TECHNICAL REPORT

LADDERS: A dynamic paradigm for planning, implementing, and evaluating sustainable change in learning health systems

Paul Meissner [iD]

Montefiore Medical Center, Bronx, NY

Correspondence
Paul Meissner, MSPH, Director Research Program Development, Office of the Medical Director for Research, Montefiore Medical Center, 111 East 210th Street, Bronx, NY 10467, USA.
Email: pmeissne@montefiore.org

Abstract

The science of learning health systems borrows and adapts models from many fields. One in particular is implementation science which has been experiencing a flourishing of new theories, models, and frameworks, some of which are generating sufficient evidence as to their effectiveness and applicability to emerge as candidates for wide adoption as useful tools for the field. In reviewing these, a common paradigm can be described which is a synthesis of those elements regularly cited by health systems implementing successful transformational change activities. As a paradigm, it offers a practical bridge to these models, concepts, and frameworks that are often hard to operationalize and are used with varying degrees of completeness. These elements can be arranged in a memorable acronym—**LADDERS**—**L**eadership, **A**lignment, **D**ata, **D**emonstration, **E**valuation, **R**eplication, and **S**ustainability. LADDERS identifies the multiple elements and dimensions recognized by persons involved in leading health system change activities. It provides a simple, useful way to assess progress by health systems in planning, implementing, evaluating, and sustaining change. There is ample organizational and systems change literature to fully describe the actual LADDERS elements individually; therefore, this article describes characteristics and functions of each element and the dynamics represented in a DNA image to reflect that in learning health systems change is recursive, constant, and happens in complex environments that are always readjusting to new stimuli and directions, and this is often not accounted for in a framework, model, or theory. It concludes with several examples of application of the LADDERS paradigm and suggests how it is a complementary approach to accomplishing Institute of Medicine Learning Health Systems goals.

KEYWORDS

change paradigm, dynamic tool, implementation science

1 | BACKGROUND AND INTRODUCTION

The science of learning health systems borrows and adapts models from many fields. One in particular is implementation science which has been experiencing a flourishing of new theories, models, and frameworks.[1] Some of these have begun to be independently tested by investigators on a variety of topical areas.[2] Several are beginning to accumulate sufficient evidence as to their effectiveness and applicability to emerge as candidates for wide adoption as useful tools for the field. In reviewing these, it seems a common paradigm can be

described and widely applied to the breadth of activities undertaken over time by Learning Health Systems.

This paradigm is a synthesis of those elements regularly cited by health systems implementing successful transformational change activities. These elements are also those that upon reflection would clearly resonate with leaders[3] as it provides an explicit enunciation of what otherwise has generally been implicitly pursued by individuals without a common or organized understanding. As a paradigm, it offers a practical bridge to these models, concepts, and frameworks that are often hard to operationalize and are used with varying degrees of fidelity.[4]

2 | LADDERS DEFINED

These elements can be arranged in a memorable acronym—**LADDERS. LADDERS** stands for **L**eadership, **A**lignment, **D**ata, **D**emonstration, **E**valuation, **R**eplication, and **S**ustainability. LADDERS identifies the multiple elements and dimensions recognized by persons involved in leading health system change activities. It provides a simple, useful way to organize and assess progress over time in planning, implementing, evaluating, and sustaining change at multiple levels within a system.

The acronym is both easy to remember and a problem. Health system change is recognized as a dynamic process with information, ideas, and decisions flowing in multiple crisscrossing, up and down, directions. Yet the acronym projects a very linear, rung by rung, image. Change happens in complex environments that are always learning, readjusting to new stimuli and directions, and this is often not accounted for in a framework, model, or theory. So, a DNA image with letters of LADDERS floating within a DNA double helix seems apt.[5]

For health system change to be actually transformational and to endure, it needs to be embedded into an organization's DNA. See Figure 1. Neilson and colleagues[6] used the DNA metaphor to codify the idiosyncratic characteristics of a company and described the DNA of a living organization like molecular DNA as having 4 bases—

structure, decision rights, motivators, and information—that, combined in myriad ways, define an organization's unique traits. They proposed using their framework tool to diagnose problems, discover hidden strengths, and modify company behavior and examining all aspects of a company's architecture, resources, and relationships, to see what is working and what is not deep inside a highly complex organization, to understand how it got that way, and to determine how to change it. LADDERS in contrast is intended as a change management tool.

3 | DESCRIPTION OF LADDERS ELEMENTS

LADDERS is similar to other frameworks most often published in the grey literature by consulting companies in preparing reports for clients such as the CDC, AHRQ, and the United Way, or those used by change institutes and consultants like the Tamarack Institute and the 5 core conditions in their Collective Impact concept[7] and the Build Initiative's framework for evaluating systems initiatives.[8] The description of LADDERS invariably generates "face validity"—everyone nods theirs heads and acknowledges these elements. Thus, it is probably not necessary to fully describe the actual LADDERS elements individually as there is ample organizational and systems change literature for that. More important is to describe characteristics and functions of each element and the dynamic interplay among the elements as represented in the DNA image. Again, this narrative description is challenged by its necessarily literary linear flow. In fact, while DNA is a 3-dimensional structure, the 2-dimensional DNA depiction does not reflect how the LADDERS elements are in constant motion, nor allow for visualizing their probing activities with which to potentially trigger mutations. In presenting LADDERS to groups, it has been useful to animate the DNA graphic which has generated both interesting discussion and at the same time complaints of visual overload.

The LADDERS elements can be grouped into 3 "waves" that reflect their natural temporal occurrence during the learning process. The first wave consists of the first 2 letters—Leadership and Alignment.

FIGURE 1 LADDERS as Organizational DNA

3.1 | Leadership

In the literature on change and change management, leadership is most often identified as the key element to maximize potential for successful transformational change in any field.[9,10] Two key points associated with LADDERS reflect its relevance to learning health systems, that: (1) there are leaders at all levels of the health system change transformation process, and (2) ensuring communication is the task for leaders to monitor with the most vigilance. The function of leaders borrows from a 7C list of leadership activities found in the social change model of leadership development guidebook.[11] These are:

1. Clear direction: Focus on a long-term vision within a whole systems context, emphasizes the urgency of change, helps frame the extent of change necessary, presents the need to sustain the change momentum and "stay the course".

2. Change readiness: Assess change readiness of organization (s) and individuals, including assessing peoples' ability to cope and adapt to demands of change, address need to build capacity within people and the organization to understand and anticipate systems change complexity.

3. Care: Champion the caring aspect of change, ensure focus on users and systems, lead the journey from a foundation of caring, including encouraging self-care for individuals, as citizens and within the system.

4. Community: Involve people at all organizational levels affected by change in its design and implementation. This includes involving people from within the organization, from front line employees to senior management and Board members, individual members of the immediate community, affected community, political, and professional associations.

5. Culture: Consider the cultural impact of changes upon an organization's values, beliefs, professional, and routine practices. Recognize internal diversity of organizational customs, traditions, and ways of doing business, and how change might impact these cultures differently and how this must be addressed. Similarly, as organizations change, their relationships to external organizations might change.

6. Construct: Ensure a sufficient structural framework exists to support the transformation. Need to know the processes for communication, how to access resources, how decisions are made, and where responsibilities and accountabilities reside. Explicitly describe rather than assume that others are aware of, understand, and interpret the framework in a consistent manner. If a sufficient framework does not exist, work towards creating a common structural framework for people to implement transformational change.

7. Communicate: One of the most commonly identified reasons for change failure is poor communication.[12] Leaders are responsible for ensuring the use of direct, explicit, and relentless communication in the form of dialogue and "listening to others" as a crucial component of the communication process to leverage both existing strengths and successes of organizations undergoing change processes.

Each of these leadership dimensions taken together comprises a whole and is not individually determinant of successful change yet accomplishment of each can have profound impacts on the structure and content of organizational DNA. The last 2 features of the social change model of leadership—construct and communicate—reflect the need for the next LADDERS component—Alignment.

3.2 | Alignment

Alignment is regularly included as a leadership function as change is a dynamic adaptive process which requires constant monitoring. The dynamic nature expressed in the LADDERS DNA metaphor identifies alignment occurring at all levels involved in change and manifests through the communication process in all directions, by all involved. One interesting depiction of alignment is provided by Espejo and Gill in describing Beer's Viable Systems Model[13] as a conceptual tool for understanding organizations. In the article, they highlight the role of complexity and recursivity by talking about complex organizations being composed of sub-systems and use the analogy of the nested Russian doll as an unfolding process among organizational levels.

There are many dimensions of alignment. Alignment is oriented both externally and internally as well as can be strategic—in terms of resources and outcomes—or be based on service delivery—in terms of processes. Envisioning its recursivity, alignment can be seen as occurring among and within institutions, operating organizations, facilities, and program units. Alignment is regularly the topic of planning and program monitoring conversations at all levels as change requires constant adjustment to external and internal circumstances and thus alignment reflects an evolutionary iterative process. It could be seen as the DNA strands searching for the right attachment patterns.

Leadership and alignment are critical areas and deserve their primacy in the literature about change and the operational focus of leaders. Yet, when leaders are effective and alignment is favorable, several other elements routinely become the focus for implementing transformational change. These "second wave" elements are Data, Demonstration, and Evaluation.

3.3 | Data

"What is measured is done" is a well-known maxim. It is critical to decide what to measure, how to measure, when to measure, who will measure, how data will be used, who will use it, and how it should be presented. Debate about data often delays transformational change progress.

Data needs to be discussed explicitly; data needs to be transparent; data needs to meet the needs of the various stakeholders participating in the change activities. Again, as with alignment LADDERS identifies multilevel recursive involvement in data. Not all data will be utilized by all involved, but each will need data relevant for their levels and for their purposes. The key features of data are 2-fold, that it will (1) allow change to be measured and (2) its definitions and measurements can be agreed upon by all involved. In the age of big data where data can overwhelm the change process, the dynamic feature captured in the DNA model is that data needs to reflect strategic and operational imperatives and be accurately produced in a timely

manner. While it is clear that there is extensive leadership and strategic alignment necessary, data also involves a myriad of others across the change lifecycle from data generators to data collectors to data analysts who do not routinely participate in strategic discussions but are critical to ground grand data desires in reality and inform feasibility determinations. These operational and strategic considerations are analogous to DNA reacting to external stimuli.

Data is closely linked to the subsequent element of LADDERS—Demonstration.

3.4 | Demonstration

Just do it! Organizations conduct extensive staff training in techniques of implementing change. They are aligned as Learning Systems to support change and train staff on strategies such as the Plan, Do, Study, Act continuous quality improvement framework or LEAN management. As transformational change activities are implemented, often beginning with pilot efforts, these structures and frameworks provide for close data and process monitoring. As changes proceed and organizations adapt, how these changes occur in particular settings, under which particular circumstances, identifying who is doing what, capturing if the adaptations are working, are reflected as features identified through review of process notes and can be conceptualized as the observance of occurrences of DNA mutations. For LADDERS, these process notes are key information sources as their review allows others to help identify contextual and adaptive learning and return these observations as learning through the communication channels of systems. As has often been noted by institutional trainers tasked with imparting Plan, Do, Study, Act methods, the need to train staff to produce these notes in a consistent format is often under-appreciated.

3.5 | Evaluation

For transformational change to be sustained requires it achieve desired results. Adopting LADDERS recognizes that evaluation has 3 considerations. First, evaluation must be explicitly articulated a priori and embedded as a part of the routine programming, with detailed description of the process, data, and analysis concepts agreed upon. Second, it needs to be multi-dimensional. Too often sustainability decisions are determined solely by reviewing cost data to identify whether the change produced the expected return. Yet in the current environment multidimensional attributes are important to a broad range of stakeholders. Examples include staff and consumer satisfaction, staff and consumer retention rates, product quality, and marketing utility. Third, perhaps most importantly, evaluation provides an opportunity to use data to test explanations for the effect observed, and to rigorously probe to identify issues or biases reflected in the data. For example, promising data which to the observer might seem significant, might not be normally distributed and require the use of non-parametric statistical analysis to truly assess its significance. This requires a formal partnership with researchers that is not common in most change management operations. Understanding these features will allow for determination whether change is indeed transformational, fortuitous, or fleeting. The evaluation element is integral to the change process and is influenced by the dynamic of the interactions of other elements among each other just as the configuration of DNA attributes contributes to the formation of chromosomes.

The "third wave" elements are Replication and Sustainability which reflects the time continuum but not necessarily that they can operationally be left to last. In fact, these 2 elements need to be considered during the first wave as they are the desired outcomes of learning systems.

3.6 | Replication

Do It Again! We know that the first time we do something we are the learners. The true test of transformational change is its ability to be replicated. Just like DNA. To achieve critical mass, scale, and be deterministic of outcome.

LADDERS posits that transformational health systems change occurs in a learning environment. As such the challenge is to assemble the LADDE (Leadership, Alignment, Data, Demonstration, and Evaluation) information and ask 5 questions to (1) determine if it was successful, (2) understand if it was done well, (3) identify if the goal needs to be modified, (4) can we do something (s) differently, and (5) see if implementation steps can be removed to make its execution more compact and simpler. At some point, there is recognition that internal/external contexts and conditions might have significantly changed. Similarly, the organizational capacity in place to function as an adaptive system might have changed. These changes can markedly impact on replication strategies and efforts.

3.7 | Sustainability

The ultimate objective of transformational change is that it endures. Sustainability ties all the other LADDERS elements together. Sustainability is achieved when the change becomes the default behavioral option,[14] when doing the right things is the easy thing to do,[15] and when in the Full Implementation stage is achieved and 50% or more of the intended practitioners, staff, or team members are using an effective innovation with fidelity and good outcomes. It is clearly a leadership and communication function.

For transformational health system change to endure requires proceeding through the change continuum with sustainability as the focal objective. LADDERS identifies 3 elements as key to enduring change: (1) hardwiring measurement into on-going program monitoring activities across the organization,[16] (2) capture of progress notes to compliment program monitoring data which will allow for review of the contextual adaptations and their impacts, and (3) the embedding of a reflective evaluation function in programming to critically review outcome achievement and to generate and codify learning. In adaptive learning systems, just like for DNA, it is recognized that change is an on-going evolutionary process and that the outcomes can be dynamic and should reflect progress in accomplishment of recognized organizational strategic objectives.

4 | APPLICATIONS

LADDERS has wide application across industries (health care, education, social services, agricultural marketing) and at all organizational

levels. It can form the basis for capturing organizational or individual perspectives. Its dynamic feature shares some characteristics of the Rapid Realist Review methodology[17,18] that aims to highlight the impact that interactions between the contextual factors (LADDERS elements) and the mechanisms have on intervention outcomes resulting in transformational change (organizational DNA mutations). It also addresses the concluding observations from Stirman's 2012 review of sustainability[19,20] which recommends careful consideration to interactions among influences at multiple levels, as well as issues such as fidelity, modification, and changes in implementation over time. More recently, Shelton et al[20] point out the need for conceptualizing the dynamic nature of sustainability, remarked on the influence of contextual factors, and suggest a framework that highlights key multilevel factors that may be important in facilitating sustainability across multiple settings and contexts.

Over several years, LADDERS has been applied by academics and practitioners to a variety of program service delivery, evaluation, quality improvement, education, and research development activities in both local and international contexts at the individual site level as well as in broader systems. These sessions have led to the development of a simple brief, 3 column LADDERS template (see Figure 2) consisting of (1) the LADDERS element, (2) a current assessment, and (3) corresponding plan. The tool can be used throughout the transformational change lifecycle during the different stages—assessment, design/planning, implementation, and evaluation—to track progress in developing, achieving, and sustaining change. This is similar to the 4 phases (Exploration, Preparation, Implementation, Sustainment) described in the Dynamic Adaptation Process[21] model to support effective evidence-based practice implementation. As such, its consistent use over time can serve as a regularly updated archive of progress which can be routinely reviewed to capture health systems learning.

The key to using this tool is to generate an Objective Statement that describes an intended outcome. This allows stakeholders, in either a group setting or individually, to reflect on the critical element(s) at a particular point in time. For example, in a recent project during the sustainability phase an objective statement was defined as —"retain two patient navigators to support integration of oral health care with medical services. "For another project, during the assessment phase the statement was—"to determine the project's change readiness for a particular activity. "As such this template can be used multiple times with the same objective during the evolution of the change process and its archive serves as process notes. Similarly, for the same project, the objective statement might change to reflect its progress through the change continuum and input from the dynamic interplay of the LADDERS elements. For instance, once change readiness has been deemed accomplished as it has addressed each of the LADDERS elements to the satisfaction of leadership, the objective statement might be recommended by leadership to be "pilot intervention X" and then "pilot data collection", and so forth. What often becomes clear in specifying these objective statements is that they engage the different LADDERS elements but tend to focus more on a particular set of LADDERS elements than on others. This can be captured in the template and reflected in the assessment and plan. For instance, the assessment for leadership as a project moves through the change continuum could be "on board" and the plan could be "continue to update on progress", yet the assessment for evaluation at that point might be "premature" and the plan might have some reference to a time frame. In these respects, LADDERS is similar to other frameworks such as PRISM.[22] PRISM is a practical, robust implementation and sustainability model (PRISM) for integrating research findings into practice which serves as a conceptual framework for improving practice that integrates the key features for successful program design,

Objective Statement:

Elements	Assessment	Plan
Leadership		
Alignment		
Data		
Demonstration		
Evaluation		
Replication		
Sustainability		

FIGURE 2   LADDERS Template

predictors of implementation and diffusion, and appropriate outcome measures. In contrast to the PRISM model, LADDERS is a paradigm intended to simply describe the concept that there are distinct elements involved in transformational change and that these elements are dynamic.

5 | CONCLUSION AND NEXT STEPS

A National Academies of Science conference[23] brought together leading prevention researchers, legislative staffers, local, state, and Federal government agency representatives and program advocates, to address the successes and challenges of scaling family-focused interventions to the real world for promoting children's cognitive, affective, and behavioral health. The presenters detailed replicating and sustaining successful programs in a range of settings including primary care, schools, and homes. In each presentation, the leaders reported on 2 to 3 or more decades of experience and each described their success unknowingly in terms of the LADDERS elements. There were presentations focused on various dimensions of data - linkage and integration to inform research and practice; the use of quality measures (evaluation) to facilitate change in different settings; new approaches to build on existing data structures; and tools to measure implementation of evidence-based prevention programs. There were workshop presenters and participants who discussed examples of innovative design (demonstration) and utilization of measurement systems that included discussions of leadership, alignment, and evaluation. From this example, it is clear that another use of LADDERS might be to serve as an organizing paradigm for these types of learning health systems forums.

From significant experience during numerous LADDERS presentations to different audiences, it is clear that it is relatively easy and straightforward to orient others to its concepts and to provide coaching in developing objective statements and in understanding assessment and planning responses. Most respondents feel the need to be very concrete and have noted that they would develop a greater comfort level with the tool from personal experience in utilizing it. Those who have used it find that using LADDERS as a tool captures the significant thought iterations used to complete change activities and allows for the identification of gaps in change process thinking, generation of reflections on each of the elements, and fostering strategies to address issues identified at the point in time the tool is used.

LADDERS represents the elements for transformational change whose understanding, from those who have attended presentations and responded to post presentation questions regarding their understanding and comfort with the concepts, is intuitive. As such, it can be easily communicated and can serve as a useful tool upon which to base organizational change activities throughout the dynamic change continuum.

Perhaps, LADDERS is better as a mnemonic than an acronym. In either case, it is a complimentary paradigm to other frameworks that can be easily remembered and used along the pathway to accomplishing the goals laid out in the Institute of Medicine Learning Health Systems workshops[24] of developing a sustainable learning health care system that gets the right care to people when they need it and then captures the results for improvement.

ORCID

Paul Meissner http://orcid.org/0000-0003-3424-2481

REFERENCES

1. Nilsen P. Making sense of implementation theories, models and frameworks. *Implementation Sci*. 2015;10(1):53.

2. Sales A. Theory and frameworks in implementation research: current and future challenges 9th Annual Conference on the Science of Dissemination and Implementation In Health: Academy Health and NIH; 2017 [Available from: https://academyhealth.confex.com/academyhealth/2016di/meetingapp.cgi/Paper/13803.

3. Morain SR, Kass NE, Grossmann C. What allows a health care system to become a learning health care system: results from interviews with health system leaders. *Learn Health Syst*. 2017;1(1):e10015. -n/a

4. Field B, Booth A, Ilott I, Gerrish K. Using the knowledge to action framework in practice: a citation analysis and systematic review. *Implementation Sci*. 2014;9(1):172.

5. Shmoop. Levels of organization and DNA structure, replication, and technology November 11, 2008 [cited 2008 November 11]. Available from: https://www.shmoop.com/dna/levels-organization.html.

6. Neilson GL, Pasternack BA, Mendes D. The four bases of organizational DNA Winter 2003, Issue 33 [Available from: https://www.strategy-business.com/archives/?issue=837213.

7. Collective Impact: Tamarack Institute. [Available from: http://www.tamarackcommunity.ca/collectiveimpact.

8. Coffman J. *A Framework for Evaluating Systems Initatives*. Boston, MA: Build Initiative; 2007.

9. Caldwell DF, Chatman J, O'Reilly CAI, Ormiston M, Lapiz M. Implementing strategic change in a health care system: the importance of leadership and change readiness. *Health Care Manage Rev*. 2008;33(2):124-133.

10. Hendy J, Barlow J. The role of the organizational champion in achieving health system change. *Soc Sci Med*. 2012;74(3):348-355.

11. Institute HER. In: Higher Education Research Institute U, ed. *A Social Change Model of Leadership Guidebook*. 3rd ed. Los Angeles: Higher Education Research Institute,University of California; 1996.

12. Institute PM. *The High Cost of Low Performance: The Essential Role of Communications*. Philadelphia, PA: Project Management Institute; 2013.

13. Beer S. *Designing the System for Organisation*. Chichester: Wiley; 1985.

14. Halpern SD, Ubel PA, Asch DA. Harnessing the power of default options to improve health care. *N Engl J Med*. 2007;357(13): 1340-1344.

15. Kenealy TW, Sheridan NF, Connolly MJ. HealthPathways website: making the right thing the easy thing to do? *N Z Med J*. 2015;128(1408):6-9.

16. Toomey R. Hardwiring change. *Nurs Womens Health*. 16(4):271.

17. Saul JE, Willis CD, Bitz J, Best A. A time-responsive tool for informing policy making: rapid realist review. *Implementation Sci*. 2013;8:103.

18. Willis CD, Saul J, Bevan H, et al. Sustaining organizational culture change in health systems. *J Health Organ Manag*. 2016;30(1):2-30.

19. Wiltsey Stirman S, Kimberly J, Cook N, Calloway A, Castro F, Charns M. The sustainability of new programs and innovations: a review of the empirical literature and recommendations for future research. *Implementation Sci*. 2012;7:17.

20. Shelton RC, Cooper BR, Stirman SW. The sustainability of evidence-based interventions and practices in public health and health care. *Annu Rev Public Health*. 2018;39(1):55-76.

21. Aarons GA, Green AE, Palinkas LA, et al. Dynamic adaptation process to implement an evidence-based child maltreatment intervention. *Implementation Sci*. 2012;7(1):32.

22. Feldstein AC, Glasgow RE. A practical, robust implementation and sustainability model (PRISM) for integrating research findings into practice. *Jt Comm J Qual Patient Saf*. 2008;34(4):228-243.

23. National Academies of Sciences E, Medicine. *Innovations in Design and Utilization of Measurement Systems to Promote Childrens Cognitive, Affective, and Behavioral Health: Workshop in Brief*. 8 Washington, DC: The National Academies Press; 2016.

24. Medicine Io. In: Olsen L, Aisner D, McGinnis JM, eds. *The Learning Healthcare System: Workshop Summary*. Vol.374 Washington, DC: The National Academies Press; 2007.