Implementation Science at a Glance

A Guide for Cancer Control Practitioners

NATIONAL CANCER INSTITUTE

Foreword

Since the National Cancer Institute (NCI) Implementation Science Team was formed within the Division of Cancer Control and Population Sciences some fifteen years ago, we have seen the importance of improving the resources needed to support implementation of evidence-based cancer control interventions. While the team also focuses on efforts to advance the science of implementation, and considers the need to integrate implementation science within the broader field of cancer control and population sciences, we know that unless we support the adoption, implementation, and sustainment of research-tested interventions in community and clinical settings, we will not move very far in reducing the burden of cancer. To that end, we recognize that the advances in our understanding of implementation processes in recent years will have greater benefit if communicated in a way that supports and informs the important work of cancer control practitioners.

This resource, *Implementation Science at a Glance*, is intended to help practitioners and policy makers gain familiarity with the building blocks of implementation science. Developed by our team and informed by our ongoing collaborations with practitioners and policy makers, *Implementation Science at a Glance* introduces core implementation science concepts, tools, and resources, packaged in a way that maps to the various stages that practitioners may find themselves in as they seek to use evidence-based interventions to meet the needs of patients, families, and communities. This resource also includes several case examples of how cancer control organizations have gone through the process of exploring evidence-based interventions, preparing for their integration into varied practice settings, actively implementing them, and evaluating their impact over time.

While we know that the volume of implementation science topics can fill many books, we hope that this resource provides an initial set of valuable and digestible information, along with suggested resources for those interested in learning more. In addition, we hope that this resource can continue to be refined over time, and that you share your experiences in applying this to the betterment of your communities and key constituents. Thank you for all your efforts to address cancer control needs, and thanks in advance for your guidance as we improve the impact of our research.

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Acknowledgments

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Introduction

Implementation Science at a Glance details how greater use of implementation science methods, models, and approaches can improve cancer control practice.

While many effective interventions can reduce cancer risk, incidence, and death, as well as enhance quality of life, they are of no benefit if they cannot be delivered to those in need. Implementation strategies are essential to improve public health. In the face of increasingly dynamic and resource-constrained conditions, implementation science plays a critical role in delivering cancer control practices.

Implementation Science at a Glance provides a single, concise summary of key theories, methods, and considerations that support the adoption of evidence-based cancer control interventions.

Who Is This Guide For?

We wrote this guide for cancer control practitioners who seek an overview of implementation science that is neither superficial nor overwhelming.

Implementation science is a rapidly advancing field. Researchers from many disciplines are studying and evaluating how evidence-based guidelines, interventions, and programs are put into practice.

How Do I Use This Guide?

Implementation Science at a Glance offers a systematic approach to implement your evidence-based, public health program, regardless of where you are in your implementation process. We organized this guide into a four-stage framework: assess, prepare, implement, and evaluate. Each stage poses important questions for practical considerations.

Look for ADDITIONAL RESOURCES , which links to a list of additional resources at the end of this workbook.

While this guide is organized into four distinct stages, these components blend and overlap in practice. We have also included four case studies to illustrate how implementation science plays out in real-world settings.

ASSESS
» Evidence-Based Interventions
» Stakeholder Engagement and Partnerships

PREPARE
» Adaptations
» Fidelity

EVALUATE
» Sustainability
» Scale-Up
» De-Implementation
» Return on Investment

IMPLEMENT
» Theories
» Models
» Frameworks
» Implementation Strategies

What Is Implementation Science and Why Is It Important?

Implementation science is the study of methods to promote the adoption and integration of evidence-based practices, interventions, and policies into routine health care and public health settings to improve the impact on population health.[1]

Implementation science examines how evidence-based programs work in the real world. By using implementation science and implementation strategies, you can help bridge the divide between research and practice—and bring programs that work to communities in need.

Applying implementation science may help you understand how to best use specific strategies that have been shown to work in your (or similar) settings.

By applying implementation science frameworks and models, you may:

» Reduce program costs
» Improve health outcomes
» Decrease health disparities in your community

Assess

Engaging Stakeholders and Partners

People and place matter. Therefore, it is important to seek out stakeholder input throughout your process of preparation and implementation. Consider partnering with researchers to advance your goals. Creating meaningful partnerships will help you:

» **Better understand** your community and its strengths and weaknesses, assets, values, culture, traditions, leaders, and feelings on change

» **Increase the likelihood that your intervention will be adopted** and sustained

» **Ensure that your intervention is relevant** to stakeholders

» **Enhance the quality and practicality** of your efforts

» **Disseminate** your evaluation findings

» Create relationships with academic centers that can help **sustain your program**

Creating and leveraging partnerships with researchers and academic programs can empower communities and create social change. Successful research and community collaboration can be particularly effective in:

» Fostering a willingness to learn from one another

» Building community members' involvement in research

» Benefiting all partners with research outcomes

» Increasing buy-in for your program

What You Can Do: Engage Stakeholders

Stakeholders are people, communities, and organizations that could be affected by a situation. While internal stakeholders participate through coordinating, funding, and supporting implementation efforts, external stakeholders contribute views and experiences in addressing the issues important to them as patients, participants, and members of the community.[2,3]

Ask these questions to identify key stakeholders:

» Who will be affected by what we are doing or proposing?

» Who are the relevant officials?

» What are the relevant organizations?

» Who has been involved in similar situations in the past?

» Who or what is frequently associated with relevant topic areas?

Measuring and assessing outcomes important to stakeholders can have a significant impact on the adoption, implementation, and sustainment of evidence-based practices.

Remember that stakeholder engagement is necessary throughout the entire implementation process. These questions can help guide you as you move through the assess, prepare, implement, and evaluate stages.

Key Questions

ASSESS

» Does your selected evidence-based intervention take stakeholders' goals and needs into account?

PREPARE

» How will stakeholder engagement help achieve program objectives?

» Does your plan include stakeholder engagement on key decisions?

» Can your team engage stakeholders effectively, or will you need to hire experts?

IMPLEMENT

» Did you identify and communicate clear roles for all stakeholders?

» Did you include resources for stakeholder engagement in your implementation plan?

» Are you planning to include stakeholder engagement as you monitor, review, and evaluate your implementation?

EVALUATE

» How will you adjust your implementation plan in response to stakeholder feedback?

» What outcomes are most important to each group of stakeholders and each partner?

Confirming Evidence for an Intervention

Cancer control practitioners make decisions based on various types of evidence: from more subjective evidence—such as their direct experience with the populations they work with—to more objective sources of evidence—including the results of well-designed research studies.

In this resource, we use the terms "interventions," "practices," and "programs" interchangeably. We generally consider an *intervention* to be a combination of *program* components, while a program often groups several interventions together.

An *evidence-based intervention* is a health-focused intervention, practice, policy, or guideline with evidence demonstrating its ability to change a health-related behavior or outcome.[4]

Using evidence-based interventions can not only increase your effectiveness but also help save time and resources.

The less robust the body of evidence supporting a program's effectiveness, the more important it is to evaluate the program and share your results.

OBJECTIVE

SYSTEMATIC REVIEWS

Summaries of a body of evidence made up of multiple studies and recommendations

RESEARCH STUDIES

Individual studies that test a specific intervention

PRACTITIONER REPORTS

Reports, briefs, or evaluations of a strategy in practice

EXPERT OPINION/ PERSONAL EXPERIENCE

Recommendations made by credible groups or individuals that have not yet been tested

SUBJECTIVE

Figure 1. A continuum of evidence to support interventions[5]

What You Can Do:
Make Sure the Intervention Is Evidence-Based

How will you know if an intervention is evidence-based? A quick internet search may suggest a wide variety of interventions, which may or may not be evidence-based. It is important to evaluate these potential sources.

Evaluate existing information on the intervention, and consider:[4]

» Who created the information?
» What types of interventions are highlighted?
» What methods were used to review the evidence?
» What criteria were applied to assess an intervention?
» How current is the evidence?
» Are resources available to help you implement the intervention?

The following resources may provide evidence to support your intervention:

» United States Preventive Services Task Force
» NCI Research-Tested Intervention Programs
» Healthy People Tools and Resources (Healthy People 2020)
» Pew-MacArthur Results First Initiative
» The Guide to Community Preventive Services (The Community Guide)

Choosing an Intervention

While it is important for interventions to be grounded in research and evidence, your program will only be effective if it "fits" your community population and your resources.

When choosing an evidence-based intervention to implement, consider the following:[6]

» Does this intervention fit our community's demographics, needs, values, and risk factors?

» Different interventions will take different amounts of money, labor, and time.

  − Does our organization have the capacity and resources this intervention requires?

  − Do we have the expertise to implement this intervention?

  − Can we engage partners or leverage other resources?

» Does this intervention target our overall goal?

After selecting your intervention, be wary about recommending adaptations without specific guidance, such as from the original developers. Adapting some aspects of an intervention can lead to a "voltage drop": a change in expected outcome when an intervention moves from a research setting into a real-world context.

The following sections can help guide you as you decide to implement an intervention as-is, if it is a good fit, or to first adapt it to your local community.
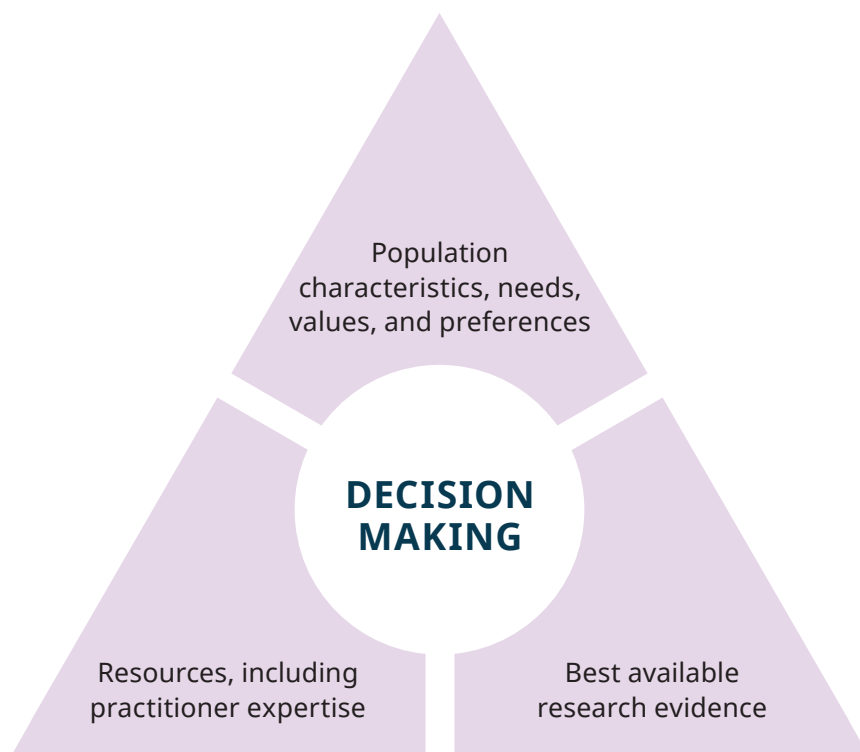
Figure 2. Components to consider when selecting an intervention[7]

ADDITIONAL RESOURCES

Prepare

Maintaining Fidelity

Fidelity refers to the degree to which an evidence-based intervention is implemented without compromising the core components essential for the program's effectiveness.[8,9] Lack of fidelity to the original design or intent makes it difficult to know which version of the intervention was implemented and, therefore, what exactly caused the outcomes.

Why is fidelity important?

One of the most common reasons that practitioners do not get the results they anticipate is that they have not properly implemented the practice or program. To avoid this problem, and to get better results, you must understand the importance of implementing the practice or program as intended.

When interventions implemented with fidelity are compared to those not implemented with fidelity, the difference in effectiveness can be profound. Those implemented with fidelity will have a greater impact on outcomes than those implemented without fidelity.[10]

The **core components** of an intervention relate to its:[11]

» Content – the substance, service, information, or other material that the intervention provides (e.g., screening tests)

» Delivery – how the intervention is implemented (e.g., setting, format, channels, providers)

» Method – how the intervention will affect participants' behavior or environment

Adapting an Intervention

Evidence-based interventions are not one size fits all. You may have to adapt them to better fit the population or local conditions.[12] Adaptations may involve the addition, deletion, expansion, reduction, or substitution of various intervention components.[8,12,13] Core components to adapt to may include the setting, target audience, delivery, or culture.[14]

Adapting an intervention can help improve health equity. For example, organizations that serve communities with limited economic resources, such as local health departments or safety-net health centers, may adapt some parts of the intervention to leverage their resources while still working toward similar outcomes.

Additionally, sharing information about your adaptations and results can contribute to a greater understanding of the full range of factors that impact implementation in high-need and under-resourced areas.

There are many areas in which changes to the original intervention can take place. See Figure 3.

Before adapting an intervention, consider the following:

» Are adaptations necessary?

» How important is it to your partners to adapt this intervention?

» What adaptation would you make?

» Do you have the resources to implement the adapted intervention?

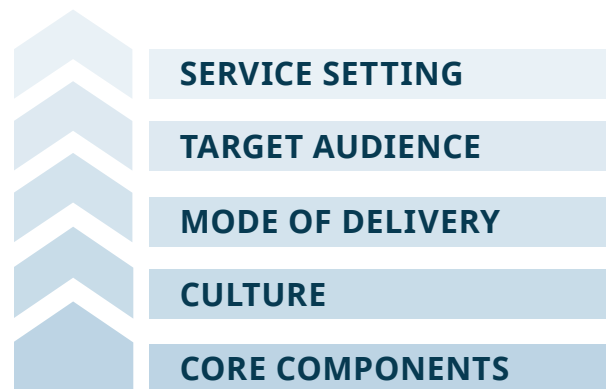SERVICE SETTING

TARGET AUDIENCE

MODE OF DELIVERY

CULTURE

CORE COMPONENTS

Figure 3. Sources of intervention adaptation[14]

What You Can Do: **Balance Fidelity and Adaptations**

Making too many changes to an intervention can reduce its original effectiveness, or worse, introduce unintended and harmful outcomes.

Before making adaptations to the intervention, you should think about how the change to the original intervention can improve the fit to your community, setting, or target population, and at the same time, maintain fidelity to the core components of the original intervention. Think of possible adaptations as you would a green, yellow, or red traffic light: green light changes are usually OK to make; yellow light changes should be approached with caution; and red light changes should be avoided when possible.[12]

GREEN LIGHT CHANGES

» Usually minor
» Made to increase the reach, receptivity, and participation of the community
» May include:
  − Program names
  − Updated and relevant statistics or health information
  − Tailored language, pictures, cultural indicators, scenarios, and other content

YELLOW LIGHT CHANGES

» Typically add or modify intervention components and contents, rather than deleting them
» May include:
  − Substituting activities
  − Adding activities
  − Changing session sequence
  − Shifting or expanding the primary audience
  − Changing the delivery format
  − Changing who delivers the program

RED LIGHT CHANGES
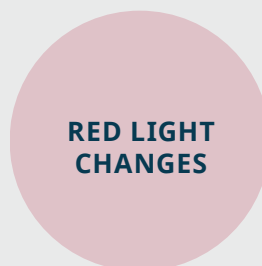
» Changes to core components of the intervention
» May include:
  − Changing a health behavior model or theory
  − Changing a health topic or behavior
  − Deleting core components
  − Cutting the program timeline
  − Cutting the program dosage

What You Can Do: **Use a Systematic Approach to Adaptations**

Try this five-step process when adapting an intervention.[12] The more adaptations you make, the more you will need to re-evaluate the effectiveness of the intervention.

1 — **ASSESS FIT**
and consider adaptation

2 — **ASSESS THE ACCEPTABILITY**
and importance of adaptation

3 — **MAKE FINAL DECISIONS**
about what and how to adapt

4 — **MAKE ADAPTATIONS**

5 — **PRETEST AND PILOT TEST**

Figure 4. A systematic approach to adapt your intervention[12]

Implement

There are multiple theories, models, and frameworks frequently used in implementation science that can guide you as you plan, implement, and evaluate your intervention. While theories, models, and frameworks are distinct concepts, this resource uses them interchangeably.

Implementation science models provide guidance for understanding how to address the gap between identifying an intervention and ensuring its adoption (the research-to-practice gap) and later sustaining the intervention.

By spending the time to understand these underlying processes, you will be better prepared to more rapidly move effective programs, practices, or policies into communities.

Models can help you understand the logic of how your implementation effort creates an impact and offer clear constructs to measure that impact.

Using models can also help you find problem areas at your setting and help guide the selection of implementation strategies. Some models include:

» Diffusion of Innovations

» Consolidated Framework for Implementation Research

» Interactive Systems Framework for Dissemination and Implementation

Diffusion of Innovations

Diffusion of Innovations theory refers to the process by which an innovation is communicated over time through members of a social network.[15] Diffusion consists of four elements:

» The innovation, idea, practice, or object that is intended to be spread

» Communication or the exchange of messages

» A social system, structure, or group of individuals that interact

» A process of dissemination or diffusion that occurs over time

This theory suggests that an innovation, like an evidence-based intervention, will be successful or adopted by individuals when the innovation is diffused or distributed through communities.[16] Tables 1 and 2 describe the theory further.[16]

Table 1. Concepts of Diffusion of Innovations

Constructs	Definition
Innovation	An idea, object, or practice that an individual, organization, or community believes is new
Communication channels	The means of transmitting the new idea from one person to another
Social systems	A group of individuals who together adopt the innovation
Time	How long it takes to adopt the innovation

Table 2. Key Attributes Affecting the Speed and Extent of an Innovation's Diffusion

Constructs	Definition
Relative advantage	Is the innovation better than what it will replace?
Compatibility	Does the innovation fit with the intended audience?
Complexity	Is the innovation easy to use?
Testability	Can you test the innovation before deciding to adopt?
Observability	Are the results of the innovation observable and easily measurable?

Consolidated Framework for Implementation Research

The Consolidated Framework for Implementation Research (CFIR) can help you identify what aspects of your context you should assess during the planning process. CFIR has five domains:[17]

» Intervention characteristics

» Characteristics of individuals involved

» Inner setting

» Outer setting

» Process

Each CFIR domain provides a menu of key factors for you to choose from. The factors have been linked with the effective implementation of interventions. Examples include, but are not limited to:

» Intervention characteristics: relative advantage, complexity, cost

» Characteristics of individuals involved: self-efficacy, knowledge/beliefs about intervention

» Inner setting: culture, readiness for implementation

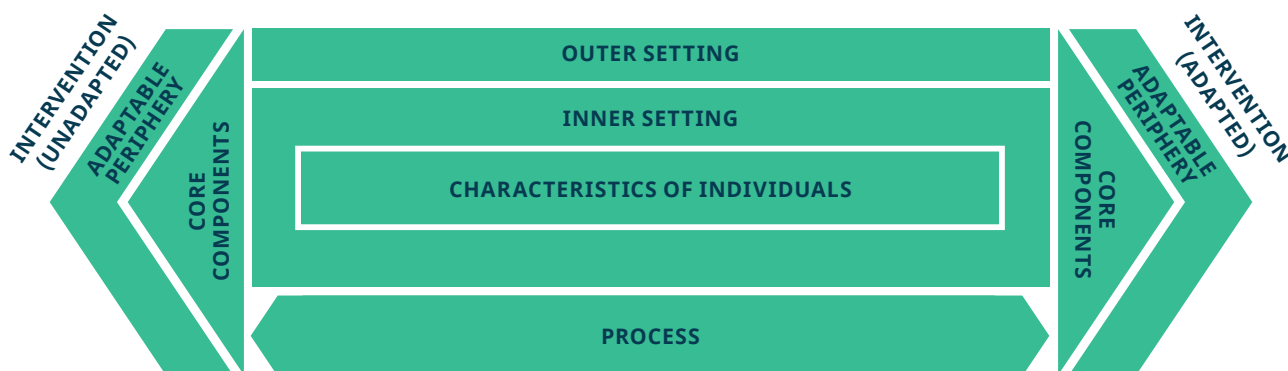» Outer setting: external policy and incentives

» Process: planning, champions

Figure 5. Consolidated Framework for Implementation Research[17]

Interactive Systems Framework for Dissemination and Implementation

The Interactive Systems Framework (ISF) for Dissemination and Implementation was developed to address the "how-to" gap between scientifically determining what works and moving that knowledge into the field for the benefit of the public.[18]

Figure 6 shows the ISF and how it connects three systems to work together for successful dissemination and implementation. The term "system" is used broadly to describe a set of activities that accomplish one of the three identified functions that make dissemination and implementation possible. These systems are:[19]

» **SYNTHESIS AND TRANSLATION SYSTEM** – Here, scientific knowledge is distilled into understandable and actionable information. Research institutions, universities, and NCI are all institutional examples of this system.

» **SUPPORT SYSTEM** – This system supports the work of the other two systems by building the capacity to carry out prevention activities. Agencies like state health departments or state cancer control coalitions are often in the role of prevention support for grantees or local programs.

» **DELIVERY SYSTEM** – This is where innovations are implemented or where "the rubber meets the road." Community-based organizations often function in the role of the prevention delivery system.

As depicted in Figure 6, these three systems work together and are embedded within an underlying context that influences decision making and the adoption of interventions. These underlying conditions include:

» Legislation that supports funding for cancer prevention and control

» The best available theory and research evidence

» The community or organizational context in which interventions are implemented

» Macro-level policy factors such as state or federal budget constraints or legislative changes

These underlying considerations are graphically displayed as the climate in which the three systems exist, and all of these have an impact on successful dissemination and implementation.

Each system within the ISF also builds upon or influences the functions of the other two systems. These relationships and influences are represented by the arrows that connect the systems to each other.

The ISF can offer you a non-exhaustive list of practical considerations and strategies to address each of the three systems involved. These strategies will make up the implementation effort, leading to the population health and implementation outcomes you seek to change.[19,20]
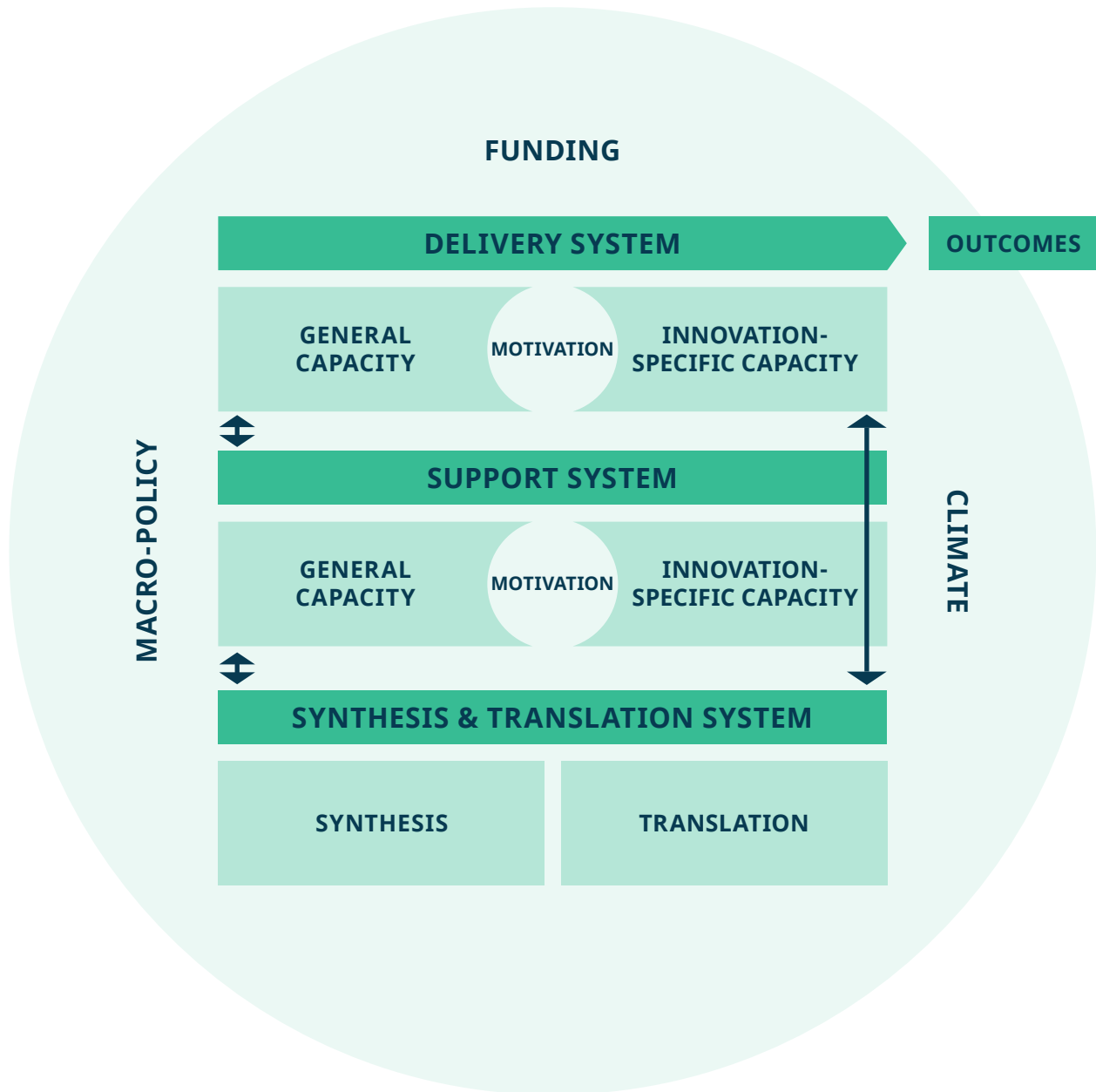
Figure 6. The Interactive Systems Framework for Dissemination and Implementation[19]

Implementation Strategies

Implementation strategies are the "how-to" components of interventions.[4,21] Think of these as ways to implement evidence-based practices, programs, and policies.

Implementation strategies are the essential components of implementation science but are often not adequately described nor labeled properly. A commonly used definition pitches them as "specific methods or techniques used to enhance the adoption, implementation, and sustainability of a public health program or practice."[21] It is important to note that an implementation strategy focuses on improving implementation outcomes such as acceptability, adoption, appropriateness, feasibility, costs, fidelity, penetration, and sustainability.

Recent progress has been made to identify and define strategies relevant to the health care context, which resulted in a list of seventy-three distinct strategies.[22] These strategies can be grouped into eleven categories as shown in Figure 7. This list provides a good starting point to understand the different types of strategies that have been used and tested previously, and also facilitates the selection of strategies that might be relevant to your practice context.

CONVENE TEAMS

DEVELOP STAKEHOLDER INTERRELATIONSHIPS

PRACTICE FACILITATION

UTILIZE FINANCIAL STRATEGIES

PROVIDE INTERACTIVE ASSISTANCE

ENGAGE CONSUMERS

SUPPORT PRACTITIONERS

USE EVALUATION PLAN AND INTERACTIVE STRATEGIES

ADAPT AND TAILOR TO CONTEXT

CHANGE INFRASTRUCTURE

TRAIN AND EDUCATE STAKEHOLDERS

Examples of "Train and Educate Stakeholders" Strategies

» Conduct educational outreach visits
» Use train-the-trainer strategies
» Create a learning collaborative
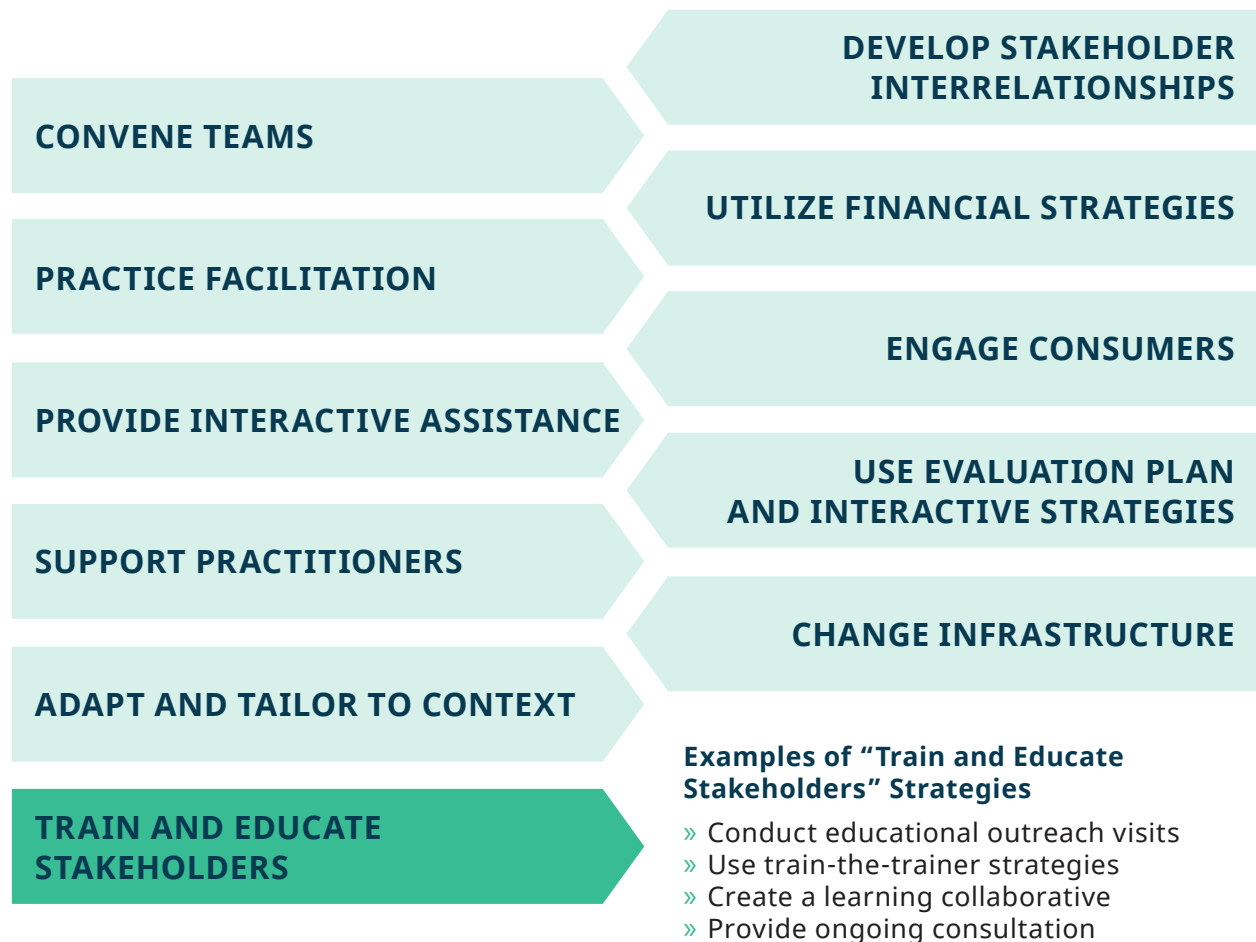» Provide ongoing consultation

Figure 7. Implementation strategy categories and examples[23]

What You Can Do: **Identify Implementation Strategies**

To maximize the potential of your implementation efforts, it is important that you select strategies that fit your local context.

Discuss with stakeholders the factors that may influence how your intervention is implemented. Their perspectives can provide important insights about the community and other contexts. Generating a list of these contextual considerations can be an important step to determine which implementation strategies best fit the local context. Table 3 illustrates how, once you have this list, you may select strategies to address these determinants.

It is rare to use a single strategy during implementation. Selecting multiple strategies to address multiple barriers to implementing the intervention may be necessary. You may also need to select different strategies in different phases of implementation.

Methods such as concept mapping and intervention mapping may also help you select relevant implementation strategies.[24]

Table 3. Selecting Strategies Based on Influential Factors

Identified Factor		Implementation Strategy
YOUR DETERMINANT	❯	YOUR STRATEGY
Lack of knowledge	❯	Interactive education sessions
Beliefs or attitudes	❯	Peer influence or opinion leaders
Community-based services	❯	Process redesign

ADDITIONAL RESOURCES

Evaluate

What to Evaluate

Is what we're doing working? ➤ *Why or why not?* ➤ *How do we show the value of the work we do?*

Evaluation is the systematic collection of information about activities, characteristics, and results of programs to assess the program and implementation outcomes.[25]

Depending on what you and your organization prioritize, you can choose specific outcomes you want to target, define what success would look like, and then evaluate your success.

Key Outcomes

There are many outcomes that you can evaluate to assess or determine whether your implementation efforts were successful.

There are **distinct categories of outcomes** you can evaluate in implementation science:

- » Implementation outcomes
- » Program outcomes
- » Community outcomes
- » Individual outcomes

The differences between these are important. Implementation outcomes assess the effects of implementation efforts, while community and individual outcomes assess the effects of the intervention. If your intervention does not achieve community or individual outcomes as expected, it is important to know whether the failure is due to ineffectiveness of the intervention in your setting or to ineffective *implementation* of the intervention. To evaluate implementation, you must assess implementation outcomes.

As depicted in Table 4, **implementation outcomes** have three important functions:[26]

- » Indicators of implementation success
- » Proximal indicators of implementation process
- » Key intermediate outcomes that impact community- and individual-level outcomes

Table 4. Key Outcomes in Implementation Science

Implementation Outcomes	Program Outcomes	Community Outcomes	Individual Outcomes
» Acceptability » Adaptation » Adoption » Appropriateness » Feasibility » Fidelity » Maintenance » Penetration » Sustainability	» Cost-effectiveness » Effectiveness » Equity » Reach	» Access to care » Access to fresh produce » Built environment » Disease incidence » Disease prevalence » Health disparities » Immunization and vaccination » Walkability	» Longevity » Physical activity and fitness » Social connectedness » Quality of life

Measurement Tools

Measurements of some implementation outcomes can be captured by examining attitudes, opinions, intentions, and behaviors.[26] Additional measures for assessing implementation outcomes can be found through the Society for Implementation Research Collaboration.

What You Can Do: **Choose Outcomes to Measure**

Table 5 defines nine implementation outcomes, their most relevant stage during implementation, and some methods to measure them.[26]

Table 5. Implementation Outcomes

Implementation Outcome	Definition	Implementation Stage	Ways to Measure
Acceptability	Perception among stakeholders that the program is agreeable to the intervention	Early for adoption Ongoing for penetration Late for sustainability	Survey interviews Administrative data
Adoption	Intention among stakeholders to employ an intervention	Early to mid	Administrative data Observation interviews Survey
Appropriateness	Perceived fit of the innovation or intervention for a given setting/population/problem	Early (prior to adoption)	Survey Interviews Focus groups
Effectiveness	Impact of an intervention on important outcomes	Mid to late	Observation Interviews
Feasibility	Extent to which the intervention can be successfully used within a given setting	Early (during adoption)	Surveys Administrative data
Fidelity	Degree to which an intervention was implemented as intended by the program developers	Early to mid	Observation checklists Self-reporting
Implementation cost	Cost impact of an implementation effort	Early for adoption and feasibility Mid for penetration Late for sustainability	Administrative data
Penetration	Integration of an intervention within a community, organization, or system	Mid to late	Program audits Checklists
Sustainability	Extent to which the intervention is maintained over time	Late	Program audits Interviews Checklists

How to Evaluate

A number of approaches are available to structure your evaluation and provide a better understanding of how and why your implementation efforts succeed or fail.[27] While the following is not an exhaustive list, it provides a summary of evaluation approaches and frameworks often used by practitioners to address the pragmatic needs of their context.

Logic Models

Logic models are a visual representation of how a program is expected to produce desired outcomes.[28] A logic model can be used in the development, planning, and evaluation phases of your program implementation, but for the purposes of this guide, logic models will be used as an evaluation tool. In using a logic model, you can identify the interrelationships of your inputs and activities, and how they relate to your desired short-term, mid-term, and long-term outcomes to be measured.

INPUTS → INTERVENTION → ACTIVITIES → OUTPUTS & OUTCOMES → LONG-TERM OUTCOMES

CONTEXTUAL AND EXTERNAL FACTORS
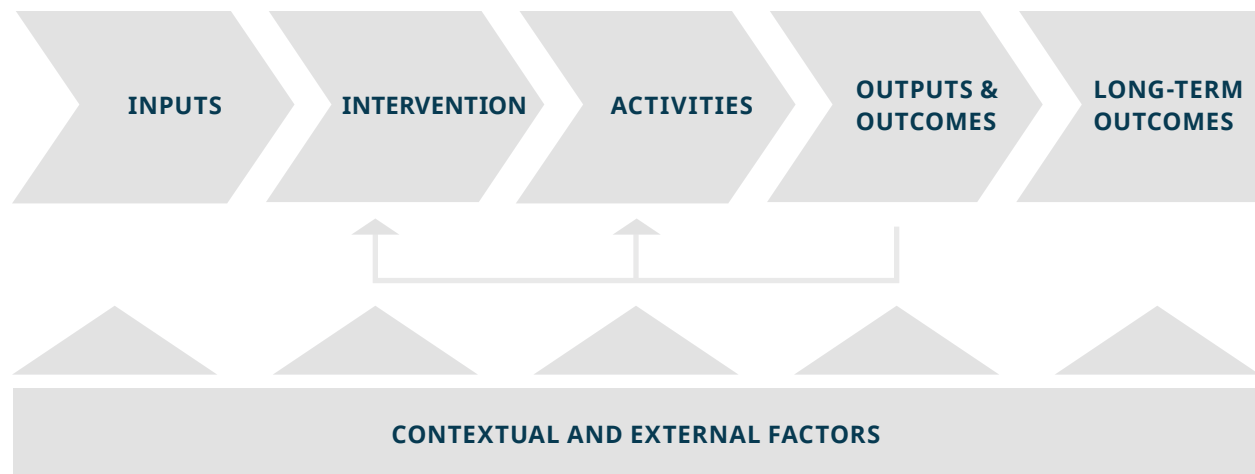
Figure 8. Simplified logic model[28]

Evaluability Assessments

Evaluability assessments are a useful evaluation approach if your program is new or premature for evaluation.[29,30] These assessments require developing a logic model with all the stakeholders involved. Evaluability assessments are highly participatory and result in stakeholders reporting on five findings:

» Plausibility

» Areas of program development

» Evaluation feasibility

» Options for further evaluation

» Critique of current data availability

Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) Framework

You can use the RE-AIM framework to inform your planning, evaluation, and reporting, but it is most often used for implementation evaluation.[31] RE-AIM is an especially useful tool for practitioners because it was created in response to the need for attention to external validity, or the extent to which the implemented intervention would be generalizable to other real-world settings.[32,33]

Table 6. Defining RE-AIM Constructs

Construct	Definition
Reach	The number, proportion, and representativeness of individuals who are willing to participate in an intervention
Effectiveness	The impact of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes
Adoption	The absolute number, proportion, and representation of settings and intervention agents who are willing to initiate an intervention
Implementation	The intervention agents' fidelity to the various components of an intervention's protocol (e.g., delivery as intended)
Maintenance	The extent to which an intervention or policy becomes institutionalized or part of routine practice and policy

Economic Evaluation

Economic evaluations will be useful to you if you are interested in the affordability of your implementation efforts in achieving individual and community outcomes.[34] A very expensive intervention that produces small improvement in outcomes is less appealing than another intervention that produces the same outcome at a fraction of the cost. Economic evaluations help you quantify cost-effectiveness and can help justify scaling up the intervention in the future.

Sustainability

Your intervention can only deliver population benefits if you are able to sustain your activities over time. Sustainability describes the extent to which an evidence-based intervention can continue to be delivered, especially if external support or funding ends.[35]

You will only be able to sustain effective implementation efforts if you keep evaluating and adapting it to your setting and population. Therefore, after you evaluate your efforts, you should reassess and continue sustaining the implementation.

What You Can Do: **Sustain Your Intervention Program**

Consider the following **eight core domains** to increase the intervention's capacity for sustainability.[36,37] These domains were developed by practitioners, scientists, and funders from several public health areas.

You can use the Program Sustainability Assessment Tool to understand factors that influence your intervention's capacity for sustainability and develop an action plan to increase the likelihood of sustainability. The tool helps identify your organization's sustainability strengths and weaknesses and can guide your sustainability planning.

Factors Influencing Sustainability

FUNDING STABILITY
Establishing a consistent financial base for your program

PARTNERSHIPS
Cultivating connections between your program and its stakeholders

PROGRAM ADAPTATION
Changing your program to ensure its ongoing effectiveness

STRATEGIC PLANNING
Using processes that guide your program's direction, methods, and goals

POLITICAL SUPPORT
Maintaining relationships with internal and external stakeholders who support your program

ORGANIZATION CAPACITY
Having the internal support and resources needed to effectively manage your program and its activities

PROGRAM EVALUATION
Assessing your program to inform planning and document results

COMMUNICATIONS
Exchanging information about your program with stakeholders and the public

Scaling Up

If the intervention has been successful in your setting, you or your organization might be considering "scale-up." Scaling up is the deliberate effort to increase the impact of successful interventions so that they can benefit more people and foster sustainability.[38] You can scale-up your implementation effort in three ways, as shown in Figure 9.

Scaling up requires a new examination of your partnerships and resources to decide if there is evidence to support the adapted intervention.

VERTICAL

Adoption by different jurisdictions for policy-based, systematic, and structural change

HORIZONTAL

Expansion across the same system levels, such as departments, organizations, sectors

DEPTH

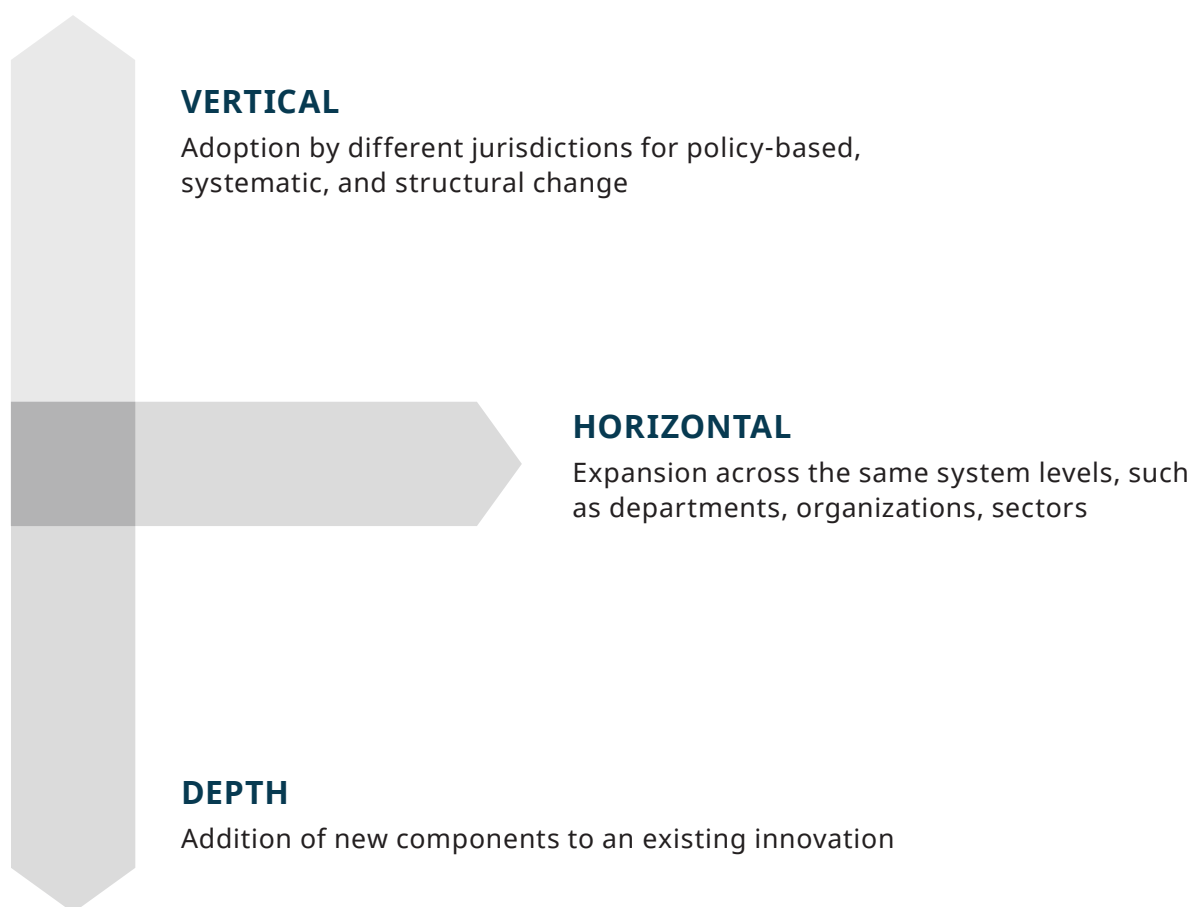Addition of new components to an existing innovation

Figure 9. Potential directions for scaling up in population public health[39]

What You Can Do: **Proceed in Increments and Closely Monitor Your Progress**

Multiple conditions and external institutions affect the process and prospects for scale-up. The environment presents many opportunities and obstacles that must be identified and addressed when deciding how you are going to scale up. You can use these steps and the scale-up framework to systematically plan and manage the scale-up process:[40]

1. Plan actions to increase scalability of your intervention.

2. Increase the user organizations' capacity to scale up.

3. Assess the conditions of your environment (e.g., policies, bureaucracy, health and other sectors, socioeconomic and cultural context, people's needs and rights).

4. Increase the capacity of the resource team and implementers.

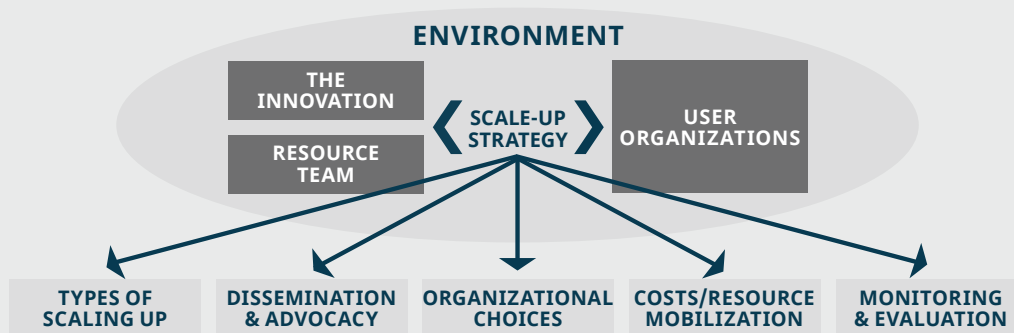5. Make strategic choices appropriate for your scale-up.

Figure 10. The ExpandNet/WHO framework for scaling up

Table 7. Considerations for Scale-Up

Strategic Choices	Issues to Consider When Choosing Strategies
Types of scaling up	» Vertical scaling up – institutionalization through policy, political, legal, budgetary, or other health systems change » Horizontal scaling up – expansion, replication
Dissemination and advocacy	» Personal – training, technical assistance, policy dialogue, cultivating champions and gatekeepers » Impersonal – websites, publications, policy briefs, toolkits
Organizational process	» Scope of scaling up (the extent of geographic expansion and levels within the health system) » Pace of scaling up (gradual or rapid) » Number of agencies involved
Cost/resource mobilization	» Assessing costs » Linking scale-up to macro-level funding mechanisms » Ensuring adequate budgetary allocation
Monitoring and evaluation	» Special indicators to assess the process » Outcome and impact of scaling-up » Service statistics » Local assessments

De-Implementing

De-implementation is the process of reducing or stopping the use of a practice, intervention, or program. There are many reasons why a public health agency, organization, or department may purposely choose to reduce (in terms of frequency or intensity) the delivery of a practice to a target population, or choose to stop offering the practice to a target population entirely.

Practices that may be appropriate for de-implementation include those that are:

» Ineffective (e.g., evidence shows the practice does not work)

» Contradicted (e.g., new and stronger or more robust evidence shows the practice doesn't work)

» Mixed (e.g., some evidence shows that the practice works but other evidence shows that it doesn't work)

» Untested (e.g., programs that have not yet been evaluated in a research study)

Determining what practice to de-implement and how quickly is influenced by many factors, including how widespread the practice is in use, what resources are allocated for implementing the program that might otherwise be spent on offering effective practices, and the needs of the target population.

De-implementation also should include multiple stakeholders, planning, and consideration of multi-level factors that can influence the de-implementation of a practice. In addition, frameworks, models, and theories that can help inform and guide the use of strategies facilitate the de-implementation process. Frameworks specifically focused on de-implementation, and identification of strategies most effective for facilitating the de-implementation process, are of increasing interest among researchers, practitioners, and policy makers.

What You Can Do: Follow These Steps for De-Implementation

1. Identify and prioritize practices that may be appropriate for de-implementation.
   a. Is your organization offering practices that are no longer needed by the community?
   b. Is there a more pressing or important health issue that should be addressed instead?

2. Gather information on potential barriers to the de-implementation process.
   a. Will personnel or organizational changes be needed if the practice is no longer offered?
   b. Will de-implementing the practice reduce collaborative opportunities with community partners?

3. Identify strategies that are needed to overcome the de-implementation barriers.
   a. Will an alternative practice be introduced to replace the one that is being removed? What training is available for the new practice?
   b. What communication is needed to educate the community on why a practice is no longer being offered?

4. Implement and evaluate strategies to support de-implementation.
   a. Can you identify alternative practices that could be used to meet the needs of the community while maintaining strong community linkages?
   b. Can you allocate resources to another important issue or public health practice?

ADDITIONAL RESOURCES

Case Studies

See how cancer control practitioners use implementation science to deliver effective interventions in their communities.

West Virginia Program to Increase Colorectal Cancer Screening

The West Virginia Program to Increase Colorectal Cancer Screening (WV PICCS) was funded by the Centers for Disease Control and Prevention and directed through the West Virginia University Cancer Institute. The program aimed to increase colorectal cancer screening rates in persons aged 50–75 by partnering with health care systems across West Virginia. The intervention sought to change protocols within health care systems, such as primary care practices, to increase referral and completion of colorectal cancer screenings.

Each year, WV PICCS partnered with a different cohort of primary care clinics to help increase their colorectal cancer screening rates. The program prioritized partner clinics serving areas with high rates of colorectal cancer mortality and late-stage diagnosis. To date, WV PICCS has partnered with forty-four clinics around the state.

WV PICCS further partnered with health systems to implement at least two evidence-based interventions and supportive activities shown to increase colorectal cancer screening. As part of the WV PICCS project, every clinic undertook a provider assessment and feedback intervention. Each clinic chose to deliver an additional intervention method they believed would be the best "fit" for both their clinic as well as their patient population.

❯ ASSESS

To help clinics identify and select the second intervention, each health system and WV PICCS collaboratively assessed the clinic's capacity, interests, and workflow, among other factors. As a result, clinics could choose to implement enhanced client reminders, provider reminders, or structural barriers reduction programs to increase the recommendation for and completion of screening. The most frequently implemented project was the enhanced call reminder program to encourage patients to complete and return fecal immunochemical tests to the clinic.

❯ PREPARE

WV PICCS staff worked with the health care systems to help tailor the enhanced call reminder intervention to best fit the clinics' workflow and ensured the protocol was adapted to fit the setting. For example, while several clinics opted to have nurses place the reminder calls, in different clinics, lab technicians or care coordinators made the calls.

❯ IMPLEMENT

WV PICCS worked with the clinics over a two-year, two-phase implementation period. WV PICCS leveraged multiple implementation strategies, such as patient navigation and media outreach, to enhance the intervention implementation and uptake.

WV PICCS provided technical assistance by a staff member to clinics extensively during the project's first year. Assigning a staff member to provide the assistance for each clinic provided tailored technical support and monthly facilitation meetings and helped monitor changes to each clinic's care delivery system.

In the second year, the technical assistance was reduced to once a month. This tapering allowed the clinic and WV PICCS to assess the clinic's capability to sustain the new interventions over time.

❯ EVALUATE

WV PICCS used the "plan, do, study, act" evaluation cycles to support their implementation and evaluation efforts. In keeping with their model, during the second year of the initiative, data collection began to assess clinical capacity to sustain the improved colorectal cancer screening rate.

LESSONS LEARNED

The call reminders were originally proposed as up to three calls followed by a letter. Knowing it is important that interventions fit the clinical culture, WV PICCS adapted the intervention to allow clinics to send reminders via letter first, if it better suited their workflow. WV PICCS listened to the clinics when they provided feedback and adjusted the protocol.

As partners, you need to listen.

Kukui Ahi (Light the Way): Patient Navigation

Racial and ethnic disparities affect rates of cancer screening. For example, Asian Americans are less likely than non-Hispanic Whites to undergo timely cervical and colorectal screening, and Native Hawaiians are less likely than non-Hispanic Whites to get a mammogram.[41] These disparities may be due to a combination of health system, provider, and patient factors that decrease access to care and lower patients' capacity to advocate for their needs. Interventions that promote accessible and coordinated care may have the potential to increase screening and reduce delays in time to diagnosis and treatment after abnormal screenings.

The intervention "Kukui Ahi (Light the Way): Patient Navigation" used lay-patient navigators from the local community. In coordination with health care providers, the lay-patient navigators support Medicare recipients through education, coordinating screenings, providing transportation, assisting with paperwork, and finding ways to pay for care. They aimed to increase screening rates for colorectal, cervical, breast, and prostate cancers among Asian and Pacific Islander Medicare beneficiaries.

❯ ASSESS

The idea of implementing a patient navigation intervention came from community partners of the 'Imi Hale Native Hawaiian Cancer Network ('Imi Hale). The 'Imi Hale team consequently examined current patient navigation programs, such as the patient navigation intervention at Harlem Hospital, and looked for ways in which they could adapt it for the populations of the Hawaiian Islands.

❯ PREPARE

To create a comprehensive training curriculum for the lay-patient navigators implementing the program, 'Imi Hale conducted a needs assessment that involved interviewing and collaborating with public health practitioners, doctors, community health workers, cancer nurses, and other stakeholders at the hospital. Additionally, they maximized opportunities to build relationships between community outreach workers and hospital-based providers by inviting both to the training.

Given the diversity of the population that 'Imi Hale served, there were three different training modules created for the lay-patient navigators. Although there was variety in intervention implementation, there were fourteen key navigator competencies that were consistently included across all trainings.

❯ IMPLEMENT

One of the reasons why 'Imi Hale believes they were able to recruit and retain such dedicated lay-patient navigators is because of their investment in building the navigators' capacity through ongoing training. The team sent their navigators to trainings that occurred in places like New York City and Michigan so that their navigators could build their network and capacity. The team also created a dynamic training atmosphere where they emphasized that the lay-patient navigators were not expected to know everything necessary during the implementation process; rather, their role was to be an active learner and find the resources needed to assist their patients.

〉 EVALUATE

With many programs and interventions, an important factor for sustainability is the availability of funding. Aside from collaborating with community health centers and their grant writers, who help in attaining continual funding, the navigation curriculum was converted into a community college course where many navigators received training. Creating a standardized training was useful in the move to certify navigators and establish mechanisms for reimbursement for navigation services.[42] Additionally, the team used a task list to ensure fidelity of program delivery. This list included tasks required across the cancer care continuum related to evaluation and quality assurance of intervention implementation.[42]

LESSONS LEARNED

Creating meaningful partnerships for successful program implementation and thinking ahead about sustainability can seem like a daunting task. However, the one lesson that the team came to understand is that when you are proactive in sharing the vision with everyone on your team, unexpected resources and people power will subsequently present themselves. When your team shares that vision of program implementation, the tasks become less daunting.

> *Share your vision with everyone on your team.*

Tailored Communication for Cervical Cancer Risk

While overall rates of cervical cancer have decreased in the United States, racial and ethnic minorities face a greater incidence of and death from the disease.[41] The most widely used screening for cervical cancer is the Pap test. Women who receive an abnormal Pap test result are referred for follow-up testing (colposcopy).[41] Low rates of follow-up after an abnormal Pap test result may contribute to the higher incidence of cervical cancer among low-income, minority women. Interventions that target barriers faced by low-income minority women are essential to redress cervical cancer.

Tailored Communication for Cervical Cancer Risk is a telephone counseling intervention developed by Fox Chase Cancer Center. The intervention targeted at-risk women who received an abnormal Pap test result and were scheduled for follow-up testing. Two to four weeks prior to their colposcopy appointment, interviewers called each woman and, using a scripted questionnaire, identified barriers to follow-up and provided tailored counseling messages. The messages address these barriers and encouraged women to attend an initial colposcopy appointment and, six and twelve months later, repeat Pap test and colposcopy appointments.

〉 ASSESS

Delivering this intervention over the telephone leveraged readily accessible resources.

〉 PREPARE

In advance of the project, Fox Chase Cancer Center created a scripted questionnaire to ensure that the intervention was delivered as planned.

Fox Chase established partnerships with health care providers—particularly those in leadership positions. By working with nurse managers, they learned about the clinic workflow and how best to manage nurses' competing priorities during intervention implementation. Additionally, their community engagement approach allowed them to identify different populations' perceived notions of the best times to call, how often to call, and the most relevant and appropriate counseling messages to deliver.

〉 IMPLEMENT

Many strategies supported the program's successful implementation. For example, Fox Chase engaged a new clinical team to conduct recruitment and deliver the intervention at an offsite facility. This ensured that there was dedicated staff trained to deliver the intervention and that support was available. Insights from community members and their review of the tailored messages were also key in ensuring the intervention fit the target population.

❯ EVALUATE

The evaluation found the intervention to be successful in both increasing the number of women who attended an initial colposcopy appointment as well as longer-term medical follow-up.[41] Integrating the intervention into the standard care practice ensured its uptake and sustainability. Hiring designated staff to deliver the intervention and engaging stakeholders throughout the process further ensured program fidelity.

LESSONS LEARNED

Program director Suzanne Miller reflected that involving research staff, clinic leadership, and community members from the onset supported their success. "It will be exhausting and time consuming, but that is what is going to set you up for success."

Have all stakeholders involved on day one.

LIVESTRONG® at the YMCA

Physical activity plays an essential role in enhancing the length and quality of life for cancer survivors. Aside from cancer-specific outcomes, the benefits of exercise include increased flexibility and physical functioning as well as improvements in patient-reported outcomes such as fatigue.

The LIVESTRONG at the YMCA program was developed to improve the well-being of adult cancer survivors following a cancer diagnosis.[43] The twelve-week physical activity program included two ninety-minute personalized exercise sessions per week, delivered in a small, supportive environment.

〉 ASSESS

LIVESTRONG at the YMCA began as an evidence-informed physical activity program that drew from studies showing that physical activity is safe for and beneficial to cancer survivors.[43] Since then, LIVESTRONG at the YMCA has had wide-reaching impact and has shown to improve the physical activity, fitness, quality of life, and reduce cancer-related fatigue in its participants.[44]

〉 PREPARE

Although LIVESTRONG at the YMCA has spread across 245 different Y associations, the program has maintained its centralized vision and program goal. Core components of the program—a functional assessment at the beginning and end of the program and the delivery of the program by a certified YMCA instructor—are consistently implemented across the local Ys.

YMCA-certified instructors are usually existing staff, external individuals, past participants, or volunteers who meet the certification requirements. The flexibility of who delivered the program as well as the required training has allowed for the adoption of this program in 700 communities across the nation.

One of the challenges that LIVESTRONG at the YMCA faced is that its onsite mode of delivery may make access to the program difficult for some YMCAs. YMCAs that did not have the capacity to host the program due to a lack of trained staff or available exercise equipment were able to sign on to an agreement with larger YMCAs to help build their readiness to implement.

Program directors at the Y attributed their continued success to meaningful partnerships they formed and nurtured with LIVESTRONG. LIVESTRONG provides not only financial support but also additional services such as patient navigation and resource books. The Y integrated these services into their usual operations.

❯ IMPLEMENT

The national partnership between LIVESTRONG and YMCA is enhanced by strong local partnerships. One key implementation strategy was a six-month capacity-building training required prior to program delivery. A key aspect of this training focused on helping local Ys collaborate with their community's health system. These local-level partnerships engaged the Y with cancer survivors, health care providers, and patients, expanding the reach of the program.

❯ EVALUATE

The goal of LIVESTRONG at the Y is to reach 100,000 cancer survivors by the year 2022. Participating YMCAs regularly collect data to track their progress and program delivery. The YMCA will soon launch a centralized reporting system to help with consistent evaluations across the Ys.

LESSONS LEARNED

When asked to reflect on the factors that contribute to the spread and uptake of LIVESTRONG at the YMCA, program directors and practitioners credited the time spent in preparation and in giving organizations the time to build the program. Investing in the time necessary to identify local staff and partners, develop a partnership pathway, and sustain meaningful relationships was central to their success.

You cannot undervalue the laying of groundwork and giving organizations the time to build.

Implementation Resources for Practitioners

Here are some resources to help further your implementation efforts.

CANCER PREVENTION AND CONTROL RESEARCH NETWORK – PUTTING PUBLIC HEALTH EVIDENCE IN ACTION TRAINING
An interactive training curriculum to teach community program planners and health educators to use evidence-based approaches, including how to adapt programs.
http://cpcrn.org/pub/evidence-in-action/#

CANCER CONTROL P.L.A.N.E.T. (PLAN, LINK, ACT, NETWORK WITH EVIDENCE-BASED TOOLS)
A portal that provides access to data and resources that can help planners, program staff, and researchers design, implement, and evaluate evidence-based cancer control programs.
https://cancercontrolplanet.cancer.gov/planet

THE COMMUNITY GUIDE
A searchable collection of evidence-based findings of the Community Preventive Services Task Force. It is a resource to help select interventions to improve health and prevent disease in a state, community, community organization, business, health care organization, or school.
www.thecommunityguide.org

CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH – TECHNICAL ASSISTANCE WEBSITE
A site created for individuals considering the use of this framework to evaluate an implementation or design an implementation study.
http://cfirguide.org

DISSEMINATION AND IMPLEMENTATION MODELS IN HEALTH RESEARCH AND PRACTICE
An interactive database to help researchers and practitioners select, adapt, and integrate the dissemination and implementation model that best fits their research question or practice problem.
http://dissemination-implementation.org

EXPANDNET/WHO SCALING-UP GUIDE
Tools that provide a more comprehensive examination of scaling-up. Includes guides, worksheets, briefs, and more.
http://expandnet.net/tools.htm

HEALTHY PEOPLE 2020 EVIDENCE-BASED RESOURCES
A searchable database with interventions and resources to improve the health of your community.
www.healthypeople.gov/2020/tools-resources/Evidence-Based-Resources

LIVESTRONG AT THE YMCA
A physical activity program developed by the YMCA and the LIVESTRONG Foundation. The program assists those who are living with, through, or beyond cancer to strengthen their spirit, mind, and body.
www.ymca.net/livestrong-at-the-ymca

NIH EVIDENCE-BASED PRACTICE AND PROGRAMS
A collection of several databases and other resources with information on evidence-based disease prevention services, programs, and practices with the potential to impact public health.
https://prevention.nih.gov/resources-for-researchers/dissemination-and-implementation-resources/evidence-based-programs-practices#topic-13

PARTNERSHIPS ENGAGING STAKEHOLDERS TOOLKIT
A set of resources to help program planners who are working in partnerships to improve policy.
www.pmc.gov.au/sites/default/files/files/pmc/implementation-toolkit-3-engaging-stakeholders.pdf

PEW-MACARTHUR RESULTS FIRST INITIATIVE
A resource that brings together information on the effectiveness of social policy programs from nine national clearinghouses.
https://www.pewtrusts.org/en/projects/pew-macarthur-results-first-initiative

PROGRAM SUSTAINABILITY ASSESSMENT TOOL (PSAT)
A 40-question self-assessment that program staff and stakeholders can take to evaluate the sustainability capacity of a program. Use the results to help with sustainability planning.
https://sustaintool.org

REACH, EFFECTIVENESS, ADOPTION, IMPLEMENTATION, AND MAINTENANCE (RE-AIM) FRAMEWORK
Resources and tools for those wanting to apply the RE-AIM framework. Includes planning tools, calculation tools, measures, checklists, visual displays, figures, an online RE-AIM module, and more.
http://www.re-aim.org

A REFINED COMPILATION OF IMPLEMENTATION STRATEGIES: (ERIC) PROJECT
A list of strategies you can use to implement your program.
https://implementation-science.biomedcentral.com/articles/10.1186/s13012-015-0209-1

RESEARCH-TESTED INTERVENTION PROGRAMS
A searchable database with evidence-based cancer control interventions and programs specifically for program planners and public health practitioners.
https://rtips.cancer.gov/rtips/index.do

UNITED NATIONS OFFICE ON DRUGS AND CRIME (UNODC) EVALUABILITY ASSESSMENTS
A template to examine whether your program can be evaluated in a reliable and credible way.
www.unodc.org/documents/evaluation/Guidelines/Evaluability_Assessment_Template.pdf

Glossary of Terms

ADAPTATION – The degree to which an evidence-based intervention is changed to suit the needs of the setting or the target population.[8,13]

ADOPTION – A decision to make full use of an innovation, intervention, or program as the best course of action available. Also defined as the decision of an organization or community to commit to and initiate an evidence-based intervention.[13]

COMMUNITY-BASED PARTICIPATORY RESEARCH (CBPR) – A collaborative approach to research that equally involves all partners in the research process and recognizes the unique strengths that each brings. CBPR begins with a research topic of importance to the community and aims to combine knowledge with action to drive social change to improve health outcomes and eliminate health disparities.[45]

CONSTRUCTS – Concepts developed or adopted for use in a theory. The key concepts of a given theory are its constructs.[46]

DE-IMPLEMENTATION – Reducing or stopping the use of a guideline, practice, intervention, or policy in health care or public health settings.[47]

DISSEMINATION SCIENCE – The study of targeted distribution of information and intervention materials to a specific public health or clinical practice audience. The intent is to understand how best to spread and sustain knowledge and the associated evidence-based interventions.[48]

EVIDENCE-BASED INTERVENTION – Health-focused intervention, practice, program, or guideline with evidence demonstrating the ability of the intervention to change a health-related behavior or outcome.[4]

FIDELITY – Degree to which an intervention or program is implemented as intended by the developers and as prescribed in the original protocol.[8,9]

IMPLEMENTATION OUTCOMES – The effects of deliberate and purposive actions to implement new treatments, practices, and services. Implementation outcomes may include acceptability, feasibility, adoption, penetration, appropriateness, cost, fidelity, and sustainability.[26]

IMPLEMENTATION SCIENCE – The study of methods to promote the adoption and integration of evidence-based practices, interventions, and policies into routine health care and public health settings to improve the impact on population health.

IMPLEMENTATION STRATEGIES – Methods or techniques to enhance the adoption, implementation, and sustainability of a program or practice.[21,49]

KNOWLEDGE SYNTHESIS – A process for obtaining and summarizing scientifically derived information, including evidence of effectiveness (risk and protective factors, core components, and key features, etc.).[18]

KNOWLEDGE TRANSLATION – The process of converting scientific and technically complex research into everyday language and applicable actionable concepts in the practice setting.[18]

REACH – The absolute number, proportion, and representativeness of individuals who participate in a given initiative or receive a specific intervention.[26]

SCALE-UP – Deliberate efforts to increase the spread and use of innovations successfully tested in pilot or experimental projects to benefit more people and to foster policy and program development.[38]

SUSTAINABILITY – The continued use of program components and activities to achieve desirable outcomes.[35]

SERVICE EFFECTIVENESS OUTCOMES – Intervention results examined at the system level, including efficiency, safety, effectiveness, equity, patient-centeredness, and timeliness.[26,50]

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