



UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

**Change Management Strategies for Seamless Adoption of Digital
Healthcare Solutions in the Healthcare Industry**

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Abstract

This thesis examined the integration of digital health technologies within healthcare systems, focusing on identifying and overcoming barriers through effective change management. Despite the potential of digital health technologies to enhance healthcare delivery and efficiency, their integration faces significant challenges, including resistance to change, technological adaptation issues, and regulatory complexities. By employing a qualitative research methodology and conducting semi-structured interviews with healthcare professionals from Germany and Sweden, this study explored these challenges in depth. The findings revealed that successful integration requires tailored change management strategies that address specific organizational, cultural and training-related barriers.

Informed by the findings and existing literature, this research proposed a comprehensive change management framework designed to guide healthcare organizations through the complexities of digital transformation. The framework starts by establishing a clear vision and strategy and involves end-user participation in tool selection, creation of cross-functional support teams, and awareness building. The process continues with resistance management, peer-to-peer and dynamic training, and concludes with ongoing support and sustained change efforts.

This framework not only facilitates the practical implementation of digital health solutions but also contributes significantly to the academic and practical understanding of change management in healthcare, offering a strategic pathway for organizations aiming to successfully adopt digital health technologies.

Keywords: change management, healthcare industry, digital health solutions, implementation barriers, technology integration, digital health integration, organizational change in healthcare.

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AI	Artificial Intelligence	7
DHI	Digital Health Intervention	23
DHT	Digital Health Technology	23
EHRs	Electronic Health Records	18
IT	Information Technology	22

1 Introduction

Integrating digital health solutions into healthcare systems transforms how medical services and patient care are delivered. This shift holds promise for improving health outcomes and operational efficiencies. However, integrating these technological innovations requires careful overcoming of barriers and effective use of facilitators (Whitelaw et al., 2021). Understanding these factors and developing an optimized change management strategy for the integration of digital tools is crucial for ensuring a smooth rollout and fully leveraging the potential benefits of digital health solutions.

1.1 Background

Digital health solutions, encompassing telemedicine and electronic health records, are revolutionizing healthcare delivery. This evolution, highlighted by Hwang and Christensen (2008), is steering healthcare towards greater efficiency and patient-centeredness. Kraus et al. (2021) further expand on this by noting the trend towards personalized and accessible healthcare through applications like remote monitoring and diagnostics driven by AI (Artificial Intelligence). These innovations are not just enhancements; they are essential shifts in healthcare delivery (Fortney et al., 2011).

While digital health technologies offer immense benefits, Kraus et al. (2021) caution about the accompanying challenges regarding the technologies' integration. These include the need for technological adaptation and the imperative of maintaining data security. These challenges underscore the complexity of integrating new technologies into existing healthcare frameworks.

The journey towards integrating digital health technologies into healthcare systems emphasizes the critical role of facilitators, such as stakeholder support and clear regulatory guidelines, as identified by Kraus et al. (2021). Yet, at the heart of this journey is a fundamental understanding: the adoption of technologies necessitates effective change management. This perspective recognizes that the successful implementation of new technologies within healthcare settings is as much about managing the change process as it is about the technologies themselves.

Effective change management involves preparing, supporting, and helping individuals, teams, and organizations in making organizational change. Given the complexities of healthcare systems and the resistance that often accompanies change, the role of change management is to ensure that the transition to digital tools is smooth, well-received, and effectively integrated into daily operations (Pereno & Eriksson, 2020).

1.2 Research Problem Statement

The integration of digital health technologies faces significant challenges that hinder the seamless adoption and optimal utilization of these innovations. Key barriers include resistance to change among healthcare professionals, technological adaptation issues, lack of sufficient training, and the need for clear regulatory frameworks (Borg et al., 2019). Additionally, the complexity of healthcare systems, characterized by diverse stakeholder interests and varying levels of technological readiness, further complicates the adoption of digital technologies as opposed to more traditional, non-digital approaches.

Pereno and Eriksson (2020) acknowledge that strategic change management can facilitate the adoption of digital health technologies, yet there is still a significant research gap in fully understanding and effectively applying change management principles to overcome existing barriers. While digital health technologies hold transformative potential for reshaping health systems - by promoting client-centered care, enabling new care models, and enhancing service access - the practical implementation of these technologies within existing healthcare frameworks often lags behind the pursuit of technological innovation, as noted by Mitchell and Kan (2019). This reveals a clear gap in how technological advances are integrated operationally within healthcare settings.

Therefore, this study aims to address the research problem centered on identifying and overcoming the barriers to the effective integration of digital health technologies into healthcare systems. The essence of this investigation lies in the development of a change management framework tailored to navigate and overcome the barriers hindering the successful adoption and utilization of digital health technologies in the healthcare sector.

1.3 Research Question and Purpose

To achieve our objective of creating a change management process for a more effective adoption of digital tools within the healthcare sector, it is important to identify and address the complexities and challenges involved in the implementation of these tools. Guiding this attempt are our overarching research questions:

1. What are the barriers to integrating digital health solutions within healthcare systems?
2. How can change management strategies be refined to address the challenges of integrating digital health technologies?

The ultimate objective of this study was to construct a change management process that bridges the gap between theoretical change management practices and those practices particularly

important to implementing digital tools in healthcare. This goal acknowledged a critical need: digital health innovations must not only be developed, but also effectively integrated and utilized to ultimately improve patient care and operational efficiency.

1.4 Scope and Limitations

As stated above, this study delves into the integration of digital health technologies within healthcare systems, aiming to overcome barriers through the lens of effective change management strategies. Focused on a qualitative analysis, it gathers the insights and experiences of healthcare professionals engaged in the practical application of these technologies. Our goal is to craft a change management framework that not only addresses these challenges but also aids in the seamless adoption and utilization of digital health innovations, such as telemedicine, electronic health records, and AI-driven diagnostics.

It is important to clarify that the focus of this work is not on the spread of digital health tools in general. It focuses on how the integration of already existing digital tools can be improved. This means that we are primarily concerned with the implementation process and not with the technological development of new digital tools. We want to understand and overcome the obstacles to their introduction. This approach ensures that we make the most of what is already available to us.

The research, while comprehensive, is subject to certain limitations. The generalizability of our findings may be constrained by the specific demographics and geographies of our interview partners, potentially limiting the applicability of our results across diverse healthcare settings or regions. Additionally, our focus rests on current digital health technologies, excluding the exploration of emerging technologies that might soon become important in healthcare delivery, which could affect the long-term relevance of our insights. The inherent subjectivity of qualitative research also poses a limitation, with the potential for researcher bias influencing the interpretation of data.

Furthermore, it is crucial to highlight that while ethical considerations and fairness are important in healthcare, they were not the focus of this thesis. Our research did not explore the implications of deploying various healthcare tools on distinct patient demographics, hence, ethical considerations were not directly addressed. Our sole focus was on enhancing the implementation of digital health tools via effective change management practices. Moreover, our attention was strictly on change management practices relevant to the deployment of digital tools, rather than encompassing change management for other hospital processes.

By acknowledging these limitations, we aim to provide a realistic interpretation of our findings, underscoring the importance of ongoing investigation in the face of the rapidly evolving digital health landscape. The study is positioned to offer valuable perspectives on navigating the complex process of digital health technology integration, setting a foundational base for future research and practical initiatives within the healthcare sector. This clear delimitation of our focus emphasizes our contribution to understanding the change management process for digital tools in healthcare, distinct from the broader operational processes within hospital settings.

2 Literature Review

In this section, we delve into the extensive body of literature surrounding change management, the healthcare sector, and digital solutions within that sector. Our literature review is systematically structured to provide a comprehensive understanding of the theoretical and practical aspects of change management.

2.1 Change Management

Change management is a fundamental process within organizations, aiming to renew their direction, structure, and capabilities to meet the ever-evolving needs of their customers, both external and internal. As described by By (2005), it is an ongoing effort essential for organizations to identify their future positioning and manage the transitions needed to reach their desired state. This dynamic is integral not only at an operational level but also at a strategic level, emphasizing change management's crucial role in organizational survival and competitiveness in today's fast-paced business environment.

According to Mintrom & Norman (2009), in organizational change, the interplay among distinct stakeholder groups is essential. At the forefront are change agents, who drive the needed transformations. These individuals, with a keen eye for future possibilities, use their skills and connections to advocate for change, often facing hurdles from those resistant to new directions. Supporting these change agents are the change supporters, a vital coalition that includes both those within the organization and external parties who stand to gain from the change. Their backing is essential for gaining wider acceptance and ensuring the smooth implementation of new strategies. On the other side are the change opponents, individuals wary of change due to fears of uncertainty, potential losses, or simply a preference for the status quo. Overcoming their resistance through dialogue and negotiation is a critical aspect of change management, requiring careful strategy to align diverse interests towards a common goal.

This dynamic between change agents, their supporters, and opponents underscores the complexity of managing organizational change, highlighting the need for engagement and leadership to navigate the challenges and realize the envisioned transformation.

2.1.1 Theoretical Foundations of Change Management

The following section delves into the theoretical fundamentals of change management, discussing various models and frameworks that can be applied in organizational settings, including healthcare. The models that this research will use as an initial foundation are Kurt Lewin's change management model, John Kotter's 8-step model, the ADKAR model, and

McKinsey's 7s model. These models are four of the most prevalent in this area, and, in certain aspects, build upon each other. Starting with Lewin's Model, the foundation is laid by presenting change as a three-step process. Building on this foundational concept, Kotter's 8-Step Model introduces a more detailed roadmap for change. Transitioning from organizational to individual focus, the ADKAR Model outlines the steps necessary for personal change - Awareness, Desire, Knowledge, Ability, and Reinforcement. Finally, the thesis integrates McKinsey's 7-S Model to provide a holistic perspective on change. This model diverges from the sequential approach of its predecessors by focusing on the alignment of seven interrelated elements: Strategy, Structure, Systems, Shared Values, Skills, Style, and Staff. Together, these models offer a multi-dimensional view of change management and form the basis for developing a specialized framework tailored to the unique challenges and dynamics of the healthcare sector.

2.1.1.1 Kurt Lewin's Change Management Model

Cummings et al. (2016) introduce Kurt Lewin's classic 3-step change management model (Figure 1), which views organizational change as a process of unfreezing, changing, and refreezing. Kurt Lewin's model was chosen for its simplicity and practical applicability in driving change within organizations. Kurt Lewin's Change Management model, with its three distinct stages, provides a structured and clear approach to understanding and implementing change.

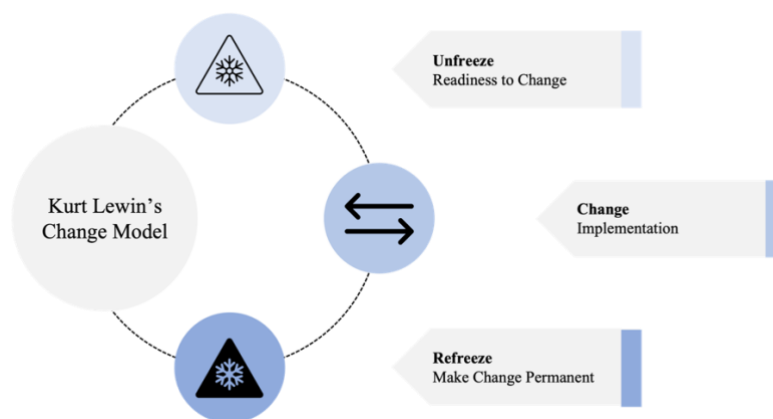


Figure 1: Kurt Lewin's Change Management Model

Three distinct stages provide a structured and clear approach in implementing change:

1. **Unfreezing:** The first phase is the preparation of the upcoming change, and includes challenging current beliefs, attitudes, values, and organizational behaviors. The essence of this stage is to create awareness of how the current state of the organization is preventing progress and thereby build a case for the necessity of change.

2. **Change:** In this stage, the actual transition, the change is implemented in the organization. Generally, this period is characterized by confusion, and new behaviors, operational processes, and perspectives form. The organization starts to move towards an altered type of existence which is directed by the initiative for change.
3. **Refreezing:** The third stage aims to solidify the changes made in the previous phase. The new behaviors, processes, and perspectives are integrated in the culture and daily operations. The purpose of this stage is to ensure that the changes are sustained over time and prevent the organization from returning to its previous state.

Lewin’s model highlights the importance of finalizing each stage to warrant a successful change management process. The model underscores a need for stability in an organization, before and after change initiatives (Cummings et al., 2016).

2.1.1.2 John Kotter’s 8-step Change Model

John Kotter’s 8-step Change Model is chosen for its comprehensive and strategic approach to facilitating organizational change, particularly enhancing and extending the foundational principles established by Lewin. This model is particularly well-suited to complex and large-scale change initiatives common in the healthcare sector, where it is crucial to engage and motivate a wide range of stakeholders through a series of well-defined steps (Kraus et al., 2021). Kotter’s model expands on Lewin’s three-stage framework by breaking down the change process into eight actionable steps, thus addressing some of Lewin’s model limitations. Specifically, Kotter emphasizes ongoing engagement throughout the change process, moving beyond Lewin’s focus on just the beginning (unfreezing) and end (refreezing) stages. Figure 2 illustrates Kotter’s 8-step Change Management model as discussed by Haas et al. (2019).

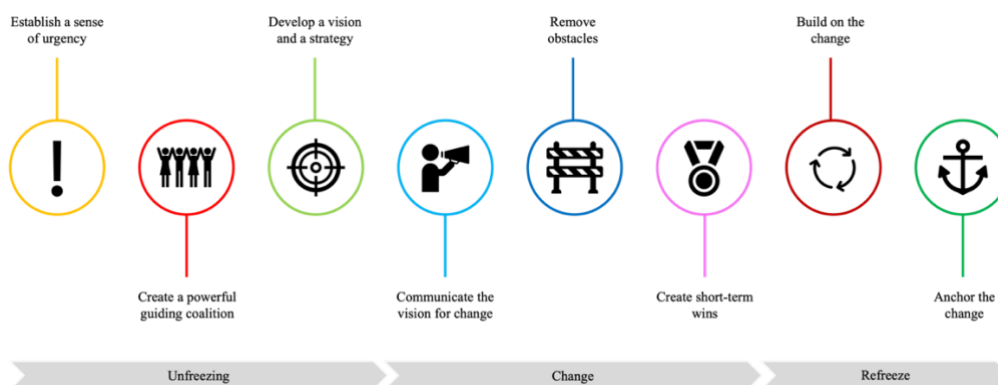


Figure 2: John Kotter’s 8-step Change Model

1. **Establish a sense of urgency:** To establish a sense of urgency within the organization, significant opportunities or potential crises are identified and communicated. The target of this step is to create a perception that change is a necessity and urgent.

2. **Create a powerful guiding coalition:** In this step, a group with great influence in the organization should be assembled. This group has a significant responsibility to support the collaborative effort to change.
3. **Develop a vision and a strategy:** A clearly defined vision aids in the understanding of why change is required, and the strategy describes how to enable the vision.
4. **Communicate the vision for change:** This phase involves a thorough attempt to communicate the change initiative, vision, and strategy. The organization should use all available communication paths to repeatedly communicate the message.
5. **Remove obstacles:** The target of this stage is to remove organizational barriers that prevent change, such as structures and subcultures that pose a threat to the change vision. The organization should also incentivize problem solving and risk-taking that are suitable to the change initiative.
6. **Create short-term wins:** During the change initiative, management should plan for short-term wins and make these visible for employees. The purpose of this stage is to provide evidence that change creates success, and that the effort is worthwhile.
7. **Build on the change:** In this phase, the momentum from the previous step should be utilized to change structures, systems, subcultures, and policies that do not correlate with the change initiative.
8. **Anchor the change:** To anchor the change, one should communicate connections between the new state of the organization and recent successes. Leaders should be incentivized to ensure that the change becomes a permanent part of the organization.

This model is sequential, which entails that each step is built on the previous one. It is crucial to thoroughly accomplish each step before continuing with the next, in order for the change to be successfully implemented and sustained (Haas et al., 2019).

2.1.1.3 The ADKAR Model

The ADKAR model, depicted in Figure 3, is also a sequential change management model and has an emphasis on the human perspective of change (Jaaron et al., 2022).

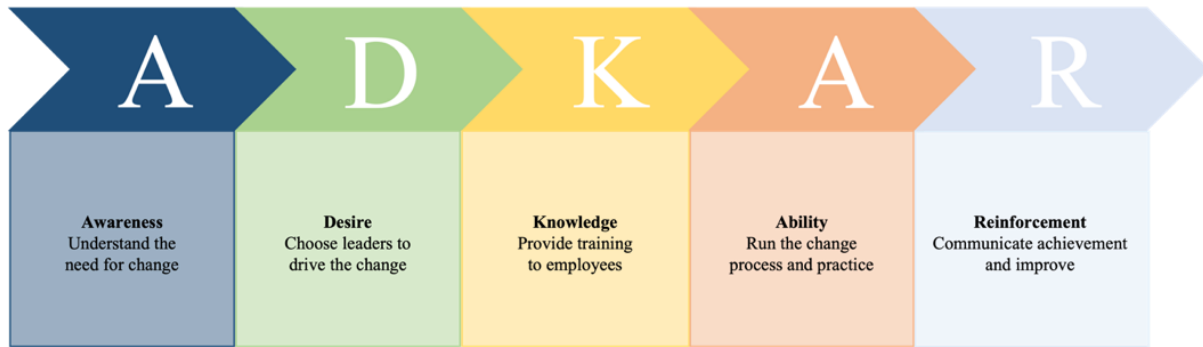


Figure 3: The ADKAR Model

The model entails the following five steps:

1. **Awareness:** In this phase the organization should create a comprehensive understanding of the need for change.
2. **Desire:** Implement effective leadership and incentivize support for the change process.
3. **Knowledge:** Acquire the knowledge on how change will occur practically. This includes educating employees to create preparation for change in the organization.
4. **Ability:** This stage involves using the knowledge from the previous phase to create action and implement the change initiative. Also, the organization must ensure that employees can effectively use the new processes that were prompted by the change.
5. **Reinforcement:** In this final phase, changes are reinforced to ensure that the initiative is sustained. This involves communicating achievements due to the change and ongoing training of employees (Jaaron et al., 2022).

2.1.1.4 McKinsey's 7-S Model

Jain and Kansal (2023) describe the 7S model developed by McKinsey. The model is a comprehensive tool for analyzing and improving the effectiveness of an organization. The model comprises seven elements: Strategy, structure, systems, shared values, skills, style, and staff. The elements are categorized into hard and soft factors, where shared values, skills, style, and staff are soft, and strategy, structure, and systems are hard factors.

Furthermore, the elements are interdependent and interconnected in several layers. For example, strategy is explained as the plan to create competitive advantages and aligns with structure, which is the organizational design, and systems, which is the operational processes. The soft elements are also connected, as the beliefs and attitudes that constitute the shared values influence skills, which are core organizational capabilities. Lastly, style, the leadership methodology, guides staff, which is the human capital. The model offers insights into change management through its holistic approach to organizational analysis (Jain & Kansal, 2023).

2.1.2 Implications: Towards a Healthcare-Specific Change-Management Model

The four primary change management models serve as a basis for understanding the diverse principles of managing change. Table 1 provides a synthesized overview of these models. This comparison highlights their phases or elements, focus areas, sequential nature, key emphases, typical applications, distinct features, and limitations to facilitate a comprehensive understanding of their similarities and differences.

Feature	Kurt Lewin's Model	Kotter's 8-Step Model	ADKAR Model	McKinsey's 7-S Model
Phases/Stages	3 (Unfreeze, Change, Refreeze)	8 Steps	5 Phases (Awareness, Desire, Knowledge, Ability, Reinforcement)	7 Elements (Strategy, Structure, Systems, Shared Values, Skills, Style, Staff)
Focus	Process of Change	Comprehensive Strategy for Change	Individual and Organizational Change	Organizational Effectiveness
Sequential Nature	Yes	Yes	Yes	No
Key Emphasis	Preparation, Transition, Consolidation	Engaging and Motivating Stakeholders	Individual Adoption and Competency	Alignment of Elements (Hard & Soft)
Application	General, with simplicity for practical application	Complex, Large-scale Initiatives	Human Perspective of Change	Holistic Organizational Analysis
Distinct Features	Simplicity and Clarity	Detailed Strategic Approach	Focus on Individual Change Process	Interdependence of Organizational Elements
Limitations	May oversimplify change	Requires rigorous adherence to steps	Focused more on individual than organizational structure	Complexity in balancing and aligning all 7 elements

Table 1: Change Management Model Synthesize

As we proceed, our next objective is to delve into the unique dynamics of the healthcare sector to find out its specific requirements and challenges of change management. Using insights from the sector and the best of the four foundational change management models, we aim to develop a new, practical framework tailored for healthcare organizations.

2.2 Healthcare Sector

The healthcare industry is one of the main foundations of society and affects almost everyone at some point in their lives. It can be described as the support system for society's well-being

(Danaher & Gallan, 2016). Health encompasses far more than the absence of illness; it represents a holistic state of physical, mental, and social well-being. It is recognized as a fundamental human right, surpassing differences in race, religion, political belief, or socioeconomic status. The well-being of individuals is not only crucial for personal fulfillment but also serves as a cornerstone for global peace and security (WHO, 2024). The following sections provide the main characteristics of the healthcare sector.

2.2.1 Stakeholders

The healthcare sector encompasses a wide range of services, institutions, and professionals dedicated to maintaining and improving health. According to Pereno and Eriksson (2020), at the core of the healthcare system are three principal stakeholders: health industries, health providers, and patients, each playing a pivotal role in the healthcare value chain (Figure 4).

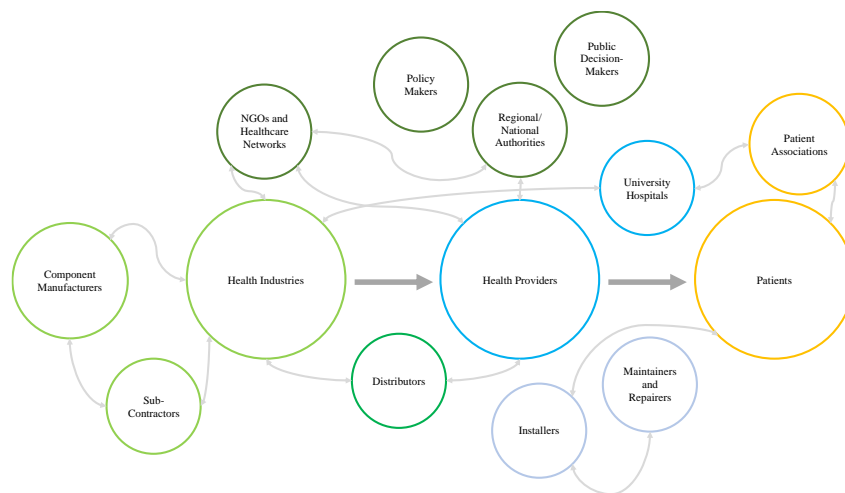


Figure 4: Stakeholders within the Healthcare Sector (Pereno & Eriksson, 2020)

The existing system often operates in silos, with limited communication among stakeholders and uneven distribution of decision-making authority. This imbalance poses challenges to integrating innovative healthcare products and services effectively and underscores the need for more integrated approaches to organizing and facilitating stakeholder interactions (Pereno & Eriksson, 2020).

2.2.2 Healthcare Services

In addition to several different stakeholders, the healthcare sector includes different health services aimed at the prevention, treatment, rehabilitation, and palliation of various health conditions, ensuring a holistic approach to meet the full spectrum of health needs throughout an individual's life (WHO, 2020). The main goals of healthcare, outlined by Tengland (2006), are to improve health-related quality of life and health-related welfare. Specifically, healthcare aims to directly influence individuals' health, while public health focuses on indirect measures,

such as environmental changes and education, to support health-related welfare. The execution of these goals relies on the collaborative efforts of care providers, such as hospitals, private practices, and public health services, as well as healthcare professionals, each contributing essential skills and expertise (Klinton, 2020; Viswanadham, 2021).

2.2.3 Regulatory Landscape

The sector's complexity is also amplified by stringent regulatory frameworks, which aim to ensure patient safety, privacy, and quality of care but also present challenges, especially to small and medium-sized enterprises due to increased compliance costs. The sector's adherence to these regulations underscores its commitment to maintaining high standards of care and fostering innovation within a highly regulated environment (Gutiérrez-Hernández & Abásolo-Alessón, 2021; Maresova et al., 2020).

2.2.4 Economics

Economic pressures, stemming from rising healthcare costs and the need for efficient resource allocation, are increased by demographic shifts like aging populations and an increased prevalence of chronic diseases. These pressures necessitate innovative funding and expenditure management strategies to ensure the sector's sustainability and the provision of high-quality care (Deloitte, 2015; Gutiérrez-Hernández & Abásolo-Alessón, 2021).

2.2.5 Synthesis: Distinguishing Characteristics of the Healthcare Sector

The healthcare sector stands out for its complex stakeholder interactions, stringent regulations, and the significant consequences of mistakes. Collaboration among patients, families, and professionals is essential, especially in implementing and adopting technology to tackle the demographic challenges and achieve long-term advancements (Batalden et al., 2016; Deloitte, 2015). Furthermore, innovating and adopting new technologies in healthcare requires a careful balance between improving patient care and meeting strict regulatory and ethical guidelines (Long et al., 2018). Therefore, while essential, the adoption of digital solutions in healthcare faces significant barriers that must be addressed for successful implementation.

2.3 Digital Solutions in Healthcare

Digital healthcare solutions represent the convergence of software and hardware technologies with healthcare delivery and management. It is a broad field that includes various technologies, including wearable devices, electronic health records (EHRs), telemedicine, mobile health applications, and artificial intelligence-driven diagnostic tools. These technologies bring unique interaction and data collection models, aiming to revolutionize healthcare delivery by enhancing efficiency, accessibility, and patient outcomes.

2.3.1 Digital Health Technologies

This subsection introduces the broad spectrum of digital health technologies. Following the framework proposed by Garg et al. (2018), digital health technologies can be classified into four main categories: connected devices, digital patient information collection, telehealth, and digital assistants.

Connected devices monitor health metrics and send data to healthcare providers, allowing for ongoing patient observation and immediate data analysis. Beyond tracking vital signs like blood sugar and blood pressure, these devices improve workflow efficiency (Garg et al., 2018). Wearables, for instance, reduce healthcare costs and enhance care by continuously monitoring vital signs, facilitating early health issue detection and minimizing hospital visits and major medical procedures (Pradhan et al., 2021).

Digital patient information collection concentrates on the techniques and tools employed for digitally gathering, storing, and managing patient health information. It includes EHRs, patient portals, and other systems that make collecting and accessing patient data easier (Garg et al., 2018). EHRs, for example, organize, maintain, and centralize medical data, representing a shift towards integrated and unified patient data management (Haas et al., 2011).

Telehealth, on the other hand, is about providing healthcare services and consultations through digital communication platforms. This technology has become increasingly vital in providing accessible care, particularly in rural or underserved areas (Garg et al., 2018). For example, during the COVID-19 pandemic, Tele-Rehabilitation emerged as a critical service, providing remote rehabilitation care through telecommunication (Ding et al., 2021).

Digital assistants, powered by AI, support decision-making, enhance patient communication, and automate tasks (Garg et al., 2018). Central to this innovation are machine learning and deep learning, AI branches that allow systems to learn and improve from data without being explicitly programmed (Saravi et al., 2022). However, deploying AI in healthcare faces hurdles such as data quality, privacy, security, and potential biases in AI systems. Therefore, developing AI tools underscores the importance of continuous education for healthcare professionals to ensure AI's effective use, complementing human expertise to address clinical needs effectively (Alowais et al., 2023).

2.3.2.2 Trends of the Digital Health Market

As depicted in Figure 5, the digital health market is supposed to grow significantly, with projections indicating an annual growth rate of 10.07 percent and a market value of around 275

billion USD by 2028. The market’s expansion is fueled by several factors, including the rising penetration of smartphones, enhanced internet connectivity, and an ongoing effort to curb healthcare costs. Additionally, governmental support for healthcare digitization and the impacts of the COVID-19 pandemic have further accelerated this growth (Statista Market Insights, 2023).

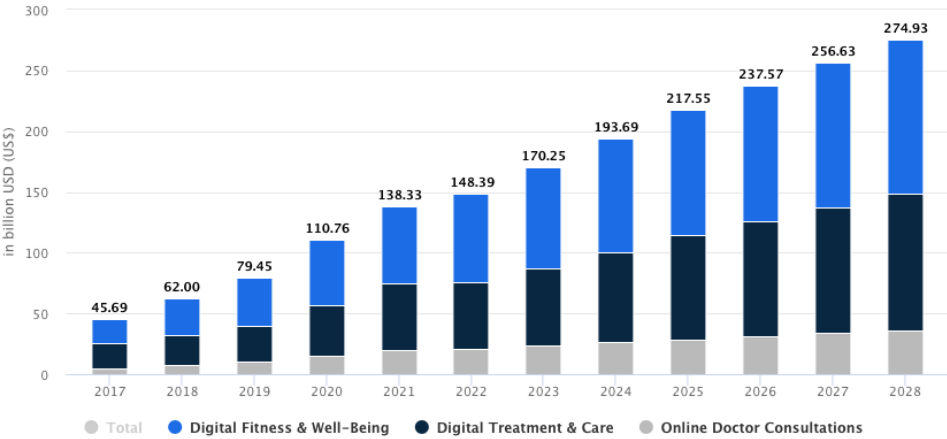


Figure 5: Worldwide Digital Health Market Growth (Statista Market Insights, 2023)

Vicente’s et al. (2020) vision for digital healthcare in 2030 emphasizes a significant shift towards personalized medicine, where treatments and preventive strategies are tailored to individual characteristics. This approach will be supported by data-driven methodologies, utilizing advanced analytics and AI for precise health predictions. Healthcare systems will undergo reforms to integrate these advancements, ensuring the infrastructure supports personalized care. Collaborations across sectors will foster innovation, while the empowerment of both patients and healthcare professionals will be crucial in adapting to these changes.

2.3.3 Advantages of Digital Healthcare Solutions

This chapter delves into the advantages of digital health solutions. By examining how digital solutions positively influence healthcare delivery, patient engagement, and medical outcomes, we establish a foundational understanding of their current value. The advantages discussed provide the reasoning for the necessity for future digital health implementation.

2.3.3.1 Enhanced Accessibility and Convenience

Telemedicine plays a crucial role in delivering medical services remotely, effectively eliminating geographical constraints. This aspect of digital health is particularly beneficial for individuals in remote or underserved areas and for those facing mobility challenges. The use of telemedicine platforms enables these patients to receive medical consultations without the need for physical travel. This not only saves time and costs associated with travel but also ensures continuous and immediate access to healthcare services (Imison et al., 2016). For instance,

during the COVID-19 pandemic, telemedicine was employed as a crucial tool for patient management. It allowed patients to receive routine care at home, thus avoiding the spread of infections in overcrowded emergency or waiting rooms (Fagherazzi et al., 2020).

2.3.3.2 Cost Reduction and Efficiency

Implementing digital health technologies can lead to significant cost savings for healthcare systems, primarily through the reduction of administrative burdens and the optimization of resource utilization (Aapro et al., 2020). One notable example of the efficacy of digital health platforms is seen in those deployed by Kaiser Permanente, showcasing significant enhancements in patient care efficiency. Their system facilitated a reduction in hospital visits for patients with multiple chronic diseases by 50 to 90 percent, and enabled physicians to consult with four to ten times more patients. Such efficiencies are achieved by providing healthcare professionals with real-time access to patient information, thus reducing waste in the system, such as the duplication of tests. This ensures that healthcare services are delivered at the right time and place, without being overdone (Imison et al., 2016). Gentili et al. (2022) highlighted the cost-effectiveness of platforms like videoconferencing, text messaging, and mobile systems. These interventions showed a favorable balance between cost and health outcomes, indicating their potential as cost-saving healthcare solutions.

2.3.3.3 Enhanced Diagnostic Accuracy

The advancement of digital tools, particularly AI-driven image analysis and diagnostic algorithms, has significantly enhanced the accuracy of diagnoses in healthcare. These tools are instrumental in identifying patterns and anomalies that might not be detected by the human eye, thereby improving the precision of diagnostic processes. For instance, AI applications, like Page.AI, have been crafted to improve tumor classification accuracy by matching unknown tumor morphologies to known diagnoses in a database. Such tools refine the diagnostic process by providing more accurate tumor classification, which is crucial for effective treatment planning (Jahn, 2020).

2.3.3.4 Real-Time Monitoring and Management

Digital health solutions, particularly wearable devices and mobile health apps, enable real-time monitoring of patient health parameters, playing a critical role in the proactive management of chronic conditions and facilitating early intervention in acute events. These technologies have empowered patients to gain more control over their healthcare. This trend is becoming increasingly popular with the availability of affordable consumer technology marking a shift towards a more proactive healthcare model (Awad et al., 2021).

Furthermore, data recorded by remote sensors tend to be more representative of a patient's typical physiological condition, as measurements taken in a patient's own environment are less likely to be influenced by factors like white coat syndrome. This accuracy in data collection is vital for ensuring effective and timely medical interventions (Awad et al., 2021).

2.3.3.5 Personalized Healthcare

Digital health solutions are also reshaping personalized healthcare. Research by Aapro et al. (2020) and Qi et al. (2017) shows that solutions offering customized medical evaluations and guidance enable personalized self-management for patients, thereby significantly enhancing patient autonomy. Furthermore, Odone et al. (2019) highlight a web-based application that includes a recommendation system, prompting patients to contact their healthcare team as needed. This aspect of the application facilitates timely support and closely aligns healthcare interventions with each patient's unique needs and conditions, thereby ensuring that the care provided is both personalized and efficacious. Overall, adopting digital health solutions has shown how technology can be leveraged to enhance healthcare delivery and response. However, the adoption and integration of these technologies are not straightforward and involve complex challenges related to technology, organization, culture, and policy that will be discussed in the following chapter (Van Velthoven & Cordon, 2019).

2.3.4 Barriers to Digital Health Integration

The following sections should provide a detailed overview of the barriers to integrating digital technologies within the healthcare sector. These barriers range from technical issues to organizational and cultural hurdles.

2.3.4.1 Interoperability

The integration of digital health solutions is significantly hindered by interoperability challenges. Lehne et al. (2019) underscore the critical importance of interoperability within healthcare, essential for leveraging advanced technologies like AI. It enables various tools to access and share data across different systems, a lack of which limits the improvement in health outcomes and operational efficiencies. Torab-Miandoab et al. (2023) further highlight the practical difficulties caused by the fragmentation of health IT (Information Technology) systems, noting the common issue of multiple incompatible systems within a single healthcare facility. This fragmentation leads to inefficiencies, hindering the seamless integration and sharing of data, and negatively affecting patient care and healthcare services efficiency. This situation underscores the need for more unified and standardized digital health solutions to facilitate smoother integration into existing healthcare systems.

2.3.4.2 Data Security

Patient confidentiality and data protection have a strong and justified tradition in the healthcare industry. This level of security is rarely seen in other sectors. Fatima & Colomo-Palacios (2018) emphasize the protection of patient data as a major barrier to adopting digital health technologies. Simpson et al. (2021) further identify trust, identity, privacy, and security as significant barriers to sharing patient-generated health data, with these concerns often rooted in past negative experiences. Angst & Agarwal (2009) discuss the ethical and legal challenges in making patient information digital, especially with laws like HIPAA. They suggest that despite these privacy concerns, individuals might be persuaded to accept digital health technologies if the benefits and safeguards are effectively communicated, underscoring the importance of proper messaging and the role of persuasion.

2.3.4.3 AI-Based Medical Decision-Making and Data Quality

Significant obstacles also stem from possible biases in AI algorithms and the lack of trust in AI-based decision-making processes. Although AI methods in medicine have produced some remarkable real-world results, their efficacy is constrained by their incapacity to "explain" the decisions they make understandably. It is challenging and frequently impossible to examine the inner workings of models to determine how and why they arrived at a particular conclusion. This could be problematic for medical applications, where there is a specific need for transparent, reliable, interpretable, and explainable methods, in addition to being high-performing (Kelly et al., 2019).

Compounding these challenges are issues related to the heterogeneity and quality of data. The diversity in healthcare data, which includes various formats, standards, and sources, can lead to inconsistent AI performance. The diversity in medical data arises not only from various modalities and characteristics but also from factors like acquisition differences, the brand of medical devices, or local demographics (Begoli et al., 2019, Rieke et al., 2020).

2.3.4.4 Rapid Evolution of the Digital Landscape

According to Murray et al. (2016), another significant barrier in the effective implementation of digital health interventions (DHIs) is the ongoing evolution of the digital landscape. This dynamic nature of technology presents a unique challenge, as it necessitates continuous adaptation and updating of DHIs to maintain their relevance and functionality. The pace at which digital technologies evolve can render DHIs obsolete or less effective within a short time frame. For instance, a mobile application designed to promote physical activity may become outdated or incompatible with newer operating systems within a few years of its development.

This rapid technological change not only impacts the immediate utility of DHIs but also complicates the accumulation of a reliable and relevant knowledge base. As DHIs need to be constantly updated to align with the latest technological advancements, the evidence gathered from earlier evaluations may have limited applicability for guiding current decisions about DHIs.

2.3.4.5 Organizational Structure and Culture

The adoption of DHTs in healthcare settings faces multifaceted organizational barriers, deeply intertwined with the structure and culture of healthcare organizations. Lluch (2011) notes that the inherent rigidity in healthcare hierarchies and departmental silos often hinders necessary collaboration and coordination for integrating technologies like EHRs. Such structural rigidity leads to resistance, primarily due to fears of disrupted workflows and increased workload, reflecting a culture resistant to change and preferring traditional methods over innovative digital solutions.

Addressing this resistance demands a cultural transformation towards digital readiness, as emphasized by Biesdorf et al. (2018). This transformation involves fostering an environment where change and innovation are pursued and embraced at all organizational levels, from senior management to operational staff. Creating a culture that is conducive to digital adoption is key to overcoming traditional resistance and is critical for the successful integration of DHTs.

Psychological resistance plays another significant role in the adoption of DHTs. Borges Do Nascimento et al. (2023) highlight the impact of fears such as job insecurity, particularly with the introduction of advanced technologies like AI-based diagnostic tools. This kind of psychological barrier can manifest as substantial resistance, which needs to be addressed through strategic communication and reassurance about the evolving nature of healthcare roles.

Boonstra & Broekhuis (2010) further underscore the importance of effective change management in the adoption process. Ensuring that the organization is not only technologically prepared but also willing to adapt its processes and practices is crucial. Aligning DHTs with the organization's broader goals and workflows and managing the transition in a way that minimizes disruption, is essential for maximizing acceptance and buy-in from all stakeholders.

2.3.4.6 Task Alignment and Workflow Integration

Task alignment with new technologies is another significant barrier. Lluch (2011) highlights that integrating DHTs like telemedicine platforms requires healthcare professionals to alter their daily routines, which can be met with resistance. An instance of this is seen in the reluctance to

adopt telehealth consultations, as it alters the traditional face-to-face interaction model, demanding new protocols and practices.

Complementing this, Whitelaw et al. (2021) identify that a prominent issue is also the initial increased workload for clinicians resulting from the adoption of DHTs. This increased workload is often due to the time and effort required to learn and adapt to new systems. For instance, integrating a digital monitoring tool into the daily workflow may require data entry and management tasks that were not previously part of a clinician's routine.

2.3.4.7 Training and Skill Development

A major obstacle identified by Borges Do Nascimento et al. (2023) is the lack of adequate training. For instance, the introduction of complex health informatics systems requires specialized training, which is often not provided sufficiently, leading to underutilization or incorrect use of these systems. This gap in skills and knowledge can result in apprehension and misuse of technology, hindering its effectiveness.

Further emphasizing this point, Budd et al. (2020) identified the scarcity of training programs as a significant clinician-level barrier in the adoption of DHTs. Without proper training, healthcare professionals may struggle to understand the full capabilities of these tools or how to interpret the data accurately, which can lead to errors or misinformed clinical decisions. This lack of training not only limits the potential benefits of innovative technologies but also contributes to resistance among clinicians, who might feel overwhelmed or unprepared to integrate these new tools into their practice.

2.3.4.8 Regulatory Barriers

The digital health sector is governed by many regulations, such as the Medical Device Regulation. These frameworks are designed to maintain high standards of safety and quality. However, as Schlieter et al. (2022) highlight, these regulations can present macro-level barriers, particularly impacting the scale-up of digital health innovations. The complexity and resource intensity required to navigate these regulatory waters are disproportionately difficult for small and medium-sized healthcare institutions, often stifling innovation and delaying the introduction of new technologies to the market. Baines et al. (2023) underscore the tension between the aims of regulation and the realities of technological innovation. The high regulatory barriers established for market entry, while crucial for safety, may inhibit the development of groundbreaking digital health solutions. This contradiction between ensuring safety and promoting innovation presents a significant challenge for the sector.

2.4 Change Management in Healthcare

After reviewing the main barriers of digital health tool implementation, this subsection is dedicated to exploring how change management practices are specifically applied within the healthcare sector to overcome these barriers. We show case studies and examples of successful change management, particularly in the context of digital health integration.

2.4.1 Selection and Strategic Alignment of Digital Health Tools

Marwaha et al. (2022) highlight several crucial change management practices for the successful implementation of digital health tools, such as a thorough selection process to ensure that the digital tool aligns with the needs and objectives of the organization. Also, it is fundamental to consider the return on investment as well as the clinical value of the tools, to make sure that the tool contributes to an effective healthcare delivery.

2.4.2 Organizational Support

Internal supporters, who provide organizational support for the implementation, are also highlighted as crucial in driving the successful integration of the tools. Furthermore, the digital tools should align with the institutional priorities of the healthcare providers, which ensures that the tools are integrated through an approach suitable to the organizational goals. The article also analyses the different resources required to successfully implement digital health tools, including the financial investment, human capital, as well as the technological infrastructure. The tools' adoption and integration requires a multifaceted approach to be successful, and therefore underscores the importance of examining these various elements before and during the implementation phase (Marwaha et al., 2022).

2.4.3 The Role of Education, Information, and Engagement

Hellström and Ekstedt (2018) underscore the complexities for healthcare professionals to adapt to new digital tools as it often demands new processes and can be perceived as disruptive to the daily work. Therefore, the success of the implementation phase is dependent on whether an organization addresses issues such as education, information, and the practical needs of professionals.

Nilsen et al. (2020) identify three key characteristics that, from the perspective of healthcare workers, contribute to successful organizational changes. The first is the opportunity for professionals to influence the change initiative, the second is being prepared beforehand, and lastly that professionals must value the change. The article highlights that changes either initiated by healthcare professionals or include their active participation are more likely to be successful and should encounter less resistance from the workforce. Furthermore, adequate

communication and preparation before changes are fundamental to enabling success as this ensures workers adapt more appropriately. Organizational changes that include significant perceived benefits for both patients and staff and align with the core values of the workers are more accepted. The essence of the article is the conclusion that organizational changes within the healthcare sector are more successful if the professionals are thoroughly included in both preparation and implementation of the initiative (Nilsen et al., 2020).

Complementary, Cao et al. (2004) emphasize change management methods to consider the interconnection between different parts of an organization. Change methods should embrace diversity and communication within organizations, and thereby be more holistic and inclusive to staff in all levels. The approach underscores the significance of involving a broad range of stakeholders in the change initiative as a tool to guarantee that diverse perspectives are considered.

2.4.4 Structured Approaches to Digital Health Integration

Lawrence and Frater (2017) analyzed a case in which a traditional screening technique was replaced by more advanced digital screening tools. The ADKAR model was pivotal for this case as it guided the transition, especially regarding the human aspects of the change initiative. Awareness, desire, knowledge, ability, and reinforcement were all key in enabling a smooth transition process. To further ensure that the change was successful, staff members were involved to comprehend their concerns and provide adequate information and support. The article concludes the importance of a structured approach in managing change in the healthcare sector, primarily due to the inherent complexities that characterize the industry.

Isett et al. (2013) analyzed a transformative change initiative within Medicaid in New York City. They highlight the importance of a culture that embraces continuous improvement and cooperation. They underscore the significance of a supporting leadership style, primarily through clear communication and adequate support, in implementing and sustaining the changes. The value of feedback loops resulting in iterative developments is also critical. These practical methods resulted in improved efficiency in operations and thereby enhanced quality of delivery (Isett et al., 2013).

2.5 Key Implications from the Literature Review

The key findings from our literature review offer a preliminary synthesis that integrates the foundational principles from four change management models - Kurt Lewin's Model, John Kotter's Model, the ADKAR Model, and McKinsey's 7-S Model - with insights into the distinct characteristics of the healthcare sector, the obstacles to digital tool integration, and lessons

regarding change management within healthcare. This synthesis provides a solid theoretical foundation for our proposed change management framework, designed to facilitate the adoption of digital tools in healthcare settings. It is crucial to recognize that these initial insights are the starting point for our framework, which will be further developed and nuanced through upcoming discussions with healthcare professionals and stakeholders.

Table 3 synthesizes the entire literature review by matching identified barriers and challenges within the healthcare sector to specific change management practices derived from various change management models. This table demonstrates how each practice can be strategically applied to address the unique challenges of integrating digital technologies in healthcare.

Critical Consideration	Healthcare Sector Challenges and Barriers	Change Management Model Components	Why It Is Important
Stakeholder Engagement and Communication	Complex stakeholder dynamics with diverse interests	Kotter’s "Forming a Strategic Vision"; ADKAR’s "Awareness"	Essential for ensuring all parties are informed, involved, and supportive of the change, fostering collaboration.
Customized Education and Training	Requirement for new competencies due to integration of digital tools	ADKAR’s "Knowledge" and "Ability"; McKinsey’s "Skills"	Addresses the skills gap, ensuring healthcare professionals can effectively utilize digital tools.
Interoperability and Integration with Existing Systems	Challenges in aligning new tools with existing IT infrastructure	Kotter’s "Removing Obstacles", McKinsey’s "Systems".	Facilitates efficient use of new technologies rather than disrupting existing workflows.
Regulatory Compliance and Data Security	Adhering to regulations and ensuring patient safety and privacy	Kotter’s "Enabling Action by Removing Barriers";	Maintains legal and ethical standards, safeguarding patient data and building trust in digital transitions.
Continuous Improvement	The dynamic nature and rapid evolution of digital solutions	Lewin’s "Refreezing" phase with an emphasis on continuous improvement	Ensures the change remains effective, adapting to new advancements and feedback.

Table 2: Strategies for Digital Adoption in Healthcare - Matching Change Management Models to Sector Needs

These steps, grounded in the insights from our literature review, highlight the critical considerations for successfully managing the adoption of digital health tools. They reflect the sector’s unique challenges, including its complex stakeholder dynamics, the critical nature of its operations, the stringent regulatory environment, and the need for continuous improvement.

To further this understanding and to create a comprehensive change management model for a facilitated adoption of digital health technologies, conducting interviews with healthcare professionals and managers is crucial. These interviews are intended to provide practical insights and first-hand experiences about the real-world application of theoretical change management models in the integration of digital health solutions. By engaging with these professionals, we aim to uncover the specific challenges encountered when introducing new digital technologies into existing systems, along with the strategies used to overcome these challenges.

3 Methodology

This chapter outlines the research strategy and design employed in this study, aimed at exploring the integration of digital health technologies in healthcare settings. A comprehensive literature review set the foundation for this research, providing a broad understanding of the topic. The methodology adopted is a cross-sectional research design, which is particularly well-suited for examining diverse aspects of technology integration in various healthcare environments.

3.1 Qualitative Research Strategy

Our research focuses on improving the integration of digital health solutions within healthcare systems. To achieve this, we employ a qualitative research method, which is important for gaining an understanding of the complex human and organizational dynamics that influence both the barriers and facilitators of this integration (Bryman et al., 2022). By exploring the detailed insights and experiences of healthcare workers and leaders who are directly engaged with the implementation of digital technologies in their environments, we can more clearly identify and understand the obstacles and supports affecting the use of digital health technologies. This approach allows us to capture the nuanced opinions and experiences essential for developing effective integration strategies.

Qualitative research gives us a detailed view but comes with its challenges. One main issue is figuring out how to clearly identify and analyze the factors involved in integrating digital health solutions, especially since these factors can be complex and intertwined with each other and the environment they exist in. To address these difficulties, we are using a variety of strategies. This includes choosing a diverse group of people to talk to, comparing different pieces of information to find common themes, and constantly checking our own biases to ensure our findings are reliable and based on the data.

Our research method primarily utilizes a deductive qualitative analysis approach. We began by reviewing existing findings in the healthcare sector and examining established change management strategies. This initial review informed the development of our interview guide, which was then used to gather and analyze data. Through this approach, we aim to identify themes and patterns that corroborate or refine our understanding of digital health integration, allowing us to better explain how its implementation can be improved within healthcare settings (Bryman et al., 2022).

Our decision to take this research path was strengthened by an initial review of existing

literature which showed us that there's a gap in the research. While there is a lot of discussion about the challenges and opportunities of digital health, there is not enough focus on how to turn these insights into practical strategies for managing change. This gap pointed out the need for our study to not just identify the barriers in digital health integration but also to develop strategies that can effectively tackle these issues.

We are approaching our research with an exploratory mindset, meaning we are open to discovering new information and insights as we go (Bryman et al., 2022). This approach is essential for digging into the less explored areas of digital health integration and addressing the gaps we have identified in previous research. It keeps our study flexible and adaptive to new findings, ensuring we stay relevant to the real-life application of digital health technologies.

Building on the rich insights and nuanced understanding gained through our qualitative research, grounded theory, and exploratory approach, our study is poised to make a significant contribution to the field of digital health integration. It allows us to create a tailored change management process specifically designed for the healthcare sector's unique challenges in digital transformation. Our change management process aims to be both practical and adaptable, capable of guiding healthcare organizations through the complexities of digital integration with a clear understanding of the barriers and enablers at play.

3.2 Cross-Sectional Research Design

Our research explores the integration of digital health solutions across various healthcare environments, such as hospitals and private practices, using a cross-sectional design. This method is effective for capturing data from multiple sources at a single point in time, providing a snapshot of digital technology adoption within these settings. Unlike longitudinal studies that analyze changes over time, a cross-sectional study allows for the examination of current conditions across different contexts simultaneously (Bryman et al., 2022). This is especially advantageous in the dynamic field of digital health, where technologies and operational practices are continuously evolving.

The capacity of our methodology to explore a broad spectrum of factors - whether technological, organizational, or cultural - affecting the integration of digital health solutions gives our research a comprehensive perspective on the cumulative effect of these factors on the adoption and performance of digital health initiatives.

In enriching our study's methodology, we contrast literature review findings with empirical data. This comparison is integral to our approach, as it not only substantiates the broad patterns

and associations observed within different healthcare contexts but also deepens the analytical dimension of our work. By integrating literature comparisons with empirical findings, we unlock a comprehensive perspective that significantly enriches our understanding of the factors influencing digital health implementation.

This approach enables a comparative analysis between literature and empirical findings that highlights both common and distinct challenges in the adoption of digital health tools, alongside the factors influencing their implementation. By distinguishing the commonalities and variances in these areas, our study gains the capacity to identify which barriers are most critical for our change management model to address and which may be considered less impactful. This prioritization ensures that our model enhances the digital health technology integration effectively. We then matched the key elements of effective change management found in both literature and interviews with the relevant obstacles. This careful coordination acts as an essential groundwork for developing a step-by-step strategy designed to support a more seamless shift towards embracing digital health technologies.

3.3 Data Collection

In this chapter, we detail the methodologies employed to gather both primary and secondary data crucial to our investigation into the integration of digital health technologies within healthcare systems. Through a combination of semi-structured interviews and comprehensive literature review, we aim to capture a multifaceted view of the challenges, practices, and strategies surrounding digital health implementation. Below, we outline the process and rationale behind our primary and secondary data collection efforts, providing a foundation for the thematic analysis that informs our study's conclusions.

3.3.1 Primary Data

Our primary method of collecting data was conducting semi-structured interviews. These interviews offer flexibility and depth, allowing for an extensive exploration of topics while maintaining consistency across interviews (Bryman et al., 2022). This consistency is crucial for ensuring that the data collected can be compared and analyzed systematically across different participants and settings, facilitating a more reliable synthesis of the findings. The interviews aim to understand the experiences, perceptions, and attitudes of healthcare professionals and administrators regarding the adoption and implementation of digital health technologies.

3.3.1.1 Interview Framework and Setting

The development of the interview guides was a meticulous process, based directly on our research question to ensure each interview systematically addressed the key themes of digital

health technology adoption and integration challenges. Initially, questions were drafted to explore operational challenges, personal experiences with digital health technologies, and perceived benefits and barriers. Then we delved into different forms of change management strategies, guided by insights from existing literature on the topic, to assess which strategies were already in place and identify those that appeared most important and promising. The process of developing the interview guides included a peer review to verify the guide's comprehensiveness and clarity, ensuring it was equipped to bring up meaningful insights.

The interview framework targeted two groups: healthcare facility leaders and staff, chosen for their unique insights into the strategic, operational, managerial, and practical aspects of digital health integration. Appendices 1 and 2 contain the interview guides tailored for healthcare facility leaders and staff, respectively. The interviews varied in length but generally ranged from 30 to 45 minutes. The chosen duration ensured that interviewees could elaborate on their experiences and insights into digital health technology adoption, addressing our research questions fully while maintaining engagement throughout the conversation.

All interviews were conducted online, primarily through Microsoft Teams. This setting was selected for several reasons: First, it allowed for a broader inclusion of participants from various locations, ensuring a diverse representation of healthcare professionals and administrators. Second, online interviews offered the most time-effective way to collect data. This approach reduced the logistical challenges and time commitments associated with arranging in-person meetings, enabling us to schedule and conduct interviews more flexibly.

3.3.1.2 Selection of Interviewees

The selection of interviewees began by reaching out to contacts known to us and was expanded through LinkedIn, leading to a somewhat random yet pragmatic selection process. While this approach resembles convenience sampling, it was strategically tailored to target healthcare professionals who met specific criteria: participants either needed to have been involved in adapting to a new digital tool or in the driver's seat of the tool integration process. This focus was crucial because those directly engaged with the operational challenges and decision-making processes provide invaluable insights into the barriers and facilitators of technology adoption. We aimed for a comprehensive understanding of digital health technology integration, achieving data saturation with a diverse mix of participants from Germany and Sweden - regions chosen due to personal connections and a higher response rate. This ensured we gathered a range of perspectives to address our research questions effectively, enabling more informed analysis of how digital tools are integrated within healthcare (Bryman et al., 2022).

After conducting seven interviews, we observed that the barriers as well as the change management practices already prevalent within the healthcare sector repeated themselves. Therefore, we decided to stop after ten interviews, confident that we had reached a point of saturation where further interviews were unlikely to yield significantly new insights.

This selection strategy, while pragmatic, introduces specific implications for the generalizability and interpretation of our findings. Focusing on Germany and Sweden, both recognized for their advanced healthcare systems and strong emphasis on digital health innovation, may influence the insights and experiences shared by participants, potentially presenting a more optimistic or forward-thinking perspective on digital health integration than might be encountered in regions with less developed healthcare infrastructures or differing healthcare policies. The focus on these two countries also means our research may inherently capture the challenges and strategies relevant to European healthcare contexts, potentially limiting the applicability of our findings to global healthcare environments with varying regulatory, cultural, and socio-economic backgrounds. Furthermore, the emphasis on Sweden and Germany could highlight integration practices and digital health adoption barriers that are specific to these nations' unique healthcare systems and digital health policies.

However, selecting these countries can also be viewed as a strength, as their progressive attitudes towards healthcare technology provide a relevant and rich context for addressing our research questions. The advanced state of digital health integration in these settings allows us to explore and understand the complexities and successes of digital technology adoption in environments that are at the forefront of healthcare innovation, offering valuable lessons that could be applied in similar contexts and countries.

In acknowledging these implications, it is important for our analysis and subsequent recommendations to clearly state the contextual foundation of our findings. This transparency ensures that while our research offers in-depth insights into digital health integration within German and Swedish healthcare environments, the extrapolation of these findings to other regions should be approached with an understanding of the potential limitations posed by the geographical focus of our respondent selection.

Our interviewees, chosen for their direct experience with digital health technologies and coming from various healthcare settings including hospitals and specialized care centers in Germany and Sweden, enriched our research with a broad spectrum of insights into digital health integration practices and challenges. This diversity proved essential in capturing a comprehensive range of perspectives, aligning with our methodological aim to achieve a

holistic understanding of digital health technology adoption and implementation. Table 4 provides an overview of our interviewees, showcasing the range of professions and experiences. One interviewee is identified by the abbreviation "I9" (Interviewee 9). This abbreviation is used to protect the anonymity of the participants who requested confidentiality.

Interviewee	Country	Position	Institution Size	Length	Date
Möller	Germany	Lead Pediatric Cardiologist	Small (< 15 employees)	59:51	2024-02-14
Alscher	Germany	Medical Director	Large (> 3000 employees)	55:30	2024-02-18
Schwan	Germany	Physiotherapist	Small (< 15 employees)	41:41	2024-02-20
Gunmalm	Sweden	Chief Executive Officer	Large (< 900 employees)	42:34	2024-02-22
Hüsing	Germany	Chairwoman of the Works Council	Large (> 1000 employees)	42:06	2024-02-23
Rezai	Sweden	Chief Digitalization Officer	Large (< 12000 employees)	40:52	2024-03-01
Paulsson	Sweden	Chief Executive Officer	Medium (< 200 employees)	39:35	2024-03-06
Isaksson	Sweden	Department Manager in Orthopedics	Medium (< 200 employees)	40:27	2024-03-08
I9	Germany	Digital Health Coordinator	Medium (> 100 employees)	35:16	2024-03-11
Juhra	Germany	Head of Telemedicine Department	Large (> 11000 employees)	41:34	2024-03-13

Table 3: Overview of Interviewees

Despite the geographical diversity of our participants, our analysis revealed that the findings related to digital health integration challenges and strategies were similar across the two countries. As such, we chose not to emphasize the geographical aspect in our final analysis. This decision was made under the rationale that the core insights regarding digital health integration transcended regional differences, highlighting regional themes and challenges in the digital transformation of healthcare services.

Following each interview, transcriptions were created for detailed data analysis, with a preliminary analysis identifying initial themes and patterns. This served as the foundation for a more comprehensive qualitative data analysis, leading to a nuanced understanding of the factors influencing digital health integration.

3.3.1.3 Selection of Healthcare Institutions

Building on the selection of interviewees detailed earlier, the choice of healthcare professionals naturally dictated the selection of hospitals and practices involved in our study. By selecting

respondents who have direct experience with digital health technologies, we naturally concentrated on the healthcare institutions where these professionals work. This approach allowed us to cover a wide range of healthcare settings, from large hospitals to small practices, each offering unique perspectives on the digital health integration process.

The selection of these institutions was influenced by the professionals' roles and their accessibility, providing us with insights into digital tool implementation processes across varied healthcare environments. Large hospitals, often with more resources, were presumed to have a more formalized implementation process, while smaller practices might adopt a more informal or flexible approach due to resource constraints. This diversity in institutional size and structure enriched our understanding of the challenges and opportunities in digital health technology adoption and integration.

While it might seem more logical to select the organizations first, focusing initially on individuals allowed us to ensure that our respondents were directly involved with digital health technologies. This method helped to guarantee that our data would be rich with informed perspectives specifically relevant to our study's focus on digital health integration, aligning directly with the expertise and experiences of those at the forefront of these efforts. This strategy not only facilitated access to various institutional settings through the professionals but also ensured that our analysis was grounded in actual user experiences within those settings.

Another research strategy, perhaps one involving a more detailed segmentation of healthcare institutions beyond just size - considering factors like funding model, specialty focus, or regional healthcare policies - might yield different findings. Such an approach could offer a more detailed understanding of how various factors interplay in the digital health technology integration process.

3.3.2 Secondary Data

Within the scope of our investigation into the seamless integration of digital health solutions into healthcare systems, our research extends beyond primary data collection to include a thorough examination of qualitative data from secondary sources. The secondary sources, encompassing academic articles and case studies, illuminate the wider organizational and industry context of digital health technologies. These were utilized for the literature review.

An important step in our secondary data analysis was the selection of keywords for literature search. Keywords such as "digital health integration", "technological adoption in healthcare", "barriers to digital health", "organizational change in healthcare", "change management

strategies in healthcare”, “opportunities with digital health”, “digital tools in healthcare”, and “implementation of digital health tools” were used. These terms were used across various databases and search engines to find literature that spans the spectrum of challenges, progress, and strategic priorities associated with digital health technologies in healthcare settings. The selection criteria for including literature in our review were predicated on relevance to our research theme, the recency of publication, and the credibility of sources. We used several key databases and search engines, including Google Scholar, Scopus and the Gothenburg University Library.

Our analysis of secondary data was intended to establish a foundation for our primary data collection. This dual-data approach facilitates a more comprehensive understanding of both the micro-level experiences of individuals within healthcare settings and the macro-level trends influencing digital health technology adoption and integration. The secondary data analysis focuses on identifying common themes related to organizational challenges, such as resistance to change, technological infrastructure issues, and regulatory constraints. Additionally, we explore documented strategies and best practices that have led to successful digital health integration in some organizations, looking for patterns and insights that can inform our own change management process development. This examination not only enriches our understanding of the organizational context in which digital health solutions are being implemented but also highlights industry trends and potential gaps in current practices.

In our literature study, we initially considered a broader range of change management frameworks, namely Lewin's Change Management Model, Kotter's 8-Step Model, the ADKAR Model, the McKinsey 7S Framework, Nudge Theory, Bridges' Transition Model, the Kubler-Ross Change Curve, and the Satir Change Management Framework. Through a systematic selection process, we decided to focus on Lewin's, Kotter's, ADKAR, and McKinsey 7S models. These four frameworks collectively cover a broad spectrum of change management aspects, from psychological and individual to strategic and structural. Lewin's model provides initial insights into the phases of change, Kotter's model complements that with a practical step-by-step guide for implementing change initiatives, ADKAR focuses on individual transitions, and the McKinsey 7S model addresses the alignment of diverse organizational elements. Including additional frameworks such as Nudge Theory, Bridges' Transition Model, Kubler-Ross, or the Satir Framework would therefore not significantly enhance the quality of the thesis, as the selected models already provide a robust and comprehensive overview of the field. Thus, the chosen four frameworks adequately represent the current research in the field of change management.

3.3.2.1 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria for the literature review are outlined in the following, following Patino and Ferreira's (2018) recommendation for transparency and consistency. The inclusion criteria were specifically designed to select references that are relevant to the research question and discuss either digital tools, change management, or both. We focused primarily on literature published within the last 20 years to ensure contemporary relevance, with particular attention given to articles released from 2018 onward to capture the most recent developments and insights. Exclusion criteria were applied to articles that, while possibly addressing change management or digital tools, did not focus on the healthcare sector. Additionally, any references older than 20-25 years were excluded to minimize the inclusion of outdated information. This selective approach ensures that the literature review is both relevant and current, aligning with the thesis's focus on integrating digital health technologies within healthcare systems through effective change management strategies.

3.4 Data Analysis

Our study employed a thematic analysis approach to analyze the interview data collected on the integration of digital health technologies within healthcare systems. This analysis begins with a coding phase where the data is meticulously examined for significant patterns relating to the research questions. For instance, mentions of organizational aspects like leadership styles, training programs, employee engagement, communication, current change management practices, or resistance to new technologies are tagged and coded. These coded segments are then analyzed to identify broader themes, such as "Openness to Innovation" or "Resistance to Technological Change". The study will explore how these themes, like "Leadership Support" or "Organizational Readiness", correlate with the success or challenges in implementing digital health technologies (Bryman et al., 2022).

The process of thematic analysis is carried out in several different steps. Initially, we read the interview transcripts several times, gaining a deep understanding of the content. This familiarization was important for grasping the data's nuances. We then systematically tagged phrases and sentences that offered key insights, moving these initial codes into potential themes through a reflective process of comparison and refinement. Each theme was reviewed to ensure it accurately reflected our research objectives and the perspectives of our interviewees. Through this process, we identified critical barriers to digital health implementation, such as interoperability issues and a lack of training, validated against literature and empirical data (Bryman et al., 2022).

To address these obstacles, our analysis aligned components from different change management models identified in the literature and empirical findings with the challenges we pinpointed. For instance, Kotter's principle of "creating a sense of urgency" appears particularly effective in combating resistance to change. Building on this analysis, we crafted a change management framework designed to facilitate the implementation of digital health tools. This framework outlines steps with clear objectives and actions that specifically address the barriers identified. Essential prerequisites for the framework's success were also identified and incorporated. Lastly, potential challenges in implementing this change management framework were anticipated. This proactive approach ensures that the framework is not only theoretically sound but also practically viable in the complex landscape of healthcare digitalization.

3.5 Research Quality

This section critically evaluates the research quality and trustworthiness of the study on change management and digital health technology implementation in the healthcare sectors of Sweden and Germany, by examining four key aspects: credibility, transferability, dependability, and confirmability, as outlined by (Bryman et al., 2022). These components are essential for ensuring that the research findings are reliable, applicable in other contexts, reproducible, and unbiased, thereby reinforcing the study's integrity and value to the field.

3.5.1 Credibility

The credibility of a study is crucial to ensure reliability, and largely depends on an appropriate research method (Bryman et al., 2022). Ten semi-structured interviews were utilized to gather detailed information about the interviewees' previous experience with change management and digital health technology. This method ensured a thorough collection of nuanced data from the healthcare sector. Furthermore, a substantial amount of theory and previous literature was included to further support and contrast the results. This approach facilitated that the analysis and the conclusion are driven by data which appropriately reflected the complex dynamics of implementing digital health tools in the healthcare environment.

3.5.2 Transferability

Transferability addresses the question whether the results of a study can be generalized, meaning applicable in other circumstances (Bryman et al., 2022). This study uses information from the healthcare systems of Sweden and Germany. In the methodological section, a thorough description of the context for the research is presented. This section can serve as a valuable resource for future researchers seeking to evaluate the relevance of our findings in diverse settings.

While our study focuses on the healthcare sector and its specific challenges, it is important to recognize that the barriers and change management strategies identified may have broader applicability within healthcare systems of similar standards across different countries. However, the unique complexities of the healthcare sector must be acknowledged, meaning that while our change management model may not be directly transferable to entirely different sectors, it still offers valuable insights that can be adapted and refined for specific healthcare contexts elsewhere.

3.5.3 Dependability

Dependability measure whether the study could be replicated and conclude the same results (Bryman et al., 2022). This concept was addressed by presenting the research process in detail, both in terms of interviewee selection and the process in which data was collected and analyzed. The documentation ensured transparency and thereby allows the research method to be replicated by other researchers. Additionally, the coding process and thematical analysis of interviewee responses further supports the dependability of the research. In conclusion, the transparency in regard to approach and research processes makes the research easy to understand and thereby enables replicability.

3.5.4 Confirmability

Confirmability addresses whether the researchers have acted in an ethical way, meaning that personal values and biases do not affect the results of a study (Bryman et al., 2022). Throughout the research process continuous checks for assumptions and biases were conducted. Additionally, through an approach grounded in theory, it is ensured that the conclusions are data-driven rather than clouded by perceptions of the researchers. The in-depth comparison of previous literature and empirical findings further supports the notion that the results are based on the collected data. These methods enhance the confirmability of this study.

4 Empirical Findings

This chapter delves into the firsthand experiences of different healthcare professionals.

4.1 Digital Adoption in Healthcare

According to Alscher, the transition towards digital tools is not just a trend but a necessary evolution to meet the increasing demands of modern healthcare systems and to cope with the demographic change.

4.1.1 Digital Health Tools

In this section, we want to gain a comprehensive understanding of the digital tools currently used by our interviewees. These tools are not simply add-ons to traditional practices but are central to enhancing operational efficiency, patient engagement, and the quality of care.

4.1.1.1 Digital Patient Record and Documentation Systems

The foundation of digital transformation in healthcare is embodied by the implementation of and comprehensive patient data management systems. Hüsing, for example, introduced an application designed for the aggregation of all patient data, which facilitates care and ensures seamless communication across various departments. One feature of the application is its ability to automate and streamline the medication management process. Similarly, Gunmalm's experience of employing an electronic medical records system underscores the utility of digital records in enhancing care delivery and operational efficiency. These systems are not just digital replacements of paper charts; they are dynamic tools that offer real-time access to patient health information, enabling informed decision-making and timely interventions.

4.1.1.2 Patient-Centric Digital Platforms and Communication

Paulsson highlights Vårdguiden 1177 as a crucial part of Sweden's healthcare system, demonstrating the impact of digital services in linking patients with healthcare providers. It enables patients to get medical advice, book appointments, renew prescriptions, and obtain personalized health information online or by phone. This platform allows patients to make informed healthcare decisions and easily connect with services, guiding them on whether to seek emergency care or manage symptoms at home.

Similarly, Rezai introduces "Flow," a communication platform offering text, voice, and video chat options to meet various patient needs. Its asynchronous communication feature lets patients share health updates at their convenience, improving care continuity. "Flow" also supports video consultations, easing access for those unable to visit clinics in person.

Juhra highlights telemedicine's key role in healthcare, offering online video consultations that support patient-centric platforms like Vårdguiden 1177 and "Flow." This approach improves access for remote or mobility-impaired patients and ensures care continuity, vital for chronic condition management and maintaining engagement outside clinics.

4.1.1.3 Administrative Digital Tools

The adoption of digital scheduling and recruitment tools, as mentioned by Isaksson, exemplifies the shift towards more efficient, technology-driven administrative processes. Digital scheduling systems streamline the allocation of staff and resources, ensuring optimal operational flow.

Schwan mentions another tool offering benefits in financial processes. Oscar, utilized specifically for the submission of treatments to insurance companies, minimizes manual input and the associated risk of errors, ensuring that treatments are accurately billed and reimbursed.

4.1.1.4 Artificial Intelligence and Diagnostic Tools

Our interviews revealed AI's transformative impact on healthcare, particularly in cancer detection and emergency care. Rezai highlighted AI's precision in identifying early-stage malignancies through medical image analysis, outperforming traditional methods in speed and accuracy. This advancement allows for early intervention and personalized treatment, improving patient outcomes. Alscher pointed out AI's efficiency in emergency digital triage, prioritizing urgent cases and optimizing resource allocation, thereby enhancing patient flow. Additionally, AI's role in preemptive data analysis before patient consultations helps professionals form educated hypotheses, streamlining the diagnostic process. This showcases AI's ability to improve diagnostic accuracy and efficiency, underscoring its value in augmenting medical expertise.

4.1.2 Implementation Challenges

Our exploration of digital health tools used by our interviewees leads us to examine their implementation challenges. Identifying these obstacles will help us in crafting a change management strategy that effectively mitigates these issues.

4.1.2.1 Employee Resistance and Demographics

One main challenge in the integration of digital health tools is highlighted by employee resistance, which varies significantly across different demographics. Hüsing's insights reveal a deep-rooted apprehension toward digital adoption, especially among older employees and those nearing retirement.

"Older employees often express strong discomfort about learning how to use a new tool. It is

making them feel nervous and causing them sleepless nights." - Hüsing

According to Gunmalm, long-serving staff, having developed a comfort with established procedures, can show particularly strong resistance to adopting digital tools. This phenomenon underscores a significant challenge in digital transformation efforts: overcoming the inertia of established work habits and the emotional and psychological barriers to embracing new technologies.

As Isaksson states, the demographic challenge is further compounded by the wide spectrum of digital literacy among staff members. This poses a substantial hurdle, as initiatives to introduce new technologies must navigate these diverse starting points, ensuring that no employee is left behind in the transition to digital practices.

Alscher points out another critical issue: digital solutions often complicate rather than simplify the tasks of doctors, nurses, and other healthcare staff. In this case, the resistance stems from the additional burdens imposed by poorly designed digital tools, such as increased time demands and complexity in workflows.

4.1.2.2 Staff Training

Building on the insights into employee resistance and demographic challenges, Isaksson highlights the complexity of training initiatives as a critical challenge in the digital transformation in healthcare. The variation in digital literacy across workforce necessitates training programs that address a broad range of skill levels, from digital novices to tech-savvy individuals. This differentiation in training complicates the development and execution of effective educational strategies.

“Unit managers are tasked with selecting personnel to receive very thorough training, which aims to ensure that these employees are proficient with the new digital tool. Afterwards, these employees are expected to distribute their knowledge to their colleagues. This also promotes a culture of collective learning.” - Isaksson

Additionally, Hüsing notes that the growing complexity of healthcare technologies complicates training, requiring more in-depth and extended sessions that increase the cognitive burden on employees.

Simultaneously, the operational realities of the healthcare sector present a unique challenge to conducting comprehensive training programs, as noted by Paulsson. The high-pressure, time-sensitive nature of healthcare work often leaves little room for extensive learning sessions, necessitating the integration of training into the hectic schedules of healthcare professionals.

4.1.2.3 Integration Complexities

Hüsing points out that integrating digital tools into healthcare systems involves complex coordination between different departments, such as those handling medication management and billing. The challenge lies in ensuring that these departments work together smoothly as they adopt new digital tools. Paulsson further highlights the necessity for dedicated workgroups and the execution of risk assessments as crucial steps in mitigating issues during the digital tool rollout.

Möller highlights that strict data privacy laws in Germany pose significant challenges to integrating digital tools in healthcare, especially for communicating sensitive patient information. These regulations limit the use of common digital channels, like email, creating a conflict between digital convenience and strict data protection adherence.

4.2.1.2 Structural Rigidity

The implementation of digital healthcare tools is often hindered by systemic barriers, including the hierarchical decision-making structures in many organizations that slow the process, as noted by I9.

"The healthcare sector is very much influenced by hierarchical systems, which I believe is a big problem. Decisions have to be approved by the board, rarely made quickly or without extensive sign-off. This often makes it difficult to adopt solutions, as everything must be thoroughly reviewed and endorsed." – I9

Additionally, I9 addresses the lack of collaboration efficiencies, particularly highlighting the issue of unnecessary attendees in meetings. Meetings intended to foster collaboration and streamline decision-making processes become bloated and inefficient. The presence of individuals who do not have a direct role or contribution to the matter at hand slows down the process. It leads to diluted outcomes, making it harder to achieve actionable decisions.

4.1.2.4 Communication and Coordination

Isaksson points out a challenge in adopting new digital processes in healthcare: many professionals, like nurses and doctors, lack a dedicated desk or computer workstation where they can easily access and learn new digital systems. This makes disseminating information about new digital processes difficult, as these professionals are often mobile and preoccupied with patient care.

Another challenge Schwan identifies stems from a lack of clear communication from leaders about the mandatory use of digital tools.

"If it's made clear that everyone must use it, and then everyone does, it would simplify things significantly, especially internal communication." - Schwan

This ambiguity leads to inconsistent adoption across the team, with younger employees more likely to use the system, while older ones might stick to handwritten notes. This inconsistency hinders efficiency and the ability to provide coordinated care, highlighting the critical role of leadership in effectively managing change and ensuring the uniform adoption of digital tools.

4.1.2.5 System Interoperability and Compatibility

Another significant barrier to implementing digital health tools, as highlighted by Rezai, is the challenge of system interoperability and compatibility. With the healthcare sector utilizing an extensive array of digital tools and platforms, ensuring these systems can communicate and work together is essential. However, the reality is often a fragmented IT landscape, where different systems operate in silos, hindering efficient data exchange and workflow integration.

Additionally, Möller underscores that the ongoing evolution of healthcare technologies introduces new compatibility challenges. As systems are updated or replaced, maintaining interoperability requires continuous adaptation and reintegration efforts, leading to a cycle of complexity and inefficiency that can negate the broader goals of digitalization in healthcare.

4.1.2.6 Funding and Investment

Rezai's insights reveal a situation where the variability in funding models across regions complicates the adoption of digital solutions. In regions where healthcare funding does not align with the costs associated with digital innovation, the financial strain can be considerable. The reliance on capitation payments and visitation reimbursements, which often do not account for the substantial investments required for digital tool implementation, presents a clear challenge.

Möller shared similar insights. While initial investments in necessary hardware might receive partial reimbursement, the ongoing expenses, such as IT support, are seldom covered by health insurance. This lack of financial support for continuous operational costs increases the challenge of sustaining a digital transformation in healthcare.

4.1.3 Essential Preconditions for Digital Tool Implementation

This section presents insights from interviews identifying necessary conditions that must be met before initiating a change management process.

4.1.3.1 Financial Planning and Resource Allocation

Möller stresses the need for proactive financial planning and seeking alternative funding to manage the costs of digital health technology adoption. This includes covering upfront

purchases and ongoing IT support, while exploring budget reallocations, grants, partnerships with vendors for better terms, and negotiating with insurers for improved reimbursement policies

4.1.3.2 IT Support and Data Protection

Ensuring robust IT support and stringent data protection measures are additional prerequisites identified by Möller to secure patient and employee information effectively. These foundational elements are critical in ensuring compliance with data protection laws, thereby facilitating a smoother integration of digital tools within healthcare practices.

4.1.3.3 Usability and Patient Readiness

Juhra's statement that you only have a benefit if the tool is actually being used serves as an important reminder that the effectiveness of digital solutions is tied to their adoption and consistent application by end-users. Schwan's experience within her physical therapy practice illustrates the critical importance of user-friendly digital interfaces. The transition of their primary software from an app to an online platform introduced significant challenges, particularly related to usability. Schwan emphasizes the need for intuitive design and reliable functionality, ensuring all team members can efficiently utilize the system. Alscher's insights further reinforce the prerequisite of simplicity in digital tool implementation.

"A general strategy is to make it as simple as possible, as convenient as possible, focusing on usability. It shouldn't be time-consuming, doesn't need to be fancy, but really easy to use.

Simplicity is key with digitalization." - Alscher

Next to the tool's usability itself, Juhra states that patient readiness must also be established to ensure the tool's effectiveness. This involves clear communication, active engagement, and educational efforts to address concerns, focusing on patient-centric approaches to enhance outcomes and experiences.

4.2 Change-Management Approaches

In exploring the dynamics of change management within the healthcare sector, particularly in the adoption of digital tools, our interviewees offered valuable insights into the spectrum of strategies they employed. For instance, Gunmalm detailed the application of Kotter's change leadership model, adapting this formal process to meet the specific operational needs of his organization. He emphasized the criticality of aligning change initiatives with organizational culture and the clarity of change purposes to ensure smooth integration.

"Kotter's change leadership model has been utilized, but it's crucial to adapt any model to

the nature of the operations, with a significant focus on identifying the purpose behind the change” - Gunmalm

Juhra tackled telemedicine integration with targeted strategies such as extensive training and phased technology rollouts, highlighting an informal approach to change management. These varied experiences reveal that change management in the healthcare sector can range from the adoption of formal, comprehensive frameworks to the implementation of selective practices that embody the principles of change management. The following section will depict the most relevant principles that could be found in the interviews.

4.2.1 Role of Leadership

Across the spectrum of perspectives gathered from our interviews, there emerged a consistent consensus: leadership is crucial when it comes to introducing new digital tools.

4.2.1.1 Commitment and Culture

As stated by I9, leadership has a crucial role in steering project execution, where the effectiveness of digital initiatives relies upon the commitment and decisiveness of leaders. I9 elaborates on the critical necessity for leadership buy-in, meaning that the success of digital projects hinges on top management’s alignment and active engagement. Complementing I9's insights, Möller underscores leaders’ significant role in fostering a culture favorable for digital integration. It is important for leaders to not only advocate digital transformation but also actively involve themselves in the change process. This commitment extends beyond implementing new technologies; it involves cultivating an organizational culture aligned with the objectives of digital innovation. Leaders are tasked with nurturing an environment that welcomes change, encourages innovation, and promotes continuous learning.

4.2.1.2 Overcoming Systemic Challenges

Schwan offers insights into the practical application of leadership strategies within the physical therapy practice she is working in. She describes a dual-leadership model where one leader focuses on the practical day-to-day needs of the therapists, while the other concentrates on the broader organizational aspects. This split up ensures that while the operational needs of implementing digital tools are met, the overarching strategic goals of the organization are not sidelined. For instance, if the practice decides to adopt a new digital scheduling system, the practical leader will handle the direct training for therapists, ensuring they can use the tool effectively in their daily work. Simultaneously, the organizational leader would oversee the integration of this system into the practice’s broader digital infrastructure, ensuring it aligns with compliance standards and enhances overall operational efficiency.

4.2.1.3 Role Models and Change Agents

Gunmalm and Alscher stress the importance of utilizing key organizational members as change agents and role models to enhance digital tool implementation. Gunmalm points out the pivotal role of leadership in driving change by mobilizing influential personnel to foster a culture of innovation and adaptability. Likewise, Alscher highlights the need for involving respected and influential individuals in choosing and deciding on digital solutions, setting a positive example for peers to follow in adopting new technologies and processes. However, Alscher also highlights a dilemma: the most capable and influential change agents are frequently indispensable in their primary roles, creating a gap when diverting them to lead digitalization efforts. To mitigate the challenge of diverting indispensable change agents from their primary roles, Alscher suggests identifying multiple role models to distribute responsibility and influence more broadly across the organization.

4.2.1.4 Engagement and Support

Gunmalm emphasizes the importance of transformational leadership qualities, where leaders envision change and empower their teams to be part of the innovation process. This inclusive approach ensures that digital solutions are aligned with end-users' needs, fostering a collaborative culture of change. Furthermore, Gunmalm underscores the consistent responsibility of leadership in sustaining change through ongoing training and support for staff post-implementation. By ensuring that teams remain competent and confident in leveraging new technologies, leaders secure the long-term success of digitalization efforts in healthcare. This commitment to engagement and support reinforces a culture of continuous learning and adaptability.

4.2.2 Training and Support Frameworks

The integration of digital tools in healthcare has spotlighted a critical requirement: the need for comprehensive training and ongoing support.

4.2.2.1 Tailored Training and Support

Paulsson and Rezai both emphasize the importance of accessibility, relevance, and comprehensiveness in training initiatives to ensure the seamless integration of technology into healthcare services.

“The approach varies but there are several strategies we employ... Repetition is key but we also provide training packages available digitally. Additionally, there might be on-site training sessions tailored to the specific needs...” - Paulsson

According to Paulsson, leveraging both digital and on-site modalities cater to the diverse

learning preferences of healthcare professionals. Training packages made available digitally facilitate easy access to training materials, enabling staff to engage with learning resources at their convenience. This is complemented by on-site training sessions, ensuring that employees gain hands-on experience that is directly applicable to their roles.

4.2.2.2 Super Users

Isaksson explains another support strategy that is centered around the concept of "super users." Super users are selected staff members who receive extra training on the digital tools being introduced. After their training, super users become essential in educating their colleagues, effectively creating a ripple effect of knowledge transfer within the organization. They are on-the-ground experts offering support, troubleshooting problems, and guiding their peers. This peer-to-peer learning model not only cultivates a collaborative environment but also lightens the load on external trainers.

Similarly, Gunmalm shared his approach that initially focused on brief theoretical discussions, information dissemination meetings, and individual coaching sessions. Recognizing the need for extended support, Gunmalm evolved the strategy by establishing networks of support among employees and identifying local experts within the organization. These local experts provide tailored assistance and guidance, ensuring that all staff members have access to the necessary support to effectively utilize digital tools.

4.2.2.3 Constant Support

Juhra's approach introduces another important component in the digital adoption process: the establishment of a constant support team.

"The process involved a dedicated team leading the introduction of digital tools. We made sure to be always available to solve any problems, and crucially, we made ourselves easily accessible. This approach proved extremely effective, as having someone to talk to directly when encountering issues made a big difference." - Juhra

The support team played a crucial role in facilitating the acceptance and efficient use of these tools among healthcare professionals. By offering regular training and support sessions, the team ensured that users felt comfortable with the tools, thereby promoting their widespread adoption. This ongoing support mechanism underscores the necessity of continuous engagement and assistance beyond the initial training phase. Complementary, Rezai outlines a continuous and dynamic training and support framework, emphasizing that learning and adaptation are ongoing processes. The strategy begins with initial information sessions to raise

awareness, followed by focused discussions and in-depth training tailored to the needs of the staff and the complexity of the tool. The cycle concludes with a follow-up phase to assess the effectiveness of the training and the use of the technologies, identifying areas for improvement.

4.2.2.4 Ad-hoc Training

Schwan's and Möller's adoption of digital health technologies in their practices highlights the effectiveness of ad-hoc training and support for employees. In Schwan's practice, the transition to an online platform was undertaken with minimal formal education or workshops. Staff members leaned on internal communication and mutual support to troubleshoot issues, fostering a culture of collective resilience and adaptability. Similarly, Möller's practice faced the integration of digital health technologies by directly engaging with the technology and addressing issues as they arose. The process involved problem identification, study, and the co-development of solutions with key personnel, underscoring the importance of hands-on involvement from all staff members.

4.2.2.5 In-house Competence Center

Hüsing shared insights into their support strategy, which includes an in-house competence center for personalized training of its 2500 employees. This center adapts to various learning styles and speeds, providing customized training on key digital tools within their facilities. This approach not only fosters a comfortable and familiar learning environment but also ensures that help is readily accessible, encouraging continuous engagement and feedback between trainers and employees. If employees have questions or require further clarification on the applications, they can easily reach out to the competence center to arrange additional training sessions.

4.2.2.6 Strategic Training Scheduling

Recognizing the busy nature of hospital operations, Alscher's methodology for scheduling training sessions is meticulously designed to align with the hospital's workflow, particularly noting the critical timing to avoid disrupting patient care. Training is intentionally planned for midweek afternoons, a period identified as optimal due to the lower incidence of emergencies, ensuring maximum attendance and engagement from the medical staff.

Alscher promotes simplicity in introducing new digital tools, focusing on practical, accessible training sessions. By making the training straightforward and integrating it into the normal running hours of the hospital, Alscher ensures that the transition to digital systems is as seamless as possible, respecting the demanding schedules of medical professionals.

4.2.3 Feedback Mechanisms and Employee Engagement

Interviewees provided insights into how feedback and engagement elements are effectively integrated in the introduction process of digital tools within healthcare. Rezai's strategy highlights the critical role of continuous employee engagement, from gathering initial feedback to providing thorough training and comprehensive follow-up. This approach keeps employees actively involved and valued, creating a conducive atmosphere for feedback and innovation.

“A key strategy is to always involve a group of people from the operations so that they are integrated throughout the process... thus we have several people who understand in-depth what we have developed, including the risks and benefits...” - Rezai

Gunmalm specifically uses interviews and surveys to tailor digital solutions to the team's needs, ensuring technology is effectively integrated and meets staff preferences. Similarly, Juhra emphasizes the importance of feedback loops in refining digital tools, showing a commitment to user-centered design by actively seeking and incorporating user feedback.

4.2.4 Sustaining Digital Changes

Rezai points out that while the deployment of digital tools can mark a significant positive shift in healthcare provision, the real test lies in their sustained usage and integration into daily operations.

4.2.4.1 Continuous Evaluation and Adaption

Rezai stresses the significance of follow-ups for ongoing assessment of digital tools in healthcare, focusing on their utility, efficiency, and impact on delivery and patient outcomes. He highlights the necessity of flexibility and adaptability in implementation, recognizing that technology, healthcare needs, and user expectations constantly evolve. This includes updating technology, modifying its use, or changing processes to address challenges like user resistance or regulatory changes. Rezai's approach underscores the critical role of adaptability in ensuring the effective and sustained use of digital tools in healthcare.

Complementary, Paulsson underlines that for digital tools to remain effective and aligned with healthcare facilities' operational needs, their integration into daily routines must be accompanied by oversight. Paulsson and his team employ structured approaches, including regular surveys and review meetings, to evaluate the performance and impact of digital technologies. This allows for the identification of areas where digital tools may fall short of their goals, facilitating timely interventions and ensuring that digital strategies evolve alongside healthcare advancements and needs.

4.2.4.2 Mandating Digital Transformation

Alscher emphasizes a different approach on sustaining change. He articulates that once a digital implementation has been decided and deployed there must be an unambiguous expectation for all staff to utilize this system. This approach leaves no room for reverting to previous methods. By mandating the use of the system from a specific start date, Alscher effectively communicates that the new digital tool is not an optional addition to existing processes but a replacement, integral to the workflow and operations moving forward. This "no chance thereafter; you have to use it" philosophy signals a strong commitment from the leadership towards the digital transformation effort, showcasing confidence in the chosen solution's ability to improve healthcare delivery. Additionally, this approach underscores the necessity of a unified and consequent shift towards digital-centric healthcare practices.

Similarly, Isaksson ensures digital adoption is irreversible by embedding it into the organization's culture, making old practices obsolete. This approach prevents any backsliding to former methods. Möller adds that despite the technical possibility of returning to old practices, like paper prescription, the efficiency and time savings brought by digital processes have consolidated their place in daily operations. This scenario shows that the success of digital transformation in healthcare relies not solely on enforced compliance but on recognizing and valuing the advantages these digital solutions bring to the table.

4.2.4.4 Benchmarking and Key Performance Indicators

Gunmalm uses benchmarking as a tool to drive long-term success of digital innovations. Key Performance Indicators play a pivotal role in this strategy. KPIs are carefully selected metrics that are directly tied to the strategic goals associated with the digital tools being implemented. These indicators might include metrics related to patient safety improvements, productivity enhancements, or user engagement levels with the new technology. By measuring performance against these indicators, Gunmalm can identify areas of success as well as opportunities for further improvement. Public recognition of good performance based on these KPIs is a critical component of Gunmalm's strategy. It not only acknowledges and rewards the hard work of staff but also motivates others within the organization to aim for similar achievements.

"I rely heavily on benchmarking and it's crucial to use the right KPIs. Publicly acknowledging when someone does a good job, such as in response times when patients contact us through an app solution, also serves to foster a bit of internal competition and increase engagement across the organization" - Gunmalm

Furthermore, Gunmalm's strategy includes providing support and energy to operations or

individuals struggling with the implementation of digital tools. This balanced approach ensures that while excellence is celebrated, support is available to those who are facing challenges, ensuring that no part of the organization is left behind in the digital transformation journey.

4.2.5 Cultural Shifts

Gunmalm emphasizes the critical importance of ensuring that new digital tools are in harmony with the company’s existing culture. The process of integrating digital tools does not inherently change the culture but requires that these tools meet the high expectations of the most demanding users within the organization. This strategy aims to achieve overall satisfaction with the technology among staff, underlining a user-centric approach that considers the workforce’s needs and preferences as central to maintaining or enhancing the organizational culture.

Alscher’s philosophy advocates for the use of digitalization as a catalyst for comprehensive organizational change. Instead of just digitizing existing procedures, Alscher argues for the opportunity to rethink and redesign internal processes fundamentally. This vision for digitalization goes beyond the introduction of new tools; it represents a shift toward a culture that is receptive to reevaluation and innovation. Significant enhancements in efficiency and productivity mark such a transformation but requires an organizational culture that is open and willing to embrace change at its core.

4.3 Key Implications from the Empirical Findings

The empirical findings from the interviews with healthcare professionals reveal considerable insights into the implementation and integration of digital health tools within the healthcare sector. These discussions uncover not only the various challenges faced, such as employee resistance, but also the innovative strategies practiced navigating these barriers. Some key findings from the empirical studies are being exemplified in Table 5.

Area	Challenge	Solution
Leadership	The most capable and influential change agents are frequently indispensable in their primary roles.	Identifying multiple role models to distribute responsibility and influence (Alscher).
Training and Support	The variation in digital literacy complicates training initiatives.	Developing user friendly and relevant training initiatives, leveraging digital and on-site modalities (Paulsson, Rezai).
Feedback	Ensuring digital tools meet healthcare professionals’ evolving needs.	Establishing responsive feedback loops for continuous tool refinement (Juhra).

Sustaining Changes	The challenge of maintaining long-term use and integration of digital tools.	Continuous evaluation, assessments and adaptation of digital tools, fostering digital transformation (Rezai, Alscher).
Cultural Shifts	Potential conflict between new digital tools and existing corporate culture.	Ensuring new digital tools align with the company's culture, using digitalization as a catalyst for organizational change (Gunmalm, Alscher).

Table 4: Key Empirical Findings

The empirical findings underline the interdependence of user (employee) engagement, tailored training, and leadership involvement in the digital transformation of healthcare. However, it is evident from the interviews that most healthcare professionals have yet to implement a structured change management process for integrating digital health tools. Acknowledging this, our next step will involve a detailed analysis of the most significant barriers and the corresponding change management practices effective in overcoming them, as identified through both the interviews and literature reviews. We aim to develop a coherent change management process tailored to the healthcare sector's unique challenges. This process will serve as a structured blueprint for healthcare organizations, guiding them through the complexities of digitalization with strategic planning and continuous improvement mechanisms.

5 Analysis

The direct and intentional link between our literature review and the empirical findings guides the structure of the analysis. By synthesizing existing knowledge on change management within the healthcare sector, we identified gaps and aligned our empirical data collection to explore these areas further. This alignment ensures that our analysis not only reflects theoretical insights but also resonates with the real-world challenges of digital health technology integration observed through our primary research. By systematically connecting the dots between what has been established in previous studies and what we discovered through our qualitative research, we ensure that our analysis is both robust and insightful. This approach not only enriches our understanding of the subject matter but also enhances the practical relevance of our findings, ultimately contributing to a more nuanced discourse on integrating digital health solutions within various healthcare environments.

5.1 Digital Health Implementation Barriers

To integrate digital health technologies within the healthcare sector, a number of barriers emerged that are challenging the adoption and effective utilization of these innovations. In this section, we first want to categorize the identified barriers into five broad themes: compliance, technical, organizational, cultural and training-related. A comparative analysis is undertaken to contrast the barriers identified through our literature review and the ones from the interviews. This comparison is important to validate the relevance of these barriers and to identify gaps that may exist in current understanding.

5.1.1 Compliance Barriers

The following section examines the challenges of data security and regulatory compliance in the adoption of digital health technologies.

5.1.1.1 Data Security

The literature strongly emphasizes the significance of data security in integrating digital tools.. Tomasella & Morgan (2021) and Fatima & Colomo-Palacios (2018) underline healthcare professionals' concerns about data accuracy, reliability, and security. In the interviews, data security is also recognized as a crucial factor. However, it is perceived more as a foundational prerequisite rather than an ongoing barrier. Ensuring robust IT support and stringent data protection measures is essential for securing both patient and employee information (Möller, personal communication, February 14, 2024).

Concluding, while both sources acknowledge the importance of data security, the literature

focuses on it as a substantial barrier that could hinder the adoption of digital health technologies. In contrast, interviews suggest that data security, while crucial, is viewed more as a fundamental prerequisite that should be established early in the implementation process. This approach underlines the necessity of addressing data security upfront.

5.1.1.2 Regulatory Barriers

Looking at the literature review, it can be found that regulatory barriers seem to be another significant barrier. The complexity and resource intensity required to comply with these regulations are highlighted as major obstacles, especially for smaller healthcare institutions. The uncertainty around complying to policies is also noted as a critical challenge (Baines et al., 2023). Interviewees barely mentioned regulatory issues as a significant concern in the digital health implementation process. This lack of emphasis suggests that, in practice, regulatory barriers may not be as critical or may be overshadowed by other more important challenges.

5.1.2 Technical Barriers

This section delves into critical technological hurdles in digital health integration.

5.1.2.1 Interoperability and System Integration Challenges

Interoperability and system integration issues are significant barriers to the successful implementation of digital tools within the healthcare sector. The literature study and the empirical findings, collectively, highlight the complexities of harmonious communication between new health technologies and existing IT systems. Lehne et al. (2019) and Torab-Miandoab et al. (2023) mention the necessity of interoperability for the efficient use of technologies such as AI and underscore the importance of standardized data formats to overcome integration issues. Hüsing (personal communication, February 23, 2024) highlights some practical implications of these challenges through the implementation of a patient data aggregation application. The usefulness of the application largely depends on its ability to integrate with other healthcare systems. This emphasizes the importance of interoperability to enable operational efficiency.

5.1.2.2 Artificial Intelligence

A nuanced picture emerges regarding the perception and application of AI in healthcare. The literature emphasizes significant obstacles associated with AI-based medical decision-making, notably the challenges of bias in AI algorithms, the lack of trust in AI-based processes, and the inherent difficulty in understanding how AI models make decisions. These concerns are compounded by the issues of data heterogeneity and quality, which can lead to inconsistent AI performance in clinical settings (Kelly et al., 2019; Begoli et al., 2019; Rieke et al., 2020).

Conversely, insights from interviews present a more optimistic view of AI's role in healthcare. Rezaei (personal communication, March 1, 2024) notes AI's precision and speed, which surpass traditional methods. Alscher's (personal communication, February 18, 2024) insights suggest that, in practical applications within healthcare facilities, AI is seen as a valuable tool that enhances diagnostic capabilities, optimizes resource allocation, and supports personalized patient care.

The differing perceptions of AI in healthcare, framing it either as a barrier or an asset, likely depend on the quality of the AI tool and how seamlessly it is integrated into clinical practices. The key takeaway is the need for a balanced approach in developing and implementing AI technologies in healthcare. This involves ensuring AI tools are not only technically sound but also ethically designed and user-friendly, facilitating their adoption and maximizing their benefits while mitigating potential risks.

5.1.3 Organizational Barriers

Further, we want to examine how organizational issues hinder the smooth integration of DHTs.

5.1.3.1 Structural Rigidity and Hierarchical Decision-Making

Both the literature and interviews pinpoint the inherent rigidity within healthcare organization's structure – especially hierarchical decision-making processes – as a substantial barrier to the adoption of digital health tools. Lluch (2011) emphasizes how healthcare hierarchies and departmental silos stifle the necessary collaboration and coordination for integrating technologies. This structural rigidity leads to resistance, primarily stemming from fears of disrupted workflows and increased workload. Similarly, interview insights from I9 (personal communication, February 11, 2024) verify this view, highlighting how hierarchical decision-making structures prevalent in many healthcare organizations slow down the implementation process. This consistency across both sources makes the hierarchical structure within many healthcare settings seem to be a bottleneck that needs to be overcome to make the digital tool's implementation process more effective.

5.1.3.2 Workflow Integration Complexities

Regarding the digital tools' workflow integration, the literature underlines task alignment as an important yet challenging area. Lluch (2011) specifically points out that the adaptation required for integrating these technologies disrupts traditional models of care delivery, like shifting from in-person consultations to telehealth. This transition demands not only new protocols and practices but also a mental shift in how care is perceived and delivered, marking a profound change in the operational culture of healthcare settings.

The interviews with Hüsing (personal communication, February 23, 2024) and Paulsson (personal communication, March 6, 2024) identify more specific operational challenges, such as challenges related to the physical and logistical realities of healthcare work environments. For instance, the issue of accessibility and the feasibility of training for healthcare professionals who are constantly on the move and do not have dedicated workstations for learning new digital systems. This practical barrier to digital tool workflow integration underscores the gap between the theoretical ideal of digital integration and the on-the-ground realities faced by healthcare staff.

These complementary findings from literature and interviews underscore that effective digital tool integration requires an approach that combines strategic, high-level cultural and procedural adaptation with attention to the specific, operational, and logistical needs identified through direct feedback from healthcare professionals.

5.1.4 Cultural Barriers

In this section, the main focus lies on the resistance to change among healthcare professionals which strongly hinders the implementation of digital health tools.

5.1.4.1 Resistance to Change among Healthcare Professionals

When it comes to the barrier of resistance among healthcare professionals, the literature highlights how the inherent structure and culture within healthcare settings, characterized by rigidity and a preference for traditional methods, create a resistance to change. This resistance is rooted in fears of disrupted workflows and increased workloads (Borges Do Nascimento et al., 2023). Furthermore, the literature delves into psychological resistance, pointing out that concerns like job insecurity can lead to substantial resistance among healthcare professionals (Luch, 2011).

Insights from interviews offer a more detailed view of resistance. Hüsing (personal communication, February 23, 2024) mentions an apprehension, particularly among older professionals, towards change initiatives. This indicates a significant barrier in adopting new technology. Gunmalm (personal communication, February 22, 2024) highlights that resistance is common in the early phases of the implementation phases, and that this occurrence is due to the perceived increase in complexity and disruption of the current workflows.

Collectively, the literature and the empirical findings reveal that the resistance to change can be multifaceted in an organization. While the literature provides a macro perspective on resistance as a structural and psychological barrier, the interviews offer a micro view, detailing

the individual and demographic factors that contribute to resistance. Overcoming this resistance requires addressing both.

5.1.5 Training-related Barriers

In this section, training-related barriers will be analyzed.

5.1.5.1 Training Program Tailoring

Both literature and interviews underscore that ineffective training is a significant barrier in the integration of digital health tools. This consensus validates the relevance of training facilitating effective technology use. A specific barrier is the absence of training programs tailored to the diverse needs of healthcare professionals. This lack of tailored training can lead to resistance among employees, who may feel overwhelmed by the new technologies and unprepared to use them effectively in their practice (Borges Do Nascimento et al., 2023; Budd et al., 2020).

Another specific challenge seems to be the increasing sophistication of healthcare technologies. As these technologies evolve, they become more complex, increasing the cognitive load on healthcare professionals who must understand and integrate them into their daily practices (Hüsing, personal communication, February 23, 2024). This complexity can extend the time required for effective training, making it harder to quickly bring staff up to speed on new systems or tools (Isaksson, personal communication, March 8, 2024).

5.1.5.2 Scheduling Training

Interviews, particularly with Paulsson (personal communication, March 6, 2024), highlight the logistical challenges of integrating training programs into the busy schedules of healthcare professionals. This challenge is less emphasized in the literature but is a critical consideration for the practical implementation of training initiatives. Healthcare environments are high-pressure and time-sensitive, leaving little room for extensive learning sessions. This issue is compounded by the need for more comprehensive training to address the complexity of new technologies.

5.2 Barrier's Prioritization

Following the comparative analysis about the implementation barriers, we want to prioritize the barriers which will be an important step for strategizing interventions. By assessing the barriers' impact on digital health tool implementation, frequency of mention, and the level of difficulty in overcoming these barriers, as depicted in Table 6, we want to find the obstacles that most critically hinder the implementation process.

Barrier Category	Specific Barriers	Impact on Implementation (1-5)	Frequency of Mention (1-5)	Ease to Overcome (1-5)	Total Score
Compliance Barriers	Data Security Regulations	1	1	2	4
Technical Barriers	Interoperability AI	3	3	1	7
Organizational Barriers	Hierarchies Workflow Integration	4	3	2	9
Cultural Barriers	Resistance	4	4	3	11
Training-related Barriers	Training Tailoring Scheduling Training	5	3	3	10

Table 5: Barrier's Prioritization

The evaluation process involved assigning scores to each specific barrier within the categories based on three criteria: impact on implementation (rated 1-5), frequency of mention (rated 1-5), and ease to overcome (rated 1-5). Each criterion is assessed through a combination of qualitative insights from interview data and quantitative measures from our empirical findings. For example, the impact on implementation is measured by the extent to which a barrier disrupts or delays the adoption of digital tools, as observed in the healthcare settings we studied. Frequency of mention is determined by the number of times a particular barrier is referenced by our interviewees, reflecting its prevalence across different settings. The ease to overcome is evaluated based on existing successful interventions reported in the literature and practical experiences from our interviews, indicating the amount of effort and resources typically required to address the barrier.

The cumulative scores highlight the relative significance of each category in hindering the implementation of digital health tools. The analysis reveals that organizational, cultural, and training-related barriers emerge as the most significant obstacles. Organizational barriers, such as hierarchical structures and the integration of workflows, along with cultural barriers, notably resistance to change, and training-related barriers, including the tailoring of training materials and scheduling, collectively represent the primary challenges. These barriers have a high impact on the implementation process. Importantly, the assessment suggests that these barriers, while significant, are feasible to address within our change management model.

In contrast, technical barriers, such as issues related to interoperability and the ethical use of AI, and compliance barriers, notably data security and regulatory requirements, are identified

as prerequisites to the implementation process. Although critical, these barriers are inherently tied to the technical and regulatory foundations necessary for digital health solutions and thus are considered distinct from the change management perspective.

The prioritization of barriers based on this analysis is helpful for our strategic planning. By focusing on organizational, cultural, and training-related barriers, we aim to leverage our change management processes to address the most critical obstacles to implementation.

5.3 Change Management for Implementing Digital Health Tools

This chapter describes both the development process and the final change management model for implementing digital health tools. It outlines how we identified and addressed the prioritized organizational, cultural, and training-related challenges. The model presented integrates effective change management practices from both literature and real-world interviews, offering a comprehensive approach tailored to the specific context of digital health implementation.

5.3.1 Change Management Framework Components

In this section, we present Table 7. This table is specifically designed to tackle the prioritized - organizational, cultural, and training-related - challenges identified in sections 5.1.3 and 5.2. It systematically aligns effective change management components from both literature and interviews with the respective challenges. The table is structured to present each challenge alongside a targeted goal, and it pairs strategies recommended in the literature with those derived from real-world experiences. Each row identifies a specific challenge and outlines a corresponding goal that aims to mitigate these issues. The "Change Management Practices - Literature" column lists theoretical approaches, providing a structured framework based on established change management models. The "Change Management Practices - Interviews" column offers practical strategies suggested by professionals in the field, reflecting adaptive and context-specific solutions. The "Integration into our Proposed Framework" column indicates whether the practices from literature, interviews, or a combination of both will be adopted in the proposed change management framework. This selection reflects the applicability and effectiveness of each approach within the specific context of digital health implementation. Practices from literature and interviews are presented side-by-side not because they directly correspond, but because they offer complementary or alternative methods to tackle the same issue. For instance, while "Generate short-term wins" focuses on building momentum through recognizable successes, "Follow-ups" ensure sustained engagement and progress monitoring, both contributing to the overall success of the implementation process.

Challenge	Goal	Change Management Practices - Literature	Change Management Practices - Interviews	Integration into our Proposed Framework
Organizational Barriers				
Healthcare hierarchies and departmental silos	Common goals and metrics	Develop a vision and a strategy (Kotter)		Literature
	Building interdisciplinary teams for initiatives	Create a powerful guiding coalition (Kotter)	Change agents (Gunmalm and Alscher)	Combination
Aligning digital health tool integration with existing tasks	Streamline daily operations and reduce workload		Involvement of end-users in the selection process (Gunmalm)	Interview
	Minimizing disruption to existing tasks		Conducting needs assessment (Juhra)	Interview
	Continuous improvement	Generate short-term wins (Kotter)	Follow-ups (Rezai) and regular review meetings (Paulsson)	Combination
Disruption to traditional care models (e.g., in-person consultation versus telehealth)	Confidence about using the new tool	Generate short-term wins (Kotter)	Super users provide on-the-ground expertise (Isaksson)	Interview
Accuracy issues (e.g., incorrect data entry)	Enhanced user interface design for intuitive data entry	Design (McKinsey's 7S)	Involvement of end-users in the selection process (Gunmalm)	Interview
Gap between the theoretical ideal of digital integration and the practical realities	Improved acceptance and ease of use	Awareness (ADKAR)		Literature
Cultural Barriers				
Resistance due to concerns about changes leading to increased workload	Higher job satisfaction due to streamlined processes	Reinforcement (ADKAR)	Ongoing engagement and training of teams (Gunmalm)	Interview

Particularly older professionals showing apprehension	Personalized learning paths	Knowledge (ADKAR)	In-house competence center (Hüsing)	Interview
Early implementation resistance	Positive initial experience	Create short-term wins (Kotter)		Literature
Training-Related Barriers				
Resistance due to inadequate or lack of training	Increased technology adoption rates	Skill (McKinsey's 7S)	Constant support team (Juhra)	Combined
Extended training time due to the complexity of digital tools	Reduced needed training time due to peer-to-peer learning	Staff (McKinsey's 7S)	Simple on-the job (Alscher) and ad-hoc training (Möller)	Interview
Logistical Barriers of scheduling training	Flexible learning formats	Remove obstacles (Kotter)	Online and in-person training (Rezai)	Interview
	Efficient use of professional's available downtime		Strategic training scheduling (Alscher)	Interview

Table 6: Change Management Components for the Healthcare Sector

The complexity and specificity of the challenges uncovered during our investigation underscored the value of insights derived from interviews. These insights frequently offered more context-specific and actionable strategies for overcoming the identified barriers. Consequently, in the last column of our framework, we predominantly incorporated practices highlighted through interviews. However, in instances where interviewees did not offer specific practices for certain challenges seen as critical, we turned to theoretical models and literature to fill these gaps.

The presence of "unfilled" boxes within our table is noteworthy, as they mark areas where empirical insights or theoretical knowledge are absent. These gaps serve as a call to action, indicating where field experiences can inform and enhance theoretical frameworks and vice versa. By acknowledging these gaps, our framework fosters a continuous dialogue between empirical experiences and theoretical advancements, promoting a unified approach to digital health challenges. Moving forward, we will provide a detailed rationale behind each change management practice chosen for inclusion in our framework. Following each practice, a table will show the detailed framework placement, objectives, actions, and success metrics for the respective change management practice.

5.3.1.1 Change Management Practices to Overcome Organizational Barriers

Addressing departmental silos in healthcare organizations necessitates a foundational approach highlighted by Kotter’s change management framework. Developing a clear vision and strategy is crucial for aligning the organization towards common goals, as supported by change management literature (Haas et al., 2019). Although not explicitly mentioned by our interviewees, its significance for organizational coherence and unity. Table 8 details the first step of our change management framework: “Vision and Strategy”.

Placement	Before implementation
Objectives	Formulate an inclusive vision for digital tool integration.
	Align departmental goals with the organizational vision.
Actions	Host collaborative sessions to craft and agree on a shared vision.
	Distribute the vision and strategy organization wide.
Success Metrics	Survey on employee alignment with the vision.
	Count of cross-departmental collaborations.
	Tracking progress towards strategic milestones.

Table 7: Vision and Strategy

To tackle challenges linked to hierarchical structures in digitalization efforts, forming interdisciplinary teams merges Kotter’s guiding coalition concept with insights on change agents’ importance from interviews (Haas et al., 2019; Gunmalm, personal communication, February 22, 2024; Alscher, personal communication, February 18, 2024). This combination ensures leadership and direction but also cultivates broad-based support and engagement. Table 9 describes the third step of our change management framework: “Cross-functional Support Team”.

Placement	Before implementation
Objectives	Create cross-functional teams.
	Ensure the teams are led by individuals who can guide and motivate.
Actions	Assemble diverse change agents across departments.
	Empower these teams with the authority and resources to drive change.
Success Metrics	The establishment and effectiveness of interdisciplinary teams.
	Qualitative feedback on the impact of these teams on promoting change.

Table 8: Cross-functional Support Team

Interview findings support a dual strategy for digital health tool integration, focusing on user involvement in selection and conducting a needs assessment before implementation (Gunmalm, personal communication, February 22, 2024). This approach, emphasizing active user

participation for tool adoption, contrasts with literature that leans towards merely informing users. Active involvement ensures the tool meets user needs, enhancing usability - a practical consideration that may be missed by theoretical models like McKinsey’s 7S "design" practice (Jain & Kansal, 2023). Table 10 describes the second step of our change management framework: “End-User Involvement in Tool Selection”.

Placement	Before implementation
Objectives	Involve end-users in the decision-making process for tool selection.
	Identify digital tools that address specific, identified needs.
Actions	Initiate participatory decision-making forums with end-users.
Success Metrics	Alignment of tool functionality with identified needs.
	Usage rates and feedback from end-users post-implementation.

Table 9: End-User Involvement in Tool Selection

Further, in the context of aligning digital health tools with existing tasks, the principle of continuous improvement emerges as an important strategy. This approach is realized by integrating Kotter’s recommendation for generating short-term wins with the practice of holding regular review meetings for ongoing feedback (Haas et al., 2019; Rezai, personal communication, March 1, 2024; Paulsson, personal communication, March 6, 2024). Such a synergistic approach ensures a culture of motivation and adaptability, which is crucial for maintaining momentum and addressing new challenges that arise during the integration process. Table 11 describes the last step of our framework: “Sustain Change”.

Placement	After implementation
Objectives	Foster improvement and adaptation in the use of digital health tools.
	Achieve and recognize quick wins to maintain engagement.
Actions	Regular feedback and review sessions for continuous improvement.
	Highlight and celebrate quick wins.
Success Metrics	Insights and improvements from feedback sessions.
	Frequency and impact of recognized short-term wins.

Table 10: Sustain Change

In boosting confidence about using new digital tools, the employment of ‘super users’ was identified as a particularly effective strategy. This practice leverages peer-to-peer expertise and support, offering hands-on guidance that significantly reduces apprehension towards new technologies (Isaksson, personal communication, March 8, 2024). Contrary to Kotter’s suggestion of short-term wins (Haas et al., 2019), this strategy emphasizes the need for continuous, personalized support rather than immediate, visible successes. Table 12 describes the fifth step of our change management framework: “Super-User Selection”.

Placement	Before implementation
Objectives	Cultivate user confidence in using the new digital tools.
	Provide continuous, personalized support for users.
Actions	Identify and empower super users as peer-to-peer support resources.
Success Metrics	Feedback from super users regarding their effectiveness in helping users.

Table 11: Super-User Selection

Lastly, improving acceptance of new technologies was linked to the ADKAR model’s emphasis on “Awareness”. By educating users about the tool’s advantages and functionalities, a favorable environment for its adoption is established, highlighting the crucial role of awareness in driving change (Jaaron et al., 2022). However, interview findings indicate a notable gap in practice, where effective communication of these benefits often falls short, pointing to an area needing improvement to fully realize the potential of technology adoption initiatives. Table 13 describes the fourth step of our change management framework: “Awareness Building”.

Placement	Before implementation
Objectives	Increase user awareness of the new tool’s advantages and functionalities.
	Establish a favorable environment for tool adoption at the earliest stages.
Actions	Communicate the advantages and rationales for the digital tool prior to implementation.
Success Metrics	User feedback on the rationale and acceptance of the new tool’s implementation.
	Participation rates in early training sessions.

Table 12: Awareness Building

5.3.1.2 Change Management Practices to Overcome Cultural Barriers

In addition to overcoming organizational barriers, we have identified change management practices specifically designed to overcome cultural challenges. Firstly, a significant emphasis is placed on ongoing engagement and tailored training as key components to address concerns related to increased workload - a common source of resistance. This decision stems from the recognition that continuous support and education are important in combating apprehensions and facilitating a smoother transition for healthcare professionals (Gunmalm, personal communication, February 22, 2024). Unlike the post-implementation focus of the "Reinforcement" element in the ADKAR model, our approach advocates for proactive measures (Jaaron et al., 2022). Through this, we aim to preempt workload-related resistance by ensuring that staff feel supported and equipped with the necessary knowledge and skills from the beginning.

To specifically counter resistance among older professionals, our approach incorporates the establishment of in-house competence centers. Originating from insights gained through interviews, this initiative seeks to offer a tailored training solution at least within larger healthcare organizations. Such centers are designed to develop training programs that cater to the varied needs of healthcare professionals within a unified organizational framework. This recognizes and addresses the differences in digital literacy and roles across the staff, crafting a concentrated yet adaptable learning environment (Hüsing, personal communication, February 23, 2024). This strategy moves away from the generalized educational approach suggested by the ADKAR model’s focus on “Knowledge”, opting instead for a more personalized and practical solution to change management (Jaaron et al., 2022).

Furthermore, our framework identifies and seeks to fill a gap in addressing early implementation resistance. The lack of emphasis on combating early implementation resistance through positive initial experiences in the interviews suggests a gap that literature-based practices can fill. Kotter’s strategy of generating short-term wins can be particularly effective in this scenario. The approach can help mitigate resistance by demonstrating the benefits of the new tools in a tangible way, boosting motivation, and reinforcing the value of the digital transition (Haas et al., 2019). As the cultural barriers all relate to resistance, the table below provides different actions that tackle resistance-related challenges as these actions go hand-in-hand. Table 14 describes the sixth step of our change management framework: “Resistance Management”.

Placement	During implementation
Objectives	Minimize resistance by addressing concerns related to increased workload.
	Address the resistance faced by older professionals due to varying levels of digital literacy.
	Mitigate early implementation resistance by creating positive, tangible experiences with new digital tools.
Actions	Implement an ongoing engagement strategy that includes regular check-ins, feedback sessions, and accessible support channels.
	Design tailored training programs that are specific to the roles and responsibilities of different staff members.
	Only feasible for large healthcare institutions: Establish an in-house competence center that provides tailored on-demand training.
	Organize demonstration sessions where the immediate benefits of the new tools are showcased.

Success Metrics	Reduction in resistance and negative feedback related to workload concerns.
	Positive changes in staff competency and confidence in managing their workload post-training.
	Increased digital literacy rates among older healthcare professionals.
	Number and significance of short-term wins recognized within the first weeks/months of implementation.

Table 13: Resistance Management

5.3.1.3 Change Management Practices to Overcome Training-related Barriers

To effectively counter resistance due to inadequate training and meet the goal of enhancing technology adoption rates, it is recommended to emphasize the “Skill” dimension within the McKinsey’s 7S framework. This strategy involves assessing and filling skill gaps through customized training, ensuring that employees are prepared to use the new digital tools (Jain & Kansal, 2023). However, since the aspect of tailored training has been discussed in the preceding section, we will not reintroduce it as a new element of our change management model here. Instead, we propose the addition of a dedicated support team. This team will play an important role in addressing immediate challenges and questions that arise post-training and aids in fostering a culture of continuous learning and adaptability (Juhra, personal communication, March 13, 2024). Table 15 describes the ninth step of our change management framework: “Continuous Support”.

Placement	Throughout and after implementation
Objectives	Provide immediate, ongoing support to healthcare professionals.
	Sustain change.
Actions	Establish a dedicated support team that can support at any time.
	Develop a knowledge base filled with FAQs and instructional content, enabling healthcare professionals to self-serve common issues.
Success Metrics	Positive feedback on the accessibility, responsiveness, and effectiveness of the ongoing support mechanisms.
	Measurable decrease in downtime or disruption due to technological challenges faced by healthcare professionals.

Table 14: Continuous Support

In addressing the need to reduce training times while enriching learning outcomes, integrating ad-hoc training (Möller, personal communication, February 14, 2024) with peer-to-peer learning mechanisms (Alscher, personal communication, February 18, 2024) offers a pragmatic solution, favoring this approach over the broader concept of "staff" adjustments suggested by the McKinsey’s 7S model (Jain & Kansal, 2023). This method stands out for the quickness and

contextual relevance of informal learning amongst peers, promoting a collaborative learning culture. It effectively combines the need for fast and simple training using existing knowledge networks, proving particularly efficacious in the healthcare’s complex landscape. Table 16 describes the seventh step of our change management framework: “Peer-to-peer Training”.

Placement	During implementation
Objectives	Foster a dynamic, collaborative learning environment that enhances both the speed and quality of learning outcomes.
Actions	Utilize the super-users to promote peer-to-peer training.
	Make sure employees know about the super-users, encouraging them to seek them out for insight and guidance.
Success Metrics	Increased speed and efficiency in the spreading of critical skills.

Table 15: Peer-to-peer Training

Despite traditional literature’s limited focus on training flexibility, the dynamic nature of healthcare necessitates adaptable learning formats. Interviews suggest practical solutions, such as online and in-person training options (Rezai, personal communication, March 1, 2024) and scheduling training during midweek downtimes (Alscher, personal communication, February 18, 2024), to address the logistical challenges faced by healthcare professionals. Table 17 describes the eighth step of our change management framework: “Dynamic Training”.

Placement	During implementation
Objectives	Offer training formats that cater to the varying schedules and learning preferences of healthcare professionals, enhancing participation.
	Utilize strategic scheduling to mitigate common logistical barriers to training, ensuring maximum accessibility
Actions	Implement a hybrid training model, providing both online and in-person options.
	Schedule training sessions during identified downtimes.
Success Metrics	Adaptability in training participation, with healthcare professionals able to balance learning with their demanding work schedules effectively.

Table 16: Dynamic Training

5.3.2 Change Management Framework for Digital Health Tool Implementation

In crafting our change management framework for digital health tool implementation, we have carefully sequenced the ten explicit steps identified above, ensuring that each phase is distinct and builds cohesively on the last. The preconditions were directly drawn from our finding’s section. The following model (Figure 6) is the route, with each step within it described in detail in the tables from the previous section. This guide is designed to lead healthcare organizations

through the complexities of digital transformation, providing a structured pathway for smooth and effective digital tool integration.

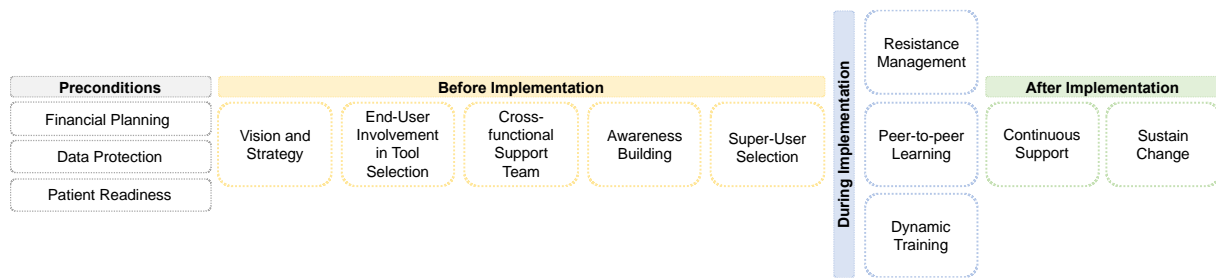


Figure 6: Change Management Process for Digital Health Tool Implementation

Three preconditions must be met to start the implementation process:

- **Financial Planning:** Budget allocation
- **Data Protection:** Data protection measures need to be in place before integrating a new digital tool.
- **Patient Readiness:** Making sure that patients will accept the new digital tool (such as online calendars for booking appointments) is important prior to the tool’s integration.

Prior to the actual implementation of the digital health tools, there are five crucial steps:

1. **Vision and Strategy:** Craft and communicate the vision and the strategy organization wide.
2. **End-User Involvement in Tool Selection:** Involve end-users in the decision-making process for tool selection to address their specific needs.
3. **Cross-functional Support Team:** Create a cross-functional support team that guides the implementation.
4. **Awareness Building:** Communicate the advantages and rationales for the digital tool implementation to increase user awareness of the tool’s functionalities.
5. **Super-User Selection:** Identify and empower super users as peer-to-peer resources.

During the implementation, the following three steps should simultaneously be considered to make sure staff gets comfortable in using the tools:

6. **Resistance Management:** Implement an ongoing engagement strategy that includes regular check-ins and provide tailored training programs that are specific to the responsibilities and digital literacy level of different staff members.
7. **Peer-to-peer Training:** Utilize the selected super-users to promote peer-to-peer training and make sure employees know about them to seek help.

8. Dynamic Training: Provide online and in-person training options during identified downtimes.

The final stage focuses on the long-term success of the digital tool implementation and encompasses two steps to follow:

9. Continuous Support: Provide ongoing support through the support team.
10. Sustain Change: Celebrate short-term wins to maintain engagement among healthcare professionals and incorporate feedback sessions with end-users for reviewing the change process.

5.3.2.1 Limitations of the Change Management Framework

The limitations of this framework are largely dependent on the availability of resources in an organization, namely financial and human resources. In terms of financial limitations, smaller institutions might not have the budget that a full-scale use of this framework necessitates. The financial investment required to develop a cross-functional support team can be excessive with strict budget constraints. In essence, smaller healthcare institutions generally have a narrow room for comprehensive implementations of digital tools and will have to analyze the framework and decide which parts are feasible for their specific preconditions.

Regarding human capital, the framework assumes availability of employees that can undertake the role of, for example, super-users. Smaller institutions with a limited staff might find this step challenging as their personnel usually cover fundamental tasks with less room for additional duties. If an institution has a significant scarcity of human resources, it might not have the opportunity to assign time-consuming roles during the implementation. These limitations should work as incentives to, during the preparation phase, analyze the current stage of the organization to identify which steps are feasible. However, if possible, the recommendation from this research is to follow the sequential framework in its entirety.

6 Conclusion

This thesis explored the integration of digital health solutions within healthcare systems, employing a structured analysis that identifies and addresses the significant barriers and facilitators affecting this process. Through a comprehensive literature review followed by qualitative interviews with healthcare professionals, the study has systematically mapped out the challenges and developed a tailored change management framework to support the effective adoption of digital health technologies.

In response to our first research question regarding the barriers to integrating digital health solutions within healthcare systems, our findings emphasize that organizational, cultural, and training-related barriers are not only significant but can also be feasibly addressed through change management strategies. These barriers, highlighted through a detailed analysis of empirical data and literature review, present notable challenges yet offer viable opportunities for effective intervention. Organizational barriers, such as rigid hierarchical structures and difficulties integrating new technologies into existing workflows, typically induce resistance and disrupt established practices. Cultural barriers, manifested in resistance to change among healthcare professionals, significantly impact the adoption process by shaping attitudes and behaviors towards new technologies. Additionally, training-related barriers, which include both the availability and quality of training programs for healthcare staff, are critical for ensuring competent use and integration of digital health technologies.

In the context of our second research question, our study has explored how to optimize change management strategies to effectively address the challenges of integrating digital health technologies within healthcare systems. This exploration has led to the development of a comprehensive change management framework, detailed in Figure 6, which provides a structured approach to implementing these strategies in various healthcare settings. The findings emphasize the critical role of targeted change management interventions that specifically address the prominent barriers: organizational structure, cultural resistance, and training deficiencies.

Key to successful integration is the engagement of healthcare professionals through tailored training and education programs that align with their daily workflows and address specific technological integrations. For instance, introducing role-specific training modules that include interactive simulations could help mitigate resistance by demonstrating the practical benefits of new digital tools in real-time, fostering a more receptive environment.

Organizational barriers, such as rigid hierarchical structures and siloed departments, require strategies that promote interdepartmental collaboration and open communication channels. Implementing cross-functional teams and regular feedback loops can bridge gaps between different units, ensuring a smoother implementation of digital technologies. An example from our findings showed how creating mixed teams of IT professionals and healthcare staff for joint problem-solving sessions led to more innovative solutions and increased buy-in from users.

Cultural resistance, often rooted in fears of increased workload or changes to established practices, can be addressed by clearly communicating the benefits of digital health technologies not only for the healthcare system but also for individual healthcare providers. Change management strategies must include a strong emphasis on demonstrating how these technologies can streamline tasks and enhance job satisfaction.

Furthermore, our study suggests that continuous adaptation of change management strategies is crucial. As digital health technology evolves, so should the approaches to managing its integration. This involves not only adapting to new technologies but also continuously evaluating and improving the change management processes themselves to keep pace with technological advancements.

6.1 Implications for Practice and Research

As we transition into discussing the broader implications, we elaborate on the practical applications of our framework and suggest directions for future research to enhance the integration and effectiveness of digital health solutions. The developed change management framework serves as a strategic tool to navigate organizational, cultural, and training-related barriers effectively. For healthcare organizations aiming to integrate digital technologies successfully, it is essential to not only adopt but also adapt this framework to fit their specific contexts. This involves a deep understanding of their unique organizational needs, challenges, and the specific barriers that might hinder digital technology integration.

Besides practical implications, further research is essential. To validate and refine the proposed framework, there is a critical need for longitudinal studies that examine its effectiveness over time. Such research would provide valuable insights into how change management strategies influence the long-term adoption and sustainability of digital health technologies. These studies would also help in understanding the adaptation processes within organizations post-implementation.

Moreover, it is essential to consider the potential impact of including other stakeholders within

the healthcare sector, such as policymakers or public decision-makers, as discussed in subchapter 2.2.1. Integrating these stakeholders into the research process could make the findings even more insightful, potentially offering valuable perspectives and insights that enrich the overall understanding of digital health technology adoption and integration within healthcare systems. For instance, policymakers and public decision-makers often have insights into the broader healthcare landscape, including regulatory frameworks, funding mechanisms, and strategic priorities. Their involvement in the research process could provide additional context on how external factors influence the implementation and integration of digital health technologies within healthcare organizations. Additionally, policymakers may have different perspectives on the prioritization of resources and the allocation of funding, which could shape the adoption and sustainability of digital health initiatives.

Further research should also aim to explore the application of digital health solutions across different healthcare environments. This includes conducting comparative studies across various geographic and socio-economic contexts to understand how contextual factors influence the effectiveness of digital health technologies and change management strategies. Such research would broaden the applicability and robustness of the change management framework.

Finally, it is essential to test the framework in real-world settings to evaluate its practicality and impact. Pilot studies could be employed to refine the framework based on empirical evidence and feedback from end-users and stakeholders. This would help in making necessary adjustments to enhance its relevance and effectiveness in diverse healthcare scenarios. By addressing these practical and research implications, we can ensure that digital health technologies are not only implemented but are also sustainable and transformative in improving patient care and operational efficiency in healthcare systems.

References

- Aapro, M., Bossi, P., Dasari, A., Fallowfield, L., Gascón, P., Geller, M., Jordan, K., Kim, J., Martin, K., & Porzig, S. (2020). Digital health for optimal supportive care in oncology: Benefits, limits, and future perspectives. *Supportive Care in Cancer*, 28(10), 4589–4612. <https://doi.org/10.1007/s00520-020-05539-1>
- Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., Aldairem, A., Alrashed, M., Bin Saleh, K., Badreldin, H. A., Al Yami, M. S., Al Harbi, S., & Albekairy, A. M. (2023). Revolutionizing healthcare: The role of artificial intelligence in clinical practice. *BMC Medical Education*, 23(1), 689. <https://doi.org/10.1186/s12909-023-04698-z>
- Angst & Agarwal. (2009). Adoption of Electronic Health Records in the Presence of Privacy Concerns: The Elaboration Likelihood Model and Individual Persuasion. *MIS Quarterly*, 33(2), 339. <https://doi.org/10.2307/20650295>
- Awad, A., Trenfield, S. J., Pollard, T. D., Ong, J. J., Elbadawi, M., McCoubrey, L. E., Goyanes, A., Gaisford, S., & Basit, A. W. (2021). Connected healthcare: Improving patient care using digital health technologies. *Advanced Drug Delivery Reviews*, 178, 113958. <https://doi.org/10.1016/j.addr.2021.113958>
- Baines, R., Hoogendoorn, P., Stevens, S., Chatterjee, A., Ashall-Payne, L., Andrews, T., & Leigh, S. (2023). Navigating Medical Device Certification: A Qualitative Exploration of Barriers and Enablers Amongst Innovators, Notified Bodies and Other Stakeholders. *Therapeutic Innovation & Regulatory Science*, 57(2), 238–250. <https://doi.org/10.1007/s43441-022-00463-4>
- Batalden, M., Batalden, P., Margolis, P., Seid, M., Armstrong, G., Opipari-Arrigan, L., & Hartung, H. (2016). Coproduction of healthcare service. *BMJ Quality & Safety*, 25(7), 509–517. <https://doi.org/10.1136/bmjqs-2015-004315>
- Begoli, E., Bhattacharya, T., & Kusnezov, D. (2019). The need for uncertainty quantification in machine-assisted medical decision making. *Nature Machine Intelligence*, 1(1), 20–23. <https://doi.org/10.1038/s42256-018-0004-1>
- Biesdorf, S., Möller, M., & Thomas, F. (2018). Barriers to Digital@Scale: Shifting the focus from tech to culture. *McKinsey Insights*. <https://www.mckinsey.com/industries/life-sciences/our-insights/barriers-to-digital-at-scale-shifting-the-focus-from-tech-to-culture#/>

- Boonstra, A., & Broekhuis, M. (2010). Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC Health Services Research*, *10*(1), 231. <https://doi.org/10.1186/1472-6963-10-231>
- Borg, K., Boulet, M., Smith, L., & Bragge, P. (2019). Digital Inclusion & Health Communication: A Rapid Review of Literature. *Health Communication*, *34*(11), 1320–1328. <https://doi.org/10.1080/10410236.2018.1485077>
- Borges Do Nascimento, I. J., Abdulazeem, H., Vasanthan, L. T., Martinez, E. Z., Zucoloto, M. L., Østengaard, L., Azzopardi-Muscat, N., Zapata, T., & Novillo-Ortiz, D. (2023). Barriers and facilitators to utilizing digital health technologies by healthcare professionals. *Npj Digital Medicine*, *6*(1), 161. <https://doi.org/10.1038/s41746-023-00899-4>
- Bryman, A., Bell, E., & Harley, B. (2022). *Business research methods* (Sixth edition). Oxford University Press.
- Budd, J., Miller, B. S., Manning, E. M., Lampos, V., Zhuang, M., Edelstein, M., Rees, G., Emery, V. C., Stevens, M. M., Keegan, N., Short, M. J., Pillay, D., Manley, E., Cox, I. J., Heymann, D., Johnson, A. M., & McKendry, R. A. (2020). Digital technologies in the public-health response to COVID-19. *Nature Medicine*, *26*(8), 1183–1192. <https://doi.org/10.1038/s41591-020-1011-4>
- By, R. T. (2005). Organisational change management: A critical review. *Journal of Change Management*, *5*(4), 369–380. <https://doi.org/10.1080/14697010500359250>
- Cao, G., Clarke, S., & Lehaney, B. (2004). The Need for a Systemic Approach to Change Management—A Case Study. *Systemic Practice and Action Research*, *17*(2), 103–126. <https://doi.org/10.1023/B:SPAA.0000018906.16607.cc>
- Cummings, S., Bridgman, T., & Brown, K. G. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin’s legacy for change management. *Human Relations*, *69*(1), 33–60. <https://doi.org/10.1177/0018726715577707>
- Danaher, T. S., & Gallan, A. S. (2016). Service Research in Health Care: Positively Impacting Lives. *Journal of Service Research*, *19*(4), 433–437. <https://doi.org/10.1177/1094670516666346>
- Deloitte. (2015). *Global Health Care Outlook: Common Goals, Competing Priorities*.
- Ding, X., Clifton, D., Ji, N., Lovell, N. H., Bonato, P., Chen, W., Yu, X., Xue, Z., Xiang, T.,

- Long, X., Xu, K., Jiang, X., Wang, Q., Yin, B., Feng, G., & Zhang, Y.-T. (2021). Wearable Sensing and Telehealth Technology with Potential Applications in the Coronavirus Pandemic. *IEEE Reviews in Biomedical Engineering*, *14*, 48–70. <https://doi.org/10.1109/RBME.2020.2992838>
- Fagherazzi, G., Goetzinger, C., Rashid, M. A., Aguayo, G. A., & Huiart, L. (2020). Digital Health Strategies to Fight COVID-19 Worldwide: Challenges, Recommendations, and a Call for Papers. *Journal of Medical Internet Research*, *22*(6), e19284. <https://doi.org/10.2196/19284>
- Fatima, A., & Colomo-Palacios, R. (2018). Security aspects in healthcare information systems: A systematic mapping. *Procedia Computer Science*, *138*, 12–19. <https://doi.org/10.1016/j.procs.2018.10.003>
- Fortney, J. C., Burgess, J. F., Bosworth, H. B., Booth, B. M., & Kaboli, P. J. (2011). A Re-conceptualization of Access for 21st Century Healthcare. *Journal of General Internal Medicine*, *26*(S2), 639. <https://doi.org/10.1007/s11606-011-1806-6>
- Garg, S., Williams, N. L., Ip, A., & Dicker, A. P. (2018). Clinical Integration of Digital Solutions in Health Care: An Overview of the Current Landscape of Digital Technologies in Cancer Care. *JCO Clinical Cancer Informatics*, *2*, 1–9. <https://doi.org/10.1200/CCI.17.00159>
- Gentili, A., Failla, G., Melnyk, A., Puleo, V., Tanna, G. L. D., Ricciardi, W., & Cascini, F. (2022). The cost-effectiveness of digital health interventions: A systematic review of the literature. *Frontiers in Public Health*, *10*, 787135. <https://doi.org/10.3389/fpubh.2022.787135>
- Gutiérrez-Hernández, P., & Abásolo-Alessón, I. (2021). The health care sector in the economies of the European Union: An overview using an input–output framework. *Cost Effectiveness and Resource Allocation*, *19*(1), 4. <https://doi.org/10.1186/s12962-021-00258-8>
- Haas, M., Munzer, B., Santen, S., Hopson, L., Haas, N., Overbeek, D., Peterson, W., Cranford, J., & Huang, R. (2019). #DidacticsRevolution: Applying Kotter’s 8-Step Change Management Model to Residency Didactics. *Western Journal of Emergency Medicine*, *21*(1), 65–70. <https://doi.org/10.5811/westjem.2019.11.44510>
- Haas, S., Wohlgemuth, S., Echizen, I., Sonehara, N., & Müller, G. (2011). Aspects of privacy for electronic health records. *International Journal of Medical Informatics*, *80*(2), e26–e31. <https://doi.org/10.1016/j.ijmedinf.2010.10.001>
- Hellström, A., & Ekstedt, M. (2018). Synergy of patients and health professional in successful implementation of digital health tools. *International Journal of Integrated Care*, *18*(s2), 371.

<https://doi.org/10.5334/ijic.s2371>

Hwang, J., & Christensen, C. M. (2008). Disruptive Innovation In Health Care Delivery: A Framework For Business-Model Innovation. *Health Affairs*, 27(5), 1329–1335. <https://doi.org/10.1377/hlthaff.27.5.1329>

Imison, C., Castle-Clarke, S., Watson, R., & Edwards, N. (2016). *Delivering the benefits of digital health care*. Nuffield Trust.

Isett, K. R., Glied, S. A. M., Sparer, M. S., & Brown, L. D. (2013). When Change Becomes Transformation: A case study of change management in Medicaid offices in New York City. *Public Management Review*, 15(1), 1–17. <https://doi.org/10.1080/14719037.2012.686230>

Jaaron, A. A. M., Hijazi, I. H., & Musleh, K. I. Y. (2022). A conceptual model for adoption of BIM in construction projects: ADKAR as an integrative model of change management. *Technology Analysis & Strategic Management*, 34(6), 655–667. <https://doi.org/10.1080/09537325.2021.1915975>

Jain, N., & Kansal, J. (2023). Application of McKinsey 7S framework as a strategic tool for a knowledge based Organizational Development. *IEEE Engineering Management Review*, 1–41. <https://doi.org/10.1109/EMR.2023.3338966>

Kelly, C. J., Karthikesalingam, A., Suleyman, M., Corrado, G., & King, D. (2019). Key challenges for delivering clinical impact with artificial intelligence. *BMC Medicine*, 17(1), 195. <https://doi.org/10.1186/s12916-019-1426-2>

Klinton, J. (2020). *The Private Health Sector: An Operational Definition*.

Kraus, S., Schiavone, F., Pluzhnikova, A., & Invernizzi, A. C. (2021). Digital transformation in healthcare: Analyzing the current state-of-research. *Journal of Business Research*, 123, 557–567. <https://doi.org/10.1016/j.jbusres.2020.10.030>

Lawrence, G. A., & Frater, T. G. (2017). Change Mangement in healthcare: Managing paradigmatic change in the Australian Natiuonal Cervical Screening Programme. *New Zealand Journal of Medical Laboratory Science*, 71 (2), 31–39.

Lehne, M., Sass, J., Essenwanger, A., Schepers, J., & Thun, S. (2019). Why digital medicine depends on interoperability. *Npj Digital Medicine*, 2(1), 79. <https://doi.org/10.1038/s41746-019-0158-1>

Lluch, M. (2011). Healthcare professionals' organisational barriers to health information

technologies—A literature review. *International Journal of Medical Informatics*, 80(12), 849–862. <https://doi.org/10.1016/j.ijmedinf.2011.09.005>

Long, K. M., McDermott, F., & Meadows, G. N. (2018). Being pragmatic about healthcare complexity: Our experiences applying complexity theory and pragmatism to health services research. *BMC Medicine*, 16(1), 94. <https://doi.org/10.1186/s12916-018-1087-6>

Maresova, P., Hajek, L., Krejcar, O., Storek, M., & Kuca, K. (2020). New Regulations on Medical Devices in Europe: Are They an Opportunity for Growth? *Administrative Sciences*, 10(1), 16. <https://doi.org/10.3390/admsci10010016>

Marwaha, J. S., Landman, A. B., Brat, G. A., Dunn, T., & Gordon, W. J. (2022). Deploying digital health tools within large, complex health systems: Key considerations for adoption and implementation. *Npj Digital Medicine*, 5(1), 13. <https://doi.org/10.1038/s41746-022-00557-1>

Mintrom, M., & Norman, P. (2009). Policy Entrepreneurship and Policy Change. *Policy Studies Journal*, 37(4), 649–667. <https://doi.org/10.1111/j.1541-0072.2009.00329.x>

Mitchell, M., & Kan, L. (2019). Digital Technology and the Future of Health Systems. *Health Systems & Reform*, 5(2), 113–120. <https://doi.org/10.1080/23288604.2019.1583040>

Murray, E., Hekler, E. B., Andersson, G., Collins, L. M., Doherty, A., Hollis, C., Rivera, D. E., West, R., & Wyatt, J. C. (2016). Evaluating Digital Health Interventions. *American Journal of Preventive Medicine*, 51(5), 843–851. <https://doi.org/10.1016/j.amepre.2016.06.008>

Nilsen, P., Seing, I., Ericsson, C., Birken, S. A., & Schildmeijer, K. (2020). Characteristics of successful changes in health care organizations: An interview study with physicians, registered nurses and assistant nurses. *BMC Health Services Research*, 20(1), 147. <https://doi.org/10.1186/s12913-020-4999-8>

Odone, A., Buttigieg, S., Ricciardi, W., Azzopardi-Muscat, N., & Staines, A. (2019). Public health digitalization in Europe. *European Journal of Public Health*, 29(Supplement_3), 28–35. <https://doi.org/10.1093/eurpub/ckz161>

Patino, C. M., & Ferreira, J. C. (2018). Inclusion and exclusion criteria in research studies: Definitions and why they matter. *Jornal Brasileiro de Pneumologia*, 44(2), 84–84. <https://doi.org/10.1590/s1806-37562018000000088>

Pereno, A., & Eriksson, D. (2020). A multi-stakeholder perspective on sustainable healthcare: From 2030 onwards. *Futures*, 122, 102605. <https://doi.org/10.1016/j.futures.2020.102605>

- Qi, J., Yang, P., Min, G., Amft, O., Dong, F., & Xu, L. (2017). Advanced internet of things for personalised healthcare systems: A survey. *Pervasive and Mobile Computing*, *41*, 132–149. <https://doi.org/10.1016/j.pmcj.2017.06.018>
- Rieke, N., Hancox, J., Li, W., Milletari, F., Roth, H. R., Albarqouni, S., Bakas, S., Galtier, M. N., Landman, B. A., Maier-Hein, K., Ourselin, S., Sheller, M., Summers, R. M., Trask, A., Xu, D., Baust, M., & Cardoso, M. J. (2020). The future of digital health with federated learning. *Npj Digital Medicine*, *3*(1), 119. <https://doi.org/10.1038/s41746-020-00323-1>
- Schlieter, H., Marsch, L. A., Whitehouse, D., Otto, L., Londral, A. R., Teepe, G. W., Benedict, M., Ollier, J., Ulmer, T., Gasser, N., Ultsch, S., Wollschlaeger, B., & Kowatsch, T. (2022). Scale-up of Digital Innovations in Health Care: Expert Commentary on Enablers and Barriers. *Journal of Medical Internet Research*, *24*(3), e24582. <https://doi.org/10.2196/24582>
- Simpson, E., Brown, R., Sillence, E., Coventry, L., Lloyd, K., Gibbs, J., Tariq, S., & Durrant, A. C. (2021). Understanding the Barriers and Facilitators to Sharing Patient-Generated Health Data Using Digital Technology for People Living With Long-Term Health Conditions: A Narrative Review. *Frontiers in Public Health*, *9*, 641424. <https://doi.org/10.3389/fpubh.2021.641424>
- Statista Market Insights. (2023). *Digital Health—Worldwide*. <https://www.statista.com/outlook/hmo/digital-health/worldwide#revenue>
- Tengland, P.-A. (2006). The goals of health work: Quality of life, health and welfare. *Medicine, Health Care and Philosophy*, *9*(2), 155–167. <https://doi.org/10.1007/s11019-005-5642-5>
- Tomasella, F., & Morgan, H. M. (2021). “Sometimes I don’t have a pulse ... and I’m still alive!” Interviews with healthcare professionals to explore their experiences of and views on population-based digital health technologies. *DIGITAL HEALTH*, *7*, 205520762110183. <https://doi.org/10.1177/20552076211018366>
- Torab-Miandoab, A., Samad-Soltani, T., Jodati, A., & Rezaei-Hachesu, P. (2023). Interoperability of heterogeneous health information systems: A systematic literature review. *BMC Medical Informatics and Decision Making*, *23*(1), 18. <https://doi.org/10.1186/s12911-023-02115-5>
- Van Velthoven, M. H., & Cordon, C. (2019). Sustainable Adoption of Digital Health Innovations: Perspectives From a Stakeholder Workshop. *Journal of Medical Internet Research*, *21*(3), e11922. <https://doi.org/10.2196/11922>

Vicente, A. M., Ballensiefen, W., & Jönsson, J.-I. (2020). How personalised medicine will transform healthcare by 2030: The ICPeMed vision. *Journal of Translational Medicine*, 18(1), 180. <https://doi.org/10.1186/s12967-020-02316-w>

Viswanadham, N. (2021). Ecosystem model for healthcare platform. *Sādhanā*, 46(4), 188. <https://doi.org/10.1007/s12046-021-01708-y>

Whitelaw, S., Pellegrini, D. M., Mamas, M. A., Cowie, M., & Van Spall, H. G. C. (2021). Barriers and facilitators of the uptake of digital health technology in cardiovascular care: A systematic scoping review. *European Heart Journal - Digital Health*, 2(1), 62–74. <https://doi.org/10.1093/ehjdh/ztab005>

WHO. (2020). Quality health services. *World Health Organization*. <https://www.who.int/news-room/fact-sheets/detail/quality-health-services>

WHO. (2024). WHO remains firmly committed to the principles set out in the preamble to the Constitution. *World Health Organization*. <https://www.who.int/about/accountability/governance/constitution>

Appendices

Appendix 1: Interview Guide for Management/ C-suite Roles

BACKGROUND QUESTIONS	Questions: Could you provide an overview of your company’s structure and primary functions? What is your position within the company?	Follow-Up Questions: Which digital tools are implemented within your organization?
STRATEGIC ALIGNMENT	Question: How do digital health technologies that you implement align with your organization’s strategic goals and objectives?	Follow-Up Questions: Impacts? Goals?
CHALLENGES AND BARRIERS	Question: When you adopted new digital health tools, could you identify specific challenges or barriers encountered during the change process?	Follow-Up Questions: How were these handled? Unexpected issues?
CHANGE MANAGEMENT STRATEGIES	Question: What specific change management strategies were employed to facilitate the adoption of digital health technologies?	Follow-Up Questions: Staff feedback? Effectiveness of strategies?
CHANGE AGENTS AND LEADERSHIP ROLES	Question: Who were the key change agents, and how was their role utilized to carry through the change process?	Follow-Up Questions: Effectiveness of change agents/supporters?
LEADERSHIP IN CHANGE PROCESSES	Question: Which leadership styles or managerial practices in managing change did you use during the change process?	Follow-Up Questions: Staff engagement? Impact of leadership style?
COMMUNICATION TACTICS	Question: Did you encounter resistance to change? If yes, what communication tactics were used to address this?	Follow-Up Questions: Effectiveness of information/communication?
TRAINING AND SUPPORT SYSTEMS	Question: How were training and support systems structured to assist staff in adapting to the new technologies?	Follow-Up Questions: Accessibility/continuity of support/training? Staff competence?

MONITORING AND EVALUATION	Question: How did you monitor and evaluate the effectiveness of the change management strategies, as well as the technologies themselves?	Follow-Up Questions: Metrics? Extent of technology implementation? Refinement of strategies?
IMPACT ON ORGANIZATIONAL CULTURE	Question: How, if at all, has the adoption of digital health technologies impacted the organizational culture?	Follow-Up Questions: Employee morale? Cultural shifts?
EMPLOYEE FEEDBACK AND INVOLVEMENT	Question: How was employee feedback and involvement incorporated into the change management process?	Follow-Up Questions: Extent of active participation? Extent of employee involvement and its correlation with satisfaction?
SUSTAINING CHANGES	Question: After the digital health technology's adoption, are there any measures in place to ensure that everyone uses the technology?	Follow-Up Questions: Strategies to make change permanent? Ongoing challenges? Strategic refinements?
KEY TAKEAWAYS AND FUTURE CHANGES	Question: What lessons were learned during the change process, what would you do differently in future technology adoption initiatives?	Follow-Up Questions: Key takeaways? Future strategies?
END	Question: Is there anything else you want to add? Do you know of any other people within your company that could be a potential interview partner?	

Appendix 2: Interview Guide for Healthcare Professionals (e.g., doctors/nurses)

BACKGROUND QUESTIONS	Questions: Could you provide an overview of your company's structure and primary functions? What is your position within the company?	Follow-Up Questions: Which digital tools are implemented within your organization?
EXPERIENCE WITH DIGITAL HEALTH TECHNOLOGIES	Question: How have digital health technologies been integrated into your daily practice? How was your first reaction when you found out that the tools would be implemented?	Follow-Up Questions: Challenges? Specific tools? User experience?
PERCEIVED BENEFITS	Question: What benefits, if any, have you noticed from using these technologies (in patient care)?	Follow-Up Questions: Examples? Patient feedback? Efficiency/effectiveness?
CHALLENGES AND BARRIERS	Question: What are the main challenges you have encountered during the adoption of digital health technologies?	Follow-Up Questions: Strategies to overcome challenges?
TRAINING AND SUPPORT	Question: Was the training/support you received for using these technologies adequate? What was good, what could have been better?	Follow-Up Questions: Quality and extent of training/support? Unmet needs? Continuous support?
WORKFLOW AND TIME MANAGEMENT	Question: How have these technologies affected your workflow and time management?	Follow-Up Questions: Efficiency changes? Workload changes? Timesaving?
COMMUNICATION WITH PATIENTS	Question: How do these technologies influence your communication with patients?	Follow-Up Questions: Patient engagement/involvement? Limits to technology?
COLLABORATION	Question: How do digital health technologies affect collaboration with other healthcare professionals?	Follow-Up Questions: Any improvements in coordination and hence effectiveness?
PERSONAL DEVELOPMENT	Question: How, if at all, have these technologies contributed to your professional development and learning?	Follow-Up Questions: Learning? Growth? Quality of care outcome?
ETHICAL CONCERNS	Question: Have you faced any ethical or	Follow-Up Questions: Specific examples?

**FUTURE
EXPECTATIONS
AND
IMPROVEMENTS**

END

privacy concerns while using digital health technologies?
(Patient data/security)

Question:

What are your expectations or hopes for the future when it comes to the way that digital health tools are being implemented?

Question:

Is there anything else you want to add?

Do you know of any other people within your company that could be a potential interview partner?

Handling challenges?
Connection to support etc. during implementation of new technologies?

Follow-Up Questions:

Implementation concerns/hopes?