DEVELOPING A PURPOSIVE CHANGE MANAGEMENT FRAMEWORK TO FACILITATE HEALTHCARE INFORMATION SYSTEMS IMPLEMENTATION SUCCESS

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ABSTRACT

DEVELOPING A PURPOSIVE CHANGE MANAGEMENT FRAMEWORK TO FACILITATE HEALTHCARE INFORMATION SYSTEMS IMPLEMENTATION SUCCESS

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Current project and change management models have largely proven ineffective in smoothing transition and improving adoption of electronic health records (EHR). A holistic systems-thinking approach is required to improve the success of EHR implementations. Many of the widely used change management models appear to be lacking, in particular, they are not actionable nor sufficient alone because the change management models lack inclusion of project management aspects, which is especially concerning for EHR implementations. Success in products meeting intended benefits as result of managing projects across their life cycle requires change management as a discipline, rather treating it as an activity.

A systematic thorough review of recent literature provided understanding of change management challenges and gathered published data about its effect on healthcare information systems implementation resulting in poor project outcomes. A survey instrument collected data from healthcare professionals, informaticists, and project team leaders which provided a comprehensive understanding into how current change management efforts performed and what challenges or problems exist. An integrated mixed-methods analysis using this data resulted in strategic insight into the many organizational factors which influence an individuals' attitude towards change, which are key indicators of the effectiveness of change efforts in the

implementation of an EHR. Applying this information, a conceptual change management framework was designed using a structured framework development approach. Lastly, an appreciative inquiry exercise in problem-solving by engaging with organizational leaders and users, helped to improve the conceptual change management framework into its final design.

Industry consistently supports that a careful and multi-disciplined approach to applying lessons-learned and comprehensive planning helps to drive successful EHR implementations. In response, a ‘best-of-breed’ change management framework design was proposed, which offers an actionable way forward and includes mechanisms for transitioning internal and external stakeholders from the current-state to the desired future-state. The proposed change management framework links psychological and change management models with project management frameworks into a comprehensive solution; leveraging the natural flow of each into a logical design which maintains primary a focus on business needs and promotes ease of transition and end-user adoption.

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1 INTRODUCTION

This research analyzes the effectiveness of change management methods and techniques in implementing healthcare information systems (HIS), primarily focusing on electronic health records (EHR), in operational healthcare settings. It will give definition to the logical alignment of psychological theories and change management concepts to project management and software implementation and propose an improved change management framework. A progressive approach in further developing the framework and related products will be utilized which is inclusive, deliberate, and structured. It is designed to collect broad-based input from a multi-disciplined team of health informaticists, change practitioners and agents, and end-users.

1.1 Background

For decades, healthcare systems, healthcare insurers, and healthcare advocacy groups have encouraged healthcare information technologies or systems as the means to reducing medical error rates, improving healthcare delivery quality, and lowering healthcare costs (Institute of Medicine, 2000). However, healthcare information systems, primarily EHRs, are often strongly resisted by the same community that is expected to benefit from their use (Pare et al., 2011). This resistance, given the expected benefits of such systems, not only runs counter to much of our current understanding of healthcare information technology adoption and usage research, but may also seriously undermine the potential benefits of adopting a new EHR system (Menachemi & Collum, 2011). Modern healthcare relies heavily on the utilization of ever-changing information technology (IT); software applications are integral components of clinical workflow (Ajami & Bagheri-Tadi, 2013), and as new technologies are developed, introducing them into clinical operations can be impactful to this risk-averse community.

According to Jones-Schenk, 70% of all change management efforts fail (Jones-Schenk, 2019). A 30% success rate is troubling, particularly when considering the additional costs in the form of loss of competitive position, confidence of the workforce in leadership, quality improvements, and anticipated cost reductions. Recent studies confirm that only 25-30% of all changes achieve full benefit realization (Martins Serra & Kunc, 2015). The failed implementations happen for a number of reasons, primarily due to weak or poor change management, as most healthcare organizations do not apply the same business discipline and rigor for managing the human elements of their change when they assemble the timeline, the budget, and the technical objectives for the project (Asher, 2018).

1.2 Statement of the Problem

Change models have limitations. They are not universal and cannot be applied for all situations. Therefore, it becomes necessary to create a change model that can adapt to complex change needs. Lazuardi, Raharja, and Muhyi conducted an analysis on the purpose and effectiveness of the change models of Kurt Lewin's Three-Stage Model of Change, John P. Kotter's Theory for Change and Prosci© ADKAR® Change Model. The researchers propose alternative solutions for different conditions using a combination of change models. Their approach suggests that paying particular attention to multiple foci is needed, namely using a model that focuses on the human aspect of change, as well as a model that focuses on the formation of change itself. This helps ensure the approach taken will be more comprehensive and can facilitate all the important aspects needed to make change (Lazuardi et al., 2021).

There are many change management models employed in health IT projects, but the most widely used change management model utilized in healthcare is the Prosci© ADKAR® Model (Counselman et al., 2018). However, its application in EHR implementations has led to

ineffective transitions from current-state to future-state and poor user adoption of resulting health IT solutions (Amlung et al., 2020). Healthcare information systems implementation poses ongoing challenges, with current use of change and project management models and frameworks proving largely ineffective in facilitating transition, overcoming resistance, and improving adoption of electronic health records (Heath & Porter, 2019). While the ADKAR® Model is effective in some contexts, there are situations where it may not achieve desired results. The following illustrate why the ADKAR® Model may be ineffective in EHR implementations:

- Simplistic Approach: The linear, stepwise nature of the ADKAR® Model contrasts with the complex and nonlinear nature of change processes, requiring greater flexibility and adaptability (Ford, 2018).
- Limited Focus: The ADKAR® Model primarily concentrates on individual change, disregarding broader organizational and cultural aspects, and fails to address systemic issues and the interconnectedness of stakeholders and systems (Amlung et al., 2020).
- Neglect of Emotional Aspects: The ADKAR® Model tends to overlook emotional responses such as resistance, fear, and uncertainty, thus potentially hindering successful implementation (Ford, 2018).
- Static Nature: The ADKAR® Model assumes that individuals move through the stages of change sequentially and at a consistent pace. In reality, people may progress through these stages at different rates, or they may regress to previous stages due to setbacks or unforeseen challenges (Heath & Porter, 2019).
- Lack of Flexibility: The ADKAR® Model prescribes a fixed set of steps, which may not be suitable for every organization or change initiative. It doesn't offer much flexibility for tailoring the approach to specific contexts, cultures, or challenges that may arise during

the change process (Heath & Porter, 2019).

- Overemphasis on Individual Change: While individual buy-in is crucial, organizational change requires collective action and alignment, which the ADKAR® Model overlooks, potentially hindering collaboration, and collective ownership (Martins, 2019).
- Insufficient Emphasis on Continuous Improvement: The ADKAR® Model's linear approach may lead organizations to view change as a one-time event rather than continuous improvement and adaptation (Warrilow, 2023).

Overall, while the ADKAR® Model can provide a useful framework for understanding individual change, its effectiveness may be limited in complex organizational environments where broader cultural, emotional, and systemic factors play significant roles (Warrilow, 2023). A holistic systems-thinking approach, adapting both technology and work practices during activation, could enhance EHR implementation success (Boonstra et al., 2014). Many of the widely used change management models appear to be lacking, in that they are not actionable (Emerson, 2022), and lack inclusion of project management activities (Prosci, 2022); especially in the context of EHR implementations (Heath & Porter, 2019). Success in meeting intended benefits requires change management as a discipline, rather than treating it as an activity.

1.3 Purpose of the Research

EHR implementations across healthcare is an ongoing challenge for all sectors, and as healthcare services consolidate, managing continuous change is critical (Huang et al., 2020). It is proposed that applying a purposive change management framework instead of the ADKAR® Model to an EHR implementation project will bring a structured, repeatable process and set of deliverables to healthcare professionals most impacted by the disruption of transitions, thus

improving their potential success of EHR implementations. Drawing on decades of practical health informatics experience, this research will develop an engagement strategy to elicit input from the field and offer an alternative. This research aims to provide a comprehensive applied framework focused on managing change in EHRs implementations, rather than a broader model.

The terms ‘model’ and ’framework’ have distinct meanings and implications in various contexts. A model is a simplified representation of a system, process, or concept which is descriptive or predictive largely dependent on its purpose. In the context of change management, a model outlines the stages or phases of the change process to address a need. A framework is a structured outline or set of guidelines that provides a foundation for organizing, categorizing, and addressing complex issues or tasks, and is customizable to specific contexts or problems. In the context of change management, a framework provides a set of principles or best practices for managing change in an organized manner. Further, models provide the general direction for attaining a goal or result but without the aspects of practice and measures, where frameworks set suppositions and practices that are designed to direct implementation. Frameworks assist in organizing knowledge, guiding decision-making, and promoting efficiency and consistency in addressing complex problems, such as the complexities of an EHR change effort.

An improved change management framework would require the following implications for future research and notable utility for use in operational practice:

- A comprehensive approach in design using a ‘best-of-breed’ strategy which incorporates multiple models and theories, providing an integrated perspective for managing the complexities of an EHR change effort.
- A solution which includes mechanisms for transitioning internal and external stakeholders from the current-state to the desired future-state, while applying

psychological theories to improve adoption.

- A change management scaffold which leverages the natural flow of change management and project management across a project's life cycle into a logical design determined to improve EHR implementation success.

A thoughtful change management framework provides a structured approach with aligned processes that support the governance of stages and phases for healthcare professionals most affected by transitional disruptions. In this context, the primary purpose of a change management framework is to facilitate a smooth transition during the implementation of an EHR system for healthcare personnel delivering patient care in operational medical settings.

1.4 Research Questions

To answer the research questions, a mixed-methods analysis approach will be used, in a concurrent triangulation design. The comprehensive research and multi-phased analysis aim to answer three major research questions (RQ):

RQ1: How effective has the ADKAR® Model been when utilized to manage change resulting from EHR implementations?

RQ1a: What are the noted strengths or weaknesses?

RQ1b: What are the unique challenges to EHR implementation projects?

A systematic literature review coupled with the information collected from the questionnaire-based survey will be applied to draw conclusions and perform qualitative analysis, to answer RQ1, as well as provide further comprehensive understanding of RQ1a and RQ1b.

RQ2: What are the strategic areas of focus to positively influence the organization's attitude towards change in an EHR implementation?

The data collected from the questionnaire-based survey of varied members of the EHR implementation team will be used to perform quantitative analysis to answer RQ2.

RQ3: To better fit-for-purpose, how can the ADKAR® Model be improved for EHR implementations to promote more successful outcomes?

To answer this research question, a mixed-methods approach will be used, and applied in a transformative design. Analysis of the systematic literature review and questionnaire insights will be used to develop a conceptual framework. Participatory interview methods will evaluate the framework and will assist in creating an improved framework as an answer to RQ3.

1.5 Significance of the Research

To apply a rational and disciplined approach to establishing the rationale for the research proposed, a comprehensive understanding of the challenges unique to health IT projects is required. Transformation and resistance are the greatest problems that all organizations face today in implementing EHRs and health IT (Kachian et al., 2018). Managing resistance to change is critical to successful implementation of health IT. While pessimism and resistance to change are not exclusive to healthcare, their impact is more profound in this sector due to the critical role of health IT in medical care delivery. Managing such resistance or addressing pessimism is not typically a major focus area or practice in projects; this is a significant contributor to poor project outcomes (Dickson, 2020).

Addressing the needs and progress of people through change entails focusing on vision and leadership alignment, stakeholder engagement, change impact and gaps mitigation, organizational readiness, and effective communication, to ensure people that are most affected by the change are prepared and engaged for successful adoption and sustainability (Huong Ha, 2014). A people-centric strategy that addresses all areas will promote successful change

execution and produce more robust outcomes, lasting benefits, and value realization (Lorenzi et al., 1998). Transitioning from current to future processes is essential in change management, with due consideration to the psychology of change (Lorenzi et al., 2008).

Studies on change management stress the significance of managing, evaluating, and acting on change plans to ensure organizational value (Imran et al., 2016). Managing change pertains to the actions or activities performed within the different domains in concert to achieve full migration of all users from the current-state to the desired end-state of the EHR implemented. The change implementation includes the following activities:

- Implementation Planning: Comparative analysis between the known 'to-be' future-state EHR solution inherent workflows and the 'as-is' current-state organizational business processes and provide recommendations on product configuration (Arabi et al., 2022).
- Workflow Development and Normalization: Configuration of the application workflows and business processes designs for the 'to-be' future-state (Deokar & Sarnikar, 2016).
- Configuration: Configuration is determined by user needs (Woody, 2020).
- Implementation: Implementation activities with minimal disruption to healthcare operations (Arabi et al., 2022).
- Data Quality Assurance: Throughout all configuration planning and, quality assurance is necessary, and metrics of relevant importance established (GAO-23-106685, 2023).
- Benefits Realization: A baseline is determined, and throughout the planning and execution of configuration activities, expected value will be evaluated for leadership and stakeholder awareness (Lehman et al., 2016).

Attitude towards change is a primary factor in resistance of change to processes, workflows, systems, and job roles in technology projects (Lorenzi et al., 2003). A change

management strategy must include how to improve the organization's attitude and openness towards change for the change effort to be effective. Change management is necessary for maximizing end-user (i.e., clinicians and physicians) adoption of clinical and health information systems (i.e., EHRs), which is the optimal outcome of successful an EHR implementation project into live patient care environments (Lorenzi et al., 2009).

The federal government has acknowledged that the effective use of technology in the operation of healthcare organizations is critical (Zheng et al., 2020). Mazlan and Bath claim that effective clinical workflows using health IT are most effective when change management is applied to all aspects of the services the change impacts (Mazlan & Bath, 2012). This research will indirectly explore how to improve workflow outcomes that affect operations.

1.6 Summary

The objective of this research is to systematically address deficiencies and shortcomings in change management for EHR implementation, through the use of a thoughtful analysis to craft a single change framework which health informaticists, change agents, and project leaders can apply to effectuate change in EHR implementations. Additionally, this research aims to stress the importance of applying a change management framework to rein in the complexities and improve the results of EHR implementations.

Chapter 1 introduces the topic and provides a statement of the problem, explaining why it is important, and why it is essential to address it now. Overarching research questions are offered, which provides the structure of the research to be conducted.

In Chapter 2, the related literature on change management models will be reviewed, noting how well it has performed in the implementation of EHRs in practice. Taking account of the complexity of EHRs implementation projects, the review of additional related literature will

be conducted on the psychology of managing organizational change, project management, and software development. This will culminate in the basis for the conceptual framework.

In Chapter 3, the research methodology will describe the mixed-methods approach and the data collection techniques used to evaluate the challenges of EHR implementations effectively. The ACTION Change Management Framework will be introduced, along with the rationale for improvement. The research model will be presented, and the dependent variable and constructs will be outlined for quantitative analysis. The plan for participatory collaboration to refine the concept through action research will be detailed, and the methods for qualitative analysis will be explained. The generalized framework development process was also provided.

In Chapter 4, the data collection and construct organization processes will be reviewed, along with the preparation of data for analysis. The methods of data and information analysis will be outlined. The results of the survey analysis will be presented from the quantitative analysis, and strategic insights supported by the analyzed data will be offered.

In Chapter 5, the participatory interview processes will be presented, and the results from these engagements will be reviewed, followed by the qualitative analysis. All relevant information will be presented, along with an explanation of how it influenced changes to the conceptual framework.

In Chapter 6, a discussion of the interpretations of the results will be provided to clarify their implications. The added understanding gained from the research project will be presented, along with recommendations on how they can benefit EHR implementation.

Chapter 7 provides the conclusions, including the research's significant contributions. Lastly, promising areas for future research and collaborative work are suggested, along with potential avenues for extending the work.

2 LITERATURE REVIEW

2.1 Source Selection

Applying the guidance of Preferred Reporting Items for Systematic Reviews and Meta-Analyses© (PRISMA) Statement of 2020 (PRISMA, 2023), a structured method for source selection scaled to support the systematic review of the literature was used. A systematic examination of highly cited publications was conducted to evaluate EHR implementation and healthcare challenges using select organizational change management models.

First, searches used the primary index Google Scholar®. The following major domain topics were used: 'change management' OR 'EHR implementation' AND EHR variants (e.g., EMR, electronic health record, HIS, etc.). The search further extended to professional organizations' websites. The strategy for selection and collection of information and studies was to determine that each peer-reviewed source was supportive of this area of interest, offered unbiased data, and provided comprehensive coverage.

2.1.1 Types of Sources

Most of the literature deemed appropriate for the study was available online from medical and healthcare informatics journals. Google Scholar® led focused evaluation of presented results to PubMed®, ResearchGate®, ScienceDirect®, BMC Health Services Research®, National Library of Medicine®, all of which proved to be useful sources. The Healthcare Information Management Systems Society©, Association of Change Management Professionals©, Project Management Institute©, American Medical Informatics Association of America©, and Prosci© were also excellent sources of trade reviewed materials and peer-reviewed studies. Key published texts and books of relevant substance were also utilized.

2.1.2 Time Frame

The literature collected for this study was predominantly published between 2003 and 2023, with few additional resources collected dating back to 1946. Generally, over the past 20 years, the bulk of change management challenges have been identified as the field matured, and its application to information technology and its business utility has expounded its relation and increased its usefulness in model design. Many healthcare organizations have felt the pressure for continuous and massive change in health IT, and the examination of information sources for this inquiry discloses that in the last decade, healthcare systems, particularly large hospitals, have begun to utilize information technology effectively.

2.1.3 Keywords

The keywords used in the searching criteria contained in combination: adoption, strategy, psychology, approaches, change management, implementation, deployment, project management, electronic health records, EHR, electronic medical records, EMRs, health information systems, HIS, and healthcare informatics. Additional terms helped filter results within search engines: effectiveness, methodology, healthcare, change management, change models, system thinking, change, learning system, change curve, and change theory.

2.1.4 Constraints

All research must be written in English to facilitate its inclusion in this study.

2.1.5 Results of Inquiry

1475 studies were retrieved. 195 were duplicates. 1027 were deemed not relevant. 253 were settled on, 127 were not used as they did not meet the focus of research as it progressed. 126 sources were ultimately included within this research.

2.1.6 Other Scrutinizing Criteria

The following criteria determined whether or not to include a reference in the study: the abstract demonstrates key ideas matching the topic scope, the credibility of literature resource, the credibility of database and search engine, and the objective reasoning and coverage.

2.2 Overview of Major Writings

Modern healthcare heavily relies on the utilization of health IT, with software applications serving as integral components of its workflow. Professionals are often familiar and comfortable with both systematic-linear and systems-thinking approaches to problem-solving (Daigrepoint & McGrath, 2007), and this fact is helpful during EHR change efforts. If changes are allowed to impact normal operations, significant patient safety concerns may arise, leading to catastrophic events and adverse outcomes (McCarthy & Eastman, 2010).

2.2.1 EHR Implementation Challenges

EHRs have emerged as a foundation of health IT implementations in the United States. Furthermore, recent incentives and directives from the federal government have led to accelerating widespread change and increases in EHR implementations, although user adoption remains sluggish (Deokar & Sarnikar, 2016). Perceived benefits of EHRs include improvements in work efficiency, quality of care, communication, and access to patient data, but conversely, negative perceptions associated with poor user adoption, disruption of provider-patient communication, and privacy and security concerns remain (Alanazi et al., 2020). Negative perceptions may inform change management strategies aimed at improving user adoption.

Barnett et al. found that despite concerns that the implementation of EHRs might adversely impact patient care during the transition period of a change effort, there was no overall

negative association on short-term inpatient mortality, adverse safety events, or readmissions in the Medicare population across 17 U.S. hospitals (Barnett et al., 2016). Many healthcare providers felt that the user experience and the flexibility of workflow within EHR applications were critical barriers to successful implementations, particularly in emergency medicine and acute care settings (Gutenstein et al., 2018).

A recurring theme in the literature is the emergence of workflow redesign as a key issue that greatly influences the success or failure of implementations (Zheng et al., 2020). An in-depth understanding of process change management is important, as many critical EHR implementations often involve changes to core processes in healthcare organizations (Takian, 2012). During an implementation, changes to clinical processes and task sequences of diagnosing and treating patients, modifications in data flows or presentation of information, and the creation of new roles and responsibilities can impact acceptance of change (Aguirre et al., 2019).

Pfoh et al., performed an assessment of early adopters of EHRs. They conducted a cross-sectional survey of providers who transitioned from an older to a newer EHR at six academic, urban ambulatory medical practices. Their results confirm primarily that a good transition with people apt to change equals good results. Secondly, significant barriers to satisfaction include dissatisfaction with workflow-related tasks (Pfoh et al., 2012).

Auguste found that a lack of engagement by end-users has been found to be the key factor contributing to failed implementations of EHRs and acceptance of changes. Additionally, inadequate customization, consultation with users in system choice, use of clinical champions, and involvement of clinical and administrative staff in engagement efforts have also been identified as failure factors. Organizations must define technological, infrastructure, organizational, and workflow changes, especially those involving business rules (Giussi et al.,

2017). EHR implementors focusing primarily on the architecture of the technology and not on clinical applications and workflows generally resulted in poor EHR adoption (Auguste, 2013).

Michael Hodgkins, MD found that the challenges are real, and poor experiences with an EHR transition can be overcome by a well-executed implementation plan. He recommends that activating the EHR involves a multi-disciplinary approach to prepare the new system, design practice workflows, train the care team and manage the adoption process. Further, he believes a thoughtful EHR implementation with proper incentivization can help the practice adapt more easily to the new system (Hodgkins, 2015, p. 2). Similarly, Cresswell et al., suggest focusing on how the implementation should be supported by leadership and then maintained once deployed. They also add that continued evaluation is crucial to maximizing user adoption, as well as gauging attainment of financial benefits for management and leadership (Cresswell et al., 2013).

According to Takain, a well-articulated vision is important in change management and insightful leadership is critical in implementing an EHR. He advocates envisioning EHRs implementations as change management endeavors to enhance their complex, multi-dimensional, and sociotechnical adoption in healthcare settings (Takain, 2012). To further stress this importance, Adedeji et al. noted in their theory of change application to EHR implementations that the health professionals and leadership showed significant commitment to adopting the EHR system, but certain physicians and midwives were unwilling to use the EHR system initially until they were persuaded or incentivized by the management (Adedeji et al., 2022).

According to Msomi et al. and their experiences in EHR implementation in South Africa, change management is regarded as an essential process in the development of an EHR system, and remains a central ingredient for the successful implementation of EHR systems. In South Africa, change management has become a requirement for organizations that are incorporating

the use of information and communication technology, and the implementation of EHRs is driven by an eHealth strategy that supports their effective adoption. Research indicates training the use of technology alone remains inadequate in guaranteeing a successful implementation, and a change management strategy is critical to accomplishing goals (Msomi et al., 2021).

Rhonda Collins, RN believes that chief information officers face a universal challenge when implementing EHRs, in particular, obtaining physician buy-in. Regardless of the potential for improvement to healthcare processes and workflows, its ability to improve patient and staff satisfaction, or improve patient outcomes, it is all about managing the change that is involved (Collins, 2020). Supporting this claim, a study of change process factors affecting the uptake of EHRs offers that results from their correlational analysis illustrated a positive, strong and statistically meaningful association existed between change process factors and EHR adoption. The findings of this study indicated that change process factors have the greatest influence on adoption of EHRs (Chirchir et al., 2021).

Despite promising to improve care and streamline operations, EHR implementations are highly disruptive to the organization. The key is that the organization builds change capacity and flexibility in the process so that the change can be better managed during the transition (Garets, 2010). Managing change is about handling the complexity of the project and process.

2.2.2 Organizational Change Models

Several change models exist, each with their own purpose and set of activities to restrict occurrence of negative impacts from foreseeable risks (Cameron & Green, 2020). According to Phillips and Klein, “there is a gap between what the rational-linear change management approach prescribes and what change agents do” (Phillips & Klein, 2023, p. 189). This disconnect may make it difficult to determine the suitability and appropriateness of using different techniques to

promote change. However, change is managed, and activities performed, the end-goal is to promote user adoption. Change can be difficult, especially in healthcare settings. Changes to healthcare processes, tasks, and workflows, which are designed to reduce variation, increase investigative power, and promote consistent results, are often rejected.

Managing change is a complex, dynamic and challenging process. “It is never a choice between technological or people-oriented solutions but a combination of all” (Al-Abri & Al-Hashmi, 2007). Additionally, the rate of change in healthcare is accelerating, not slowing. To accomplish change successfully, an organization must provide incremental improvement on existing capabilities, give empowerment to change agents and business owners, and provide continuous support to change leaders (Al-Abri & Al-Hashmi, 2007).

Kho et al. found in their analysis of change processes used which resulted in the slow rate of adoption of services was largely due to a piecemeal approach to the change process, and a lack of understanding of how to plan, manage and reinforce change when implementing services. In their study, they note the importance of conducting a needs assessment before tackling a complex health IT project. Understanding the characteristics, needs, and expectations of the stakeholders was important for designing a solution that is compatible with end-users. Paying close attention to the context and needs of clinics and providers was important when tailoring the change and implementation strategy, methods for engaging stakeholders and overcoming resistance, and evaluating organizational readiness (Kho et al., 2020).

2.2.2.1 Kübler-Ross Change Curve Model

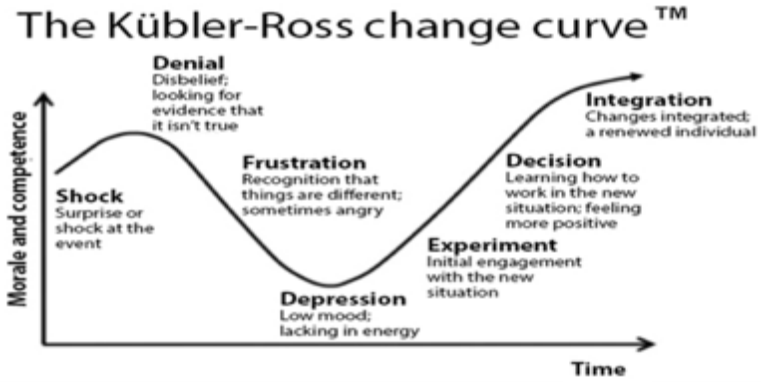
The Kübler-Ross Change Curve Model is based upon Dr. Elisabeth Kübler-Ross’ Grief Cycle as developed during research and work with the terminally ill and culminated in her seminal work ‘On Death and Dying’ (Kübler-Ross, 1969). In it, she systematically examined the

human response to dying. The 'Five Stages of Grief' which comprise denial, anger, depression, bargaining and acceptance, helps in understanding how to live with loss and grieving. The Grief Cycle model explains how individuals manage the change process through grief and loss, and how most persons typically move through all of them in a prescribed order (refer to Figure 1).

Source: Kubler-Ross (1969)

Figure 1 - Grief Cycle Model

Dr. Kübler-Ross's analysis yielded a more comprehensive change model which articulates how individuals' transition and transform through change and has been applied to many domains. The Kübler-Ross Change Curve Model method's seven states are as depicted: Shock, Denial, Frustration, Depression, Experiment, Decision, and Integration (Kübler-Ross, 1993) (refer to Figure 2).



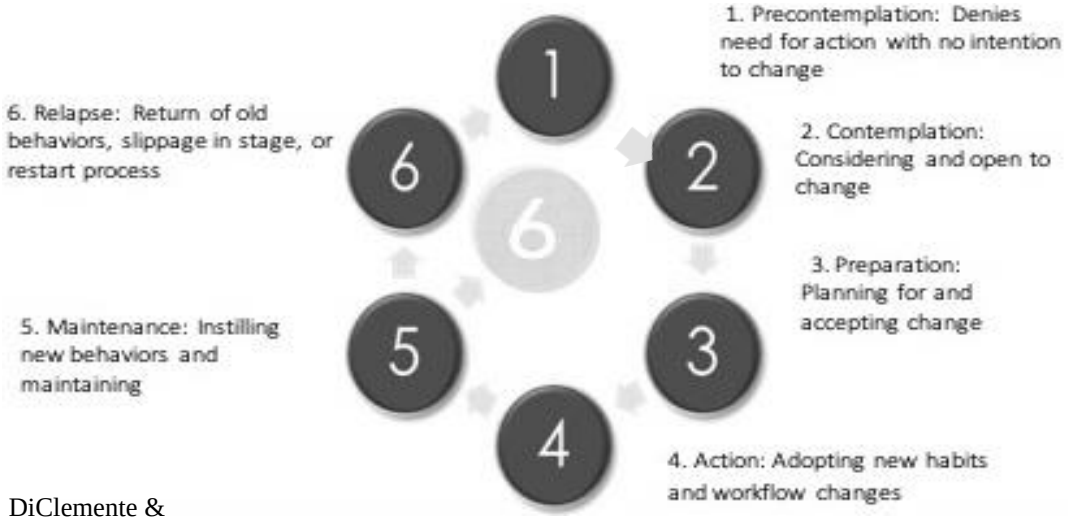
Source: Kubler-Ross (1969)

Figure 2 - Change Curve Model

The ‘Change Curve Model’ describes the journey that individuals or groups typically experience when dealing with change and transition. End-users’ behaviors and actions resemble those experiencing grief, and much like team dynamics, it also applies to EHR implementations. The concept is widely accepted, and it has been found that it was valid in a majority of cases and situations relating to change. The Change Curve Model is the primary psychological depiction of change; however, it lacks description of what occurs once change is implemented.

2.2.2.2 Transtheoretical or Stages of Change Model

Dr. Carlo DiClemente’s and Dr. James Prochaska’s Transtheoretical Model or Stages of Change Model depicts how people struggling with addictions step through the stages of change and potential relapse. It operates on the assumption that people and groups do not change behaviors quickly and decisively, rather, the change occurs continuously through a cyclical process. The six stages are Precontemplation, Contemplation, Preparation, Action, Maintenance, and Relapse (DiClemente & Prochaska, 1983). Relapse is represented by movement out of the progression, restart, or backward in stages (refer to Figure 3).



Source: DiClemente & Prochaska (1983)

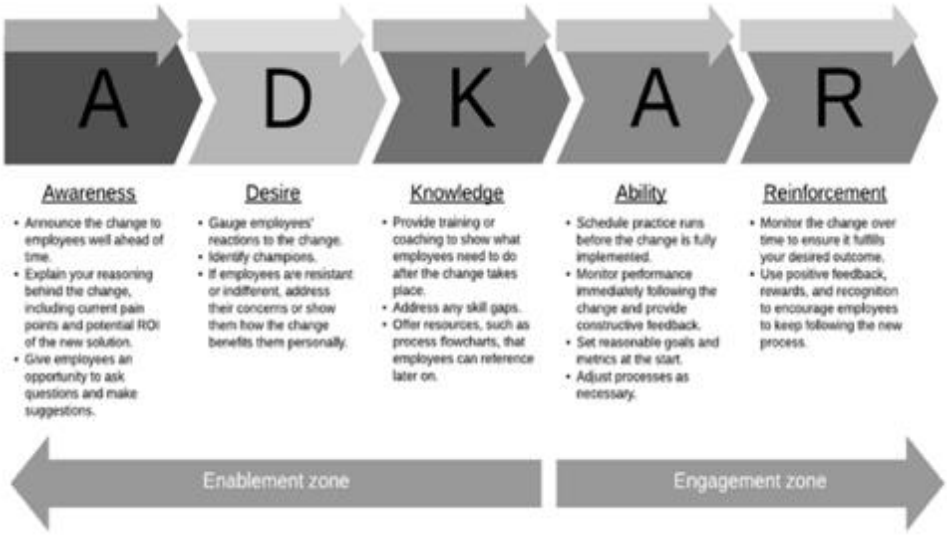
Figure 3 - Transtheoretical Model

The Stages of Change Model has become one of the most commonly applied theoretical and clinical frameworks in mental health and has been proven effective across a broad spectrum of problems. It predominately focuses on the decision-making of the individual and is a model of intentional change but has relevance to organizational change as well. To progress through the stages of change, people and groups apply cognitive, affective, and evaluative processes. Similarly, health IT users step through resistance to adoption in much the same manner. The concept evaluates readiness for change and applies a stepwise approach (LaMorte, 2022).

2.2.2.3 The ADKAR Change Model

The Prosci© ADKAR® Model is a goal-oriented change model that guides individual change. Multiple variations of change management models exist based on this research-based foundation (Hiatt, 2006). According to Hiatt, this powerful model is based on the understanding that organizational change can only happen when individuals change. Whereas Prosci© has also developed a framework for facilitating organizational change, the ADKAR® Model primarily focuses on individual change by guiding individuals through change and addressing any roadblocks or barriers (Hiatt & Creasey, 2012). The ADKAR® Model represents the five tangible and concrete outcomes for change to occur: Awareness, Desire, Knowledge, Ability, and Reinforcement components (Malhotra, 2019) (refer to Figure 4):

- Awareness (of the need to change)
- Desire (participate and support the change)
- Knowledge (on how to change)
- Ability (to implement required skills and behaviors)
- Reinforcement (to sustain the change) (Hiatt, 2006)



Source: Prosci.com (2020)

Figure 4 - ADKAR Model

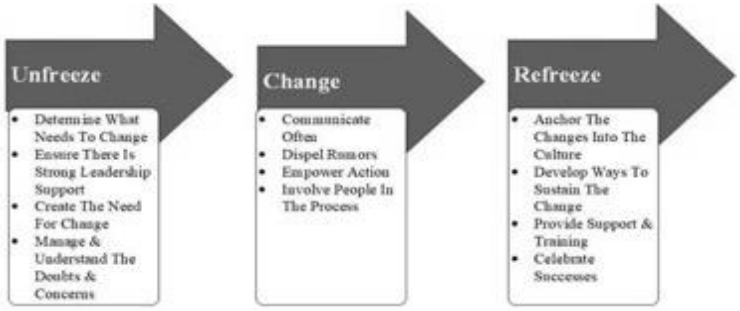
The ADKAR® Model focuses on organizational change by putting the focus on employees, the ADKAR® Model limits resistance and thus speeds up implementation (Kaminski, 2022). Further, the method's main premise is to give employees the confidence they need to complete the transformation. This people-centric method promotes a higher success rate for sustained change compared to methods that do not actively involve the people affected by the change. Any change takes place one individual at a time. Change also takes place sequentially as individuals move through the phases of the ADKAR® Model (Creasey, 2022).

2.2.2.4 Lewin's Change Model

The Three-Stage Model of Change, developed by Kurt Lewin, is popular thanks to its simple three-phase model that breaks changes into more manageable chunks. Lewin's Three-Stage Model often involves spreading out the 'change' phase over a long period of time to overcome resistance and provide adequate training. Despite a universally applicable model, the broad steps of this model may vary significantly depending on institutional situations and

interpretations (Lewin, 1947) (refer to Figure 5):

1. Unfreeze.
2. Change.
3. Refreeze (Lewin, 1947).



Source: Lewin (1947)

Figure 5 - Lewin's Three-Stage Model

'Unfreezing, Change, Refreezing' provides sequential anchors for a somewhat linear systemic change. Raza adds, Lewin's Three-Stage Model of Change describes status-quo as the present situation, but a change process, where a proposed change should then evolve into a future desired state. He posits that to understand group behavior, and hence the behavior of individual group members during the change process, we must evaluate the totality and complexity of the field. This is also commonly known as Field Theory, which is widely used as the premise for multiple change models, including the Lewin's Three-Stage Model of Change (Raza, 2019).

2.2.2.5 Bullock & Batten Model of Planned Change

The Model of Planned Change, introduced by David Bullock and David Batten, presents a structured approach to organizational change, emphasizing systematic planning and execution of organizational development (OD) phase analysis. The Model of Planned Change provides insights into the dynamics of change processes within organizations, and how change efforts originate and mature through completion and integration. This work contributes to the field of

organizational development by offering a nuanced understanding of the different stages involved in organizational change efforts (Bullock & Batten, 1985) (refer to Figure 6).

Source: Bullock & Batten (1985)

Figure 6 - Bullock & Batten Model of Planned Change

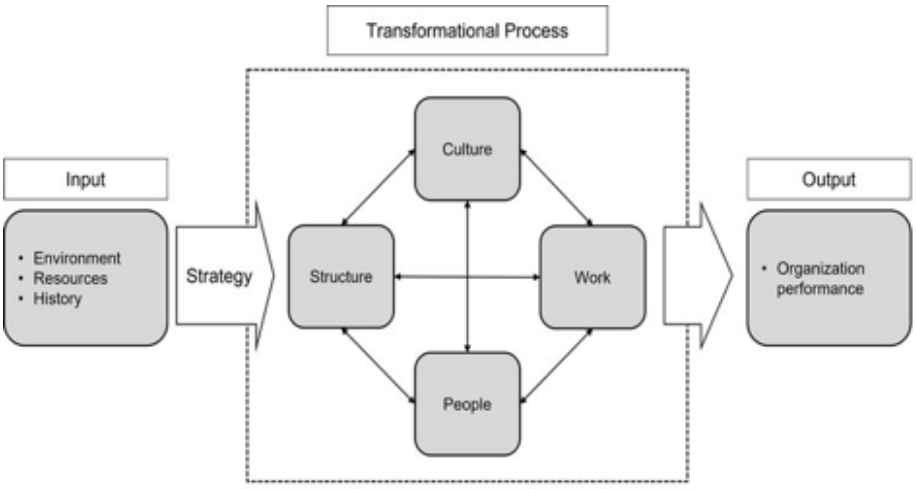
It consists of four phases (i.e., Exploration, Planning, Action, and Integration) aimed at guiding organizations through the change process, from recognizing the need for change to integrating change into the organizational system for long-term sustainability. The Bullock and Batten Model of Planned Change expands upon Lewin's three-stage model by creating nine distinct steps. It involves a systematic approach to organizational change:

1. Recognize the need for change: Identify the issues or areas requiring change.
2. Establish goals and objectives: Define clear and measurable goals for the desired change.
3. Diagnose relevant variables: Analyze the factors influencing the current situation.
4. Select appropriate change technique: Choose the most suitable methods or interventions for implementing the change.
5. Plan for implementation: Develop a detailed plan outlining how the change will be executed, including timelines and responsibilities.
6. Implement the change: Put the plan into action, ensuring effective communication and management of the change process.
7. Evaluate the change: Assess the effectiveness of the implemented change against the established goals and objectives.

8. Stabilize the change: Ensure that the change becomes ingrained in the organization's culture and processes.
9. Build change into the system: Integrate mechanisms to sustain the change and adapt to future challenges (Bullock & Batten, 1985).

2.2.2.6 Nadler & Tushman Congruence Model

The Nadler and Tushman Congruence Model is a framework for understanding organizational behavior and performance. Developed by David A. Nadler and Michael L. Tushman in the 1980s, it is based on the principle that a team or organization can only succeed when the work, the people who do it, the organizational structure, and the culture are 'congruent' (Nadler & Tushman, 1980) (refer to Figure 7).



Source: Nadler & Tushman (1980)

Figure 7 - Nadler & Tushman Congruence Model

The Congruence Model is a useful tool for thinking through how changes an organization considers will impact other areas of the business. The model suggests that organizations are effective when there is alignment, or congruence, between various elements within the organization. The model identifies four key components:

1. Inputs: Various factors that affect an organization, including its environment, resources,

history, and organizational culture.

2. Outputs: Results or outcomes produced by the organization, such as products, services, and financial performance.
3. Processes: Activities and interactions that occur within the organization, including communication, decision-making, and coordination.
4. Feedback: Represents the information that flows back into the organization, providing insights into its performance and effectiveness (Nadler & Tushman, 1980).

According to the Congruence Model, organizational effectiveness is achieved when there is alignment or fit among these four components and should be consistent with each other and with the organization's goals and objectives. When there is congruence among these elements, organizations are better able to adapt to their environment, achieve their objectives, and sustain high performance over time (Nadler & Tushman, 1980).

2.2.2.7 Senge's Model for Sustainable Change

The Fifth Discipline: The Art and Practice of the Learning Organization' by Peter Senge is a seminal book that explores the concept of the learning organization and offers a framework for organizational development. Senge introduces the concept of the learning organization, emphasizing its ability to adapt and thrive in change (Senge, 1991) (refer to Figure 8).

Source: Senge (1991)

Figure 8 - Model for Sustainable Change

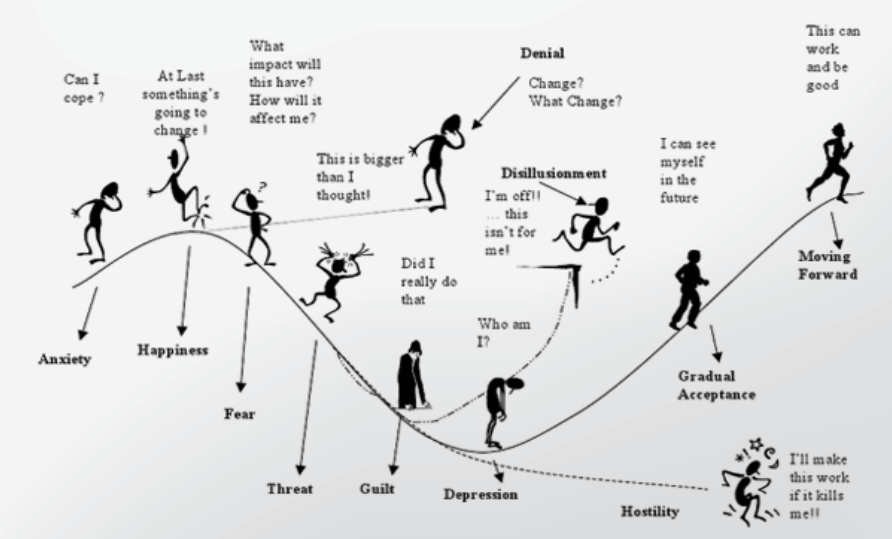
Senge identifies five disciplines that are essential for fostering organizational learning and establishing a learning organization:

1. Personal Mastery: This discipline focuses on individuals continuously improving and developing their skills, competencies, and personal vision.
2. Mental Models: Involves uncovering and challenging the deeply ingrained assumptions, beliefs, and mental models that shape individuals' perceptions and behaviors.
3. Shared Vision: Emphasizes the importance of creating a shared vision that inspires and motivates individuals within the organization, aligning efforts towards common goals.
4. Team Learning: Involves fostering an environment where teams can learn together, share insights, and collaborate effectively to achieve shared objectives.
5. Systems Thinking: Involves understanding and analyzing the interconnectedness and interdependencies within the organization and its environment (Senge, 1991).

Senge provides practical guidance and tools for applying these disciplines in organizations, encouraging leaders to cultivate a culture of inquiry, collaboration, and innovation. He emphasizes the importance of long-term thinking, systems awareness, and a commitment to continuous learning and improvement for organizational success. It is a holistic approach to organizational development, promoting a shift towards more adaptive, resilient, and learning-focused organizations.

2.2.2.8 Fisher Change Transition Curve Model

The John Fisher Change Transition Curve Model explores how people react to organizational change and transition, building upon the foundational psychological research initiated by Elisabeth Kübler-Ross (refer to Figure 9).



Source: Fisher (2013)

Figure 9 - Fisher Change Transition Curve Model

Through the Fisher Change Transition Curve Model, Fisher states that individuals and groups pass through a series of phases (Fisher, 2013):

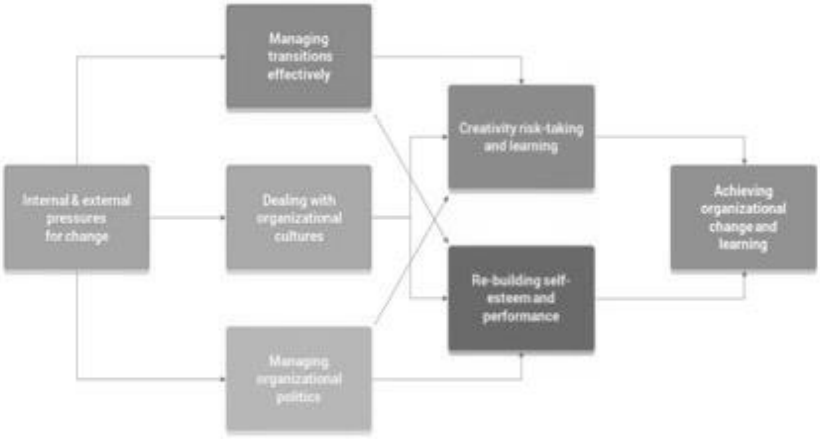
1. Anxiety: Response to the uncertainty of the future. Characterized by a fear of the unknown and an inability to predict outcomes triggers a sense of apprehension.
2. Happiness: State of happiness fueled by the prospect of positive change. Marked by hopeful anticipation and, often, unrealistic expectations about the future.
3. Fear: Characterized by the emergence of doubts and minor behavioral changes, signaling a growing awareness of the need for personal adaptation.
4. Threat: Individuals face the implications of change on their core identity. Previous beliefs and choices are questioned.
5. Guilt: Individuals reflect on their past actions and recognize mistakes. Involves acknowledgment of one's role in contributing to less-than-ideal outcomes.
6. Depression: Realization that past behaviors, actions, and beliefs clash significantly adding to confusion and disconnection from core identity.

7. Gradual acceptance: Individuals begin making sense of their surroundings and place within the changes occurring.
8. Moving forward: Regaining control and making positive strides. Individuals rediscover their sense of self, feel confident in their decisions which align with their convictions.
9. Complacency: Individuals have adapted to the change, rationalized, and integrated them into their new worldview. Characterized by a return to the 'comfort zone' (Fisher, 2013).

The goal of the change agent is to help ease the transition by providing education, information, and support. The change agent must aid the organization in developing change strategy to assist in overcoming resistance, and alleviating anxiety through strategy focused on both the individual and the organizational whole (Fisher, 2013).

2.2.2.9 Carnall's Change Management Model

Carnall's Change Management Model, developed by Colin Carnall, offers a structured approach to understanding and implementing organizational change. It's a five-stage model that emphasizes the need for careful planning and management throughout the change process and until completion (Carnall, 2007) (refer to Figure 10).



Source: Carnall (2007)

Figure 10 - Carnall Change Management Model

According to Carnall, coping with changes takes place gradually. Staff typically go through five stages during major organizational change efforts. Employee engagement is the involvement and enthusiasm of employees (Carnall, 2007). Change management is a systematic approach to dealing with the transition or transformation of an organization's goals, processes, or technologies The model consists of:

1. Diagnosis: Involves assessing the current state of the organization and identifying the need for change. It includes analyzing internal and external factors that may be driving the need for change, such as market trends, competition, or internal inefficiencies.
2. Planning: Focuses on developing a detailed plan for implementing the change. This plan should outline the objectives of the change, the strategies for achieving those objectives, and the resources and timelines required for implementation.
3. Implementation: Involves communicating the change to stakeholders, mobilizing support for the change, and executing the strategies. Effective leadership and communication are critical during this stage to manage resistance and ensure a smooth transition.
4. Evaluation: Continually monitor and evaluate its progress. This stage involves assessing whether the change is achieving its objectives, identifying any unexpected challenges or barriers, and making adjustments to the plan as needed.
5. Stabilization: Focuses on stabilizing the new state of affairs. It involves embedding the changes into the organization's culture and processes, ensuring that they become the new norm (Carnall, 2007).

Carnall's Change Management Model emphasizes the importance of systematic planning, effective communication, and ongoing evaluation throughout the change process to maximize the likelihood of success (Carnall, 2007). While very useful in long-term projects or programs,

continuous process improvement projects, singular efforts do not require such structure.

2.2.2.10 Kotter's Theory

Developed by Harvard Business School professor John P. Kotter, Kotter's Theory for Change Management is divided into eight stages (refer to Figure 11):

1. Create a sense of urgency.
2. Build the change team.
3. Form a strategic vision.
4. Communicate the vision.
5. Remove barriers to change.
6. Focus on short-term wins.
7. Maintain momentum.
8. Institute change (Kotter, 1990).

Source: Kotter (1990)

Figure 11 - Kotter's Theory

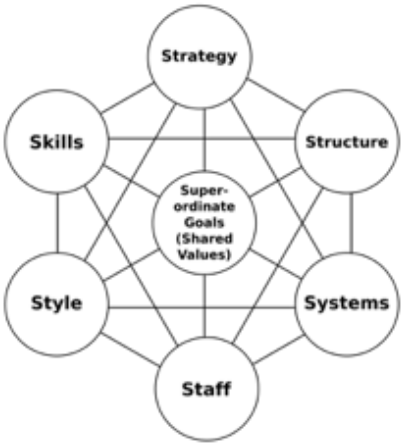
Kotter's Theory introduces an eight-step process for leading organizational transitional change. Its core belief of leadership's importance in creating and sustaining changes, the importance of employees' engagement, and its stepwise approach are used in a project's implementation. Steps such as 'develop and form a strategic vision' neither informs possible

unpredictability in the process nor guides the user to consider individual institution policy and culture (Kotter, 1995).

2.2.2.11 McKinsey 7-S Model

The seven Ss of the McKinsey 7-S Model make it one of the more complex models, but that complexity may be necessary when implementing complicated organization-wide changes. The model's seven elements are not designed to be addressed in a specific order but rather assessed by how they affect each other so that weaknesses can be readily identified and corrected (refer to Figure 12):

1. Strategy.
2. Structure.
3. Systems.
4. Shared Values.
5. Style.
6. Staff.
7. Skills (McKinsey, 2008).



Source: McKinsey (2008)

Figure 12 - McKinsey 7-S Model

The first three components (i.e., strategy, structure, and systems) are considered the 'hard' elements. The remaining four (i.e., shared values, style, staff, and skills) are considered the 'soft' elements. The McKinsey 7-S Model describes the importance of the interaction between seven organizational elements (i.e., strategy, structure, systems, skills, staff, style, and shared values) in organizational changes for enhanced effectiveness. When the interconnected 7-Ss in the McKinsey 7-S Model are aligned, orchestrated changes are underway. This model is often used to analyze but not to manage changes within an organization (McKinsey, 2008).

2.2.2.12 Bridges' Transition Model

The Bridges' Transition Model is similar to the Kübler-Ross Change Curve Model in that it focuses on the emotional reactions throughout a transition. While many models focus on either the process of change, or the change itself, the Bridges' model narrows the transition process into three systematic stages (refer to Figure 13):

1. Ending, losing, and letting go.
2. The neutral zone.
3. The new beginning (Bridges, 2016).

Source: Bridges (2016)

Figure 13 - Bridges' Transition Model

The concept behind this model is that change is a thing that happens to people, versus a

transition. According to Bridges, by anticipating the denial, anger, and frustration that comes with change, you can better guide people towards the neutral zone, which is the bridge between the old and new. This feelings-based approach helps management, and employees work together to transition and solidify change. It helps to manage the human and people side of change (Bridges, 2016). Changes involve transitions, the actual movement from what is to what will be, and either be an effective process, or ruin the experience (Bentley, 2018), thus negatively impacting the adoption of the changes being implemented.

2.2.2.13 Satir Change Model

The Satir Change Model monitors the emotional progression of employees by tracking their performance through five stages:

1. Late status quo.
2. Resistance.
3. Chaos.
4. Integration.
5. New status quo (Satir, 2018).

The core concept of the Satir Change Model is there is always the possibility of improvement from any change process. Continuous review and improvement are a result of focusing on tracking rather than influencing performance. To effectively address the impact of change, change agents and practitioners must implement an appropriate change management strategy (Satir, 2018).

2.2.2.14 Maurer 3 Levels of Resistance and Change Model

The Maurer Three Levels of Resistance and Change Model is unique in that it centers on

what causes changes to fail. This model focuses on three critical levels of understanding causes of resistance:

1. I don't get it.
2. I don't like it.
3. I don't like you (Maurer, 2010).

The creator of this model, Rick Maurer, believes that up to two-thirds of significant changes will fail due to lack of information, negative emotional reactions to change, or lack of trust and confidence in the person or people trying to successfully implement the change (Maurer, 2010). Organizational change can manifest in various forms, including strategic direction, leadership commitment, or technological shifts. Change management is a strategic process focused on aiding the people aspect of organizational change and transitions, and thus is critical to an implementation, most especially an EHR.

2.2.2.15 Deming Cycle (PDCA) Model

The Deming Cycle Model, originally developed by Dr. Williams Edwards Deming, is also known as the Plan-Do-Check-Act (PDCA) cycle. The PDCA Cycle is a systematic process for gaining valuable learning and knowledge for the continual improvement of a product, process, or service. It is also known as the Deming Wheel, or Deming Cycle. The improvement model was first introduced to Dr. Deming by his mentor, Walter Shewhart of Bell Laboratories as the PDSA (Plan-Do-Study-Act) and was later revised into its current form by Dr. Deming in 1950 (Deming, 2023). This model's primary focus is on process evaluation and improvement and is divided into four phases (refer to Figure 14):

1. Plan.

2. Do.
3. Check.
4. Act (Deming, 2023).

Source: Deming (2023)

Figure 14 - PDCA Cycle

The iterative Deming Cycle Model can be applied to implement changes for improvement. It is applicable in complex projects or smaller and more frequent changes.

2.2.2.16 Nudge Theory

Nudge Theory relies on subtle, indirect suggestions that are backed up by evidence so that employees will be nudged towards the change that you desire. The premise is that 'nudging' change is more effective than forcing change. Below are the seven basic steps or principles:

1. Define changes.
2. Consider the employee's point of view.
3. Provide evidence to show the best options.
4. Present change as a choice.
5. Listen to employee feedback.
6. Limit options.
7. Solidify change with short-term wins (Thaler & Sunstein, 2009).

The Nudge Theory is an application of behavioral economics that uses a choice structure that positively reinforces people's behavior without forbidding their freedom of choice or imposing mandatory obligations. It has found application among health care professionals in the clinical setting, although it requires additional research (Thaler & Sunstein, 2009).

2.2.3 Managing Change in Health IT Projects

Jardim provides an excellent differentiation between project management and change management: "Project management is the process of planning, organizing, and controlling resources to achieve a specific goal. It involves defining the project scope, setting timelines and budgets, and ensuring the project is completed within those constraints." He further adds, "Change management is the process of implementing and managing changes to an organization's processes, systems, or structures. It involves identifying the need for change, analyzing the impact of the change, and implementing and monitoring the change to ensure its success. Change management is focused on managing change's people and organizational aspects rather than just the technical aspects" (Jardim, 2023).

He continues, "Despite their differences, project management and change management are closely related because projects often involve significant changes to an organization's processes, systems, or structures. Effective project management and change management go hand-in-hand, and organizations that can effectively manage both will be better equipped to handle the challenges of a changing business environment. Project managers and change managers need to work together to ensure that projects are delivered on time, within budget, and to the required quality standards while also managing the people and organizational aspects of change" (Jardim, 2023).

According to Baldauf, as a project manager leading an implementation, it is crucial that

change management also be part of the important activities. The perspective of change management is a major contributor to the project's success. Either by assuming this role or promoting it, close collaboration with change leaders and practitioners will help to take into consideration the human aspects of the changes within an organization (Baldauf, 2021). An EHR implementation project can have significant impact on the ways individuals do their work on a daily basis. Change resulting from this new project can impact processes, systems, tools, job roles, workflows, mindsets, and behaviors. According to Chittoor, individuals resist change for either fear of the unknown, or the uncertainty of relearning. Change practitioners understand that for a change to happen, individual change should happen first (Chittoor, 2012).

Unlike project management, change management does not have formal technical processes. However, change management does apply structured approaches including processes and tools. When applied correctly, the approach will increase the chances of successful adoption (Chittoor, 2012). Change leaders must understand that "factors ensuring successful outcomes in one case do not always lead to success in another case" (Dempsey et al., 2022).

Jarocki proposes that project management and change management are two disciplines which are both critical to the overall success of any organizational initiative and are often practiced disjointedly. Each discipline applies its own set of tools, techniques, and methodologies to the same initiative, many times in redundant or duplicate fashion. He believes "this inadvertently creates a schizophrenic approach to project success where critical interdependencies and joint opportunities are never fully realized. The results are unnecessary project expenses and delays, increased stakeholder frustration, and low rates of organizational adoption and business value realization" (Jarocki, 2009). To achieve a singular approach, he suggests integrating and enhancing the most effective perspectives, approaches, and techniques

of project management and change management disciplines into one sequential set of activities.

The Project Management Institute® (PMI) Project Management Framework illustrates that projects pass through five distinct project phases throughout its project life cycle (i.e., initiation, planning, execution, performance, and closeout). To standardize project management information and practices, PMI® created the text, A Guide to the Project Management Book of Knowledge (PMBOK® Guide) (PMI, 2021); currently in its seventh edition. Robert Wysocki, PhD rescoped the PMBOK® Guide as scoping, planning, launching, monitoring and controlling and closing, and outlined project management fundamentals and how those apply and could be adapted in more complex real project situations. His continued work promotes a sophisticated approach of conducting project management on how Agile, Extreme and hybrid project management frameworks are applied as appropriate to each project situation (Wysocki, 2009).

According to Goodison et al., health IT projects would benefit greatly by assessing and evaluating agile methods and how they could be adopted for health IT projects. They believe it could help reduce the high percentage of IT project failures (Goodison et al., 2019). Nordmark et al. intuitively claims, "there is a need for close collaboration between the development and deployment project teams and management to reach an organizational change that is timely for both the individual and the collective organizational change. When time or timing fails in the development or implementation process, there is a huge risk of non-adoption of new tools, services, or procedures, or among the end-users" (Nordmark et al., 2022, p.1).

An example of how the consideration of end-user experiences concerning how work is performed, and its significance to how the change is perceived, and product is adopted, is the deployment of the Epic© EHR at the Mayo Clinic in Rochester, Minnesota. Care was taken to develop workflows that account for how the system and end-users work together. The goal of the

workflow is to identify system configuration, assist in development of test scripts, guide design of training curriculum, provide insight in potential challenges to user experience and help the change management team assess process changes for the end-users. In their change processes, business analysts began with a nonspecific vendor-supplied workflow, and if none were available, a new workflow was created. Next, workflows were reviewed with the teams, including the end-users. To finalize the workflow, end-users provided a final sign-off on the system design. Finally, the end-users identified gaps from current-state to future-state, and developed mitigation plans or identified resolutions (Counselman et al., 2018). The overall goal was to create workflows representing the enterprise, but because of structural differences, divergent workflows were occasionally needed. This allowed the user experience, testing, training and change management teams to facilitate a smooth transition. This was achieved by refining the system to meet a high proportion of users' expectations rather than forcing users to change their behaviors. (Counselman et al., 2018).

Guissi et al. found in their assessment of the change during an EHR implementation, that to decrease healthcare professionals' and physicians' resistance to change, it was necessary to consider healthcare workflow in the redesign of processes and the EHR. Significant changes to workflows were required, and the healthcare end-users were critical in its redesign. This approach avoided the misuse of the systems and the poor quality of the recorded information by professionals, as well as costly delays (Guissi et al., 2017).

2.3 Limitations of Change Models in EHR Implementations

Numerous change models exist, each with a different purpose and approach for guiding or driving change. Some change models focus on the people within the organization and the psychological aspects of change, while others focus on the projects themselves. Many change

models focus on the structural dynamics of the organization with less emphasis placed on the people in the organization. Most change models are linear, and do not consider the need for continually assessing, reassessing, and adjusting change efforts throughout the change process. Importantly, existing change models lack the actionable strategy and usable tools needed to apply the change concepts to the healthcare IT industry needs, and most specifically to EHRs implementation projects. There are notable performance concerns within the current change processes, which could benefit from a systems thinking approach.

Change management represents a continuous cycle, and requires a sound vision, plan, time, aptitudes, inspiration, monetary and automatic endeavors to execute the change. There are several models of change management available and choosing the right change management model will help facilitate success. Many of the models are complementary, so their use in combination may be beneficial (Bekmukhambetova, 2021).

While the Prosci© 3-Phase Process is certainly useful for preparing an organization for change, EHR implementations have used the ADKAR® Model with varied success (Prosci, 2024). According to Amlung et al., existing implementation frameworks fail to provide experiential feedback such as implementation challenges, data conversion, and regulatory, functionality, and interoperability requirements (Amlung et al., 2020). Their collection of experiences using a change methodology cements the insights of others into lessons learned. The following experiences are offered, and while they correlate to the use of the ADKAR® Model, they also demonstrate that applying a multi-disciplined approach could offer more predictability of success by awareness of multiple disciplines' activities work towards joint objectives:

1. Change the people/process, not just technology - to achieve optimal benefit of technology transitions, especially in healthcare, the culture and processes must also be addressed.

2. Difficulties of a homegrown system - offers the advantage of meeting an organization's unique needs, but difficult to keep the system integrated and functionally relevant to clinical and non-clinical staff.
3. Clinical involvement - clinical staff must also be involved throughout the implementation process; they are primary users utilizing the new EHR system in operation.
4. Data conversion - challenge for organizations that required historical data to be transferred to their new EHR system.
5. Leadership involvement - requires the engagement of leadership and project champions throughout the decision making and implementation processes (Amlung et al., 2020).

According to Worley and Mohrman, the ADKAR® Model makes it possible to identify and evaluate reasons why changes are not working, but the ADKAR® Model does not provide a means for evaluation and continuous improvement, nor offer solutions to identify barriers at each stage of change process (Worley & Mohrman, 2014). The ADKAR® Model focuses on outcomes and lacks aspects of a framework to examine strategies for developing and implementing information technology systems for electronic health records (Ridley, 2018). This observation supports conclusions based on my personal experiences in health IT implementations.

The ADKAR® Model does not adequately address issues with a poor fit of the proposed replacement in an EHR implementation project. It is rarely as simple as replacing a system or service (Al-Abri & Al-Hashmi, 2007); most changes are complex and require a systems-thinking approach. While it attends to the 'people-side of change' (Hiatt & Creasey, 2012), the model does not provide strategy to help move from each of their phases in conjunction with a project management methodology. It seems to assume a solution is known, is acceptable as a suitable replacement, and the project is moving forward according to plan (Smith et al., 2022).

Additionally, in an EHR implementation, the selection of a suitable replacement is part of the concern for stakeholders, as it rarely meets all of their business requirements entirety, nor fits their workflow (Takain, 2012), thus the reason for such resistance. The ADKAR® Model does not easily integrate the disciplines either. Emerson claims, the use of the ADKAR® Model alone is not sufficient to assure healthcare practitioners that the introduced solution to their known problems does, in fact, address them (Emerson, 2022).

The ADKAR® Model is not helpful in all situations. It is useful in rapidly addressing change management hurdles, but it is not as effective when the change activities are loosely defined or the project's intended goals are not well understood (Kimberling, 2021). Also, for application to small-scale projects, the tools and processes are rigid and cumbersome.

In a study of the effectiveness of Lewin's Three-Stage Model of Change, Hussain et al. offers that the key factors that can encourage change in organization are largely affected by leadership. The dominant role of leadership and a significant connection of knowledge sharing in change with employees and leaders is crucial to the change process (Hussain et al., 2018). The model can support an EHR change project, but it does not introduce much structure to activities or coordination with process analysis in its change phase. Also, once the change is complete and 'refrozen', this is not a conducive state for continuous process improvement.

According to Bullock and Batten, integration begins after all actions in the change plan happen, however integration occurs after the changes are aligned to the organization (Bullock & Batten, 1985). A concentrated effort in this area is warranted. Policies and procedures are necessary for the formalization of the changes to be integrated. In healthcare, much is governed by polies and procedures, thus it is critical to be applied in change strategy (Etareri, 2022).

The Nadler and Tushman Congruence Model helps to exemplify an organization as a

system comprising interrelationships and feedback loops (Nadler & Tushman, 1980). In a healthcare enterprise, this is indeed an important aspect, as actions and activities supporting patient care are performed. Inputs received from the varied actors are transformed by work processes into outputs, which are used in the diagnostic process. Change strategies must optimize congruence between the activities and the work, to better ensure performance in achieving outcomes is more likely (Merrill et al, 2009).

Peter Senge's 'Learning Organization' concept is becoming an increasingly widespread philosophy in modern health care organizations, and it facilitates an organization's readiness for change promoting successful results (Al-Abri & Al-Hashmi, 2007). According to Senge, organizations must continually learn to adapt to changes in the environment (Senge, 1991). Any organization implementing a learning organization philosophy requires an overall strategy. Per Argyris, the biggest challenge that must be overcome in any organization is to identify and breakdown the ways people reason defensively. Everyone must embrace change and constantly precipitate an ever-evolving structure that has a forward-leaning vision (Argyris, 1991).

John Fisher Change Model allows managers to determine which stage of change individuals more easily are in the transition cycle, so that they may employ the best strategy to help the organization proceed through the stages to adoption (Fisher, 2013). It aids in understanding their emotional changes through the transition process, so that they may be better managed, and a rapid facilitation to normalcy established.

Carnall promotes the inclusion of managers in the transitional process of change. They are the best poised to impact the environment, so that change may be understood, and the group may process the change (Carnall, 2007). In healthcare, this is a vital lesson learned.

Kotter's Theory helps prepare or ready an organization for a large organizational change

but does not provide the framework alignment to how projects are managed. This is important in EHR implementations, as the new product typically requires changes to how business is conducted, but an EHR does not require changes to why business is performed, as this model is supportive of. While the model can be valuable for managing organizational change, its effectiveness will depend on leadership support, communication, and resource allocation.

The McKinsey 7-S Model applies the concept of management by objectives, which is also utilized in healthcare organizations at a macro level. The 7-S concept helps analyze the dysfunctions of the management process and assists in understanding where corrective actions may be best applied. While a useful tool in supporting smaller changes, it may be limited in supporting a large-scale EHR implementation project.

The Bridges Transition Model helps organizations and individuals understand and more effectively manage and work through the personal and human side of change. While useful in helping to define how end-users adopt solutions, it does not offer much more in managing change in a structured manner through a project with moderate to high complexity.

The Satir Change Model focuses on preparation for change but does not help determine what changes need to be made, so it makes sense to use this model when you know what you want to rework. This approach acknowledges that many changes are abandoned due to resistance, confusion, and lack of communication, but it does not necessarily provide you with a roadmap to reinforced, sustained change (Satir, 2018). The Satir Change Model supports how an EHR implementation occurs, though not in specific ways. It identifies the need for managing the chaos, and why once a change is completed, a new status quo must be established. This provides the basis for how new changes can be normalized.

Per Maurer, resistance to change is a reaction to the way a change is being led (Maurer,

2010). People resist in response to change ambiguity. This change model focuses on what reasons for resistance or reluctance may exist inhibiting progress but offers little in means of helping to manage the change endeavor in part or in its entirety.

The PDCA is used in healthcare setting with great effect in guiding continuous changes to processes. Though it is serving as an implementation guide, it omits the change management process (Deming, 2023). While a critical overarching model in managing iterative projects, it does not provide sufficient coverage for a change management framework's complexity.

The Nudge Theory can be useful to achieve the desired outcome when applied in combination with a more enforceable model to facilitate adherence, and a structured and disciplined approach. Alone it is insufficient for a complex EHR implementation project.

2.4 Need for New Change Model in EHR Implementations

Healthcare organizations rely heavily on their EHRs, which have become a critical component of their success. While EHRs have evolved rapidly, their pace of development has not matched that of other markets. The MUMPS (Massachusetts General Hospital Utility Multi-Programming System), also known as M, is a programming language developed in 1966 that has been widely used to manage patient medical records and hospital laboratory information systems (November, 2016). For nearly fifty years, the 'roll-and-scroll' MUMPS platform utilizing video terminal (VT) emulator interfaces dominated electronic health records in the U.S.—many homegrown electronic medical records (EMRs) were developed using this platform.

The U.S. Department of Veterans Affairs (VA) has a long and successful history of implementing its internally developed MUMPS based EMR, named the Decentralized Hospital Computer Program (DHCP) developed in the early 1980s (Wiechman, 2006). The healthcare system was modeled after the best aspects of American healthcare, emphasizing inpatient care,

medical specialization, physician education, medical innovation, and information technology.

In 1996, the VA replaced the aging DHCP with the Veterans Health Information Systems and Technology Architecture (VistA) system, further enhancing the MUMPS platform. VistA was designed to streamline work activities across the entire healthcare encounter, including all administrative components. It featured separate medical and ancillary modules supporting every aspect of hospital administration and clinical care management.

In 1997, the VA released the Computerized Patient Record System (CPRS), which provided advanced clinical documentation capabilities and served as the center for application integration (Wiechman, 2006). Ownership of these customized health IT solutions generated significant enthusiasm and pride in the locally developed capabilities.

Digital technology has advanced rapidly as we entered the new millennium. To meet patients' expectations for functionality, modern graphical user interfaces (GUIs), and the secure transmission of health data, technological changes have become commonplace. GUIs were eventually overlaid to modernize the display and presentation of data. The transition from "roll-and-scroll" EMRs to GUI-based EHRs represented a significant adjustment for clinicians and healthcare providers. The predominant change management models utilized during this shift were Lewin's Three Stages of Change Model and Kotter's Model, each offering valuable approaches (Harrison et al., 2021). Over time, change management methodologies began to focus more on the individual aspects of change, recognizing that end-user satisfaction and adoption were critical measures of success.

As database storage applications matured, opportunities emerged to improve the performance of rapidly accessing vast stores of health data during EHR transactions. This opened the market to modern healthcare IT vendors. Commercial-off-the-shelf (COTS) EHR solutions

quickly gained dominance, and their success in enhancing documentation and reducing errors soon prompted U.S. government mandates requiring the use of EHRs to improve patient care outcomes and reduce the financial burden on taxpayers. While COTS EHRs are typically clinically focused, they often lack the administrative utilities provided by previous solutions, creating gaps in a clinician's ability to seamlessly perform all necessary tasks.

In May 2018, the VA awarded the Cerner Corporation a contract to replace its current EHR systems with a COTS EHR—Cerner Millennium© (VA, 2022). The VA is now experiencing the challenges of managing complex change as the organization begins its transition to the modernized EHR platform. In April 2023, VA announced that it would halt deployment of the new EHR until it is confident that the system is highly functioning and meeting intended business needs (VA, 2023). The deployments to date have not achieved the expected clinical and administrative improvements, and workflow transition and configuration issues persist leading to poor adoption by the deployed sites. Resistance to EHR solutions is high when it does not address all workflow requirements.

Change in healthcare is difficult, and risk to patient safety is often introduced by poorly designed workflows/processes dictated by external business requirements and use of health IT at the point of care. Integration of new health IT is difficult, as workflows in operational environments seldom have flexibility to integrate components. End-users in healthcare settings have both rigid and flexible workflows and can adapt when the situation requires. However, medical processes are designed to ensure critical activities are consistently adhered. Effective adoption is a key enabler to normalizing change in health IT and EHR implementations.

Change management is a psychology-driven model for implementing change. The McKinsey Report 'The psychology of change management' suggests that four basic conditions

are necessary before employees change their behavior:

1. Compelling story because employees must see the point of the change and agree with it.
2. Role modeling, because they must also see leadership behaving in the new way.
3. Reinforcing mechanisms because systems and processes must align with new behavior.
4. Capability building, because employees must have the skills required to make the desired changes (Aiken & Keller, 2009).

Psychology studies have addressed the behavioral dynamics of both individuals and groups. The methods used help to provide insight into which stage the group is at, and how to facilitate successful change at any level. Further application of the methods to address challenges assists in recommending methods of overcoming resistance and opposition. Some models are illicit in their prescribed use, while others are more generally able to be applied to multiple subject domains. Little focus is placed on removing or reducing barriers to change, such as opposition and resistance, which are major project risks which must be considered.

Overcoming resistance to change is the primary driver of individual and organizational change models and is the foremost inhibitor to success. A change model inclusive of a change management plan and strategy to overcome resistance must address this early on. Per Bentley et al., the strategic change associated with the transition from one information technology platform to another constitutes organizational change likely better understood using a change model that focuses more on preparation aspects to overcome resistance. A more comprehensive change model should provide a better fit to explore the adoption of EHRs in this context. The Stages of Change Model allows for a greater weight on the framing of issues around why change is necessary, how change will be executed, what are implications for poor execution, and risk mitigation activities within the change process itself (Bentley et al., 2016).

Mobtahej found that there are three aspects to change in software delivery projects: leadership of challenges, communication, and commitment. Leadership's reason for change, their business goals and vision of an organization, have direct and indirect effects on functional and non-functional requirements, and will shape the development process and design of architecture. Leading the project in a way to meet those objectives with fewer problems in development requires a separate strategy. He suggests considering managing using a 'pair programming' technique for a successful implementation. This will have the project manager and change manager working closely together focusing on the same goals and objectives (Mobtahej, 2020).

A change team performed an analysis of the Mayo Clinic's success focusing on what aspects are critical to planning. They found that to ensure effective adoption and use of the new system among all end-users, a comprehensive change management strategy is required. The strategy's six important components were leadership engagement, establishment of readiness agents and provider adoption networks, a change impact analysis, readiness activities, measurement and communications (Leung et al., 2021). A change management framework which offers a systems thinking approach (Gharajedaghi, 1999) and accommodates all suggested components would offer the best chance for a successful EHR implementation and ensure its adoption by the end-users into operation.

According to Aziz, project management methodology and other facilitative processes could be used to successfully manage change and mitigate the risk of innovation adoption. Using project management methodology, the project manager is able to create a stakeholder analysis matrix, a governance board, a communication plan, a risk management plan, a status reporting dashboard, and a change management plan. The effective use of these tools within the context of relationship building, coupled with a feedback loop could prove very valuable to the organization

undergoing change and transformation (Aziz, 2007). While this is a circumspect idea, the need for some disciplined boundaries may still be required, as the different framework's intended goals are slightly different, and project managers must remain focused on project milestones.

Prosci© stipulates that change management and project management, in a combined effort, present a unified value proposition for achieving successful change by providing a foundation for the tactical integration at the people, process and technology dimensions (National Learning Consortium, 2013). They continue, in addition to the value of integrating the disciplines, there is further value to change management practitioners in sharing this unified value proposition (Prosci, 2022). Their suggested four-point joint value proposition is below:

1. Strengthens your case for change management.
2. Contributes positively to the perception of change management by project teams.
3. Appeals to the desire of project teams for structure and process.
4. Identifies a problem while proposing a solution (Prosci, 2021).

Prosci© claims that "projects are consistently failing to realize their full benefits, despite having a well-developed and planned technical solution. A perfectly designed technical solution with low adoption and engagement by end-users does not deliver value" (Prosci, 2021). Their value proposition is a result of integrating project management and change management.

The assessment of literature provided substantive evidence that outcomes using the ADKAR® Model are not entirely or consistently positive, nor predictable (Emerson, 2022) and provided sufficient answers to RQ1. In answering sub-question RQ1a ample evidence found in literature specified the strengths and weaknesses of current change model use. In answering sub-question RQ1b, the challenges of managing the complexities of EHRs implementations, requires a better solution given its noted failures.

3 METHODOLOGY

Aligning models logically to complement one another is crucial for designing a change management framework that ensures successful EHR implementations. An interdisciplinary approach, integrating multiple disciplines into a unified practice, can empower change agents and project managers to achieve their desired implementation outcomes. The proposed solution is the ACTION Change Management Framework, establishing an example of a new 'best-of-breed' change management framework.

This chapter elaborates on the above concept through a combination of quantitative and qualitative analysis techniques. Table 1 provides the framework for the research activities. The research focus-areas are significant expressions of the research tasks therein. The document map below provides the tasks, inputs, outputs, and the location within this research document the results of the actions are found.

Focus Areas	Tasks	Inputs	Outputs	Document Map
Research Questions	• Rationale • Supporting Information	• Experiential • Circumstantial • Literature	• Questions	Introduction Research model Research questions
Research Methods	• Literature review	• Literature review	• Methods	Literature review Methodology
Data & Information	• Collect data & information • Review literature • Reduction	• Source selection	• Focused targets • Literature analysis • Research implications • Concepts	Quantitative analysis Methodology Appendices
Concept Development	• Develop concept design • Apply literature review results	• Best-of-breed design • Literature review analysis inputs	• Concept design draft	Literature review analysis application & conceptual framework design Qualitative analysis Methodology
Validate Assumptions	• Survey questionnaire • Quantitative analysis • Qualitative analysis	• Questionnaire responses • Respondent comments • Analysis of results	• Survey quantitative results • Survey qualitative results analysis • Recommendations	Quantitative results Qualitative results Framework design and current model deficiencies Appendices
Elaborate Concepts	• Appreciative Inquiry (AI) • Survey comments • Survey results analysis	• AI interviews • Survey findings • Conceptual Framework • Assertions	• Modifications to framework • Strategy considerations • Updated concepts	Analysis of results Quantitative results Qualitative results Appendices

Framework Development	• Incorporate changes • Framework development	• AI notes and information • Survey findings • Recommendations • Assertions	• Final framework design • Strategy • Planned use • Assertions	Results Discussion

Table 1 - Research Model Framework

A systematic review of recent business case literature identified the challenges for change management in EHR implementations. Reviewing professional and academic experiences documented in peer-reviewed journals proved invaluable in understanding the ADKAR® Model's application and performance. A detailed survey was conducted, gathering collective experiences in applying the ADKAR® Model's principles to real-world EHR implementation projects. The survey results provided the foundational knowledge necessary to develop a conceptual change management framework.

The initial conceptual change management framework design was subjected to action research using the appreciative inquiry method developed by Cooperrider (Cooperrider, 2012). Using an interactive insight-gathering dialogue, participants uncovered existing strengths, advantages, and opportunities which were applied in iterative improvements. The assertions, propositions, recommendations, and opinions expressed by the field experts evolved the conceptual design into the final purposive change framework which was developed based on their expert insights.

3.1 The ACTION Change Management Framework

This research project aimed to understand how well the current ADKAR® Model works and appreciate areas for improvements for use in EHR implementations, so that a better approach to managing change in EHR implementations projects can be developed. The ACTION Change Management Framework presents a systems-thinking and results-driven approach. The logical

alignment of multiple disciplines' models maintains the need for multiple division of work, and a change implementation team responsible for supporting the integrated team's engagement with leadership, change agents, business and functional stakeholders, and end-users.

3.1.1 ACTION Change Management Framework Detailed Description

The key strategic alignments, description of stages and phases, and accompanying activities of the ACTION Change Management Framework are outlined in this subsection. It is intended to give a change practitioner the understanding of how to effectively manage the complexities of an EHR implementation project, through a thoughtful and progressive approach which focuses on change management as the key enabler and promoter of positive outcomes.

Each stage of the model outlines the continued logical flow in model progression. Each stage component can be considered a 'target'—a state by which the activities managed by a change practitioner during this stage are intended to achieve or attain. Each stage's execution is also crucial to the attainment of the next stage and is supportive of it. This builds a foundation where each stage can be managed. Stages are also grouped into phases. The Initialization phase is where the need for a change is identified, a case for its importance is made, and commitment to support it is affirmed. The Execution phase comprises developing the project's planning documentation, conducting its supporting analysis, and applying project management techniques so that the solution can be deployed. The Integration phase encompasses the operationalized solution and its establishment in meeting business objectives. Each stage also specifies the participation dimension, providing the complement of roles involved in performing activities and work within each stage and phase (i.e., Physician Informaticists (PI), Nurse Informaticists (NI), Clinical Informaticists (CLI), Project Managers (PM), Program Managers (PGM), Change Implementers (CI), and Change Practitioners (CP)). Refer to Figure 15.

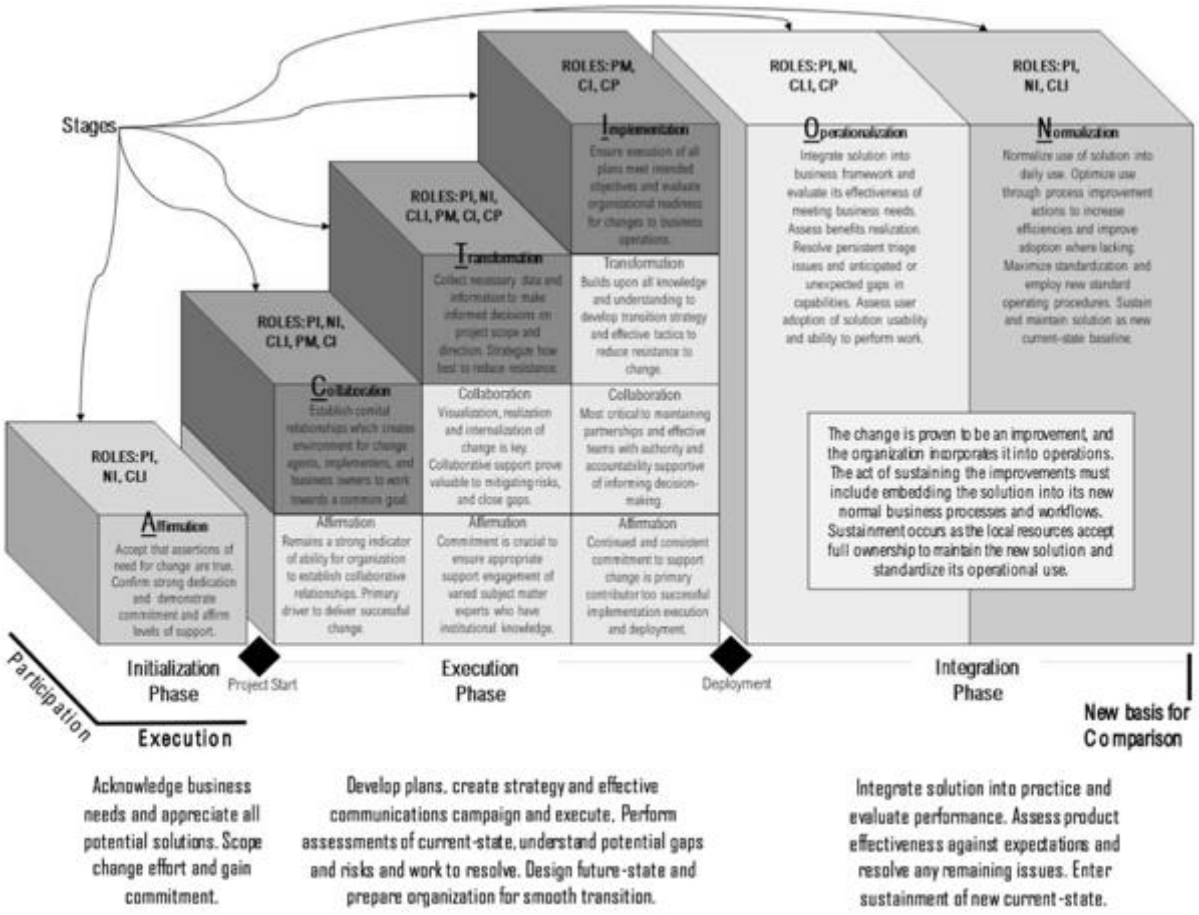


Figure 15 - ACTION Change Management Framework Hierarchical Model

The ACTION Change Management Framework includes a couple milestones. The Project Start milestone occurs after the business case justifies the need for change and affirmation supporting it is attained. It occurs with the commitment of the project charter and a kick-off is officially planned. The project begins with the typical activities of estimates, resources alignment, and planning, where documentation is developed collaboratively. The organization begins transformative work to evaluate how best to implement the new solution. The Deployment milestone is reached after all implementation activities have been accomplished and the organization is readied for the solution. The solution is deployed, and the organization begins its operationalization, where it is placed into production use, and it begins sustainment of

its normal and standard use.

Affirmation is the first stage of the framework and is the most important. It is critical as the primary focus of the Initialization phase and is necessary for progression. This includes the act of acknowledging and confirming strong dedication and steadfast commitment, and positive reinforcement through this acknowledgement, where the demonstration of reinforcing support is crucial (Kandidata ASIA, 2022). To achieve Affirmation, a facilitator helps the team understand the need for change, appreciate the purposes, commit to its success, and affirm levels of support. A primary area of concern lies in the Affirmation stage which involves identifying resistance and interference, as well as strategies to overcome them. It requires commitment from leaders, managers, and front-line representatives, it is formalized with the signature of the project charter.

Collaboration is the second stage in the framework. It establishes the foundational support and begins with the formal acceptance of the project start, marking the beginning of the Execution phase. According to Dr. Hicks, collaboration goes beyond communication, cooperation, and coordination, it is a committal relationship where partners work towards common goals by sharing responsibility, authority, and accountability for achieving results (Hicks, 2018). During the Collaboration stage, a facilitator creates the environment for all participants to effectively work together towards the goals they have committed to and begin the underpinnings of project development. Collaboration is critical in maintaining commitment and reaffirming continuously, as the foundation for the change effort.

Transformation is the third stage and is a key component within the Execution phase. The process of transformation is critical to change efforts, as the act of changing can be either slow or swift, and how it is accepted, integrated, and adopted by end-users is largely dependent on how well or how poorly the transformation was managed (Kotter, 1995). During the Transformation

stage, change practitioners support the collection of the necessary data and information to make informed decisions on the project's scope, begin strategizing on how to best accomplish goals, and outlining the objectives so that a transition plan can be operationalized. Initial understanding of the work performed is critical to defining how the new product will meet the needs of the stakeholders, and to ensure any gaps in capabilities are addressed.

Implementation is the fourth stage and is the most consequential in the Execution phase. Implementation is the execution of a plan, idea, model, or system that is responsible for accomplishing a goal. Implementations can go smoothly or not, based on how a planned sequence was enacted, and if the solution meets the need for the system to be placed into effect at its eventual deployment (Cresswell et al., 2013). During the Implementation stage, a facilitator helps project managers and analysts collaborate so that the business needs and goals remain in focus. Attention is primarily on designing the future-state which meets the business needs and organizational goals. Preparation and readiness for deployment are major objectives of this stage, resulting in the milestone of deployment.

Operationalization represents the fifth stage, and the beginning of the Integration phase. For a solution to support an operational service or activity, it must meet the intended business needs of the solution imparted and be adequately integrated into other operational activities and constructs (Prosci, 2020). Once it is proven effective at satisfying its intended use, it can be reliably used to support operations. The Operationalization stage is where the EHR is moved to production. The newly deployed EHR should achieve performance expectations as per the business requirements, the plan is actualized, and all intended benefits are fully realized.

Normalization is the last stage and is the predominant component of the Integration phase. Once a new process or system is placed into operation, it can be normalized into daily use

(Amatayakul, 2012). It can be supportive in its native state may require optimization through process improvement actions to help increase efficiencies and improve adoption by users of the overall system. Normalization is completed when the new state is fully accepted as the new way of business, and both end-users and customers fully appreciate how it achieves their business objectives. It then becomes the new baseline of work to support business operations.

Within each stage, multiple tasks and activities are performed to achieve intended outcomes of work conducted by various team members. The resultant products of work tasks in the stage and phase in which they belong, are often used for informed decision making of project and change team leadership, organizational leadership and project champions, and other inter-disciplinary team managers. The work products may result in project deliverables and persisting reports or artifacts which may be used as inputs to subsequent stages. Table 2 outlines the details of the ACTION Change Management Framework.

Initialization Phase			
Stage	**Tasks**	**Inputs**	**Outputs**
Affirmation	• Requirements elicitation and needs assessment • Acknowledge need for change and demonstrate commitment • Business case development initial gaps identification • Change maturity assessment and opposition strategy • Solution identification (material vs. non-material) • Project charter and initial resources commitment	• Feasibility analysis • Business requirements analysis documents • Initial cost estimates • Solutions review	• Business case documentation • Initial needs assessment results • Business requirements documentation • Request for information and proposal (RFI/RFP) • Affirmation attestation • Signed project charter
Execution Phase			
Stage	**Tasks**	**Inputs**	**Outputs**
Collaboration	• Acceptance of commitment to design and shared decision to make something new • Visualization, realization, and internalization • Realistic estimates and plans • Risks identification and mitigation plans • Resource strategy • Communications strategy	• Vendor information • Business case • Business requirements documentation • RFI/RFP	• Project Plan • Project schedule • Risk management plan • Communications plan

Transformation	• 'As-is' current-state assessment • Impact identification, risk analysis and mitigation • 'End-to-end' workflow analysis to identify gaps • Product effectiveness baseline metrics • Pre-deployment baseline	• New EHRs designs • Business requirements • Project schedule	• Current-state analysis results • Workflow analysis results • Impact and issues analysis results • Gaps analysis results • Transition plan • Product effectiveness baseline • Pre-deployment baseline
Implementation	• Project and risk management framework • 'To-be' future-state design, standardization, and gaps resolution • Project change control (manage scope creep) • Formal state and readiness review/assessment • Benefits realization baseline metrics	• Current-state analysis • Workflow analysis • Impact and issues analysis • Gaps analysis	• Future-state designs • Implementation Plan • Gaps resolution plan • Risk mitigation plan • Readiness review results • Benefits realization baseline
Integration Phase			
Stage	**Tasks**	**Inputs**	**Outputs**
Operationalization	• Integration review and gauge or assess user adoption • Implementation Plan actualized • Collect lessons-learned • Product effectiveness metrics update • Benefits realization metrics update • Post-deployment assessment • Persistent issues triage and resolution	• Implementation Plan • Integration analysis • Adoption assessment • Lessons-learned • Performance metrics and data	• Adoption analysis results • Product effectiveness analysis results • Benefits realization analysis results • Post-deployment assessment
Normalization	• Full-use and standard operating procedures • Employ changes derived from lessons learned • Optimize with quality and process improvement • Maximize standardization • Sustainment of new process current-state baseline	• New current-state analysis • Improvement targets	• Current-state baseline • Process improvement plan

Table 2 - ACTION Change Management Framework Stage Activities

In the design of the ACTION Change Management Framework, each stage has been strategically aligned to other inter-disciplinary frameworks and models, to demonstrate how they are complementary, and external teams may benefit from improved communications and awareness. Additionally, the model has also been aligned to prominent psychological models of personal and organizational change which befits it and has greatly benefitted from the knowledge and how it can be applied to EHR implementations. The mapping of the various inter-

disciplinary models is in Table 3.

Stage	Phase	Kübler-Ross Stage	Kübler-Ross State	DiClemente & Prochaska Stage	ADKAR Model Element	Project Management Phase
Affirmation	**Initialization**	Denial & Anger	Shock & Denial	Precontemplation & Contemplation and see Note 1	Awareness	Initiation
Collaboration	**Execution**	Anger & Depression	Frustration & Depression	Contemplation	Desire	Initiation & Planning
Transformation	**Execution**	Bargaining	Experiment	Preparation & Action	Knowledge	Execution
Implementation	**Execution**	Acceptance	Decision	Action	Ability	Monitoring & Control
Operationalization	**Integration**	Acceptance	Integration	Maintenance	Ability & Reinforcement	Closeout & Evaluation
Normalization	**Integration**	See Note 2	See Note 3	See Note 3	Reinforcement	Closeout & Evaluation

Table Notes:

1. Proposed new stage of Opposition to DiClemente & Prochaska Stages of Change Model.

2. Propose new stage of Continuation to Kübler-Ross Grief Model, and new activity extension of Sustainment of Change

3. Proposed plateau and new state of Normalization to Kübler-Ross Change Curve and Proposed new stage of Improvement to DiClemente & Prochaska Stages of Change Model.

Table 3 - ACTION Change Management Framework Inter-Disciplinary Mapping Table

The inter-disciplinary models require additions or extensions to articulate the new state of the business changes in practice. Proposed modifications to existing change models are for the purpose of the ACTION Change Management Framework alignment use only, and do not apply to all other applications of the change theories. The modifications are designed to support EHR implementations. Many of the models reach their maturity, and enter sustainable phases of existence, while others evolve into new states. The application is to demonstrate how the changes are sustained and then become the new baseline for continuous process improvement programs,

as is common in the use of health IT.

3.1.2 Basis for Claimed Superiority

The ACTION Change Management Framework is a comprehensive approach to change in EHR implementation projects, and alignment to inter-disciplinary models has proven valuable. Not all projects are of the same complexity nor progress in the same manner, and this illustrates the criticality for a thoughtful approach to managing change.

As the healthcare industry continues to evolve and adopt modern solutions and automated tools, the need for change management processes and techniques that help ensure changes are minimally disruptive has become increasingly important. The literature provides ample evidence that improvements in managing change during EHR implementations should be considered. The ACTION Change Management Framework is designed to address the noted deficiencies.

Modern healthcare relies heavily on the utilization of health IT, with software applications serving as integral components of its workflow. Healthcare Professionals are often familiar and comfortable with both systematic-linear and systems-thinking approaches to problem-solving (Daigrepoint & McGrath, 2007), and this fact is helpful during EHR change efforts. The ACTION Change Management Framework leverages this in its logical design, and alignment with project management so that a comprehensive view of all interdependencies is established and maintained.

Change must be effectively managed during an EHR implementation. If changes are allowed to negatively impact normal operations, significant patient safety concerns may arise, leading to catastrophic events and adverse outcomes (McCarthy & Eastman, 2010). Despite promises to improve care and streamline operations, EHR implementations are typically highly disruptive to the organization. The key is that the organization builds change capacity and

flexibility so the impending change can be better managed during the transition (Garets, 2010). The ACTION Change Management Framework addresses this by promoting it as a practice which is proactive in its approach to understanding gaps and issues and focused on supporting transition to improve implementation success potential.

Change management frequently results in mixed results, largely determined by leadership, and change agents. If properly followed, predictability of outcomes can be greatly increased. The conceptual design of the ACTION Change Management Framework addresses the deficiencies noted of the current change management processes in use and thus reduces the variation of results due to project complexity.

3.1.3 Need for Assessing and Perfecting ACTION Change Management Framework

Although the ACTION Change Management Framework was designed to address the challenges of managing change associated with EHR implementation, it is unproven in this capacity. The continued iterative improvement to mature it and address practitioners' needs is required to make it ready for use.

To determine whether the ACTION Change Management Framework effectively addresses the deficiencies noted in the literature review, it should be evaluated against other models used in EHR implementations. Piloting the framework in an actual EHR implementation is beyond the scope of this project. The logistics of such a complex endeavor would require significant personnel and financial resources, which are not currently accessible.

Nonetheless, the model needed to be evaluated. Since testing against competing models was not feasible, an alternative method was developed. The appreciative inquiry action research approach enabled the evaluation by making the model accessible to subject matter experts with relevant knowledge and experience in EHR implementations. Their constructive input and

suggestions were then leveraged for assessment.

3.2 Quantitative Research Approach

To fully appreciate the challenges of managing change in an EHR implementation, an integrated mixed-methods approach is essential for gaining insight into an inductive research topic, particularly when the underlying issues are complex (Nieuwenhuis, 2015).

According to the Organization for Economic Cooperation and Development, the quality of implementation can be described by evaluating effectiveness, efficiency, impact, and sustainability as aspects of each criterion (OECD, 2021). Attitude, behavior, and culture are important components to organizational change effectiveness because they represent intangibles that cannot be shifted with conversation alone and are essential to change strategy. An individual's attitude shapes their habits and behavior, and the group's behavior ultimately influences the formation of an organization's culture (Suresh, 2018).

Quantitative analysis was conducted to explore relationships between various independent and dependent variables. This analysis examined the structural relationships between measured variables and latent constructs, provided insights into interdependencies, evaluated the influence of these variables on an organization's attitude toward change, and assessed their strategic value as outlined in RQ2. The results will help validate the change management framework's potential to effectively augment project management activities, and the evaluation of its potential will be performed during the qualitative analysis.

3.2.1 Research Model

Despite the availability of several change models, the literature has documented that many change efforts involving EHR implementations have not been successful. In an effort to

identify the possible reasons for the lack of demonstrated success, this research seeks to identify possible determinants towards the attitude towards change. Determinants are grouped into organizational, process, and individual constructs.

At the organizational level, the independent variables are culture, leadership, purpose, and strategy. Culture is included as it describes organizational dynamics; it reflects an organization's shared values and behaviors, which help to understand its openness or rigidity toward change. Leadership is important in shaping an organization's character; confidence in leaders influences attitudes, particularly in terms of commitment to direction, decision-making, and executing change plans. Purpose is also critical, as an organization's relevance and value affect attitudes toward change, if it lacks value, skepticism may arise, leading to a negative attitude toward change. Lastly, strategy is essential for an organization to be forward-looking and responsive to change; the ability to plan for the future is crucial for adaptability. Refer to Figure 16. Control variables include gender, age, service length, and organization type. The inclusion of the demographic traits of gender, age, service length, and organization type are justified, as they are the most widely used in testing of models of this kind (Bernerth & Aguinis, 2016).

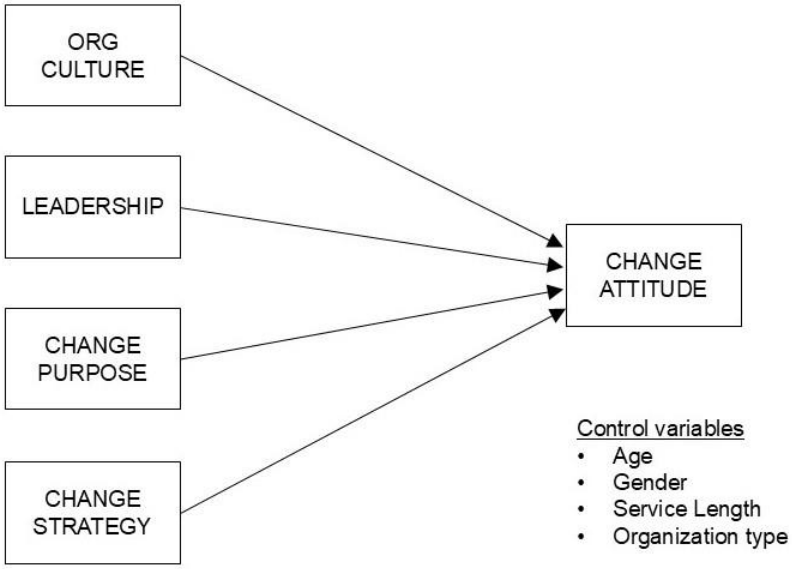


Figure 16 - Organizational Determinants of Change Attitude

The effect of process determinants includes communication, implementation, resistance, and training as independent variables. Communication is included because its effectiveness among all stakeholders, from leadership to end-users, significantly influences the organization's attitude and willingness to change. Implementation is also crucial, as the processes and capabilities involved play a key role in the effectiveness of an implementation plan; poorly planned or executed activities can negatively impact an organization's attitude toward change. Resistance is another major factor influencing attitudes toward change; managing resistance effectively is essential to prevent it from negatively affecting attitudes. Finally, training, both the quality of training on the change itself and the organization's confidence in applying this training, is essential to fostering a positive attitude toward the ability to adapt. Figure 17 illustrates this model. As before, gender, age, service length, and organization type serve as control variables.

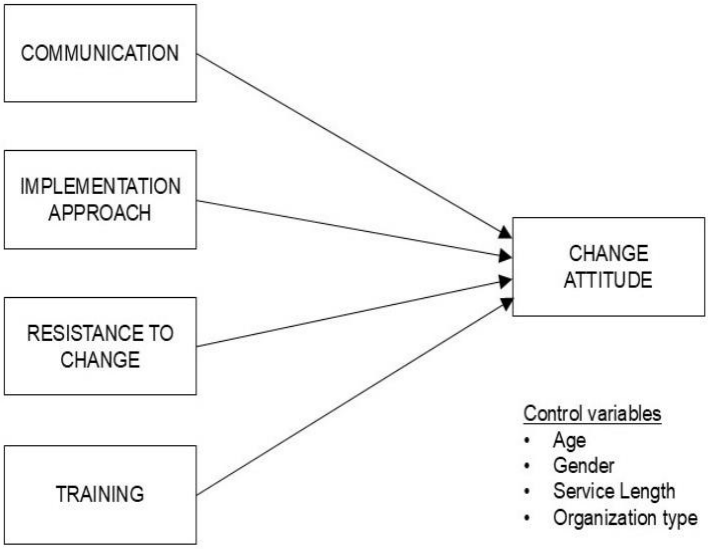


Figure 17 - Process Determinants of Change Attitude

The role of individual level determinants of attitude to change is also investigated. In this case, the independent variables include confidence, involvement, knowledge, motivation, optimism, and pessimism. Confidence was selected as it appears to have a significant effect on an organization's ability to change, though it can be challenging to measure directly. Involvement can be measured directly, but its impact is often difficult to evaluate due to its susceptibility to subjective interpretation; it may be either effective or ineffective, and only final outcomes truly reflect its value. Knowledge is similarly elusive, as it doesn't always equate to preparedness; however, understanding why, how, and when a change will occur can greatly impact an organization's attitude. For example, an immediate change may meet with resistance, while insufficient clarity around what is changing could lead to opposition. Motivation, a psychological driver, can vary widely among individuals affected by change, but was included due to its potential influence on attitude, provided it has enough personal significance to be effective. Optimism was selected for its positive effect on attitude and is measurable. Pessimism, on the other hand, tends to have a negative impact on attitude, and when pervasive, it can be

particularly influential. Figure 18 presents this model. Gender, age, service length, and organization type serve as control variables, yet again.

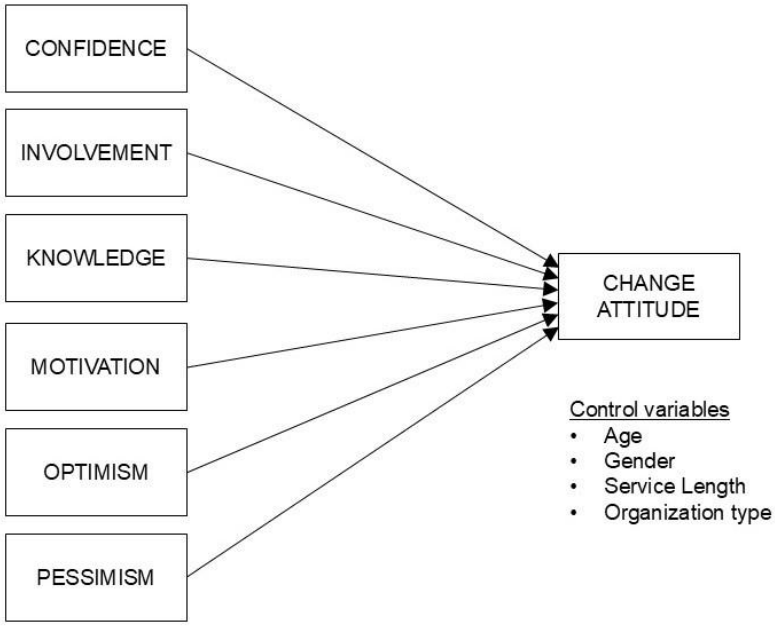


Figure 18 - Individual Determinants of Change Attitude

3.2.2 Quantitative Research Design

The formulation of survey items was based upon experience in the field. Incremental improvements were added through the collaboration of health informaticists, project and program managers, and health IT implementation team members between the years of 2008 and 2021. In October through December of 2022, a prototype questionnaire was evaluated by 22 practicing health informaticists individually. It was further validated by 47 change management practitioners in an open change management community of interest forum, receiving focused input on how to improve the tool for use for the purpose of gaining appreciable insight into the use and effectiveness of the ADKAR® Model in implementing health IT.

The survey content was validated qualitatively. Per Ricci et al., content validity is a fundamental element of a questionnaire's validity, evaluating the degree to which items of a

questionnaire are relevant to and representative of the targeted construct for a particular assessment purpose. The most appropriate way to collect data to ensure content validity is by conducting qualitative research using direct venues of communication with the population of interest. The generation of the survey contents included “qualitative methods involving members of the population of interest to ensure that the survey fully reflects their perspective and that items are acceptable, comprehensive, and relevant to their condition”, thus ensuring that all important aspects were explored, and that no important aspect was omitted (Ricci, et al., 2019).

The survey captured respondent responses within domains of interest, used for evaluating strategy and performance of change management readiness and actions. The survey used a Likert scale approach to evaluate the respondent’s experiences. The survey addressed constructs in each of the domain aspects. The items discussed the following seven focus areas:

- Change Management Implementation Approach
- Communications
- Culture
- Leadership
- Participation
- Strategy
- People Organizational Change Readiness

Likert scaling is a bipolar summative method used to measure graded positive or negative qualitative responses to a statement, but it can be subject to distortion from several factors. Respondents may avoid extreme responses (central tendency bias), agree with statements regardless of their opinion (acquiescence bias), or try to present themselves or their organization more favorably (social desirability bias) (Statistics Café, 2011). As with many surveys, there is

also a tendency for respondents to complete the survey with minimal attention, rather than carefully considering their responses. To mitigate this, the survey included some design checks, including reversal of the directionality of the items.

Surveys were planned to be distributed to a convenience sample of healthcare professionals. A convenience sampling method was used because a diverse group of healthcare informaticists, project management professionals, and change agents experienced with EHR implementations was important to the data and information collection methods. The researcher had access to this pool of professionals through professional affiliation. Seven distinct roles were surveyed: physician informaticists, nurse informaticists, clinical informaticists, project managers, program managers, change implementers, and change practitioners.

The survey employed a progressive, inclusive approach designed to gather input from a multidisciplinary team of health informaticists, change practitioners, and end-users. A role-based strategy for selecting subject matter experts was essential to this approach. Each generalized role listed in Table 4 serves as a respondent category relevant to a project of this nature and scope. These core roles reflect standard stakeholders in health IT projects.

Core Roles	Core Role Definition	Activities
Informaticists	Informatics experts who assist in expressing business to health information technology designs and assist in defining business needs and usability expectations. Multiple domains of informatics expertise exist, including physician, nursing, and clinical informaticists.	• Provide informatics support • Design workable solutions • Communicate directly with stakeholders Integrate work and technology
Project Manager	Contribute to successful change outcomes by designing with adoption and usage in mind and integrating with the people side.	• Design the actual change • Manage the technical side • Engage frequently with change practitioner • Integrate change management plans with the project plans
Program Manager	Manage multiple projects within portfolio, direct the development teams, plan strategic activities, align projects, and report on enterprise-level activity.	• Design the actual change
Change Implementers	Manages successful change outcomes through coaching and promoting adoption and usage by applying the plans and strategies.	• Participate throughout the life of the project • Build coalition of support with stakeholders • Communicate directly with end-users • Resistance management

Change Practitioners	Contribute to successful change outcomes through adoption and usage by preparing, equipping, and supporting people with integrated strategies and plans.	• Direct engagement with the change team • Integrate plans • Develop role-based focused plans • Support local informaticists and end-users

Table 4 - Core Role Definitions

Constructs were developed based on categories relevant to organizational change, including implementation, culture, leadership, communication, participation, strategy, and organization. Each construct was aligned with the category that best suited it, and survey items were categorized under the construct that matched their intent. For each construct, a correlation matrix was created to analyze items within it, allowing for a cohesive list of constructs to be established. These constructs are purpose, leadership, training, planning, culture, strategy, communication, implementation, resistance, knowledge, confidence, motivation, involvement, belief, attitude, pessimism, optimism, and enthusiasm. Together, they help evaluate an individual's attitude toward organizational change.

3.2.3 Expected Quantitative Research Outcomes

Outcomes of this analysis will provide needed understanding of the value of the constructs on predicting the attitude of the population generally towards change. The outcomes are expected to help use the influencing factors to improve the effectiveness of the conceptual framework in managing an individual's attitude towards organization change and provide informative insights into the issues and is used to answer to RQ2. It will also provide insights into the most influential variables, so that change agents can utilize focused campaigns to help improve their efficacy of the change management process in the context of limited resources.

3.3 Qualitative Research Approach

The assembly of all the information collected during the literature review was essential

for forming the basis to understand the issues and challenges of applying the ADKAR® Model to EHR implementations. To augment this research and support the approach, a concurrent embedded research design was employed. This design involves collecting both quantitative and qualitative data to progressively improve the ACTION Change Management Framework. The combination of quantitative and qualitative data enhances the value of the analysis. Qualitative data can assess the validity of quantitative findings, while quantitative data can help generate qualitative samples or explain qualitative results. Additionally, qualitative inquiry can inform the development or refinement of quantitative instruments or interventions or generate hypotheses for testing in the quantitative component. (Fetters, et al., 2013).

In this research, free-text input was incorporated into participant surveys (Hassan, 2023). This approach also helped determine how best to apply a systems-thinking-inspired, structured change management approach to improve EHR implementation success. Since the solution was not approved for a pilot during this research, it was decided that the most effective method for evaluating it would be to leverage the knowledge and experience of the subject matter experts involved in the survey through appreciative inquiry.

The appreciative inquiry process offered the best structured approach to constructively improve processes and tools. Using this process, the conceptual design of the ACTION Change Management Framework could be stressed under ‘action research’ and subjected to scrutiny through iterative improvement and constructive criticism. The collection of this qualitative input would be used to provide critical direction to its improvement. The qualitative analysis of the survey responses will be instrumental in better understanding the challenges in place, explain the current deficiencies, and through qualitative analysis of interview notes, RQ3 will be answered by the improvements in the conceptual design.

3.3.1 Overview of the Appreciative Inquiry Process

Appreciative inquiry (AI) is a form of 'action research' that is participatory in nature. It is a collaborative technique used in organizational development to facilitate change. The aim of AI is to use direct participation to solve problems in a positive, goal-oriented manner. It adopts constructionist and positivist approaches to focus on the strengths of people and the organization (Gonzales, 2010). AI uses positive experiences from the past and hope for the future to collaboratively define expectations. The focus is on desired results of the change, and not problems (Cooperrider, 2012). AI is also similar to scenario-based approaches for soliciting requirements, making it extremely valuable in medical settings. The scenarios used in AI are based on past successes that can be theoretically applied to a future goal and assist in improvement of designs (Cooperrider, 2012).

The AI process is comprised of a series of facilitated and collaborative meetings with a representative group of stakeholders that can include end-users, technical support staff, and management. The overview of the process includes the overall definition and depicts the affirmative topic choice in the focused center of the 5-D Process Model for the topic of inquiry (Lewis et al., 2008). As its name implies, there are five activities:

1. Definition Phase provides the affirmative topic of inquiry to focus all attention. The definition is to be the basis for improvement through positive model use.
2. Discovery Phase aims to discover the best of 'what is', discussing high points in their work experiences, dynamics within their organizations, and interpersonal relationships.
3. Dream Phase focuses on 'what might be', envisioning the ideal organization, process, and system. Creativity and imagination are encouraged with no constraints.
4. Design Phase defines 'possible solutions' using the identified strengths and future visions

to define ‘possibilities’, including designing relevant product information.

5. Destiny Phase which details ‘what will be.’ The goal is to define actions and confirm wide-spread support. (Cooperrider, 2023).

The 5-D Process Model offers a generative yet practical, method for performing change at all levels within a system, using a collaborative, strengths-based approach to performing change. AI targets an affirmative topic and narrowly focuses on the positive (strengths) of a design. Through interview techniques, it systematically collects input for making changes to the target design which can improve the overall concept (Cooperrider, 2023).

A primary advantage of the AI approach is its process that enables people to pay attention to the existing positive aspects of the affirmative or generative topic. It is very effective at promoting broad stakeholder engagement by sharing visions. Some criticisms include the possibility of bias towards positivity may blind participants to the deficits and issues that are in fact part of the reality (Griesten et al., 2018). However, Gonzales found that AI demonstrated it worked well with defined projects, when the forum was unintimidating, and the facilitator utilized structured and thought-provoking questions. When executed well, the participants expressed improved vision and confidence (Gonzales, 2010).

3.3.2 Qualitative Research Design

The literature informed a design for which other models and disciplines are complementary and helped bolster a change management framework where they logically aligned. This resulted in the initial conceptual framework which was the generative focus of AI and improvement using the positive principles. AI was utilized to evaluate the conceptual framework design as its affirmative topic and is the basis for improvement in the focused

exercises. The respondents were provided the AI interview questions in advance with instructions to review for preparation. Table 5 provides the AI process objectives and activities planned for the interviews.

Phase	Objective	Activities
Definition	Provide a primer of appreciative inquiry and explain method that utilizes a positive and constructive approach for change to the subject matter experts (SME). Understand the affirmative topic and agree to seek positive reinforcements to it.	• Describe appreciative inquiry process. • Distribute detailed ACTION conceptual framework as the affirmative topic. • Describe use of how affirmative topic will be used. • Answer questions on a topic or process. • Think about the challenges and decide how to work on them.
Discovery	Engage the SMEs to discuss what is well-designed and working with regard to the affirmative topic and identify best current practice. Appreciate the best of the positives in the affirmative topic and define how to start improvement.	• Conduct interviews. • Discuss the ACTION conceptual framework capabilities. o Ask open-ended questions, to fully listen, and focus on letting the SMEs share their experiences and perspective. o Encourage SMEs to consider strengths and weaknesses of proposed design. • Identify what is working well. • Identify what can be improved. • Identify gaps. • Discuss needs of SMEs in managing change efforts. • Keep positive and continually rephrase in a positive way. • Use virtual whiteboard techniques (Microsoft Teams) to facilitate a discussion on a strength of the topic (ACTION) and add improvements by use of 'magnet statements'. • AI questions are unconditionally positive and generative. The questions invite new ideas or images, provoke new action, and create shared meaning. • Brainstorm a list of positive reinforcements and investigate them further to discover new improvements.
Dream	Engage the SMEs to describe their ideal future state, and identity ideal new process. Use imagination to explore what might be possible.	• Conduct interviews. o Encourage the SMEs to speak freely about their desires around the topic. o SMEs should describe the desired future state and articulate their wishes. • Identify what needs to change in new process. • Specify implications of these changes. • Request their suggestions on improvement potential. • Utilize 'exploring scenarios' method to explore scenarios about the potential future. • Utilize the 'provocative proposition' method to transform their visual image of the best case into a word image. It is used to challenge the status quo.
Design	Engage the SMEs to plan for the future and create possible solutions.	• Conduct interviews. o Ask the SMEs what we can design. o Explain that the first design goal is to build on what exists and amplify strengths. • Describe a realistic new change process. • Identify what must change to get there. • Identify resource and personnel implications. • Identify any tools and suggest management activities. • Identify systems, processes, policies, and other requirements. • Identify logistics required using the 'bridging technique', where tangible work is considered.

		• Create 'possibility statements' (actionable items) that may provide the basis for scheduling and planning.
Destiny	Engage the SMEs to co-create a plan that will create, deploy, and sustain the develop an action plan.	• Identify steps to create a realistic new change process. • Specify resource constraints for evaluation. • Investigate pilot potential.

Table 5 - AI Objectives and Activities

AI activities will include structured interview sessions, with necessary follow-up time for questions to clarify areas requiring further explanation of the propositions offered. The interview sessions will be performed on the virtual platform, Microsoft© Teams®. The interviewer will provide an overview and outline the ground rules. A script was used to guide the AI interview sessions, ensuring a structured and repeatable process. The AI script was developed based on the 5-D process to align with each phase of the method. Each question was crafted to focus on the positive aspects of the ACTION Change Management Framework design, while encouraging constructive criticism.

A review of the target roles that could offer the best insight into the effectiveness of current change management activities resulted in some of the intended targets being removed from the list. Clinicians and health care providers are end-users, and not directly responsible for formulating change strategy, nor evaluating how the change management plan performed. This resulted in targeting interview candidates functioning in the roles of project managers, program managers, change implementers, and change practitioners.

AI interviews were proposed to be conducted with the targeted roles. To meet the goal of completing this activity within sixty days, the proposed AI interviews would be in a stratified manner, wherein all project manners would be interviewed first, followed by program managers, then change implementers, and finally change practitioners.

The result of the AI experience was expected to be the collection of participants' perspectives, input, and propositions, which will be applied to the improvement of the conceptual

design of ACTION Change Management Framework. Information gathered from survey comments and interview session notes was organized categorically for integration into the conceptual design. This information will be categorized into the structural areas of framework strategy, framework alignment, framework design, and framework implementation, and will be applied during framework development.

3.3.3 Expected Qualitative Research Outcomes

The framework development process ensures structure and alignment, maximizes accountability of activities, and allows for scalability, promoting fit-for-use. The structured core framework design includes both abstract and concrete definitions within the domain, with internal increments that expand the applications further. This design ensures that the capabilities are supported through value-added components, which may be either tightly or loosely coupled. The design should leverage proven utility in a structure that supports the framework's purpose and should be capable of performance evaluation (Adair, 1995). The AI results will aid in developing improved framework design content which directly answers RQ3.

The culmination of this work will be the transformation of the initial concept design into a refined solution, achieved through meticulous research, data accumulation, quantitative and qualitative analysis, and the application of recommendations and insights derived from the invaluable contributions of subject matter experts. It will embody the realization of a change management strategy, encapsulating the collective experiences and perspectives of its contributors. This research will result in an application of change management principles to aid in predicting measured outcomes, increasing end-user adoption of the product or solution, and improving the success of EHR implementation projects.

4 QUANTITATIVE ANALYSIS

An integrated mixed-methods analysis approach was utilized, as it proved the most effective way to collect data and information on the topic. This chapter discusses the quantitative analysis aspects of this research.

4.1 Data Collection

The data for quantitative analysis was collected through a survey. The survey targets medical professionals and project management team members involved in implementing an EHR across various healthcare settings. Respondents were provided the survey, along with detailed instructions to answer each statement or question was based on their experience with the ADKAR® Model in EHR implementations, and to add details or comments in the provided comments field if they had additional input to offer. Completed surveys were loaded into a master data collection workbook tool as raw data entries. The respondent demographics were captured so that descriptive statistical analysis could be performed. The data was tabulated for quantitative analysis, with free-text responses extracted for subsequent qualitative interpretation, and categorized for application when all results were compiled.

4.1.1 Data Collection Mechanism

Personal discussions were held with each target healthcare professional to request their participation prior to distributing the survey instrument, ensuring an acceptable number of participants could be identified. The counts and roles of survey recipients are shown in Table 6. If the targeted individuals were unavailable, alternative respondents were contacted for the initial solicitation. The survey instrument was sent via email between May 25 and May 31, 2023. Each recipient also received a courtesy phone call to address any questions regarding the process,

research intent, and deadlines. The surveys were accompanied by instructions and sent to the targeted recipients.

Role	Count
Physician Informaticists (PI)	12
Nurse Informaticists (NI)	12
Clinical Informaticists (CLI)	12
Project Managers (PM)	16
Program Managers (PGM)	10
Change Implementers (CI)	24
Change Practitioners (CP)	24

Table 6 - Survey Recipient Roles and Counts

Of the 110 surveys sent there were 74 surveys returned—a response rate of 67.3%. The 74 survey respondents were a diverse sampling of healthcare professionals, EHR implementation project managers, and health IT program managers comprising multiple disciplines, positions, and functional sources of institutional knowledge. Many of the survey respondents were informaticians, in fact, 35 of the 74, or 47.2% of the survey respondents either self-identified as informaticists or were practicing informaticians of differing healthcare domains. Additionally, there were 13 (17.6%) EHR implementation project managers and 6 (8.1%) health IT program managers as part of the survey respondent pool, all who had significant experience in health IT. Of note, an average of 17.3 years of service in the healthcare field was found, with the fewest being a novice at 2 years, and the most was a seasoned 40 years of experience. Table 7 provides the participant demographics descriptive statistics.

Participants (n=74)		
Activity	**Frequency**	**Percentage**
Role		
Physician Informaticist	10	13.5 %
Nurse Informaticist	9	12.2 %
Clinical Informaticist	9	12.2 %
Project Manager	13	17.6 %

	Program Manager	6	8.1 %
	Change Implementer	17	23.0 %
	Change Practitioner	10	13.5 %
Gender			
	Male	33	44.6 %
	Female	41	55.4 %
Age			
	26-35	11	14.9 %
	36-45	26	35.1 %
	46-55	22	29.7 %
	56-65	15	20.3 %
	Age Mean 45.1	Age SD 10.0	
Years of Service			
	1-5	11	14.9 %
	6-10	13	17.6 %
	11-15	12	16.2 %
	16-20	14	18.9 %
	21-25	8	10.8 %
	26-30	7	9.5 %
	31-35	8	10.8 %
	36-40	1	1.4 %
	Years of Service Mean 17.3	Years of Service SD 9.7	
Organization			
	VA	31	41.9 %
	DoD	23	31.1 %
	HHS	7	9.5 %
	Commercial	13	17.6 %

Table 7 - Survey Respondent Descriptive Statistics

4.1.2 Data Collection Instrument

An integrated survey instrument was developed to evaluate organizational components related to the use of a change model in EHR implementations, validate the perceived poor EHR implementation outcomes using the ADKAR® Model as highlighted in the literature review and research, and capture initial improvement targets and needs of the intended respondents. The survey was constructed using health informatics statements and questions gathered from multiple engagements with end-users who received health IT services and products during several years of health IT and EHR project implementations.

The survey instrument consisted of 122 items, organized into 7 categories: change management implementation approach, communications, culture, leadership, participation,

strategy, and organizational change readiness. These domains were selected based on the literature, as they collectively represent the majority of elements necessary for managing change. Each has been identified as a contributor to either the success or failure of EHR implementation projects. The distribution of survey items across these 7 domains formed the basis for the constructs used in the quantitative analysis. The survey instrument can be found in Appendix A: ADKAR® Model Usability & Effectiveness Survey.

4.1.3 Construct Formation

An exercise was conducted by the two research analysts to align each survey item with the construct it best supports. The results helped to level-set the constructs as much as possible for data analysis. Each item appeared only once under the construct with which it was most closely aligned. This alignment formed the basis for conducting the quantitative analysis. The models will provide insights into the effects of different constructs on the dependent variable of attitude and assess their significance.

For each construct, a correlation matrix was created for all items within that construct. The correlation coefficients in the matrix were then examined. Based on the matrix results, Pearson correlation coefficient greater than 0.5 were considered indicative of a strong correlation and would be selected to be used in further regression analysis. Items that were poorly correlated with others in the construct were discarded so that only relevant and similarly significant items were kept, resulting in more cohesive constructs.

For the attitude construct, the correlation analysis suggested 4 of the 9 items that are indicative of the attitude towards change. Items 105, 116, 117, and 120 help capture the intent of the attitude construct. Notably, each question provides insight into how the respondent felt generally towards the imminent change, The final set of items appear in Table 8.

Attitude	
105	My peers speak positively about this project.
116	The change supports my professional career plans and goals.
117	The change will improve my financial position.
120	The change will result in a more enjoyable work environment.

Table 8 - Final Attitude Construct

For the belief construct, the correlation analysis offered 2 items that correlated strongly with each other. Items 32 and 66 are used to capture the belief construct. The items selected for the belief construct provide insight into if the respondent believed the organization is amenable to change, if the organization is operationally prepared, and if a structured change effort was warranted and perceived beneficial. The items appear in Table 9.

Belief	
32	Our culture is capable of coping with this change.
66	A robust change management initiative is needed.

Table 9 - Final Belief Construct

For the communication construct, the correlation analysis found that 4 of the 7 were strongly correlated with each other. Items 20, 21, 23 and 30 help capture the intent of the communication construct. The items aligned to the communication construct help to determine if a communications strategy was developed, and the activity of communicating was effective. The items are found in Table 10.

Communication	
20	Management keeps us informed about the changes before making them.
21	The reasons for change are communicated clearly.
23	Managers have been given the information to understand the reasons for the change.
30	Implementation communications are open and readily available.

Table 10 - Final Communication Construct

For the confidence construct, the correlation analysis notes that 5 of the 7 were very strongly correlated with each other. Items 94, 95, 97, 106, and 108 help capture the intent of the confidence construct. An individual's confidence that they can change, are sufficiently willing,

and they have the ability to make and apply change are important emotive understandings which the questions applied to the confidence construct are used to evaluate. Refer to Table 11.

Confidence	
94	I feel I am well-trained in the new process/tool to successfully make the transition when the project is launched.
95	I feel I am ready for the upcoming project's rollout date.
97	I believe a clear vision has been developed and communicated regarding this project.
106	I am confident that this project will succeed.
108	I feel confident about delivering the change.

Table 11 - Final Confidence Construct

For the culture construct, the correlation analysis found that 5 of the 14 were strongly correlated with each other. Items 41, 43, 71, 72, and 85 help capture the intent of the culture construct. The items applied to evaluate the culture construct provide an understanding of the respondent's past experiences with their organization's response to change, and its support of the individuals who operate within its system. The analysis results are found in Table 12.

Culture	
41	Most changes in my organization in the past have been implemented successfully.
43	The organization takes care of employees that are adversely impacted by change.
71	If warranted, our organization is willing to change the way we work.
72	The company is considering our values while implementing changes.
85	I feel supported during organizational change.

Table 12 - Final Culture Construct

For the enthusiasm construct, the correlation analysis identified only 1 item which was sufficient for use. Only item 59 helped to capture the intent of the enthusiasm construct. Much like the attitude construct, the enthusiasm construct can provide understanding of the member's level of willingness to support the change effort, and if enthusiasm is lacking it can point to areas for improvement or added attention to apply strategic communication. Refer to Table 13.

Enthusiasm	
59	There is a passionate and engaged change team in place.

Table 13 - Final Enthusiasm Construct

For the implementation construct, the correlation analysis shows 5 of the 8 which were moderately correlated with each other. Items 4, 5, 8, 9, and 10 help capture the intent of the implementation construct. The items aligned to the implementation construct help to define the operational readiness for the change activities and provide insight into the needed resources to accomplish them. The results are shown in Table 14.

Implementation	
4	The change management implementation approach includes an understandable plan to deal with the technical challenges of the change.
5	The change management implementation approach ensures the right systems are in place to support the change and is scalable to be appropriate.
8	The change management implementation approach addresses stakeholder fears in tangible ways.
9	The change management implementation schedule ensures change is delivered in accordance with EHR implementation plan.
10	The change management implementation approach includes reasonable and accountable timelines.

Table 14 - Final Implementation Construct

For the involvement construct, the correlation analysis identified 3 in which only 3 existed and were strongly correlated with each other. Items 57, 102, and 103 help capture the intent of the involvement construct. The items which help to evaluate the involvement construct give sufficient information which can be used to ensure the necessary resources assigned are active in an appropriate and strategic manner to accomplish the necessary change tasks. The identified items are found in Table 15.

Involvement	
57	Change agents are identified and active.
102	My direct manager encourages me to get involved.
103	I feel listened to with regards to my views on this project.

Table 15 - Final Involvement Construct

For the knowledge construct, the correlation analysis offered 5 of the 20 which were very strongly correlated with each other. Items 98, 99, 107, 109, and 113 help capture the intent of the knowledge construct. The items applied to the knowledge construct help to give understanding to

the reasons for the change, and if the organization's communications campaign has been effective. Table 16 presents the results.

Knowledge	
98	I understand the key objectives and desired outcome of this project.
99	I understand the impact this project will have on you and your responsibilities within the organization.
107	I'm fully aware of how the changes will affect me.
109	I have been told how the changes will affect my team and me.
113	I'm aware that the managers are trying to make plans for the future.

Table 16 - Final Knowledge Construct

For the leadership construct, the correlation analysis suggested 3 of the 7 which were moderately correlated with each other. Items 35, 48, and 54 help capture the intent of the leadership construct. The items aligned to the leadership construct provide a means to evaluate leadership commitment, and the trust instilled in the change team, which is critical to success. Trust is evident when commitment is outwardly displayed by leadership. Refer to Table 17 for the correlation results.

Leadership	
35	Stakeholders trust in the change management team.
48	The management team is committed to fully rolling up their sleeves and get fully involved.
54	Executives in this organization are visible and active change leaders and sponsors.

Table 17 - Final Leadership Construct

For the motivation construct, the correlation analysis offered only 2, in which only 2 existed, which were strongly correlated with each other. Items 73 and 74 help capture the intent of the motivation construct. The items show alignment to the motivation construct and provides further insight into how effective the communications campaign was, if influential in its approach and rewards, and if the individuals affected by the change are motivated and committed to its success. An effective communications campaign is very important when relaying the need for change. The analysis results are in Table 18.

Motivation	
73	There's a real need for the changes outlined in the change plan.
74	There are logical reasons for change which are visible, and the goals are transparent.

Table 18 - Final Leadership Construct

For the optimism construct, the correlation analysis discovered all 5 which offered a varied response and were slightly to moderately correlated with each other. Items 14, 47, 91, 104, and 115 help capture the intent of the optimism construct. The items aligned to the optimism construct give needed query to understanding if the overall emotive response to the change is positive. It also helps to provide a basis to evaluate the potential for commitment amongst stakeholders. The results appear in Table 19.

Optimism	
14	Conflicts within the change are looked for and try to be solved.
47	The management team is on board and ready to support the change.
91	I can easily incorporate the required educational and awareness activities for the project into my schedule.
104	I will actively support this project.
115	I believe in the future of the change project.

Table 19 - Final Optimism Construct

For the pessimism construct, the correlation analysis offered all 6 which were slightly correlated with each other. Items 13, 28, 39, 75, 90, and 121 help capture the intent of the pessimism construct. Item 39 was normalized to account for sentiment ([recorded result] – 6 = nRes). The items aligned to the pessimism construct give needed query to understanding if the overall emotive response to the change is negative, which is important to acknowledge so that the root causes can be identified and requires a positive messaging campaign to address. The results offered are located in Table 20.

Pessimism	
13	Good ideas for change are hidden and used for personal agendas.
28	The reasons for change are unclear and there are different views of the goals of the implementation.
39	Change projects create resistance which has to be broken.

75	Change is expected without being linked to incentives.
90	I am concerned I'll be expected to do my normal job and perform change management activities on my time or only as regular workload allows.
121	I'm sure this whole thing will blow over soon.

Table 20 - Final Pessimism Construct

For the planning construct, the correlation analysis found only 1 question for use. Item 49 helps capture the intent of the planning construct. The item supporting the planning construct assists in understanding if a structed plan is in effect, and if resources are applied to it as needed. Refer to Table 21 for the analysis results.

Planning	
49	The project lead for the change is known and project champions aid the planning and implementation.

Table 21 - Final Planning Construct

For the purpose construct, the correlation analysis noted only 4 of the 14 which were moderately correlated with each other. Items 7, 17, 22, and 61 help capture the intent of the purpose construct. The items aligned to the purpose construct are critical in understanding the general approach to addressing individual and organizational resistance to change, and the overall effectiveness of the barriers which may influence the reluctance towards change efforts. Table 22 contains the results of the analysis.

Purpose	
7	Mitigation to barriers that derail change has been identified and included in the change management implementation approach.
17	Conflicts and mitigations within the implementation are planned for in the change approach.
22	There is an appropriate level of transparency regarding change efforts in our organization.
61	Achievements and progress in change management can be measured.

Table 22 - Final Purpose Construct

For the resistance construct, the correlation analysis suggested 4 of the 5 which were strongly correlated with each other. Items 11, 37, 38, and 63 help capture the intent of the

resistance construct. The items aligned to the resistance construct are also critical in knowing how efforts to reduce resistance or overcome barriers are proceeding, the strategy to address resistance is performing, and areas of doubt which must be addressed with information. The findings are located in Table 23.

Resistance	
11	The process of implementation for the change is flexible and reactive.
37	Stakeholders have overcome their resistance to the change initiative.
38	Management resistance and doubt has been eliminated.
63	Incentives are linked with the implementation to aid the process of change.

Table 23 - Final Resistance Construct

For the training construct, the correlation analysis offered only 3 which were strongly correlated with each other. Items 15, 86, and 87 help capture the intent of the training construct. The items which evaluate the training effectiveness generally assess if current training support is adequate to the task of informing those involved in change efforts. Refer to Table 24.

Training	
15	The change management training plan will yield adequate levels of change knowledge.
86	I have access to the resources (e.g., material, equipment, technology) I need to do my job effectively.
87	I have the training I need to do my job effectively.

Table 24 - Final Training Construct

For the strategy construct, the correlation analysis shows 4 of the 8 which were strongly correlated with each other. Items 68, 69, 70, and 78 help capture the intent of the strategy construct. Understanding if the change strategy is aligned with goals and objectives, and properly supportive of the project plan is very important to the project's success potential. The more closely aligned with the organization's values, the more effective the strategy will be at achieving the project's intended outcomes. Results of the analysis appear in Table 25.

Strategy	
68	The change management strategy addresses high-level goals and when they will be achieved.

69	The change management strategy addresses why change is occurring prior to EHR deployment timelines.
70	The change management strategy defines clear and reasonable strategic objectives.
78	I understand the changes proposed in the new strategy.

Table 25 - Final Strategy Construct

The analysis was structured to ascertain the influence of these constructs on an organization's attitude towards change, which in turn affects the efficacy of employing change methodologies. The statistical analysis will provide the basis for a more effective strategy to manage organizational influences.

4.2 Statistical Analysis

Multiple linear regression modeling was employed to analyze the influences and effects of the independent constructs on the dependent variable of attitude and to assess the factors influencing an individual's attitude toward change. This understanding is crucial for evaluating the model's overall effectiveness. Microsoft© Excel® was utilized to perform the statistical analysis. Approximately 10 hours were spent preparing the survey data for statistical analysis.

Multiple linear regression was chosen as the analysis technique due to its strength in examining the relationship between a single dependent variable and multiple independent variables or constructs. It enabled the estimation of the effects on the respondent's attitude toward change and the influence of each or a combination of constructs, while holding the other explanatory constructs constant. Control variables were applied to test the validity of the results. This approach is particularly useful for applying systematically obtained results to predict the most influential and impactful constructs. Once identified, these constructs can be managed to focus strategy on positively improving the overall attitude toward change, thereby enhancing the effectiveness of change efforts. Performing the statistical data analysis and interpreting the

results took approximately 40 hours to complete.

4.2.1 Regression Results

The analysis explores relationships between measured variables and constructs to assess and predict the impact of these constructs on attitude toward change, thereby influencing the effectiveness of change methods. The constructs were systematically reduced to their final states to minimize extraneous influences and irrelevant information. All regression models were of the form:

$$Attitude = \beta_0 + \beta_1 \cdot IndepVar_1 + \cdots + \beta_n \cdot IndepVar_n + \varepsilon$$

where $IndepVar_i$ represents the relevant independent variable for that regression.

4.2.1.1 Effect of Organizational Constructs on Attitude

Multiple linear regression was employed to test if organizational constructs are effective in predicting attitude towards change. The organizational constructs employed as independent variables were culture, leadership, purpose, and strategy. The dependent variable was attitude. Construct values were computed using the items retained in the previous section. The control variables of gender, age, service length, and organization type were held constant in validating the model. Multiple regression was employed to determine the effect of organizational constructs on attitude.

As shown in Figure 17, the organizational constructs employed as independent variables were culture, leadership, purpose, and strategy. The dependent variable was attitude.

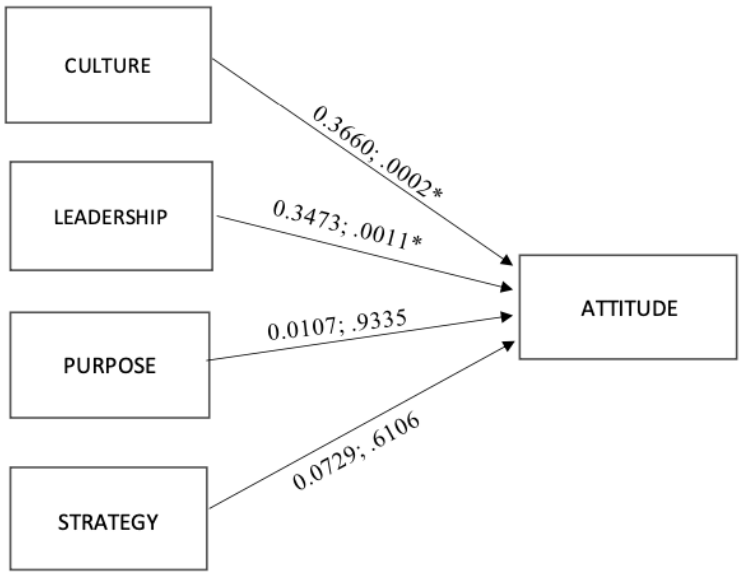


Figure 19 - Effects of Organization Constructs Model

Results of running the multiple regression analysis yielded a fitted model of

$$Attitude = 3.2108 + 0.3660 \cdot Culture + 0.3473 \cdot Leadership + 0.0107 \cdot Purpose + 0.0729 \cdot Strategy$$

The regression yielded an R^2 of 0.6297, and an adjusted R^2 of 0.6082, indicating that a sizeable portion of the variance in the attitude construct was accounted for by the independent constructs. The overall model was strongly supported, with an F-ratio of F(4,69) = 29.33 and $p <$ 0.0000. Detailed results from the regression appear in Table 26.

Constructs	Coefficients	Standard Error	t Stat	P-value
Intercept	3.2108	1.1614	2.7645	0.0073 *
Culture	0.3660	0.0943	3.8815	0.0002 *
Leadership	0.3473	0.1017	3.4153	0.0011 *
Purpose	0.0107	0.1313	0.0812	0.9355
Strategy	0.0729	0.1425	0.5115	0.6106

Table 26 - Organizational Constructs Analysis

* $p < 0.05$

The model indicates that culture and leadership are significant predictors of attitude ($p <$ 0.05). This makes sense from an obviative perspective, when considering what most influences

how attitudes are formed. The results showed that there is an association between organizational culture and leadership, and they have a positive influence on an individual's attitude toward organizational change. Attitude is a critical component of change effectiveness, and promoting a positive attitude towards change is crucial to a project's success. The analysis has shown that organizational culture and leadership were significantly (positively) correlated with attitude. A change management strategy should take this into account when considering where to apply resources to generate the most gain. Purpose and strategy independent constructs were found to not be significant predictors of attitude.

4.2.1.2 Effect of Process Constructs on Attitude

Again, multiple linear regression was employed to test if process constructs are effective in predicting attitude towards change. The process constructs employed as independent variables were communication, implementation, resistance, and training. The dependent variable was attitude. Construct values were computed using the items retained in the previous section. The control variables of role, age, service length, and organization type were held constant in validating the model. Multiple regression was employed to determine the effect of process constructs on attitude.

As shown in Figure 18, the process constructs employed as independent variables were communication, implementation, resistance, and training. The dependent variable was attitude.

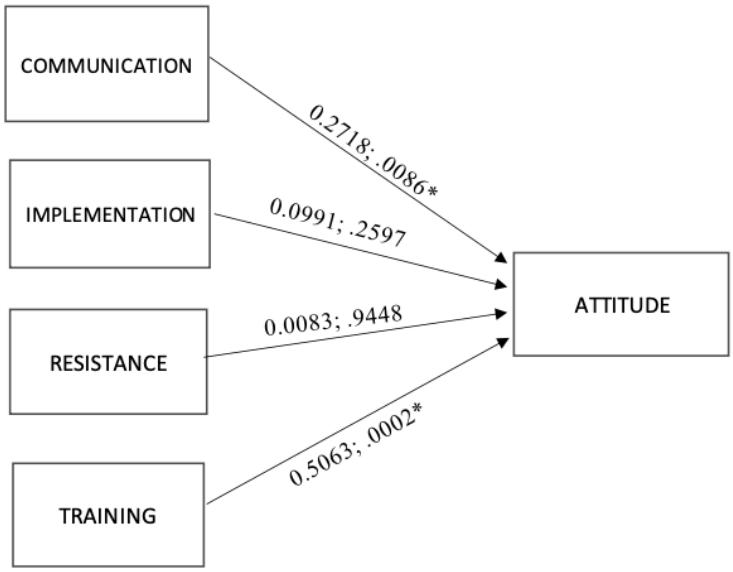


Figure 20 - Effects of Process Constructs Model

Results of running the multiple regression analysis yielded a fitted model of

$$Attitude = 3.2896 + 0.2718 \cdot Communication + 0.0991 \cdot Implementation + 0.0083 \cdot Resistance + 0.5063 \cdot Training$$

The regression yielded an R^2 of 0.5189, and an adjusted R^2 of 0.4910, moderately indicating that the variance in the attitude construct was accounted for by the independent constructs. The overall model was adequately supported, with an F-ratio of F(4,69) = 18.61 and $p < 0.0000$. Detailed results from the regression appear in Table 27.

Constructs	Coefficients	Standard Error	t Stat	P-value
Intercept	3.2896	1.3125	2.5064	0.0146 *
Communication	0.2718	0.1005	2.7056	0.0086 *
Implementation	0.0991	0.0873	1.1364	0.2597
Resistance	0.0083	0.1201	0.0695	0.9448
Training	0.5063	0.1267	3.9952	0.0002 *

Table 27 - Process Constructs Analysis

* $p < 0.05$

The model indicates that communication and training are significant predictors of attitude

as well ($p < 0.05$). These results make sense as well, as both communication and training are very important aspects of any change project plan. Communications must be effective, yet not too cumbersome to avoid introducing fatigue. The process of communication between leadership and change teams, and amongst change agents must be seamless so that attitudes can be fortified with information. Also, training of the change itself, and how to enact it, is extremely important to develop a positive attitude towards the achievement of training goals. Implementation and resistance independent constructs were found to not be significant predictors of attitude.

4.2.1.3 Effect of Individual Constructs on Attitude

Multiple linear regression continued to be employed to test if individual constructs are effective in predicting attitude towards change. The individual constructs employed as independent variables were confidence, involvement, knowledge, motivation, optimism, and pessimism. The dependent variable was attitude. Construct values were computed using the items retained in the previous section. The control variables of role, gender, age, service length, and organization type were held constant in validating the model. Multiple regression was employed to determine the effect of individual constructs on attitude.

As shown in Figure 19, the individual constructs employed as independent variables were confidence, involvement, knowledge, motivation, optimism, and pessimism. The dependent variable was attitude.

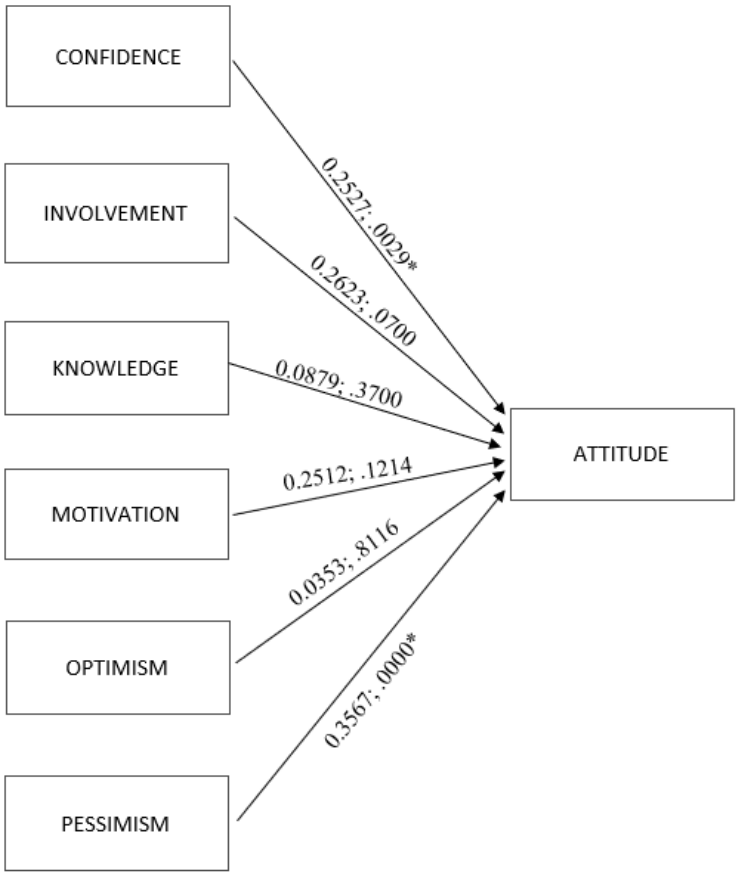


Figure 21 - Effects of Individual Constructs Model

Results of running the multiple regression analysis yielded a fitted model of

$$Attitude = -4.0874 + 0.2527 \cdot Confidence + 0.2623 \cdot Involvement + 0.0879 \cdot Knowledge + 0.2512 \cdot Motivation + 0.0353 \cdot Optimism + 0.3567 \cdot Pessimism$$

The regression yielded an R^2 of 0.8210, and an adjusted R^2 of 0.6741, indicating that a large portion of the variance in the attitude construct was accounted for by the independent constructs. The overall model was also strongly supported, with an F-ratio of F(6,67) = 23.09 and $p < 0.0000$. Detailed results from the regression appear in Table 28.

Constructs	Coefficients	Standard Error	t Stat	P-value
Intercept	-4.0874	2.0995	-1.9468	0.0557
Confidence	0.2527	0.0816	3.0963	0.0029 *

Involvement	0.2623	0.1424	1.8416	0.0700
Knowledge	0.0879	0.0974	0.9025	0.3700
Motivation	0.2512	0.1602	1.5686	0.1214
Optimism	0.0353	0.1473	0.2393	0.8116
Pessimism	0.3567	0.0769	4.6395	0.0000 *

Table 28 - Individual Constructs Analysis

* $p < 0.05$

The model indicates that confidence and pessimism are significant predictors of attitude ($p < 0.05$). For the combined evaluation, confidence in the individual's and organization's ability to change, and pessimism which gives the needed insight into how the change is being received, both had positive effects on attitude. Improvements to instilling confidence in the organizational population's ability to work through change initiatives and accomplish tasks is most helpful to remaining on track. Also, attention to understanding areas of individuals' concerns and addressing them early on change efforts is crucial to overcoming challenges to impactful change. Involvement, knowledge, motivation, and optimism independent constructs were found to not be significant predictors of attitude.

4.2.1.4 Regression of Major Constructs on Attitude

Multiple linear regression was employed to test which constructs are effective in predicting attitude towards change. The regression was performed on all major constructs. The independent variables were communications, confidence, culture, implementation, involvement, knowledge, leadership, optimism, pessimism, purpose, resistance, strategy, and training. The dependent variable was attitude. Construct values were computed using the items retained in the previous section. Multiple regression was employed to determine the effect of all independent constructs on attitude, so that the initial list can be systematically reduced to only significant independent constructs for analysis.

As shown in Figure 20, the regression was performed on the major constructs. The independent variables were communications, confidence, culture, implementation, involvement, knowledge, leadership, optimism, pessimism, purpose, resistance, strategy, and training. The dependent variable was attitude.

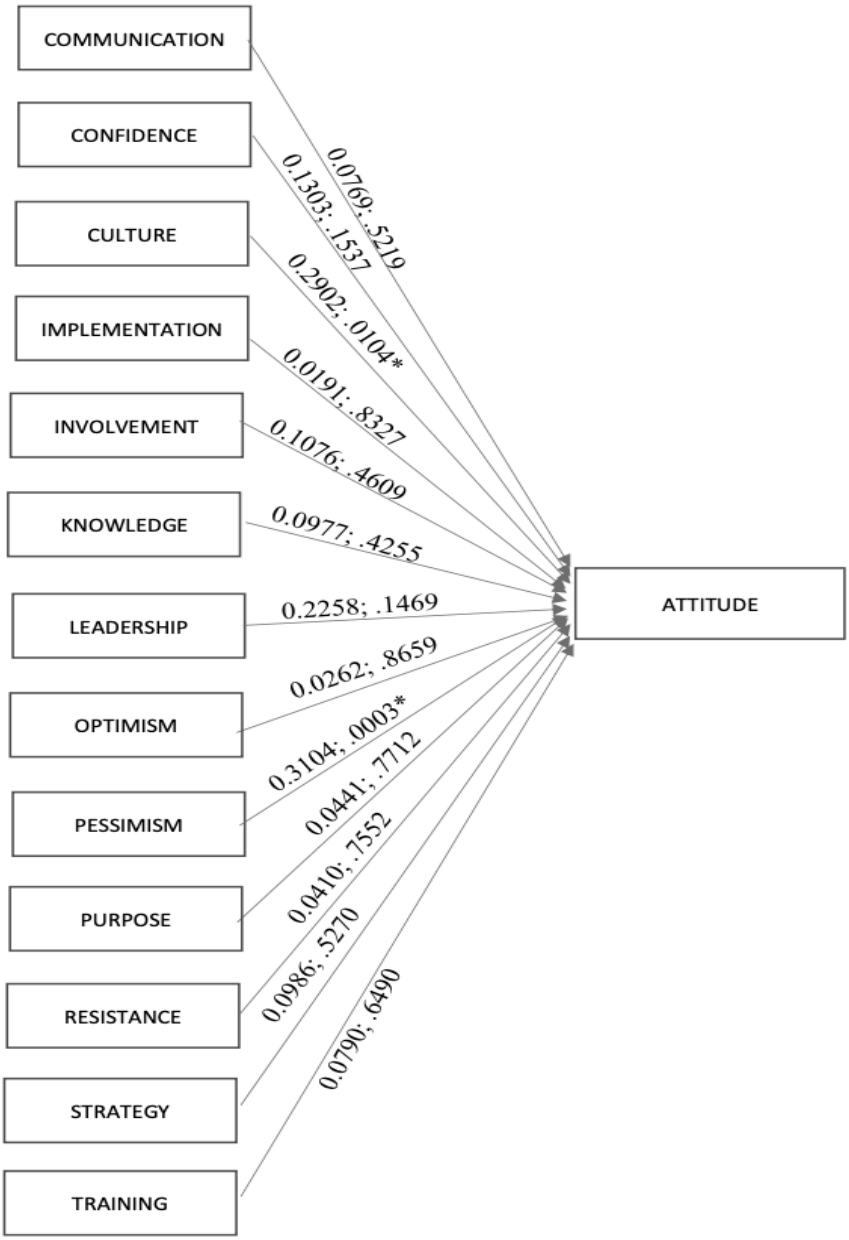


Figure 22 - Effects of Major Constructs Model

Results of running the multiple regression analysis yielded a fitted model of

$$Attitude = -2.7337 - 0.0769 \cdot Communication + 0.1303 \cdot Confidence + 0.2902 \cdot Culture - 0.0191 \cdot Implementation + 0.1076 \cdot Involvement + 0.0977 \cdot Knowledge + 0.2258 \cdot Leadership + 0.0262 \cdot Optimism + 0.3104 \cdot Pessimism + 0.0441 \cdot Purpose - 0.0410 \cdot Resistance - 0.0986 \cdot Strategy + 0.0790 \cdot Training$$

The regression yielded an R^2 of 0.7350, and an adjusted R^2 of 0.6775, indicating that much of the variance in the attitude construct was accounted for by the 13 independent constructs, and the model fit the data well. The overall model was strongly supported, with an F-ratio of F(13,60) = 12.80 and $p < 0.0000$. Detailed results of the regression appear in Table 29.

Constructs	Coefficients	Standard Error	t Stat	P-value
Intercept	-2.7337	2.1281	-1.2846	0.2039
Communication	-0.0769	0.1194	-0.6442	0.5219
Confidence	0.1303	0.0902	1.4450	0.1537
Culture	0.2902	0.1097	2.6442	0.0104 *
Implementation	-0.0191	0.0898	-0.2122	0.8327
Involvement	0.1076	0.1449	0.7422	0.4609
Knowledge	0.0977	0.1218	0.8023	0.4255
Leadership	0.2258	0.1536	1.4696	0.1469
Optimism	0.0262	0.1547	0.1696	0.8659
Pessimism	0.3104	0.0800	3.8787	0.0003 *
Purpose	0.0441	0.1509	0.2922	0.7712
Resistance	-0.0410	0.1309	-0.3132	0.7552
Strategy	-0.0986	0.1549	-0.6363	0.5270
Training	0.0790	0.1727	0.4575	0.6490

Table 29 - Initial Regression Analysis

* $p < 0.05$

The regression of the major independent constructs served as the baseline for performing the stepwise regression analysis. Independent constructs were subsequently evaluated for inclusion.

4.2.2 Stepwise Regression

The multiple regression testing was run, and the values reviewed. The use of a backward-elimination rule was used to discards the least statistically significant constructs and keeping those found statistically significant at *p*-values < 0.05. The process repeated. The discarding stopped when the parsimonious target of useful constructs was reached.

4.2.2.1 Stepwise Regression of Constructs on Attitude

Stepwise multiple linear regression was employed to test which constructs were effective in predicting attitude towards change. The initial regression analysis model was the basis for continued stepwise regression. 7 consecutive regression analyses were performed after the initial for purposes of reduction, ultimately resulting in the final constructs of confidence, culture, knowledge, leadership, and pessimism to be evaluated as predictors of attitude and how it relates to change readiness and effectiveness. Keeping variables that are not statistically significant or considered irrelevant can reduce a model's precision. Refer to Table 30.

Constructs Entered	Constructs Removed	Final Constructs	Method
Communication	Communication	Confidence	Stepwise Multiple Regression Analysis
Confidence	Implementation	Culture	
Culture	Involvement	Knowledge	
Implementation	Optimism	Leadership	
Involvement	Purpose	Pessimism	
Knowledge	Resistance		
Leadership	Strategy		
Optimism	Training		
Pessimism			
Purpose			
Resistance			
Strategy			
Training			

Table 30 - Stepwise Regression Results

As the results of each regression analysis sequence progresses, the least significant

constructs will be removed so that a meaningful assessment of significant influences can be performed. The stepwise regression results will provide the understanding of the most influential constructs on the dependent variable of attitude and offer a means for prioritizing strategic planning to address them by applying limited resources.

4.2.2.2 Final Regression of Constructs on Attitude

Multiple linear regression was employed to test which constructs were effective in predicting attitude towards change. The final constructs evaluated the significant independent variables of confidence, culture, knowledge, leadership, and pessimism. The dependent variable was attitude. Construct values were computed using the items retained in the previous section. Multiple regression was employed to determine the effect of the more focused list of significant independent constructs on attitude.

As shown in Figure 21, the final constructs evaluated the significant independent variables of confidence, culture, knowledge, leadership, and pessimism. The dependent variable was attitude.

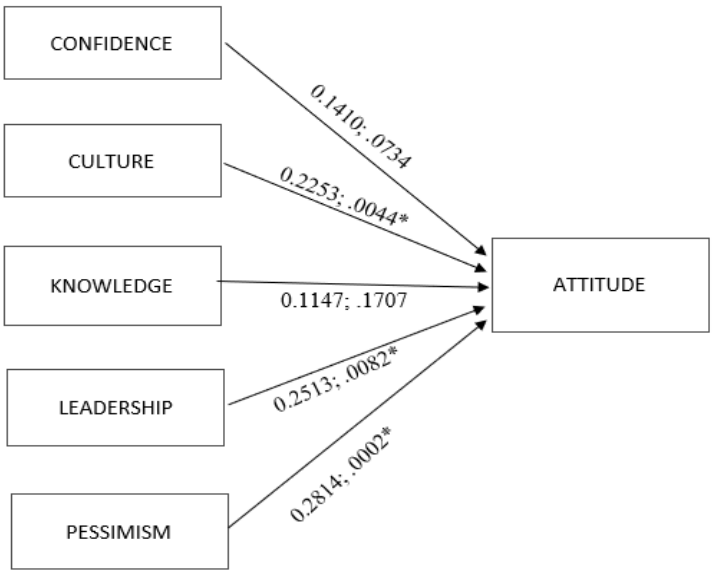


Figure 23 - Final Regressions of Effects of Most Significant Constructs Model

Results of running the multiple regression analysis yielded a fitted model of

$$Attitude = -1.9577 + 0.1410 \cdot Confidence + 0.2253 \cdot Culture + 0.1147 \cdot Knowledge + 0.2513 \cdot Leadership + 0.2814 \cdot Pessimism$$

The regression yielded an R^2 of 0.7229, and an adjusted R^2 of 0.7025, indicating that still a very sizeable portion of the variance in the attitude construct was accounted for by the independent constructs. The final results with only 5 independent constructs do show that the reduced model fits the data very well. The overall model proved to be strongly supported, with an F-ratio of $F(5,68) = 35.48$ and $p < 0.0000$. Detailed results from the regression appear in Table 31.

Constructs	Coefficients	Standard Error	t Stat	P-value
Intercept	-1.9577	1.5887	-1.2323	0.2221
Confidence	0.1410	0.0776	1.8183	0.0734
Culture	0.2253	0.0764	2.9502	0.0044 *
Knowledge	0.1147	0.0828	1.3847	0.1707
Leadership	0.2513	0.0923	2.7230	0.0082 *
Pessimism	0.2814	0.0724	3.8859	0.0002 *

Table 31 - Final Regression Analysis

* $p < 0.05$

The analysis results provided support for determining the significance of the independent constructs, and their relative value of influence on attitude. The results show that 70.3% (denoted by the adjusted R^2) of the variance in the dependent construct of attitude can be confidently predicted from the independent constructs of culture, leadership, and pessimism.

The investigation of the association between the factors and attitude demonstrated that culture and leadership are very important in the formation of an attitude towards change. This is especially important in healthcare settings which are very structured and methodical in their approach to service. A culture willing to embrace change, and the leadership to direct, support, and reinforce the need for change has a significant effect on the attitude of the affected staff

directly impacted by change. Additionally, if an organization is pessimistic about how well it will navigate through the change, the behavior and emotional effects on attitude will coincide with the effectiveness of the change initiative or project. Improvements in addressing pessimism have a direct influence on attitude and is likely the greatest target to address to receive the most benefit from efforts and application of resources.

Confidence and knowledge constructs were found to not be significant predictors of attitude. Both are important to promoting effectiveness of operationalizing a plan, but they have little initial effect on attitude formation. While most change professionals and practitioners will focus attention on boosting user confidence and sharing knowledge to improve the organization's willingness or readiness for change, this may not be the best strategy to focus efforts.

The work demonstrated that rededicating resources and reallocating time to improve cultural readiness and promoting its willingness to accept change and remain flexible in its business dealings will maximize effect on attitude towards a change project. Effective leadership and their ability to promote confidence in their decision for the direction of the change effort will also lessen the effect of pessimism within its ranks. Pessimism is typically caused by a lack of confidence in direction imposed by leadership and can dramatically impact the overall attitude on change. Centering attention on management or improvement strategies in these three areas has the potential to yield the greatest results.

4.3 Overall Findings

The results helped to identify the influencing factors in estimating how each construct supports attitude toward a change effort, providing strategic areas of focus as input to address RQ2. Measuring attitude is crucial for evaluating the effectiveness of a model or framework, as it helps determine why the model may or may not have achieved its goals, thereby identifying

areas for improvement. These factors may be internal or external and are related to management, relevance or purpose, implementation modifications, or deviations from the original plans.

Multiple linear regression proved to be an effective tool for evaluating the influence of various constructs on an individual's attitude toward change. The results provided significant implications for strategic planning, particularly in healthcare change projects, where resources are actively engaged in operations and healthcare delivery. In such settings, reluctance and resistance to change can act as protective strategies for maintaining control. Training on both the process and the product has been shown to be most effective in improving the overall attitude of organizations and individuals toward change, as they become more familiar with how it will be used, how it may enhance work capabilities, and its usability. The results from the multiple regression analysis can be used to determine how best to allocate limited resources and engage high-value targets, maximizing the impact of change efforts.

5 QUALITATIVE ANALYSIS

This chapter addresses the qualitative analysis component of the integrated mixed-methods approach utilized in this dissertation. The appreciative inquiry process was adopted for the qualitative approach.

During the survey, it was noted that many of the end-user roles queried had little experience in the processes of the ADKAR® Model and the change management processes and rather were solely recipients of the effects of how well or how poorly it was performed and managed. Consequently, the appreciative inquiry plan was adjusted to shift the discussion focus to only project managers, change implementers, and change practitioners.

The script contained interview questions and followed the AI structured conversation, focusing on strengths and assets instead of problems. The information collected through survey and literature review supported the Definition phase of AI and was used to derive the topics and questions for the remaining phases of AI.

5.1 Coverage of the Appreciative Inquiry Process

The AI process of data collection involved structured interview sessions with subject matter experts. The AI 5-D process encompasses the following phases: Definition, Discovery, Design, Dream, and Destiny. In conducting the AI interviews, only the Discovery, Design, Dream, and Destiny phases were explored. The Definition phase included the affirmative topic as the conceptual design, and it served as the foundation for improvement and the focus of all attention. The interviews focused on the Discovery phase, during which the conceptual design was reviewed and scrutinized to understand how it addresses the performance deficiencies of the status quo. In the Dream phase, the interviews shifted to explore the framework's potential and

envision how it could be enhanced. Moving to the Design phase, the interviews evaluated possibilities for how improvements could be incorporated into the design of a change management model that would meet their needs. The Destiny phase was used to a limited extent, as discussions about the potential for a pilot project of the improved design were outside the scope of this research. All interview sessions were documented in facilitator notes to ensure that the insights could be applied to the framework's continued development process.

5.2 Data Collection

The determination of the potential usability of the ACTION Change Management Framework was the primary goal of the AI interviews. These interviews were conducted with project managers, change implementers, and change practitioners between June 10 and August 11, 2023. Each AI interview lasted approximately 60 minutes. The interviewer's notes, captured during the individual AI interviews, were compiled in the data collection workbook tool. Suggestions were validated through further literature review as warranted.

AI played a crucial role in improving the conceptual model through collective knowledge and experience. The AI interview sessions and follow-up questions were used to enhance the framework design and assess whether the ACTION Change Management Framework would be effective in practice. A script was used to guide the discussion, and the interviewer captured the conversation in transcription notes. This information was later utilized for qualitative analysis.

5.2.1 Population Sample

Of the 74 potential candidates for interviews functioning in the target roles of project managers, program managers, change implementers, and change practitioners, 28 did not respond to the survey, bringing the total number of potential candidates to 46. All remaining

candidates had considerable relevant experience, and an active role in managing change during an EHR implementation.

Of the 46 individuals in the pool, it was decided that program managers would be excluded on account of their low level of intimacy with change efforts. This reduced the respondent pool to 40. Of the 40 subjects, 27 agreed to participate in appreciative inquiry interviews. 13 of the 17 (76.4%) of change implementers, 6 of the 10 (60%) change practitioners, and 8 of the 13 (61.5%) of project managers agreed to interviews. The remaining 13 subjects were not available, resulting in 67.5% overall participation in the action research activities.

The 27 AI interviewees represented a diverse sample of change practitioners, change implementers, and project managers covering multiple disciplines with differing project-level involvement and perspectives. During the interviews, the participants shared and contributed from their average of 15 years of service in the healthcare field, collectively totaling 406 years of experience. Table 32 provides the participant descriptive statistics.

Participants (n=27)		
Activity	**Frequency**	**Percentage**
Role		
Change Implementer	13	48.1 %
Change Practitioner	6	22.2 %
Project Manager	8	29.6 %
Gender		
Male	10	37.0 %
Female	17	63.0 %
Age		
26-35	4	14.8 %
36-45	13	48.1 %
46-55	9	33.3 %
56-65	1	3.7 %
Age Mean 42.1	Age SD 8.3	
Years of Service		
1-5	4	14.8 %
6-10	5	18.5 %
11-15	6	22.2 %
16-20	6	22.2 %
21-25	4	14.8 %
26-30	2	7.4 %

Years of Service Mean 15.0	Years of Service SD 7.5	
Organization		
VA	9	33.3 %
DoD	11	40.7 %
HHS	2	7.4 %
Commercial	5	18.5 %

Table 32 - Appreciative Inquiry Interviewee Descriptive Statistics

5.2.2 Data Collection Process

The definition of the problem occurred earlier in the project. The affirmative topic for evaluation using the AI process was the ACTION Change Management Framework conceptual design. The conceptual design was given to the participants in advance so that they could familiarize themselves with the concepts and be prepared for discussion during the interview sessions. AI interviews were scheduled based on their availability.

The questions were organized under each of the 5-D process categories, and the scripts were used during the interview sessions (refer to Appendix B: Appreciative Inquiry Interview Script). Each interview began with introductions and an overview of the ACTION Change Management Framework. A primer on AI was then provided to ensure that the interviewees understood the process to be followed and how the focused discussions would progress in sections to keep the meeting organized. The interviews were conducted using remote and virtual technologies, as in-person interviews were not offered.

The Discovery, Dream, and Design sections were fully covered, and the questions employed were sufficient to guide the discussions. The questions followed the positive principle of AI, focusing intently on how to improve the ACTION Change Management Framework. Before moving on to the next section, an open dialogue was also encouraged, which provided valuable insights into related topics in change management and project management.

The Discovery phase activities included a virtual whiteboard technique to ‘post magnet statements’ used to direct focused positive attention, and the use of the technology was

supportive of an efficient and engaging session. The discussion then dove into evaluating the ACTION Change Management Framework's alignment strengths and potential for improving collaboration amongst the stakeholders. The use of open-ended questions proved helpful during the unscripted portion of the dialogue. Brainstorming was another technique used, and also proved successful, despite the challenges of virtual interview sessions.

The Dream session was performed next. The desired future-state was discussed, and the ACTION Change Management Framework's potential to facilitate its attainment was investigated. Envisioning techniques, such as the 'exploring scenarios' and 'provocative propositions' methods were very useful at managing the positive conversation, using an imaginative future-state solution.

The Design session was where most of the constructive conversations were held. The participants were enthusiastic about providing input into the ACTION Change Management Framework's design in a reality-based sense and provided considerable detail into the logistical activities which would be needed. The use of 'possibility statements' was interesting and resulted in many recommendations and suggestions for developing the framework.

The Destiny section was covered last. The two questions on the topic of evaluating the framework were briefly discussed, as the potential for a pilot project to directly evaluate it against another change management model was not feasible and was considered outside the scope of the dissertation. The discussions speculated on how best to evaluate the solution in the future and which methods would be most effective. The resource constraints were also acknowledged, which made the Destiny sessions short with little insightful value.

All material from each AI interview session was collected in the interview sessions logs, and interviewer notes. Transcription using automated tools in the virtual environment were

initially used but quickly abandoned due to numerous errors. Digital storage also became an issue, with most files averaging over 400 MB.

5.3 Analysis of Interview Data

The interviews took approximately 30 hours to perform. Approximately 10 hours were spent transcribing and organizing the interview logs and notes. The transcription notes were copied into a data collection workbook, and general grammar corrections were made to ensure that the notes were useable. Approximately 50 additional hours were spent performing qualitative analysis of the information captured and applying it to the model as improvements or changes. Additionally, the survey responses were collected and integrated into the analysis. Altogether, the information provided considerable insights for strategy, model design, and potential areas for future research.

The analysis of the information collected during the AI sessions led to several changes to the ACTION Change Management Framework. Each recommendation was documented in a data collection workbook. In this regard, the appreciative inquiry approach proved effective, offering many relevant additions to the framework design. This process helped improve the framework from a conceptual idea to a more usable and refined framework design. After thorough analysis of the results obtained through surveys and interviews, several patterns emerged in the responses and input. The complete interview notes are also documented in the data collection workbooks and have been de-identified to protect the interviewees' identities.

5.3.1 Discovery Questions

The facilitator and SMEs investigated the proposed solution and focused on the strengths of the ACTION Change Management Framework. Using positive questions allowed the

discussion to grow, develop, and become agile in thinking of possible ways forward. The aim was to get a clear appreciation of what the core strengths are in the proposed solution and understand its weaknesses. Table 33 provides the Discovery questions used, and significant answers offered by the interviewees.

Upon review of the ACTION Change Management Framework, what…	
Questions	**Responses**
…good ideas came to mind for you?	In general, the interviewees felt that the structured alignment of ACTION to other project disciplines was very helpful, and the psychological aspects of change supported the model. "Incorporating change management best practices improves success rates and establishes principles for ongoing improvement." "The plan's psychological approach is praised for its intelligence and uniqueness, particularly in how it integrates various change models into a cohesive framework."
…gaps from the current use of ADKAR are closed by applying ACTION in an EHR implementation project?	Most all agreed that the ACTION model would be very helpful, and its framework would benefit project managers and change teams. They agreed ADKAR tends to focus on individual growth rather than project-related needs, making its application to project work less clear, and while effective in change management it lacks strong communication tools for aligning project teams and business owners, leading to potentially siloed work. They felt that the ACTION proposal, however, integrates all teams and clarifies how they can support one another. They also concurred that a key gap in ADKAR is that its recommendations are not consistently applied in practice, which your model could help address. "I am a PM, and the projects I have managed have always had a period where business requirements tended to increase the scope of the project. ADKAR lacks the attention to projects and focuses more on personal growth." "There are not many opportunities to make sure all project teams can help move an implementation along and assist in CM with business owners. Your proposal aligns them all and shows where they can help each other." "One thing I liked about ADKAR was its acknowledgement of the importance of integrating project management. ACTION takes this one step

	further by incorporating the systems development frameworks and the psychological approach.“
…strengths are apparent to the ACTION in facilitation change during an EHR implementation?	Interviewees agreed that strengths are definitely the synthesis of other frameworks. They also acknowledged that the change effort must be scalable yet customizable, based upon the project. They felt that this is the only way stakeholders would assume additional duties and tasks without rejecting the important concepts this framework is trying to address. “The proposed plan you offer aligns a lot of work together which is nice. Too often teams work separately with different goals, and this brings them together with a common goal in theory.” “ADKAR has resulted in problems in adoption, so having a structured approach to a change will be very helpful, we know consequences of the current approach are not optimizing hardly anything. ACTION rectifies that.” “Strength is its alignment with the other models. No other change model does that.”
…shortcomings in the ACTION solution design to you see, and what do you believe will correct them?	It was noted that there has to be trust in the product (i.e., EHR). Problems and issues have to be resolved, or frustration will increase. “The ACTION framework relies on a human component and resistance to change. People must be made malleable to change. They must be readied for the implementation and is a challenge of change theory.” “Not all strategies are flexible to apply change theory to each person type.”
…do you believe could measure success using ACTION in implementing an EHR product?	Not all agreed that success is measured consistently, and while is project-specific, consistency should be helpful in evaluating effectiveness. “I definitely think success can be measured. I'd start with defining what success looks like for each of the components (Affirmation, Collaboration, etc.).”

Table 33 - AI Discovery Questions

5.3.2 Dream Questions

The facilitator and SMEs focused on future aspirations for the ACTION Change Management Framework, placing the emphasis on what works well and has potential to improve the success of EHRs implementations. Table 34 provides the Discovery questions used, and significant answers offered by the interviewees.

Upon review of the ACTION Change Management Framework, what…	
Questions	**Responses**
…effect do you believe the use of ACTION will have on implemented EHR product meeting user's needs?	Most felt that a focus on understanding requirements and gaps earlier on, will more likely ensure the implementation will meet the user's needs. "Implementing this framework will permit a wide variety of users, from doctors to clerks, to nurses and clinicians to help them make a fast transition to a modern EHR." "It doesn't get down to the least common denominator because all the fancy calculations and such are really missed on people who have to use this tool to do their job, and they are comfortable exactly where they're at with the existing tool."
…effect do you believe the use of ACTION will have on implemented EHR product on project success?	The interviewees generally felt it would better ensure the implementation will be successful and meet the user's needs. "User adoption is critical. It is not ever focused on in regular projects but is so important. The ACTION framework seems to focus on it and applies to areas which it is a primary task. It will aid in gaps resolution and risk mitigation by incorporating and then focusing on workflow and current to future state design." "I believe ACTION's focus on workflow analysis in the Transformation and Implementation portion will go a long way in ensuring the EHR product meets the user's needs. Training on the product itself will only get them so far."
…effect do you believe the use of ACTION will have on implemented EHR product on user adoption?	They generally believed that the model would improve adoption. "I think it could have a tremendous effect on user adoption because of its focus on collaboration."
…benefit will ACTION have on improving a project managers' ability to predict positive EHR implementation project outcomes?	The interviewees generally believe that if the collaborative relationships are improved, and gaps in capabilities addressed earlier, then results will be more predictable. "I do not know anyone who has been successful at this. You need a crystal ball for most IT projects, but the ACTION change model seems like it will be very good at making results more predictable."
…benefit will ACTION have on gaining commitment and increase stakeholder buy-in?	The interviewees agreed this is critical and the ACTION model addresses this. "The A in ACTION focuses on this."

…benefit will ACTION have on improving user participation in the EHR implementation project?	The interviewees felt that the ACTION model focuses on engagement and collaboration amongst project teams. "User participation and user engagement are two things. If users truly participate, then the product will be better for it."
…benefit will ACTION have on improving end-user adoption by adding focus on workflow and integration?	Interviewees noted that end user adoption will improve with the focus on workflow and integration because they will truly understand the value of the new EHR, its capabilities and how it changes their work, and they will understand how they will work in the future. "I think this is the biggest factor (and biggest selling point). Integration is key." "Integrating IT into workflows is hard and managing change to help that is even harder. The ACTION model seems to do this well. A focus on workflows is very important."
…benefit will ACTION have on improving ability to gauge meaningful end-user adoption by applying adoption metrics?	They generally agreed that the model focuses on adoption more than regular project management so the robust capture of metrics should improve. "Adoption metrics are never met. There is a real need for understanding the gaps first, then applying a solution which can be measured."

Table 34 - AI Dream Questions

5.3.3 Design Questions

The positive, appreciative questions covered here will help the facilitator and SMEs to see what is required to accomplish the above resolutions, and how improvements could achieve the dream goals. Table 35 provides the Discovery questions used, and significant answers offered by the interviewees.

Upon review of the ACTION Change Management Framework, what…	
Questions	**Responses**
… did we specifically learn that could also be applied in the future ACTION solution design?	The interviewees offered that developing tools and metrics would be valuable in future as the model prepares for operational use. "Tools which help communications is critical component." "What's going to help is the accumulation of metrics. An independent evaluation using statistical methodology can demonstrate how the application of this model has made things better. It's all about "how" you apply ACTION

	and how you measure whether it is producing positive outcomes."
…will the design look like that will prove to be successful?	Most all agreed that the ACTION model was a considerable improvement, which addressed their concerns of past performance of other models, in particular ADKAR. They believed the design was robust in how it addressed both change management and project management. Using project metrics, their input may benefit both in their assessments. "Similar to yours and incrementally changed." "I think the success of this framework could be greatly impacted by figuring out how to scale and tailor it to meet the needs of the organization and figure out how to ensure real collaboration across the organization."
… tools should be designed in future iterations?	They felt that tools which aid in communication will be needed, focused on explaining how the model will be used, and how handoffs occur. "The user of too many tools or just using tools for the sake of using tools will have a negative impact. It could also provide the right tools at the right time to assist the person." "I think there are plenty of tools within ADKAR that are sufficient as long as you can figure out the minimum number needed."

Table 35 - AI Design Questions

5.3.4 Destiny Questions

These questions will assist the facilitator and SME by inquiring how the deployment may progress in a positive manner. Table 36 provides the Discovery questions used, and significant answers offered by the interviewees.

Upon review of the ACTION Change Management Framework, what…	
Questions	**Responses**
…is the best manner to evaluate the ACTION performance against the use of ADKAR?	All interviewees stated that a demonstration or pilot would be the best way to evaluate the performance of the model.
…is a way to evaluate its success in a future iteration in practice?	All interviewees agreed that testing and assessment of usability, with definition of how to measure effectiveness in implementation was critical to assessing its readiness for operational use.

Table 36 - AI Destiny Questions

5.4 Final Takeaways

Peer review and validation were integral to refining the change management framework, ensuring its efficacy. Subject matter experts contributed through appreciative inquiry, addressing key questions about the framework's effectiveness and actionable processes. The results of the appreciative inquiry, along with the complete logs of information gathered during the interview sessions, were documented in the data collection workbooks.

The general concepts of the change management approach have remained as proposed in the conceptual model. Much of the input collected was subjective, focusing on the design of the ACTION Change Management Framework rather than the need for change management or change theory itself. However, some interviewees provided supportive insights, emphasizing the need for a comprehensive and actionable change management framework, particularly to address the complex challenges of EHR implementation projects. They also praised the conceptual design and its novel application to the fields of project and change management.

5.4.1 Changes Made to the ACTION Change Management Framework

The value of the insights and collective experiences strengthened the framework and was applied throughout the development process. Each suggestion was carefully noted, and action was taken on all relevant recommendations received during the questionnaire survey and AI interview processes. Modifications were made to address any deficiencies or concerns raised during the sessions. The framework was then updated to incorporate the recommendations, ultimately resulting in the final solution: the ACTION Change Management Framework.

Some relevant suggestions helped to improve the framework design, and actions were taken on constructive recommendations. The flow of progression through the stages was solidified by the introduction of the 3 phases of initialization, execution, and integration.

Arranging each stage into phases of project work, better clarified the importance of the constructive aspects of each, as they build the foundation required for the next. The stages are sequential, and each supports the next, so that the necessary structure is formed. The resources engaged at each stage continue and mature throughout the activities and strengthen their confidence in achieving the goals and objectives of the implementation project.

Some changes were significant, altering objectives or activities within each phase, while others were more subtle, providing greater clarity on alignment during execution and participant roles. For example, the focus on resistance and agreement for a truly collaborative relationship is the primary objective of the Affirmation and Collaboration stages, and establishing this is critical for success. Gaining commitment from leaderships is accomplished in the approval of the project charter and assignment of resources, but attaining the organization's commitment is more difficult. In order to gain commitment from the individuals most affected by the change, it is very important to clearly define what the change is, and how it will affect them. Acknowledging the need for change, coupled with the outward display of leadership commitment, helps develop the organization's conditions for sustained effective collaboration.

The AI activities also helped to further elaborate on the necessary work and project artifacts that are beneficial to the Transformation and Implementation stages, as they prepare the organization for the changes expected. Suggestions pertaining to work activities, such as performing workflow analysis to gain current-state understanding, served to acknowledge that this work is crucial to the gap's identification. The interviewees stressed that the new EHR must fully support their needs, and where gaps may be evident, solutions to address them must be available prior to deployment.

Overall, the insights and collective experiences gathered during the AI exercises

strengthened the framework's design through envisioning and intangible simulation. Few participants felt that the improved framework should be discarded in favor of returning to the status quo. While most feedback was integrated into the framework, some comments identified areas needing further research.

5.4.2 Common Themes Between AI Interviews and Quantitative Surveys

Their prior experience with using the ADKAR® Model was instrumental in comparing it with the conceptual framework and was necessary it is performing the AI activities. Their perspectives offered during the AI sessions provided great insight, and by incorporating their free-text comments collected during the survey exercise helped correlate their individual survey responses, thus also serving to provide supporting information and further validating them.

Several trends were obvious. The perspectives of the interviewees were clearly delineated in the survey data reviewed. While not unexpected, it was significant enough to justify the distinction between change practitioners and change implementers. Therefore, separation into distinct categories was deemed prudent on account of discrete roles assigned, and activities performed. For example, change practitioners offered more support for the use of the ADKAR® Model tools than implementers, as they were more apt to use the tools to their benefits in overarching change activities at a localized level. While change implementers valued the tools use and utility, they did not actively engage at the end-user level to facilitate changes at the social level and maintained a professional distance as their oversight responsibilities and positions required.

Additionally, it was evident that different perspectives were employed by change implementers, practitioners, and project managers. Project managers were not as engaged with end users applying the ADKAR® Model; their use of the ADKAR® Model was general

awareness, monitoring of user requirements and needs across the differing types of stakeholders and attaining acceptance during pre-determined user acceptance testing events and other acceptance criteria of the project nature. Their perspectives were made known in their collective experiences and responses which remained approving of the ADKAR® Model as a tool but not providing much benefit in terms of understanding if the product was achieving intended benefits nor any value for its ability to aide in predicting project outcomes. Project managers generally felt that change management efforts did not soften end-users to accept projects as designed, rather the ADKAR® Model served little value-added purpose.

Another common theme demonstrated in the survey results was that generally the ADKAR® Model was not providing the benefits for which it was employed. The other roles, such as program managers, physician informaticists, nurse informaticists, and clinical informaticists, were largely not aware that the ADKAR® Model was a predominant change management framework encompassing change efforts regarding their EHRs and health IT implementation projects. Some were not aware that it was being used to help manage change, nor had any communications in such regard. It seems, from the survey results, that while the ADKAR® Model was being utilized at the project level and by various agents, end-users and actual clinical professionals were not receiving any value in its performance, nor cared. Even the simplest of communications were not effective, such as they were unaware of why the change was occurring and could not express what was going to happen to their current work, workflows, processes or business activities. The roles above held only a cursory understanding.

Additionally, there were clear trends in how the interviewees replied concerning how well the change has been implemented thus far. Generally, they felt that lessons learned were indeed collected but were conflicted as to if they were applied later on. The processes used to

express change status, and the project as a whole did not portray a singular effort; a combined approach across teams was not noted, and the numerous disconcerted efforts within siloes were not effective at achieving goals of the EHRs implementation project.

Also, while most did know a change effort was underway and felt that leadership at the top was supportive, most were conflicted that this did not result in greater support later on in the process. Change agents were identified, and communications attempts were being received, but the combined results of these efforts were not apparent. The enormity of the EHRs implementation, and significance of the impacts to business was not entirely understood, leaving many confused and uncertain of the success of the project as a whole. In general, most of the issues were predictable, and proved complex to address effectively.

5.4.3 Significant Findings

The interviewee's use of the ADKAR® Model was instrumental in investigating the proposed solution's potential, by focusing on the strengths of the proposed solution and understanding its weaknesses. Their perspectives offered great insight, and their free-text comments as included input as noted in the logs did also correlate closely to their individual survey responses as well, thus also serving to provide supporting information and further validating them.

Much of the information gathered through the use of static surveys and appreciative inquiry proved effective in improving the ACTION Change Management Framework. The issues and concerns, or areas of concurrence of gaps in support or primary focus necessity was all noted as deficiencies or significant contributions of value-added input where applicable and have informed the design of the ACTION Change Management Framework improvement.

Almost all participants concurred that the ADKAR® Model has not been successful at

managing change when they applied it to their health IT and EHR implementations projects. They felt that while its use was better than not attending to change at all, the ADKAR® Model had many demonstrated weaknesses. Primarily, it was cumbersome, and did not align to the other project teams well, so it was not as efficient as it should be. Secondly, while the concepts were sound in theory, its use in managing a complex project such as an EHR implementation, did not afford sufficient flexibility, and did not support a project's risk-based model. Support for end-users to accommodate business needs is important in an agile model, and a focus on workflow and integration was also deemed to be lacking.

To address RQ3, the AI exercise yielded valuable recommendations on improving the change management framework based upon the collective experiences or subject matter experts in the field. Additionally, some insights and inputs offered advice on future planned research objectives. Lastly, the AI activities of improving the conceptual framework helped ensure the ACTION Change Management Framework is better fit-for-purpose to support the complexities of an EHR implementation.

6 DISCUSSION

6.1 Research Contributions

The research indicates that a structured change management strategy that is aligned with project activities, including change-related planning and communication efforts, will best support the organization through its EHR implementation. It facilitates implementation at the operational level and extends the current research within the field of change management.

6.1.1 Quantitative Research Contributions

The survey tool effectively supported the evaluation of deficiencies or shortcomings in the current change models used by active health informaticists, health practitioners, change agents, and project and program managers. To achieve this, the survey items were organized into categories based on organizational change domains. Aligning the survey items into constructs was key to identifying relationships among the responses and helped in interpreting influencing factors against the dependent variable of attitude towards change. The quantitative analysis of the survey results, using multiple regression, provided insights into various strategic objectives to improve engagement effectiveness between change teams and stakeholder groups. Additionally, using a correlation matrix to assess each item's significance for inclusion or exclusion was essential for strengthening the model's evaluative capability.

The results demonstrate that an organization’s attitude toward change can be reliably predicted by its culture, leadership, and overall pessimism regarding change. This finding is especially relevant for organizations preparing to undergo a major transition. Organizations that proactively address the cultural and leadership factors influencing their openness to change are better positioned for a successful EHR implementation. Both elements are essential for

developing an effective stakeholder engagement strategy, which can reduce resistance and pessimism through a well-planned communications campaign.

Pessimism typically stems from a lack of confidence in the possibility of successful change and can have a profoundly negative impact on an organization's attitude toward change efforts. Recognizing this is critical to any change initiative. The research found that addressing pessimism is one of the most strategic investments, whether through material or non-material resources, as it offers the highest return relative to the effort invested. To foster positivity toward the change effort, communications must be open, using multi-modal approaches and varied venues for effectiveness. Communication between leadership, change agents, and end-users must also be relevant to daily work, enabling each person to envision how the change could benefit them. Efforts to understand individuals' concerns and address them early are vital to keeping the project focused on end-user adoption. Additionally, training tailored to specific roles is essential to cultivate a positive attitude toward navigating the change.

While it might be expected that knowledge of how to implement change would be critical to initiating a change effort, the data revealed that an understanding of change theory and processes had little impact. However, training on the new EHR system and awareness of its capabilities significantly supported the change process by boosting end-user confidence in its ability to replace the current EHR without losing functionality. Overall, the research shows that positive experiences with preparation and implementation activities fostered a healthy attitude toward change by promoting both the product itself and the organization's support and commitment to improving work capabilities, increasing efficiencies, and reducing staff burden.

The survey instrument proved highly effective in identifying root causes and determining strategic influences on an organization's attitude toward change, as well as assessing the impact

of various factors on positively shaping this attitude. Its predictive capability was enhanced by using an objective approach to evaluate the collected data, rather than relying on anecdotal input from respondents' experiences. This approach provided valuable insights and challenging assumptions about the most influential factors.

6.1.2 Qualitative Research Contributions

The use of appreciative inquiry provided substantial benefits, and its novel approach helped overcome challenges posed by the inability to directly evaluate the solution in a pilot study. This is, in itself, a significant contribution to the evaluation of frameworks. By applying the AI method to assess the conceptual framework's potential, the interviews generated positive suggestions and constructive outcomes.

Insights gleaned from the qualitative analysis offered numerous suggestions, which collectively helped to positively influence design considerations. These recommendations informed many decisions and actions on how best to improve the conceptual framework, with many being incorporated into its development process as the framework was refined and adjusted. The resultant design is very likely to meet the needs of the change team.

The scripting of the AI interview sessions was essential for maintaining constructive conversations and efficiently capturing feedback on how the conceptual framework would meet participants' needs. Following the scripted portion, the open dialogue provided additional value, helping clarify participants' perspectives and experiences. This approach effectively captured input from the SMEs and demonstrates how a dual approach can be beneficial.

As project performance metrics become increasingly prominent, applying change management to improve EHR implementation outcomes is a prudent approach. This strategy can positively impact various deliverables within monitoring and control processes. It was suggested

that success metrics be established for each project and linked to change efforts to evaluate effectiveness. Connecting these metrics to change management will enhance the development of meaningful measures by providing a baseline understanding of the origin of change needs. This approach can also help ensure that all project-related changes, including mitigations, follow a standardized process, making them measurable.

The final framework consists of core design elements, internal framework increments, and application-specific increments, ensuring a repeatable and adaptable approach. Additionally, aspects of change management theory and models were integrated with project management frameworks, aligning them across the project life cycle to create a cohesive and logical design. The result is a comprehensive methodology that shows how alignment with project management can yield significant benefits in achieving project goals and objectives.

6.2 Managerial Implications

The ACTION Change Management Framework is aligned with a multidisciplinary project management approach, enhancing a project manager's ability to predict positive outcomes in EHR implementation projects. It promotes collaboration to secure leadership and managerial commitment, increases stakeholder buy-in, and encourages end-user participation. This focus on effective collaboration among all stakeholders ensures that the project team is aware of concerns or gaps early, engages in solving these issues, and facilitates a seamless transition from the current state to the future state. By identifying unforeseen risks early, the project is better positioned to meet key implementation and deployment milestones on schedule.

6.2.1 Implications for Change Management Agents

The findings of this research have important implications for lending support to

individuals who may take on multiple roles throughout the project, with change management agents providing support and guidance at every stage of the process. The results have indicated that a change management framework must allow change management agents to perform multiple key functions. These include:

1. To conduct repeatable change analysis which informs an EHR implementation: The structure of the final framework establishes rigor yet remains flexible. It does provide the structure for a repeatable process. As tools are designed in future collaborative research and work, they will augment this ability.
2. To solve behavioral and process problems which impact successful adoption of the EHR: The strategies to help change practitioners solve behavioral and process problems will be further elaborated on in the future anticipated work efforts as well. While the mere application of a change theory to a framework does help ensure it is foremost in its application, strategies, and activity-sheets to be developed will help lay-person's ability to perform the functions as a change team member or change lead.
3. To identify gaps in capability and elevate for resolution: Gaps and issues resolution is another critical activity, one which is typically not performed or considered. It must be closely monitored with risk management.

Further analysis of the survey responses revealed that most respondents believe that they are employing change management best practices in some capacity, or at least perceive they are. However, the results suggest that the ADKAR® Model has not been as effective in practice. While respondents indicated they are using some aspects of the framework, they are not fully utilizing its capabilities. Many felt that current change management models, including the ADKAR® Model, often led to less standardization due to reliance on personal preferences.

The general consensus among respondents indicated that overall, the ADKAR® Model has been too rigid and unwieldy. Most expressed uncertainty regarding the flexibility of the ADKAR® Model's approach, which directly affects its perceived effectiveness; they reported low confidence in the implementation plan's success and minimal results. This lack of confidence may be attributed to delays in their EHR projects, poor product acceptance, and uncertainty surrounding field support.

The quantitative analysis also demonstrated that strategically dedicating resources and time to enhance an organization's readiness and acceptance of change, by reducing reluctance, resistance, and pessimism, can significantly improve its attitude toward a change project. Effective leadership and clear communication can further boost end-users' confidence that the change is both necessary and beneficial to the organization's performance. This approach is particularly valuable when engaging executive leadership, stakeholders, and shareholders who may not be fully committed but have influence over fiscal resources that can impact the project.

The research suggests that executive leadership commitment is crucial, and while high-level support and promotion are important, the real driving force behind successful change lies in middle management, where enforcement and demonstration are most evident. Conscientious collaboration between the change manager and project manager is essential for effectively managing stakeholder expectations. Management style at this level plays a significant role in influencing end-user acceptance. A culture of change must be fostered, starting with leadership commitment at the top and expanding through consistent action and support. This ensures that middle management and end-users adopt these attitudes until they become ingrained beliefs and norms. Activities during the affirmation and collaboration stages focus intently on this process.

However, the results indicate that leadership and management directly involved in

decision-making and executing change strategies at the field level felt the current approach was ineffective, even though those at the enterprise or program level believed their decisions were communicated effectively. This disconnect creates confusion and conflict, hindering collaborative engagement. Additionally, it introduces avoidable risks by failing to convey end-users' needs to key stakeholders, including project champions, change implementers, project managers, and development teams. The establishment of collaborative relationships during the collaboration stage and the performance of work in preparation for change during the transformation stage are focused on addressing these issues.

Moreover, the results further indicate that a framework focused on workflow and integration improves the ability to measure meaningful end-user adoption, ultimately enhancing adoption metrics and ensuring a smoother implementation. Workflow and process integration are often overlooked in EHR implementations, which is a significant factor in adoption challenges. This critical work begins in the implementation stage and continues beyond deployment into the integration phase as staff acclimate to the new EHR.

According to the survey results, respondents were not confident that resistance and doubt at the mid-tier management level had been fully addressed. The research suggests that change agents must ensure leadership commitment is secured, as their stewardship of change is essential, and a visible demonstration of commitment is critical. Additionally, for successful change adoption, a clear understanding of the change at all levels is necessary to foster genuine commitment, encourage active participation, and facilitate collaboration in design and mitigation efforts. The involvement of subject matter experts in solution design, along with their dedication to supporting proposed changes and advancing the project, is crucial. Without their active participation and commitment, achieving success will be exceedingly difficult. The affirmation

stage establishes this, collaboration demonstrates it, transformation leverages it, and the implementation stage is dedicated to supporting it through decisive action.

6.2.2 Implications for Healthcare Practitioners

The findings of this research have important implications for healthcare practitioners, as they are the ones most affected by the changes incurred. The research indicates that end-users, healthcare practitioners, and informaticists must understand their workflows and business processes, and how changes to these will impact operations. A change strategy must provide the means to perform this important healthcare informatic-led analysis.

The research further indicates that many gaps remain unknown until after the deployment of the new solution, at which point they have a significant impact on operations. Subject matter experts and healthcare practitioners must be forthcoming about how work is actually performed, especially if it departs from standard operating procedures. Understanding the 'as-is' current-state workflows and business processes is crucial, as it provides a basis for change during the 'to-be' future-state design sessions, as well as for articulating the gaps between the two states. Healthcare practitioners must acknowledge that gaps not addressed by the solution will need to be filled by other means, or they must accept the risks introduced.

The research also indicates that an impact assessment, along with an accompanying risk analysis and mitigations, could help ensure that the current-state vs. future-state workflow gap analysis remains actionable. Healthcare practitioners play key roles in ensuring all gaps are identified and adequately explained, so that a common understanding of how to address them can help resolve them, should they persist as requirements in the future-state.

According to the survey results, while most stakeholders feel that their concerns are being addressed, a significant level of uncertainty remains, preventing a more positive response.

Addressing this uncertainty is a primary motive of the affirmation stage.

The results suggest that messaging is not being shared consistently with those who should be involved, and whose input is critical to the effectiveness of collaborative efforts. A large percentage indicates they have good reason to be concerned and more engaged, but this has not translated into genuine collaborative engagement. The establishment of stakeholders' comity during the collaboration stage intends to alleviate this concern.

The results indicated that most healthcare practitioners were open to changing how they work, or they expressed positive or neutral attitudes toward flexibility and willingness to adapt. This suggests that, contrary to expectations, there was less pessimism and resistance than anticipated. However, it appears that as people present excuses, many are, in fact, resistant to changing their work habits, often based on speculative or unfounded assumptions. It suggests that a strategy to address resistance should be a major component of any change effort. Any change management approach must prioritize developing a strategy to address resistance and reluctance early on. Building trust is critical and can be easily lost, especially if it happens early in the project where its absence can derail the change initiative before it even begins.

It was also noted that not all roles have equal persistence in all projects. Some participate on the periphery, and some not at all, and it is borne out from the responses regarding the ADKAR® Model's effectiveness. The research suggests that not all roles are involved equally, and their unique perspectives determine their reality, which may not be represented when not fully understood. Work and activities during the transformation stage address this.

The results build on evidence that a multi-disciplinary approach to understanding healthcare practitioner's needs is required. Many projects employ business requirements elicitation from multi-disciplinary groups within an organization, but the differences in

perspectives within healthcare settings can confound this activity, and result in poorly documented and untestable business requirements. Continued focus on requirements and preparation and readiness for deployment are key during the implementation stage.

6.2.3 Implications for Healthcare Institutions

Hospital organizations allocate substantial professional and technical resources to EHR implementation projects. The research has shown that changing medical applications and EHRs can place significant strain on end-users and often disrupt operations and patient care. The results suggest that employing a change management strategy to minimize the impact on continuity of care and ensure a seamless transition can help prevent the negative effects of poorly managed, organizationally impactful changes resulting from EHR implementation.

As noted in the literature review and the quantitative analysis of the survey, change management applications are used to improve various aspects of organizations, however, simply applying a change management model to an EHR implementation does not guarantee success. The research indicates that a change strategy should focus on end-user adoption as its foremost goal to achieve intended benefits. Successful change adoption requires more than only generating positive reactions from business owners and end-users, it requires the solution to be completely integrated into an organization's operations. The data collected indicates that all aspects of change management are essential for achieving successful adoption.

Prior research has claimed that EHR systems are essential to provide the highest quality care while controlling costs. The implementation process can take time, but the benefits of EHRs far outweigh the costs. This research concludes that change management is critical to success, and staff buy-in is important to move forward, but leadership helps to shepherd the project towards a positive outcome. Most of the activities and work performed across the three phases of

the ACTION Change Management Framework supports the introduction of change management as its own practice within a project and can result in improved results.

6.2.4 Implications for Policy Makers

Research indicates that affirmation and commitment are key to successfully implementing policy, and especially crucial in large change efforts, such as an EHR implementation. Policy makers must ensure that leadership is supportive and understands the importance of championing it, to assure it achieves policy objectives. Leadership's ownership of the change effort, and complete endorsement also helps in gaining acceptance. Research also indicates that when all staff understand the necessity of the change, it will be more easily accepted. It is mainly all in the communication and explanation of why the change is necessary, and why now, particularly when implementing an EHR in response to external directives.

6.2.5 Implications for Technology Vendors

The research has demonstrated that effective change management practices within EHR implementation projects can improve the acceptance and adoption of a health IT product or EHR. Healthcare technology vendors typically employ change management methods in their implementation planning recommendations, but as research has shown, consistent success remains elusive. When applied inconsistently, change management, combined with project management, does not support improved predictability of project results. The ACTION Change Management Framework helps manage the inconsistencies and complexities associated with health IT projects, thereby increasing the likelihood of meeting expectations more reliably.

7 CONCLUSION

While it may be impossible to address every aspect of change, a thoughtful change management strategy can meet the needs of healthcare professionals while guiding them through the transition. Successfully navigating a complex EHR implementation project requires a focus on vision and leadership alignment, stakeholder engagement, change impact assessment and gap mitigation, organizational readiness, and effective communication. This approach ensures that a well-considered transition strategy and plan is effectuated; those most affected by the change are prepared for successful adoption and sustained usage after deployment.

Findings from the systematic literature review and surveys of the healthcare information technology community indicate that applying the ADKAR® Model in EHR implementations has yielded inconsistent results. It has often resulted in ineffective transitions from the current state to the future state and poor user adoption of health IT solutions. Significant inconsistencies and limited predictability persist in current implementation strategies.

A mixed-methods research approach was employed, utilizing a broad survey instrument to evaluate the experiences of healthcare informaticists, change practitioners, change agents, and project managers with current change methodologies. The survey was administered, and a quantitative analysis was conducted, providing better understanding of the factors which have significant effect on change efforts.

Drawing on the survey results and findings from an extensive literature review, a conceptual change management framework, ACTION, was developed. This initial conceptual change management framework was then critically evaluated using the appreciative inquiry method, and the insights gained were used to refine it into a more fit-for-purpose framework aimed at promoting successful outcomes in EHR implementation projects. The insights given

helped to elaborate the framework, by adding the three phases and project milestones, offering better congruences amongst the stages and activities. The framework maintains focus on the end goal of adoption by incorporating workflow changes, gaps resolution, and transition planning as key activities in its execution phase and gauging the effectiveness of those actions in the integration phase. The three-phased structure also acknowledges the importance of integrating change and project management, and incorporates a psychological approach, which helps to reign in complexity; the original conceptual framework did not articulate this well.

The mixed-methods research approach proved highly effective for evaluating this complex issue, and the qualitatively validated integrated survey instrument performed exceptionally well. The quantitative analysis provided valuable strategic insights into the application of limited resources, aimed at improving an organization's readiness for change. Combining the findings from both quantitative and qualitative analyses resulted in a significantly enhanced change management framework, promising to guide change agents toward greater consistency and predictability in EHR implementation projects.

Few existing framework models combine business needs with change models that address transition challenges, promote adoption tools, or include measurement activities; however, the ACTION Change Management Framework does. Communication is a concern across all disciplines and activities, and especially important in managing change. Ineffective communication has been the root of many project failures and is of significant concern in healthcare IT. Rigidity should be avoided if usability is to be promoted. Success in achieving intended benefits from products results from managing projects throughout their life cycle and evaluating and course-correcting as it progresses. This requires treating change management as a discipline rather than a mere activity, and the ACTION Change Management Framework

elevates it to a leading capacity.

The ACTION Change Management Framework addresses these issues by applying the psychology of change to thoughtfully aligning a multidisciplinary array of models, specifically purposed to improve EHR implementation projects. By providing a structured approach, it makes complex projects more manageable. This novel approach to change management in health IT implementation serves as a foundation for increasing attention in a field that has historically demonstrated poor performance. Some larger organizations, such as the VA, have complex local site and enterprise-level bureaucracies, which present significant management challenges. Adding to this complexity, organizations may use EHR transformation as an opportunity to standardize operations and workflows across their facilities.

Furthermore, implementations in such organizations must be carefully coordinated to manage the numerous dependencies involved, ensuring the transition is as seamless as possible for clinicians. These multifaceted challenges must be carefully considered when developing a change management strategy, whether for a local clinic, a hospital, or a large healthcare system. Effectively communicating leadership decisions and changes to management processes is a significant challenge, requiring dedicated change resources and a multi-pronged approach. The application of the ACTION Change Management Framework can serve as a valuable guide, but each aspect of how change agents operationalize it must be tailored to the unique needs of the project. A flexible approach is essential to address the communication requirements of the organization's size and complexity. This includes developing a strategy to effectively convey the need for change across diverse management tiers and stakeholder interests.

Though the research has provided significant direction for improving the change management process, it is not without limitations. The survey instrument has not been validated

for datasets from other disciplines or for the impact of other constructs. This highlights the need for further development of a more robust instrument with greater applicability. The use of a limited pool of local subjects also limits generalizability of findings.

It is acknowledged that generalizability of the findings is also limited by the nature of the organization used in this research. As a large, distributed, government entity that is subject to external dictates, its characteristics are bound to be different from other medical establishments, particularly those in the commercial sector. The sheer size, complex bureaucracies at the site and enterprise levels, rigid chains of command and decision making, make for very different deployments of EHR implementations. The need for coordinated rollout of the EHR software across a large number of sites also represents a significant difference, entailing a greater requirement of resources and close coordination across multiple sites and teams. Nonetheless, some barriers to change will be present in most, if not all, organizations. On account of its wide scope, the ACTION Change Management Framework should effectively identify change management concepts that will be applicable across multiple institutions and EHR implementations.

Clearly, the most significant limitation remains the inability to test the ACTION Change Management Framework in a real environment, which prompted the use of appreciative inquiry to achieve the specified goals and objectives. Without approval to evaluate a pilot, the framework could not be directly assessed against the outcomes of other change management models, including the ADKAR® Model.

In addition to conducting direct evaluations or pilot studies, it would be insightful to utilize ACTION Change Management Framework to assess past performance of EHR implementations across various organizational types and sizes. This approach could help serve as

an early warning signal for potential problems. This would facilitate organizations to anticipate issues based on factors including organizational complexity or common forms of resistance.

These insights could then be incorporated into risk management and strategic planning to proactively address challenges. Each situation will likely require different tactics to effectively influence factors that can enhance the success of the change process. For instance, the VA's implementation plan failed to allocate sufficient resources for workflow standardization and identifying capability gaps prior to deployment, which led to encumbered workflows.

The ACTION Change Management Framework was developed, but there remain the activity-based deliverables which are required to operationalize it. Strategic guidance on supportive management is a consideration to make it ready for piloted study. During the appreciative inquiry activities, many professionals in this field expressed a willingness to collaborate in further developing the framework components and tools. Future research may include many tools, techniques, and strategies necessary to enable a change team to utilize the ACTION Change Management Framework in practice.

Communications is a concern in all disciplines and project-related work activities. In future collaborative research and work efforts, the design and development of templates for stakeholder engagement with accompanying suggested frequencies for distribution will help to facilitate better effective communications.

Although project management consists of many planning activities and management tools, it is necessary to also develop them for managing change in much the same way. Tools which help maintain active alignment with project management, work and activity tracking, and a risk mitigations intake process for sharing with risk management professionals, will be designed and developed in future work efforts and collaborative research endeavors.

Management guidance may include the definition of an adoption metrics toolkit which can help guide EHR implementations. To better support the understanding of how well the solution meets the expectations of the end-users, a benefits realization metrics package will be developed which captures observed objective and perceived subjective measurements. The metrics will be captured in an initial baseline assessment 90 days prior to deployment and reassessed 90 days after entering production to determine if it is achieving intended benefits.

Targeted strategies for overcoming resistance will be researched, and documentation and guidance developed to address each potentiality which can be anticipated. As pessimism has been identified as a predominant negative influence on an organization's attitude towards a change effort, a campaign with helps to promote confidence in change endeavors will be its primary focus in future collaborative research and work efforts.

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APPENDIX A - ADKAR Model Usability & Effectiveness Survey

ADKAR Model Usability & Effectiveness Survey
The survey questions listed below were used to solicit input into how the ADKAR Model performed in EHR implementations. The survey targeted medical professionals and project management team members involved in implementing an electronic health record across various healthcare settings.
Change Management Implementation Approach
We are employing best practices and commonly used change management models (i.e., ADKAR)
The timeline for the change management activities is reasonable
The change management implementation approach leverages lessons learned
The change management implementation approach includes an understandable plan to deal with the technical challenges of the change
The change management implementation approach ensures the right systems are in place to support the change and is scalable to be appropriate
The change management implementation approach focus includes the all necessary aspects of our business, and the conceptual side of change
Mitigation to barriers that derail change been identified and included in the change management implementation approach
The change management implementation approach addresses stakeholder fears in tangible ways
The change management implementation schedule ensures change is delivered in accordance with EHR implementation plan
The change management implementation approach includes reasonable and accountable timelines
The process of implementation for the change is flexible and reactive
Project teams are informed on the consequence and consistency in regards to the change
Good ideas for change are hidden and used for personal agendas
Conflicts within the change are looked for and try to be solved
The change management training plan will yield adequate levels of change knowledge
There are predetermined guidelines for how the system implementation is to be managed and these are followed
Conflicts and mitigations within the implementation are planned for in the approach
Training is frequently given with supporting materials creating confidence with the system and the processes
The change management implementation approach reinforces the necessity of this change to key stakeholders
Communications
Management keeps us informed about the changes before making them
The reasons for change are communicated clearly
There is an appropriate level of transparency regarding changes in our organization
Managers been given the information to understand the reasons for the change
Stakeholders understand what they will gain and lose in this change
Stakeholders have been given reasons to be engaged with the change
Communications about the change are timely and relevant
Communication about the change is limited to only those directly concerned with the project

The reasons for change are unclear and there are different views of the goals of the implementation
Communications about the implementation are not given in advance and not relevant
Implementation communications are open and readily available
Culture
Ideas are openly communicated and encouraged within the implementation
Our culture is capable of coping with this change
The workplace culture is adaptable
Stakeholder's concerns about being heard are addressed
Stakeholders trust in the change management team
The organization has the right talent to make this change
Stakeholders have overcome their resistance to the change initiative
Management resistance and doubt been eliminated
Change projects create resistance which has to be broken
The direction of the implementation is influenced by resistance
Most changes in my organization in the past have been implemented successfully.
The organization rewards and celebrates successful change.
The organization takes care of employees that are adversely impacted by change.
The organization encourages and rewards employees that promote change and introduce new ideas.
I view my peers and work colleagues as willing and able to embrace change.
Leadership
My manager is supportive of the change.
The management team is on board and ready to support the change
The management team has committed to fully rolling up their sleeves and get fully involved
The project lead for the change is known and project champions aid the planning and implementation
Corporate Headquarters directs the implementation of the project/initiative without having real control
Implementation leadership is unclear, and champions are not utilized effectively
Key implementation personnel are chosen, put in charge, and left unchanged
Middle managers have been advocates for change in the past
Executives in this organization are visible and active change leaders and sponsors.
My management team is receptive to feedback and alternative ideas, and encourages open communication
Participation
Those concerned with the outcome of the change project are participating in change planning
Change agents are identified and active
Appropriate leadership is involved to address the people's side of change management
There is a passionate and engaged change team in place
User involvement begins well prior to the implementation
Achievements and progress in change management can be measured
Participants are held accountable for making or not making the change
Incentives are linked with the implementation to aid the process of change
Strategy
I believe organizational change is good for the business

Changes are aligned with our company's goals
A robust change management initiative is needed
The change management strategy addresses what should be stopped and what should be continued
The change management strategy address high-level goals and when they will be achieved
The change management strategy addresses why change is occurring prior to EHR deployment timelines
The change management strategy defines clear and reasonable strategic objectives
If warranted, our organization is willing to change the way we work
The company is considering our values while implementing changes
There's a real need for the changes outlined in the change plan
There are logical reasons for change which are visible and the goals are transparent
Change is expected without being linked to incentives
People Organizational Change Readiness
I am aware that the organization is implementing a new strategy
Our organization thinks ahead and plans for the future
I understand the changes proposed in the new strategy
I see the need for the changes outlined in the new strategy
At work, I know what is expected of me.
I want to change the way I work
I think the organization is implementing its plans in line with our values
I am passionate about the future of the organization.
I know where to find out more information about the changes which the organization is making
I feel supported during organizational change
I have access to the resources (e.g. material, equipment, technology) I need to do my job effectively
I have the training I need to do my job effectively.
I can see changes happening around me as a result of the new strategy
I feel the new structure lets me do my job better than before.
I am concerned I'll be expected to do my normal job and perform change management activities on my time or only as regular workload allows
I can easily incorporate the required educational and awareness activities for the project into my schedule
I know what is expected of me throughout the change management initiative
I am aware of what I need to change in my workflow when the project is launched
I feel I am well-trained in the new process/tool to successfully make the transition when the project is launched
I feel I am ready for the upcoming project's rollout date
I can fully explain how my workflows will change
I believe a clear vision has been developed and communicated regarding this project.
I understand the key objectives and desired outcome of this project.
I understand the impact this project will have for you and your responsibilities within the organization.
I understand why this project is taking place now.
My direct manager shows a clear understanding of their role and responsibility to make this effort a success.
My direct manager encourages me to get involved.

I feel listened to with regards to my views on this project.
I will actively support this project.
My peers speak positively about this project.
I am confident that this project will succeed.
I'm fully aware of how the changes will affect me.
I feel confident about delivering the change.
I have been told how the changes will affect my team and me.
I have a clear idea of what the change is
I know why the change is happening
I know how the change will be implemented
I'm aware that the managers are trying to make plans for the future.
I understand the changes projected in the new plan.
I believe in the future of the change project.
The change supports my professional career plans and goals.
The change will improve my financial position.
I do not view my job as at risk with this change.
I am confident that I can learn the new skills and behaviors to perform my new job.
The change will result in a more enjoyable work environment.
I'm sure this whole thing will blow over soon

APPENDIX B - Appreciative Inquiry Interview Script

Appreciative Inquiry Interview Script
The facilitator and SMEs investigate the proposed solution and focus on the strengths of the ACTION Change Management Framework. By using positive questions, together we will grow, develop, and become agile in our thinking of possible ways forward. The aim is to get a clear appreciation of what the core strengths are in the proposed solution, and understand its weaknesses. Upon review of the ACTION Change Management Framework, what…
…good ideas came to mind for you?
…gaps from the current use of ADKAR are closed by applying ACTION in an EHR implementation project?
…strengths are apparent to the ACTION in facilitation change during an EHR implementation?
…shortcomings in the ACTION solution design to you see, and what do you believe will correct them?
…do you believe could measure success using ACTION in implementing an EHR product?
The facilitator and SME will focus on future aspirations for the ACTION Change Management Framework, placing the emphasis on what will work well and improve the success of EHRs implementations. Upon review of the ACTION Change Management Framework, what…
…effect do you believe the use of ACTION will have on implemented EHR product meeting user's needs?
…effect do you believe the use of ACTION will have on implemented EHR product on project success?
…effect do you believe the use of ACTION will have on implemented EHR product on user adoption?
…benefit will ACTION have on improving a project managers' ability to predict positive EHR implementation project outcomes?
…benefit will ACTION have on gaining commitment and increasing stakeholder buy-in?
…benefit will ACTION have on improving user participation in the EHR implementation project?
…benefit will ACTION have on improving end-user adoption by adding focus on workflow and integration?
…benefit will ACTION have on improving ability to gauge meaningful end-user adoption by applying adoption metrics?
The positive, appreciative questions covered here will help the facilitator and SME to see what is required to accomplish the above resolutions, and how improvements could achieve the dream goals. Upon review of the ACTION Change Management Framework, what…
… did we specifically learn that could also be applied in the future ACTION solution design?
…will the design look like that will prove to be successful?
… tools should be designed in future iterations?
These questions will assist the facilitator and SME by inquiring how the deployment may progress. Upon review of the ACTION Change Management Framework, what…
…is the best manner to evaluate the ACTION performance against the use of ADKAR?
…is a way to evaluate its success in a future iteration in practice?