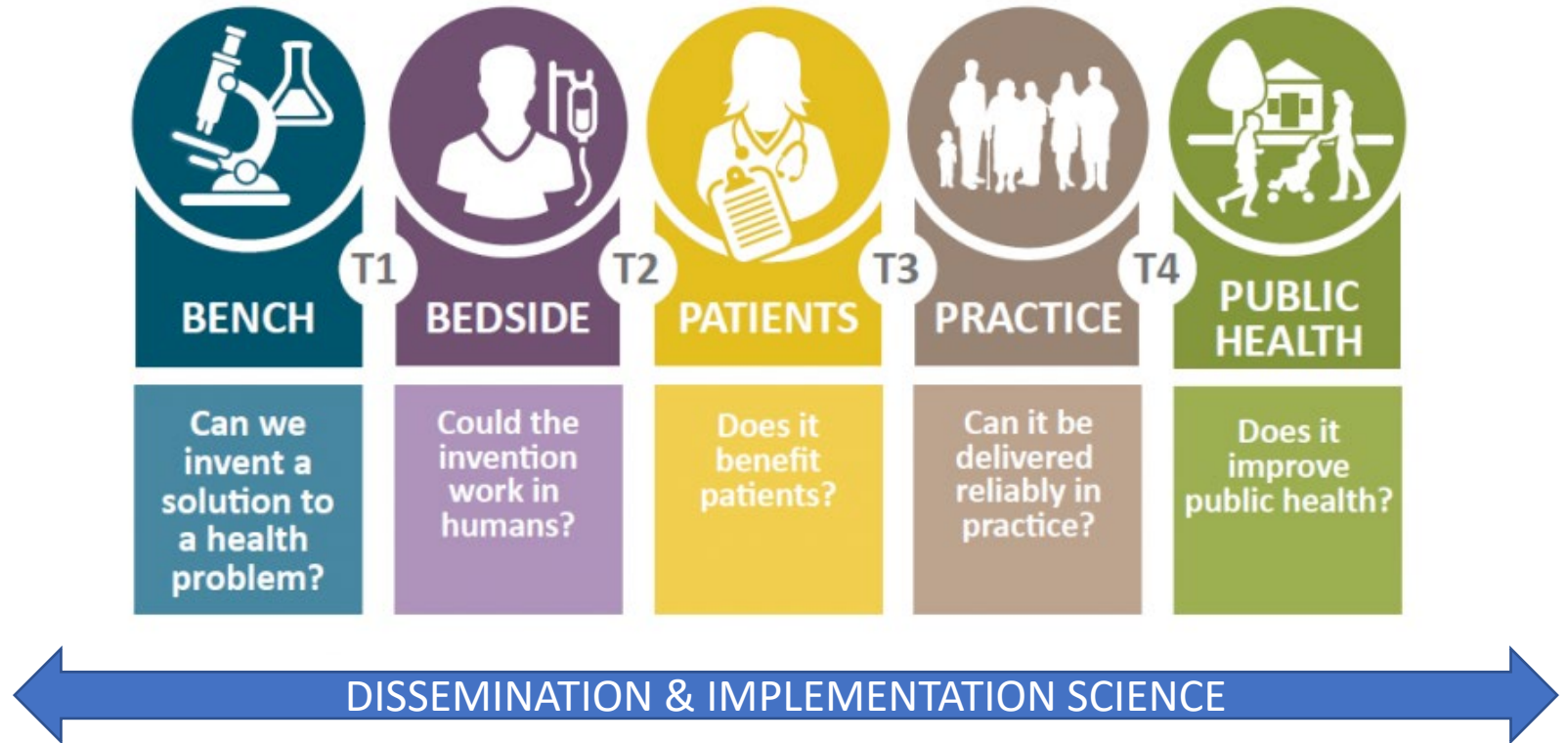


Table 1. Recommendations for effective integration of dissemination and implementation (D&I) sciences in Clinical and Translational Science Award (CTSA) programs

Methods and processes
Develop standard expectations and processes for incorporating D&I ¹ expertise and perspectives in CTSA ² hub leadership and in key initiatives, methods, and processes.
Advance understanding of different models of D&I ¹ cores and other infrastructures for CTSA ² , and methods for collaboration and coordination across centers, including guidance from NCATS ³ for incorporation into renewal proposals.
Increase involvement of D&I ¹ experts on cross-CTSA initiatives and working groups central to methods and processes, including topics from which they have traditionally been excluded, including clinical trial study design and the responsible conduct of research.
Identify methods by which D&I ¹ sciences can enhance sharing of best practices and programs between CTSA ² hubs to promote cross-hub adoption of CTSA ² innovations.
Support and track translation of a broader range of innovations into practice, for example, the spread and use of important innovations with high potential for health impact but low market potential.
Evaluation
Develop a set of D&I ¹ competencies for early-stage translational researchers.
Develop D&I ¹ sciences training curriculum for K-scholars, postdoctoral students in translational sciences, doctoral students, and master's level students.
Identify and catalog novel methods to expand the workforce of D&I ¹ mentors, consultants, and collaborators.
Develop the set of core D&I ¹ competencies to assist partners to engage as scientists, stakeholders, and users of science
Evaluation
Develop novel measures and methods of assessing progress in D&I ¹ advancement and impact within CTSA ² , including assessments of faculty D&I ¹ competency, training opportunities and quality, infrastructural and mentorship capacity, methodological alignment with D&I ¹ principles, and translational success.
Establish NCATS-coordinated effort to recruit and train D&I ¹ experts to evaluate CTSA ² with the use of a standardized rubric and approach and a corresponding expectation that D&I ¹ experts should be systematically incorporated into External Advisory Committees and funding review panels
Identify standards for the evaluation of impact resulting from translation of research into practice.

¹D&I: dissemination and implementation

²CTSA: Clinical and Translational Science Award

³NCATS: National Center for Advancing Translational Sciences

Standards for evaluating impact of translation of research into practice

Mehta, T., Mahoney, J., Leppin, A., Stevens, K., Yousefi-Nooraie, R., Pollock, B., . . . Moore, J. (2021). Integrating dissemination and implementation sciences within Clinical and Translational Science Award programs to advance translational research: Recommendations to national and local leaders. *Journal of Clinical and Translational Science*, 5(1), E151. doi:10.1017/cts.2021.815

Table 2. Dissemination and implementation science principles and example competencies applicable to Clinical and Translational Science training

Principle	Example competencies to maximize design for ultimate translation
Context matters and is multilevel	<ul style="list-style-type: none">• Describe factors that influence research adoption, implementation, maintenance, and reach.• Prioritize questions with high relevance to stakeholders.
It is not sufficient that evidence exists	<ul style="list-style-type: none">• Be familiar with user-centered design; making interventions useful, usable, and desirable (design for dissemination).• Understand the stakeholders that should be engaged.• Understand the value of early engagement of stakeholders.• Understand the relevance of study design and choice of target group to external validity and ultimate translatability.
Change happens proactively	<ul style="list-style-type: none">• Understand the importance of value proposition, designing for dissemination, cost effectiveness, and policy implications.• Understand the value of type 1 hybrid design in all phases of clinical research.• Understand the sources of error: fidelity/lapses in implementation as a source of reduced/heightened effect.
Both implementation practice and implementation science are team endeavors	<ul style="list-style-type: none">• Understand how to identify relevant nonacademic stakeholders in research and how and when to engage with them to aid in movement across research stages and translation into practice.• Understand the benefit of and how to communicate with relevant stakeholders.• Employ weighted evidence, cost-effectiveness, and translation into policy

Mehta, T., Mahoney, J., Leppin, A., Stevens, K., Yousefi-Nooraie, R., Pollock, B., . . . Moore, J. (2021). Integrating dissemination and implementation sciences within Clinical and Translational Science Award programs to advance translational research: Recommendations to national and local leaders. *Journal of Clinical and Translational Science*, 5(1), E151. doi:10.1017/cts.2021.815

Understand the benefit of and how to communicate with potential adopters and influencers of the products of research

Table 2. Example strategies and uses of D&I to improve the translational process of research conduct within each research stage

	IFDIT stage objective	Research method and output	Potential use of translational science	Potential use of dissemination science	Potential use of implementation science
Basic research	To determine whether targets, markers, or pathways exist	Basic and pre-clinical studies that generate knowledge about new targets, markers, or pathways	Develop lab registries and open science models that share insights and avoid unnecessary duplication of efforts	Seek to understand social pressures among basic scientists that inform the research questions they pursue	Study the effect of strategies to improve routine use of efficient, best practice lab procedures among staff
Pre-clinical research	To determine whether target, marker, or pathway can be influenced in humans	Phase 1 trials that generate knowledge about whether interventions work in humans	Advance novel study designs that improve the efficiency of phase 1 trials	Apply marketing principles to inform participant recruitment strategies to trials	Use behavioral economic strategies to improve participant engagement and retention in trials
Clinical research	To determine whether interventions are effective in patients	Phase 2 and 3 trials that generate knowledge about whether interventions help patients	Develop multi-site IRBs and other infrastructures to increase study efficiency	Utilize key opinions leaders to optimize communication among study teams at multiple sites	Use audit and feedback to improve adherence to study protocols among study teams
Clinical implementation	To determine whether interventions can be effectively delivered in practice	Phase 4 and pragmatic trials that generate knowledge about whether interventions help patients in practice and how to implement them in these settings	Develop clinical and practice-based research networks that can respond quickly to conduct T3 research	Conduct studies to ascertain optimal strategy for disseminating evidence to improve intervention adoption and reach	Conduct studies to identify and reduce key barriers to adopting and implementing in routine practice, and to reduce disparities in implementation
Public health	To determine whether interventions can be effectively delivered to improve population health	Observational, outcome-based studies and implementation research that generate knowledge about whether and how interventions improve population health	Develop informatics approaches and big data practices to efficiently monitor effects of wide-spread intervention roll-out	Conduct comparative studies of different dissemination strategies to determine most cost-effective method of reaching target settings and audiences	Conduct comparative studies of different implementation strategies to determine most cost-effective method of sustainably implementing in target settings

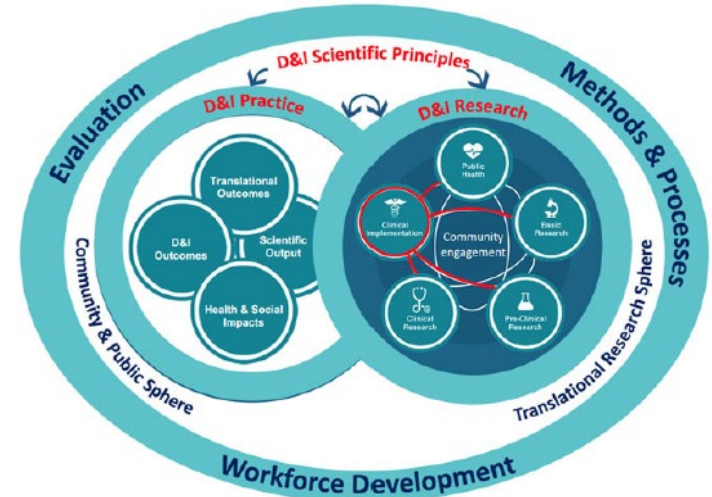
D&I, dissemination and implementation; IFDIT, Integrative Framework of Dissemination, Implementation and Translation.

Conduct comparative studies of different dissemination strategies to determine cost effective methods of reaching key audiences

Leppin, A., Mahoney, J., Stevens, K., Bartels, S., Baldwin, L., Dolor, R., . . . Meissner, P. (2020). **Situating dissemination and implementation sciences within and across the translational research spectrum.** *Journal of Clinical and Translational Science*, 4(3), 152-158.
doi:10.1017/cts.2019.392

D&I in Clinical Translational Science Awards (CTSAs)

- Currently more than 50 CTSAs (including CCTSI) nationwide
- Newest Funding Opportunity Announcement, PAR-21-293
 - Requires each hub to have foundational dissemination and implementation (D&I) capabilities and activities to ensure that translational research results in health impact.




Integration of D&I sciences and translation are overlapping circles of D&I research and practice. D&I research is the process of understanding the most effective strategies to implement effective practices; D&I practice is the process of applying these strategies of D&I sciences to successfully implement effective practices. Red lines indicate that D&I sciences could be useful in all stages.





Fig. 1. Integrating dissemination & implementation (D&I) research and practice.

Mehta, T., Mahoney, J., Leppin, A., Stevens, K., Yousefi-Nooraie, R., Pollock, B., . . . Moore, J. (2021). Integrating dissemination and implementation sciences within Clinical and Translational Science Award programs to advance translational research: Recommendations to national and local leaders. *Journal of Clinical and Translational Science*, 5(1), E151. doi:10.1017/cts.2021.815

D&I Competencies, Training, & Resources

- Padek et al 2017 Educational competencies for D&I training
 - Section A: Definition, Background, & Rationale for D&I Research
 - Section B: D&I Theory & Approaches
 - Section C: D&I Design & Analysis
 - Section D: Practice-Based Considerations
- Huebschmann et al 2022 Implementation science capacity building programs
 - Additional competencies related to increasing health equity and speed of translation

 University of Colorado **Anschutz Medical Campus**

Webmail  | UCD Access  | Canvas  | Quick Links  | 

D&I Science Graduate Certificate Program

The mission of the Dissemination & Implementation Science Graduate Certificate Program is to equip our graduates with the D&I research skills needed to design rigorous and innovative translational research, and to successfully compete for federal funding to carry out their proposed work.


Admissions


Cost


Courses

FAQs

We individualize our training to address key D&I competencies and meet each trainee's unique program goals through three key strategies


Small Class Size


Synchronous Online Classes


Recruit from Diverse Disciplines

<https://medschool.cuanschutz.edu/accords/cores-and-programs/dissemination-implementation-science-program>

D&I Competency: C5 Apply common D&I measures and analytic strategies relevant for your research question(s) within your model/framework.

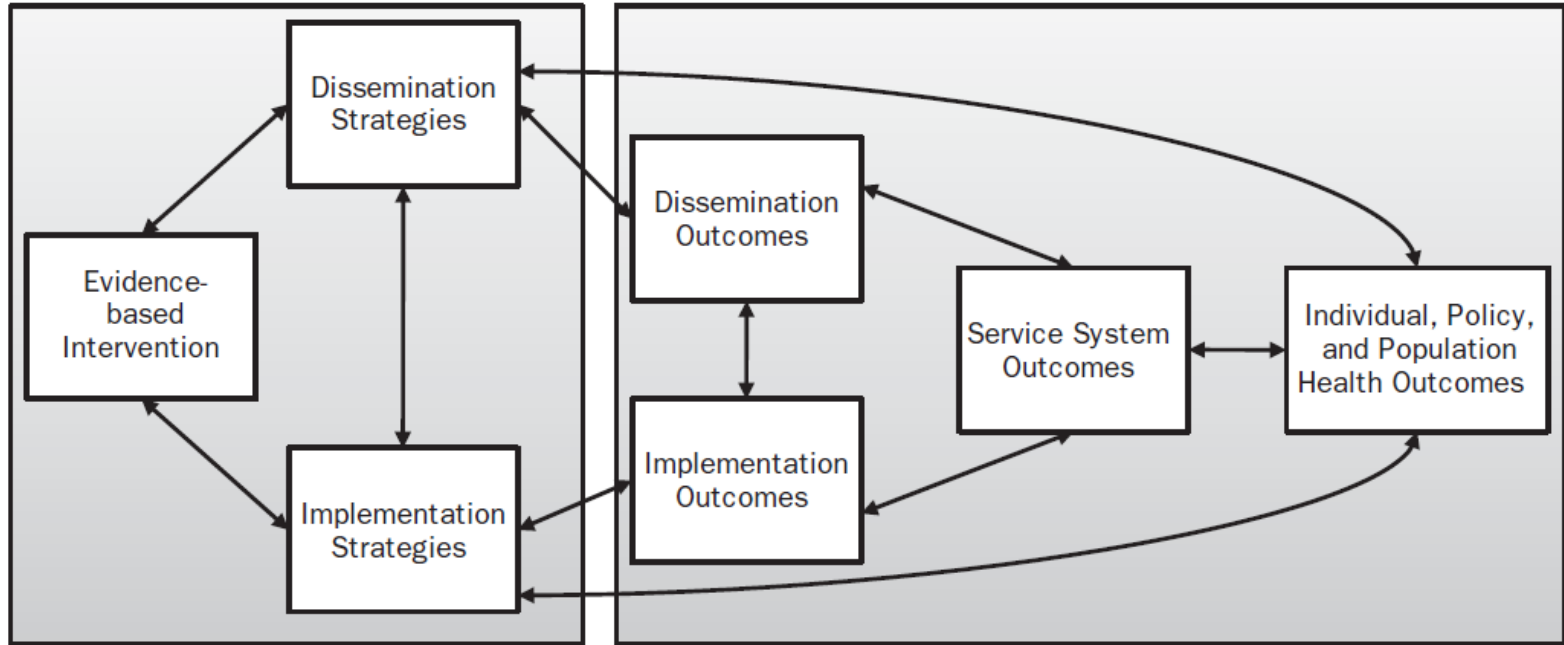


FIGURE 14.1 A framework for dissemination and implementation.

D&I competency: B1 Describe a range of D&I strategies, models, and frameworks.

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



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 Waltz², Matthew J Chinman^{3,4}, Laura J Damschroder⁵, Jeffrey L Smith⁶, Monica M Matthieu^{6,7}, Enola K Proctor⁸ and JoAnn E Kirchner^{6,9}

Abstract

Background: Identifying, developing, and testing implementation strategies are important goals of implementation science. However, these efforts have been complicated by the use of inconsistent language and inadequate descriptions of implementation strategies in the literature. The Expert Recommendations for Implementing Change (ERIC) study aimed to refine a published compilation of implementation strategy terms and definitions by systematically gathering input from a wide range of stakeholders with expertise in implementation science and clinical practice.

•Use evaluative and iterative strategies

•Provide interactive assistance

•Adapt and tailor to context

•Develop stakeholder interrelationships

•Train and educate stakeholders

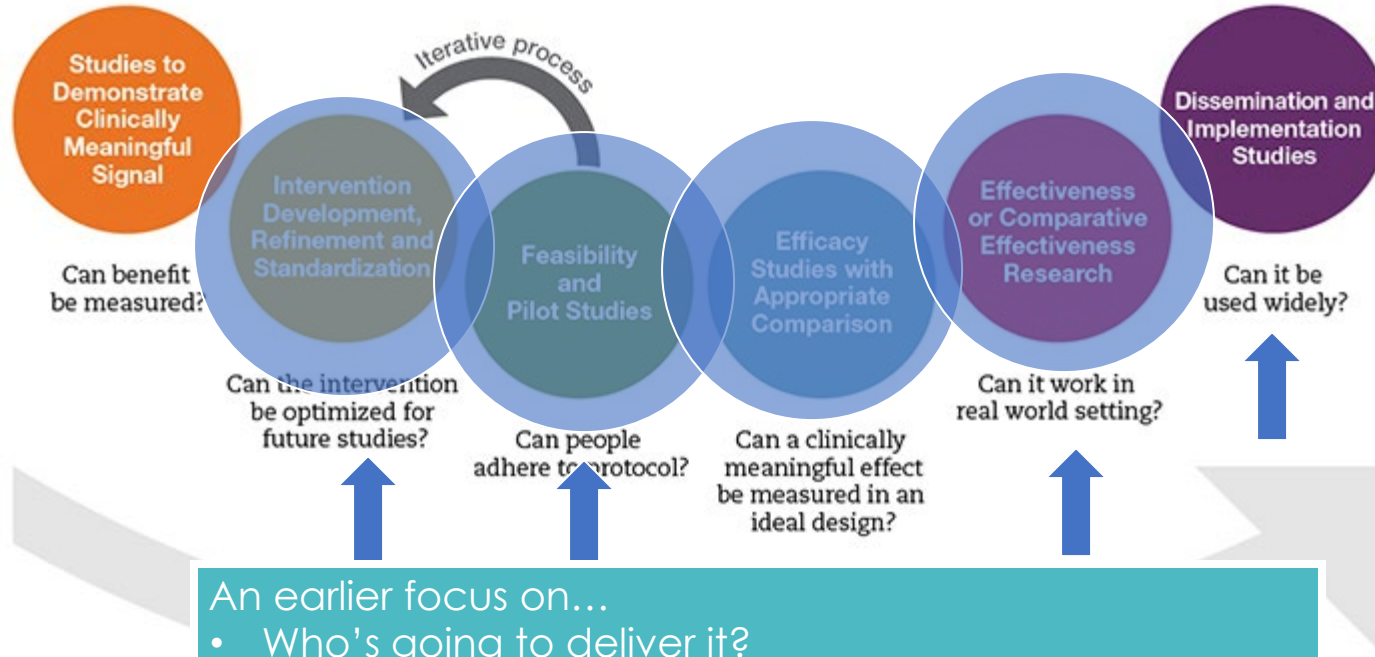
•Support clinicians

•Engage consumers

•Utilize financial strategies

•Change infrastructure

Considering D&I earlier



An earlier focus on...

- Who's going to deliver it?
- Fit with ultimate patient population
- Building in tests of training, support, adherence, mediators and moderators to high quality delivery
- Hybrid implementation-effectiveness designs

D&I competency B4: Describe a process for designing for dissemination (planning for adoption, implementation, and sustainability during the intervention development stage).

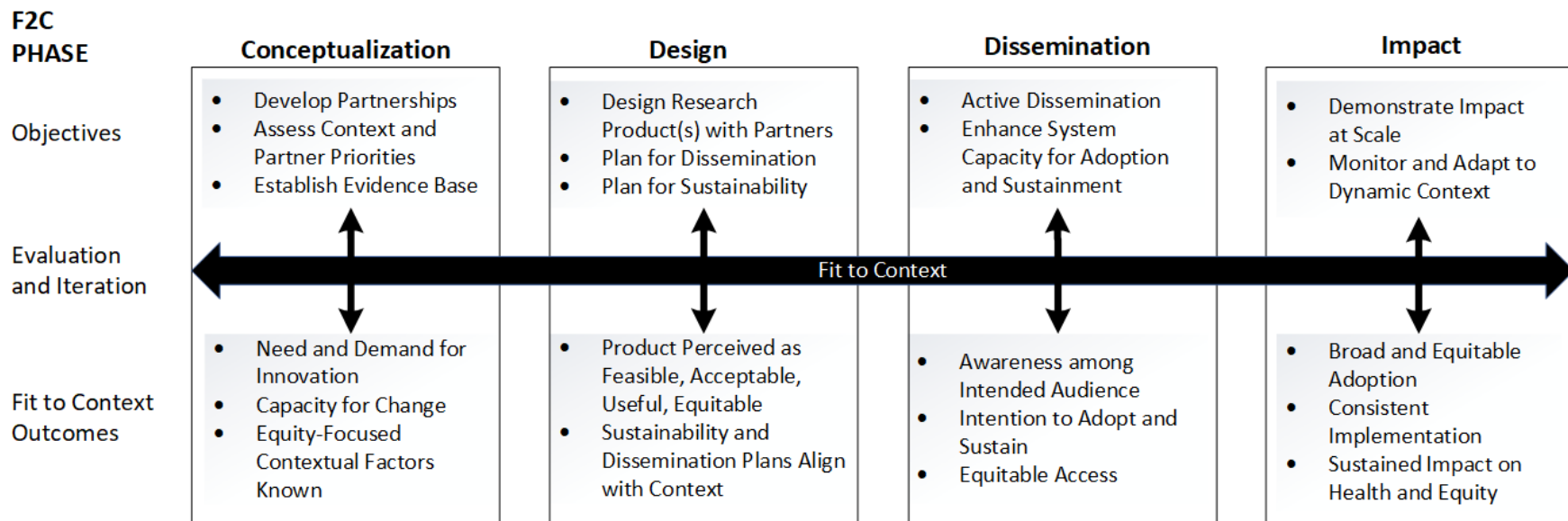
Ensuring Fit to Context

- “Designing for Dissemination and Sustainability” (D4DS)
 - **Enhancing the fit** between a health program, policy, or practice and the context in which it is intended to be adopted
 - Early and active planning for dissemination and sustainability
- Designing for dissemination
 - the process of ensuring that the products of research are developed to **match the contextual characteristics** of the target audience and setting for intended use
- Designing for sustainability
 - early planning and **design processes** designed to increase the likelihood of sustainment of an evidence-based program or practice after initial implementation

[Designing for Dissemination and Sustainability to Promote Equitable Impacts on Health](#)

Bethany M. Kwan, Ross C. Brownson, Russell E. Glasgow, Elaine H. Morrato, Douglas A. Luke
Annual Review of Public Health 2022 43:1, 331-353

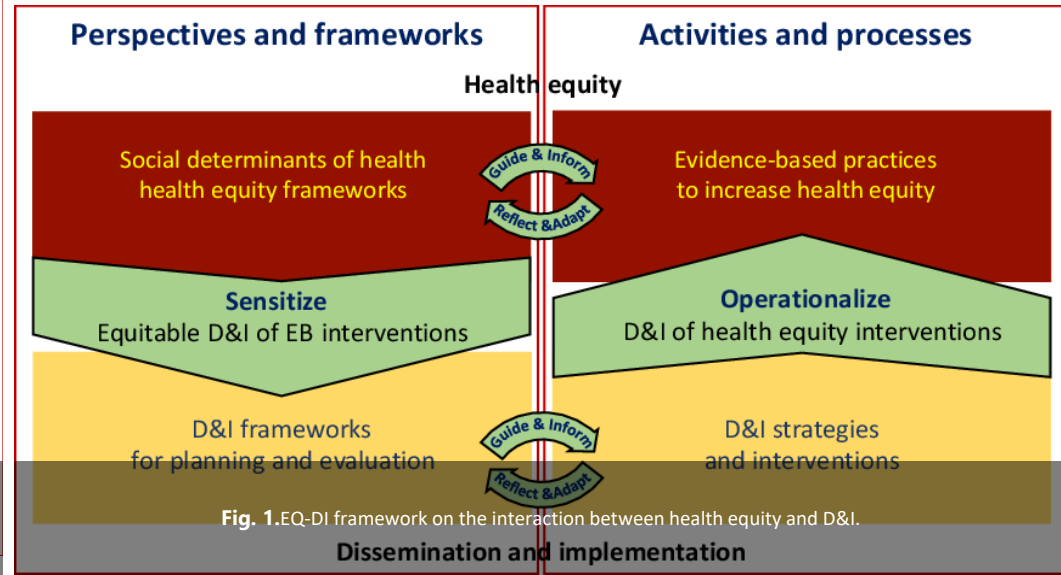
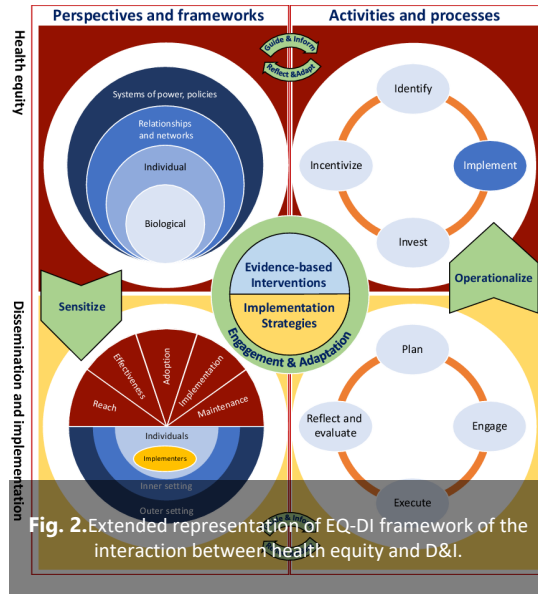
Fit to Context (F2C) Framework for Designing for Dissemination and Sustainability



Kwan BM, Luke DA, Adsul P, Koorts H, Morrato EH, Glasgow RE, *Designing for Dissemination and Sustainability: Principles, Methods, and Frameworks for Ensuring Fit to Context* In: *Dissemination and Implementation Research in Health*. Edited by: Ross C. Brownson, Graham A. Colditz, and Enola K. Proctor, Oxford University Press. © Oxford University Press 2023. DOI: 10.1093/oso/9780197660690.003.0027

Health Equity, D&I, and CTSA


D&I Competency: Develop strategies to promote equity in resource distribution across all external research partners, including community partners or other external organizations and the researcher's institution



Yousefi Nooraie, R., Kwan, B., Cohn, E., AuYoung, M., Clarke Roberts, M., Adsul, P., & Shelton, R. (2020). Advancing health equity through CTSA programs: Opportunities for interaction between health equity, dissemination and implementation, and translational science. *Journal of Clinical and Translational Science*, 4(3), 168-175. doi:10.1017/cts.2020.10

Community and Partner Engagement and Participatory Methods

dicemethods.org/Tool

 **STAKEHOLDER ENGAGEMENT NAVIGATOR**
DICEmethods.org | Dissemination, Implementation, Communication, and Engagement
A guide for health researchers

RE-LAUNCH TOOL

Home > Stakeholder Engagement Selection Tool > Research Stage Selection > Engagement Purpose Selection > Refinements and Results Page

Your chosen research stage(s): **Planning**

Your chosen purpose(s) of engagement: **Develop research questions relevant to stakeholders**

Use the sliders to further refine your search. You may use the sliders to set a range or to select one point.

Budget

\$ ———— \$\$\$ ———— \$\$\$\$\$

Time per interaction

An hour or less ———— Half a day ———— A full day

Number of interactions

1-2 times ———— Appx. 5 times ———— 10+

After adjusting sliders, click on highlighted strategies below to discover more.



25/10 CROWDSOURCING APPRECIATIVE INQUIRY CITIZEN JURIES COMMUNITY ENGAGEMENT STUDIO CONCEPT MAPPING

CONVERSATION CAFE DELIBERATIVE POLLING DELPHI TECHNIQUE DISCOVERY AND ACTION DIALOGUES FOCUS GROUPS

HUMAN-CENTERED DESIGN KEY INFORMANT INTERVIEWS NOMINAL GROUP TECHNIQUE ONLINE COLLABORATIVE PLATFORMS

ONLINE COMMUNITIES TOWN HALL MEETING USER EXPERIENCE FISHBOWL

The Stakeholder Engagement Navigator is a service of the **Data Science to Patient Value Initiative** at the University of Colorado Anschutz Medical Campus

About us | Find us on  

D&I competencies:



- D1: Describe the importance of incorporating the perspectives of different stakeholder groups;
- D4: Determine when engagement in participatory research is appropriate with D&I research
- D6: Identify and apply techniques for stakeholder analysis and engagement when implementing evidence-based practices.

University of Colorado **Anschutz Medical Campus** Internal | UCD Access | Canvas | Quick Links | G

Resources • Training • Funding • Community Engagement • News and Events • About Us • Volunteer for a Study •



Community Engagement and Health Equity (CEHE) is critical to increase the reach, effectiveness, adoption, implementation and maintenance of clinical and translational research.

  **Colorado Clinical and Translational Sciences Institute (CCTSI)**
UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS

Contact Us


Donald Nease, Jr., MD
Community Engagement and Health Equity Director
[Read full profile](#)

Community Engagement and Health Equity

Community Engagement and Health Equity (CEHE) is critical to increase the reach, effectiveness, adoption, implementation and maintenance of clinical and translational research. The Community Engagement and Health Equity core aims to give communities a voice in the research that is important to them.

The Community Engagement and Health Equity core through the Partnership of Academics and Communities for Translation (PACT) aims to:

- Educate and connect investigators and communities
- Develop programs to improve relationships and build trust between academics and communities
- Build capacity in community-academic partnerships
- Provide funds for community engagement and research
- Facilitate Community-Based Participatory Research (CBPR)

CCTSI CU-CSU Summit: Enhancing the Impact of Translational Research through D&I

- **Translational Sciences Benefits Model:** The products of clinical and translational research and assessing impacts at multiple levels
- **Dissemination Planning:** Communication and strategies for enhancing awareness and encouraging adoption of evidence-based approaches
- **Resources:** Collaborating and building personal expertise in D&I science
- **Case examples:** applying TSBM, D&I theories, models, and frameworks, engaging communities, industry partners, and decision makers in research
- **Networking:** Building relationships and identifying opportunities for team sciences and partnering with communities



Bethany Kwan
Bethany.kwan@cuanschutz.edu
@BethanyKwan