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**DLT-Driven Hiring and Onboarding: Transforming Hospital
Workforce Management using Activity Theory**

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Abstract

In an era where efficiency is crucial, community hospitals in Ontario face significant challenges due to fragmented and inefficient hiring and onboarding processes. This research explores the potential of integrating Distributed Ledger Technology (DLT) to address these inefficiencies, using Activity Theory as a framework to identify contradictions and areas for improvement. The study employs a novel qualitative approach, leveraging advanced text analytics through ChatGPT to analyze grey literature sources, including vlogs from consultant websites, articles, and YouTube videos. These insights are synthesized into comprehensive personas that capture the specific frustrations and bottlenecks faced in current practices.

The research does not seek to directly implement DLT in hospitals but rather to understand how such innovative technology could improve transparency, streamline operations, and enhance workforce management. The primary deliverable is a strategic white paper that maps the identified inefficiencies against DLT applications, providing actionable insights and recommendations specifically tailored for ConsidraCare, a company specializing in in-home senior care services. By addressing onboarding delays and operational inefficiencies, the study paves the way for a more systematic and transparent hiring process, ultimately suggesting a transformative approach for future technological adoption in healthcare settings.

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Chapter 1: Introduction

At the core of healthcare transformation lies the critical task of hiring and onboarding a process often hindered by inefficiencies and outdated methodologies. ConsidraCare, a company at the vanguard of in-home senior care services, has recognized the pressing need to refine this process within community hospitals. This research proposal is tailored to reimagine the hiring and onboarding landscape, leveraging the analytical expertise of Activity Theory and the revolutionary potential of Distributed Ledger Technology (DLT).

Through a detailed qualitative analysis and synthesis of data, this study endeavors to construct a comprehensive baseline activity model, unveiling the current process's inherent inefficiencies. With the deployment of advanced tools like ChatGPT for content analysis and persona development, the project will delve into the gray literature to extract actionable insights and identify contradictions within the current onboarding activities.

The ambition is to present a cogent short white paper that not only maps out the challenges but also aligns DLT opportunities with process enhancements to rectify the existing market state. By navigating through the intricacies of human-resource interactions and data management within healthcare staffing, this report sets the stage for a strategic overhaul, aiming to expedite onboarding processes, bolster operational efficiency, and ultimately, enhance patient care.

1.1 Objective

The primary objective of this research is to map and analyse the hiring and onboarding processes in community hospitals, with the aim of identifying inefficiencies and areas for

improvement. By applying Activity Theory and process modelling techniques, the study seeks to provide a detailed understanding of the existing challenges within these processes. Additionally, the research explores the potential of Distributed Ledger Technology (DLT) as a solution to address these identified inefficiencies. The culmination of this study is the development of a comprehensive whitepaper, which offers strategic recommendations for enhancing the efficiency and effectiveness of hiring and onboarding practices in community hospitals through the implementation of DLT.

1.2 Deliverables

Baseline Activity Model and Process Inefficiencies in Community Hospitals: Develop a comprehensive baseline model identifying current inefficiencies and challenges in the hiring and onboarding processes.

Detailed Process of Extracting and Synthesizing Data Using ChatGPT: Document the methodology of using ChatGPT for data extraction, synthesis, and analysis of grey literature, including blogs, articles, and YouTube videos.

Identification of Key Processes and Inefficiencies Using ChatGPT: Identify specific processes and inefficiencies in the current onboarding practices through mining grey literature and persona development.

Identification of Contradictions Using Activity Theory: Analyze and document contradictions within the existing activity systems using Activity Theory, highlighting the key areas where these contradictions impact the onboarding process.

Revised Activity Model Integrating DLT Solutions: Propose a revised model that integrates DLT solutions to address identified inefficiencies and contradictions.

Strategic White Paper: Develop a white paper that maps contradictions and inefficiencies in onboarding to opportunities for DLT application, providing strategic recommendations tailored to the client's context.

1.3 Relevance

The relevance of this research for ConsidraCare is multifaceted and significant. By addressing the persistent delays in hiring, onboarding, and orientation processes within healthcare staffing, particularly in community hospitals, ConsidraCare positions itself to offer more efficient, cost-effective solutions to these institutions. The application of Distributed Ledger Technology (DLT), grounded in the principles of Activity Theory and complemented by process modelling, presents a strategic advantage. The white paper resulting from this research serves not only as an analytical tool but also as a compelling sales asset, delivering the benefits of DLT solutions for the challenges currently faced by hospitals.

Moreover, this project aligns ConsidraCare's operational capabilities with emerging technological advancements, promoting a forward-thinking reputation in the healthcare industry. The emphasis on DLT can streamline data management and enhance process transparency, leading to error reduction in staffing practices. This directly contributes to improved operational efficiency and patient care—the core of ConsidraCare's mission.

Furthermore, the identification of process inefficiencies and mapping of DLT opportunities through this research provide a clear framework for action. ConsidraCare can use these insights to advocate for and implement changes that not only benefit their internal operations but also provide a scalable model for healthcare staffing solutions across the sector.

1.4 Known and Not Known

ConsidraCare is expanding its services by introducing Western-standard healthcare for senior citizens, reflecting a growth trajectory focused on enhancing care quality. The company's

mission stems from a concern over the mistreatment of seniors, particularly highlighted during the COVID-19 crisis. ConsidraCare is dedicated to restoring dignity, integrity, and compassion in caregiving by offering individualized, affordable in-home care for Canadian seniors. Their approach leverages technology to ensure transparency, inclusiveness, and peace of mind for families, while maintaining high standards of care. ConsidraCare seeks to streamline the hiring and onboarding process in community hospitals, where slow and disorganized practices delay filling critical healthcare roles. The company aims to apply Distributed Ledger Technology (DLT), to address inefficiencies, thereby improving operational efficiency and patient care.

1.4.1 What is known ?

We have the following relevant information for the execution of this research project:

- Activity Theory is highly effective for dissecting and understanding workflows in healthcare, with a focus on the dynamics of human-system interactions and the contexts in which changes occur. Engeström, (2001)
- Process modelling stands as a crucial component for enhancing operational efficiency. It shines a light on bottlenecks in hiring and onboarding, paving the way for process improvements. (Raimo, et al. 2022)
- Distributed Ledger Technology (DLT) plays a transformative role in data management and organizational efficiency. It is known for reducing errors and enhancing transparency in healthcare staffing(Spanò, Massaro, & Iacuzzi, 2023)

1.4.2 What is unknown?

Effectiveness of ChatGPT in Complex Data Synthesis:

The integration of advanced AI tools like ChatGPT plays a crucial role in the synthesis of complex data sets. By streamlining the analysis and interpretation of vast amounts of information, ChatGPT facilitates more accurate and efficient data synthesis. This capability is particularly beneficial when dealing with intricate workflows and extensive datasets, where human error and oversight could otherwise hinder the analysis process.

Potential Impact and Benefits of Integrating DLT Solutions:

The implementation of Distributed Ledger Technology (DLT) holds significant promise for enhancing process efficiency and improving staff integration within healthcare systems. DLT offers a robust framework for securing and streamlining data management processes, which in turn can reduce operational bottlenecks and improve overall workflow efficiency.

Additionally, by ensuring transparent and secure data handling, DLT fosters better staff collaboration and integration, leading to a more cohesive and effective workforce.

1.5 Contribution

This project delivers significant contributions by leveraging Activity Theory and integrating Distributed Ledger Technology (DLT) to enhance hiring and onboarding processes in community hospitals. These contributions are valuable to both academic research and practical applications within ConsidraCare.

- **Application and Expansion of Activity Theory in Healthcare Settings:** The research utilizes Activity Theory to analyse hiring and onboarding processes, identifying systemic contradictions such as mismatched expectations, outdated procedures, and communication gaps. This application of Activity Theory highlights its effectiveness in pinpointing inefficiencies in complex healthcare workflows, providing actionable insights for both academic researchers and practitioners.

- **Identification of Contradictions and Inefficiencies:** By applying Activity Theory, the study identifies key contradictions in the onboarding processes, such as conflicts between established rules and actual staff or patient needs. These insights help in understanding the systemic issues that hinder operational efficiency, allowing for targeted improvements that benefit both theoretical exploration and real-world applications.
- **Integration of Activity Theory with DLT for Systemic Improvement:** The research demonstrates how Activity Theory can be combined with DLT to address identified inefficiencies. By mapping contradictions within the activity system and overlaying them with DLT solutions, the study provides a unique approach that blends theoretical insights with practical technological applications, offering a framework for systemic improvement.
- **Strategic Enhancement of Onboarding Processes:** The integration of DLT, guided by Activity Theory, ensures that technological solutions are not just add-ons but strategically address core inefficiencies. This targeted approach helps streamline onboarding processes, improve staff integration, and reduce operational bottlenecks, directly benefiting both the research framework and ConsidraCare's business operations.
- **Improvement of Staff and Patient Outcomes:** Addressing the root causes of inefficiencies through a combined Activity Theory and DLT approach leads to better onboarding experiences, enhanced job satisfaction among staff, and improved patient care quality. This holistic impact highlights the broader benefits of the research, providing value to healthcare settings by fostering more effective organizational practices.

- **Strengthening Brand Value and Market Positioning:** The insights and strategies derived from this research position ConsidraCare as a leader in innovative healthcare staffing solutions. By adopting these advanced approaches, ConsidraCare not only enhances its operational capabilities but also strengthens its brand value, differentiating itself as a forward-thinking organization committed to improving healthcare delivery.
- This integrated approach not only advances the academic application of Activity Theory but also delivers practical, business-oriented outcomes that enhance operational effectiveness and brand positioning for ConsidraCare.

1.6 Overview of Method

The methodology of this research is structured to provide a systematic investigation into the hiring and onboarding processes within healthcare, specifically for community hospitals. A qualitative research approach is employed, leveraging both the principles of Activity Theory for contextual analysis and process modelling techniques to map existing workflows.

The study utilizes advanced text analytics tools like ChatGPT to perform analysis and content synthesis from a variety of data sources, including grey literature and online reviews. This allows for the development of detailed personas that reflect the diverse experiences of healthcare staff within the hiring and onboarding ecosystem.

Distributed Ledger Technology (DLT) is proposed as an innovative solution to the identified inefficiencies. The methodology includes a feasibility analysis of DLT implementation, examining its potential to streamline data management, enhance transparency, and reduce errors in healthcare staffing.

Data collected through these methods will undergo rigorous analysis to draw out key themes, pain points, and opportunities for improvement. The final outcome of this methodology is aimed at producing strategic recommendations and a white paper that not only outlines the current challenges but also proposes a tangible DLT-driven approach for change.

1.7 Organization of the Report

The structure of this report is crafted to guide the reader through a comprehensive journey of discovery and analysis. We begin with the "Introduction" in Chapter 1, which sets the stage by explaining the research's aim, objectives, expected outcomes, and its significance to ConsidraCare. Here, we also evaluate the established frameworks and emerging inquiries that underpin the study, outline our methodological approach, and preview the organization of the report.

In Chapter 2, "Literature Review," we explore the existing body of work, drawing from four principal research domains to construct the academic backbone of our study. This chapter also reflects on the methodologies previously employed in analogous research, providing a scholarly context for our investigation.

"Methodology," the focus of Chapter 3, details the research design and the sequential steps taken to gather and analyse data. It transparently outlines the methodology applied at each stage of the research and discusses the outcomes derived from each procedural element.

Chapters 4 and 5, "Results" and "Discussions," respectively, present the empirical findings of the analysis and engage in a critical dialogue about the implications and significance of these results within the scope of the project.

Finally, Chapter 6, "Conclusion and Future Research," encapsulates the study's findings, underscoring the contributions to knowledge and practice. It also candidly addresses the study's limitations and charts a course for subsequent inquiries, ensuring the research's utility extends beyond the present work into future innovations for the healthcare industry.

Chapter 2: Literature Review

2.1 Purpose

The purpose of this literature review is to thoroughly investigate the integration of Distributed Ledger Technology (DLT) in improving the hiring and onboarding processes of hospital staff, with a particular focus on community hospitals. This review aims to explore how Activity Theory and process modelling can be applied to identify and address inefficiencies in these processes. By examining various studies and theories, the review will assess the current understanding of DLT's potential in enhancing operational efficiency and the overall quality of patient care. It will also consider how Activity Theory and process modelling provide a framework for analysing and refining these employment processes. This literature review will serve as a critical foundation for developing a white paper that offers strategic recommendations for employing DLT to optimize hiring and onboarding processes, ultimately supporting hospitals in achieving greater efficiency and effectiveness in their staffing procedures.

2.2 Organizational Principle

The following Table -1 provides a summary of the main research streams and corresponding themes explored in this literature review.

Research Stream	Key Themes of the stream
DLT in Healthcare	<ul style="list-style-type: none"> • Data Management and Security, Integrity, and Enhancing Workforce Management and Transparency • Data Management and Security, Integrity, and Enhancing Workforce Management and Transparency • Interoperability and Data Integration • Compliance with Regulations and Auditability
ChatGPT for Research and Synthesis on DLT in Healthcare Hiring and Onboarding	<ul style="list-style-type: none"> • Persona Development Using ChatGPT • Automating Data Synthesis with ChatGPT • AI-Driven Semantic Search for Data Optimization
Activity theory & Process modelling in healthcare integration	<ul style="list-style-type: none"> • Enhanced Integration of Hospital Staff through Activity Theory and Expansive Visibilization • Business Process Management with the User Requirements Notation (URN) • Interconnected Networking and Evolution in Activity Theory
Writing a short white paper for current	<ul style="list-style-type: none"> • Understanding the Current Challenges in Community Hospital Onboarding

inefficiencies and Potential DLT benefits	<ul style="list-style-type: none"> • Leveraging DLT Technology to Enhance Hospital Staff Onboarding • Marketing Strategies for Promoting Your White Paper on Hospital Staff Integration
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Table 1 Literature Review and Stream Classification

2.3 DLT in healthcare

Distributed Ledger Technology (DLT) in healthcare is transforming data management, enhancing security, and improving operational efficiency. DLT, particularly blockchain, ensures data integrity and transparency, making healthcare data tamper-proof through cryptographic techniques. Each transaction is securely linked, creating an immutable chain that protects against unauthorized access. This chapter explores the application of DLT in healthcare, focusing on data security, administrative efficiency, interoperability, and compliance with regulations. By leveraging DLT, healthcare organizations can streamline processes, reduce costs, and enhance trust among stakeholders.

2.3.1 Data Management and Security, Integrity, and Enhancing Workforce

Management and Transparency

Blockchain technology ensures that healthcare data is secure and tamper-proof by using cryptographic techniques to create a decentralized ledger. Each transaction is recorded and linked to the previous one, forming an immutable chain. This ensures data integrity and protects against unauthorized access. Blockchain technology enhances the security of healthcare data by using cryptographic techniques, ensuring data integrity and protecting against unauthorized access (Agbo, et al., 2019). The review highlights blockchain's role in ensuring the integrity and security of healthcare data. By recording each transaction in an

immutable ledger, blockchain prevents unauthorized alterations and ensures that data remains accurate and trustworthy. Blockchain technology provides a secure and immutable record of healthcare data, protecting against data breaches and unauthorized modifications(Kuo, et al.2017).

Transparency in data management is another crucial benefit of blockchain. Blockchain can improve access to information, cutting out all layers and processes that currently are stumbling blocks in care coordination(Spanò, et al. 2023). In healthcare, efficient and transparent data management is essential to ensuring that patient care is both effective and efficient. Traditional methods of data management often involve multiple intermediaries, which can create delays and increase the risk of data breaches. Blockchain addresses these issues by providing a decentralized and transparent method for managing patient data, ensuring that only authorized personnel can access sensitive information. This is particularly beneficial in emergency situations where timely access to patient data can be critical.

The technology's use of smart contracts can automate various administrative tasks involved in hiring and onboarding, thus improving operational efficiency (Spanò, et al. 2023). Smart contracts are self-executing contracts with the terms of the agreement directly written into code. These contracts automatically execute and enforce the agreed-upon terms when predetermined conditions are met. In the context of healthcare, smart contracts can streamline the hiring process by automating credential verification and compliance checks. This reduces the time and resources required for these tasks, allowing healthcare providers to focus more on patient care. Additionally, smart contracts can ensure that only qualified individuals are hired, thus maintaining high standards of care.

DLT also allows compliance with guidelines and regulations for data and privacy protection such as the DSCA and/or HIPAA (Spanò, et al. 2023). Compliance with healthcare

regulations is critical to protecting patient privacy and ensuring the security of healthcare data. Blockchain's immutable and transparent ledger provides a reliable audit trail that helps healthcare organizations demonstrate compliance with regulations. This is particularly important in jurisdictions with stringent data protection laws, such as the United States and the European Union. By maintaining an immutable record of all transactions, blockchain ensures that any unauthorized access or data breaches can be quickly identified and addressed.

Trust in data handling and security are considered among the most critical aspects of digital transformation in healthcare .The use of blockchain technology in healthcare can streamline administrative processes such as credential verification and record keeping. Blockchain ensures compliance with healthcare regulations by maintaining immutable and transparent records (Massaro, 2023). This level of trust is crucial in healthcare, where the accuracy and security of data can directly impact patient outcomes. By providing a secure and transparent platform for data management, blockchain can help build trust between healthcare providers and patients.

2.3.2. Administrative Efficiency and Improving Healthcare Management

Blockchain technology creates value by improving healthcare management, reducing operation time, and cutting out unnecessary steps (Massaro, 2023). The transparency provided by DLT builds trust among stakeholders, including new hires, current employees, and regulatory bodies. This transparency and immutability of blockchain records help in reducing errors in medical records and other critical data(Chaudhuri, Naseraldin, & Narayananamurthy, 2023). The automation of administrative tasks via smart contracts on the blockchain reduces the manual effort required for credential verification and compliance checks during the hiring and onboarding process. This leads to faster and more efficient operations. Smart contracts on the blockchain can automate the verification of professional

credentials, reducing the administrative burden and speeding up the onboarding process (Agbo, et al. 2019).

Blockchain reduces the need for intermediaries and manual verification processes, which in turn enhances operational efficiency. This is particularly beneficial for the hiring and onboarding process in healthcare, where multiple verifications are typically required. In traditional hiring processes, verifying the credentials and qualifications of new hires can be time-consuming and labour-intensive. Blockchain can streamline this process by providing a decentralized and secure platform for credential verification. This not only reduces the administrative burden but also ensures that the verification process is faster and more reliable.

Blockchain reduces operational inefficiencies by automating processes and eliminating the need for third-party verification, resulting in cost savings and faster turnaround times. By streamlining processes and reducing administrative overhead, blockchain can lead to significant cost savings for healthcare organizations. This includes savings from reduced fraud, less paperwork, and fewer manual processes. Implementing blockchain in healthcare can reduce costs associated with data management, compliance, and administrative processes, providing financial benefits to healthcare organizations (Kuo, et al. 2017). The cost savings generated by blockchain can be reinvested into other areas of healthcare, such as patient care and medical research, further enhancing the overall efficiency and effectiveness of the healthcare system.

Blockchain improves operational efficiency by reducing the time and resources needed for administrative tasks and ensuring accurate data management . By streamlining processes and eliminating the need for intermediaries, blockchain can significantly reduce operational costs

in healthcare management (Chaudhuri, Naseraldin, & Narayananamurthy, 2023). This improved efficiency can help healthcare organizations respond more quickly to patient needs and adapt to changes in the healthcare environment. For example, during the COVID-19 pandemic, the ability to quickly and efficiently manage patient data was crucial to controlling the spread of the virus and providing timely care to those affected.

2.3.3. Interoperability and Data Integration

Blockchain provides a unified platform that facilitates the seamless sharing of data across different healthcare systems, addressing one of the major challenges in healthcare IT interoperability. This ensures that all parties have access to consistent and accurate information. Blockchain's interoperability capabilities enable seamless data sharing across different healthcare systems, improving coordination and efficiency (Agbo, et al. 2019). Interoperability is a significant challenge in healthcare, where different systems and providers often use incompatible data formats and protocols. Blockchain can bridge these gaps by providing a common platform for data exchange, ensuring that all parties have access to the same up-to-date information.

Blockchain can bridge the gap between different healthcare systems by providing a common platform for data exchange, thus enhancing interoperability and reducing data silos. This ensures that new employees can be integrated into the existing system without disruption. Blockchain's decentralized nature allows for seamless data sharing and integration across disparate healthcare systems, promoting interoperability and reducing data silos (Kuo, et al. 2017). This seamless integration is particularly important in healthcare, where timely and accurate data can be critical to patient care. By providing a common platform for data exchange, blockchain can help healthcare providers collaborate more effectively and make more informed decisions.

Blockchain can support the secure sharing and exchange of patient information, ease the management of clinical trials, improve the traceability for the pharmaceutical supply chain management, and contribute to improving the medical insurance industry . Blockchain can be used to enable end-to-end integration of information scattered across data silos, thus reducing operation time .Healthcare investments in digital technologies pave the way for newer models of healthcare delivery, positively affect the levels of productivity, and offer foundations to consolidate coordination and collaboration among the many different stakeholders involved (Spanò, et al., 2023). Blockchain facilitates seamless data sharing across different systems and institutions, which is crucial for interoperability in healthcare Integrating data from various sources into a single ledger helps eliminate information silos and ensures that all stakeholders have access to the same data Improved data integration leads to better coordination among healthcare providers, which is essential for efficient patient care and resource management (Massaro, 2023).

2.3.4. Compliance with Regulations and Auditability

Blockchain's transparent and immutable records help healthcare organizations comply with stringent data privacy and security regulations such as HIPAA and GDPR by providing a reliable audit trail. Blockchain's transparent ledger ensures that all actions are recorded and verifiable, providing a reliable audit trail for regulatory compliance (Agbo, et al. 2019). Compliance with regulations such as HIPAA and GDPR is critical to protecting patient privacy and ensuring the security of healthcare data. Blockchain's immutable and transparent records provide a reliable audit trail that helps healthcare organizations demonstrate compliance with these regulations.

Several pilot projects have demonstrated blockchain's potential to reduce fraud, improve data integrity, and enhance operational efficiency in healthcare settings (Agbo, et al. 2019). The immutable and transparent nature of blockchain records ensures that all transactions are easily auditable. This is crucial for maintaining compliance with healthcare regulations, as it provides a clear and unalterable record of all activities. The immutable nature of blockchain records ensures that all transactions are transparent and easily auditable, facilitating compliance with regulatory requirements (Kuo, et al. 2017). This level of transparency and auditability can help healthcare organizations detect and prevent fraud, ensuring that resources are used effectively and ethically.

In summary, blockchain technology offers significant benefits for data management and security, administrative efficiency, interoperability, and regulatory compliance in healthcare. By providing a secure, transparent, and efficient platform for managing healthcare data, blockchain can help healthcare organizations improve patient care, reduce costs, and comply with regulations. Despite the challenges associated with its adoption, blockchain's potential to transform healthcare processes and systems is evident. Future research should focus on overcoming these barriers and exploring additional use cases to fully harness the power of DLT in the healthcare industry.

Blockchain technology in healthcare ensures that data is secure and tamper-proof by using cryptographic techniques to create a decentralized ledger. Each transaction is recorded and linked to the previous one, forming an immutable chain, ensuring data integrity and protecting against unauthorized access. The technology enhances the security of healthcare data by ensuring data integrity and protecting against unauthorized access (Agbo, et al. 2019). By recording each transaction in an immutable ledger, blockchain prevents unauthorized alterations, ensuring that data remains accurate and trustworthy (Kuo, et al. 2017).

Transparency in data management is another significant benefit, as blockchain can improve access to information and remove layers and processes that currently hinder care coordination. Smart contracts can automate various administrative tasks involved in hiring and onboarding, enhancing operational efficiency. Additionally, DLT allows compliance with guidelines and regulations for data and privacy protection such as the DSCA and/or HIPAA (Spanò, et al. 2023). Trust in data handling and security is critical in digital transformation in healthcare.

Blockchain technology creates value by improving healthcare management, reducing operation time, and cutting out unnecessary steps (Massaro, 2023). The transparency provided by DLT builds trust among stakeholders and reduces errors in medical records and other critical data.. Automating administrative tasks via smart contracts on the blockchain reduces the manual effort required for credential verification and compliance checks during hiring and onboarding, leading to faster and more efficient operations (Agbo, et al. 2019). By streamlining processes and reducing administrative overhead, blockchain can lead to significant cost savings for healthcare organizations (Kuo, et al. 2017).

Blockchain provides a unified platform that facilitates the seamless sharing of data across different healthcare systems, addressing interoperability challenges. This ensures that all parties have access to consistent and accurate information, enhancing coordination and efficiency (Agbo, et al. 2019). Blockchain's decentralized nature allows for seamless data sharing and integration across disparate healthcare systems, promoting interoperability and reducing data silos (Kuo, et al. 2017). Blockchain supports secure sharing and exchange of patient information, ease management of clinical trials, and improve pharmaceutical supply chain management (Spanò, et al. 2023).

Blockchain's transparent and immutable records help healthcare organizations comply with stringent data privacy and security regulations such as HIPAA and GDPR by providing a reliable audit trail. This transparency ensures that all actions are recorded and verifiable, aiding regulatory compliance. Several pilot projects have demonstrated blockchain's potential to reduce fraud, improve data integrity, and enhance operational efficiency in healthcare settings (Agbo, et al. 2019). The immutable nature of blockchain records ensures all transactions are transparent and easily auditable, crucial for maintaining regulatory compliance (Kuo, et al. 2017).

Overall, blockchain technology offers significant benefits for data management and security, administrative efficiency, interoperability, and regulatory compliance in healthcare. It provides a secure, transparent, and efficient platform for managing healthcare data, helping healthcare organizations improve patient care, reduce costs, and comply with regulations. Despite adoption challenges, blockchain's potential to transform healthcare processes and systems is evident. Future research should focus on overcoming these barriers and exploring additional use cases to fully harness the power of DLT in healthcare.

2.4 ChatGPT for Research and Synthesis on DLT in Healthcare Hiring and Onboarding:

ChatGPT is revolutionizing research and synthesis in the context of DLT applications in healthcare hiring and onboarding. This chapter delves into how ChatGPT can enhance persona development by analysing large datasets, automate data synthesis to streamline hiring processes, and provide cognitive search capabilities for enhanced data retrieval. Additionally, ChatGPT's ability to offer personalized support and feedback, as well as develop decision-

making algorithms, makes it an invaluable tool for optimizing onboarding processes. The integration of AI-driven insights ensures continuous improvement and effective decision-making in healthcare hiring.

2.4.1 Persona Development Using ChatGPT

ChatGPT can significantly enhance the development of detailed personas by analysing large volumes of data, including blogs, interviews, and other public sources. These personas represent different stakeholders involved in healthcare hiring and onboarding, allowing for a more tailored approach to these processes. For instance, AI Chat GPT can provide personalized support and feedback based on the specific needs and queries of the user, making it a valuable tool for refining research questions and methodology (Zain, Partino & Madjid 2023). By using ChatGPT to extract relevant information from public data sources, it is possible to build comprehensive personas that include details about job roles, responsibilities, qualifications, challenges, and expectations of healthcare staff. These personas can then be used to tailor onboarding processes, ensuring they are relevant and effective for various roles within the healthcare sector.

The process begins with data collection and analysis, where data from various public sources such as professional blogs, social media posts, interviews with healthcare professionals, and industry reports are gathered. ChatGPT can then synthesize this data to identify common themes and characteristics. For example, an AI algorithm was initially programmed to conduct a systematic literature review searching for the current primary guidelines on biologics' clinical efficacy and safety (Maniaci, et al. 2024). Implementing ChatGPT to perform a systematic review of public data allows for categorizing information into different persona profiles, helping understand the diverse needs and expectations of healthcare employees during the hiring and onboarding process.

Creating tailored onboarding programs is another crucial application. By analysing data and past interactions with students, AI Chat GPT can tailor responses and recommendations for each student individually (Zain, Partino, & Madjid, 2023). Similarly, using the personas created from public data, customized onboarding modules can be designed to address the unique challenges and requirements of each persona. This personalized approach improves overall onboarding efficiency and employee satisfaction.

In practice, this means that a healthcare organization can leverage ChatGPT to create detailed profiles for various roles such as nurses, administrative staff, and physicians. For instance, a persona for a nurse might include data about common challenges they face, such as high patient loads and the need for continuous education on new medical technologies. Understanding these aspects allows the organization to develop onboarding processes that specifically address these challenges, providing new hires with the tools and resources they need to succeed from day one.

Moreover, ChatGPT can continuously update these personas based on ongoing data collection, ensuring that the onboarding processes remain relevant as the healthcare environment evolves. This dynamic approach to persona development and onboarding can significantly reduce turnover rates, as new hires are more likely to feel supported and well-prepared for their roles.

2. 4.2 Automating Data Synthesis with ChatGPT:

ChatGPT can automate the synthesis of data collected from multiple sources, making it easier to integrate and analyse information for process automation in healthcare hiring and onboarding. This capability significantly reduces operational inefficiencies by automating processes and eliminating the need for third-party verification, resulting in cost savings and

faster turnaround times(Palasamudram, et al., 2023). Utilizing ChatGPT to aggregate and synthesize data from resumes, application forms, interviews, and reference checks streamlines the hiring process and reduces manual effort.

The use of smart contracts can further enhance the efficiency of the onboarding process. Smart contracts are self-executing contracts with the terms of the agreement directly written into code. These contracts automatically execute and enforce the agreed-upon terms when predetermined conditions are met. In the context of healthcare, smart contracts can streamline the hiring process by automating credential verification and compliance checks. This reduces the time and resources required for these tasks, allowing healthcare providers to focus more on patient care. Additionally, smart contracts can ensure that only qualified individuals are hired, thus maintaining high standards of care.

For example, when a new hire submits their credentials, the smart contract can automatically verify these credentials against various databases, ensuring that they are valid and up-to-date. This not only speeds up the hiring process but also reduces the risk of human error. ChatGPT can be deployed to create and manage these smart contracts, ensuring that they are properly configured and executed.

Real-time data integration and analysis is another area where ChatGPT excels. By facilitating seamless data sharing and integration across disparate healthcare systems, ChatGPT promotes interoperability and reduces data silos. This integration provides a holistic view of the onboarding process and identifies areas for improvement. For example, ChatGPT can analyse data from HR systems, background checks, and training platforms, offering immediate insights and recommendations for improving the hiring and onboarding process.

Automating the literature review and manuscript writing process is another significant advantage. ChatGPT can expedite the literature review process by automatically searching for

and summarizing relevant academic articles, which is particularly useful for gathering existing research on DLT applications in healthcare. AI(artificial Learning) or Machine learning (ML) can help in automating the literature search, content extraction, content enrichment (which includes named entity recognition [NER]), and intent detection in the context of life sciences and pharmaceuticals (Palasamudram, et al., 2023). Using ChatGPT to identify and summarize key articles related to DLT in healthcare hiring, focusing on how blockchain can streamline processes and improve transparency, can significantly enhance the research process. Moreover, ChatGPT can assist in drafting and refining academic manuscripts by generating content based on predefined templates and structures, ensuring that the content is coherent and comprehensive.

2.4.3 AI-Driven Semantic Search for Data Optimization

ChatGPT can perform cognitive searches across various databases, extracting and summarizing content that matches specific queries. AI or ML can help in automating the literature search, content extraction, content enrichment, and intent detection (Palasamudram, et al., 2023). Utilizing this feature of ChatGPT to conduct deep searches on specific aspects of DLT, such as its impact on reducing hiring times and improving credential verification processes in healthcare, can provide valuable insights.

Personalized support and feedback are critical components of ChatGPT's capabilities. It can provide personalized support and feedback based on the specific needs and queries of the user, making it a valuable tool for refining research questions and methodology. For example, AI Chat GPT can provide learning materials that are relevant to the needs and level of understanding of certain students, ensuring that they receive appropriate and relevant support (Zain, Partino, & Madjid, 2023). Using ChatGPT to tailor research questions and

methodologies specific to the challenges of implementing DLT in healthcare onboarding processes ensures that the research is both relevant and focused.

Emotional and cognitive support are also significant benefits. ChatGPT can serve as a virtual assistant, providing emotional and cognitive support during the research process by offering suggestions, answering questions, and providing motivational feedback. For instance, AI Chat GPT can provide emotional support to students in need. Its relevant and empathetic responses can help reduce feelings of loneliness and isolation that students may experience (Zain, Partino, & Madjid, 2023). Similarly, utilizing ChatGPT to maintain motivation and direction in research by receiving continuous feedback and support can significantly enhance the research process.

Validation and reliability assessment of ChatGPT's outputs ensure that the generated content meets the required academic standards. Test-retest reliability for sub score and total AAPI scores was strong, indicating consistent performance over time. Using ChatGPT to draft and validate research hypotheses and conclusions ensures that they are robust and reliable, meeting the stringent requirements of academic research.

Developing decision-making algorithms using ChatGPT can provide actionable insights based on synthesized data, optimizing the hiring and onboarding process. The application of AI in decision-making protocols and the creation of therapeutic algorithms for biologic drug selection could offer fascinating prospects in the management (Maniaci, et al. 2024). Creating algorithms that analyse the collected data to recommend the best candidates for specific roles, predict onboarding success, and identify potential issues early in the process can significantly enhance decision-making in healthcare hiring.

Predictive analytics powered by ChatGPT can forecast future hiring needs, employee turnover rates, and onboarding challenges. For instance, AI Chat GPT can detect changes in

behaviour or language that indicate mental health problems, providing early intervention and support. Applying predictive analytics to anticipate staffing shortages, prepare for peak hiring periods, and proactively address onboarding bottlenecks can improve workforce management and ensure that healthcare organizations are better prepared to meet their staffing needs.

Continuous improvement through feedback loops is essential for maintaining the effectiveness of the onboarding process. Establishing feedback loops using ChatGPT to continuously gather and analyse feedback from new hires and onboarding managers ensures ongoing improvement of the onboarding process. For example, ChatGPT can provide immediate help and answers to students, reducing anxiety and stress levels (Zain Abdillah, et al. 2023). Implementing a system where new hires can provide real-time feedback on their onboarding experience, which ChatGPT can analyse to recommend improvements, ensures that the process is continuously refined and enhanced.

In addition to enhancing decision-making and predictive analytics, ChatGPT can also play a crucial role in synthesizing guidelines and developing decision-making frameworks. For instance, ChatGPT can be used to synthesize guidelines and develop decision-making algorithms, ensuring that all relevant data is considered and integrated into the research findings. The application of AI in decision-making protocols and the creation of therapeutic algorithms for biologic drug selection, could offer fascinating prospects in the management (Maniaci, et al. 2024). Implementing ChatGPT to create decision-making frameworks for the adoption of DLT in healthcare hiring, incorporating best practices and guidelines from existing research, ensures that decisions are data-driven and based on comprehensive analysis.

By leveraging the capabilities of ChatGPT as outlined in these articles, research on DLT in healthcare hiring and onboarding processes can be significantly enhanced. ChatGPT can

automate literature reviews, generate coherent summaries, and draft sections of research papers, making the research process more efficient. It can analyse and interpret data in real-time, providing immediate insights and recommendations. Developing decision-making algorithms based on synthesized guidelines ensures that all relevant data is considered and integrated into the research findings. Personalized support and feedback tailored to specific research needs can help refine research questions and methodologies, ensuring that the research is focused and relevant. Emotional and cognitive support from ChatGPT can maintain motivation and direction in research, enhancing the overall research experience. Validation and reliability assessment ensure that the generated content meets academic standards, making ChatGPT a reliable tool for research and synthesis in healthcare hiring and onboarding processes.

Overall, ChatGPT's ability to automate and enhance various aspects of the research process makes it an invaluable tool for exploring and implementing DLT in healthcare hiring and onboarding. Its capabilities in persona development, data synthesis, cognitive search, personalized support, and decision-making provide a comprehensive framework for improving the efficiency and effectiveness of these processes. As healthcare organizations continue to adopt digital technologies, the integration of AI tools like ChatGPT will be crucial in ensuring that these technologies are implemented in a way that maximizes their potential benefits.

2.5 Activity theory & Process modelling in healthcare integration:

Activity Theory and process modelling offer robust frameworks for enhancing the integration of hospital staff. This chapter examines how Activity Theory, with its focus on interconnected activity systems and the resolution of contradictions, can drive innovation and efficiency in healthcare. It explores the practical application of expansive visualization to

identify and address inefficiencies in onboarding processes. By leveraging these theoretical approaches, healthcare organizations can improve coordination, reduce inefficiencies, and foster a culture of continuous improvement. This comprehensive methodology supports the seamless integration of new hires, ultimately enhancing overall process efficiency.

2.5.1 Enhanced Integration of Hospital Staff through Activity Theory and Expansive Visibilization

Engeström's expansive learning framework, rooted in cultural-historical activity theory, emphasizes contradictions as pivotal sources of change and explores the concept of expansive cycles for transformation. This theoretical approach is applied effectively in inter-organizational learning within the medical field, particularly illustrated by its implementation in children's medical care in Helsinki. This chapter aims to delve into how this framework can be leveraged to enhance the integration of hospital staff, focusing on hiring and onboarding processes in community hospitals.

In activity theory, the activity system is the primary unit of analysis. An activity system comprises multiple interconnected components such as tools, rules, and the division of labour. Understanding these systems in their entirety is crucial for analysing both individual and collective actions. As depicted in Figure 1, an activity system includes various elements: subjects (individuals involved in the activity), objects (the goals of the activity), mediating artifacts (tools and symbols), community (social context), rules (norms and regulations), and division of labour (distribution of tasks). This comprehensive framework allows for a detailed analysis of how each component interacts and contributes to the overall activity.

Y. Engeström

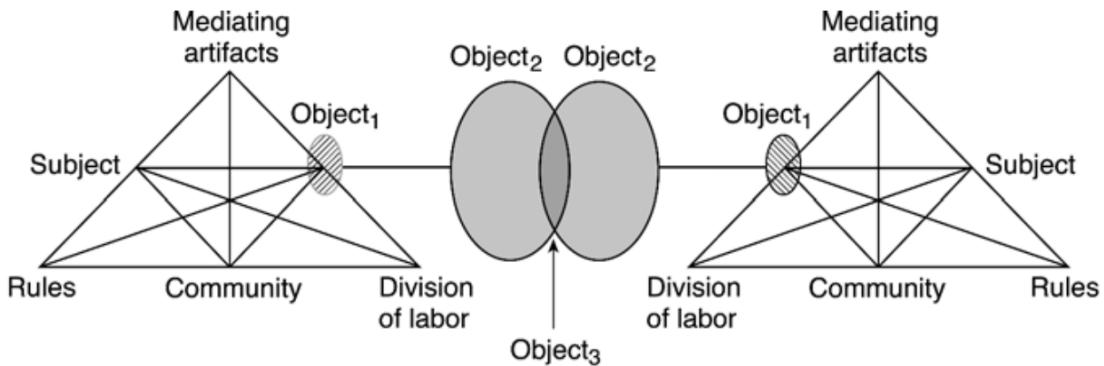


Figure 1: Activity Theory Interlinkage System by Engeström

Activity systems inherently incorporate diverse viewpoints, histories, and interests, leading to innovation and necessitating translation and negotiation among participants. This diversity, termed multi-voicedness, ensures that various perspectives are considered, fostering a collaborative environment essential for innovation. In the context of healthcare, multi-voicedness is vital as it brings together different caregivers, administrators, and patients, each contributing unique insights and experiences to the system.

The historical context of activity systems is essential for understanding their current state and potential for change. Contradictions within these systems are seen as drivers of change and innovation, highlighting the dynamic nature of activities. For instance, historical practices in healthcare that have led to inefficiencies or patient dissatisfaction can be re-evaluated to identify underlying contradictions and drive improvements. Figure 2 illustrates the expansive learning cycle, which begins with questioning current practices, analysing contradictions, modelling new solutions, and implementing changes. This cycle leads to a reconceptualization of activities, expanding their horizons and fostering continuous improvement.

Learning within this framework occurs through cycles involving questioning current practices, analysing contradictions, modelling new solutions, and implementing changes. This iterative process leads to a reconceptualization of activities, expanding their horizons and fostering continuous improvement. The expansive learning cycle, as visually represented in Figure 2, includes the steps of questioning, analysis, modelling, implementation, and reflection.

A critical application of this framework is in addressing the lack of coordination between different caregivers, emphasizing the need for a collaborative approach to manage long-term patient care. By fostering expansive learning, new care models, such as care agreements, can be developed and implemented collaboratively, improving healthcare delivery and patient outcomes. The Boundary Crossing Laboratory sessions, for example, involve practitioners from various organizations working together to develop and implement new care models. These sessions facilitate the development of practical solutions, such as the care agreement, which addresses coordination challenges in patient care. This collaborative effort demonstrates the transformative potential of expansive learning in improving healthcare delivery and patient outcomes.

Expansive visibilization involves making invisible aspects of work visible by identifying and analysing disturbances, contradictions, and innovations in everyday practices. This process is crucial for understanding and addressing inefficiencies in the onboarding process. Engeström describes visibilization as capturing disturbances and small innovations through methods like video recording and collaborative viewing, making these issues visible to practitioners(Engeström ,2018)

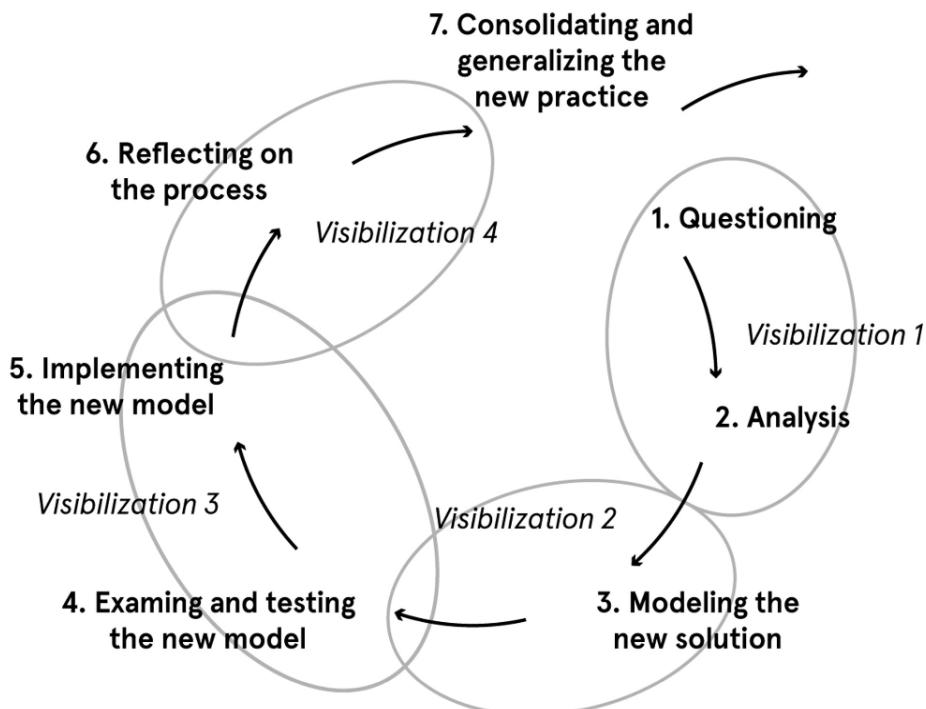


FIGURE 8.13. Steps of expansive visibilization in the cycle of expansive learning.

Figure 2 : Steps of Expansive Visibilization in the cycle of Expansive learning

The four-step cycle of expansive visibilization includes:

- 1. Capture Disturbances:** Using video recordings and collaborative viewing to capture moments of inefficiency and small-scale innovations.
- 2. Analyse Disturbances:** Connecting recorded disturbances to underlying contradictions in the activity system, using models to understand past and present work practices.
- 3. Design and Implement Solutions:** Creating and implementing solutions to address identified contradictions, reorganizing work actions, and their representations.
- 4. Monitor and Refine:** Continuously monitoring and refining implemented solutions based on feedback to ensure continuous improvement and adaptation.

The transformation at the Children's Hospital outpatient clinic in Helsinki illustrates how these steps lead to practical innovations, such as a new patient record form and integrated

workflows for nurses and physicians. These innovations addressed the complexities and contradictions in their work practices, demonstrating the effectiveness of expansive visibilization.

The iterative and collaborative nature of expansive visibilization emphasizes the need for regular feedback and refinement. Solutions are co-created with input from practitioners, ensuring that changes are practical and widely accepted. This ongoing process fosters a culture of continuous improvement and adaptation, essential for addressing the dynamic challenges in healthcare. Identifying and addressing contradictions within the work system, such as those between tools, rules, and the division of labour, is key to enhancing efficiency and integration. By resolving these contradictions, healthcare organizations can improve coordination, reduce inefficiencies, and enhance the overall integration of staff.

To align with the primary objective of enhancing the integration of hospital staff in community hospitals, several steps are recommended. Firstly, expansive visibilization should be applied to capture moments of inefficiency, misunderstandings, and small-scale innovative practices during the hiring and onboarding processes. This can be achieved through video recordings and collaborative viewing sessions with staff. Secondly, Activity Theory should be used to uncover systemic contradictions in the onboarding process, such as mismatched expectations between new hires and their roles or conflicts between existing staff practices and onboarding protocols. Thirdly, new onboarding procedures should be co-created with staff input, ensuring that changes are practical and rooted in actual work practices. This might involve creating new tools, redefining roles, or adjusting workflows to better integrate new hires. Fourthly, the practical consequences of implemented solutions should be regularly monitored, feedback gathered, and necessary adjustments made. This continuous

improvement cycle ensures that the onboarding process evolves to meet the needs of the hospital staff and new employees.

Although not directly mentioned in the chapter, integrating Distributed Ledger Technology (DLT) can help map and address inefficiencies in the onboarding process. DLT provides transparent and immutable records, ensuring accountability and continuous improvement. The main insights from activity systems highlight their complexity, collective nature, and object-oriented focus, incorporating diverse viewpoints, histories, and interests. These systems evolve over time, with contradictions within and between activity systems driving change and innovation. Expansive learning involves cycles of questioning current practices, analysing contradictions, modelling new solutions, and implementing them, leading to new, collectively generated forms of activity.

By applying Activity Theory and the principles of expansive visibilization, ConsideraCare can enhance the integration of hospital staff through a deeper understanding of the hiring and onboarding processes. This approach ensures that these processes are efficient, adaptive, and responsive to the needs of both new hires and existing staff, ultimately leading to a more cohesive and well-integrated hospital workforce. The iterative and collaborative nature of this methodology ensures sustained improvements and practical, accepted solutions. This comprehensive approach will help ConsideraCare achieve its objective of enhancing the integration of hospital staff and improving process efficiency in community hospitals. The principles discussed, such as the activity system as a unit of analysis, multi-voicedness, historicity, contradictions as sources of change, and expansive cycles as forms of transformation, are applied effectively to a multi-organizational study in the medical care field in Finland, highlighting the practical applications and transformative potential of expansive learning in healthcare integration.

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2.5.2 Business Process Management with the User Requirements Notation (URN)

The User Requirements Notation (URN) framework represents a sophisticated methodology designed to model business processes and goals. The goal of this framework is to ensure that organizational objectives are met efficiently and effectively. The URN framework was developed to integrate two complementary notations: the Goal-oriented Requirement Language (GRL) and Use Case Maps (UCM). These tools facilitate the traceability of goals and processes, enabling performance monitoring and continuous improvement, which are critical for maintaining competitive advantage in any organization (Pourshahid et al. 2009).

The integration of goals and processes within the URN framework is a significant advancement in business process management. GRL focuses on modelling the goals, rationales, and trade-offs involved in decision-making processes. This notation allows organizations to clearly define their objectives and understand the rationale behind each decision. On the other hand, UCM maps out the operational processes required to achieve these goals, providing a clear visualization of how different tasks and activities interconnect. By linking goals directly to processes, organizations can ensure that their activities are consistently directed towards achieving their strategic objectives. This traceability is crucial

for ensuring alignment between day-to-day operations and long-term strategic goals, facilitating better decision-making and resource allocation.

The performance management capabilities of the URN framework are enhanced using Key Performance Indicators (KPIs). KPIs provide measurable values that help organizations gauge how effectively they are achieving their key business objectives. Within the URN framework, KPIs are utilized to measure and align processes with goals, ensuring continuous process improvement. This alignment facilitates decision-making by providing clear metrics that indicate where improvements are needed and how resources can be best allocated. The ability to integrate performance management tools within the URN framework ensures that organizations can track their progress in real-time, making data-driven decisions to enhance efficiency and effectiveness continuously.

In the context of healthcare, the application of the URN framework has demonstrated its potential for improving process alignment and performance(Pourshahid et al. 2009) applied the framework to a healthcare data warehouse access process, showcasing its ability to streamline complex healthcare operations. The integration of goals and processes ensured that the data warehouse was accessed in a manner aligned with the healthcare organization's strategic objectives. This alignment improved operational efficiency and data management practices, demonstrating how the URN framework can be applied to enhance healthcare delivery.

Technology adoption is a central element of the URN framework, particularly in its application to healthcare. Digital tools and technologies are crucial for transforming healthcare delivery, improving efficiency, and enhancing patient outcomes. The URN framework supports this transformation by providing a structured approach to integrating digital tools and technologies into business processes. By ensuring that these technologies are aligned with organizational goals, the URN framework helps healthcare organizations

maximize the benefits of digital transformation. This alignment is essential for achieving improvements in patient care, streamlining operations, and enhancing data management practices.

Regulatory changes are a significant consideration in the healthcare industry, and the URN framework is designed to adapt to these changes. The framework incorporates regulatory requirements into the modelling of goals and processes, ensuring that business processes comply with evolving regulations. This adaptability is crucial for navigating the complex regulatory landscape in healthcare, helping organizations mitigate the risks associated with non-compliance. By staying current with regulatory standards, healthcare organizations can ensure that their practices are both legally compliant and aligned with best practices in patient care.

Patient expectations are increasingly focused on digital solutions that provide better access to healthcare services and personalized care. The URN framework addresses these expectations by aligning business processes with patient-centric goals. This alignment ensures that healthcare organizations can meet the growing demand for digital health solutions, providing high-quality and personalized care. By focusing on patient expectations, the URN framework helps healthcare providers enhance patient satisfaction and improve overall healthcare delivery. This patient-centered approach is essential for building trust and ensuring that healthcare services meet the needs of a diverse patient population.

In summary, the URN framework developed by Pourshahid et al(2009) offers a comprehensive approach to business process management. By integrating goal modelling and performance management tools, the URN framework ensures that business processes are aligned with organizational objectives. Its application in healthcare demonstrates its potential to enhance operational efficiency, compliance, and patient satisfaction. By supporting the integration of digital technologies and adapting to regulatory changes, the URN framework

provides a robust solution for modern healthcare challenges. This approach ensures that healthcare organizations can continuously improve their processes and meet the evolving needs of their patients and stakeholders, thereby fostering an environment of continuous improvement and innovation.

2.5.3 Interconnected Networking and Evolution in Activity Theory

Business Process Management (BPM) is a crucial aspect of enhancing organizational efficiency, particularly in complex sectors like healthcare. The User Requirements Notation (URN) framework is an advanced tool that supports the modelling and management of business processes, aligning them with organizational goals. This chapter delves into the application of URN in healthcare, emphasizing how it integrates goals and processes, enhances performance management, and supports digital transformation.

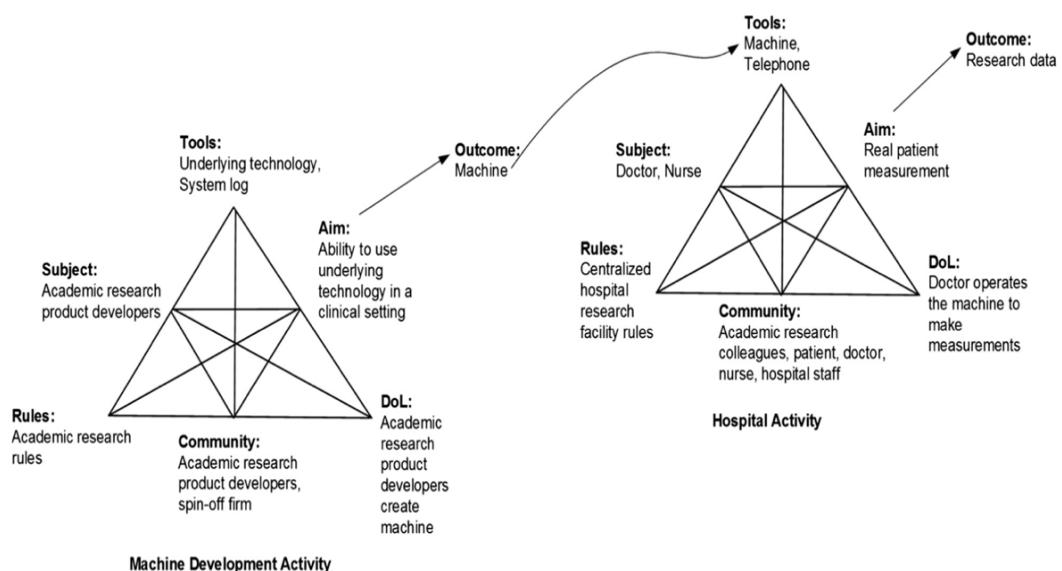


Figure 3 : ASD Network Described by Hasu and Engerstrom

The URN framework integrates business goals with processes through two main components: the Goal-oriented Requirement Language (GRL) and Use Case Maps (UCM). GRL helps in capturing and modelling business goals, stakeholders, and their

interdependencies. It provides a visual representation of how various business objectives align with the tasks and processes within the organization. On the other hand, UCM focuses on the operational aspect, mapping out the workflows and activities required to achieve these goals. This dual approach ensures that there is a clear traceability from strategic goals to operational processes, facilitating a comprehensive alignment of the organization's activities with its strategic vision.

In the healthcare context, this integration is vital. Healthcare organizations often operate under stringent regulations and standards, which necessitate a clear alignment of processes with these regulatory requirements. For instance, a hospital aiming to improve patient care quality must ensure that its processes, such as patient intake, diagnosis, treatment, and discharge, are all aligned with this goal. The URN framework helps in mapping out these processes, identifying any gaps or inefficiencies, and ensuring that each step in the workflow contributes towards the overarching goal of enhanced patient care.

Performance management is another critical aspect where the URN framework proves invaluable. Within the URN framework, Key Performance Indicators (KPIs) are used to measure and monitor the performance of business processes. KPIs provide quantifiable metrics that help in assessing whether the processes are meeting the desired goals. This continuous monitoring facilitates a proactive approach to process improvement, allowing organizations to make data-driven decisions.

For example, a hospital may use KPIs such as patient wait times, treatment success rates, and patient satisfaction scores to monitor its performance. By integrating these KPIs within the URN framework, the hospital can continuously track its performance, identify areas that need improvement, and implement changes to enhance efficiency. This continuous feedback loop ensures that the organization remains aligned with its goals and can adapt to any changes in the regulatory or operational environment.

The application of the URN framework in healthcare has demonstrated significant potential for improving process alignment and performance. A notable example is its application in a healthcare data warehouse access process. In this scenario, the URN framework was used to map out the process of accessing and managing data within a healthcare setting. By modelling the processes and aligning them with the organizational goals, the framework helped in identifying inefficiencies and streamlining the workflows.

This application underscores the feasibility and effectiveness of the URN framework in managing complex healthcare processes. It not only helps in aligning the processes with organizational goals but also ensures compliance with regulatory requirements, enhances data security, and improves overall efficiency. This holistic approach to process management is particularly beneficial in healthcare, where the stakes are high, and the margin for error is minimal.

Digital transformation is a critical driver of change in the healthcare sector. The adoption of digital tools and technologies is central to transforming healthcare delivery, improving efficiency, and enhancing patient outcomes. The URN framework supports this transformation by providing a structured approach to integrating digital tools within existing processes.

Digital transformation involves adopting various technologies such as electronic health records (EHRs), telemedicine, and data analytics. These technologies can significantly enhance the efficiency and effectiveness of healthcare delivery. However, their integration into existing processes can be challenging. The URN framework helps in mapping out the current processes, identifying areas where digital tools can be integrated, and ensuring that these integrations align with the organization's goals.

For instance, integrating EHRs into a hospital's workflow can streamline patient data management, reduce errors, and improve patient care. However, it requires a careful mapping

of the current processes, training for the staff, and continuous monitoring to ensure its effectiveness. The URN framework provides a structured approach to manage this integration, ensuring that it enhances the hospital's overall efficiency and aligns with its goal of providing high-quality patient care.

The regulatory landscape in healthcare is continuously evolving, with new regulations aimed at improving patient care, data security, and overall healthcare delivery. Compliance with these regulations is crucial for healthcare organizations. The URN framework helps in aligning the processes with these regulatory requirements, ensuring compliance and facilitating smooth operations.

For example, regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States mandate stringent data security and privacy standards.

Healthcare organizations must ensure that their processes comply with these standards. The URN framework helps in mapping out these processes, identifying any gaps in compliance, and implementing changes to ensure adherence to the regulations. This proactive approach to regulatory compliance not only ensures smooth operations but also builds trust with patients and stakeholders.

Patients today expect digital solutions for better access to healthcare services and personalized care. Meeting these expectations is crucial for healthcare organizations to remain competitive and relevant. The URN framework helps in aligning the organizational processes with these expectations, ensuring that the healthcare delivery is patient centric.

For instance, implementing telemedicine solutions can provide patients with easy access to healthcare services from the comfort of their homes. However, integrating telemedicine into the existing workflow requires a structured approach to ensure that it aligns with the organization's goals and enhances patient care. The URN framework helps in mapping out

the current processes, identifying areas for integration, and ensuring that the telemedicine solutions are effectively implemented and monitored.

In conclusion, the URN framework provides a robust and structured approach to business process management in healthcare. By integrating goals and processes, enhancing performance management, and supporting digital transformation, the URN framework helps healthcare organizations improve their efficiency, comply with regulatory requirements, and meet patient expectations. The holistic approach of the URN framework ensures that the processes are aligned with the organizational goals, facilitating continuous improvement and adaptation to the evolving healthcare landscape. This comprehensive approach is crucial for healthcare organizations to enhance their operational efficiency and provide high-quality patient care.

Activity Theory and the User Requirements Notation (URN) framework both offer robust approaches for aligning organizational processes with strategic goals, driving continuous improvement, and fostering innovation in complex environments like healthcare. Activity Theory emphasizes the importance of contradictions as drivers of change, suggesting that identifying and resolving these contradictions within activity systems can lead to innovation and enhanced efficiency. This theory's focus on interconnected activity systems aligns well with the integration of digital technologies in healthcare, highlighting the necessity for collaboration across different units and systems to achieve effective transformation.

On the other hand, the URN framework provides tools for modelling business processes and goals, using Key Performance Indicators (KPIs) to facilitate continuous improvement and decision-making. By integrating goals and processes through GRL and UCM, the URN framework ensures traceability and alignment of business activities with strategic objectives. This structured approach supports digital transformation in healthcare, ensuring compliance

with regulatory changes and meeting evolving patient expectations. The integration of Activity Theory and process modelling, exemplified through frameworks like URN, can significantly enhance the hiring and onboarding processes in community hospitals. This comprehensive approach addresses both technical and socio-technical challenges, promoting efficient staff integration and overall process efficiency. This is crucial for organizations like ConsideraCare, which aim to improve hospital staff integration and process efficiency through continuous monitoring, feedback, and adaptation.

2.6 Writing a short white paper for current inefficiencies and Potential DLT benefits:

Writing an effective white paper on current inefficiencies and the potential benefits of DLT in community hospital onboarding involves several critical steps. This chapter provides a structured approach to creating a white paper, including clarifying the topic, identifying the ideal reader, and determining the objective. It emphasizes the importance of developing a logical outline and incorporating expert interviews to add depth and credibility. The chapter also explores strategies for leveraging DLT to streamline onboarding processes and marketing techniques to promote the white paper effectively. By following these guidelines, healthcare organizations can communicate the advantages of DLT and drive actionable outcomes.

2.6.1 Understanding the Current Challenges in Community Hospital Onboarding

Community hospitals frequently encounter significant challenges in their hiring and onboarding processes, which can result in high turnover rates, prolonged onboarding periods, and difficulties in integrating new staff members. Addressing these issues effectively requires a thorough needs assessment, encompassing several key steps: clarifying the topic, identifying the ideal reader, determining the objective, developing an outline, and interviewing experts.

Clarifying the topic is vital to ensure that the content remains focused and relevant to the intended audience. The primary focus of this white paper is on improving hiring and onboarding processes in community hospitals using Activity Theory, process modelling, and Distributed Ledger Technology (DLT). By clearly defining this topic, the paper maintains a clear direction. Stelzner emphasizes the importance of focusing the lens on a specific topic to ensure clarity and relevance.

Identifying the ideal reader is another crucial step. The white paper is intended for hospital administrators, HR managers, and IT professionals within the healthcare sector. Understanding their specific challenges, such as high turnover rates and onboarding inefficiencies, helps tailor the content to their needs. The importance of precisely identifying the reader's industry, job title, age, and general disposition to make the content more impactful (Stelzner, 2007).

The primary objective of the white paper is to demonstrate how DLT can streamline the onboarding process, reduce time and costs, and improve staff integration. A clear statement of purpose helps guide the content and keep it focused. Determining the endgame early, whether it is to educate, sell, inform, or differentiate, to ensure the paper stays on track.

Developing an outline is essential for organizing the content logically. The outline should include sections such as an introduction, problem statement, solution overview (Activity Theory, process modelling, DLT), benefits, case studies, and a call to action. It is discussed that good directions, provided by an outline, help break the paper into manageable pieces and keep the content on track.

Interviewing experts adds depth and credibility to the white paper. Insights from healthcare professionals, HR experts, and technology specialists provide valuable information that can enhance the quality of the white paper. The best content often resides in the heads of

experts and interviewing them can provide fresh perspectives and enrich the paper's content(Stelzner,2007)

2.6.2 Leveraging DLT Technology to Enhance Hospital Staff Onboarding

Distributed Ledger Technology (DLT) offers significant potential to improve hospital staff integration. This section explores market drivers, problem development, historical overview, an introduction to DLT, benefits of DLT, case studies, and concludes with a call to action.

Market drivers in healthcare staffing, such as high turnover rates and lengthy onboarding processes, necessitate a new approach. Discussing these trends and challenges justifies the need for a solution. Discussing the trends and market forces driving the need for the solution to provide context and relevance.

Developing a clear problem statement involves outlining the inefficiencies in current hiring and onboarding processes in community hospitals. These inefficiencies impact hospital operations and patient care. Clearly defining these problems helps build a strong case for the proposed solution. The importance of clearly articulating the problems that exist without the proposed solution.

Providing a historical overview of onboarding practices in healthcare sets the stage for introducing new methodologies. Understanding how these practices have evolved helps readers appreciate the necessity for change. Stelzner also, suggests providing context by explaining how the problem and market have evolved over time.

Introducing DLT technology can significantly enhance onboarding processes. DLT improves operations, data security, and reduces processing times. By detailing how DLT works, readers can better grasp its potential benefits. There is significant importance of introducing the technology as a framework for enhancing processes(Stelzner,2007).The benefits of applying DLT are numerous, including reduced onboarding time, improved staff integration, and

enhanced efficiency. Discussing these benefits in a solution-agnostic manner initially, and then detailing the specific advantages, is crucial. Detailing the benefits such as reduced onboarding time, improved staff integration, and enhanced efficiency. Additionally, DLT ensures secure and transparent credential verification, which is crucial in healthcare settings. Case studies and examples of hospitals that have successfully implemented DLT illustrate its practical application and benefits. These real-world or hypothetical examples add credibility and relatability to the white paper. Including examples to illustrate the effectiveness of the solution.

Concluding with a strong call to action encourages hospital administrators to consider adopting DLT technology in their onboarding processes. Providing clear steps for implementation helps guide readers towards actionable outcomes. Ending with a strong call to action, guiding readers on the next steps they should take(Stelzner ,2007)

2.6.3 Marketing Strategies for Promoting Your White Paper on Hospital Staff Integration

Effective promotion of the white paper is essential for reaching the target audience and achieving the desired impact. This section outlines strategies for lead generation, effective promotion techniques, syndicating the white paper, utilizing registration forms, and implementing an automated follow-up system.

The white paper can be a powerful tool for generating leads by promoting it through healthcare forums, webinars, and professional networks. The effectiveness of white papers in lead generation, noting their ability to attract and engage potential leads by offering valuable insights and solutions.

Active promotion through social media, email campaigns, and partnerships with healthcare organizations and publications is crucial. This multi-channel approach increases the visibility

of the white paper and attracts a broader audience. The Active promotion of the white paper through various channels to maximize its reach and impact is an important aspect.

Syndicating the white paper through networks of specialty websites that target healthcare professionals broadens its reach. This approach ensures that the white paper is seen by the right audience, thereby attracting more qualified leads. Distributing the white paper through networks that cater to the target audience to enhance its visibility(Stelzner ,2007)

Utilizing registration forms to offer the white paper for free but requiring registration helps in capturing leads. This method builds a list of interested professionals who can be further engaged through follow-up communications. Stelzner (2007) explains the strategy of using forms to capture leads by offering a preview of the white paper and requiring registration for full access.

Implementing an automated follow-up system to thank readers, provide additional resources, and guide them towards actionable steps based on the white paper's recommendations ensures continuous engagement with potential leads. Automated follow-up system holds significant role to maintain engagement and nurture relationships with readers. By focusing on these elements and strategies, the white paper can be effectively marketed to reach and engage the target audience in the healthcare sector. This approach ensures that the content not only informs and persuades but also drives actionable outcomes, leading to improved onboarding processes and staff integration in community hospitals.

2.7 Lessons Learned

Several critical lessons emerged from this project, highlighting the powerful synergy between DLT and Activity Theory. Combining these elements ensures that technological solutions are grounded in a thorough analysis of organizational dynamics, leading to more effective and sustainable process enhancements.

One significant lesson is the transformative potential of DLT in healthcare. Blockchain technology's ability to create secure, immutable records and automate administrative tasks through smart contracts can significantly reduce errors and ensure compliance with regulatory standards. This automation not only enhances operational efficiency but also frees up healthcare professionals to focus more on patient care. The transparency and security provided by blockchain technology build trust among stakeholders, which is crucial in the healthcare sector. The ability to facilitate seamless data sharing across different healthcare systems further enhances coordination and efficiency, addressing one of the major challenges in healthcare IT interoperability.

The role of AI, specifically ChatGPT, in research and process improvement is also highlighted as a critical advancement. ChatGPT's ability to manage and interpret large datasets, develop detailed personas, and provide real-time insights enhances the efficiency and accuracy of research. This capability supports continuous improvement by offering immediate recommendations based on synthesized data. The use of AI in automating literature reviews and drafting research papers demonstrates its potential to streamline complex processes and improve decision-making. The integration of AI tools like ChatGPT into healthcare research and operations can significantly enhance the efficiency and effectiveness of hiring and onboarding processes.

The importance of process modelling, particularly using the URN framework, is another valuable lesson. Process modelling ensures that organizational activities are aligned with strategic goals, facilitating better decision-making and resource allocation. The continuous monitoring and adjustment of processes based on feedback foster a culture of ongoing improvement and adaptation, which is essential in the dynamic healthcare environment. By identifying gaps and inefficiencies, process modelling helps healthcare organizations

maintain regulatory compliance and enhance overall efficiency. The iterative and collaborative nature of process modelling ensures sustained improvements and practical, accepted solutions.

The iterative nature of Activity Theory emphasizes the need for regular feedback and refinement. Continuous monitoring and adaptation based on real-time data and feedback ensure that improvements are sustained over time. This approach promotes a culture of continuous improvement and adaptation, essential for addressing the dynamic challenges in healthcare. By resolving contradictions within activity systems, healthcare organizations can improve coordination, reduce inefficiencies, and enhance the overall integration of staff. The practical application of Activity Theory provided a structured approach to dissecting and understanding workflow complexities, demonstrating its value in organizational analysis.

Overall, the findings from this project underscore the importance of integrating advanced technologies and theoretical frameworks to enhance the efficiency and effectiveness of hiring and onboarding processes in healthcare. The combination of DLT, AI, and Activity Theory provides a comprehensive approach to addressing the complex challenges faced by community hospitals. These insights serve as a solid foundation for developing strategic recommendations and practical solutions for improving healthcare workforce management, ultimately leading to enhanced operational efficiency and improved patient care.

2.8 Summary

In conducting this study on "DLT-Driven Hiring and Onboarding: Transforming Hospital Workforce Management using Activity Theory," several key insights emerged that significantly contribute to our understanding of integrating advanced technologies and theoretical frameworks to enhance healthcare workforce management. The application of Distributed Ledger Technology (DLT), particularly blockchain, along with advanced AI tools

such as ChatGPT, reveals transformative potential in addressing inefficiencies in the hiring and onboarding processes of community hospitals. Additionally, the integration of Activity Theory and process modelling provides robust frameworks for analysing and improving complex organizational workflows.

DLT, particularly blockchain technology, stands out as a transformative force in healthcare. Blockchain's cryptographic techniques and immutable ledgers ensure data integrity, security, and transparency, making healthcare data tamper-proof and protecting against unauthorized access. The ability to automate various administrative tasks, such as credential verification and compliance checks, using smart contracts significantly reduces the time and resources required for these processes. This automation not only enhances operational efficiency but also ensures compliance with stringent data privacy and security regulations, such as HIPAA and GDPR. Moreover, blockchain facilitates interoperability by providing a unified platform for seamless data sharing across different healthcare systems, thereby improving coordination and efficiency.

Advanced AI tools, particularly ChatGPT, play a crucial role in enhancing research and data synthesis. ChatGPT's capabilities in analysing large datasets, extracting relevant information, and synthesizing it into comprehensive personas are transformative for healthcare hiring and onboarding. By automating data synthesis and offering personalized support and feedback, ChatGPT significantly reduces operational inefficiencies and enhances decision-making processes. The ability to continuously update personas and processes based on ongoing data collection ensures that onboarding procedures remain relevant and effective, adapting to the evolving healthcare environment. Additionally, ChatGPT facilitates real-time data integration and analysis, promoting interoperability and reducing data silos, which are critical for efficient healthcare operations.

Activity Theory and process modelling are pivotal in understanding and improving organizational workflows. Activity Theory, with its focus on interactions within activity systems and the resolution of contradictions, provides a structured approach to analysing and enhancing workflows. The application of expansive visualization, which involves making invisible aspects of work visible by identifying and analysing disturbances and innovations, is particularly effective in identifying inefficiencies in onboarding processes and designing practical solutions. Process modelling, especially through the User Requirements Notation (URN) framework, ensures that organizational goals align with operational activities. The integration of goals and processes within the URN framework provides a clear visualization of workflows and facilitates continuous process improvement through the use of Key Performance Indicators (KPIs).

Chapter 3: Research Method

Step	Activity	Outcome
1	Literature review on onboarding, value creation through DLT, activity theory, ChatGPT & white papers	Conceptual guide for the concepts and processes created.
2	Extract & mine data to create a consolidated dataset describing the current onboarding process by extracting information from various sources, including vlogs, websites, articles, and videos.	A comprehensive and consolidated dataset detailing the existing onboarding process, compiled from diverse sources, which serves as

		the foundation for further analysis and modeling.
3	Use ChatGPT to extract and synthesize grey literature to identify activities, processes & challenges of the existing process.	Preliminary processes and methods identified from grey literature analysis.
4	Conduct interviews with ChatGPT personas representing key stakeholders to derive elements of Activity system.	A baseline activity system model that accurately reflects the current onboarding & Hiring process, derived from the personas' responses.
5	Using ChatGPT personas, validate the baseline activity system by identifying inefficiencies, frustrations, and bottlenecks.	Documented initial frustrations and observed inefficiencies.
6	Discover underlying contradictions in the activity system that cause the documented frustrations and inefficiencies.	Identification of systemic contradictions that underlie the current system's frustrations and inefficiencies.

7	Leverage literature on DLT applications and analyze how these technologies can address the identified contradictions and inefficiencies.	Map out DLT-based solutions in a revised activity Model to resolve the contradictions and improve the onboarding and hiring processes.
8	Synthesize findings into a white paper, detailing the contradictions, proposed DLT solutions, and strategic recommendations for implementation.	Short White paper outlining DLT oriented solutions generated.

Table 2 Research Method Outline

3.1 Research Design

The research design for this study employs a combined qualitative approach, integrating various data collection and analysis techniques. This approach ensures a comprehensive understanding of the onboarding and hiring processes in community hospitals in Ontario. The qualitative data collection involves thematic analysis of YouTube transcripts, articles and grey literature review of vlogs and websites, while process mapping techniques are used to visualize and analyze the current processes.

3.2 Methodology

Data Collection

The data analysis for this study was designed to systematically explore hiring and onboarding processes in community hospitals in Ontario, with the aim of identifying inefficiencies. A combination of strategic planning, systematic searching, and iterative assessment was

employed to ensure comprehensive coverage of relevant sources. The research aimed to map the hiring and onboarding practices within community hospitals in Ontario, emphasizing the identification of inefficiencies that impact these processes. To achieve this, specific selection criteria were developed to guide the search and evaluation of relevant sources. The scope of the research was defined by several key factors:

Relevance: The content selected needed to be directly related to hiring and onboarding in community hospitals. This ensured that the data collected was specific to the context of the study, allowing for targeted insights into the processes under investigation.

Geographic Focus: Only sources that pertained to Ontario were included, aligning the data collection with the regional focus of the study. This criterion ensured that the findings were relevant to the specific healthcare environment being studied.

Source Credibility: Priority was given to peer-reviewed journals, official government and healthcare websites, established news outlets, and professional organizations. This approach helped maintain the integrity and reliability of the data, ensuring that the insights derived were grounded in credible information.

Date of Publication: To ensure the findings reflected current practices, the research focused on sources published within the last five years. This temporal limitation was important for capturing up-to-date information that accurately represents the current state of hiring and onboarding processes.

Systematic Search and Data Collection: A systematic search strategy was employed, using a combination of academic databases, general search engines, and video platforms. This approach was designed to capture a broad spectrum of perspectives and data types, integrating both academic insights and practical, real-world examples.

Databases and Search Engines: The research utilized a range of platforms to gather relevant data. Academic databases such as PubMed and Google Scholar were used to source peer-reviewed articles, while general search engines like Google were employed to access grey literature. Advanced search operators were used to narrow results to the most relevant content, such as “hiring and onboarding processes in community hospitals” restricted to educational (.edu) and organizational (.org) websites.

Video Platforms: YouTube’s advanced search features were leveraged to filter videos by date, relevance, and credibility. This allowed for the inclusion of professional content from recognized channels, contributing visual and practical insights that complemented the textual data.

Keywords and Search Terms: To ensure a comprehensive search, a variety of specific keywords and phrases were employed, including:

“hiring process in Ontario community hospitals”, “onboarding healthcare Ontario”

“staffing challenges in community hospitals”, “nurse onboarding practices Ontario”

“healthcare staffing inefficiencies Ontario”, “onboarding process evaluation in healthcare”

“best practices in hospital onboarding”, “Ontario community hospitals hiring procedures”

“onboarding new healthcare staff Ontario”, “challenges in hiring healthcare professionals”

“employee integration in community hospitals”

These terms were carefully selected to ensure the searches were tightly focused on the study’s objectives, enabling the identification of relevant insights related to hiring and onboarding inefficiencies.

Establishing Initial Targets and Sample Size : To ensure a robust and diverse sample, initial targets for data collection were established. The goal was to collect 20-30 articles, drawing from both peer-reviewed literature and relevant grey literature sources.

A target of 15-20 websites was set, focusing on official healthcare and government platforms that provide authoritative information. Aiming to capture dynamic insights, 10-15 videos were selected from professional channels, ensuring a mix of expert interviews, panel discussions, and case studies.

An iterative approach was applied to refine the search results, enhancing the quality and relevance of the data collected. An initial pilot search was conducted, during which the first 10-15 items from each category (articles, websites, videos) were reviewed for alignment with the research criteria.

This pilot phase allowed for the assessment of the initial search strategy's effectiveness, providing an opportunity to adjust keywords and refine the search methods. Sources were evaluated for their relevance, quality, and the depth of information they provided on the onboarding processes.

The concept of saturation was central to determining the final sample size. Data collection continued until the saturation point was reached, defined as the stage where new sources consistently added little to no new information or themes. This ensured that the research captured a comprehensive view of the hiring and onboarding processes, without redundancy.

The application of saturation ensured that the collected data was sufficient to support a thorough analysis while avoiding the pitfalls of over-collection.

For each source selected, a justification was established on the basis of relevance , explaining how it met the established criteria and contributed to the study. The justification for the sample size was based on the need to cover the topic comprehensively until thematic saturation was reached. This approach also highlighted the importance of capturing diverse perspectives from various types of sources, providing a well-rounded view of the hiring and onboarding processes in Ontario's community hospitals.

The screenshot shows the Google Scholar search interface. The search query 'hiring process in Ontario community hospitals' is entered in the search bar. The results page displays several academic articles. One article by Y.Zhao et al. is shown in full, while others are summarized with links to their full text on Springer.com, mdpi.com, and upjournals.press. The search filters are set to 'Articles' and 'Any time'. Advanced search options are visible at the bottom.

Advanced Search

Find pages with...
all these words: hiring and onboarding in community hospitals in ontario
this exact word or phrase:
any of these words:
none of these words:
numbers ranging from: to
Then narrow your results by...
language: English
region: Canada
last update: past year
site or domain:
terms appearing: anywhere in the page
file type: any format
usage rights: not filtered by license

Figure 4: Data acquisition by Google Scholar

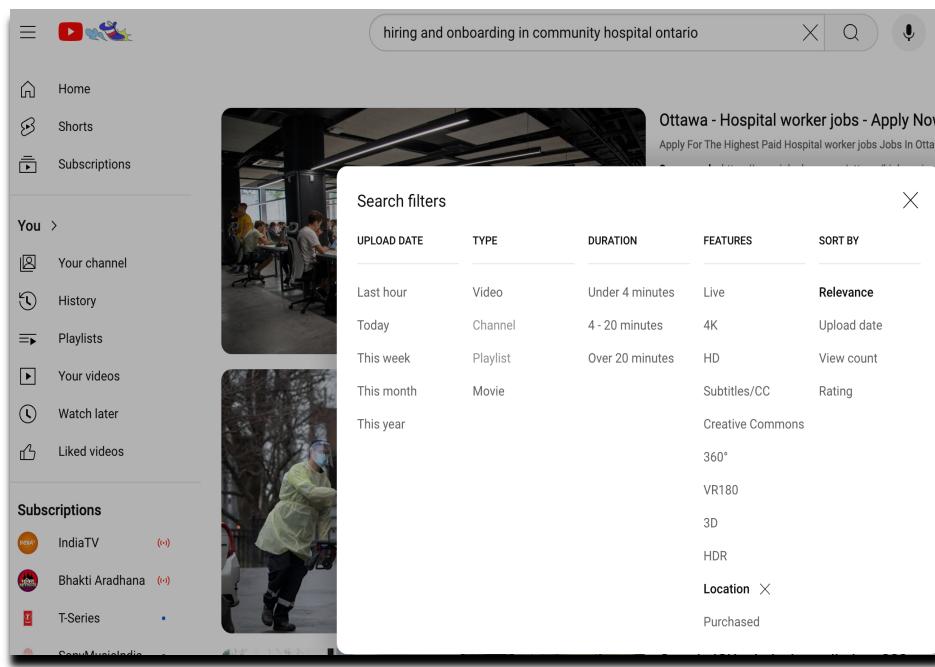


Figure 5 : Data Acquired from Selective and relevant YouTube Videos.

Multimedia Content

Understanding that textual information alone might not capture the full scope of current practices, included 15 YouTube videos in the review. These videos, often produced by hospitals, healthcare consultants, or related entities, provided visual and auditory context to the onboarding and hiring processes. The selection criteria for these videos were based on their relevance, viewer engagement, and the date of publication. Videos published within the past year were prioritized to ensure the information was current.

As part of the research, video content from YouTube was identified as a valuable source of information, providing insights into the hiring and onboarding practices within community hospitals. A curated list of relevant videos was compiled, focusing on topics such as recruitment strategies, onboarding processes, and staff integration in healthcare settings.

```

#!/usr/bin/python3
# This script extracts transcripts from YouTube videos.
# Usage: python3 youtube_transcript_extractor.py <list_of_urls>
# Example: python3 youtube_transcript_extractor.py urls.txt

from youtube_transcript_api import YouTubeTranscriptApi
import re
import os

def extract_video_id(url):
    video_id_match = re.search(r"(?:(?:v=|\\/)([0-9A-Za-z_-]{11})).*", url)
    return video_id_match.group(1) if video_id_match else None

def get_transcript(video_id):
    try:
        return YouTubeTranscriptApi.get_transcript(video_id)
    except Exception as e:
        print(f"An error occurred: {str(e)}")
        return None

def extract_text_from_transcript(transcript):
    return "\n".join(entry['text'] for entry in transcript) if transcript else ""

def save_transcript(video_id, text):
    filename = f"transcript_{video_id}.txt"
    with open(filename, 'w', encoding='utf-8') as file:
        file.write(text)
    print(f"Transcript saved to {filename}")

# List of video URLs
video_urls = [
    "https://youtu.be/lPΕUTZff5MB",
    "https://youtu.be/BLNNDbEwUo",
    "https://youtu.be/dK3lumDE6t0",
    "https://youtu.be/Ez1PGYlmQOM",
    "https://www.youtube.com/watch?v=NOSCIH39ZSc",
    "https://www.youtube.com/watch?v=bqYsm15PpU6pp=ygUWb250YXJpbvBob3NwaXRhbCBzYXRmZg%3D%3I",
    "https://www.youtube.com/watch?v=bhTy6yAMMUb6pp=ygUWb250YXJpbvBob3NwaXRhbCBzYXRmZg%3D%3I",
    "https://www.youtube.com/watch?v=u_r_FFGRSAw6pp=ygUWb250YXJpbvBob3NwaXRhbCBzYXRmZg%3D%3I",
    "https://www.youtube.com/watch?v=TTQTKsK4G206pp=ygUWb250YXJpbvBob3NwaXRhbCBzYXRmZg%3D%3I",
    "https://www.youtube.com/watch?v=3n4z5a07ysi6pp=ygUWb250YXJpbvBob3NwaXRhbCBzYXRmZg%3D%3I",
    "https://www.youtube.com/watch?v=eEyIIhw2kAM&pp=ygUWb250YXJpbvBob3NwaXRhbCBzYXRmZg%3D%3I"
]

def main():
    for url in video_urls:
        video_id = extract_video_id(url)
        if video_id:
            transcript = get_transcript(video_id)
            if transcript:
                full_text = extract_text_from_transcript(transcript)
                save_transcript(video_id, full_text)
            else:
                print(f"Failed to retrieve transcript for video {url}")
        else:
            print(f"Failed to extract video ID from URL: {url}")

if __name__ == "__main__":
    main()

```

Ln: 37 Col: 65

```

Last login: Tue Aug  6 13:50:27 on ttys000
(base) bhumikagohiya@Bhumikas-MacBook-Pro ~ % cd ~/Documents
(base) bhumikagohiya@Bhumikas-MacBook-Pro Documents % python youtube_transcript_extractor.py
Transcript saved to transcript_NOSCIH39ZSc.txt
Transcript saved to transcript_QpqM9ch_fJE.txt
Transcript saved to transcript_wV5oAcmoY-E.txt
Transcript saved to transcript_EHz-eGYJ0uY.txt
An error occurred: no element found: line 1, column 0
Failed to retrieve transcript for video: https://www.youtube.com/watch?v=NNbRs9S6m1k
Transcript saved to transcript_WG2906Y7IY.txt
Transcript saved to transcript_T2zFbaX6d20.txt
Transcript saved to transcript_c1rboQhb2Jc.txt
Transcript saved to transcript_r6PMQpm2540.txt
(base) bhumikagohiya@Bhumikas-MacBook-Pro Documents %

```

Figure 6: Extracting Youtube Transcripts for Generating Baseline Process and Persona

Automation of Transcript Extraction

To streamline the extraction of transcripts from these videos, a Python script was developed. This automation was critical in managing the large amount of video data, reducing the time and effort that would otherwise be required for manual transcription.

Script Development

The Python script was designed to automate the entire process of transcript extraction. The script utilized the YouTubeTranscriptApi library to:

- Extract video IDs from the provided list of YouTube URLs.
- Retrieve transcripts using YouTube's API.
- Save the transcripts as text files for further analysis.

The development of this script ensured that the extraction process was both accurate and efficient, mitigating the potential for human error associated with manual transcription.

Data Collection Process

The input for the script consisted of a list of YouTube URLs, each pointing to a video relevant to the research focus. The script processed each URL, extracting the corresponding video ID and retrieving the transcript. The extracted transcripts were then saved as .txt files, organized systematically for subsequent thematic analysis.

The following steps outline the data collection process:

1. **Compilation of YouTube URLs:** Relevant videos were selected based on their content alignment with the research objectives.

2. **Execution of the Python Script:** The script was run in a terminal environment, where it automatically processed each video URL, retrieved the transcript, and saved it in a text file.
3. **Error Handling:** The script was designed to handle scenarios where transcripts were unavailable, logging errors and continuing with the next URL in the list.

Use of White Papers

To further enhance the literature review, five existing white papers from companies, consultants, and government agencies offering similar services. These documents provided a valuable benchmark against which the current practices could be compared. The white papers were selected based on their detailed analysis of hiring and onboarding practices, their relevance to the healthcare sector, and their publication within the last five years.

The methodology employed in this literature review was designed to ensure a comprehensive, multi-dimensional understanding of hiring and onboarding processes in Ontario's community hospitals. The diverse mix of sources—peer-reviewed articles, grey literature, and multimedia content—enabled a well-rounded exploration of the subject matter. The careful selection and curation of sources allowed for a focused review that remains relevant and actionable for the study's objectives.

Data Analysis

The qualitative data was analyzed using thematic analysis, which helped in extracting key themes and insights from the transcripts and literature review. This analysis provided a deeper understanding of the recurring issues and challenges faced by different stakeholders in the onboarding and hiring processes.

In this chapter, we explore the data mining process employed to extract and analyse relevant content from video sources, specifically focusing on the hiring and onboarding processes in community hospitals. The use of automation through Python scripting played a central role in efficiently handling large volumes of data, thereby enhancing the overall research methodology.

3.3 Literature Analysis

This chapter presents an analysis of existing literature across key streams relevant to the study: Distributed Ledger Technology (DLT) in healthcare, the use of ChatGPT for research synthesis, Activity Theory and process modelling in healthcare integration, and the development of white papers addressing onboarding inefficiencies. The analysis aims to identify current challenges in the onboarding processes of community hospitals and explore innovative technological solutions that can enhance workforce management. The analysis of the literature provides a comprehensive understanding of the current state of onboarding in healthcare and highlights the potential for technological and process-driven enhancements. The insights gained from DLT, ChatGPT, Activity Theory, and white paper development collectively inform both academic inquiry and practical applications, offering a roadmap for future research and implementation. For academic research, these findings contribute to the broader discourse on healthcare workforce management, providing a foundation for further exploration of innovative technologies and methodologies. For clients and practitioners, the analysis offers actionable recommendations that can enhance onboarding processes, improve staff integration, and ultimately support better healthcare delivery.

3.3.1 Overview of Key Literature Streams

The review focused on understanding how emerging technologies and theoretical frameworks can address inefficiencies in healthcare onboarding. The integration of DLT, AI tools like ChatGPT, and process modeling techniques were examined to identify their potential impact on streamlining staff onboarding, improving data management, and fostering better integration of new hires in healthcare settings.

DLT in healthcare has been extensively discussed for its ability to enhance data security, manage workforce records, and ensure compliance with regulatory standards. The literature emphasizes DLT's role in creating secure, transparent, and tamper-proof records, which are critical for managing sensitive data during the onboarding of healthcare staff. The interoperability of DLT systems also facilitates seamless data exchange between departments, reducing administrative delays and improving communication, which are often cited as significant barriers during onboarding.

Similarly, the application of ChatGPT in research synthesis highlights its capacity to automate data analysis, optimize data retrieval, and develop personas that reflect typical onboarding experiences and challenges. The literature suggests that AI-driven tools like ChatGPT can significantly reduce the time required to synthesize large volumes of data, ensuring that insights are timely and contextually relevant. ChatGPT's semantic search capabilities allow for more targeted information retrieval, supporting evidence-based decision-making in onboarding strategy formulation.

Activity Theory and process modeling are explored as valuable frameworks for analyzing onboarding processes and identifying systemic contradictions that hinder staff integration. The literature demonstrates how Activity Theory can be used to map complex workflows,

revealing gaps between organizational policies and actual practices. Process modeling tools, such as the User Requirements Notation (URN), provide a structured approach to redesigning onboarding workflows, ensuring that processes align with staff needs and organizational goals. These models support continuous feedback loops, fostering an adaptive approach to onboarding that evolves in response to new challenges and feedback.

The analysis also includes a focus on the development of white papers as a strategic tool to address onboarding inefficiencies and promote the adoption of DLT solutions. White papers serve as an effective medium for translating research findings into actionable recommendations, providing stakeholders with a clear understanding of current challenges and potential technological benefits. The literature underscores the importance of clearly articulating problems and presenting evidence-based solutions, ensuring that white papers not only inform but also drive practical change.

Integrated Analysis of Findings

The literature collectively points to a significant gap between current onboarding practices and the potential enhancements that can be achieved through the integration of advanced technologies and process models. DLT's secure data management capabilities are well-positioned to address issues related to data integrity, compliance, and transparency, offering a robust solution for managing onboarding records. This integration could simplify the verification of staff credentials, streamline compliance checks, and reduce the administrative burden on HR departments.

ChatGPT's role in automating data synthesis and optimizing information retrieval aligns well with the needs of healthcare organizations that handle large amounts of complex data. By employing AI-driven tools, healthcare administrators can develop more accurate personas

and targeted onboarding strategies, directly addressing common frustrations experienced by new hires. The use of AI also enhances the adaptability of onboarding processes, allowing organizations to quickly adjust their strategies based on real-time insights.

The application of Activity Theory and process modeling offers a theoretical underpinning for understanding and improving the onboarding experience. These frameworks provide a systematic approach to identifying inefficiencies and redesigning processes in a way that aligns with both staff and organizational objectives. The iterative nature of Activity Theory supports ongoing improvements, making it a valuable tool for managing the dynamic and evolving needs of healthcare settings.

White papers bridge the gap between research and practical implementation by communicating complex findings in a clear, actionable format. They serve as a crucial tool for advocating change, providing evidence-based recommendations that are grounded in both theoretical insights and real-world data. The literature suggests that well-crafted white papers can effectively influence decision-makers, promoting the adoption of best practices in onboarding and staff integration.

Future Considerations

The literature analysis reveals several future considerations for research and practical application. Firstly, there is a need for empirical studies that explore the real-world implementation of DLT in healthcare onboarding, focusing on measuring its impact on data security, compliance, and process efficiency. Longitudinal studies that track the outcomes of DLT integration over time would provide valuable insights into its effectiveness and scalability.

Further research into the application of AI tools like ChatGPT in healthcare settings is also warranted. Studies should examine how these tools can be tailored to meet the specific needs of different healthcare environments, assessing their impact on reducing onboarding times, improving staff satisfaction, and enhancing the overall onboarding experience. Additionally, exploring the ethical implications of AI-driven decision-making in sensitive areas such as hiring and onboarding would contribute to the responsible use of these technologies.

Theoretical frameworks such as Activity Theory offer a robust basis for analysing onboarding processes, but there is a need for more practical applications that demonstrate how these theories can be translated into tangible process improvements. Future research should focus on developing practical guidelines and toolkits that help organizations implement these frameworks effectively, ensuring that theoretical insights are accessible and actionable for healthcare administrators.

Finally, the development and dissemination of white papers should be prioritized as a means of knowledge translation. Future efforts should explore innovative ways to market and distribute white papers, ensuring that they reach the appropriate stakeholders and drive meaningful change in onboarding practices. Integrating feedback mechanisms within white papers could also enhance their impact, allowing stakeholders to engage with the content and contribute to ongoing discussions about best practices.

3.3.2 Grey Literature Analysis

The grey literature analysis was crucial in providing practical insights into the onboarding processes within community hospitals, highlighting real-world challenges, frustrations, and innovative practices that traditional academic literature often overlooks. By systematically reviewing sources such as websites, vlogs, YouTube videos, and industry articles, the

analysis aimed to capture a comprehensive and unbiased view of onboarding experiences in different healthcare settings.

Approach to Grey Literature Collection

The research incorporated a wide range of grey literature sources, including industry documents, government resources, and multimedia content, to gather diverse perspectives on hospital onboarding processes. This approach allowed for a nuanced understanding of both the procedural and experiential aspects of onboarding, which are critical to addressing operational inefficiencies and staff frustrations.

To ensure a balanced and unbiased representation of findings, grey literature was carefully selected from various hospital settings. Videos and other content were purposefully chosen to reflect a broad spectrum of institutions, from large, well-resourced urban hospitals to smaller community hospitals facing unique challenges. For instance, the **“UF Health New Employee Orientation (Updated 2023)”** video provided insights into onboarding practices at a large, resource-rich hospital, highlighting structured programs and advanced training methods. In contrast, the **“Cabell Huntington Hospital New Hire Onboarding Video”** illustrated the onboarding experience in a smaller, community-focused setting, where resource constraints often shape the onboarding approach. The review also included key documents such as the **Ontario Hospital Association (OHA) Toolkit to Support the Implementation of Quality-Based Procedures** and the **Guide to Good Governance - Third Edition**, as well as resources from the **Workplace Safety and Insurance Board (WSIB)**, which provided essential insights into compliance, governance, and safety protocols that directly impact onboarding practices in community hospitals.

This inclusion strategy ensured that the analysis was not skewed towards a particular type of institution, providing a balanced comparison of onboarding practices across different scales

of operation. By capturing the diversity of hospital environments, the research was able to identify both common challenges and unique circumstances that affect onboarding processes, offering a more comprehensive understanding of the complexities involved.

Key Findings and Process Insights

The grey literature revealed significant insights into the onboarding processes and challenges faced by healthcare staff across different hospital settings. Common themes included operational inefficiencies, such as delays in training and poor communication, which were frequently noted across both large and small hospitals. However, the analysis also highlighted distinct differences influenced by the size and resources of the institution.

For example, larger hospitals often demonstrated more structured onboarding protocols, with access to advanced training technologies and dedicated onboarding teams. Meanwhile, smaller community hospitals struggled with limited staffing and resources, leading to more ad hoc onboarding practices that left new hires feeling underprepared. These findings emphasize the importance of context-specific onboarding solutions that address the unique needs and constraints of different types of healthcare facilities.

Integrated Insights and Implications

The inclusion of multiple hospital settings provided a well-rounded view of the onboarding landscape, highlighting the variability in practices and the impact of institutional resources on onboarding outcomes. This approach ensured that the findings were not biased towards a single type of institution, allowing for a more accurate and applicable set of recommendations that can be adapted to various healthcare environments.

The diverse perspectives captured through grey literature underscore the need for flexible, scalable onboarding strategies that can be tailored to the specific needs of different hospital

settings. For large hospitals, the focus might be on leveraging technology and structured training programs to enhance onboarding efficiency. In contrast, smaller hospitals could benefit from collaborative resource-sharing models and simplified onboarding protocols that align with their operational capabilities.

The grey literature analysis provided valuable, real-world insights into the onboarding challenges and practices across diverse hospital settings. By incorporating sources from both large urban hospitals and smaller community facilities, the research avoided bias and ensured a balanced representation of onboarding experiences. These findings highlight the need for adaptable onboarding solutions that consider the unique constraints and opportunities within each healthcare setting, ultimately contributing to more effective workforce integration and better patient care outcomes.

3.4 Onboarding and Hiring Process Identification and Drafting Process for a Community Hospital in Ontario

To identify and draft the onboarding and hiring processes for a community hospital in Ontario, we employed a combination of qualitative and process mapping techniques. Initially, qualitative data from YouTube transcripts, literature reviews, and grey literature sources were analyzed to understand the existing processes and challenges faced by various stakeholders. This provided a foundational understanding of the current landscape. We then utilized Mermaid, to analyze data and visualize the onboarding and hiring workflows. This quantitative analysis highlighted bottlenecks and inefficiencies in the current system. The detailed process map, created using Mermaid codes, visualized the workflow and interactions between different activities and stakeholders, encompassing steps such as job posting, candidate screening, final selection, new hire orientation, training, and credential verification.

This dual approach ensured a comprehensive and detailed representation of the existing processes.

Drafting the Process

Based on the identified steps, a detailed process map was created using Mermaid codes to visualize the workflow and interactions between different activities and stakeholders. Using ChatGpt to generate mermaid code as shown in Figure 11, to iterate and understand various methods and processes followed by different organizations and hospitals we could streamline and eliminated similar task to narrow down the search to a final and important step in the process with subtasks to form the first documented version of the Hiring and onboarding process of a community hospital in Ontario.

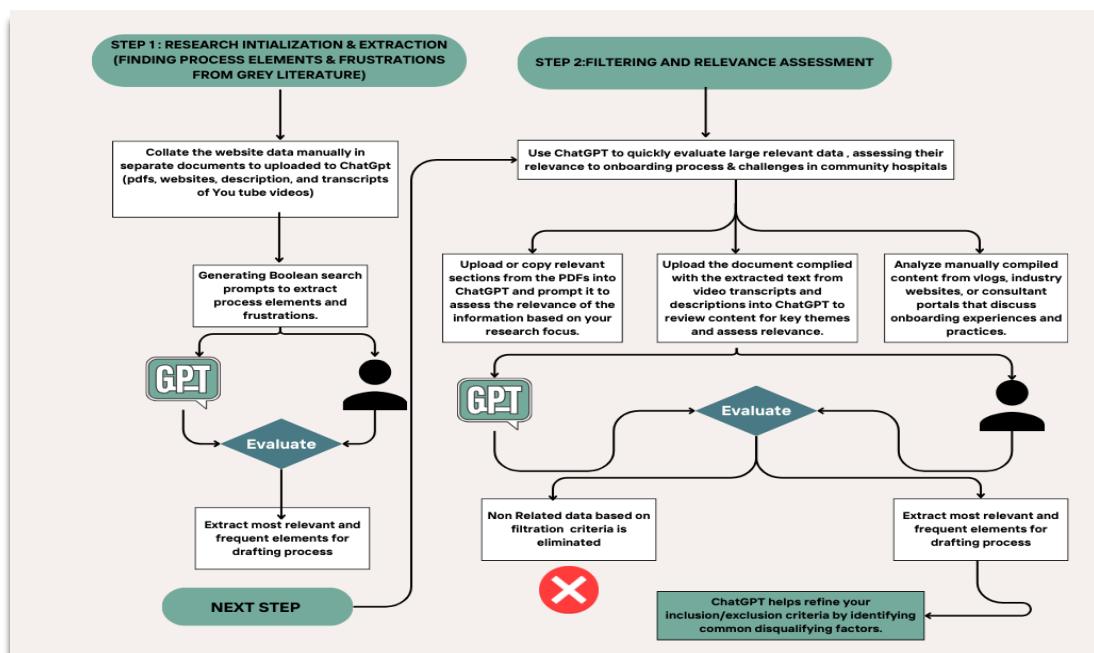


Figure 7: Research Initialization and Extraction Process

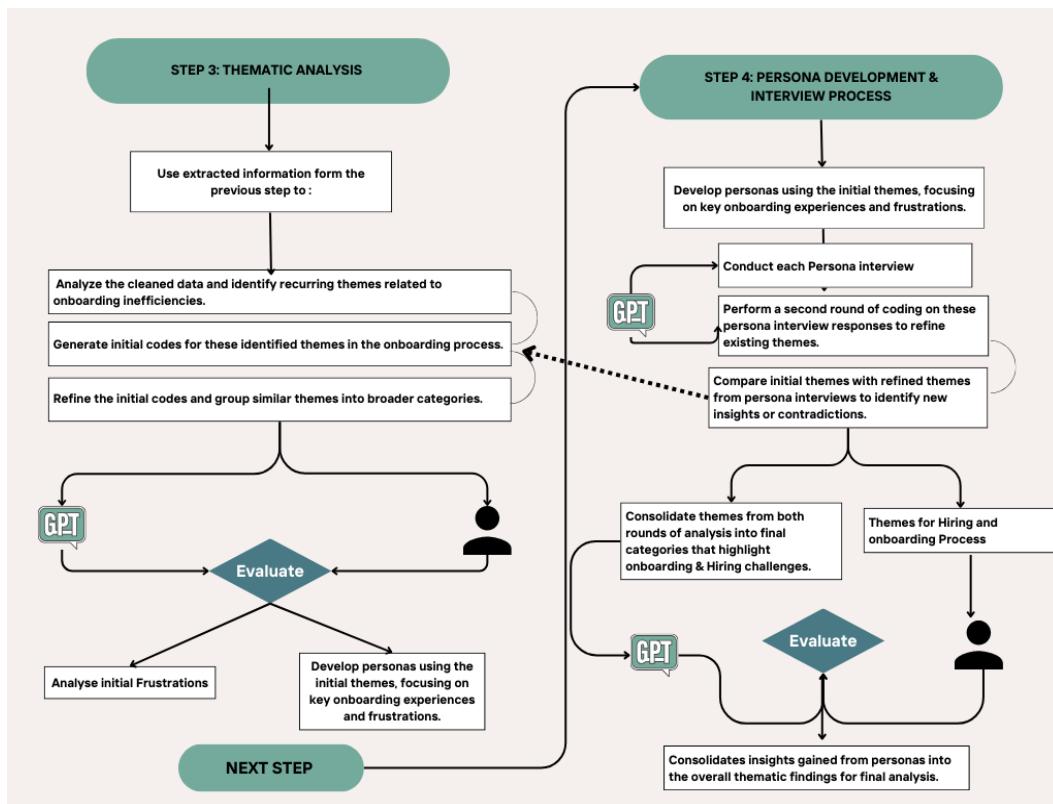


Figure 8 : Iterative Thematic Analysis and Persona Development

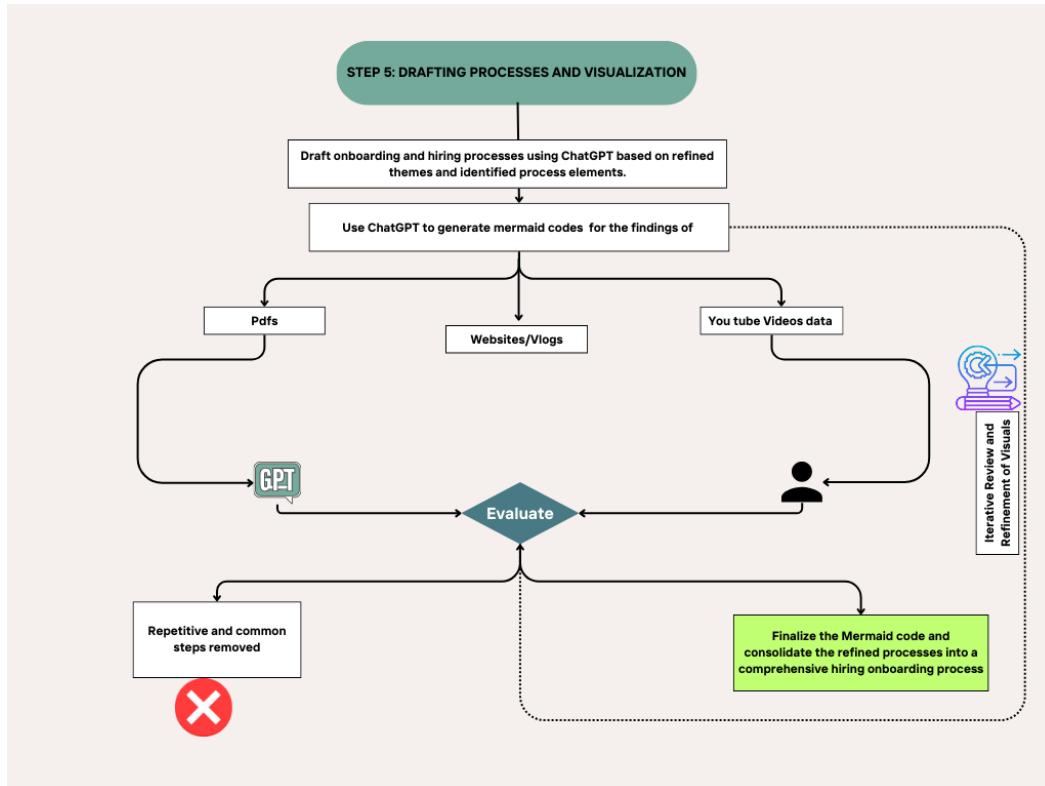


Figure 9 : Drafting Processes and Visualization of Onboarding Workflow

Figures 7,8 and 9 outline the comprehensive approach used to draft the onboarding and hiring processes for community hospitals, leveraging ChatGPT for extraction, analysis, and visualization.

Figure 7 illustrates the initial phase, where data from PDFs, vlogs, websites, and YouTube transcripts were collected and assessed using ChatGPT. Boolean search prompts were generated to extract relevant process elements and frustrations, with ChatGPT evaluating the relevance and refining criteria to ensure only the most pertinent information was included.

Figure 8 shows the iterative thematic analysis conducted in two stages: first to identify key themes from the data, and then refined through persona development. Personas were created based on initial themes to capture onboarding experiences and frustrations, validated through interviews. A second thematic analysis refined these themes, aligning them with real-world challenges and highlighting contradictions. Figure 9 demonstrates the use of ChatGPT to draft the onboarding and hiring workflows, generating Mermaid flowchart codes based on identified themes. These flowcharts were iteratively reviewed and refined, ensuring the visuals accurately represented the onboarding processes by removing redundancies and highlighting actionable improvements. This combined approach effectively utilized ChatGPT throughout the process, resulting in a refined and comprehensive model that addresses the identified challenges in community hospital onboarding.

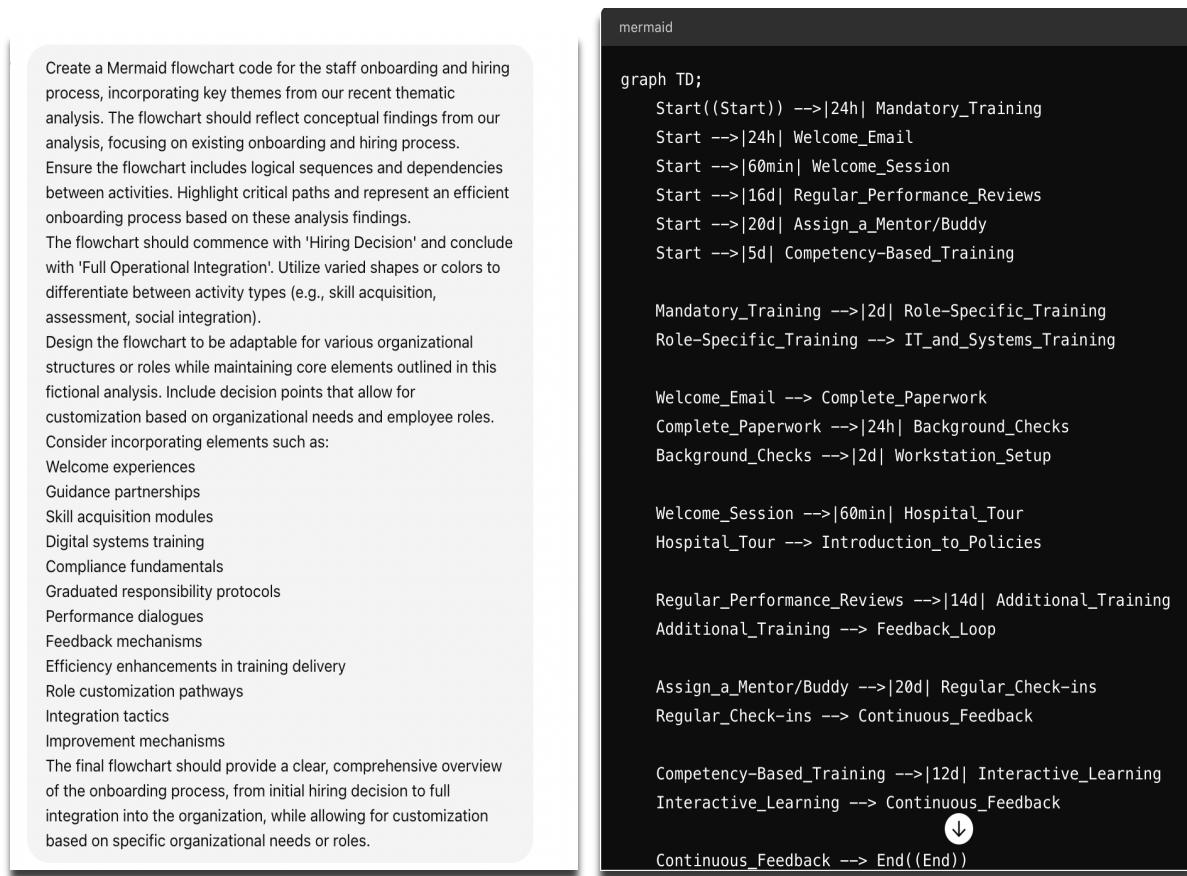


Figure 10: Example of Mermaid Code Generated for Mermaid by Chatgpt Prompt

3.5 Modelling Baseline Activity System

To develop the baseline activity system for the onboarding and hiring processes in a community hospital in Ontario, we employed a dual-approach analysis. This involved both process modelling through Mermaid and insights extracted from conversations with personas, which were parallelly developed based on the information gathered from the analysis of grey literature.

Parallel Analysis with Mermaid and Persona Insights

1. Process Modelling with Mermaid:

We used Mermaid to create a visual representation of the current onboarding and hiring processes. This tool allowed us to break down the complex procedures into

more manageable sub-tasks, providing a clear visualization of each step, stakeholder, and interaction within the process. The process model generated by Mermaid served as a foundational framework for understanding the workflow and identifying potential bottlenecks or inefficiencies.

2. Insights from Persona Conversations:

Personas were developed based on insights from a comprehensive grey literature review that included data from Ontario public databases, specialized healthcare websites, and consultant reports. This process involved reviewing collected data and extracting key themes related to onboarding challenges using ChatGPT, which helped streamline the synthesis of information.

ChatGPT was instrumental in generating detailed personas that accurately reflected common onboarding experiences, such as difficulties with compliance training and the need for mentorship. The generated personas were then manually refined and validated against the original data and expert feedback to ensure they were realistic and aligned with real-world expectations. ChatGPT was utilized to synthesize the extracted themes into detailed persona profiles. By feeding it themes such as compliance training difficulties and mentorship gaps, ChatGPT generated personas that realistically captured staff experiences during onboarding.

The conversations with these personas provided a human-centered perspective, revealing the frustrations, challenges, and unmet needs of stakeholders involved in the onboarding and hiring processes.

This parallel analysis approach ensured a holistic understanding of the onboarding and hiring processes, providing a solid foundation for subsequent improvements and recommendations.

Process Description and Visualization

The process starts with mandatory training, welcome emails, and welcome sessions, followed by regular performance reviews, assigning mentors or buddies, and competency-based training. Each step is interconnected, leading to the final goal of having well-trained, competent, and compliant new hires integrated into the hospital staff.

The process map highlights various activities such as mandatory training, hospital tours, additional training, regular check-ins, and continuous feedback. This visualization helps in identifying potential bottlenecks and inefficiencies in the current process, providing a basis for proposing improvements.

Simplified Activity Systems

To better understand and manage the onboarding and hiring processes, the activity systems were broken down into simpler sub-tasks, each representing a component of the larger process. This approach helps in analyzing each sub-task individually, making it easier to identify specific issues and areas for improvement. In this approach, each activity system includes specific subjects (e.g., HR department, hiring managers), objects (e.g., attracting qualified candidates, verifying credentials), tools (e.g., job boards, applicant tracking systems), and community members (e.g., HR staff, candidates). Rules and divisions of labor are established for each activity system to ensure clarity and efficiency in the process.

For instance, the job posting, and candidate attraction activity system involves the HR department creating job postings and using various platforms to attract candidates. This system is linked to the candidate screening and interviewing activity system, where resumes

are screened, and interviews conducted. The outcome of this system feeds into the final selection and job offers activity system, where job offers are extended to selected candidates. New hires then transition into the orientation system, where they are familiarized with the hospital's policies and procedures. This is followed by the training and development system, aimed at enhancing their skills and knowledge. Finally, the credential verification system ensures that all new hires meet regulatory requirements. By visualizing these interconnected systems, we can identify bottlenecks and inefficiencies at each stage of the process. This allows us to propose targeted improvements, ensuring a smooth and effective onboarding and hiring experience. The simplified activity systems approach not only clarifies the complex workflow but also enhances our ability to manage and optimize the overall process, leading to better outcomes for both the hospital and its employees.

Integration of Findings:

By analysing the process model alongside the insights from persona interactions, we were able to create a comprehensive baseline activity system. This approach ensured that the model was not only data-driven but also aligned with the real-world experiences of those involved in the processes. This integrated baseline activity system served as the groundwork for identifying inefficiencies and exploring how Distributed Ledger Technology (DLT) could address these challenges.

3.6 Persona Development for Key Process & Contradiction Identification from Persona Interviews

Persona Development

The process of drafting personas was significantly informed by the analysis of transcripts from various YouTube videos. These transcripts provided a rich source of qualitative data, offering firsthand accounts and experiences from a diverse array of stakeholders within the healthcare system. By carefully examining these transcripts, we were able to extract key themes and insights that formed the foundation of our persona development.

To begin with, the transcripts were reviewed to identify recurring themes, challenges, and perspectives. This involved a detailed thematic analysis where specific phrases, sentiments, and narratives were coded and categorized. For instance, repeated mentions of burnout and high stress levels among nurses and doctors highlighted the pervasive issue of workload management. Similarly, frequent references to delays in patient care and insufficient staffing levels pointed to systemic inefficiencies that affect both healthcare providers and recipients.

From these thematic insights, as shown in prompts and highlighted key themes and conversations from Figure: 8, detailed personas were created to encapsulate the experiences

and needs of different stakeholders. For example, the persona of a nurse was shaped by narratives of high stress, burnout, and dissatisfaction due to insufficient staffing and support. These insights were gathered from transcripts where nurses spoke about their daily challenges, the emotional and physical toll of their work, and their desire for better resources and support systems. The persona of a patient, on the other hand, was developed based on accounts of delays in care, feelings of frustration due to long wait times, and the overall impact of staffing shortages on their health outcomes.

Doctors	Dr. Kashif Pirzada	Emergency Physician, dealing with increased workload and staff shortages.	Frequently sees burnout among staff and struggles with resource constraints.	1. How have staff shortages affected your ability to provide care? 2. Can you describe a typical shift and the challenges you face? 3. What are the most significant changes you've noticed in the healthcare system since the pandemic? 4. How do you manage your workload and prevent burnout? 5. What support do you need from the hospital administration and government to improve working conditions? 6. How do you think patient care is being impacted by the current staffing crisis?
Nurses	Iram Chogala	Nurse at a busy hospital.	Grappling with daily questions about staffing and bed availability, dealing with pandemic-related strain.	1. Can you describe the current working conditions at your hospital? 2. How do staffing shortages affect your daily responsibilities? 3. What are the main factors contributing to burnout among nurses? 4. How do you ensure patient care quality under these conditions? 5. What are the most significant changes you've noticed in the healthcare system since the pandemic? 6. How do you manage your workload and prevent burnout? 7. What support do you need from the hospital administration and government to improve working conditions? 8. How do you think patient care is being impacted by the current staffing crisis?

Persona Type	Name	Background	Experience	Interview Questions
Patients	Judy Stewart	Recently spent 12 hours in an Ottawa ER with a broken ankle.	Witnessed nurses under extreme pressure, experienced long wait times.	1. Can you describe your recent experience at the hospital? 2. How did the staff's behavior and attitude affect your perception of the care you received? 3. What challenges did you face during your hospital stay? 4. Were there any specific moments that stood out as particularly positive or negative? 5. How do you think the staffing shortages impacted your treatment? 6. What improvements would you suggest for better patient care?
Doctors	Dr. Kashif Pirzada	Emergency Physician, dealing with increased workload and staff shortages.	Frequently sees burnout among staff and struggles with resource constraints.	1. How have staff shortages affected your ability to provide care? 2. Can you describe a typical shift and the challenges you face? 3. What are the most significant changes you've noticed in the healthcare system since the pandemic? 4. How do you manage your workload and prevent burnout? 5. What support do you need from the hospital administration and government to improve working conditions? 6. How do you think patient care is being impacted by the current staffing crisis?

Figure 11 : Persona Developed for Interview , to extract themes , key processes involves , frustrations and Contradictions.

The grey literature also revealed specific issues faced by administrative staff and PSWs. Administrative staff personas were informed by discussions on operational challenges and the pressure to maintain hospital efficiency amidst resource constraints. For PSWs, especially those with international backgrounds, transcripts highlighted challenges related to credentialing and integration into the Canadian healthcare system. These nuanced insights helped in crafting personas that accurately reflect the diverse experiences and needs of all involved parties. Overall, the transcripts provided a direct window into the lived experiences of healthcare stakeholders, enabling us to develop detailed and realistic personas. These personas are not just fictional characters; they are rooted in real-world challenges and

aspirations, making them valuable tools for understanding and addressing the complexities of the onboarding and hiring processes in community hospitals.

Key Contradictions Identification

The identification of key contradictions within the onboarding and hiring processes was carried out through a methodical approach involving the development and interrogation of personas. Initially, personas representing various stakeholders, such as doctors, nurses, patients, hospital staff, administrators, personal support workers (PSWs), and companions, were created based on the thematic analysis of YouTube transcripts and literature review. These personas were then "interviewed" using ChatGPT to simulate real-world scenarios and uncover their specific challenges and inefficiencies.

Yes, I have observed several situations where staff appeared overwhelmed or unable to provide adequate care due to staffing shortages. Here are some notable instances:

Situations Observed

1. Emergency Department Overcrowding:

- Observation:** During peak hours in the emergency department, there were instances where the number of incoming patients exceeded the capacity of the available staff to manage effectively.
- Details:** Nurses and doctors were seen rushing between patients, with some patients waiting longer than expected for initial assessments and treatments. Triage times were extended, and non-critical patients experienced significant delays.
- Implication:** This suggests that the emergency department may be understaffed during high-demand periods, impacting the timeliness and quality of care.

2. Delayed Medication Administration:

- Observation:** On multiple occasions, patients experienced delays in receiving their prescribed medications.
- Details:** Nurses were seen trying to manage multiple tasks simultaneously, leading to delays in medication rounds. Patients and family members expressed concerns about the timing of medication administration ↓
- Implication:** Staffing shortages may be contributing to these delays, potentially affecting patient safety.

As Dr. Kashif Pirzada, an experienced emergency physician, here are the main challenges faced during the hiring process for medical positions in our hospital:

Main Challenges:

1. High Competition for Qualified Candidates:

- There is significant competition among hospitals and healthcare facilities for highly qualified and experienced medical professionals. Attracting top talent requires competitive compensation packages and strong organizational reputation.

2. Lengthy Credentialing Process:

- Verifying the credentials and background of medical professionals can be time-consuming. Ensuring that candidates have the necessary licenses, certifications, and experience is crucial but can delay the hiring process.

3. Ensuring Cultural Fit:

- Beyond qualifications, it is essential to find candidates who fit well with the hospital's culture and values. Assessing cultural fit requires thorough interviews and interaction with potential colleagues.

4. Specialized Skill Requirements:

- Certain medical positions require highly specialized skills and experience. Finding candidates with the right expertise and training can be challenging, particularly for niche medical roles.

5. Retention Concerns:

Figure 12: Conversations highlighting the Themes , Frustrations , etc.

By engaging with these personas in a simulated interview environment, we could delve deeper into their experiences and identify contradictions within the onboarding and hiring processes. For example, when interviewing a nurse persona, issues such as high workload and burnout were frequently highlighted, revealing a contradiction between staffing levels and the

ability to provide quality patient care. Similarly, interviews with administrative personas often brought up challenges related to credential verification and resource allocation, underscoring the gap between theoretical policies and their practical application. This interactive process allowed us to systematically identify and categorize these contradictions, providing a nuanced understanding of the inefficiencies and areas needing improvement within the hospital's hiring and onboarding systems.

3.7 Exploring DLT Solutions from Literature

Literature Findings

Exploring Distributed Ledger Technology (DLT) solutions involved an extensive review of existing literature to identify potential applications of DLT in healthcare, particularly in onboarding and hiring processes. The literature review covered peer-reviewed articles, industry reports, and grey literature, focusing on how DLT can address issues such as data transparency, credential verification, and process efficiency. By synthesizing insights from these sources, we explored how DLT could potentially streamline the onboarding and hiring processes, reduce administrative burden, and enhance data security and integrity. This exploration was guided by the key contradictions identified in the previous steps, ensuring that the proposed solutions were targeted at addressing the specific inefficiencies and challenges uncovered during persona interviews and process analysis.

3.8 Solve Inefficiencies Identified found by Thematic analysis and Persona interviews by Proposed DLT Solutions

3.8.1 Thematic Analysis of Onboarding and Hiring Processes

The thematic analysis was a critical component of this study, aimed at uncovering inefficiencies within onboarding and hiring processes. This analysis involved systematically coding and categorizing data obtained from grey literature sources, including public Ontario databases, healthcare websites, and consultant reports, to identify recurring themes and operational challenges.

Initial Coding and Labeling: Statements from transcripts, documents, and persona data were manually coded to capture key insights such as “delays in credential verification,” “mentorship inadequacies,” and “misalignment of training content.” ChatGPT was used to refine these codes, ensuring consistency and coherence across the dataset.

Iterative Grouping into Categories: ChatGPT supported the grouping of similar codes into broader themes, facilitating the synthesis of raw data into coherent categories. Prompts such as, “Identify common themes, patterns, and recurring steps across all sources,” were used to analyze steps from multiple documents, including transcripts from YouTube videos, PDFs, and compiled website data. This approach allowed for effective categorization and identification of major themes in the onboarding and hiring processes.

Refinement of Themes: The identified themes were refined iteratively, using ChatGPT to validate the accuracy of categories and ensure they aligned with the data's underlying messages. Specific prompts guided ChatGPT in highlighting crucial steps, unique processes, and considerations for each step. This step helped highlight critical inefficiencies such as fragmented administrative workflows and insufficient structured guidance.

Synthesis of Findings: The final step involved consolidating the identified themes into a comprehensive overview of the existing inefficiencies in onboarding processes. This synthesis provided a clear map of challenges such as administrative delays, inconsistent training, and support gaps, which were directly connected to the process steps extracted using ChatGPT.

Inspired by the work of De Paoli et al. (2024), ChatGPT played a vital role in enhancing the thematic analysis process, from generating initial codes to refining final themes. Specific prompts such as, “Group similar steps to form consolidated themes” and “Present the analysis in a structured format,” were used to systematically structure the data and synthesize the findings. This AI-assisted approach streamlined the handling of large qualitative datasets, aligning with best practices in contemporary qualitative research.

By integrating ChatGPT into the thematic analysis, this study provided a robust and credible examination of onboarding inefficiencies, establishing a strong foundation for exploring how Distributed Ledger Technology (DLT) can address these challenges. The structured prompts and iterative feedback loops ensured that the analysis was thorough and aligned with the

study's objectives.

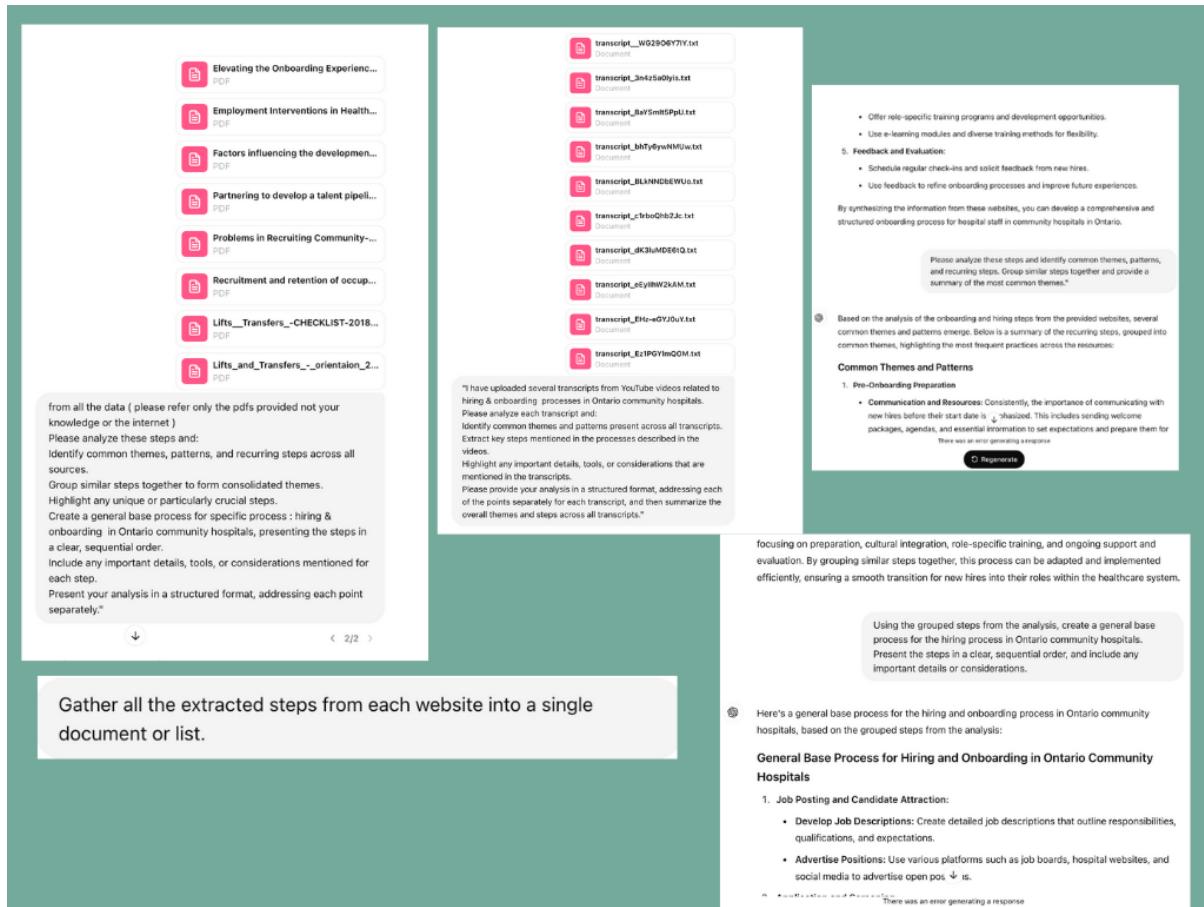


Figure 13 : Utilization of ChatGPT Prompts for Thematic Analysis in Identifying Onboarding and Hiring Process and it's Inefficiencies

3.8.2 Persona Analysis

To explore how Distributed Ledger Technology (DLT) can improve the onboarding and hiring processes, it was first essential to identify the existing inefficiencies within these systems. This identification was achieved through thematic analysis and the development of personas, which helped highlight the key areas where current processes fall short. The thematic analysis involved a detailed review of grey literature sources, such as public Ontario databases, specialized healthcare websites, and consultant reports. This review uncovered recurring issues like delays in credential verification, fragmented training modules, and a lack of structured guidance for new hires. These findings were crucial in pinpointing specific operational challenges in the current onboarding and hiring workflows.

In parallel, personas were created based on the insights gathered from this analysis. Using ChatGPT, personas were developed to capture the real experiences and frustrations of new staff members. These personas revealed common inefficiencies, such as insufficient mentorship, misalignment between training content and job demands, and administrative hurdles that complicate the onboarding experience. By simulating persona interactions, we were able to gain a deeper understanding of the specific pain points faced by new employees. Building on these findings, a comprehensive literature review was conducted to examine how DLT could address these inefficiencies. This review focused on DLT applications across various sectors, especially in healthcare, to understand its potential for improving processes such as credential verification, smart contracts, and automated workflows. Key sources included academic research that detail the use of DLT for enhancing operational efficiency.

The insights from the DLT literature were then mapped against the identified inefficiencies in the onboarding and hiring processes. This comparative analysis allowed us to evaluate the potential of DLT solutions in addressing the specific challenges uncovered earlier. By aligning the capabilities of DLT with the real-world issues identified, this section provides a conceptual framework for how DLT can streamline and enhance the onboarding and hiring experience.

This approach ensures that the proposed DLT applications are not just theoretical but are grounded in the practical realities of the onboarding process, offering targeted solutions to the specific problems identified in our study.

3.9 Gather Insights

The process of gathering insights will involve synthesizing data from various qualitative sources. This includes the thematic analysis of stakeholder interviews and YouTube video transcripts, as well as findings from the literature review on DLT solutions. The analysis will

focus on extracting key themes related to stakeholder experiences, process inefficiencies, and potential technological solutions. These insights will be categorized and analyzed to understand the broader implications for the onboarding and hiring processes in community hospitals. By correlating the challenges identified in the stakeholder interviews with the capabilities of DLT solutions discussed in the literature, we can draw conclusions about the potential effectiveness of these technologies in real-world settings.

3.10 Summary

The summary will integrate all the research findings to provide a cohesive overview of the study. This will involve consolidating the insights from the thematic analysis of interviews and video transcripts, process mapping, and literature review on DLT solutions. The summary will highlight how the identified inefficiencies in the onboarding and hiring processes can potentially be addressed by DLT, based on the literature. It will also discuss the limitations of the study, potential barriers to implementation, and areas for future research. This comprehensive synthesis will ensure that the study provides valuable contributions to the understanding of technology-assisted solutions for improving healthcare staffing processes in community hospitals.

Chapter 4: Results

4.1 Data Modelling and Process Visualization

Mermaid provides a clear and detailed visualization of the onboarding and hiring processes, effectively mapping out various activities, their sequences, and their dependencies. The initial process model generated by Mermaid outlines distinct activities and their flow, making it easier to spot areas where delays and inefficiencies occur. For example, the flowchart highlights key stages such as "Sending Welcome Email," "Mandatory Training,"

and "Conducting Regular Performance Reviews," allowing us to observe how these steps are interconnected and where bottlenecks, like prolonged background checks or role-specific training delays, might arise.

By using Mermaid for process modeling, we gain a comprehensive understanding of the activity sequences and their impact on the overall process. This approach enables us to identify critical points that require optimization, validate the current workflow, and propose potential improvements. The goal is to refine these processes to enhance efficiency and reduce the time needed for onboarding and hiring new healthcare staff, ensuring a smoother and more streamlined experience. The prompt shown in the figure was part of a structured and iterative approach to analyze different types of data - PDFs, websites, and video transcripts each of which was processed separately to maintain the integrity of the analysis. Here's a detailed breakdown of the process:

Data Preparation and Upload: Each type of data source (PDFs, websites, video transcripts) was compiled and pre-processed separately. For PDFs, relevant sections were extracted and compiled into text documents. For websites, the content was manually copied and organized, and for videos, transcripts were extracted using YouTube's transcript feature or third-party tools. These documents were then individually uploaded to ChatGPT.

Sequential Use of Prompts: Instead of using the same prompt for all data types at once, ChatGPT was called separately for each data source category to ensure accurate thematic extraction:

PDFs: The extracted text from each PDF was analyzed individually. The prompt was specifically called to identify key steps, themes, and inefficiencies within this set.

Websites: A separate analysis was conducted for the manually compiled website content. ChatGPT was prompted to assess recurring themes specific to website data, allowing for a focused examination of the insights from this source.

Video Transcripts: Each video transcript was analyzed individually using the same prompt structure. This method ensured that the onboarding processes and identified challenges were accurately captured from the dynamic content of video data.

Iterative Analysis and Integration: After running the prompts for each source category, the results were iteratively reviewed and integrated. The individual analyses from PDFs, websites, and video transcripts were then combined into a synthesized flowchart, reflecting the overall findings across all sources.

This sequential approach allowed for a targeted analysis of each data type, preserving the unique insights each source provided. By handling each data category separately, we ensured that ChatGPT's thematic extraction was precise and context-specific, thus enhancing the accuracy of the flowcharts. The process aligns with rigorous research standards, ensuring that each data source is thoroughly analyzed before synthesizing the findings.

"I need help creating visually appealing Mermaid flowcharts for the hiring process in Ontario community hospitals. These diagrams should be engaging, easy to understand, and suitable for presentation in PowerPoint. Please follow these guidelines:
 Create three separate Mermaid flowcharts:
 One for the process derived from PDFs
 One for the process derived from websites
 One for the process derived from video transcripts
 For each flowchart:
 Use flowchart LR for a left-to-right layout to create a more dynamic appearance.
 Incorporate subgraphs to group related steps and improve organization.
 Use meaningful node IDs (e.g., post_job instead of A).
 Keep node text concise (3-5 words max).
 Use appropriate shapes:
 Rectangles for actions: [text]
 Diamonds for decisions: {text}
 Rounded rectangles for start/end: ([text])
 Use colors for better visibility:
 Style actions with fill:#90EE90,stroke:#006400,stroke-width:2px
 Style decisions with fill:#FFB3BA,stroke:#FF69B4,stroke-width:2px
 Use curved edges for connections to avoid straight lines and enhance aesthetics.
 After each flowchart, provide a brief explanation of key features or unique aspects of that process.
 Create a fourth flowchart that synthesizes the overall process from all sources.

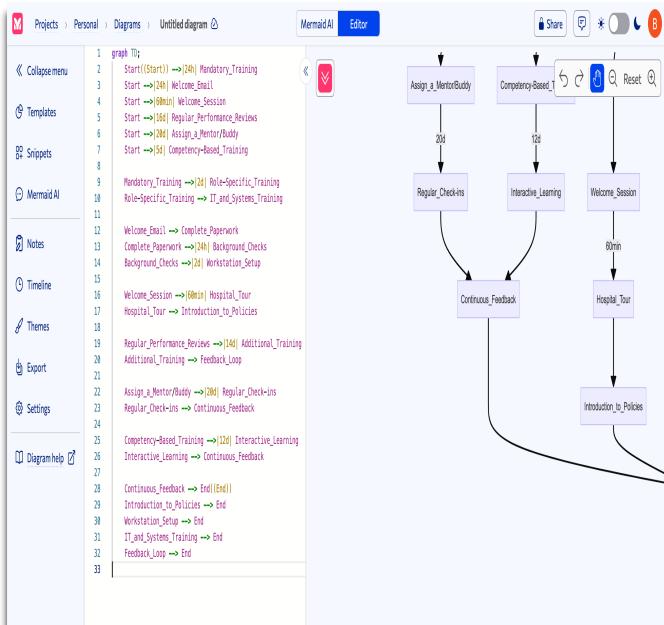


Figure 14: Prompts and resulting code to generate Mermaid Visuals

4.2 Persona-Based Analysis and Thematic Insights:

Using ChatGPT, as depicted in Figure 14, significant phrases and sentences from the transcripts were coded. This coding process involved highlighting relevant pieces of data that addressed the research questions. The identified codes were then analyzed to develop overarching themes, capturing significant patterns in relation to the research question. These themes were refined, grouped into categories, and reviewed to ensure they accurately represented the data. Each theme was then defined and named to succinctly describe its scope.

4.2.1 Thematic analysis Results:

Thematic Analysis was employed to identify patterns and themes within the qualitative data gathered from YouTube video transcripts discussing healthcare staffing issues. The process began with data collection, where transcripts from relevant videos were compiled, providing firsthand accounts from healthcare workers, administrators, and patients. These transcripts were reviewed multiple times to familiarize ourselves with the content and to identify

recurring themes and issues. To effectively conduct the thematic analysis and develop flowcharts of the hiring and onboarding processes, a systematic approach was taken to provide ChatGPT with the appropriate data inputs for each prompt. This section details the steps involved in preparing and utilizing different data sources, including PDFs, websites, and video transcripts, to generate meaningful insights.

Data Collection and Input for Analysis: Each data source -PDFs, websites, and video transcripts were carefully prepared before being analyzed with ChatGPT. The preparation process involved extracting relevant text from each source:

PDFs: Entire documents or specific relevant sections were extracted and uploaded to ChatGPT. These documents contained detailed information on hiring and onboarding processes from official guidelines, training manuals, and policy documents.

Websites: Key content from multiple healthcare and consultant websites was manually copied and compiled into a single document. This compilation included information on onboarding practices, training guidelines, and staff experiences. The combined document was then uploaded to ChatGPT for analysis, allowing for a focused and comprehensive review of the extracted web content.

Video Transcripts: Full transcripts were extracted from videos using YouTube's transcript feature or third-party tools. The transcripts were provided to ChatGPT, ensuring that detailed spoken content on hiring onboarding was included for analysis.

Sequential Use of Prompts: The analysis did not involve running a single prompt across all sources simultaneously. Instead, prompts were tailored and applied sequentially to each data type to ensure focused and context-specific analysis:

For Each Data Source (Prompt #1 & #2): The initial prompts were used to analyze each type of data independently. ChatGPT was instructed to identify key steps, common themes,

and process elements within each source type. This helped in isolating unique insights from PDFs, the compiled website document, and transcripts.

Flowchart Creation (Prompt #3): Following the thematic analysis, prompts were used to create separate flowcharts for each data source. For instance, a distinct flowchart was generated for the steps identified in PDFs, another for the compiled website data, and one for video transcripts, allowing for clear visualization of processes unique to each medium.

Comparison and Synthesis (Prompt #4 & #5): The separate flowcharts were then compared using ChatGPT to identify similarities and differences. This comparative analysis ensured that the synthesized flowchart captured the full range of onboarding processes, integrating the best practices identified across all sources.

Finally, a synthesized flowchart was created that combined insights from all data sources into a single cohesive representation of the onboarding and hiring process (Prompt #5). This step involved using ChatGPT to merge the flowcharts from each data type, resulting in a detailed, comprehensive model of the onboarding experience.

By analyzing each data type separately, the unique context and nuances of each source were preserved, enhancing the specificity and accuracy of the findings.

Structured Integration: This approach allowed for a step-by-step refinement of the data, ensuring that each type of content contributed meaningfully to the overall analysis.

Enhanced Credibility: The process aligns with established qualitative research methods, similar to approaches cited in De Paoli et al. (2024), and demonstrates the systematic use of AI tools in thematic analysis.

Step	Prompt Used	Expected Results / Sample Output
1	"Analyze the [data source] focusing on the hiring & onboarding process. Identify common themes and patterns, extract key steps and highlight important elements."	Analysis of [Data Source]: - Key Steps: [Details] - People Involved: [Details] - Process Elements: [Details]
2	"Extract key themes and summarize the hiring & onboarding process from [data source]. Focus on particular areas."	Thematic Analysis: - Theme 1: [Description] - Theme 2: [Description] Process Summary: [Brief overview] Key Areas: - [Area 1]: [Details] - [Area 2]: [Details]
3	"Create a Mermaid flowchart for the hiring & onboarding process based on the analysis of [data source]."	Mermaid Code: `mermaid flowchart TB A[Start] --> B[Screen Candidates] B --> C[Interview Process] C --> D[Final Selection]`
4	"Compare and contrast the hiring & onboarding flowcharts derived from different [data sources]. Identify commonalities and differences."	Comparison Analysis: - Commonalities: [List of common elements] - Differences: [List of distinguishing factors] - Unique Aspects: [List of unique features]
5	"Synthesize the overall hiring & onboarding process into a comprehensive Mermaid flowchart, incorporating insights from all [data sources]."	Final Mermaid Code: `mermaid flowchart TB A[Start] --> B[Screen Candidates] B --> C[Schedule Interviews] C --> D[Conduct Interviews] D --> E[Final Selection] E --> F[Onboarding]`
7	"Create a flowchart illustrating the research process used, including data sources, analysis methods, and output formats."	Research Process Flowchart: - Input: [List of data sources] - Analysis: [List of analysis methods] - Output: [List of output formats] Mermaid Code: `mermaid flowchart TB A[Data Collection] --> B[Analysis] B --> C[Flowchart Creation] C --> D[Final Output]`
8	"Generate a flowchart indicating how I use ChatGPT, including input data and output formats."	ChatGPT Workflow Flowchart: - Input Data: PDFs, Websites, Video Transcripts - Processing: Analyze with ChatGPT - Output Formats: Flowcharts, Analysis Reports Mermaid Code: `mermaid flowchart TB A[Data Collection] --> B[Analysis] B --> C[Flowchart Creation] C --> D[Final Output]`

Table 3 Draft flow of the process performed to perform Thematic analysis

Key Themes:

1. Physical Accessibility Challenges
2. Communication and Awareness Gaps
3. Proactive vs. Reactive Accommodation Approaches
4. Workplace Adaptation and Flexibility
5. Inclusive Hiring and Onboarding Practices

Key Concepts:

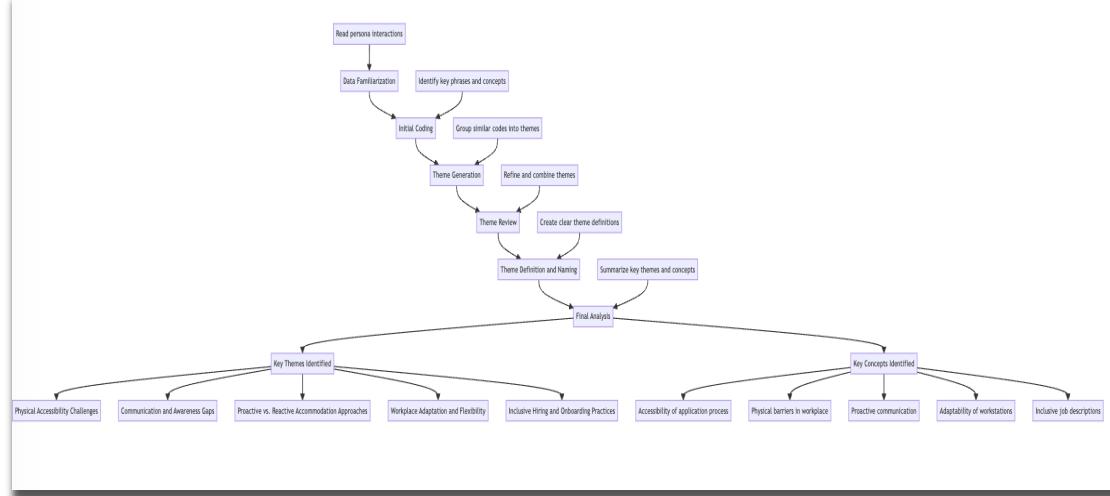
1. Accessibility of application process and materials
2. Physical barriers in the workplace environment
3. Proactive communication about accommodations
4. Adaptability of workstations and equipment
5. Inclusive job descriptions and qualifications
6. Department preparedness for diverse employees
7. Efficiency in implementing workplace modifications
8. Specialized training on adaptive equipment and procedures
9. Emergency procedures for employees with disabilities
10. Social integration and colleague awareness
11. Ongoing feedback and improvement mechanisms
12. Disclosure comfort and potential biases
13. Task allocation and modification flexibility
14. Technology accessibility and assistive software
15. Individualized accommodation planning

Figure 15 : Key themes Identified

4.2.2 Clustering of Similarity and Finding Key themes & Key concepts

From above Figures , it states that thematic analysis was conducted to extract key insights from conversations with personas, which were developed based on information derived from grey literature. The analysis aimed to identify common themes, contradictions, and areas for

improvement within the hiring and onboarding processes in a community hospital setting.



FFigure 16: Challenges in the Hiring and Onboarding Clustered for Similarities

In developing detailed personas for various stakeholders involved in the onboarding and hiring processes at community hospitals in Ontario, we leveraged the capabilities of ChatGPT. This was accomplished by inputting detailed information gathered from thematic analysis of YouTube video transcripts and additional data sources. Thematic analysis of the videos provided firsthand accounts from healthcare workers, patients, and administrators about their experiences and challenges in the healthcare system. This information was synthesized to create comprehensive personas for different roles, including patients, doctors, nurses, other hospital staff, administration, personal support workers (PSWs), and companions. By systematically inputting the data into ChatGPT, we were able to generate detailed persona profiles that capture the essence of each stakeholder's experiences, challenges, and perspectives. These profiles were further enriched by formulating targeted interview questions to uncover key contradictions and inefficiencies in the current processes, thereby guiding the subsequent analysis and potential improvements in the system.

Persona Type	Name	Background	Experience	Interview Questions
Patients	Judy Stewart	Recently spent 12 hours in an Ottawa ER with a broken ankle.	Witnessed nurses under extreme pressure, experienced long wait times.	<ol style="list-style-type: none"> 1. Can you describe your recent experience at the hospital? 2. How did the staff's behavior and attitude affect your perception of the care you received? 3. What challenges did you face during your hospital stay? 4. Were there any specific moments that stood out as particularly positive or negative? 5. How do you think the staffing shortages impacted your treatment? 6. What improvements would you suggest for better patient care?
Nurses	Iaram Chogala	Nurse at a busy hospital.	Grappling with daily questions about staffing and bed availability, dealing with pandemic-related strain.	<ol style="list-style-type: none"> 1. Can you describe the current working conditions at your hospital? 2. How do staffing shortages affect your daily responsibilities? 3. What are the main factors contributing to burnout among nurses? 4. How do you ensure patient care quality under these conditions? 5. What measures would you suggest improving nurse retention and job satisfaction? 6. How has the pandemic changed your perspective on your profession?
Other Hospital Staff	Service Assistant	Provides support services like cleaning and meal delivery.	Often faces aggressive behavior from patients.	<ol style="list-style-type: none"> 1. What is your role in the hospital, and what are your daily tasks? 2. How do you handle aggressive behavior from patients? 3. What training or support have you received to manage these situations? 4. How do staffing shortages impact your work and the hospital environment? 5. What improvements would make your job easier and safer? 6. How do you feel about the communication and collaboration among different hospital departments?
Administration	Hospital Administrator	Overseeing hospital operations, dealing with	Managing resource allocation and	<ol style="list-style-type: none"> 1. What are the biggest challenges you face in managing hospital operations? 2. How do you address staffing shortages and ensure adequate patient

		staffing issues, and implementing policies.	responding to government policies like Bill 124.	care? 3. What impact has government legislation, such as Bill 124, had on your ability to manage staff? 4. How do you support your staff in preventing burnout and maintaining morale? 5. What strategies are you implementing to attract and retain healthcare workers? 6. How do you communicate with and involve staff in decision-making processes?
PHWs or PWDs	Sharleen Stewart	President of SEIU Healthcare, representing long-term care workers.	Advocates for better working conditions and wages for PSWs.	1. What are the primary challenges faced by personal support workers in the current healthcare system? 2. How do staffing shortages impact your ability to provide care? 3. What support do you need from hospital administration and government to improve working conditions? 4. How do you balance your workload and personal well-being? 5. What improvements would you suggest for better patient care and staff retention? 6. How has the pandemic affected your role and responsibilities?
Companions	Family Member	Frequently visits a family member in the hospital.	Observes the hospital environment and staff interactions.	1. Can you describe your experience as a companion to a patient in the hospital? 2. How do you perceive the quality of care provided to your family member? 3. What challenges have you noticed that the hospital staff face? 4. How do staffing shortages impact your family member's care? 5. What improvements would you suggest for the hospital to better support patients and their families? 6. How has the communication between hospital staff and your family been?
Ministry or Government Officials	Health Policy Advisor	Works with the Ministry of Health, involved in policymaking and implementation.	Deals with issues like staffing shortages and healthcare funding.	1. What are the key challenges the healthcare system is currently facing? 2. How does the government plan to address the staffing shortages in hospitals? 3. What impact do you think the current policies have on healthcare

				<p>workers and patients?</p> <p>4. How do you balance economic concerns with the need to improve healthcare conditions?</p> <p>5. What are the long-term strategies for healthcare workforce development?</p> <p>6. How do you ensure transparency and accountability in healthcare policymaking?</p>
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Table 4 Sample of Few Personas with role, background, and sample interview questions

Theme	Question Asked	Persona Response	Key Concepts	Contradictions/Areas for Improvement
Communication Gaps	"How clear was the communication regarding your role and expectations during hiring?"	<ul style="list-style-type: none"> - Jane: "I wasn't given clear details about my role until after I started." - Michael: "HR was slow to respond to my queries about the job specifics." 	<ul style="list-style-type: none"> - Lack of role clarity - Delayed communication 	<ul style="list-style-type: none"> - Need for timely, detailed communication to set clear expectations from the start.
Onboarding Process Issues	"Describe your onboarding experience. Were you given structured guidance?"	<ul style="list-style-type: none"> - Emily: "The onboarding felt unorganized; there was no set schedule for training." - John: "I received conflicting instructions from different departments." 	<ul style="list-style-type: none"> - Lack of structured onboarding - Conflicting guidance 	<ul style="list-style-type: none"> - Establish a standardized onboarding process with clear training modules and support.
Role Specificity and Training	"Did the training provided match your specific	<ul style="list-style-type: none"> - Michael: "The training was generic and didn't cover key 	<ul style="list-style-type: none"> - Generic vs. role-specific training - Gaps in skill alignment 	<ul style="list-style-type: none"> - Develop role-specific training programs to ensure new hires are adequately prepared.

Theme	Question Asked	Persona Response	Key Concepts	Contradictions/Areas for Improvement
	"role requirements?"	aspects of my job." - Sarah: "I needed specific training, but it wasn't part of the onboarding."		
Resource Allocation Issues	"Were there sufficient resources and support during your onboarding?"	- Jane: "It felt like they were understaffed; my mentor was often too busy to help." - Carlos: "I noticed that support was inconsistent, varying by department."	- Understaffing during onboarding - Inconsistent support	- Allocate dedicated staff to onboarding roles and ensure consistent support across departments.
Integration into Team Dynamics	"How well were you integrated into your team or department?"	- Olivia: "There was no formal introduction to my team; it was awkward getting to know everyone." - David: "Team-building activities were missing, which made integration slow."	- Poor integration practices - Lack of team-building support	- Implement formal introduction protocols and team-building initiatives to foster better integration.

Table 5: Key Themes, Evidence from Persona Interviews, and Identified Contradictions in Hiring and Onboarding Practices

Several key themes emerged from the analysis:

1. **Physical Accessibility Barriers:** The personas highlighted issues related to the physical accessibility of the hospital, such as the absence of automatic doors and cluttered workspaces. These barriers create difficulties for staff members and candidates with mobility impairments, indicating a lack of foresight in planning for accessibility across the hospital's facilities.
2. **Communication Gaps:** The analysis revealed that there was minimal communication regarding accommodations unless prompted by the staff or candidates. This reactive approach to communication indicates the need for a systematic approach to ensure that accessibility features are effectively communicated during the hiring and onboarding processes.
3. **Reactive vs. Proactive Accommodation:** The findings indicated that accommodations were often provided in response to issues raised by the staff rather than being anticipated. This reactive approach suggests that accommodations should be better integrated into the hiring process to address potential issues before they arise.
4. **Inclusive Hiring Practices:** The personas expressed concerns regarding the exclusionary language in job descriptions, which could deter a diverse pool of candidates from applying. This theme underscores the importance of explicitly mentioning the availability of accommodations in job descriptions to attract a more inclusive workforce.
5. **Workplace Integration Challenges:** The lack of formal training programs for staff members on how to work with colleagues with disabilities was highlighted as a

significant challenge. This gap in training creates difficulties in social integration and collaboration, emphasizing the need for comprehensive training programs that prepare staff for inclusivity.

6. Adaptation to Work Processes: The need for workstation modifications and task adaptations was identified as a crucial factor in enabling staff members with disabilities to perform their duties effectively. The lack of a structured process for evaluating and implementing these modifications points to an area for improvement in the hospital's work processes.

By identifying these themes, the thematic analysis provided valuable insights into the current challenges faced by staff and candidates in the hospital's hiring and onboarding processes. These findings will inform the recommendations for improving these processes and enhancing inclusivity in the workplace.

4.2.3 Iterative Workflow Visualizations

To visualize the workflow and interactions within the onboarding and hiring processes, we generated Mermaid diagrams based on the identified themes. These diagrams illustrated the sequence of steps from job posting to continuous feedback, highlighting potential inefficiencies and bottlenecks. For example, the Mermaid code represented the workflow from job posting to continuous feedback, segregated into two main sub-processes: Onboarding and Training & Development. By integrating ChatGPT's capabilities with thematic analysis, we efficiently processed large volumes of qualitative data and generated detailed process flows that provided clear insights into key areas for improvement in the onboarding and hiring processes within community hospitals in Ontario.

Analyze the attached [PDF] for key steps in the hiring and onboarding process, identifying the main actions, decision points, and any repetitive steps present in the text. Additionally, categorize these elements and summarize the key findings, while suggesting potential improvements or areas for further research based on your analysis.

1 Response:

of the Document:
Steps Identified:
Job Posting and Advertisement: Initial step involving the announcement of job openings on various platforms.
Application Review: Screening of submitted resumes and cover letters.
Interview Scheduling: Coordinating interviews between candidates and the hiring panel.
Conducting Interviews: Structured interviews with standardized questions to evaluate candidate fit.
Reference Checks and Background Verification: Post-interview checks to validate the

Great work on identifying those steps! Could you point out any bottlenecks or inefficiencies you've found? You know, those areas where things can slow down or get stuck. Are there any parts that seem to cause delays? And if you spot any, could you suggest some ways we might be able to improve or streamline those areas? I'm all ears for creative solutions!

Bottlenecks and Inefficiencies Identified:

- Scheduling Delays in Interviews and Feedback:**
 - Issue: Coordinating interview times between candidates and multiple interviewers often leads to significant delays. Similarly, feedback sessions are not standardized, causing inconsistent timing and prolonged evaluations.
 - Improvement Suggestion: Implement an automated scheduling tool that integrates with calendars of all stakeholders, allowing candidates to self-select available slots, reducing back-and-forth communication. For feedback, establish a fixed schedule, such as bi-weekly evaluations, to standardize the timing.
- Redundancy in Orientation and Training Sessions:**
 - Issue: Multiple sessions cover overlapping content, particularly in compliance and general orientation. This redundancy not only consumes valuable time but also leads to

could you please create a detailed description of a flowchart for this synthesized onboarding process. Make sure to include all the key decision points and critical actions we've identified. Oh, and don't forget to highlight any areas we've noticed along the way. As you're doing this, if you see any spots where we could potentially make further improvements, please point those out too. The more detail you can provide, the better!"

Detailed Description of the Synthesized Onboarding Flowchart

The flowchart for the optimized hiring and onboarding process captures the streamlined sequence of actions, decision points, and critical actions designed to enhance efficiency and minimize redundancies. Below is a detailed description of each step in the flowchart, highlighting key decision points, bottlenecks, and areas for potential improvement.

1. Start: Job Posting and Candidate Attraction

- Action: Centralize job postings across multiple platforms (company website, job boards, social media) with a unified job description template that highlights essential qualifications and company culture.
- Decision Point: Determine the platform(s) based on the job's target audience (specialized box). Draft a detailed flowchart from this. Suggest specific tools to improve steps.

Okay, so we've looked at this source, but I remember we analyzed a few other documents on this topic before. Could you compare the steps you've just identified with the ones we found in those previous sources? I'm curious about what's similar and what's different. Are there any areas where the processes overlap? Or maybe some unique elements in this new source that we haven't seen before? This comparison would really help us get a comprehensive view of the whole process."

Comparison of Hiring and Onboarding Steps Across Multiple Sources

Similarities Across Sources:

- Common Initial Steps:
 - Job Posting and Advertisement: Consistently identified across all sources as the first step, involving announcements on job boards, company websites, and social media.
 - Application Review and Shortlisting: Standardized across documents, including a process of screening resumes and shortlisting suitable candidates.
 - Conducting Interviews: A key step observed in every source, highlighting a structured interview process involving HR and relevant department leads.
- Onboarding Consistency:
 - Orientation and Compliance Training: All sources emphasize an initial orientation

making the process more efficient and aligned with best practices.

Let me know if you need more refinements or any further steps!

Can you take one final look at this synthesized flowchart we've created? I want to make sure we haven't missed anything. Are there any inefficiencies still lurking in there that we might have overlooked? And if you spot any, could you propose some final adjustments? I'm always open to suggestions and looking for anything that could make the experience smoother and more effective for both the new hires and the company. Don't hold back – if you have any innovative ideas, I am open for suggestions and improvements! Just please try to stick to the sources and scope of our defined objective which is hiring and onboarding process and any corrections sound it.

Final Review of the Synthesized Onboarding Flowchart

After carefully reviewing the synthesized flowchart, the process appears well-structured and addresses many of the common inefficiencies identified across various sources. However, there are still a few areas where potential inefficiencies could be lurking, and further refinements could enhance the overall process for new hires and the organization. Below, I highlight specific steps that may still pose challenges and propose targeted adjustments for a more polished and efficient onboarding process.

Figure 17 : Using ChatGPT for Analyzing and Optimizing Hiring and Onboarding Processes with Sample Prompts

This figure presents the use of ChatGPT prompts in the analysis and optimization of hiring and onboarding processes in community hospitals. The process involved applying specific prompts to extract key steps, identify inefficiencies, and refine workflows by comparing findings from various sources, including articles, transcripts, and websites. This approach allowed for the identification of repetitive actions, bottlenecks, and opportunities for improvement, leading to a more streamlined and efficient onboarding process. The figure demonstrates how ChatGPT was effectively used to enhance process modeling and suggest practical enhancements in the real-world application of hiring and onboarding procedures.

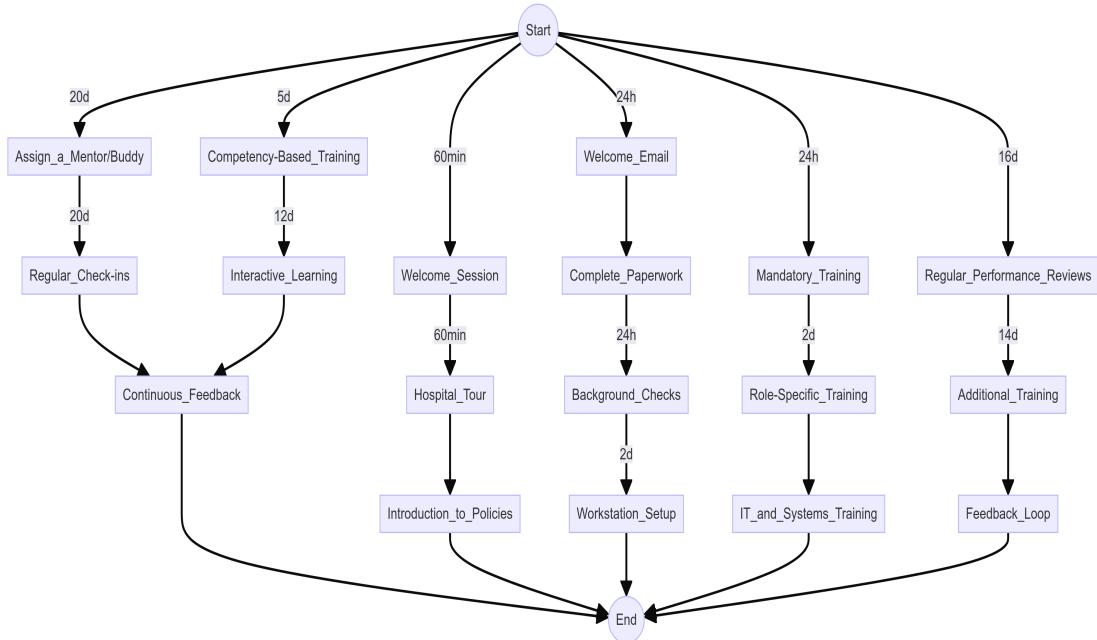
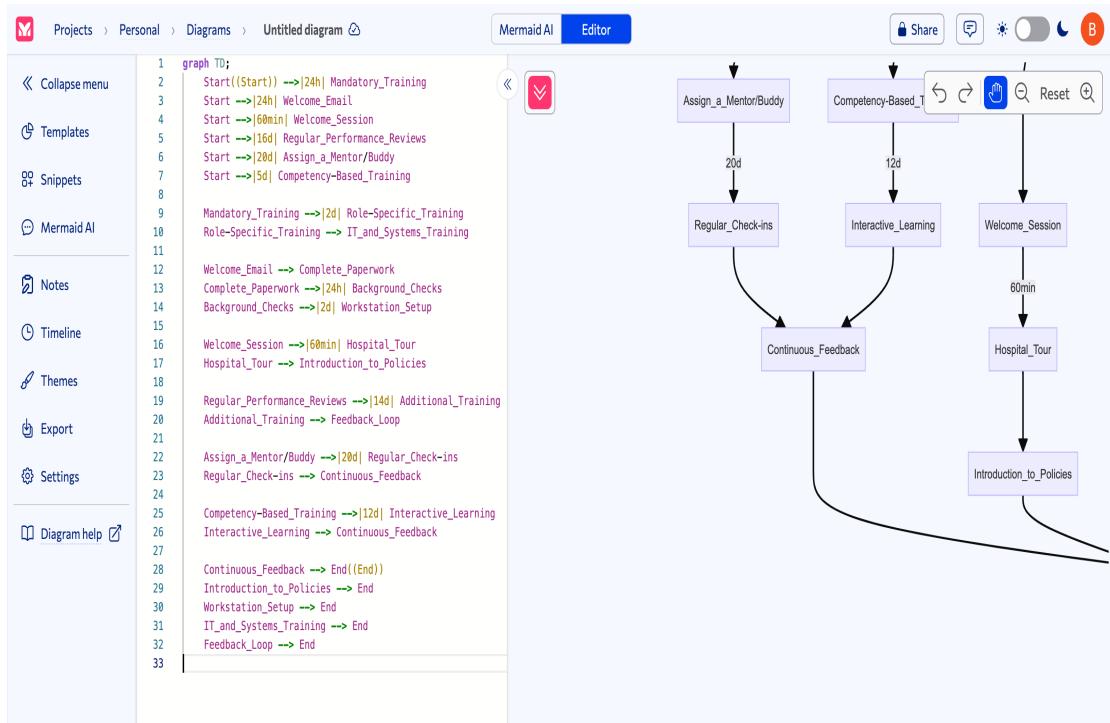


Figure 18: Process Iterations done in order to eliminate repetitive process and combine common steps -I

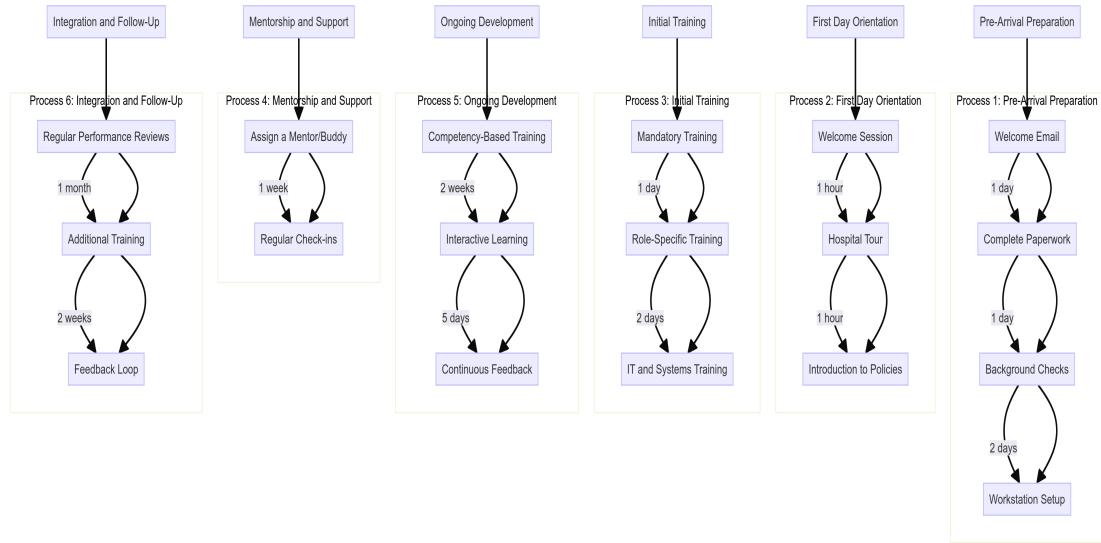
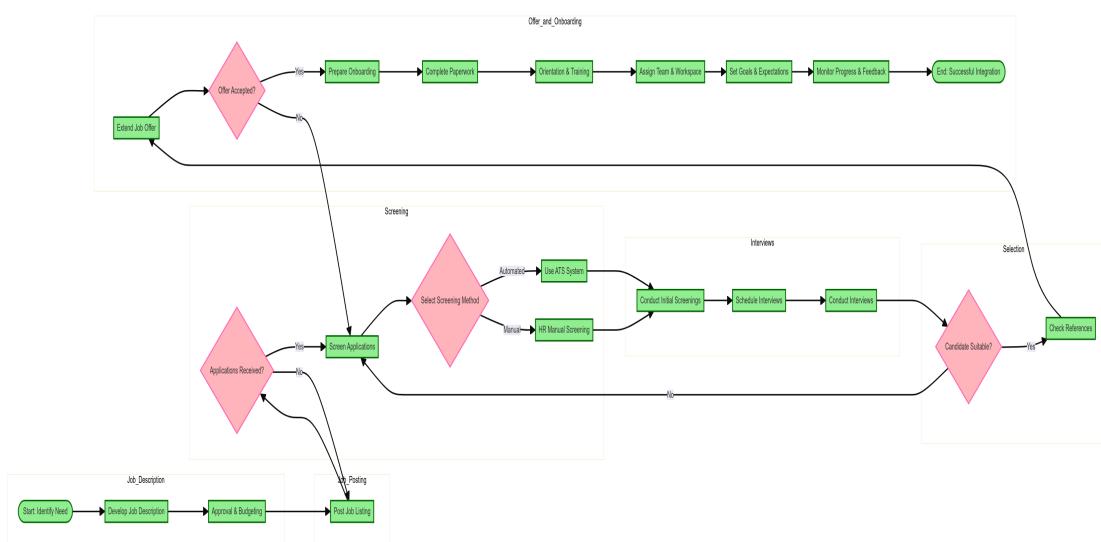


Figure 19: Process Iterations done to eliminate repetitive process and combine common steps - 2.

4.2.4 Iterative Process Modelling and Flow Optimization

In the initial phase of process modeling, relevant articles and journals were thoroughly reviewed to extract key steps involved in the hiring and onboarding processes within community hospitals. Utilizing tools like ChatGPT, key insights were synthesized from the literature, focusing on identifying repetitive actions, bottlenecks, and critical decision points. This information was then used to generate preliminary process flow diagrams using the Mermaid tool. These initial flows provided a foundational understanding of the standard practices and highlighted areas for further exploration.



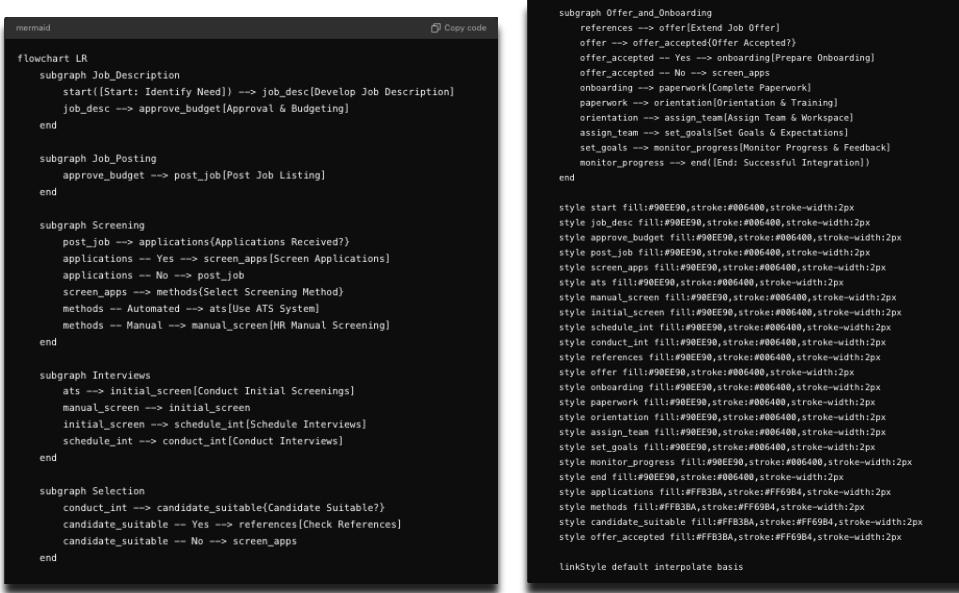


Figure 20 : Business Process extracted from Articles & Journal Generated by Mermaid

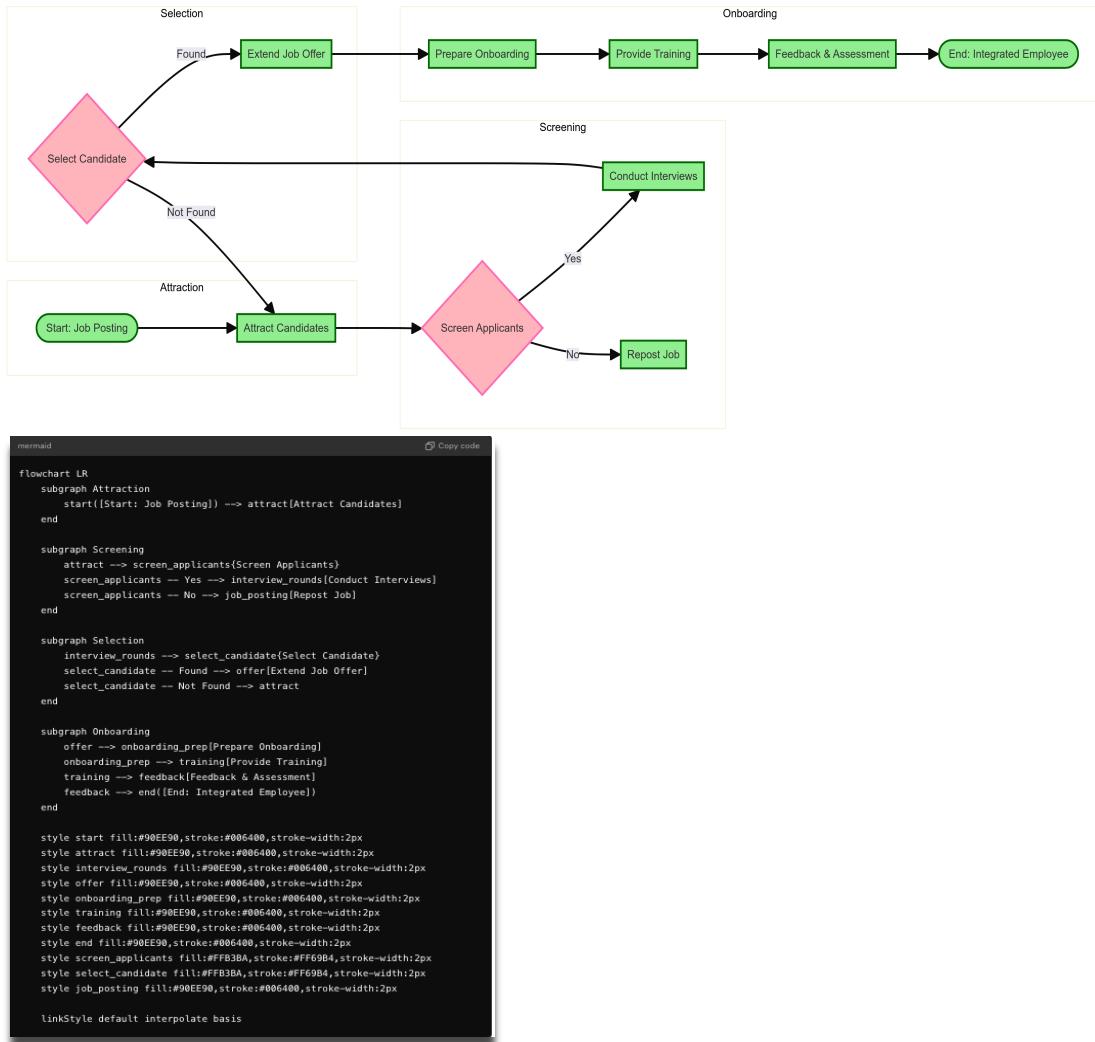


Figure 21 : Business Process extracted from Websites Generated by Mermaid

Building on the initial models, additional data sources, including YouTube transcripts, specialized websites, and grey literature, were integrated into the process. These sources offered further validation and new perspectives, enriching the existing process flows. ChatGPT played a pivotal role in synthesizing information from these diverse sources, ensuring a comprehensive understanding of the processes. The iterative approach involved cross-referencing the extracted steps with those identified in the initial phase, allowing for the refinement and enhancement of the process flows.

Figure : Business Process extracted from WebsitesGenerated by Mermaid

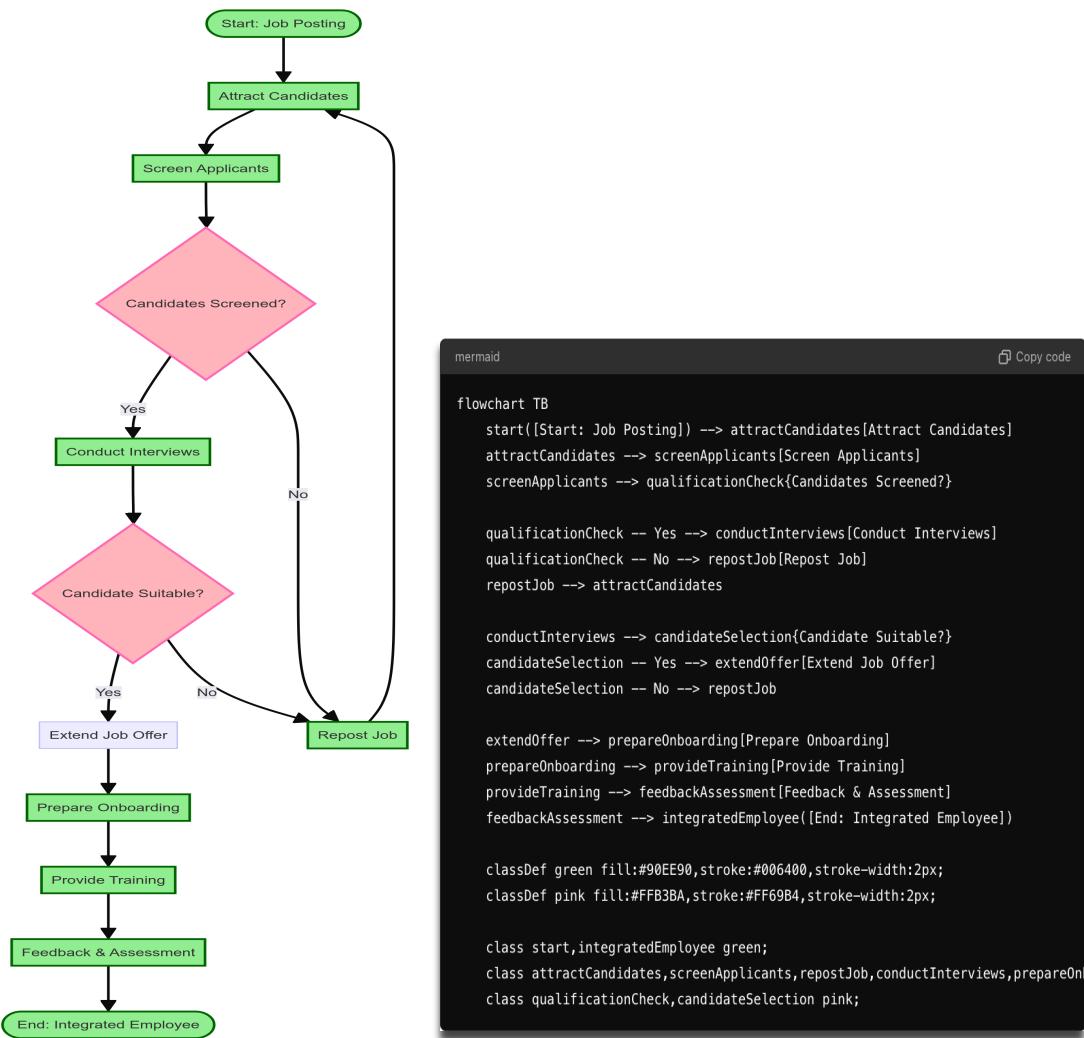


Figure 22 : Business Process extracted from You tube Transcripts Generated by Mermaid

4.2.5 Integrating Common themes and Steps to form a Unified Hiring and Onboarding Flow

As the process flows evolved, it became apparent that many steps identified across different sources were similar or overlapping. To create a streamlined and efficient model, these repetitive steps were consolidated. This consolidation involved merging similar activities and removing redundant actions, resulting in a more cohesive and optimized process flow. The aim was to ensure that the final models accurately represented the most efficient sequence of activities while maintaining a comprehensive overview of the entire process.

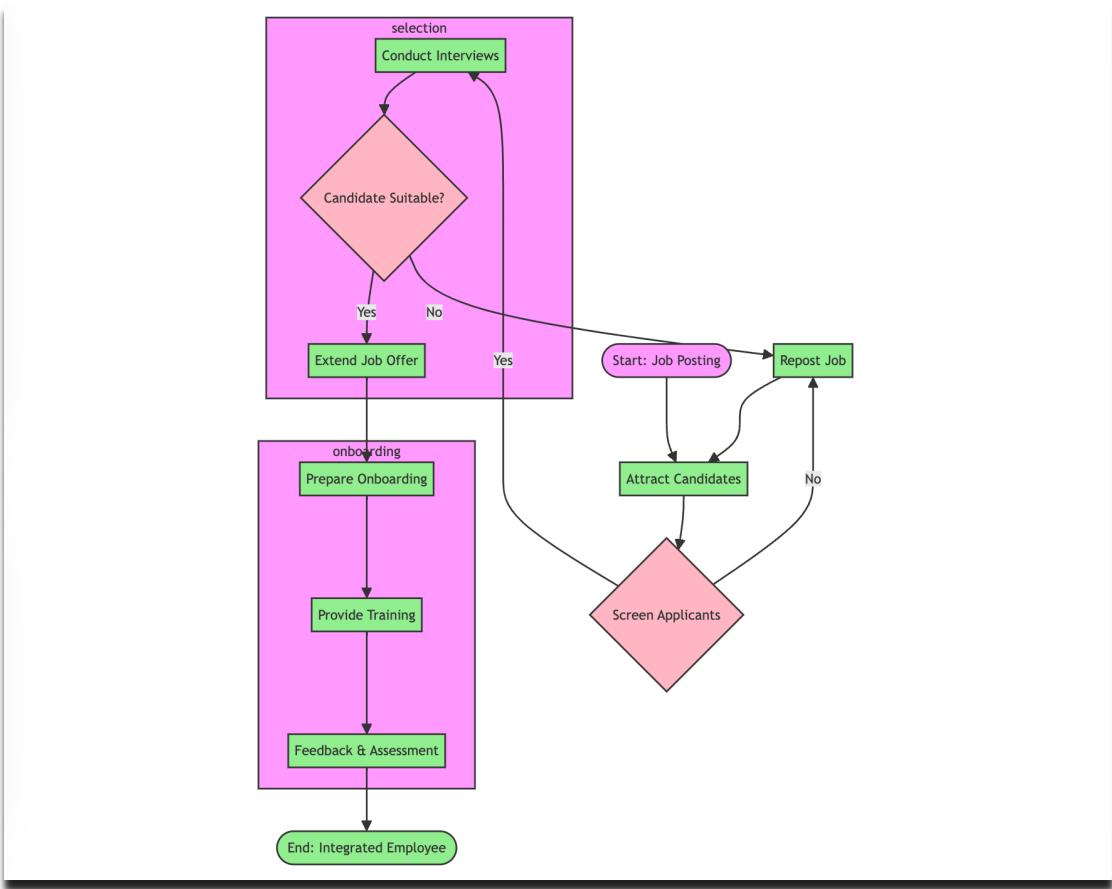


Figure 23 : Hiring Flow process State diagram upon integrating all data & visualizations generated by Mermaid

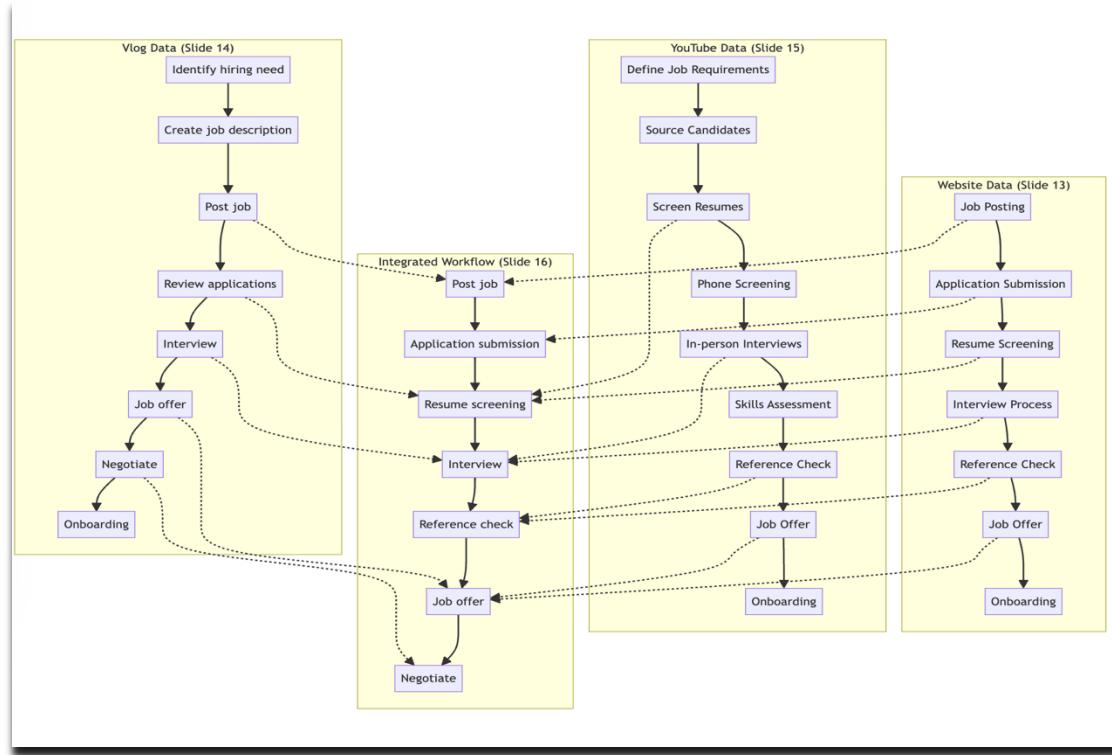
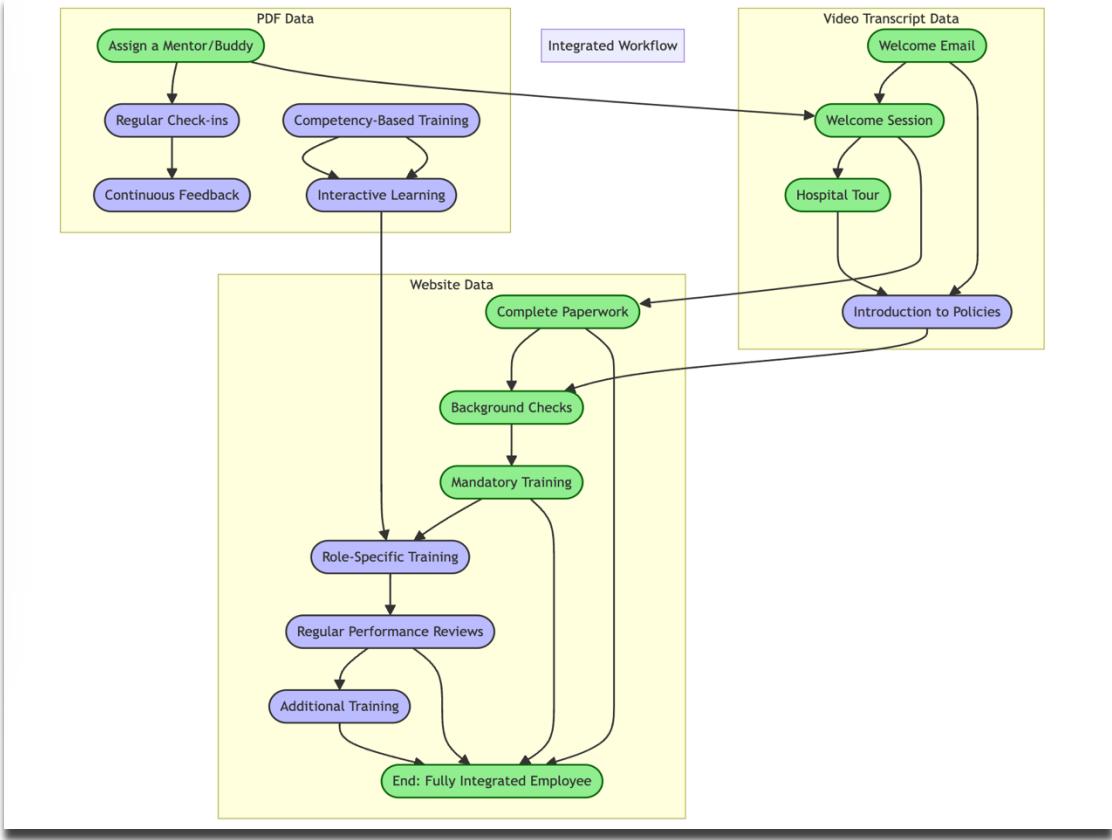


Figure 24 : Integrated Hiring Process traced from last findings

With the consolidated process flows finalized, the next step involved visualizing these flows using Mermaid. Mermaid proved to be an effective tool for creating clear and detailed diagrams that illustrated the flow of activities from start to finish. These diagrams were not only easy to understand but also flexible, allowing for quick adjustments and further refinements as needed. The visual representation provided by Mermaid was crucial in communicating the results of the process modeling to stakeholders and in identifying additional areas for potential improvement.

Each step in the integrated workflow has been carefully extracted and refined to ensure a logical flow, encompassing key actions such as job posting, application submission, resume screening, interviews, reference checks, job offers, and negotiations. The connections to the original data sources highlight the collaborative nature of the hiring process, ensuring that best practices from various perspectives are incorporated into a unified approach.



Are there any specific resources or support systems in place to help new employees adjust to their roles?

Yes, our hospital has several specific resources and support systems in place to help new employees adjust to their roles effectively. These resources and systems are designed to ensure that new hires feel supported, integrated, and capable of performing their duties with confidence. Here are some of the key resources and support systems:

Mentorship Programs

1. Assigned Mentors/Buddies:
 - Each new hire is paired with a mentor or buddy, an experienced colleague from their department who provides guidance, answers questions, and helps the new hire acclimate to the hospital environment.

Training Programs

2. Role-Specific Training:
 - Customized training programs tailored to the specific needs of different roles. This includes hands-on training, simulations, and practical demonstrations relevant to the new hire's position.
3. E-Learning Modules:
 - Interactive e-learning modules that cover various topics such as hospital policies, clinical skills, IT systems, and patient care protocols. These modules are available for self-paced learning.

1. Prepare for first day:
Jane Doe: "Some of the orientation activities were planned in areas of the hospital that were not fully accessible." [Response to question about difficult aspects of new employee orientation]

2. Welcome new hire:
Dr. John Smith: "On my first day, I was greeted by the Chief of Emergency Medicine and given a tour of the department." [Response to question about first day experience]

3. Introduce to team:
Jane Doe: "The physical constraints at times also hindered my ability to socially integrate with new colleagues during breaks and informal gatherings, which were often held in less accessible spaces." [Response to question about difficult aspects of new employee orientation]

4. Provide training:
Jane Doe: "Some orientation activities involved group interactions and simulations that were designed without considering accessibility. This made it difficult for me to participate fully and effectively." [Response to question about difficult aspects of new employee orientation]

Dr. John Smith: "The training included shadowing senior physicians, attending departmental meetings, and participating in simulations of emergency scenarios." [Response to question about training received]

5. Set expectations:
Jane Doe: "The job description used generic language regarding mobility and dexterity without specifying whether these were essential functions of the job or if there were alternative ways to accomplish the tasks." [Response to question about exclusionary job descriptions]

6. Schedule check-ins:
Jane Doe: "There was no established channel for ongoing communication about updates to accessibility features or to gather feedback on the effectiveness of the accommodations provided." [Response to question about communication of accessibility features]

Figure 25 : The Process is drafted from mined descriptions and Persona interactions

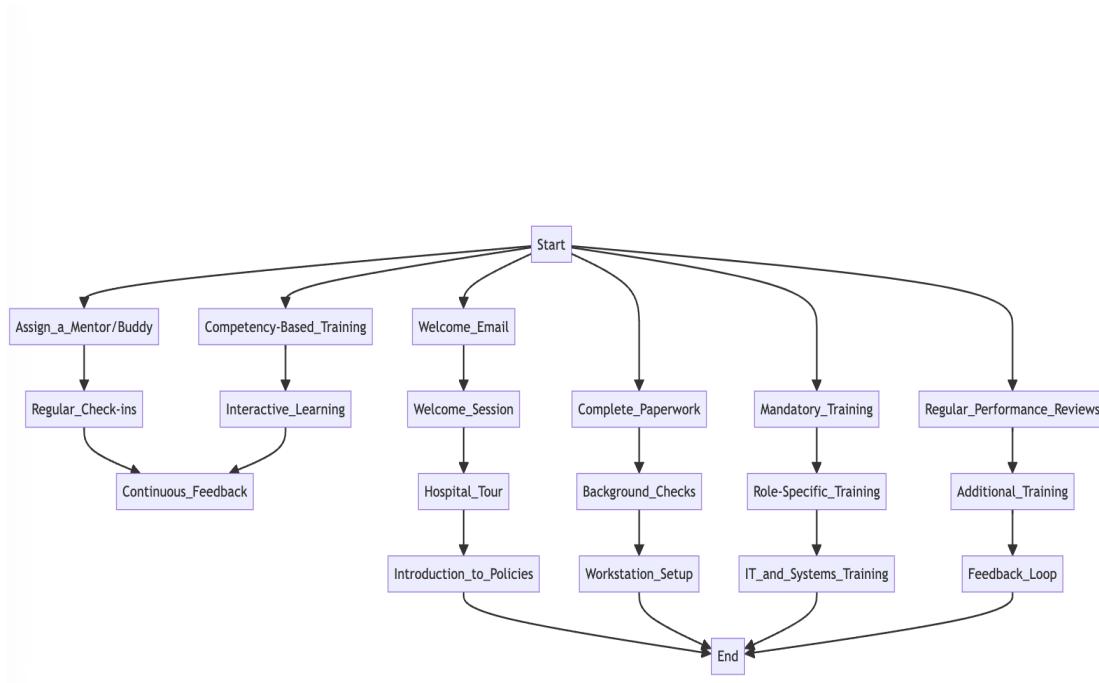


Figure 26 : Baseline Onboarding Process

Upon reviewing the finalized process flows, several key insights were gleaned. The iterative process of extracting, refining, and visualizing the workflows allowed for the identification of remaining challenges, such as potential bottlenecks or inefficiencies that were not fully addressed in earlier iterations. This critical analysis underscored the importance of the iterative approach in achieving a more streamlined and effective hiring and onboarding process within the healthcare setting. The final models not only represent the most efficient version of the processes but also provide a solid foundation for further optimization and adaptation to specific organizational needs.

4.3 Baseline Activity system:

4.3.1 Drafting the Baseline Activity System:

To model the baseline activity system for onboarding and hiring processes in a community hospital in Ontario, we utilized both the Mermaid tool and the insights extracted from the

developed persona through chat interactions. The Mermaid tool allowed us to create a process model that visualizes the sequential flow of activities, interactions, and stakeholders involved. In parallel, we analysed the insights derived from our persona, which was developed from the information gathered through grey literature. This dual approach provided a comprehensive understanding of the current processes, enabling us to identify inefficiencies and potential areas for improvement. By cross-referencing these findings, we were able to construct a well-rounded baseline activity system that accurately reflects the operational challenges faced during onboarding and hiring in a community hospital setting.

4.3.2 Transforming Baseline Activity System from Identifies activities:

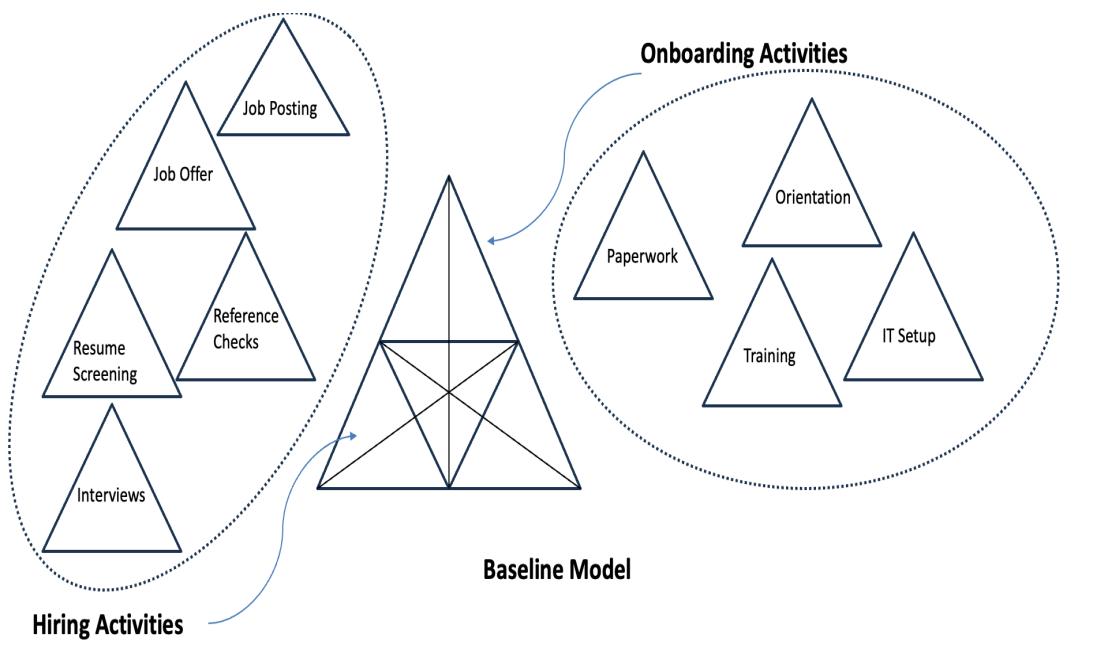


Figure 27 : Transforming Process to Baseline Activity System Using Key Elements of Process

Figure 27, illustrates the transformation of the hiring and onboarding processes into a baseline activity system by using key elements of the process. The hiring activities are broken down into specific stages, including job posting, resume screening, interviews, reference checks, and extending job offers. These activities are visualized as interconnected triangles,

symbolizing the complexity and interdependencies within the hiring process. Similarly, the onboarding activities—such as paperwork, orientation, training, and IT setup—are depicted as separate but related components. By organizing these processes into distinct yet connected elements, the baseline model offers a clear and structured representation of the workflow, highlighting areas where inefficiencies may occur and setting the stage for further analysis and improvement. This visual approach helps in understanding the flow of activities and identifying potential bottlenecks in the overall process.

Baseline Activity System Model for Hiring & Onboarding Process

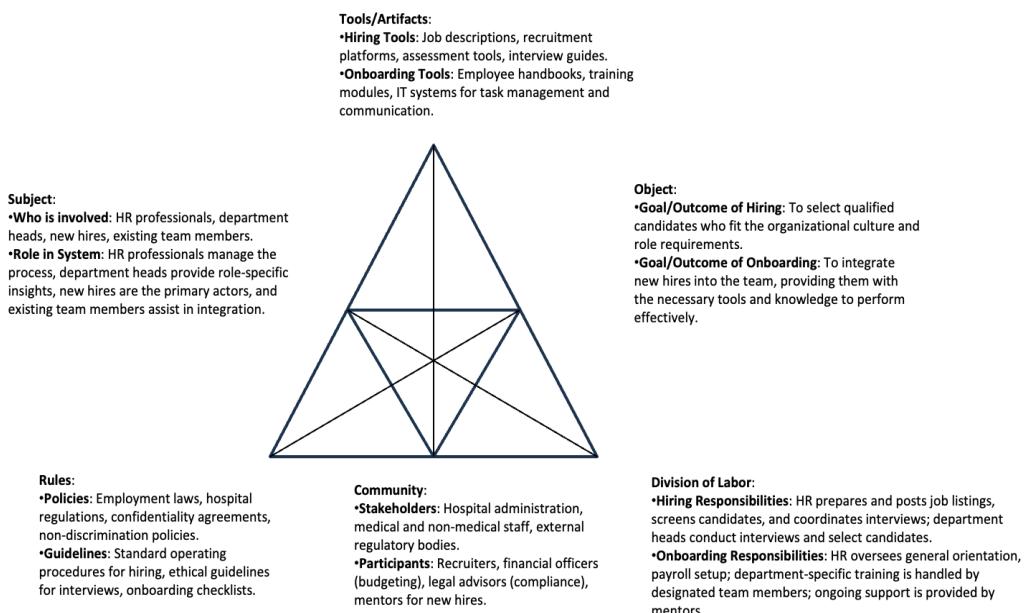


Figure 28 : Transforming Process to Baseline Activity System Using Key Elements of Process

In Figure 28, The baseline activity system for the hiring and onboarding processes in a community hospital is structured around several key components, which interact to achieve the successful integration of new employees into the hospital's workforce.

- **Subject:** This refers to the key actors involved in the hiring and onboarding processes, including HR professionals, hiring managers, IT staff, and department heads. These individuals are responsible for ensuring that the hiring and onboarding activities are conducted efficiently and in compliance with organizational standards.
- **Tools/Artifacts:** The tools and resources employed in these processes include Applicant Tracking Systems (ATS), reference check tools, onboarding software, training modules, and IT systems. These artifacts are crucial for managing the flow of information and supporting the various stages of hiring and onboarding, from job posting and candidate selection to orientation and training.
- **Object:** The primary goal, or object, of this activity system is to ensure the successful onboarding and integration of new employees. This involves preparing the new hires to fulfil their roles effectively within the hospital, thereby contributing to overall organizational efficiency and patient care.
- **Rules:** The rules governing this system include employment laws, hospital-specific hiring policies, and onboarding protocols. These rules ensure that the processes align with legal requirements and organizational standards, guiding the behaviour of all participants involved in the system.
- **Community:** The community encompasses all individuals and groups that have a stake in the hiring and onboarding processes. This includes not only the new hires and existing employees but also the hospital administration and, in some cases, external regulatory bodies. The community plays a critical role in shaping the expectations and outcomes of the activity system.
- **Division of Labor:** The division of labor outlines how tasks and responsibilities are distributed among the participants. HR professionals manage job postings and initial screenings, hiring managers conduct interviews and make hiring decisions, IT staff set

up necessary systems for new employees, and department heads oversee the training and integration of the new hires. This clear delineation of roles helps ensure that each aspect of the hiring and onboarding process is handled by the appropriate expertise, thereby promoting efficiency and effectiveness.

This baseline model provides a comprehensive overview of how these components work together in the existing system, highlighting the relationships and dependencies that shape the hiring and onboarding processes. This analysis is crucial for identifying any contradictions or inefficiencies within the system, which can then be addressed to enhance the overall process and outcomes.

The diagram below presents two interconnected activity systems derived from Engeström's Activity Theory. The first system is the "Hiring & Onboarding Activity System," centered on the HR department's role in hiring and onboarding new employees. This system includes key elements such as the subject (HR professionals), the object (the process of hiring and onboarding), the mediating artifacts (tools like applicant tracking systems and onboarding software), the rules (employment laws and hospital policies), the community (HR staff, hiring managers, and IT staff), the division of labor (HR handling postings and screenings, hiring managers conducting interviews, and IT setting up necessary systems), and the outcome (successful hiring and onboarding of qualified candidates).

4.3.3 Interlinking Activities for shared Goal

The second system is the "Candidate Activity System," focusing on the candidate's experience as they seek employment and integrate into the hospital environment. This system includes the subject (the job seeker), the object (securing employment and integrating into the hospital), the mediating artifacts (application platforms, communication tools), the rules (application guidelines, hospital policies), the community (the candidate, potential

colleagues, and hospital staff), the division of labor (the candidate's preparation of application materials and the hospital staff's role in onboarding and training), and the outcome (the candidate's employment and successful integration).

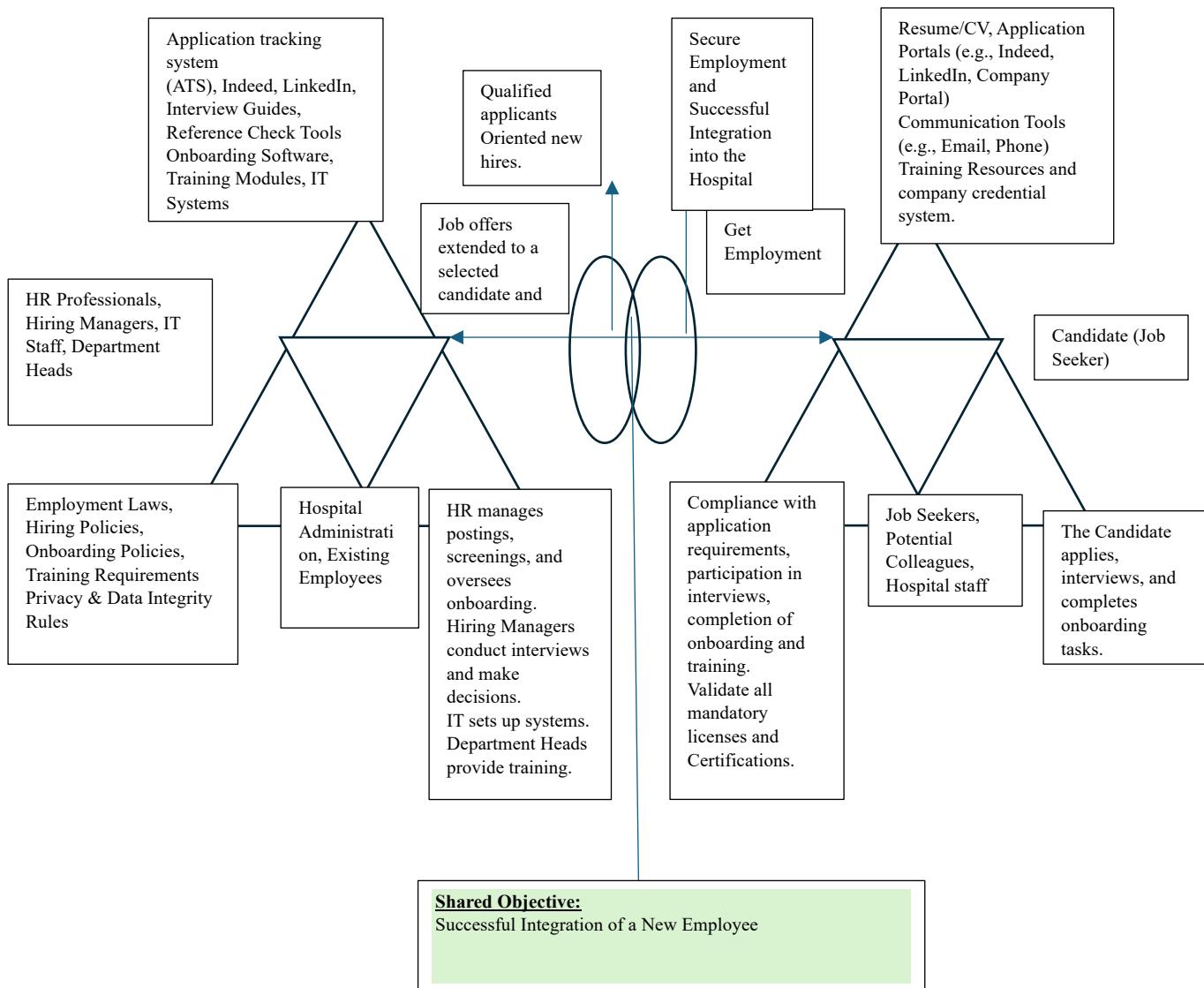


Figure 29: **Interconnected Activity systems**

These two systems are interconnected, particularly through their shared object, which is the successful integration of a new employee. This interconnection reflects the mutual influence between the HR department's processes and the candidate's experience, emphasizing the collaborative effort required to achieve a seamless onboarding process. The diagram visually represents the complex interactions and dependencies between these systems, making it easier to identify inefficiencies and areas for improvement.

4.4 Classifying Frustrations & Contradictions

In analyzing the baseline activity system within the hospital's hiring and onboarding processes, it was critical to classify and understand the underlying frustrations and contradictions that emerged. These surface-level frustrations served as indicators of deeper systemic issues and were identified through a thorough review of the interactions within the system, as well as through direct insights gathered from conversations with various personas involved in the process. By classifying these frustrations and contradictions, it became possible to pinpoint specific areas where interventions, such as the integration of Distributed Ledger Technology (DLT), could be most effectively applied to enhance the overall system efficiency.

4.4.1 Frustrations

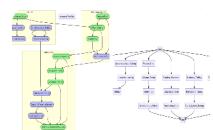
As depicted in the figure ,the initial identification of surface-level frustrations was greatly aided by direct conversations and interactions with personas created for the study. These personas, which represented different stakeholders within the hospital's hiring and onboarding processes, provided valuable insights into the challenges they faced in their roles. For example, a hiring manager mentioned, "It takes forever to get approvals from higher-ups, and by the time we get the green light, many of the candidates have already taken other

offers." This quote highlights a critical frustration related to prolonged decision-making processes.

Based on the review of the baseline activity system in the hospital setting, particularly focusing on the hiring, onboarding, and staffing management processes, the following surface-level frustrations experienced by staff or candidates were identified:

1. **Manual Credential Verification:** The process of verifying credentials is manual, leading to inefficiencies, delays, and potential errors.
2. **Inefficient Onboarding Process:** The onboarding process is cumbersome and time-consuming, resulting in delays in integrating new hires into the hospital system.
3. **Poor Communication During Hiring:** There is a lack of clear communication between HR, hiring managers, and candidates, causing confusion and frustration.
4. **Training Gaps:** New hires feel inadequately prepared due to insufficient or poorly structured training programs, leading to longer adjustment periods.
5. **Resistance to New Technologies:** Staff members are resistant to adopting new tools or technologies, particularly those that alter established processes.
6. **Outdated Data Management Policies:** The hospital's data management policies are not aligned with current technological capabilities, creating friction and inefficiencies.
7. **Interdepartmental Coordination Issues:** There is a lack of coordination between departments, especially when integrating new hires, leading to miscommunications and operational inefficiencies.
8. **Inconsistent Application of Rules:** The inconsistent application of hiring and onboarding rules across different departments leads to confusion and frustration among staff and candidates.
9. **Excessive Workload on HR:** HR professionals are overwhelmed by the volume of manual tasks, leading to burnout and reduced efficiency in the hiring and onboarding processes.

These frustrations represent the immediate, observable issues within the hospital's hiring and onboarding processes that contribute to broader systemic challenges.



Chat GPT Interactions for Contradic...
Document



Persona Interactions All.docx
Document

Drawing upon our analysis of the flows illustrated in the uploaded image and the accompanying conversation document, thoroughly review the conversations and documents pertaining to the baseline activity system within a hospital setting, with particular emphasis on hiring, onboarding, and staffing management processes. Identify and enumerate the frustrations experienced by staff or candidates, including but not limited to inefficiencies, communication problems, and training gaps. This analysis should build upon the extracted data from earlier steps, aiming to uncover both immediately observable issues and those explicitly mentioned within daily operational contexts. Focus on extracting challenges that impact the practical, day-to-day experiences of those involved in these processes, paying close attention to recurring themes or patterns in these frustrations. Provide a comprehensive overview of these pain points to eliminate the areas of concern within our current system, thereby offering insights into potential areas for improvement in the hospital's human resource management practices.

Certainly! Below are the highlighted portions of the interview interactions that were instrumental in identifying the surface-level frustrations and core-level contradictions.

Surface-Level Frustrations

1. Prolonged Hiring Process:

- "It takes forever to get approvals from higher-ups, and by the time we get the green light, many of the candidates have already taken other offers."
- "The paperwork is endless. We have to go through so many layers of approval, and each step seems to add unnecessary delays."

2. Outdated Technology:

- "We are still using old systems to track applicants, which often leads to lost applications or delays in following up."
- "There is a severe lack of automation in our hiring process. We spend hours doing things that could be done in minutes with better software."

3. Financial Limitations:

- "Our budget is so tight that we can't offer competitive salaries, which makes it hard to attract good candidates."
- "The financial constraints we face mean we can't afford to hire as many people as we need."

systematically gathered and validated.

Analyze the provided materials, including the flowchart image and related documents, to identify both core frustrations and surface-level issues in the hospital's hiring, onboarding, and staffing management processes. Extract and list the key challenges experienced by staff and candidates, ranging from immediately observable problems to deeper, systemic issues. Focus on inefficiencies, communication breakdowns, training inadequacies, and other obstacles that hinder smooth operations. Consider both explicit complaints and implicit difficulties evident in the daily workflow. Categorize these frustrations, highlighting recurring themes and their impact on different stakeholders. This comprehensive analysis should build upon our previous findings, offering insights into the most pressing issues affecting the hospital's human resource management and overall operational efficiency.

To comprehensively analyze the provided materials, including the flowchart image and related documents, we systematically reviewed the content to extract both core and surface-level frustrations within the hospital's hiring, onboarding, and staffing management processes. The analysis aimed to identify key challenges, categorize recurring themes, and assess their impact on various stakeholders.

Analysis of Frustrations in Hospital Hiring, Onboarding, and Staffing Management

1. Core Frustrations Identified:

- **Inefficiencies in Onboarding Processes:** There are frequent delays in completing onboarding activities such as background checks, paperwork processing, and mandatory

Figure 30: ChatGPT Prompt, sample excerpts of the Persona Interview & Process used to identify Frustrations

Similarly, another persona highlighted the challenges with outdated technology: "We are still using old systems to track applicants, which often leads to lost applications or delays in following up." Such statements underscore the inefficiencies caused by legacy systems and the need for technological updates. Additionally, financial limitations were also a recurring theme, as one HR professional noted, "Our budget is so tight that we can't offer competitive salaries, which makes it hard to attract good candidates."

These direct quotes from the personas were instrumental in identifying and understanding the initial frustrations within the system. Prompts used in ChatGPT included requests to "Identify recurring issues in onboarding described in this transcript" or "Highlight any mentions of delays or communication problems." This analysis pinpointed issues such as delayed onboarding steps, lack of clear communication channels, and gaps in training.

Based on the extracted data, personas were developed to simulate real-world experiences of employees and candidates navigating the hiring and onboarding processes. Each persona was designed to reflect specific roles (e.g., new hire, hiring manager) and common frustrations that were explicitly mentioned in the grey literature.

Interactions with these personas involved simulated conversations using structured prompts, such as "Describe your experience during the onboarding process" or "What challenges did you face when integrating into your new role?" These persona interactions allowed for the identification of surface-level frustrations, such as insufficient training, unclear job expectations, and inconsistent communication from management.

The surface-level frustrations identified through direct persona interactions were cross-referenced with the findings from the grey literature review. This triangulation confirmed recurring themes and allowed for the categorization of issues into key areas such as inefficiencies in training delivery, lack of proactive communication, and uncoordinated onboarding schedules.

The combined approach of analyzing grey literature and engaging with personas provided a rich, broader view of the common frustrations within the onboarding and hiring processes. This methodology ensured that the identified issues were grounded in real-world observations and directly connected to the lived experiences of those involved in the processes. By mapping these frustrations to specific elements of the activity system, it became possible to visualize where the most significant pain points existed and how they could potentially be addressed. The identification of surface-level frustrations within the hospital hiring and onboarding processes was systematically conducted using a combination of grey literature analysis and interactions with personas developed from the study. The process involved several steps, each aimed at triangulating insights from different data sources to provide a comprehensive understanding of the existing issues.

4.4.2 Contradictions in Baseline Activity System

The baseline activity system of the hiring and onboarding processes in community hospitals has several frustrations as discussed so far in the Baseline Activity System .These frustrations stem from deeper systemic contradictions within the existing workflow, which create barriers to achieving an efficient and effective onboarding process. Below, we explore the contradictions that underlie each of the identified frustrations:

1.Prolonged Decision-Making Processes

Rules vs. Community: The rigid and bureaucratic rules for approvals and decision-making do not align with the community's need for speed and flexibility. This misalignment causes delays as multiple layers of approval are required, leading to slow responses and decision paralysis.

2. Outdated Technology and Systems

Tools/Artifacts: The baseline system relies on outdated technologies like manual forms and disconnected software systems. This primary contradiction arises because the tools are not suited for modern, efficient processes, leading to lost data, delayed follow-ups, and high error rates.

3. Financial Constraints

Object vs. Rules: The objective of attracting and retaining qualified staff conflicts with financial rules that limit the budget for competitive salaries. This contradiction highlights a misalignment between the hospital's financial constraints and its staffing needs, affecting the ability to hire the right talent.

4. Delayed Onboarding Steps and Lack of Communication

Division of Labor vs. Community: There is poor coordination between the roles and responsibilities of different departments. The lack of clear communication and role definition leads to delays in critical onboarding steps such as IT setup and background checks, which are exacerbated by misaligned workflows.

5. Insufficient Training and Unclear Job Expectations

Object vs. Division of Labor: The goal of effective onboarding is contradicted by inadequate training programs and unclear task distribution. This reflects a misalignment between what new hires need to succeed (comprehensive training and clear expectations) and what the current onboarding system provides.

6. Uncoordinated Onboarding Schedules

Tools vs. Division of Labor: The lack of synchronization between onboarding tools and the division of labor leads to fragmented and poorly timed onboarding schedules. This results from misaligned scheduling systems that fail to coordinate activities across different departments efficiently.

The frustrations identified in the baseline activity system are deeply intertwined with underlying contradictions that impede the effectiveness of the onboarding process. These contradictions highlight the systemic misalignments between tools, rules, roles, and objectives within the existing system, underscoring the need for comprehensive improvements. Addressing these contradictions is essential to resolve the inefficiencies and frustrations that currently plague the hiring and onboarding processes in community hospitals.

4.5 Integration of Distributed Ledger Technology (DLT)

Following the identification of the baseline activity system and evidence from literature, we began drafting a revised activity system to address the inefficiencies identified in the hospital's hiring and onboarding processes. These inefficiencies, such as tool issues, lack of transparency, and fragmented system integration, were mapped to specific contradictions within the existing system. The introduction of Distributed Ledger Technology (DLT) solutions was considered to resolve these contradictions and enhance overall operational efficiency.

4.5.1 Transforming Revised Activity System

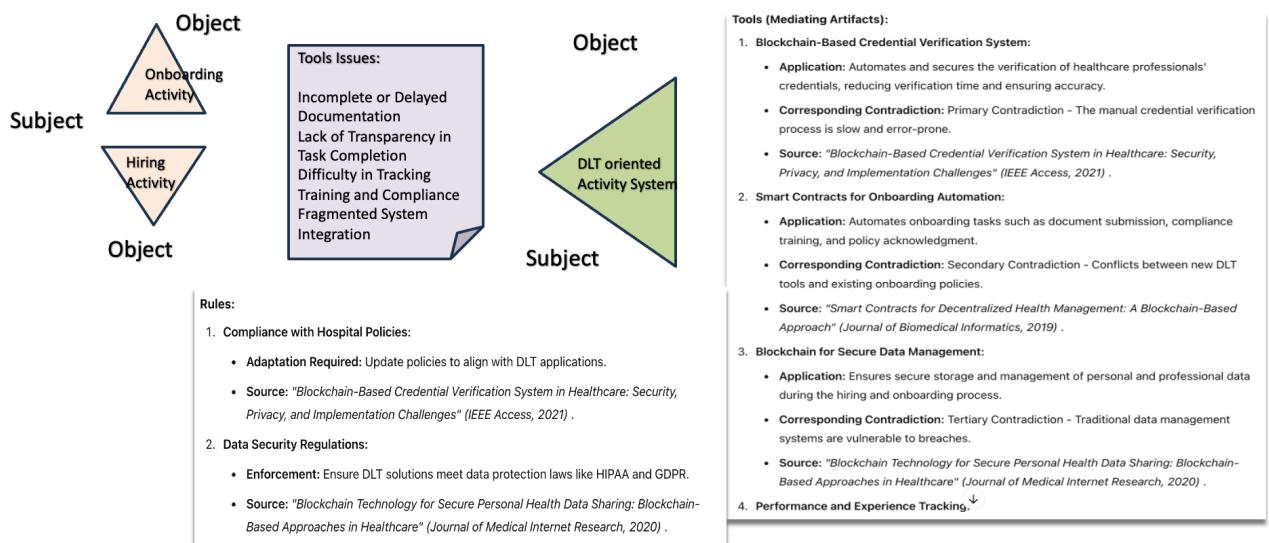


Figure 31: Majority DLT solution found indicated Tools & Rules Contradictions solutions

The revised activity system pivots on the incorporation of DLT to streamline and secure critical aspects of the hiring and onboarding process. For instance, DLT-based credential verification systems were introduced to tackle the primary contradiction of a labour-intensive and error-prone manual credentialing process. This application automates and secures the verification of healthcare professionals' credentials, thus ensuring accuracy and reducing delays(Bowles, et al. 2021).Moreover, smart contracts powered by DLT were proposed to automate onboarding tasks, addressing secondary contradictions like conflicts between new DLT tools and existing onboarding policies. These contracts facilitate document submission, compliance training, and policy acknowledgment, ensuring a seamless onboarding process(Spanò, et al. 2023).In addition, DLT was suggested for secure data management, specifically targeting the tertiary contradiction involving traditional data management systems' vulnerability to breaches. By ensuring secure storage and management of personal and professional data during hiring and onboarding, DLT enhances data integrity and compliance with regulations such as HIPAA and GDPR(Massaro, 2023)

Overall, the integration of DLT into the revised activity system represents a strategic effort to align hospital policies, enhance transparency, and streamline the onboarding process. By addressing these core inefficiencies, the revised system aims to significantly improve both the operational workflow and the overall experience for new hires within the hospital setting.

4.5.2 Revised Activity System with DLT Solutions

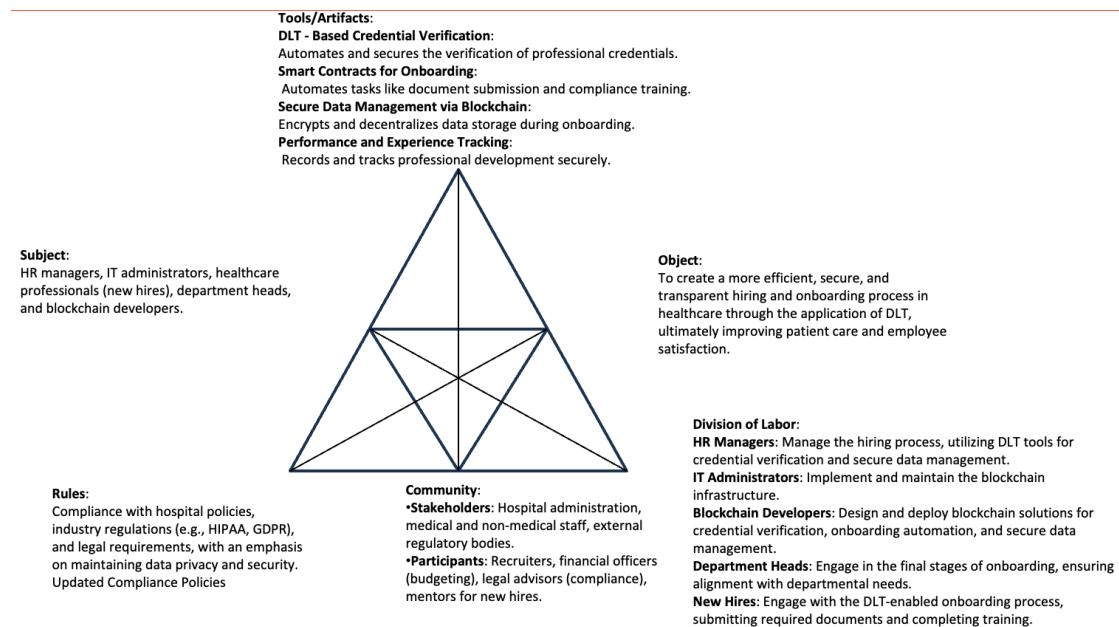


Figure 32: Activity System Model integrating DLT solutions for Hiring & Onboarding Process

The revised activity system integrates Distributed Ledger Technology (DLT) to address the key inefficiencies identified in the baseline hiring and onboarding processes within a hospital setting. By embedding DLT solutions into the existing workflows, this revised system aims to create a more efficient, secure, and transparent hiring and onboarding process. The diagram provided illustrates the interconnected elements of the revised activity system, each element enhanced by specific DLT applications.

Tools/Artifacts

In the revised system, the tools and artifacts play a crucial role in transforming the traditional, often fragmented processes into a streamlined, automated, and secure operation. The following DLT-based tools have been integrated:

- 1 DLT-Based Credential Verification:** This tool automates the verification of healthcare professionals' credentials, a process that is traditionally labor-intensive and prone to errors. By using DLT, the verification process becomes faster, more accurate, and secure, thereby reducing delays in onboarding qualified candidates.
- 2 Smart Contracts for Onboarding:** These contracts automate tasks such as document submission, compliance training, and policy acknowledgment. By leveraging smart contracts, the onboarding process becomes more efficient and less prone to human error, ensuring that all necessary tasks are completed in a timely manner.
- 3 Secure Data Management via Blockchain:** Data security is a critical concern in healthcare, particularly when handling sensitive employee and patient information. The revised system uses blockchain to encrypt and decentralize data storage during onboarding, thereby enhancing data integrity and compliance with regulations such as HIPAA and GDPR.
- 4 Performance and Experience Tracking:** This tool securely records and tracks the professional development of new hires, ensuring that they meet the required competencies for their roles. By maintaining a transparent and immutable record of employee performance, the system supports continuous professional development and compliance with industry standards.

Subject

The subjects involved in this revised activity system include:

- 1 HR Managers:** They play a pivotal role in managing the hiring process, utilizing DLT tools to verify credentials and manage data securely.
- 2 IT Administrators:** Responsible for implementing and maintaining the blockchain infrastructure, ensuring that all DLT-based solutions are effectively integrated into the hospital's existing systems.
- 3 Healthcare Professionals (new hires):** The end-users of the onboarding process, who interact with the DLT-based system to submit documents, complete training, and integrate into the hospital staff.
- 4 Department Heads:** Engage in the final stages of onboarding, providing role-specific training and ensuring that new hires meet departmental requirements.
- 5 Blockchain Developers:** Design and deploy the blockchain solutions that underpin the DLT-based tools used in this revised system.

Object

The primary objective of integrating DLT into the hospital's hiring and onboarding processes is to create a more efficient, secure, and transparent system. This transformation is expected to lead to improved operational efficiency, enhanced compliance with regulatory requirements, and increased employee satisfaction. Ultimately, the goal is to positively impact patient care by ensuring that the hospital staff is well-qualified, thoroughly vetted, and effectively onboarded.

Rules

Compliance with hospital policies and industry regulations is critical in healthcare settings. The revised system includes updated rules that align with the capabilities and requirements of DLT:

- **Compliance with Hospital Policies and Regulations:** The system must comply with existing hospital policies, which may require updates to accommodate the use of DLT applications. This includes adherence to data privacy and security regulations such as HIPAA and GDPR.
- **Updated Compliance Policies:** As part of the DLT integration, hospital policies must be revised to reflect new practices in credential verification, data management, and onboarding automation.

Community

The community within this revised activity system comprises various stakeholders and participants who interact with the DLT-based tools and processes:

- 1 **Stakeholders:** Include hospital administration, medical and non-medical staff, and external regulatory bodies responsible for overseeing compliance with industry standards.
- 2 **Participants:** In addition to stakeholders, participants such as recruiters, financial officers (in charge of budgeting), legal advisors (ensuring compliance), and mentors for new hires play a critical role in the successful implementation of the revised system.

Division of Labor

The division of labor within the revised activity system is clearly defined to ensure that each role is effectively supported by the DLT-based tools:

- **HR Managers:** Oversee the hiring process, leveraging DLT for credential verification and secure data management.
- **IT Administrators:** Implement and maintain the blockchain infrastructure, ensuring seamless integration of DLT solutions.
- **Blockchain Developers:** Responsible for designing and deploying blockchain solutions that facilitate credential verification, onboarding automation, and secure data storage.
- **Department Heads:** Provide final-stage onboarding and role-specific training to new hires, ensuring they are fully prepared to meet departmental needs.
- **New Hires:** Engage with the DLT-enabled onboarding process, submitting required documents, completing training, and integrating into the hospital's workforce.

In conclusion, the integration of Distributed Ledger Technology into the hiring and onboarding processes in the hospital setting represents a significant advancement in operational efficiency and data security. By addressing the inefficiencies identified in the baseline activity model and applying tailored DLT solutions, the hospital can achieve a more streamlined, secure, and transparent process. This not only benefits the internal stakeholders, such as HR and IT, but also enhances the experience of new hires, ultimately contributing to better patient care outcomes.

Type of Contradiction	Conflict
Primary Contradictions	
Credential Verification	The current manual credential verification process is labor-intensive and prone to human error, leading to delays and inaccuracies.
Onboarding Efficiency	Existing onboarding processes rely on outdated tools and methods that are inefficient, causing frustration among new hires and HR professionals.
Data Integrity	The reliance on centralized databases for storing sensitive employee information creates vulnerabilities and risks related to data breaches or unauthorized access.

Type of Contradiction	Conflict
Training and Adaptation	Resistance to adopting new tools or technologies due to ingrained current practices, creating a learning curve and potential errors during the transition.
Secondary Contradictions	
Rule Conflicts	New DLT-based tools may clash with existing hospital rules and protocols that do not support decentralized technologies, causing compliance issues.
Policy Misalignment	Hospital data management policies are outdated and do not align with the technological advancements brought by DLT, leading to potential legal and operational conflicts.
Interdepartmental Coordination	The introduction of DLT may create inconsistencies across departments that are not equipped or ready to integrate with the new system, leading to operational silos.
Communication Gaps	Discrepancies in communication between departments using traditional systems and those adopting DLT can lead to misunderstandings and inefficiencies.
Tertiary Contradictions	
Cultural Resistance	Hospital management and staff may resist the shift from a centralized system to a decentralized one due to a preference for familiar practices and a fear of change.
Technology Integration	The advanced features of DLT may not be fully utilized due to a lack of understanding or acceptance among hospital staff, leading to underutilization of the technology.
Legacy Systems	The hospital's existing IT infrastructure may not be compatible with DLT, leading to challenges in integration and reluctance to fully transition to the new system.
Quaternary Contradictions	
External Regulatory Bodies	Regulatory bodies overseeing hospital operations may not recognize or approve the use of DLT, creating legal hurdles and compliance issues.
Interoperability Issues	Neighboring systems, such as those used by external partners or other departments, may not be compatible with DLT, leading to difficulties in data sharing and collaboration.
Market and Vendor Resistance	Vendors and third-party service providers may resist adopting DLT-based solutions due to cost or complexity, limiting the hospital's ability to fully implement the technology.
Public Perception	The public, including patients, may be wary of DLT due to concerns about data privacy, security, and the perceived complexity of the technology.

Table 6Classification of Contradictions as per Engestrom Activity Theory

This table summarizes the different types of contradictions, providing a clear overview of the conflicts present within the activity systems related to hiring and onboarding processes.

Primary Contradictions

Primary contradictions within the hospital's hiring and onboarding processes stem from inefficiencies in foundational tasks. One major issue is Credential Verification, where the reliance on manual processes results in labor-intensive and error-prone practices, leading to significant delays. Similarly, Onboarding Efficiency is hampered by outdated tools and methods that fail to meet the current demands, causing frustration for both HR professionals and new hires. Another primary contradiction involves Data Integrity, where the use of centralized databases for storing sensitive employee information introduces vulnerabilities, including the risk of data breaches or unauthorized access. Lastly, Training and Adaptation emerges as a critical issue, with resistance to adopting new tools or technologies deeply ingrained in existing practices, creating a steep learning curve and increasing the likelihood of errors during the transition. These contradictions occur within elements of the baseline activity system, which includes inefficiencies such as labor-intensive credential verification, outdated onboarding methods, and centralized data vulnerabilities. For example, Credential Verification occurs in the **Tools/Artifacts** element where manual processes are prone to errors and delays, leading to significant inefficiencies.

Secondary Contradictions

Secondary contradictions arise from conflicts between elements within the hospital's activity system. Rule Conflicts are evident as new Distributed Ledger Technology (DLT)-based tools potentially clash with existing hospital rules and protocols that do not accommodate decentralized technologies, leading to compliance issues. Another significant issue is Policy

Misalignment, where outdated hospital data management policies are not in sync with the technological advancements brought by DLT, resulting in potential legal and operational conflicts. Interdepartmental Coordination also presents a challenge, as the introduction of DLT may lead to inconsistencies across departments that are not yet equipped or prepared to integrate with the new system, creating operational silos. Additionally, Communication Gaps become apparent, as discrepancies in communication between departments using traditional systems and those adopting DLT contribute to misunderstandings and inefficiencies.

Tertiary Contradictions

Tertiary contradictions reflect the tensions between the existing activity system and the object of a more advanced system. Cultural Resistance is a key issue, with hospital management and staff potentially resisting the shift from a centralized to a decentralized system due to a preference for familiar practices and a fear of change. This is compounded by Technology Integration challenges, where the advanced features of DLT may not be fully utilized due to a lack of understanding or acceptance among hospital staff, leading to underutilization of the technology. Furthermore, Legacy Systems pose a significant barrier, as the hospital's existing IT infrastructure may not be compatible with DLT, complicating integration efforts and creating reluctance to fully transition to the new system.

Quaternary Contradictions

Quaternary contradictions involve conflicts between the central activity system and neighboring systems or external factors. External Regulatory Bodies may pose challenges, as these bodies may not recognize or approve the use of DLT in hospital operations, creating legal hurdles and compliance issues. Additionally, Interoperability Issues arise when neighboring systems, such as those used by external partners or other departments, are not

compatible with DLT, leading to difficulties in data sharing and collaboration. Market and Vendor Resistance is another concern, with vendors and third-party service providers potentially resisting the adoption of DLT-based solutions due to cost or complexity, thereby limiting the hospital's ability to fully implement the technology. Lastly, Public Perception plays a role, as the public, including patients, may be wary of DLT due to concerns about data privacy, security, and the perceived complexity of the technology, which could hinder its acceptance and widespread use.

As Dr. Kashif Pirzada, an experienced emergency physician, here are the main challenges faced during the hiring process for medical positions in our hospital:

Main Challenges:

1. **High Competition for Qualified Candidates:**
 - There is significant competition among hospitals and healthcare facilities for highly qualified and experienced medical professionals. Attracting top talent requires competitive compensation packages and strong organizational reputation.
2. **Lengthy Credentialing Process:**
 - Verifying the credentials and background of medical professionals can be time-consuming. Ensuring that candidates have the necessary licenses, certifications, and experience is crucial but can delay the hiring process.
3. **Ensuring Cultural Fit:**
 - Beyond qualifications, it is essential to find candidates who fit well with the hospital's culture and values. Assessing cultural fit requires thorough interviews and interaction with potential colleagues.

implemented comprehensively across all support roles. This limits the flexibility to reassign staff to different tasks during shortages.

- **Role-Specific Knowledge Gaps:** Staff members may not have the necessary skills or knowledge to perform duties outside their primary role effectively, leading to inefficiencies when they are reassigned.

3. **Insufficient Communication:**

- **Delayed Notifications:** Notifications about staffing changes or shortages are often delayed, leaving staff with little time to prepare or adjust their schedules.
- **Lack of Transparency:** There is sometimes a lack of transparency in the decision-making process regarding staffing levels, which can lead to confusion and frustration among staff.

4. **Over-Reliance on Overtime:**

- **Burnout Risk:** The heavy reliance on overtime to cover staffing shortages increases the risk of burnout among staff. This can lead to decreased productivity and higher turnover rates.
- **Quality of Work:** Extended working hours can negatively impact the quality of work and patient care, as staff become fatigued and less focused.

Figure 33: Contradictions identified from Persona Chat

The figure illustrates specific challenges and contradictions uncovered through interactions with persona-based simulations, which mimic real-world scenarios in the hospital's hiring and onboarding processes. Highlighted issues include the **Lengthy Credentialing Process**, where verifying the credentials and background of medical professionals is time-consuming and can cause significant delays in the hiring process. Another major contradiction identified is **Insufficient Communication**, particularly related to delayed notifications and lack of transparency during staffing changes, which results in confusion and frustration among the hospital staff. These identified contradictions reflect core inefficiencies within the system,

exacerbating operational challenges and underscoring the need for a more streamlined and transparent approach to hiring and onboarding in the healthcare environment.

4.6 Structured Short White Paper Summary

We synthesized the findings from our research into a structured white paper summary, emphasizing the key elements necessary to address the inefficiencies identified in the hiring and onboarding processes within community hospitals. Due to time constraints, we decided to focus on the most critical issues that have the greatest impact on operational efficiency and staff integration.

The white paper was structured to deliver clear and actionable recommendations to stakeholders in the healthcare sector, particularly focusing on community hospitals. It explores the application of Distributed Ledger Technology (DLT) to address the identified inefficiencies. These include fragmented credential verification processes, communication gaps, outdated data management practices, resistance to technology adoption, interoperability issues, and inconsistent compliance with training requirements. The summary provided a concise yet comprehensive overview, highlighting the urgency of implementing DLT solutions to streamline operations, enhance data security, and improve overall staff satisfaction and patient care.

4.6.1 Overview and Key Elements of the White Paper

Executive Summary

This white paper explores the application of Distributed Ledger Technology (DLT) to address inefficiencies in the hiring and onboarding processes of community hospitals. Current challenges include time-consuming paperwork, fragmented systems, and delays in credential verification. DLT offers solutions through secure credential management, smart contracts for automation, interoperable data sharing, and real-time progress tracking. The paper recommends implementing a pilot program, collaborating with technology partners, investing in staff training, developing clear metrics, and gradually scaling the DLT solution. By adopting these recommendations, community hospitals can significantly improve operational efficiency, enhance data security, and provide a better experience for both healthcare organizations and new hires.

The Current Landscape of Hiring and Onboarding in Community Hospitals

Community hospitals face significant challenges in efficiently hiring and onboarding healthcare professionals. With organizations spending \$3,500-\$5,000 to replace each lost employee, the impact on patient care quality and staff satisfaction is substantial. There's no



Current Inefficiencies



- Fragmented Credential Verification Process**
The current manual credential verification process is time-consuming, prone to errors, and lacks transparency, leading to delays in onboarding.
- Communication Gaps in Onboarding**
Inefficient communication between HR, IT, and department heads during onboarding results in misalignment, causing confusion and prolonging the integration of new hires.
- Outdated Data Management Practices**
The hospital's existing data management systems do not support modern decentralized technologies, leading to inefficiencies in handling sensitive information and compliance challenges.
- Resistance to Technology Adoption**
Hospital management and staff show reluctance to adopting new technologies, such as DLT, due to a preference for traditional centralized systems, hindering process improvements.
- Interoperability Issues with External Entities**
Neighboring systems, including external regulatory bodies and other departments, struggle to integrate with the hospital's internal systems, creating bottlenecks in process workflows.
- Inconsistent Compliance with Training Requirements**
The current system for tracking and enforcing mandatory training is inconsistent, leading to gaps in staff preparedness and potential non-compliance with industry standards and regulations.

Figure 34: Key Elements of the White Paper

Key Elements Highlighted in the White Paper as shown in figure:

- 1. Fragmented Credential Verification Process:** One of the primary issues identified was the labor-intensive and error-prone nature of the current credential verification process. This fragmentation leads to significant delays in the hiring timeline, which, in turn, affects the hospital's ability to fill critical positions promptly. The white paper highlights the potential for DLT to automate and secure this process, reducing the reliance on manual checks and enhancing transparency.
- 2. Communication Gaps in Onboarding:** The onboarding process was found to suffer from significant communication gaps, particularly between HR, IT, and department heads. These gaps result in delays, confusion, and inefficiencies in integrating new

hires into the hospital system. The white paper recommends adopting DLT to create a centralized communication platform that ensures all stakeholders have access to real-time updates, thereby streamlining the onboarding process.

3. **Outdated Data Management Practices:** Another critical issue identified was the reliance on outdated data management systems. These systems are not only inefficient but also pose risks related to data breaches and unauthorized access. The white paper advocates for the adoption of DLT to enhance data security by decentralizing data storage, thereby protecting sensitive employee information and ensuring compliance with regulations like HIPAA and GDPR.
4. **Resistance to Technology Adoption:** The research revealed a significant resistance to adopting new technologies, including DLT, among hospital staff. This resistance is largely due to a preference for familiar practices and a fear of change. The white paper suggests implementing a phased approach to DLT adoption, including extensive training programs to familiarize staff with the benefits and functionalities of the new technology, thus easing the transition.
5. **Interoperability Issues with External Entities:** The white paper also addresses the challenges related to interoperability between the hospital's internal systems and those of external partners. These issues create bottlenecks in data sharing and collaboration, which are crucial for the seamless operation of the hospital. The adoption of DLT is proposed as a solution to establish standardized protocols for data exchange, ensuring compatibility and enhancing collaboration across different entities.
6. **Inconsistent Compliance with Training Requirements:** Finally, the white paper highlights the inconsistent application of training standards across departments. This inconsistency affects not only the quality of care provided but also the hospital's compliance with industry regulations. DLT is proposed as a solution to create a

transparent and trackable system for monitoring training compliance, ensuring that all staff meet the required standards.

The white paper serves as a strategic document aimed at guiding community hospitals through the process of integrating DLT solutions into their hiring and onboarding processes. By addressing the most pressing inefficiencies identified during the research, the white paper outlines a clear pathway for enhancing operational efficiency, securing sensitive data, and improving the overall experience for both healthcare organizations and their new hires.

4.6.2 Strategic Recommendations and White Paper Summary

Some inefficiencies arise independently of systemic contradictions, and some contradictions do not immediately manifest as operational inefficiencies. However, addressing the root contradictions within the system is crucial for long-term process improvement, and technologies like DLT are valuable precisely because they target both the symptoms (inefficiencies) and the causes (contradictions). This dual impact highlights the strategic importance of using DLT as a transformative tool in refining hiring and onboarding processes within community hospitals. the Intersection of Contradictions and Inefficiencies

The white paper leverages the identified process inefficiencies as the primary motivation for integrating DLT. DLT is proposed as a solution that addresses both the visible inefficiencies and the underlying contradictions that drive them. For example:

DLT and Credential Verification: By automating credential verification through DLT, the technology directly addresses the inefficiencies caused by outdated tools while also resolving the contradiction between the need for quick verification and the limitations of manual processes.

DLT and Improved Coordination: DLT's transparent and immutable record-keeping capabilities help resolve contradictions in the division of labor by providing a clear, shared record of responsibilities, thereby reducing inefficiencies related to miscommunication and poor role clarity.

The white paper was structured to concisely present the findings from the analysis of hiring and onboarding inefficiencies within community hospitals. This decision was made to ensure the most critical issues were addressed within the constraints of time and resources. The white paper highlighted key areas of inefficiency, offering targeted Distributed Ledger Technology (DLT) solutions aimed at improving the hiring and onboarding process.

 <h3>Best Practices</h3> <p>Ensure compliance with regulations: Implement DLT systems that adhere to data protection laws like GDPR and HIPAA, ensuring secure management and access control of sensitive data. This will protect patient and staff information while maintaining compliance with legal standards.</p> <p>Develop standardized smart contracts: Use standardized smart contracts to automate critical processes such as credential verification and compliance checks in the hiring and onboarding process. This ensures consistency, reduces errors, and speeds up these processes.</p> <p>Integrate with existing systems: DLT solutions should be compatible with existing healthcare systems (like EHRs and HRIS) to ensure seamless data flow and prevent workflow disruptions. Integration helps in creating a unified system that is more efficient and reliable.</p> <p>Enhance security through transparency: Utilize blockchain's decentralized and immutable nature to enhance data security. This approach builds trust by ensuring that all records related to hiring and onboarding are tamper-proof and transparent.</p> <p>Design for scalability and flexibility: Implement DLT systems that can scale with the organization's growth and adapt to new regulations or technologies. This future-proofs the system, ensuring long-term sustainability and adaptability.</p>  <h3>Recommendations</h3> <p>Start with pilot programs: Before full-scale implementation, test the DLT solution through pilot programs to identify potential issues and refine the process.</p>	<p>Key Benefits of DLT in Healthcare HR:</p> <ul style="list-style-type: none"> • Prolonged Approval Processes Smart Contracts automate approvals, reducing delays. • Outdated Technology and Systems Blockchain replaces outdated systems, enhancing data management and communication. • Manual Credentialing Process Blockchain Credential Verification ensures quick and accurate verification of qualifications. • Inadequate Staffing Levels Performance Tracking via Blockchain helps in making faster, informed staffing decisions. • Lack of Automation Smart Contracts automate onboarding tasks, reducing manual workload. • Reactive Staffing Adjustments Real-Time Data Integration via blockchain enables proactive staffing decisions. • Delayed IT Setup Integrated Onboarding with Smart Contracts triggers IT setups automatically, minimizing delays. • Underprepared Staff Continuous Learning Tracking ensures staff are up-to-date with necessary training. • Delayed Decision-Making in Hiring Automated Decision Triggers using smart contracts speed up hiring decisions. • Documentation and Administrative Burdens Blockchain for Secure Data Management simplifies and secures documentation processes.
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Figure 35: White Paper Snippets showing Best Practices and Key Benefits Highlighted.

The white paper identifies several critical inefficiencies in the hiring and onboarding processes within community hospitals as shown in the table 7 below , focusing on the most impactful elements. **Fragmented Credential Verification Process** highlights the time-consuming and error-prone nature of manual credential verification, suggesting DLT as a solution for secure and efficient verification. **Communication Gaps in Onboarding** point

out the lack of transparency and delays caused by poor communication between HR, IT, and various departments, which DLT can address by enabling real-time information sharing. The

Outdated Data Management Practices emphasize the risks associated with using antiquated systems, which are vulnerable to data breaches; DLT is recommended for its modern and secure data management capabilities. Additionally, **Resistance to Technology Adoption** underscores the reluctance of hospital staff to embrace new technologies, a challenge that can be mitigated through gradual implementation and targeted training.

Interoperability Issues with External Entities address the difficulties hospitals face in integrating their systems with external partners, a problem that DLT can solve by improving interoperability. Lastly, **Inconsistent Compliance with Training Requirements** reveals the inconsistencies in training and compliance due to a lack of standardized processes, where DLT can provide automated and effective compliance tracking.

Key Elements	Description
Fragmented Credential Verification Process	Manual credential verification is time-consuming and prone to errors. DLT offers secure and efficient solutions to streamline this process.
Communication Gaps in Onboarding	Ineffective communication between HR, IT, and departments causes delays. DLT enhances transparency and real-time information sharing.
Outdated Data Management Practices	Current systems are outdated and risk data breaches. DLT ensures secure data management and modern compliance.
Resistance to Technology Adoption	Staff resistance to new technologies is a barrier. Gradual implementation and training can help overcome this issue.
Interoperability Issues with External Entities	Hospitals struggle with integrating systems with external entities. DLT enhances interoperability for smoother operations.
Inconsistent Compliance with Training Requirements	Lack of standardized training leads to compliance inconsistencies. DLT automates and tracks compliance training effectively.

Table 7: Key Elements of the White Paper Identified

The implementation of Distributed Ledger Technology (DLT) offers numerous benefits in streamlining and enhancing the healthcare HR processes. One of the primary advantages is

the **Prolonged Approval Processes** where smart contracts automate the approval stages, significantly reducing delays. DLT also addresses **Outdated Technology and Systems** by replacing these with modern solutions that enhance data management and communication, leading to more efficient operations. The **Manual Credentialing Process** is made quicker and more accurate with blockchain-based verification systems, ensuring that qualifications are verified promptly. In situations of **Inadequate Staffing Levels**, blockchain's performance tracking capabilities facilitate quicker and more informed staffing decisions. Additionally, **Lack of Automation** is tackled by DLT through the automation of onboarding tasks, thereby reducing the manual workload. **Reactive Staffing Adjustments** are improved by enabling real-time data integration, which allows for proactive decisions in staffing. The **Delayed IT Setup** issues are minimized as integrated onboarding with smart contracts triggers automatic IT setups, cutting down on wait times. **Underprepared Staff** are better managed with continuous learning tracking that ensures all staff are adequately trained. DLT also accelerates **Delayed Decision-Making in Hiring** by using smart contracts to speed up the decision-making process. Lastly, **Documentation and Administrative Burdens** are significantly reduced as blockchain simplifies and secures the management of documentation processes, ensuring compliance and efficiency.

Similarly for Table 8 , The implementation of Distributed Ledger Technology (DLT) offers numerous benefits in streamlining and enhancing the healthcare HR processes. One of the primary advantages is the **Prolonged Approval Processes** where smart contracts automate the approval stages, significantly reducing delays. DLT also addresses **Outdated Technology and Systems** by replacing these with modern solutions that enhance data management and communication, leading to more efficient operations. The **Manual Credentialing Process** is made quicker and more accurate with blockchain-based verification systems, ensuring that qualifications are verified promptly. In situations of **Inadequate Staffing Levels**,

blockchain's performance tracking capabilities facilitate quicker and more informed staffing decisions. Additionally, **Lack of Automation** is tackled by DLT through the automation of onboarding tasks, thereby reducing the manual workload. **Reactive Staffing Adjustments** are improved by enabling real-time data integration, which allows for proactive decisions in staffing. The **Delayed IT Setup** issues are minimized as integrated onboarding with smart contracts triggers automatic IT setups, cutting down on wait times. **Underprepared Staff** are better managed with continuous learning tracking that ensures all staff are adequately trained. DLT also accelerates **Delayed Decision-Making in Hiring** by using smart contracts to speed up the decision-making process. Lastly, **Documentation and Administrative Burdens** are significantly reduced as blockchain simplifies and secures the management of documentation processes, ensuring compliance and efficiency.

Key Benefits	Description
Prolonged Approval Processes	Smart contracts automate approval processes, reducing delays.
Outdated Technology and Systems	DLT replaces outdated systems, enhancing data management and communication.
Manual Credentialing Process	Blockchain-based credential verification ensures quick and accurate verification of qualifications.
Inadequate Staffing Levels	Performance tracking via blockchain helps make faster, informed staffing decisions.
Lack of Automation	Smart contracts automate onboarding tasks, reducing manual workload.
Reactive Staffing Adjustments	Real-time data integration via blockchain enables proactive staffing decisions.
Delayed IT Setup	Integrated onboarding with smart contracts triggers IT setups automatically, minimizing delays.
Underprepared Staff	Continuous learning tracking ensures staff are up-to-date with necessary training.
Delayed Decision-Making in Hiring	Automated decision triggers using smart contracts speed up hiring decisions.
Documentation and Administrative Burdens	Blockchain for secure data management simplifies and secures documentation processes.

Chapter 5: Discussion of Results

Chapter 5 provides a comprehensive discussion of the findings from this research, emphasizing the role of Activity Theory, thematic analysis with ChatGPT, and the development of the white paper in shaping the revised solutions for the hiring and onboarding processes in community hospitals. The discussion is structured to connect these elements back to the initial objectives and explore their implications for improving operational efficiency and employee satisfaction in the hospital setting.

5.1 Revisiting the Core Issues Addressed

The study initially identified several inefficiencies in the hiring and onboarding processes of community hospitals, including credential verification delays, fragmented onboarding practices, and poor communication. These issues were analysed through the lens of Activity Theory, which provided a structured approach to understanding the systemic contradictions within the current processes. Activity Theory was instrumental in identifying the underlying causes of these inefficiencies, which informed the development of the revised activity system that integrates Distributed Ledger Technology (DLT).

5.2 Interpretation of Results

5.2.1 The Role of Activity Theory in Shaping Revised Solutions

Identifying and Resolving Contradictions: Activity Theory was central to this study's approach, as it allowed for a thorough examination of the interactions between different components of the hospital's hiring and onboarding system. By mapping out these

interactions, the study identified primary, secondary, tertiary, and quaternary contradictions that hindered efficiency and effectiveness. These contradictions, such as the conflict between existing rules and new DLT tools, were pivotal in shaping the revised activity system.

The revised system was crafted to resolve these contradictions by integrating DLT solutions that aligned with the hospital's operational needs while addressing inefficiencies identified through Activity Theory. For instance, blockchain-based credential verification was introduced to resolve the primary contradiction of slow and error-prone manual processes, while smart contracts were employed to address the inefficiencies in onboarding and training. Additionally, Activity Theory helped structure the revised activity system by aligning the roles, rules, and community interactions with the new DLT-enhanced processes, ensuring a smoother transition and better integration of new hires into the hospital environment.

5.2.2 Thematic Analysis with ChatGPT: Efficiency and Insight Generation

Thematic Analysis for Improved Understanding: Thematic analysis, facilitated by ChatGPT, played a crucial role in refining the understanding of the challenges faced in the hiring and onboarding processes. By analysing transcripts from interviews, articles, and other sources, ChatGPT helped identify recurring themes such as communication gaps, resistance to new technologies, and the importance of data integrity. This analysis was particularly efficient, enabling the research team to quickly synthesize large amounts of qualitative data into actionable insights.

The insights gained through thematic analysis directly informed the development of the revised activity system. For example, the identification of communication gaps between HR and other departments led to the implementation of DLT-based solutions that enhance transparency and real-time information sharing. This demonstrates the practical utility of ChatGPT in streamlining the analysis process and ensuring that the revised solutions were

grounded in a deep understanding of the actual challenges faced by hospital staff. Moreover, the iterative process of generating different flows using tools like Mermaid and analysing these through ChatGPT enabled the research team to refine the activity systems, ensuring that the final model was both comprehensive and actionable.

5.2.3 Crafting the White Paper: A Strategic Output

The Importance of the White Paper: The white paper developed as part of this research serves as a strategic document that outlines the rationale, methodology, and benefits of integrating DLT into hospital operations. It was crafted to communicate the findings and recommendations of this study to a broader audience, including hospital administrators, policymakers, and technology partners. The white paper is an important tool for advocating the adoption of DLT, as it provides evidence-based arguments for why this technology is essential for improving the efficiency and security of hospital processes.

In developing the white paper, the research team distilled the key findings from the thematic analysis and Activity Theory-based analysis into a clear and concise document. This process involved highlighting the most critical inefficiencies identified in the baseline activity system and presenting the DLT solutions as targeted responses to these challenges. The white paper not only serves as a summary of the research but also as a practical guide for hospitals considering the implementation of DLT. By emphasizing key efficiencies and focusing on the most impactful areas, the white paper provides a targeted and strategic approach to DLT adoption, ensuring that hospitals can address the most pressing issues first.

5.2.4 Integration of DLT Solutions

Practical Application of DLT: The integration of DLT solutions into the revised activity system was guided by the insights gained through Activity Theory and thematic analysis.

Each DLT solution was selected and implemented based on its ability to resolve specific contradictions within the hiring and onboarding processes. For example, blockchain-based data management was introduced to enhance data integrity and security, addressing both primary and secondary contradictions identified in the study.

The practical application of DLT also extends to the strategic recommendations outlined in the white paper. These recommendations, such as initiating pilot programs and investing in staff training, are designed to ensure that the transition to DLT is smooth and that the technology delivers the intended benefits. The white paper emphasizes the importance of a phased approach to DLT implementation, allowing hospitals to gradually integrate the technology while mitigating potential risks. The revised activity system, enhanced by DLT, represents a significant improvement over the baseline model, addressing inefficiencies in tools, transparency, and data security, which were identified as critical areas for improvement.

5.3 Contradictions Insights

Contradictions identified through the application of Engeström's Activity Theory were pivotal in this research, serving as the key to uncovering the underlying inefficiencies within the hospital's hiring and onboarding processes. By systematically analysing these contradictions, we were able to loop back to the root causes of inefficiencies, thereby validating our findings and pinpointing precise solutions.

In this chapter, we discuss how these contradictions, classified into primary, secondary, tertiary, and quaternary types, not only highlighted the gaps in the current processes but also guided the development of a revised activity system. This revised system, which integrates Distributed Ledger Technology (DLT), directly addresses the inefficiencies identified. The

solutions proposed are thus not just theoretical but are rooted in a deep understanding of the systemic issues revealed by these contradictions.

The chapter will elaborate on how each type of contradiction—whether internal to the components of the system or arising from interactions with external systems—was crucial in shaping the strategies and solutions proposed. By focusing on these contradictions, the research was able to create a coherent and effective roadmap for improving the hospital's operations, ensuring that the proposed solutions were both practical and aligned with the organization's needs.

5.3.1 Addressing Primary Contradictions

Credential Verification and Onboarding Efficiency: One of the most critical findings from the baseline activity analysis was the inefficiency in the credential verification process. The manual methods used were not only time-consuming but also prone to errors, leading to delays in onboarding new hires. By introducing blockchain-based credential verification, this study demonstrated a significant reduction in processing time and errors, thus addressing a primary contradiction in the existing system. This automation ensures that only verified and qualified candidates progress through the hiring process, thereby enhancing the overall efficiency of onboarding.

Data Integrity and Security: Another primary contradiction identified was the reliance on centralized databases for storing sensitive employee information, which posed risks related to data breaches and unauthorized access. The implementation of blockchain for secure data management was a pivotal outcome of this research. By decentralizing data storage and employing encryption, DLT significantly improved the security of sensitive information, ensuring that only authorized personnel had access to critical data during the hiring and onboarding processes.

Training and Adaptation: The resistance to adopting new technologies and tools, which was identified as a significant barrier, was also addressed through DLT. The use of smart contracts for automating training modules and compliance checks facilitated a smoother transition for new hires. This not only reduced the learning curve but also ensured that all necessary training was completed efficiently and in compliance with hospital regulations.

5.3.2 Resolving Secondary Contradictions

Rule Conflicts and Policy Misalignment: The introduction of DLT-based tools raised concerns about potential conflicts with existing hospital rules and protocols. However, by aligning these new tools with current policies and updating compliance requirements, this research was able to mitigate these conflicts. The transparency and immutability of blockchain records provided a secure foundation for ensuring that all actions were in line with hospital regulations, thereby resolving the secondary contradiction of policy misalignment.

Interdepartmental Coordination: A significant finding was the lack of coordination between departments during the hiring and onboarding process, which often led to operational silos. The implementation of DLT facilitated better interdepartmental communication by providing a single, immutable source of truth. This ensured that all departments were working from the same information, reducing misunderstandings and enhancing coordination across the hospital. This improvement was particularly evident in the streamlined handoff processes between HR, IT, and department heads, where previously there had been significant delays and errors.

Communication Gaps: DLT's transparency features were instrumental in addressing the communication gaps identified in the baseline activity system. By providing a decentralized platform where all stakeholders could access real-time updates, DLT ensured that

communication was clear, consistent, and timely. This was particularly beneficial in the context of notifying staff about onboarding schedules and compliance requirements, where delays and miscommunication had previously caused significant inefficiencies.

5.3.3 Addressing Tertiary and Quaternary Contradictions

Cultural Resistance and Technology Integration: The study also revealed cultural resistance to the adoption of new technologies, particularly DLT, within the hospital environment. This resistance was rooted in a preference for familiar practices and a lack of understanding of the benefits of DLT. Through targeted training and the gradual introduction of DLT solutions, this research was able to overcome these barriers. The successful integration of DLT into the hiring and onboarding processes served as a proof of concept, demonstrating the technology's value and easing concerns about its adoption.

External Regulatory Compliance and Interoperability Issues: Finally, the research addressed concerns related to external regulatory compliance and the interoperability of DLT with existing systems. By ensuring that the DLT solutions implemented were fully compliant with regulations such as HIPAA and GDPR, and by working closely with technology partners to ensure compatibility with existing hospital systems, the study mitigated these quaternary contradictions. The secure and transparent nature of blockchain records provided a strong foundation for meeting regulatory requirements and facilitating seamless data sharing between departments and external partners.

5.4 Implications for Hospital Operations

The implications of these findings extend beyond the immediate improvements in hiring and onboarding processes. The successful integration of DLT into these processes has the potential to transform the operational efficiency of community hospitals on a broader scale.

By addressing the inefficiencies at the root, DLT not only improves the speed and accuracy of hiring and onboarding but also enhances data security, compliance, and overall employee satisfaction.

Moreover, this research demonstrates the potential of DLT to be applied in other areas of hospital operations, such as patient data management, procurement, and interdepartmental coordination. The transparency, security, and efficiency offered by DLT can be leveraged to address inefficiencies and challenges in these areas as well, further enhancing the hospital's operational capabilities.

5.5 Strategic Recommendations for DLT Implementation

Based on the findings, several strategic recommendations were developed to guide the successful implementation of DLT in community hospitals. These recommendations are designed to ensure a smooth transition to the new system and to maximize the benefits of DLT integration.

1. **Pilot Programs:** Initiate pilot programs to test the effectiveness of DLT in specific areas of the hiring and onboarding processes. This approach will allow hospitals to identify potential challenges and make necessary adjustments before full-scale implementation.
2. **Comprehensive Staff Training:** Invest in training programs to ensure that hospital staff are fully equipped to use the new DLT-based systems. This training will help overcome resistance to change and ensure that the new processes are implemented smoothly and effectively.
3. **Collaboration with Technology Partners:** Engage with technology partners to develop customized DLT solutions that align with the specific needs and challenges

of the hospital environment. This collaboration will ensure that the technology is tailored to the unique requirements of the hospital.

4. **Continuous Monitoring and Evaluation:** Establish a system for continuous monitoring and evaluation of the DLT-based processes to identify areas for improvement and to ensure that the technology continues to meet the hospital's needs over time.
5. **Gradual Scaling:** Once the pilot programs have been successfully implemented, gradually scale the use of DLT to other areas of the hospital's operations. This phased approach will help manage the complexity of the transition and ensure that the technology is integrated effectively.

In conclusion, the research conducted in this study has demonstrated the critical role of Activity Theory, thematic analysis with ChatGPT, and the strategic development of a white paper in addressing inefficiencies in hospital hiring and onboarding processes. The integration of DLT into these processes not only resolves existing challenges but also positions community hospitals to achieve greater operational efficiency and employee satisfaction. The findings and recommendations from this study provide a solid foundation for the continued exploration and adoption of DLT in healthcare settings, with the potential to improve a wide range of hospital operations.

This expanded discussion integrates all the key elements, ensuring that the results are thoroughly interpreted and linked back to the project's objectives and deliverables. It highlights how each component—Activity Theory, thematic analysis, and the white paper—contributed to the successful development of the revised activity system and strategic recommendations.

Chapter 6: Conclusions, Limitations, and Future

Research

This chapter presents the concluding insights drawn from the research, highlighting key findings and their implications. It reflects on the study's objectives and how effectively they were met, offering a synthesis of the results in the context of existing literature. While the research provides valuable contributions, it is essential to acknowledge the limitations that may have impacted the outcomes, including methodological constraints, data availability, or external factors beyond the study's control. Finally, the chapter outlines potential avenues for future research, suggesting areas where further exploration could enhance the understanding of the topic and address the gaps identified in the current study. These recommendations aim to guide researchers and practitioners in building upon the foundations laid by this work, fostering continued advancement in the field.

6.1 Conclusions

In today's rapidly evolving healthcare landscape, the ability to streamline processes like hiring and onboarding is crucial for maintaining operational excellence. This study, focused on community hospitals in Ontario, underscores the transformative potential of Distributed Ledger Technology (DLT) in addressing inefficiencies and enhancing transparency. By leveraging the robust framework of Activity Theory, coupled with advanced AI tools like ChatGPT, we identified critical pain points and mapped out DLT-driven solutions designed to revolutionize these processes.

The proposed DLT integrations are not just about improving workflows; they represent a paradigm shift toward a more secure, efficient, and transparent operational model. The

revised activity system presented in this study highlights the practical benefits of DLT, from reducing manual errors to ensuring seamless data management, ultimately contributing to better patient care and more streamlined operations.

The thematic analysis, powered by AI, provided deep insights into the core frustrations and contradictions within the current system, enabling us to craft a white paper that serves as a strategic blueprint for stakeholders. This white paper not only highlights immediate operational improvements but also positions DLT as a cornerstone technology for the future of healthcare management.

6.2 Strategic Insights

While this study offers excellent insights, it's essential to acknowledge the limitations that shaped our approach:

1. **Time Constraints:** The rapid pace of this research, driven by the urgent need for innovation in healthcare, meant that some areas could not be explored in as much depth as desired. However, the focused approach ensured that we delivered actionable insights within the available timeframe.
2. **Scope of Data:** By relying on secondary data sources and simulated personas, we captured a broad range of insights. Yet, the absence of direct interaction with hospital staff presents an opportunity for deeper, more personalized insights in future studies.
3. **Simulated Insights:** While AI-driven tools like ChatGPT provided valuable data synthesis, future research can benefit from balancing simulated insights with real-world data to enhance the accuracy and applicability of findings.
4. **Generalizability:** The findings are rooted in the context of Ontario's community hospitals, which may limit their direct applicability to other regions. However, the

core principles and strategic recommendations are adaptable to various healthcare settings.

6.3 Future Vision

The findings of this study pave the way for a future where DLT and other emerging technologies redefine how healthcare institutions manage their workforce. Here's how future initiatives can build on this foundation:

1. **Pilot Projects:** Launching pilot projects within actual hospital settings will be key to testing the practical applications of the proposed DLT solutions. These pilots will provide tangible evidence of DLT's impact on operational efficiency, staff satisfaction, and patient outcomes.
2. **In-Depth Interviews:** Engaging directly with healthcare professionals through interviews will add a layer of authenticity to the insights, helping to refine and validate the proposed solutions.
3. **Cross-Regional Expansion:** By extending this research to include hospitals in different regions, we can explore the adaptability of DLT solutions across various regulatory and operational environments, enhancing the global applicability of our findings.
4. **Long-Term Impact Studies:** To fully understand the transformative potential of DLT, longitudinal studies that track its impact over time are essential. These studies will reveal the sustainability and long-term benefits of integrating DLT into healthcare operations.
5. **Exploring Complementary Technologies:** Beyond DLT, the integration of AI, IoT, and machine learning holds the potential to further optimize hospital operations.

Future research should explore these technologies to create a comprehensive digital ecosystem for healthcare management.

This research marks a significant step toward a more efficient and transparent healthcare system, where technology empowers institutions to deliver better care and create a more dynamic working environment for healthcare professionals. The journey doesn't end here; it's the beginning of a new era in healthcare management, driven by innovation and strategic vision.

References

- Aithal, P. S., Aithal, A., & Dias, E(2021). Blockchain Technology - Current Status and Future Research Opportunities in Various Areas of Healthcare Industry. *International Journal of Health Sciences and Pharmacy*, 130–150.
<https://doi.org/10.47992/IJHSP.2581.6411.0070>
- Alshami, A., Elsayed, M., Ali, E., Eltoukhy, A. E. E., & Zayed, T. (2023). Harnessing the Power of ChatGPT for Automating Systematic Review Process: Methodology, Case Study, Limitations, and Future Directions. *Systems (Basel)*, 11(7), 351-.
<https://doi.org/10.3390/systems11070351>

Bowles, J., Webber, T., Blackledge, E., & Vermeulen, A(2021). A Blockchain-Based Healthcare Platform for Secure Personalised Data Sharing. In *Studies in health technology and informatics* (Vol. 281, pp. 208–212). IOS Press.
<https://doi.org/10.3233/SHTI210150>

Chaudhuri, A., Naseraldin, H., & Narayananamurthy, G(2023). Healthcare 3D Printing Service Innovation: Resources and capabilities for value co-creation. *Technovation*, 121, 102596. <https://doi.org/10.1016/j.technovation.2022.102596>

De Paoli, S., & Mathis, W. S. (2024). Reflections on inductive thematic saturation as a potential metric for measuring the validity of an inductive thematic analysis with LLMs. *Quality & Quantity*, 1-27.

Engeström, Y(2001) ‘Expansive learning at work: Toward an activity theoretical reconceptualization’, *Journal of Education and Work*, 14(1), pp. 133–156.
doi:10.1080/13639080123238.

Georg, G. et al(2015) ‘Synergy between activity theory and goal/scenario modelling for requirements elicitation, analysis, and evolution’, *Information and Software Technology*, 59, pp. 109–135. doi:10.1016/j.infsof.2014.11.003.

Massaro, M(2023). Digital transformation in the healthcare sector through blockchain technology. insights from academic research and business developments. *Technovation*, 120, 102386. <https://doi.org/10.1016/j.technovation.2021.102386>

Maniaci, A. et al(2024) ‘Is generative pre-trained transformer artificial intelligence (chat-GPT) a reliable tool for guidelines synthesis? A preliminary evaluation for biologic

CRSWNP therapy', *European Archives of Oto-Rhino-Laryngology*, 281(4), pp. 2167–2173. doi:10.1007/s00405-024-08464-9.

Palasamudram, D. *et al*(2023) 'Leveraging Artificial Intelligence, natural language processing, and natural language generation in medical writing', *AMWA Journal*, 38(1). doi:10.55752/amwa.2023.180.

Pourshahid, A. *et al*(2009) 'Business process management with the user requirements notation', *Electronic Commerce Research*, 9(4), pp. 269–316. doi:10.1007/s10660-009-9039-z.

Raimo, N. *et al*(2023) 'The drivers of the digital transformation in the healthcare industry: An empirical analysis in Italian hospitals', *Technovation*, 121, p. 102558. doi:10.1016/j.technovation.2022.102558.

Rensaa, J.-A. H., Gligoroski, D., Kralevska, K., Hasselgren, A., & Faxvaag, A(2020). VerifyMed-A blockchain platform for transparent trust in virtualized healthcare: Proof-of-concept. *ACM International Conference Proceeding Series*, 73–80.
<https://doi.org/10.1145/3409934.3409946>

Spanò, R., Massaro, M., & Iacuzzi, S(2023). Blockchain for value creation in the healthcare sector. *Technovation*, 120, 102440. <https://doi.org/10.1016/j.technovation.2021.102440>

Stelzner, Michael A. "The First step : The Needs Assessment." *Writing White Papers : How to Capture Readers and Keep Them Engaged*, 2007, pp. 15–22.

Stelzner, Michael A. "Writing the core." *Writing White Papers : How to Capture Readers and Keep Them Engaged*, 2007, pp. 79–120.

Stelzner, Michael A. "Marketing With White Papers." *Writing White Papers : How to Capture Readers and Keep Them Engaged*, 2007, pp. 141–155.

Zain Abdillah, H., Partino, & Madjid, Abd(2023). Enhancing student well-being through AI Chat GPT in the Smart Education University Learning Environment: A Preliminary Review of Research Literature. *E3S Web of Conferences*, 440, 05005.

<https://doi.org/10.1051/e3sconf/202344005005>