Introduction to Implementation Science

Frances Chu PhD, MLIS, MSN, RN

Objectives

- Define implementation science
- Describe implementation strategies vs. evidence-based interventions (EBIs)
- Summarize case studies using implementation science methods

It takes an average of 17 years for research evidence to reach clinical practice

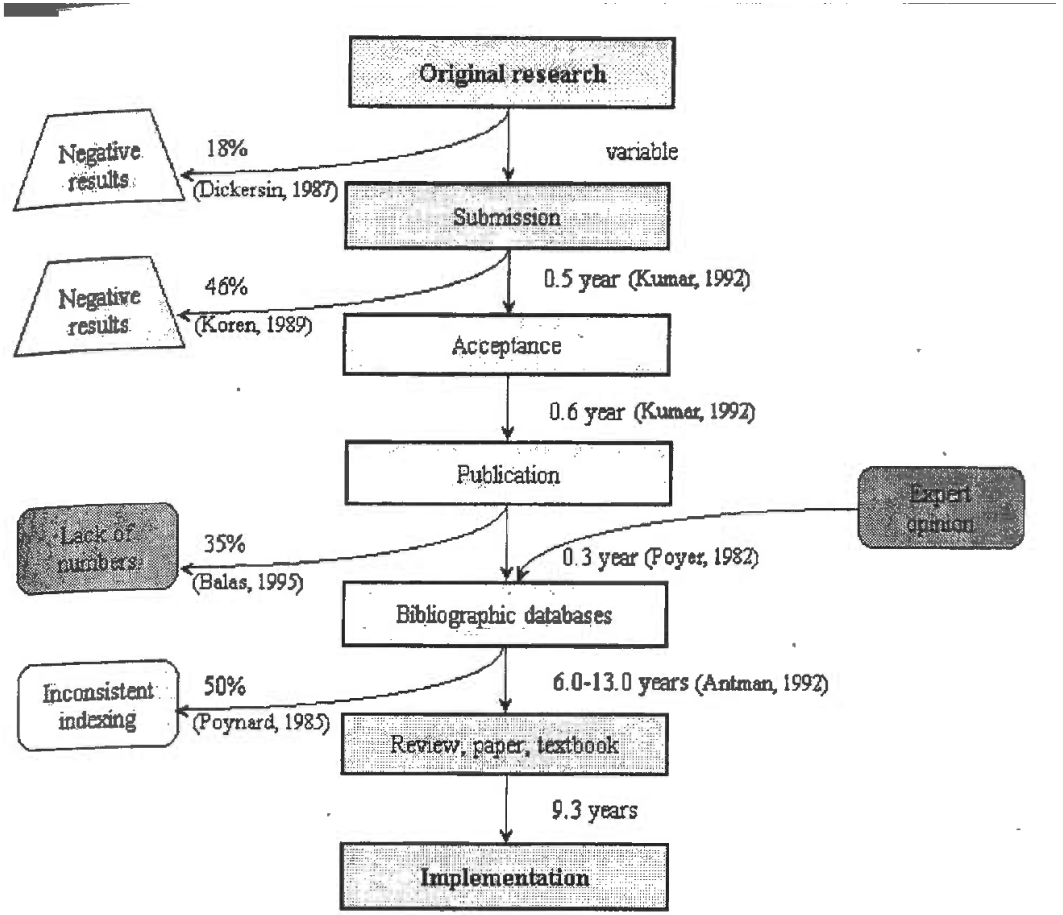


Figure I. Transfer of Research

Balas & Boren, 2000

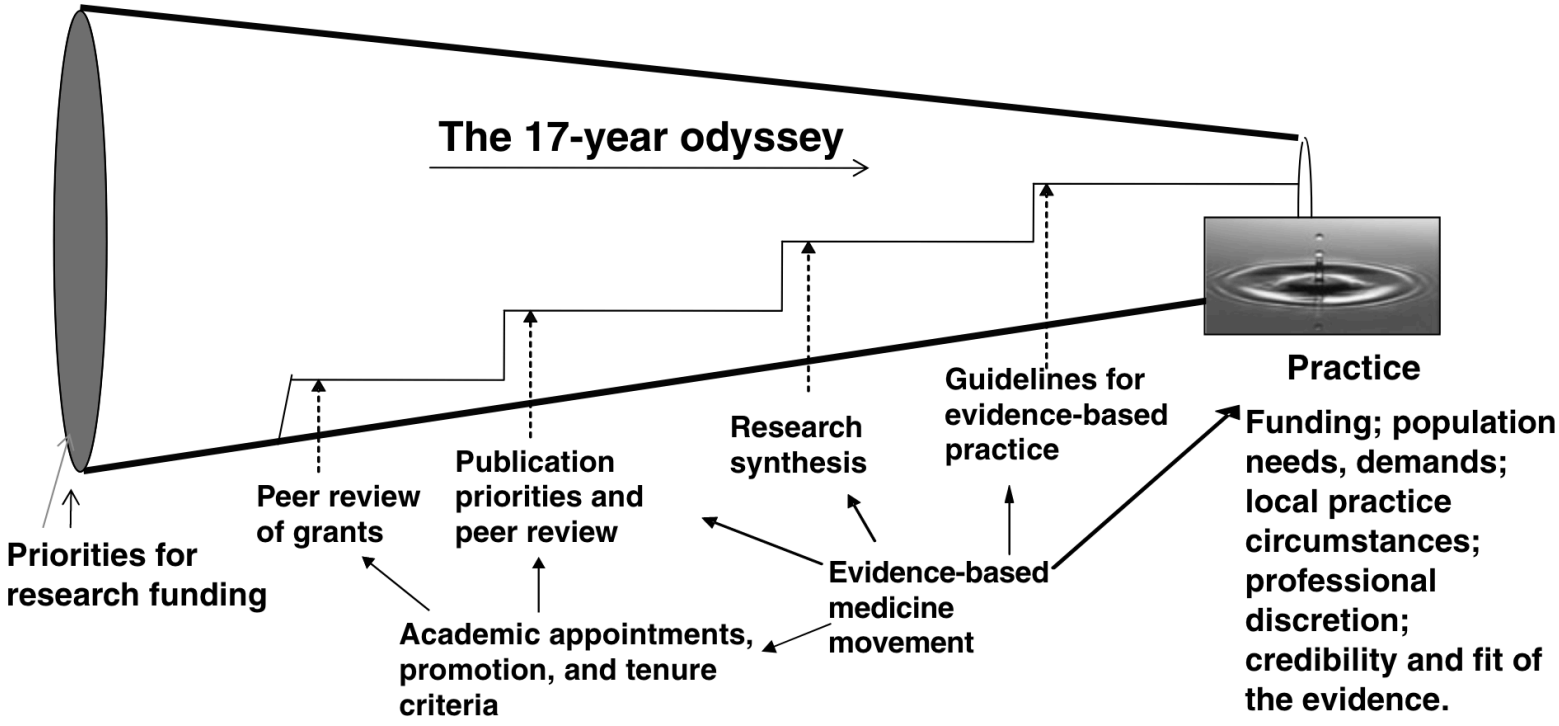


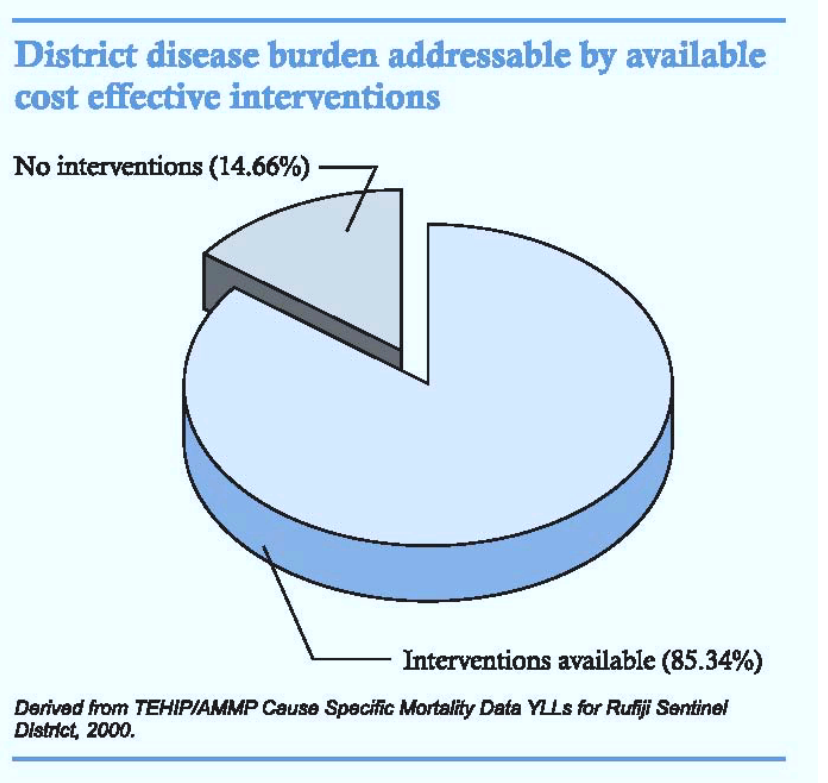
Figure 1

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 et al., 2009

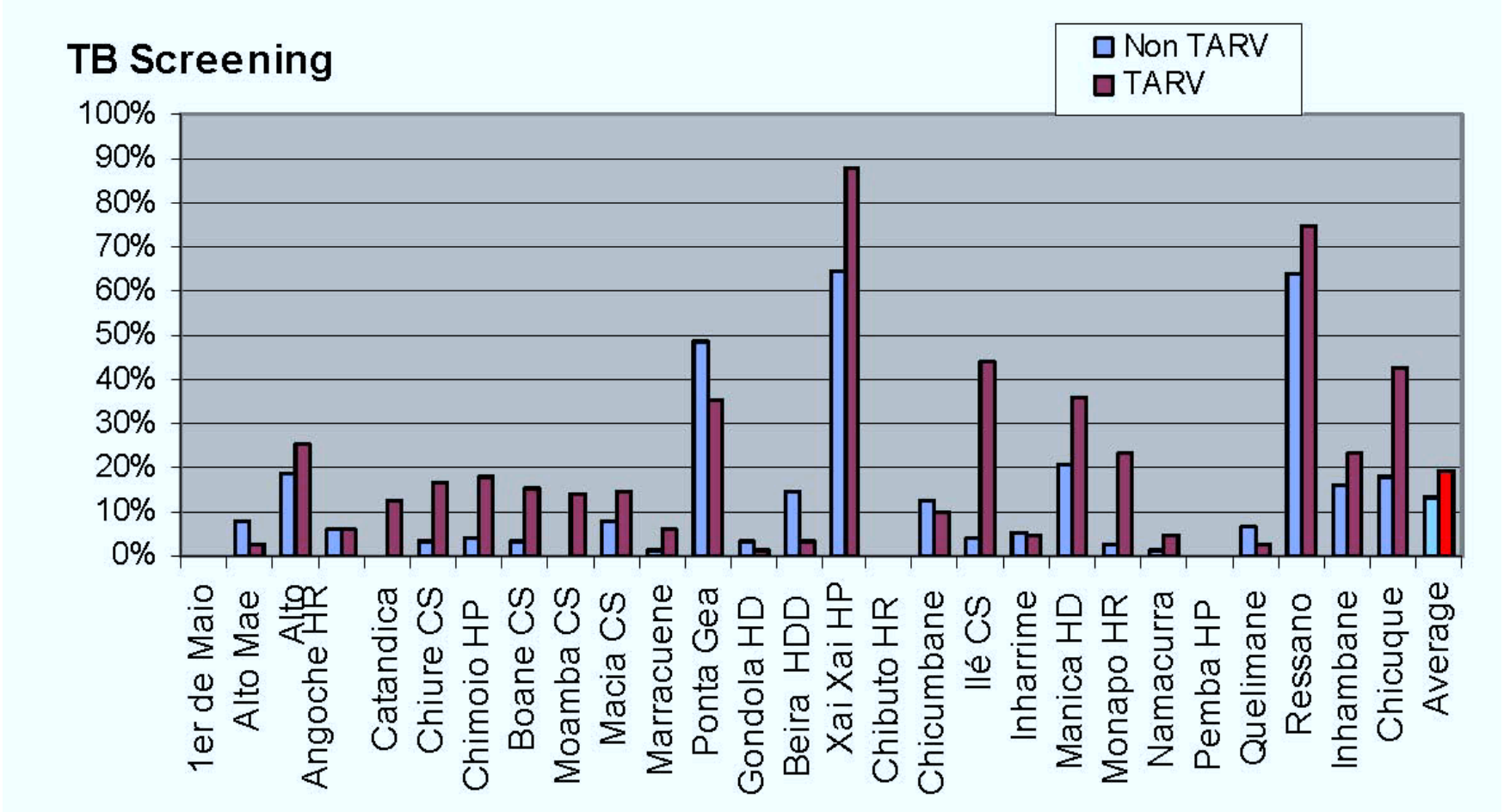
Consequences of ‘Know-Do’ Gap

- Advancements in medical science have outpaced their application
- 10+ million annual deaths from diseases with proven, low-cost prevention or treatment strategies
  - 1.7 million TB-related deaths
  - 1.1 million HIV-related deaths
  - 6.6 million preventable child deaths
  - 300,000 maternal deaths



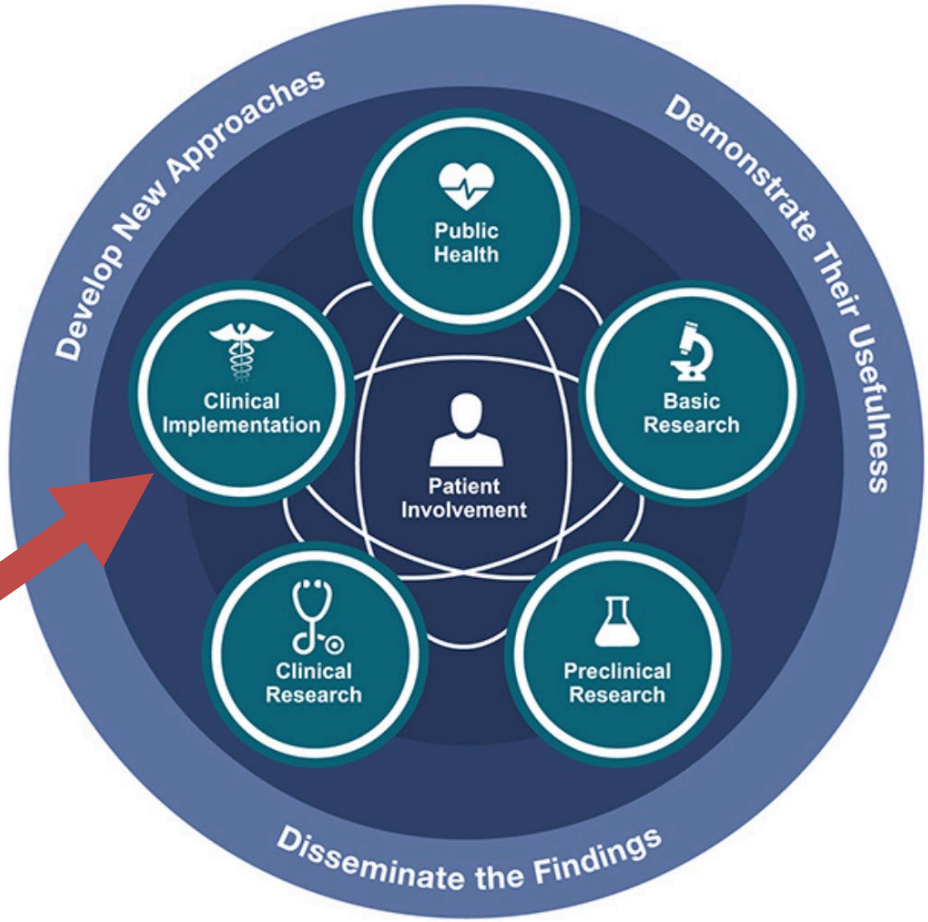
Sherr, 2019

Possible Cause: Inconsistent Implementation



Sherr, 2019

Translational Science Spectrum



Credit: National Center for Advancing Translational Sciences

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 or care

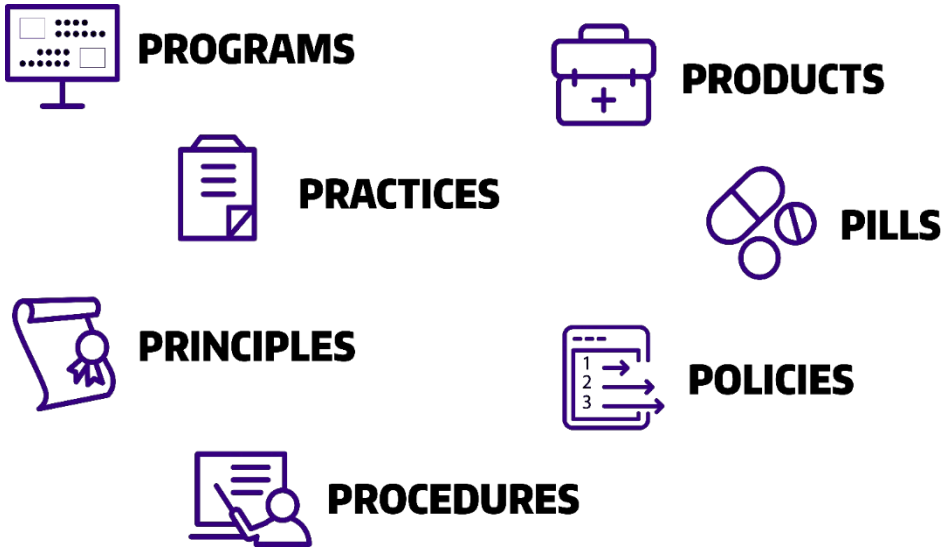
Eccles & Mittman, 2006

Implementation Science

- Many names…..
  - Delivery science
  - Scale-up science
  - Operations research
  - Implementation research
  - Diffusion/Dissemination research
  - Quality improvement research
  - Outcomes research
  - Health systems research
  - Translational research
  - Knowledge translation
  - Program Science

Implementation Strategy vs. Evidence-Based Intervention

EBIs: programs, practices, principles, procedures, products, pills, and policies that improve health behaviors, health outcomes, or health-related environments (the '**what**')



Implementation strategies: Actions to enhance *adoption, implementation, and sustainability* of EBIs. (the '**how**')

Sherr, 2019

Key Concepts

- **Adoption:** The decision of individuals or organizations to use an innovation or practice.
- **Implementation:** The use of strategies to introduce and apply new practices in specific settings.
- **Sustainability**: continued use and integration of an evidence-based intervention within a particular setting over time, ensuring that it remains effective and beneficial to the intended population. It involves maintaining the fidelity and effectiveness of the intervention while potentially adapting it to evolving circumstances or needs within the organization or community.

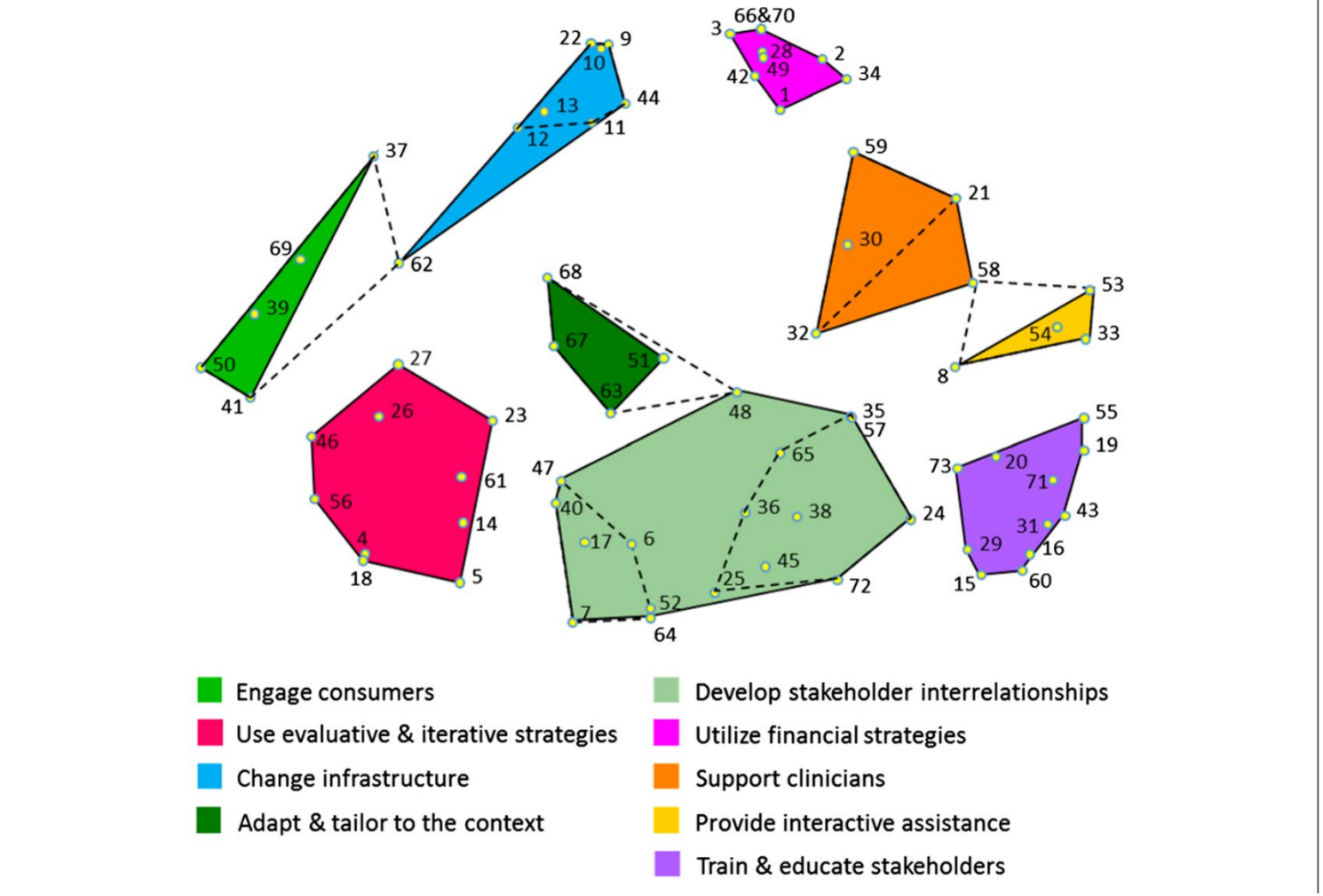
Sample of Implementation Strategies

Table 3 ERIC discrete implementation strategy compilation (n = 73)

Strategy	Definitions
Access new funding	Access new or existing money to facilitate the implementation
Alter incentive/allowance structures	Work to incentivize the adoption and implementation of the clinical innovation
Alter patient/consumer fees	Create fee structures where patients/consumers pay less for preferred treatments (the clinical innovation) and more for less-preferred treatments
Assess for readiness and identify barriers and facilitators	Assess various aspects of an organization to determine its degree of readiness to implement, barriers that may impede implementation, and strengths that can be used in the implementation effort
Audit and provide feedback	Collect and summarize clinical performance data over a specified time period and give it to clinicians and administrators to monitor, evaluate, and modify provider behavior
Build a coalition	Recruit and cultivate relationships with partners in the implementation effort
Capture and share local knowledge	Capture local knowledge from implementation sites on how implementers and clinicians made something work in their setting and then share it with other sites
Centralize technical assistance	Develop and use a centralized system to deliver technical assistance focused on implementation issues
Change accreditation or membership requirements	Strive to alter accreditation standards so that they require or encourage use of the clinical innovation. Work to alter membership organization requirements so that those who want to affiliate with the organization are encouraged or required to use the clinical innovation
Change liability laws	Participate in liability reform efforts that make clinicians more willing to deliver the clinical innovation

Powell et al., 2015

Concept Map of ERIC Strategies



Waltz et al., 2015

Theories, Models, and Frameworks

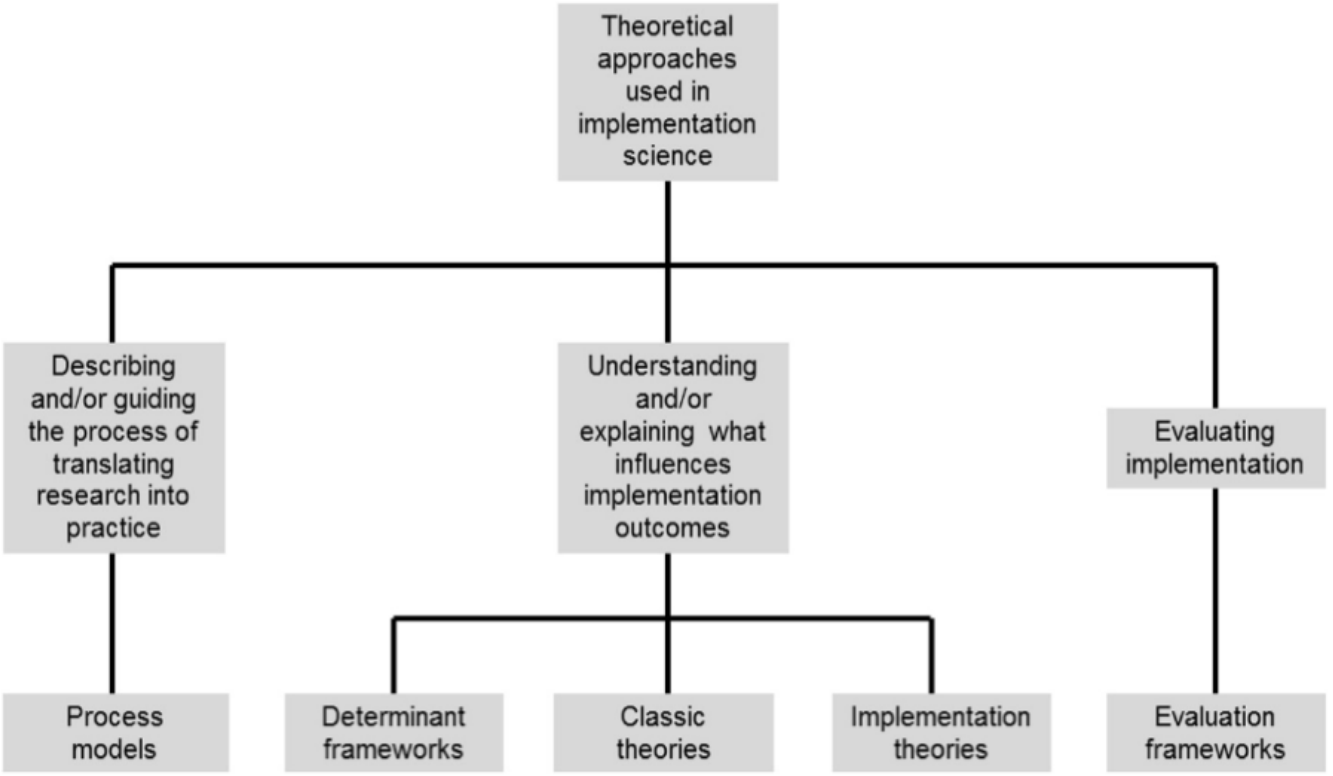
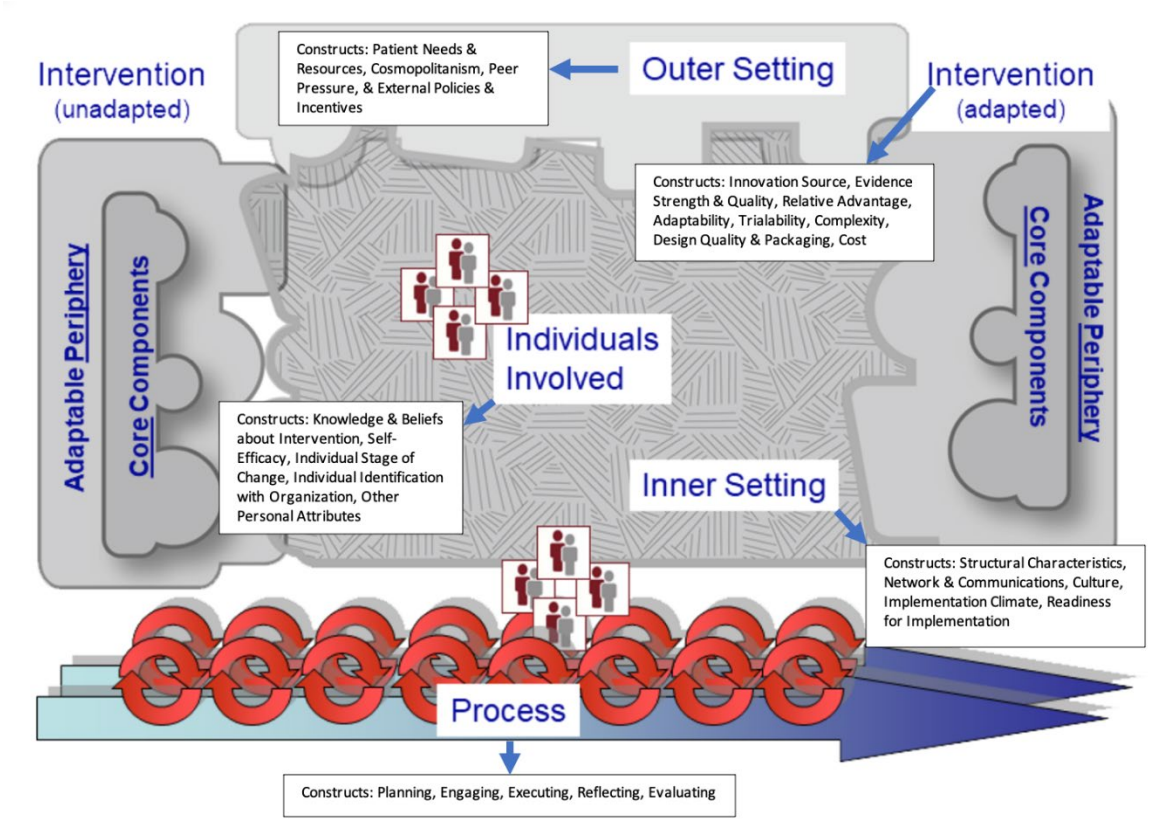


Figure 1 Three aims of the use of theoretical approaches in implementation science and the five categories of theories, models and frameworks.

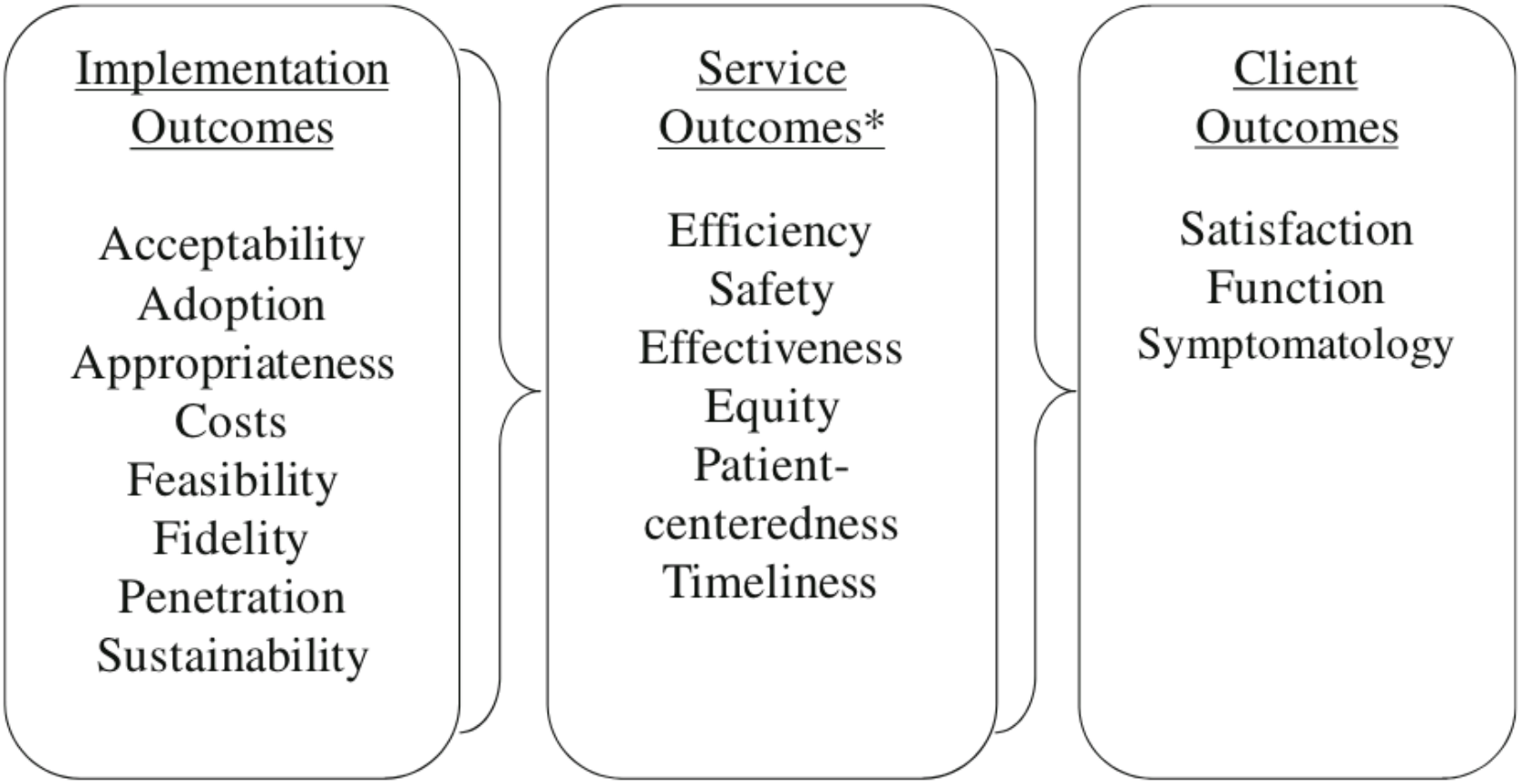
Nilsen et al, 2015

Consolidated Framework for Implementation Research (CFIR)



Damschroder et al., 2009
Adapted from https://cfirguide.org/cfirdiagram/

Implementation Outcome Framework



***IOM Standards of Care**

Proctor, 2011

REP Framework

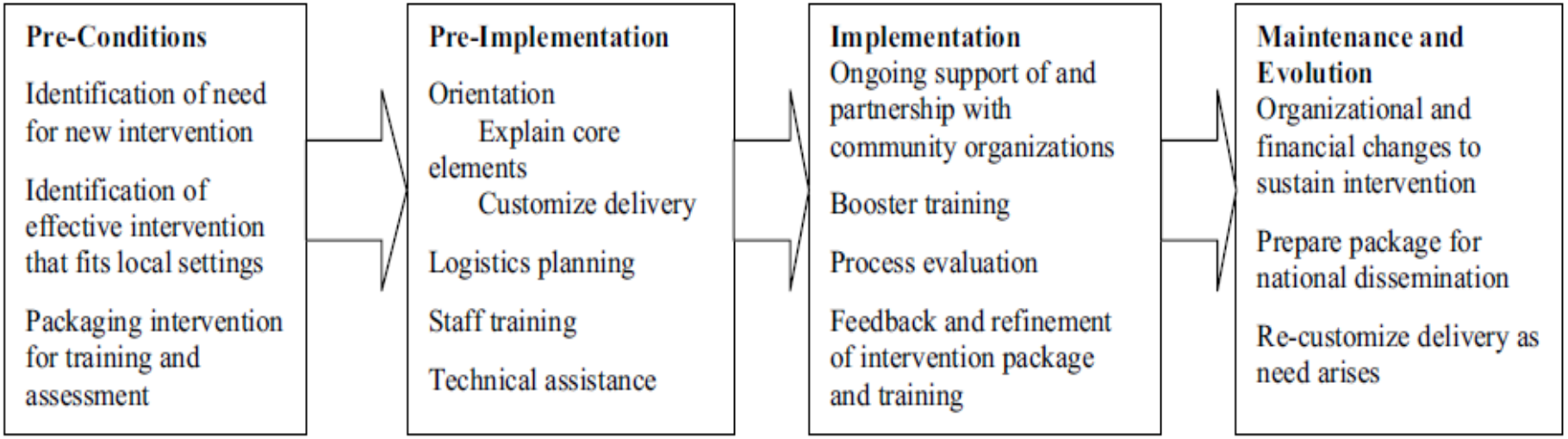
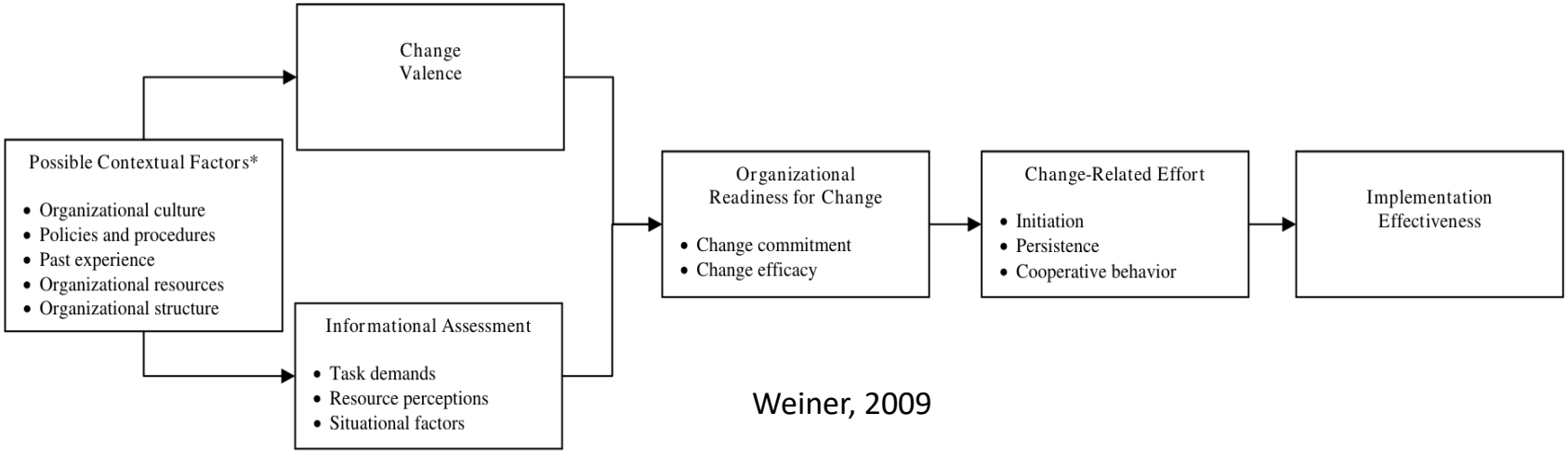


Figure 1
Replicating effective programs framework for health care interventions. This figure outlines the Replicating Effective Programs (REP) process as it can be applied to health care interventions.

Kilborne et al., 2007

Organizational Readiness for Change



Weiner, 2009

* Briefly mentioned in text, but not focus of the theory

Research vs. Practice

Research

- Objective to study methods and strategies that impact adoption, implementation, and sustainment of EBIs
- Approach to use scientific methods investigate the methods and strategies
- Focus on generalizable knowledge on the methods and strategies

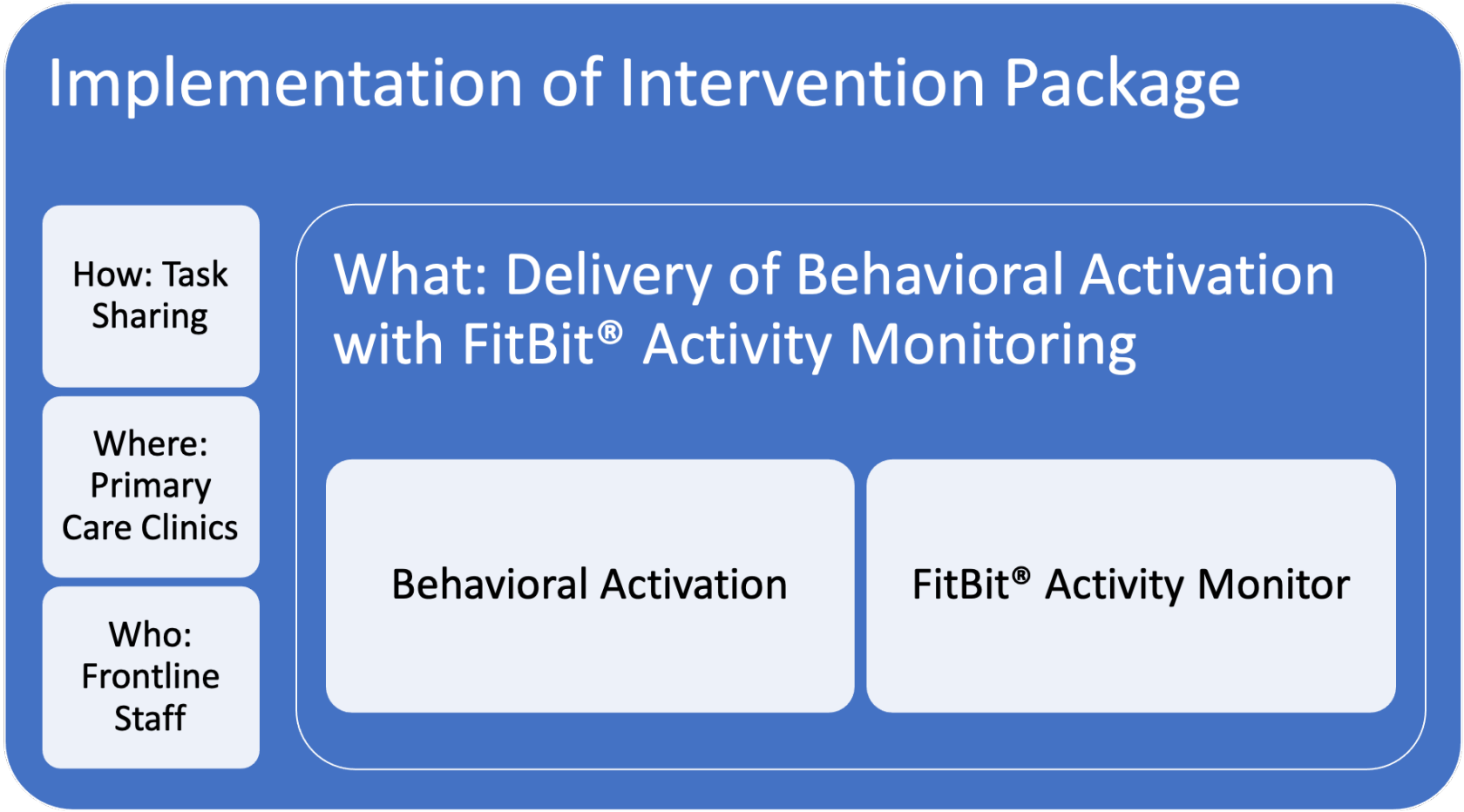
Practice

- Objective focuses on actual implementation process of EBIs
- Approach to use the methods and strategies to implement, sustain, and scale up EBIs
- Focus on pragmatic problem-solving, change management, stakeholder engagement, etc.

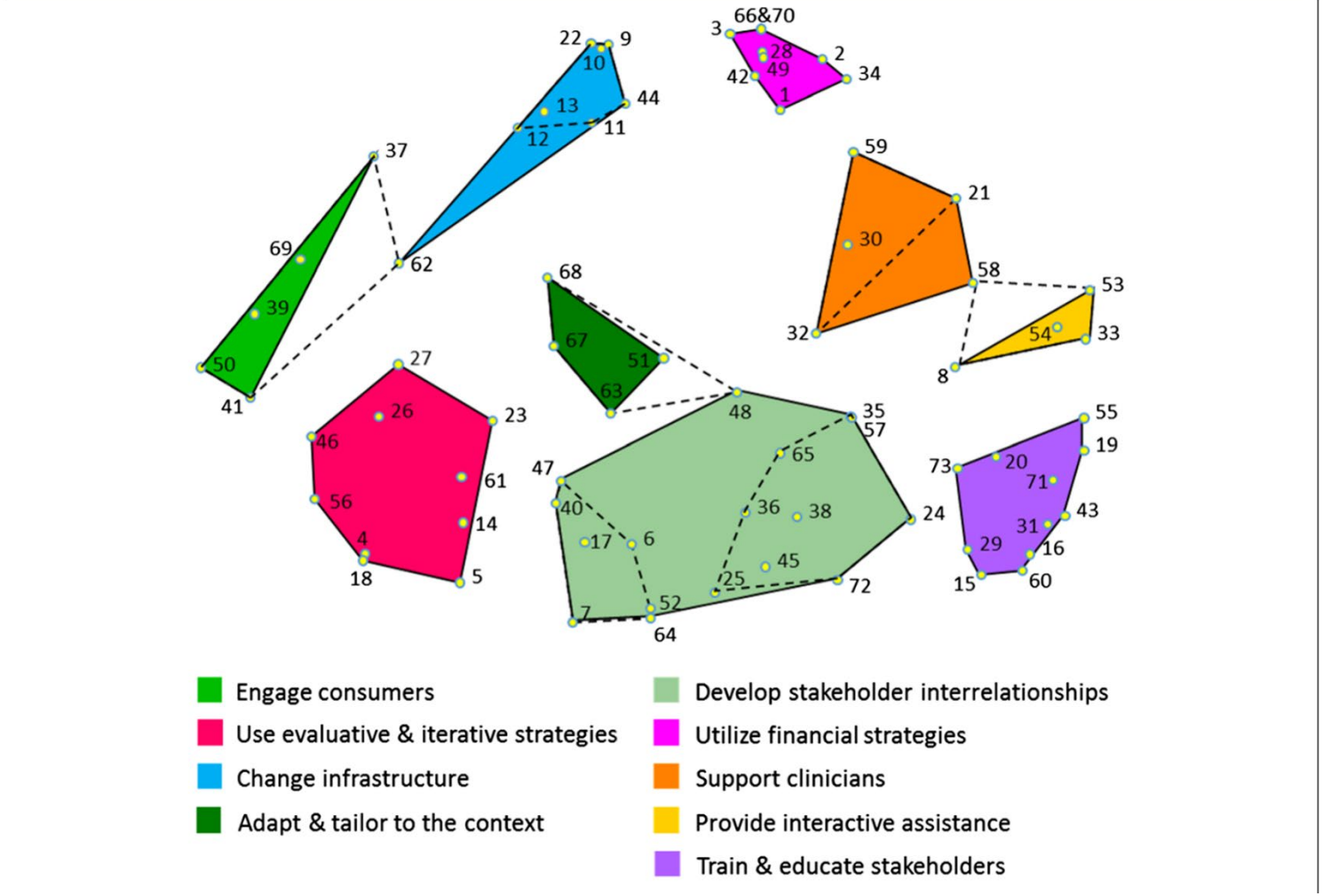
Case Study 1 Background

- Conduct a contextual inquiry to map the policies, workforce competencies, and clinical workflows for delivering the innovation in primary care.
- Multi-method with interviews/focus groups and surveys.

The Innovation

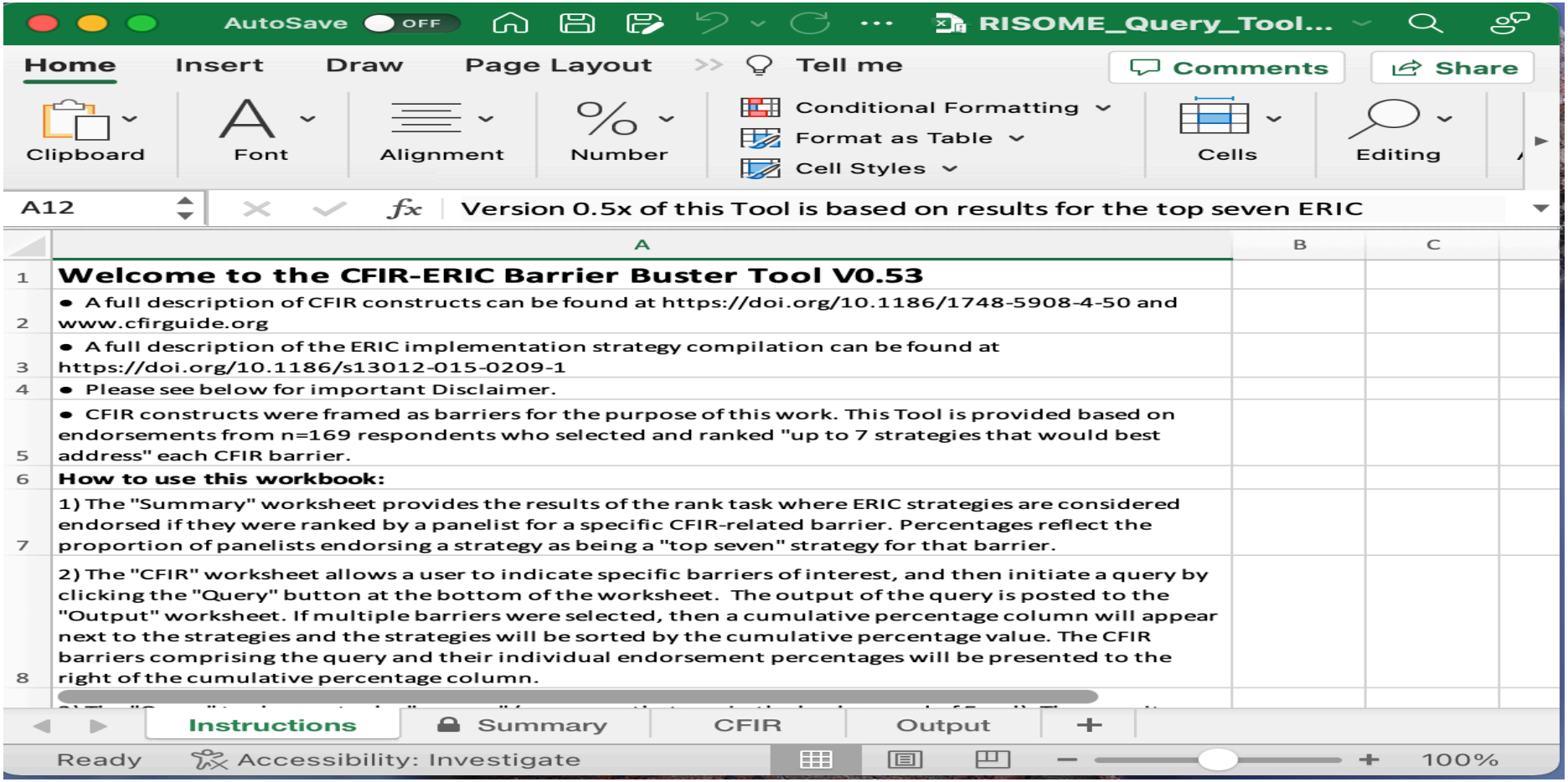


Concept Map of ERIC Strategies



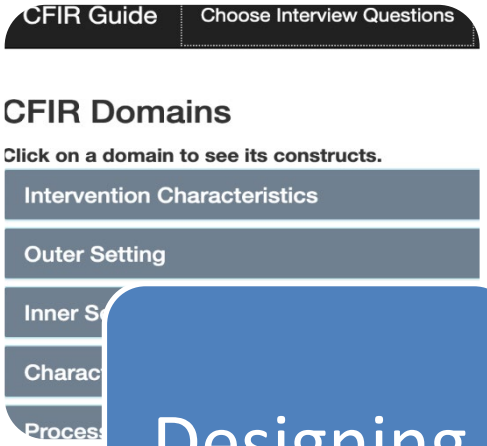
Waltz et al., 2015

CFIR-ERIC Mapping Tool

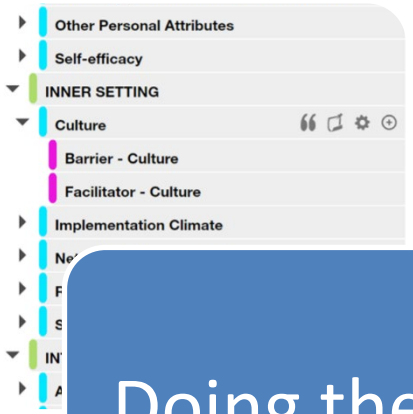


https://cfirguide.org/choosing-strategies/

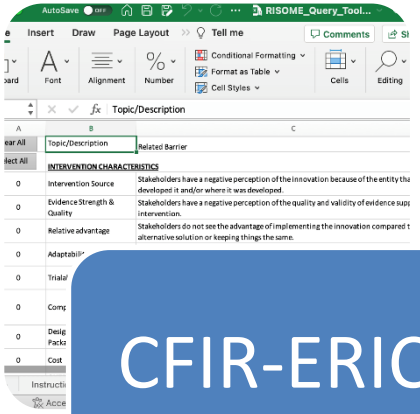
Using CFIR and CFIR-ERIC for Formative Implementation



Designing the plan

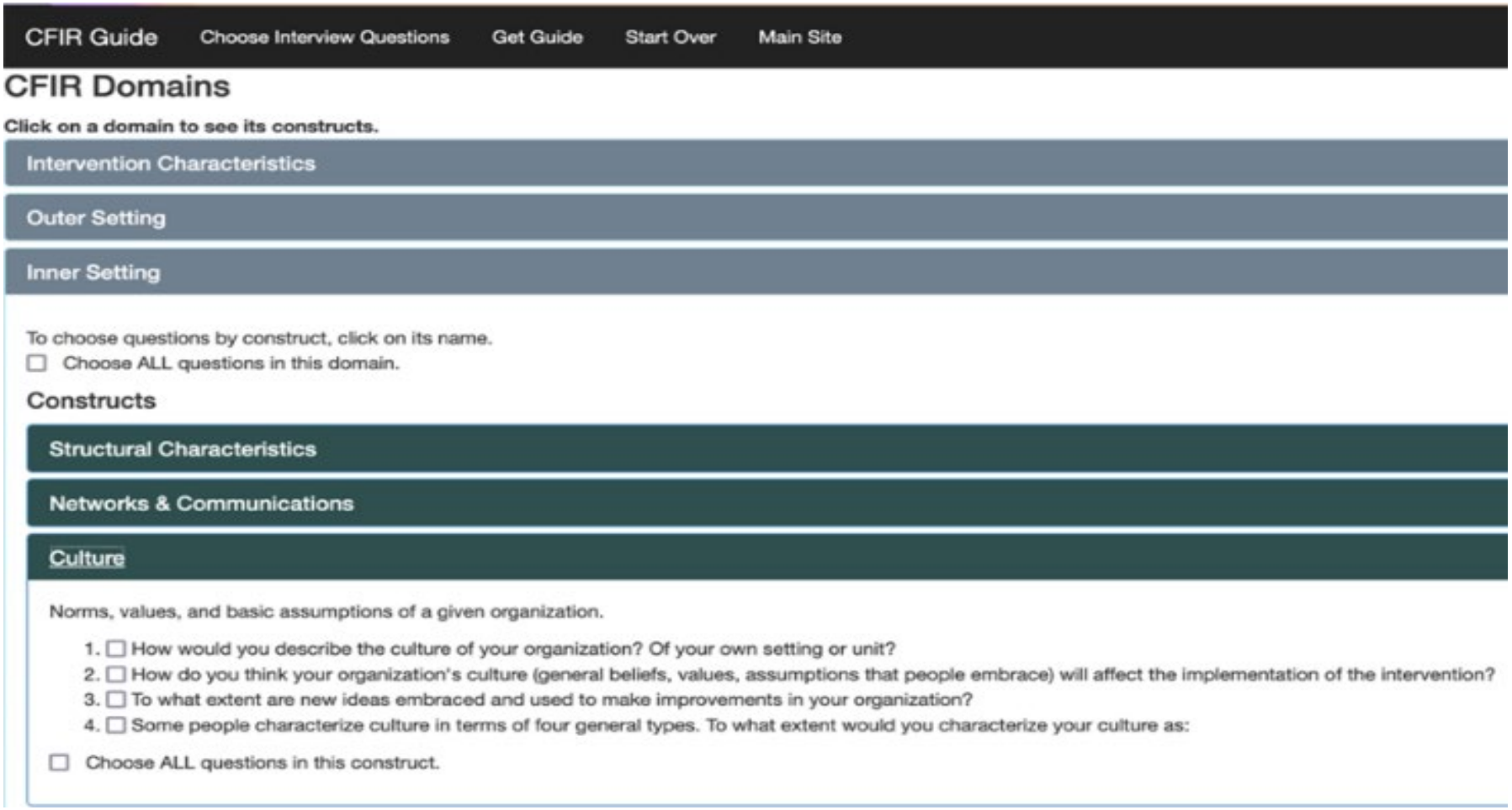


Doing the interviews



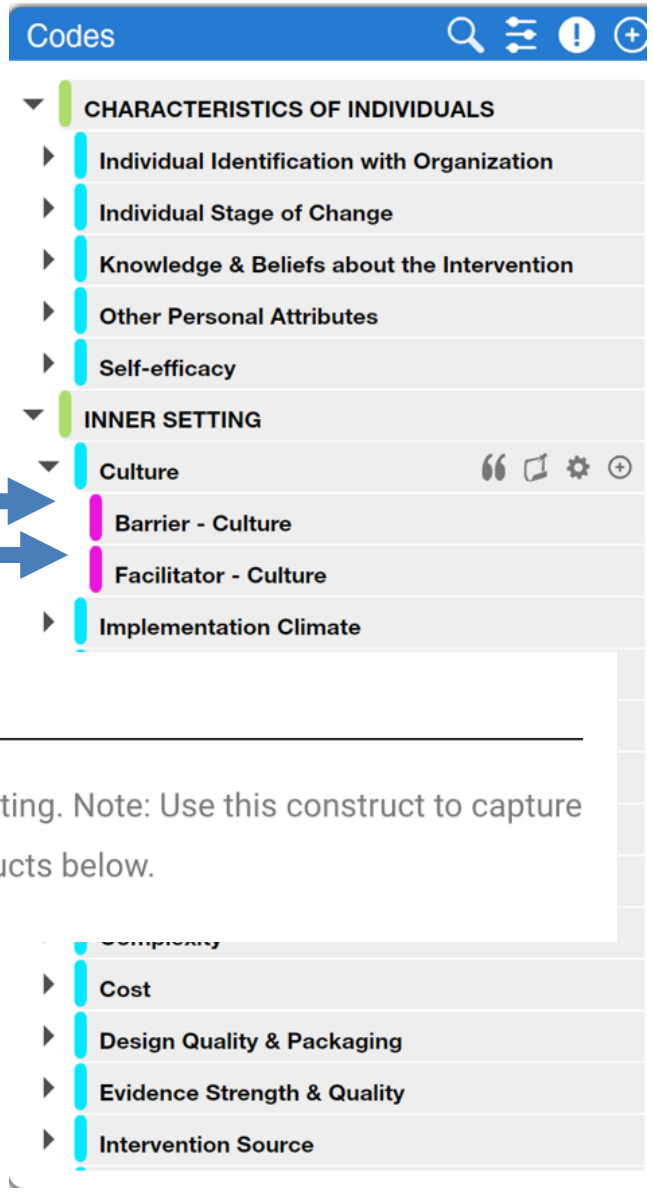
CFIR-ERIC Mapping process

CFIR Interview Guide



https://cfirguide.org/guide/app/#/

CFIR Coding in Dedoose®



Culture

There are shared values, beliefs, and norms across the Inner Setting. Note: Use this construct to capture themes related to Culture that are not included in the subconstructs below.

https://cfirguide.org/constructs/inner-setting/culture-updated/

CFIR-ERIC Mapping Tool

	INNER SETTING	
1	Structural Characteristics	The social architecture, age, maturity, and size of an organization hinders implementation.
1	Networks & Communications	The organization has poor quality or non-productive social networks and/or ineffective formal and informal communications.
1	Culture	Cultural norms, values, and basic assumptions of the organization hinder implementation.
0	Implementation Climate	There is little capacity for change, low receptivity, and no expectation that use of the innovation will be rewarded, supported, or expected.
0	Tension for Change	Stakeholders do not see the current situation as intolerable or do not believe they need to implement the innovation.
1	Compatibility	The innovation does not fit well with existing workflows nor with the meaning and values attached to the innovation, nor does it align well with stakeholders' own needs and/or it heightens risk for stakeholders.
0	Relative Priority	Stakeholders perceive that implementation of the innovation takes a backseat to other initiatives or activities.
0	Organizational Incentives & Rewards	There are no tangible (e.g., goal-sharing awards, performance reviews, promotions, salary raises) or less tangible (e.g., increased stature or respect) incentives in place for implementing the innovation.
0	Goals and Feedback	Goals are not clearly communicated or acted upon, nor do stakeholders receive feedback that is aligned with goals.

https://cfirguide.org/choosing-strategies/

Results

Sample

- Two clinics, one rural-serving and one urban
- 10 frontline staff
- 7 providers and behavioral/mental health specialists
- 5 clinic administrator

Domain	Construct	Number of Times Coded
Characteristic of the individuals constructs	Self-efficacy	12
	Knowledge & beliefs about the intervention	8
	Other personal attributes	8
Inner setting constructs	Available resources in readiness for implementation	43
	Compatibility in implementation climate	24
	Access to knowledge & information in readiness for implementation	22
	Structural characteristics	10
	Networks & communication	10
	Culture	6
Characteristics of the intervention constructs	Adaptability	31
	Design quality & packaging	29
	Relative advantage	26
	Trialability	13
	Complexity	7
Outer setting constructs	Patient needs & resources	53
	External policy & incentives	16
	Cosmopolitanism	11

Identified ERIC Strategies sorted by Cumulative Percentages
Identify and prepare champions
Capture and share local knowledge
Assess for readiness and identify barriers and facilitators
Promote adaptability
Create a learning collaborative
Conduct educational meetings
Build a coalition
Conduct local consensus discussions
Conduct local needs assessment
Conduct cyclical small tests of change
Tailor strategies
Facilitation
Inform local opinion leaders
Identify early adopters
Develop educational materials

ERIC Strategies	Cumulative Percent	Relative advantage	Adaptability	Trialability	Complexity
Identify and prepare champions	**382%**	45%	23%	12%	30%
Capture and share local knowledge	**355%**	17%	35%	23%	27%
Assess for readiness and identify barriers and facilitators	**355%**	24%	31%	35%	30%
Promote adaptability	**355%**	24%	**73%**	27%	40%
Create a learning collaborative	**323%**	7%	23%	12%	33%
Conduct educational meetings	**315%**	24%	12%	8%	13%
Build a coalition	**296%**	14%	15%	15%	0%
Conduct local consensus discussions	**283%**	24%	31%	8%	7%
Conduct local needs assessment	**280%**	34%	35%	19%	3%
Conduct cyclical small tests of change	**277%**	31%	23%	38%	37%
Tailor strategies	**264%**	17%	35%	23%	27%
Facilitation	**249%**	10%	27%	23%	20%
Inform local opinion leaders	**235%**	28%	15%	23%	13%
Identify early adopters	**212%**	17%	27%	15%	20%
Develop educational materials	**210%**	14%	12%	0%	13%
Promote network weaving	**194%**	3%	4%	0%	0%
Visit other sites	**184%**	21%	19%	12%	3%
Develop a formal implementation blueprint	**183%**	7%	8%	19%	43%
Model and simulate change	**183%**	10%	19%	31%	27%

CFIR Barrier Determinants	ERIC Recommended Strategies	Percent Endorsement
Relative advantage	Identify and prepare champions	45%
Adaptability	Promote adaptability	73%
Trialability	Conduct cyclical small tests of change	38%
Complexity	Develop a formal implementation blueprint	43%
Design Quality & Packaging	Promote adaptability	48%

Issues with CFIR-ERIC Mapping

- Use of CFIR-ERIC Mapping Tool had issues
- Updated CFIR
  - New constructs
  - Constructs moved to different domains
  - New definitions for constructs
  - Will impact ERIC strategies and CFIR-ERIC Mapping Tool

Case Study 2 Background

- Implementation of electronic blood transfusion safety systems (EVTSS) in hospitals in UK and Netherlands.
- Multi-case method to compare implementation process across three hospital.
- Employed interviews, observations, and document analysis

Horck et al., 2025

Overview of common challenges and solutions to address them.

CFIR domain	Challenges	Solutions
Innovation	IT-systems integration	Tailoring EBTSS features to specific needs (i.e., the necessity of smart fridges)
	Compatibility of hardware	Following national wristband guidelines and adopting universal scanners
		(that aligns with economic replacements)
		Consider wristband protocols in other hospitals
	Vendor rigidity	Seeking smaller, more adaptable technology vendors
Outer setting	Vendor rigidity	Engage in contracts suitable to the hospital (i.e., service-based, product procurement)
		Leveraging user groups and networks to enforce software changes
		Use national guidelines as a pressure tool
	Funding	Utilising different financial strategies
Inner setting	Goal misalignment among primary users	Clear communication about the necessity of implementing EBTSS
	Ineffective training approaches	Considering multiple training options
		(train-the-trainer for less technical based, outsource training for complicated work routine changes)
	Work relations disruptions	Increase awareness of changed processes among the entire health care workforce
Individual setting	Deciding leadership	Leverage the influential statuses of involved individuals
		Construct the project group to consist of all groups impacted by EBTSS
	Bridging nursing and IT	Integrating former nurses as functional application managers
	Creating supportive staff	Appoint ward champions from individuals in (in)formal positions per ward/department
		Create key users based on IT-savvy nurses to give hands-on assistance in the wards/departments
Implementation	Engaging nursing staff in using EBTSS	Strict compliance enforcement through training requirements (i.e., locking smart fridges)
		Refusing old procedures to be processed
		Emphasise the nursing staff's role in continuous development
		Involve the nursing staff in the pre-implementation phase
	Adapt to emergencies	Ensure consistent management support (i.e., post-implementation workgroups)
		Utilise the safe and efficient workarounds driven by expert knowledge of nurses

Horck et al., 2025

Nurses in Implementation Science

- As implementation researchers
  - Focus on the implementation strategies
  - Aiming to generalize the knowledge on implementation strategies
- As implementation practitioner
  - Vital to building support and tailoring implementation strategies and EBIs to local context
  - Use tools and methods developed by implementation research and work with implementation experts at local context

Kirchner et al., 2017

References

Balas EA, Boren SA. Managing clinical knowledge for health care improvement. *Yearb Med Inform*. 2000;09(01):65-70. doi:10.1055/s-0038-1637943

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. *Implement Sci*, *4*, 50. https://doi.org/10.1186/1748-5908-4-50

Eccles MP, Mittman BS. Welcome to implementation science. *Implementation Sci*. 2006;1(1):1, 1748-5908-1-1. doi:10.1186/1748-5908-1-1

Green LW, Ottoson JM, García C, Hiatt RA. Diffusion theory and knowledge dissemination, utilization, and integration in public health. *Annu Rev Public Health*. 2009;30(1):151-174. doi:10.1146/annurev.publhealth.031308.100049

Horck, S., Fahy, N., & Greenhalgh, T. (2025). Implementation challenges of electronic blood transfusion safety systems: Lessons from an international, multi-site comparative case study. *Transf Med*, *35*(1), 48–59. https://doi.org/10.1111/tme.13095

Kilbourne, A. M., Neumann, M. S., Pincus, H. A., Bauer, M. S., & Stall, R. (2007). Implementing evidence-based interventions in health care: Application of the replicating effective programs framework. *Implement Sci*, *2*(1), 42. https://doi.org/10.1186/1748-5908-2-42

Kirchner, J. E., Woodward, E. N., Smith, J. L., Curran, G. M., Kilbourne, A. M., Owen, R. R., & Bauer, M. S. (2016). Implementation science supports core clinical competencies: An overview and clinical example. *Prim Care Companion CNS Disord*, *18*(6). https://doi.org/10.4088/PCC.16m02004

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implement Sci*, *10*, 53. https://doi.org/10.1186/s13012-015-0242-0

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. E. (2015). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implement Sci*, *10*, 21. https://doi.org/10.1186/s13012-015-0209-1

Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Health*, *38*(2), 65–76. https://doi.org/10.1007/s10488-010-0319-7

Sherr K. Introduction to Implementation Science. Lecture presented at: GH 541 Fundamentals of Implementation Science in Global Health; April 02, 2019; Seattle, WA.

Waltz, T. J., Powell, B. J., Matthieu, M. M., Damschroder, L. J., Chinman, M. J., Smith, J. L., Proctor, E. K., & Kirchner, J. E. (2015). Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: Results from the Expert Recommendations for Implementing Change (ERIC) study. *Implement Sci*, *10*(1), 109. https://doi.org/10.1186/s13012-015-0295-0

Weiner, B. J. (2009). A theory of organizational readiness for change. *Implement Sci*, *4*(1), 67. https://doi.org/10.1186/1748-5908-4-67

Thank you!