

Implementation Science

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Abstract

Implementation science has developed rapidly and has established frameworks for summarizing a variety of influences on intended outcomes. The frameworks are useful for guiding the work of implementation in typical human service practice settings and for generating useful hypotheses for social sciences to explore. Evaluations of successful efforts to make full and effective use of social science innovations to benefit citizens and society have led to rapid expansion of implementation science.

Implementation Defined

Implementation is defined as a specified set of activities designed to put into practice an activity or program of known dimensions. According to this definition, implementation processes are purposeful and are described in sufficient detail such that independent observers can detect the presence and strength of the 'specific set of activities' related to implementation. In addition, the activity or program being implemented is described in sufficient detail so that independent observers can detect its presence and strength. When thinking about implementation the observer must be aware of two sets of activities (intervention-level activity and implementation-level activity) and two sets of outcomes (intervention outcomes and implementation outcomes).

Fixsen et al., 2005, p. 5

Implementation is universal and applies to any attempt to use innovations in practice. The implementation activities designed to put into practice an activity or program may be haphazard and unintentional (do the best you can), or they can be purposeful and specified well (do what is most effective). Using well-specified implementation supports has a substantial impact on intervention outcomes in practice. Active implementation frameworks help define effective implementation supports and are outlined in this article.

Innovation Defined

Implementation is in service to a well-defined innovation. An innovation is anything new to an individual, organization, or human service system (Rogers, 1995). The innovation may be a therapeutic intervention, instruction method, evaluation practice, management practice, clinical guideline, policy directive, improvement initiative, or other activity or program.

As noted in the definition of implementation quoted above, the extent to which an innovation is operationalized affects the ability to use the intervention in practice. Usable innovation criteria are outlined in this article.

Human Services Defined

The phrase human services is used to denote the full spectrum of services where one human being (e.g., a therapist; teacher;

community organizer) is interacting with another human being (e.g., a student; neighborhood resident) in a way that is intended to be helpful. Human service domains include child welfare, community development, corrections, education, health, global health, mental health, public health, social services, substance abuse treatment, and others. Literature and examples drawn from human services are used in this article along with examples from business, manufacturing, and computer science.

Rationale for Implementation Science

The interest in implementation has grown with the interest in evidence-based innovations. The evidence-based intervention movement began with the documentation of intervention and policy failures in human services. Eysenck (1952) was the first of many who reviewed a series of outcome studies and declared various therapies to be ineffective. Rittel and Webber (1973) and Van Meter and Van Horn (1975) were among those who summarized public policies designed to improve human services and noted their general lack of intended impact. These seminal reviews led to great debates and to a new focus on developing evidence-based (effective) approaches to human service interventions of all kinds.

As the evidence-based program movement has developed over the ensuing decades, it has become clear that innovations are not self-implementing in human services. Evidence-based practices and programs are celebrated when they are published. Disappointment follows when attempts generally fail to make use of them outside of experimental trials. This has become known as the science to service gap and the quality chasm (Institute of Medicine, 2001). Implementation is now recognized as the link between science and service and is studied in its own right. Evaluations of successful efforts to make full and effective use of innovations to benefit citizens and society have led to rapid expansion of implementation science.

Diffusion, Dissemination, and Implementation

Implementation science is a blend of three strands of knowledge development. First, diffusion theory as described by Rogers (1995) originated in the 1950s in agriculture and

focused on communication patterns related to adoption of innovations in farming (e.g., use of hybrid seed; crop rotation). Diffusion theory has been generalized to a wide variety of fields and is the best known of the three strands. The outcome of diffusion of information is a decision to adopt an innovation.

The second strand is dissemination theory or, more accurately, dissemination theories. [Brownson et al. \(2012\)](#) provide a summary of dissemination findings and [Tabak et al. \(2012\)](#) list over 60 theories pertaining primarily to dissemination. Dissemination theories typically focus on helping practitioners, managers, policy makers, and others understand research findings so they may be more likely to use those findings in their work. The outcome of dissemination is understanding an innovation and attempting to make use of the innovation in practice.

The third and most recent strand is implementation theory. Implementation theory is based on evaluations of attempts to use innovations in practice. Applied research data are accumulating rapidly as common language, common measures, and guiding frameworks become available. [Meyers et al. \(2012\)](#) provide a comparative summary of 25 implementation frameworks. The outcome of implementation is full, effective, and sustained use of an innovation in practice.

The field is on the verge of a unifying theory of implementation that includes diffusion and dissemination along with active approaches to moving science into service in order to realize the promise of evidence-based programs and other innovations.

Using Innovations in Practice

The evidence-based program movement has permeated all social sciences and human services in the past three decades. There is great appeal to the idea that governments and service agencies funded by governments should make use of innovations demonstrated to be effective. Why invest in using what does not work when effective (evidence-based) alternatives are available for use?

Problems arise because attempts to use innovations (evidence-based or otherwise) in typical service or living environments bring into play a variety of personal, organization, and system factors. Change stimulates concern and concern is a powerful inducement to maintain the comfort of the status quo, even when the evidence persistently demonstrates the need for change. In the United States, literacy outcomes for students have remained at a consistently modest level since 1971, hovering around a score of 215 on a 500-point scale for 9-year-old children. Thus, the fundamental elements of education instruction in school, district, state, and federal systems have maintained an unacceptable status quo in spite of decades of tremendous changes in policy, massive increases in funding, countless legislative mandates, huge investments in education science and technology, and the rise of compliance-oriented data systems.

These problems are noticeable because the pervasive growth of the evidence-based program movement globally has raised expectations for achieving socially significant outcomes in human services. The science to service gap has exposed the challenges related to fidelity, sustainability, and scalability. Implementation science has developed in part in response to these

issues. [Schofield \(2004\)](#), [Vernez et al. \(2006\)](#), and others note that achieving socially significant outcomes on a useful scale will require scaling implementation supports needed to make use of effective innovations.

A Science of Implementation

The science of implementation has lagged behind the development of best practices in implementation. Logically, we cannot do research on purported effective implementation practices unless those practices are being used. Thus, the purposeful and active use of implementation best practices amounts to building a better laboratory in which research on implementation can be done. If we continue to use implementation practices that already have been studied and demonstrated to be insufficient, the best we can hope for is a replication of findings that show little or no effect. If we begin to use practices that are predicted to be effective by the active implementation frameworks, then we can hope for different (and perhaps improved) outcomes.

The active implementation frameworks ([Fixsen et al., 2005](#); [Blase et al., 2009](#)) can be considered a mid-level theory of implementation ([ICEBeRG, 2006](#)). As such, the frameworks can provide guidance for action planning and the development of testable hypotheses to guide research. The active implementation frameworks fit the 14 dimensions described by [Meyers et al. \(2012\)](#) in their review of extant implementation frameworks, and incorporate many dimensions of diffusion and dissemination theories reviewed by [Brownson et al. \(2012\)](#) and [Tabak et al. \(2012\)](#).

The active implementation frameworks are based on the best available evidence. A thorough review and synthesis of transdisciplinary implementation evaluation articles was conducted, and the research base informed each component of the frameworks ([Fixsen et al., 2005](#)). The review of the literature has continued since 2005 and has resulted in modifications and additions to the frameworks ([Blase et al., 2012](#); [Fixsen et al., 2013](#)). The active implementation components described in 2005 benefitted from systematic knowledge capture (using concept mapping and nominal group process; each an evidence-based approach to collecting qualitative data from groups) by experienced purveyors and users of a range of evidence-based programs ([Blase et al., 2005](#)), and by representatives of national racial, ethnic, family, and cultural advocacy groups ([Blase and Fixsen, 2003](#)). The information from these meetings expanded and operationalized best practices associated with the active implementation frameworks.

These methods comport with best practices in other fields for arriving at guidelines for clinical practice. Thus, the best available evidence and expert guidance in implementation science provide the foundations for the active implementation frameworks.

A Formula for Success

It is widely acknowledged that implementation science is complex and includes many influences operating simultaneously.

What is known about implementation science can be summarized in a formula for success that accounts for multiple levels of influence over time:

$$\text{Effective Innovations} \times \text{Effective Implementation} \\ \times \text{Enabling Contexts} \frac{1}{4} \text{Socially Significant Outcomes}$$

To explain the formula for success, the following frameworks for implementation will be outlined in this article: (1) usable interventions, (2) implementation stages, (3) implementation drivers, (4) improvement cycles, (5) implementation teams, and (6) enabling contexts.

Effective Innovations: Usable Interventions

If the goal of innovations (evidence-based or otherwise) is to produce change, potential users need to know what the innovation is. Summaries of the literature since 1991 consistently point to the lack of specification of the independent variable (the innovation) in randomized control trials and other evaluations. Naleppa and Cagle (2010) provide a summary of the literature and of the methodological challenges related to this issue. From an implementation perspective, it is not enough for innovations to be 'evidence-based,' they also must be usable. Fixsen et al. (2013) described the criteria for interventions usable in practice.

1. Clear description of the innovation; philosophy, values, and principles; inclusion and exclusion criteria that define the population for which the innovation is intended.
2. Clear description of essential functions that must be present to say that an innovation exists in a given location (essential functions sometimes are referred to as core intervention components, active ingredients, or practice elements).
3. Operational definitions of the essential functions; the core activities that allow an innovation to be teachable, learnable, and doable in practice.
4. A practical assessment of the performance of practitioners who are using the innovation; the performance (fidelity) assessment is highly correlated with intended outcomes.

Innovations that meet these criteria are more likely to be teachable, learnable, doable, and assessable in practice. The evidence of effectiveness is established in criterion #4 that calls for continual assessment of the strength of the innovation as it is used in practice and continual assessment of intended outcomes. This requirement recognizes the complexity of human interactions and the mutual influences people exert on one another. It is expected that the use of innovations will vary within practitioners across time and experience, and across practitioners. To produce socially significant outcomes reliably, innovations need to be used within an acceptable range of performance.

When implementation difficulties are encountered, the lack of specification of an innovation is the first place to look for a solution. Vague ideas, general philosophies or principles, and statements of goals make it difficult for practitioners and others to know what to do in practice to realize the intended benefits. Innovations that meet the usable intervention criteria provide a strong foundation for teaching, learning, doing, and assessing innovations in practice.

Innovations are more than names and claims. In a compliance-oriented environment, it is tempting to simply say an innovation is being done in order to meet a requirement and pass a compliance review. For example, when new standards were issued for quality improvement in health care, many hospitals claimed they were using Total Quality Management (TQM) to meet these new requirements for accreditation. TQM is the application of complex Six Sigma and Lean Manufacturing principles and methods to health care. Westphal et al. (1997) conducted a study of 2721 hospitals and found that few of those that claimed using TQM actually used TQM as intended. The authors concluded, "If organizations can minimize evaluation and inspection of their internal operations by external constituents through adoption alone, they may neglect implementation altogether, decoupling operational routines from formally adopted programs" (p. 371).

In outcome-oriented environments, it is necessary to actually use the innovation in practice and show evidence that intended outcomes are being realized (fidelity of delivery, improvements for intended beneficiaries). Names and claims do not produce socially significant benefits.

Effective Implementation

Innovations (usable interventions) describe *what* to do but the evidence is overwhelming that knowing what to do is necessary but not sufficient for achieving socially significant outcomes (Kessler and Glasgow, 2011). The question is *how* to make use of innovations as intended in typical service settings outside the laboratory.

The status quo supports the existing ways of work. Innovations are, by definition, new ways of work for practitioners, organizations, and systems. Thus, practitioners must learn innovations, and organizations and systems must change to accommodate and support the new ways of work embodied in those innovations. Eventually, an innovation becomes the new standard way of work. After that, any new innovations must undergo the same process of changing the new status quo if they are to be effective and sustained. The process of change is never done as human service systems seek to continually improve socially significant outcomes. Implementation frameworks provide guidance for *how* to incorporate innovations into existing systems effectively and efficiently to realize socially significant outcomes.

Effective Implementation: Stages

The full and effective use of an innovation occurs over time. Stages of implementation have been identified. They are not linear although there are some time dimensions and sequences involved in the staged processes. The stages of implementation are exploration, installation, initial implementation, and full implementation.

During *exploration* information is exchanged and leads to a decision to attempt to use an innovation or not. Given the difficulties inherent in changing the status quo, an implementation team helps organizations and systems carefully consider the need for change, the availability of innovations

and implementation supports to fulfill the need, and the preparation of leadership for initiating and managing the change process over a few years. Convening groups of leaders, stakeholders, and partners is an important part of making the decision to implement an innovation. The understanding and support developed during the exploration stage helps organizations and practitioners negotiate the rocky shoals of change when later attempting to use innovations in complex human service environments. The availability of an implementation team ensures that the human resources are available to shepherd the innovation from an idea to full and effective use.

Installation preparations begin in earnest once a decision is made. Innovations typically have inclusion/exclusion criteria for participants and therefore affect referral processes. Supports for innovations also require extra resources for start-up, planning for training and coaching, and selecting staff who are ready and willing to try to make effective use of an innovation. Immediate impacts on organization and system functions, roles, and structures are considered and accommodations are agreed upon to help create a hospitable environment for practitioners to begin doing the new ways of work.

Some accumulation of resources (preparation of contracts, assignment of staff time) may begin during the exploration stage. During the installation stage, some resources promised during exploration may be difficult to obtain and may lead to further exploration work to bring more people to the table to have them be part of the innovation implementation process.

Implementation is a dynamic process and the stages are overlapping and nonlinear. Implementation teams are essential to expediting the process of exploration and anticipating the needs for installation stage resources. Lack of readiness and lack of resources frequently are found on lists of impediments to success. Experienced implementation teams can help focus attention, anticipate common issues, and avoid wasted time and effort during these early stages.

Initial implementation begins when the first newly trained practitioner attempts to use an innovation in his or her interactions with intended beneficiaries. Many attempts to use innovations fail at this point. As attempts commence to use an innovation in actual practice, the status quo is disturbed. When the use of an innovation requires changes in fundamental operations of an existing organization, the disturbance is more substantial and impacts the status quo more dramatically. Without engaged leadership and persistent implementation supports, the innovation likely will fail (Marzano et al., 2005; Nord and Tucker, 1987).

The availability of skilled implementation teams is important in each stage of implementation, and especially helpful for negotiating the multiple issues that arise during initial implementation. Given their expertise and experience, implementation team members anticipate reactions by the status quo and help organizations quickly change their standard operating methods to accommodate and support the innovation. If serious issues are encountered during initial implementation, it may require reengaging in exploration or installation stage activities to secure agreements or resources found lacking during the initial implementation attempt. The goal of an implementation team is to support the use the innovation as

intended and to help overcome barriers to realizing the benefits of the innovation in each organization setting.

Full implementation is achieved when half or more of the intended users of an innovation are using it as intended (with fidelity). Without the support of a skilled implementation team, very few innovations reach full implementation. Estimates of 5–15% are common (Green, 2008; Vernez et al., 2006; Wiltsey Stirman et al., 2012). This means that few innovations such as evidence-based programs actually produce socially significant benefits in practice. Without implementation teams, efforts to support the use of innovations in various practice settings likely will be haphazard and reactive instead of purposeful and proactive.

Skilled implementation teams greatly improve the odds of producing higher rates of success (60–80%) in shorter periods of time (Saldana and Chamberlain, 2012). Implementation teams are not commonly available or purposely constituted in human services but are growing in number and sophistication as their value is recognized.

Effective Implementation: Drivers

Implementation drivers are the heart of the change processes that support the full, effective, and sustained use of innovations in complex human service environments.

In their review of the diffusion and dissemination literature, Greenhalgh et al. (2004) noted three categories of implementation-related activities: letting it happen, helping it happen, and making it happen. Letting it happen summarizes many attempts to use innovations that rely on diffusion of information through networks and communication patterns (e.g., publication of articles; conferences; champions). Others are helping it happen by providing ready access to useful summaries of the literature, Web sites aimed at practitioner and policy audiences, and persuasive communications in the form of social marketing. The idea is to get relevant information into the hands of those who could be using the innovation so they are better informed and more likely to find ways to use the innovation in their daily practice.

Letting it happen and helping it happen approaches result in about 5–15% use of innovations as intended. Making it happen approaches are quite different. They offer purposeful, active, and persistent supports for using innovations as intended and producing promised results in practice. Most of the 25 frameworks reviewed by Meyers et al. (2012), including the active implementation frameworks described in this article, fit the making it happen category.

A review of the implementation evaluation literature (Fixsen et al., 2005) found evidence in support of several factors that seem to drive full and effective uses of innovations. As shown in Figure 1, there are competency drivers, organization drivers, and leadership drivers associated with consistent use of innovations in typical human service settings and the production of intended benefits (Fixsen et al., 2009). As noted in the center of the triangle, the various components (e.g., coaching, facilitative administration) are integrated and focused on using the innovation as intended (e.g., fidelity). Furthermore, strengths in some components can be used purposefully to compensate for weaknesses in other components to still realize the goal of

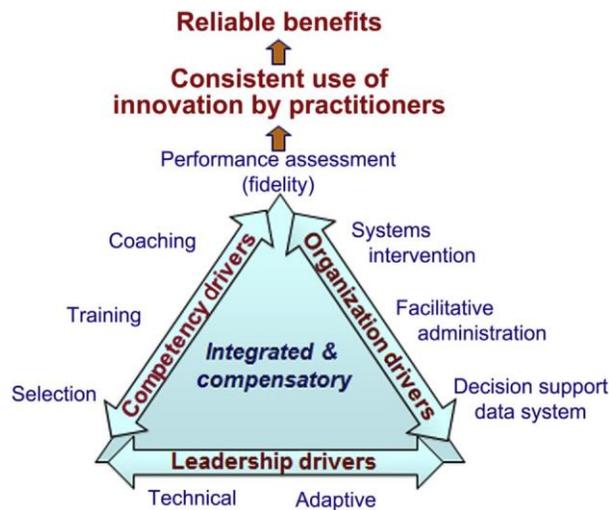


Figure 1 Implementation drivers. Reproduced from Fixsen, D.L., Blase, K.A., Duda, M., Naoom, S.F., Van Dyke, M., June 2008. Establishing an infrastructure for implementing substance abuse programs. Invited presentations and workshop, OASAS, Albany, NY; used with permission.

producing use of the innovation as intended and therefore, reliable benefits. Again, the value of an implementation team is apparent to assure the use of implementation best practices to realize the intended benefits of innovations in typical human service settings.

The logic connecting implementation and innovations is clear in [Figure 1](#). By definition, an innovation is new to practitioners and organizations. Thus, practitioners (and others) need to learn the new ways of work embodied in an innovation. Staff selection, training, coaching, and feedback from performance assessments frequently are cited in the literature as important ways to assure skilled use of innovations. Mentioned less often, but equally important, is the integration of these components. Too often practitioners leave training and find their new knowledge and skills are not supported by their supervisor (“that’s not how we do things in my unit”). In an integrated approach, coaches (supervisors) are prepared to support and expand the knowledge and skills introduced in training.

Given the use of an innovation by practitioners, organizations need to change to accommodate and support the new ways of work if they are to be sustained. Creating a hospitable environment is the work of administrators who are alert for ways to change standard operating procedures to facilitate use of the innovation. It is also their task to remove impediments that are discovered as the innovation moves from initial implementation to full implementation. Facilitative administrators rely on data to inform their decisions as they seek to continually improve supports for practitioners and improve innovation outcomes. Given the multilevel impact of using innovations in existing systems, organizations need to help surrounding systems change to accommodate and facilitate the new ways of work (e.g., referrals, funding, accreditation, scheduling).

None of this will happen without engaged leadership ([Marzano et al., 2005](#)). Adaptive leadership is needed for

solving difficult problems that arise when legitimate and competing interests collide (including wicked problems as defined by [Rittel and Webber, 1973](#)). For example, union interests to protect members from unnecessary intrusions in their workspace may conflict with requirements to conduct frequent performance (fidelity) assessments to assure use of an innovation. Adaptive issues require convening meetings to discover the issues underlying a problem, finding common ground with agreed upon outcomes, and arriving at consensus solutions that can be tried in practice and modified as needed to resolve the issue. Given the tentative identification of the problem and search for a solution, wicked problems requiring adaptive leadership often defy any permanent solution. They are said to be resolved at any point in time with the expectation that there will be an opportunity to resolve the problem again in the future.

Technical leadership is needed for managing daily operations of the organization, including assuring the operation of each of the implementation drivers at a high level or performance. These tame problems ([Rittel and Webber, 1973](#)) can be solved more readily since the problems are easier to identify, are agreed to be problematic, staff have the skills to solve them, and work groups can be formed and disbanded as needed to modify procedures, realize a solution, and establish the new methods as part of daily practice. Leaders need to engage in both technical and adaptive leadership skills. Applying technical leadership approaches to resolving adaptive issues can make the problems worse. Using adaptive leadership approaches to solve tame problems is inefficient. Implementation team members are alert to identifying the types of challenges they are facing and are involved in supporting the appropriate leadership strategies.

Effective Implementation: Improvement Cycles

In the early days of attempting to use evidence-based programs in typical practice settings, there was debate about the need to replicate an innovation exactly versus the need to adapt an innovation to local circumstances to achieve acceptance and use. There was also the notion that since an evidence-based innovation had research to support its effectiveness those results could be expected when employing it in practice. While these quaint ideas still have some currency in intellectual debates, the issues have been settled in practice: there is no such thing as exact replication, and no laboratory-developed innovation delivers in practice all the benefits one expects. In addition, the (sometimes wild) swings in combinations of public policy, funding, workforce availability, leadership, personal and family dynamics, and community values challenge even the most agile organizations to continue delivering excellent service with excellent outcomes in full implementation mode.

In implementation practice and science, innovations provide a place to begin. Reasonably so, evidence-based innovations offer higher expectations for good outcomes. Innovations that have been demonstrated to be effective and meet the usable intervention criteria have the practical information and supports needed to get started and then get better by using performance (fidelity) assessment and outcome data.

Adjustments and improvements are expected in the beginning and over time and are part of the continuing work of an implementation team.

Implementation teams make use of the plan, do, study, act (PDSA) improvement cycle designed to detect and correct errors and strengthen facilitators *en route* to realizing excellent outcomes. PDSA cycles sometimes are referred to as trial and learning cycles and fit well with the need to make changes in operations while preserving and improving intended outcomes. As used in implementation work, PDSA cycles take three forms (rapid-cycle, usability testing, practice-policy communication) that are distinguished by time frames (rapid, medium, longer term) and scope of issues (small, medium, large).

The first PDSA improvement cycles originally were used in manufacturing and business settings (Shewhart, 1939) and have since been employed in a wide variety of human service settings. Rapid-cycle uses of PDSA require frequent opportunities to do what was planned, study what has been done and the results, and make changes to improve the next plan. Note that rapid-cycle use of PDSA includes the assumption of clear accountability for achieving the desired outcomes. This is a good fit with the making it happen approach inherent in the active implementation frameworks. Rapid PDSA cycles are well suited to making improvements in teacher instruction behavior or therapist behavior from 1 day or week to the next. In these cases, plans can be adjusted and results known on a frequent basis and improvements can be made quickly. Implementation teams make use of rapid-cycle PDSA processes to develop usable interventions. Coaches make use of PDSA cycles as they work to expand the skills and improve the outcomes of practitioners.

Usability testing in human services is PDSA work with medium time frames and issues with more interactive components. Usability testing is done with iterative groups of four or five individuals (Akin et al., 2013; Genov, 2005). For innovation development or capacity building, the number of iterations equals the opportunities to learn, adjust, and learn again. For example, assume 20 people need to be trained and training capacity needs to be developed. Capacity to do training well means having skilled trainers who:

- know the material well,
- can deliver it effectively to adult learners,
- have established behavior rehearsal scenes,
- know how to carry out the behavior rehearsal leader and confederate roles so that trainees have the opportunity to practice essential skills (see usable intervention criteria), and
- have created useful pre-post training tests of knowledge and skill development.

If training is provided to all 20 people at one time, there is one opportunity to develop training capacity and any lessons learned have to wait until next time. If the focus broadens from not only training 20 people but also to developing effective and durable training capacity, then training is done with iterative groups of four or five people. The usability testing format provides more opportunities for the trainers to build their capacity (plan training materials, do training, see the pre-post results, make changes for improved training materials

and methods, do it again), while still providing training for all 20 people. The difference is substantial when developing usable interventions and establishing effective implementation supports.

Practice-policy communication cycles are another example of the application of PDSA logic in human services (Fixsen et al., 2013). For example, implementation team members report monthly to the executive managers regarding the systemic facilitators for and barriers to achieving and sustaining excellent outcomes. The implementation team is highly involved in reality at the practice level, can use their first-hand knowledge and data to describe to policy makers what is working or not, and can offer suggestions for how to change roles, functions, and structures in the organization/system to support improved outcomes. Based on this information, policy makers and executive leaders have the authority to make changes to facilitate the full, effective, and sustained use of innovations to achieve socially significant outcomes. Iterative use of such feedback and problem-solving loops can result in a transformed organization or system that is increasingly designed to support effective interventions and effective implementation. It has become an enabling context for supporting the innovation and realizing excellent outcomes.

The use of improvement cycles in implementation work is as important as implementation drivers or stages. Every attempt to do something is an opportunity to learn how to do it better next time. Many people plan and do. Few study and act, and fewer yet use improvement cycles on purpose and persist until they realize intended outcomes.

Effective Implementation: Implementation Teams

Implementation teams are essential to full, effective, and sustained use of innovations. They are *who* do the work of implementation. Like surgical teams, sports teams, financial accounting teams, and others, implementation team members work together to achieve intended outcomes – innovation outcomes and implementation outcomes – in spite of the complexities faced in practice. The functions of implementation teams have been noted throughout this article. In summary, implementation team members are experts in the processes to establish usable innovations, know and contribute to the science of implementation, and participate in organization and system change processes to develop enabling contexts for effective innovations and effective implementation (see the formula for success). Implementation teams greatly increase the likelihood of successful use of innovations and shorten the time for reaching full implementation (Fixsen et al., 2005; Nord and Tucker, 1987; Saldana and Chamberlain, 2012).

Enabling Contexts: Creating Hospitable Environments

It is a truism that all organizations and systems are perfectly designed to achieve exactly the results they obtain (“If you do what you’ve always done...”). This statement does not impute intention to the design. Many organizations and systems are the accumulated product of decades of good ideas, leadership

plans, well-meaning reforms, and responses to political mandates and local needs. As noted in the formula for success, enabling contexts are needed to achieve and sustain socially significant outcomes. Effective innovations and effective implementation methods interact with the context. Thus, the context needs to change to facilitate the work of innovation practitioners and implementation teams if new (and improved) results are to be realized and sustained.

The process of creating enabling contexts is complex and involves a broad view of interactions among organization and system components within and between multiple layers. Fundamental to enabling contexts is the use of knowledge. [Kenneth Arrow \(1963\)](#) won the Nobel Prize for introducing the idea of information economics. The premise is that knowledge-based activities gain in value with use, unlike atom-based resources that are depleted with use. Thus, knowledge-based organizations and systems make use of information to enable the work in increasingly precise and flexible ways that in turn produce more and better information for ongoing improvements. One glance at the amazing progress of digital products and information systems over the past five decades gives credence to Arrow's premise.

Not every organization enables knowledge-based solutions; if that were the case, every organization would be performing at peak effectiveness and efficiency. According to [Von Krogh et al. \(2000\)](#), intended outcomes can be amplified by designing enabling contexts that purposefully:

- grapple with unique cultural and interpersonal conditions,
- dismantle as many individual and organizational barriers as possible (organization structures can facilitate or hinder enabling interactions within the organization),
- share tacit knowledge with microcommunities (such as implementation teams),
- align contexts, strategies, and structures.

They state that traditional organizations and systems can no longer coordinate activities “in a world where boundaries are fuzzy, relationships are ever more complex, and the competitive environment is in constant flux” (p. 177).

Other contributions come from complexity theory. Complexity theory is useful for understanding how even loosely interrelated components of systems can influence one another as they interact, and how small changes in a few parts of a system can result in massive changes in system functions and outcomes. The practice–policy communication cycle is built on complexity theory and relies on implementation teams to convey meaningful information and act on that information within a human service system ([Fixsen et al., 2013](#)). It provides a venue where “thinking can be challenged, issues about authority and the exercise of power candidly explored, and where participants can continue to learn and adapt to ever-changing circumstances” ([Onyett et al., 2009](#), p. 3). For implementation work designed to use innovations at scale, the improvement cycles are essential for quickly finding solutions to thorny problems that inevitably arise in organization and system contexts.

The implementation field has developed well enough to begin research on these challenges. A longitudinal study of organizations that are attempting to use evidence-based programs provides a view of the factors influencing initial

adoption, deadoption, readoption, and full implementation of innovations ([Panzano et al., 2004](#)). Recently, [Glisson et al. \(2010\)](#) carried out a seminal study of interactions among layers of services, organizations, and systems. This study combined an evidence-based approach to service delivery and an evidence-based approach to system change in a 2 × 2 experimental design where US counties were randomized to conditions. The results showed that each intervention was effective when used alone. However, the best outcomes for youths resulted when the interventions were combined, that is, when the evidence-based service was operating in a changed system.

The [Glisson et al. \(2010\)](#) experiment is the first to combine simultaneously the three components of the formula for success – evidence-based innovations supported by skilled implementation teams in contexts that were more or less enabling. Socially significant outcomes were the result of attention to each component. Note that the study would not have been possible to conduct in the absence of skilled implementation teams who were well prepared to produce high-fidelity examples of each evidence-based intervention. This study is a good example of how implementation done well in practice creates a better laboratory in which to study implementation variables.

The lack of implementation teams and implementation expertise is a major impediment to realizing goals in human service systems ([Schofield, 2004](#)). Human behavior is complex, interactions among humans add to the complexity, and provider organizations and systems often lack the information and skills needed to make meaningful change. Human service systems simultaneously are ever changing and intractable. Improved practices to initiate and manage change and conduct research on system change is the next great frontier in implementation science.

Conclusion

Implementation science is a new science and is reaching a point of geometric growth. Implementation frameworks provide guidance for implementation practice, and improved practice provides a better laboratory for studying implementation done well. This creates a virtuous cycle that feeds on itself to rapidly develop better practices and better science. The value of virtuous cycles is seen in the last century in the computer industry where crude silicon-based integrated circuits were used to develop and manufacture more effective and efficient integrated circuits. Those improved versions then were used to create the next generation of even better integrated circuits. Implementation science is on the verge of following this path with the development of active implementation frameworks to guide the next generation of improved frameworks.

The long-time frames for implementation slow the process of discovery and improvement. Thus, there is a premium on using improvement cycles on purpose, recording data at each point of the journey, and improving the efficiency of the process as well as its effectiveness. The complexity and long-time frames inherent in implementation present challenges related to measures, research designs, and theory development. The transdisciplinary involvement in implementation makes language and conceptual thinking difficult and frustrates efforts

to find and summarize the literature(s). Nevertheless, implementation science has come a long way and is on the brink of advancing rapidly in the coming decades.

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See also: Applied Social Research, History of; Cost-Benefit and Cost-Effectiveness Analyses in Evaluation Research; Evidence-Based Practice; Policy Analysis; Prevention Research.

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