AI in Sundhedsjournalen - Prerequisites for implementation

Jonas Mølskov Martin Schack

November 19, 2024

Title: AI in Sundhedsjournalen - Prerequisites for implementation
Theme: AI in Healthcare platforms

Project period: 19. August 2024 - 19. September 2024

AALBORG UNIVERSITET
STUDENTERRAPPORT

Abstract:

This thesis explores integrating AI-driven systems into Sundhedsjournalen, Denmark's electronic health record platform, to enhance users' understanding of healthcare data. Using a techno-anthropological approach grounded in postphenomenology, it identifies challenges such as fragmented data and complex medical terminology. The study highlights the need for trust, transparency, and human oversight in AI implementation, emphasizing iterative, user-informed development.
Prerequisites for AI integration were developed and positively received by Styringsgruppen, demonstrating their potential for guiding future advancements. This research contributes to understanding how AI can responsibly enhance mediation of healthcare data on digital platforms.

Projectgroup: 02

Members: 2

Martin Schack

Martin

Jonas Mølskov

Jonas

Supervisor: Mette Ebbesen
Institution: Institution for planning
End date: November 19, 2024

Page count: 65
Normal pages: 73 (156010 characters)
Bilagsantal: 00

Contents

1 Introduction **5**

2 Problem Analysis **6**
2.1 Introduction to the Project 6
2.2 Collaborating with Styringsgruppen 7
2.3 Sundhedsjournalen and it role in Denmark's Healthcare System 8
2.3.1 Overview of Sundhedsjournalen 8
2.3.2 Styrringsgruppens Goals in regards to Sundhedsjournlaen 9
2.4 Understanding Artificial Intelligence 10
2.5 The Potential of Generative AI in Healthcare 12
2.6 Studying AI: An Interdisciplinary Approach 13
2.7 Examples of AI-use in healthcare 14
2.8 Introduction to the Problem Statement 16
2.9 Problem Statement 17

3 Boundaries **18**
3.0.1 Establishing the Scope 18
3.0.2 A patients-user perspective 18
3.0.3 Delineating Sundhedsjournalen and Sundhed.dk 19
3.0.4 Ethical and Analytical Considerations 19

4 Methods **21**
4.1 Scientific approach 21
4.1.1 Postphenomenology in Methodology 21
4.1.2 Postphenomenology in a Digital Context 22
4.2 Literature Review 23
4.2.1 Preliminary Literature Search 23
4.2.2 Supplementary literature 24
4.3 Recruiting Informants 24
4.3.1 On Names and Anonymity 26
4.4 Data Gathering and Processing 26

4.4.1 Semi-Structured Interviews . . . 26
4.4.2 Treatment of Interviews . . . 27
4.4.3 Coding . . . 28
4.5 Addressing Limitations . . . 29
4.5.1 Scope of Participant Perspective . . . 30
4.5.2 Qualitative Nature and Generalizability . . . 30
4.5.3 Impact of Ethical and Technological Contexts . . . 30
4.6 Usage of AI Within the Thesis . . . 30

5 Applied Theory **31**
5.0.1 Postphenomenology as a Theory . . . 31
5.1 Human-Centered AI . . . 34
5.1.1 Framework for HCAI . . . 34
5.1.2 Bridging Postphenomenology and HCAI . . . 37

6 Analysis **38**
6.1 Postphenomenology in Analysis . . . 38
6.2 Perception of Sundhedsjournalen . . . 39
6.2.1 Usability and Accessibility . . . 39
6.2.2 Presentation of Data . . . 41
6.2.3 Future Expectations . . . 42
6.3 Systemic Barriers in Health Care Data Mediation . . . 42
6.3.1 Inconsistent and Fragmented Data . . . 43
6.3.2 Understanding Health Data . . . 44
6.3.3 Dual Roles: Infrastructure and Interactive Platform . . . 46
6.4 Trust and Ethics in AI . . . 47
6.4.1 Privacy and Ethical Boundaries . . . 47
6.4.2 Ethical Implications of AI in Healthcare . . . 49
6.5 HCAI Analysis . . . 51
6.5.1 Balancing Automation and User Oversight . . . 51
6.5.2 Trust, transparency, and User Oversight . . . 53
6.5.3 Designing for Interpretive Clarity . . . 54
6.5.4 Ethical Dimensions in AI mediation . . . 55
6.5.5 Summary of HCAI Analysis . . . 56

7 Discussion **57**
7.1 Postphenomenological Insight on Mediation . . . 57
7.2 A Human-Centered Approach to Sundhedsjournalen . . . 58
7.2.1 Retrieval Augmented Generation . . . 60
7.2.2 Red Teaming . . . 62

8 Prerequisites **64**

9 Conclusion **67**

Bibliografi **68**

1 Introduction

The integration of artificial intelligence (AI) into healthcare systems offers profound opportunities to transform the management, mediation, and interpretation of health data. By enhancing access to and understanding of complex medical information, AI has the potential to benefit both healthcare professionals and users of public healthcare platforms. This thesis builds on a growing interest in the intersection of healthcare and AI, exploring how these technologies might shape interactions with healthcare data within Denmark's digital health infrastructure. A key focus of this thesis is Sundhedsjournalen, a cornerstone of Denmark's electronic health record system. While Sundhedsjournalen provides critical access to health data for citizens and clinicians alike, it presents significant challenges, particularly in terms of usability and the accessibility of its medical information. Users often struggle to interpret the complex health data available on the platform, highlighting an urgent need for tools that can mediate these interactions more effectively.

AI technologies hold the potential to address these issues, offering new methods for interpreting and mediating user interactions with healthcare data. However, integrating AI into an established platform like Sundhedsjournalen requires careful consideration of both technical and ethical dimensions. This includes understanding how users engage with the platform, their perceptions of AI technologies, and the cultural and systemic factors that shape these interactions.

This research, conducted in collaboration with Sundhedsjournalen and its governing bodies, leverages a technoanthropological approach to examine these complexities. Drawing from postphenomenological theory, the thesis investigates how AI-driven systems mediate relationships between users and their healthcare data. By emphasizing the relational dynamics of user interactions with technology, this thesis aims to provide insights into how AI can be thoughtfully and ethically integrated into existing healthcare platforms

2 Problem Analysis

This chapter serves as the foundation for our thesis, establishing the necessary framework for understanding the analysis and discussions that follow. Our study centers on the integration of AI-based tools into the Danish healthcare platforms, Sundhedsjournalen and Sundhed.dk. We begin by outlining our motivations and experiences that led to this exploration, followed by a concise overview of AI technologies relevant to our context. We then discuss the potential of AI in enhancing healthcare data systems, drawing from recent advancements and reports. The chapter continues with an examination of the interdisciplinary nature of AI and a review of current applications of AI in healthcare. It concludes with an introduction to our problem statement, setting the stage for a detailed exploration of our objectives and findings.

2.1 Introduction to the Project

Artificial intelligence (AI) has been both a personal and academic interest for us over the past several years. We have co-authored several projects during our Bachelor's degree and Master's program, many of which revolved around the implementation, development, consequences, and use cases of AI. Our interest in the field of AI dates back more than a decade, particularly around 2015-2017, when leading AI-focused companies such as Google DeepMind and OpenAI began achieving significant breakthroughs in neural networks. Examples of these breakthroughs include Google DeepMind's AI, AlphaGo, defeating the world's best player, Lee Se-dol, in the Chinese game of Go—a game previously thought too complex for AI due to its vast number of possible moves, which made traditional brute-force methods impractical (Byford 2016). Similarly, OpenAI demonstrated promising capabilities with neural networks by challenging and beating some of the world's best players in complex games like Dota II and StarCraft II (Brockman, Dennison, Zhang, et al. 2018). These showcases of AI capabilities coincided with the publication of Google DeepMind's influential research paper on the Transformer architecture, titled "*Attention Is All You Need*" (Vaswani et al. 2017). This paper introduced a novel approach that significantly influenced subsequent AI models. Shortly thereafter, OpenAI published "*Improving Language Understanding by Generative Pre-Training*" (Radford et al. 2018), out-

lining their initial Generative Pre-trained Models (GPTs). One of us had early access to these innovations, notably GPT-2, as well as the DaVinci and Babbage configurations of GPT-3, which predated the first versions of ChatGPT.

Having followed the evolution of AI and worked with Generative AI for several years, we recognize its potential to improve various areas, particularly in healthcare. This interest became more focused when an associate professor at Aalborg University introduced us to a representative from *Medcom*. Medcom, actively seeking master's students for collaborative projects, presented a unique opportunity. A representative of Medcom, our initial gatekeeper, connected us with the project group *Forbedret Borgervisning*, a group of representatives from *Sundheds.dk* who were exploring how AI could be integrated into their *Sundhedsjournal* platform, which laid the groundwork for facilitating our collaboration with Sundheds.dk and the platform itself. This group was internally referred to as *Styringsgruppen* and will be referred to as such in this project. This collaboration allowed us to explore the idea of implementing AI systems into an already established platform, moving beyond individual use of existing AI technologies like ChatGPT. We aim to investigate how users of Sundhedsjournalen currently understand and use the platform, how they interpret it, what, if any, challenges arise in this process, and what users of Sundhedsjournalen think of AI and its potential integration into the platform

2.2 Collaborating with Styringsgruppen

In the following section, we further define our cooperation with Styringsgruppen, what it entailed and how it established the baseline for the project itself. As mentioned previously, this project was a collaborative effort in which we worked with representatives of the project *Forbedret Borgervisning*, in the form of Styringsgruppen. The overall goal of *Forbedret Borgervisning* is to research potential improvements to the way healthcare data is presented and communicated to users across the various facets of Sundhed.dk, especially Sundhedsjournalen. The current stage of this project is what they describe as the *paper stage*, during which no concrete development or planning has yet taken place. The terms of our collaboration were that, at the end of our project, we would present Styringsgruppen with a correlation of our findings that could serve as the foundation for a guide or approach outlining how one might plan and prepare for the potential development of AI systems intended to help users interpret and better understand their own healthcare data, as well as what steps would be necessary to integrate such technology successfully into the preexisting platform. In this case, Sundhedsjournalen would serve as the intended future testing ground for such an integration before scaling it to the entire Sundhed.dk platform.

Their reasoning for pursuing this initiative, beyond a broader desire to be at the forefront of technological advancement, was based on prior research they had conducted, such as their *Quarterly Surveys* (Sundhed.dk 2024a) or their thesis, **A Solid Foundation for Strategic Development of Sundhed.dk** (Anna Juhl Pedersen 2019). Through this

research, they identified a common thread among informants and testers: interpreting or fully understanding their healthcare data as it is presented in Sundhed.dk, and specifically in Sundhedsjournalen, was perceived by some as a challenge or an issue. It was made clear during our collaboration that we would have the freedom to develop our thesis as we saw fit and that we should view Styringsgruppen as much as a resource as a collaborator. Throughout this project, we had recurring meetings with Styringsgruppen, who were instrumental in providing feedback, data, and information regarding Sundhedsjournalen and its users, such as the aforementioned surveys and thesis

2.3 Sundhedsjournalen and it role in Denmark's Healthcare System

In recent years, Denmark has been at the forefront of healthcare digitization, with systems like Sundhed.dk and Sundhedsjournalen playing pivotal roles in modernizing patient care. Sundhed.dk serves as the official digital health portal for Danish citizens, offering access to various health-related services and information. Within this framework, Sundhedsjournalen is a digital health record system designed to centralize and streamline access to patient health data for both healthcare professionals and patients. The development of this system reflects Denmark's broader policy goals related to public health, efficiency, and patient empowerment (Healthcare-Denmark 2024). In this section, we explain Sundhedsjournalen and its functions in detail, providing the necessary foundation for analysis and discussion later in the thesis

2.3.1 Overview of Sundhedsjournalen

Sundhedsjournalen is a platform that allows patients and healthcare providers to access critical health information, including medical history, prescriptions, vaccination records, and test results. It serves as a unified interface where general practitioners, specialists, hospitals, and pharmacies can update and share relevant patient data, aiming to provide a holistic overview of a patient's medical history. This centralization is intended to reduce the likelihood of treatment errors and improve the continuity of care when multiple healthcare providers are involved. Sundhedsjournalen also integrates with other national e-health services, such as the Shared Medication Record (Fælles Medicinkort), to enhance patient safety by providing healthcare professionals with up-to-date medication information Sundhed.dk 2024b. From a patient's perspective, users generally access Sundhedsjournalen by logging in through Sundhed.dk or using the mobile application *Min Sundhed*. Sundhed.dk acts as a portal where users can find various information and access different parts of the healthcare system, including Sundhedsjournalen.

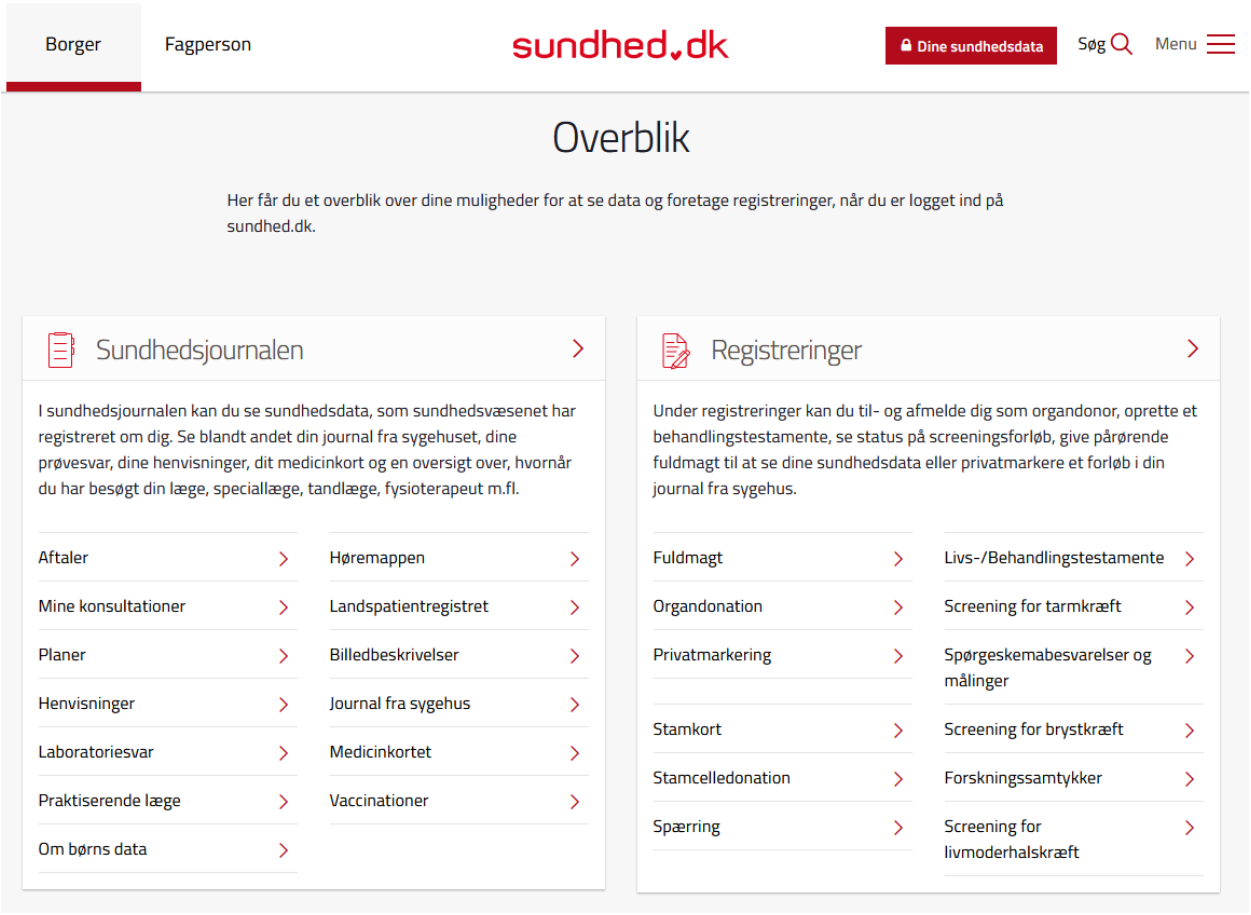

Figure 2.1: A screenshot of the main page of Sundhed.dk after logging in. From here, one can access the many features of Sundhedsjournalen, as seen in the lower left Sundhed.dk 2024b

As seen in 2.1, the offers of Sundhedsjournalen are presented in the lower left box and offers a wide variety of ways to access your own healthcare data, such as journals, lab answers, an overview of consultations, and others.

2.3.2 Styrringsgruppens Goals in regards to Sundhedsjournlaen

Expanding upon the research conducted by Styringsgruppen, as mentioned in Section 2.2, while Sundhedsjournalen aims to improve healthcare delivery, several challenges affecting its users were identified by Styringsgruppen and Sundhed.dk as a whole:

- **Patients**:One of the central challenges for Sundhedsjournalen's users is interpreting complex medical data, often laden with jargon and presented in ways that hinder engagement. Generative AI, with its capacity for natural language processing and data rephrasing, holds promise in addressing these barriers. For instance, AI could translate medical terminology into more user-friendly explanations, empowering patients to make informed decisions about their health. Furthermore, AI's ability to handle vast datasets with precision offers opportunities to enhance data security and

compliance with regulations like GDPR, a significant concern for users navigating sensitive health information on digital platforms Sundhed.dk 2024b, 2024c.

- **Healthcare Providers**: Healthcare professionals must navigate the demands of data accuracy and consistency. Ensuring that patient records are kept up to date across multiple healthcare entities (e.g., hospitals, GPs, pharmacies) requires significant coordination. There is also the risk of data inaccuracies or system errors, which could have adverse consequences for patient care Sundhed.dk 2024c.
- **Technological and Organizational Issues**: The integration of multiple healthcare systems, such as Sundhedsjournalen and the Shared Medication Record, adds complexity in managing data flows and ensuring information consistency. Furthermore, differences in technological capabilities and resources among healthcare entities can create disparities in how effectively the system is utilized. Technical issues, such as system downtimes or data synchronization problems, pose risks to the reliability of the platform Healthcare-Denmark 2024.

Sundhedsjournalen is a crucial part of Denmark's effort to improve healthcare outcomes through digital innovation. Its ability to centralize patient data and improve access is intended to enhance patient-centered care, reduce treatment errors, and promote greater efficiency. However, challenges related to the complexity of medical information, data accuracy, privacy concerns, and the integration of various systems remain significant barriers that need to be addressed. These challenges highlight the dual role of Sundhedsjournalen in advancing healthcare while presenting organizational and technological obstacles that must be overcome to fully realize its potential.

2.4 Understanding Artificial Intelligence

With the recent emergence of accessible AI systems such as ChatGPT, general perceptions and understandings of how AI can be utilized have undergone significant change. No longer an abstract concept, AI has taken a form that people can directly interact with and more readily comprehend. By simulating human-like conversations and delivering highly accurate responses, these AI-driven chatbots have become the face of AI for many individuals. However, the technology, concepts, and disciplines behind these chatbots are extensive, and their applications extend far beyond chat-based interfaces. The ease of use and ability to convey information inherent in AI-driven chatbots have opened doors for implementing these technological characteristics in other existing platforms. This raises and important question: How does one implement AI-driven technology into an already established platform? One that people rely on and is already firmly intergrated into several other frameworks. At its core, AI refers to the simulation of human cognitive processes in machines, encompassing learning, decision-making, and problem-solving. It aims to replicate cognitive functions typically attributed to human minds, such as reasoning, un-

derstanding, and adaptability. Over the past seven decades, AI has evolved significantly, beginning with early innovations like Christopher Strachey's checkers program in 1951 and the ELIZA chatbot in 1966 (Copeland 2023). While these pioneering projects were rudimentary compared to today's advancements, they marked important milestones in AI's development. Experts now suggest AI could be one of the most transformative technologies in history, with impacts comparable to the agricultural and industrial revolutions (Roser 2022). In recent years, AI has seen rapid advancements, particularly with the rise of Machine Learning (ML), Deep Learning, Natural Language Processing (NLP), and Large Language Models (LLMs). LLMs, such as OpenAI's GPT series and Google's PaLM and Gemini models, have revolutionized how machines understand and generate human language. These models perform complex tasks like translation, summarization, and creative writing with unprecedented accuracy. Advancements in ML, especially deep learning, have enabled machines to learn from data and improve their performance in tasks such as image recognition and predictive analytics. NLP has enhanced machines' ability to comprehend and interact with human language in more natural and intuitive ways. Together, these technologies form the foundation of Generative AI (GenAI), which continues to push the boundaries of AI-driven applications in a remarkably short span of time.

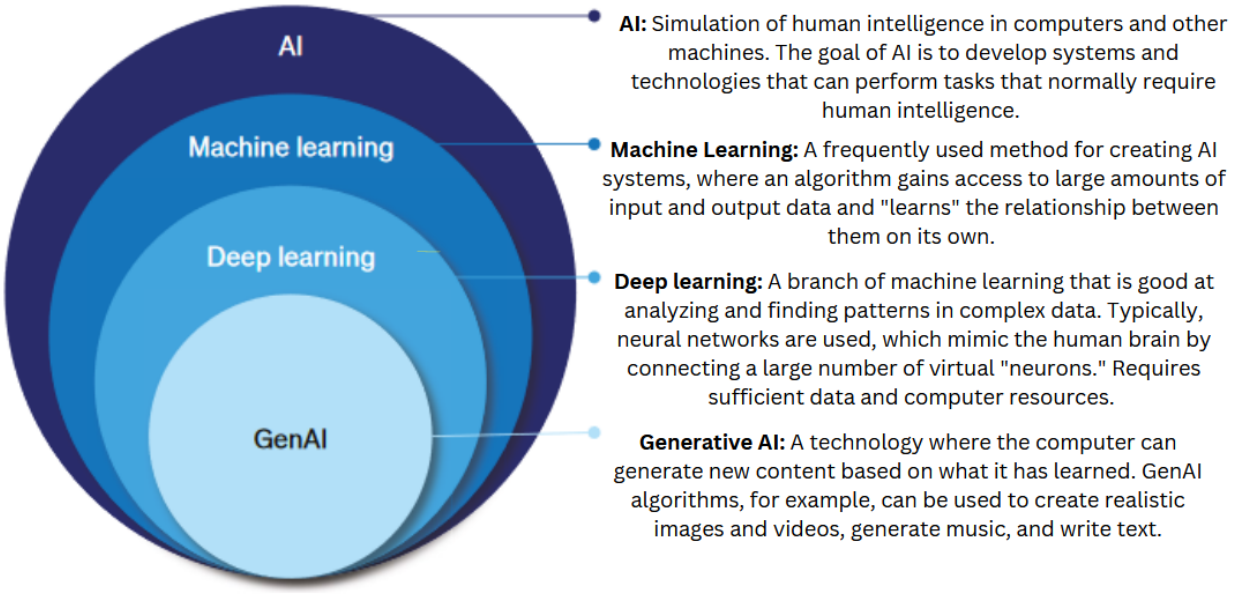

Figure 2.2: Hierarchy of AI Technologies - This diagram illustrates the hierarchical relationship between AI, Machine Learning, Deep Learning, and Generative AI. (Mølskov 2023) (Andersen et al. 2023)

Figure 2.2 visually represents the hierarchy of AI technologies, showing how Generative AI is a specialized subset that builds upon broader AI and Machine Learning frameworks to create new, original content. Our thesis focuses mainly on the generative aspect of

AI, exploring its ability to generate new content and the implications of this emerging technology. The advancements in AI technologies outlined above have paved the way for innovative applications in various industries, particularly healthcare. Generative AI, a rapidly evolving subset, has emerged as a transformative tool for addressing the complexity and accessibility challenges faced in platforms like Sundhedsjournalen.

2.5 The Potential of Generative AI in Healthcare

Having followed the evolution of AI over the last decade and worked with Generative AI for several years, we recognize that Generative AI has the potential to improve many technologies and existing platforms, provided its implementation considers the many relevant aspects of the healthcare sector and employs a critical approach. One of those areas is healthcare, particularly in translating and improving healthcare data. The proficiency of Generative AI, making it a relevant tool in many industries, has become more acknowledged since the launch of ChatGPT and similar chatbots built on LLMs. This general utility of generative AI translates well to the specific needs of healthcare platforms like Sundhedsjournalen. For patients using Sundhedsjournalen, Generative AI could play a pivotal role in simplifying complex medical information. For instance, AI-driven tools capable of rephrasing clinical jargon into layperson-friendly terms could address a common user pain point—difficulty in interpreting test results and medical records. This not only enhances accessibility but also empowers patients to actively participate in their healthcare decisions. Such applications align directly with the identified challenges and the Styringsgruppen's goal of improving data comprehension for users.

McKinsey & Company, a global management consulting firm, recently published reports highlighting several key points that underscore the importance of evaluating the potential of Generative AI, both generally and as a tool for translating and improving the understanding of healthcare data (Andersen et al. 2023) (Chui et al. 2023):

1. **Economic Impact and Productivity Growth**:
    - Generative AI has the potential to significantly boost productivity and economic growth. For Denmark, it could contribute DKK 230-290 billion annually, about 10% of the country's GDP.
    - Implementing Generative AI in healthcare can lead to notable productivity gains, particularly by automating routine tasks and improving data handling, which directly aligns with enhancing Sundhedsjournalen.
2. **Technological Advancements and Accessibility**:
    - The rapid development and accessibility of foundation models like GPT-3 and GPT-4 have lowered the barriers to entry for adopting Generative AI technologies. This makes it an opportune moment to explore their integration into

healthcare systems.

- The widespread recognition and acceptance of Generative AI's capabilities, demonstrated by the popularity of tools like ChatGPT, underscore the technology's maturity and readiness for practical applications.

3. **Sector-Specific Benefits**:
    - **Healthcare**: Generative AI can enhance healthcare by improving data translation, processing, and analysis. This could streamline patient record management, personalize patient care, and support medical research.
    - **Public Sector**: The public sector, including healthcare, stands to gain substantially from Generative AI, potentially capturing half of the economic benefits. This includes improving service delivery and operational efficiency.

While the potential of generative AI in healthcare is vast, its implementation must be approached with caution to address critical ethical challenges. Data privacy is a paramount concern, particularly in handling sensitive patient information within a platform like Sundhedsjournalen. Additionally, algorithmic bias and the risk of perpetuating inequities in healthcare outcomes require careful consideration, as do issues of transparency in AI-generated outputs. Ensuring that users understand how AI-derived insights are produced is crucial for maintaining trust. These ethical dimensions underscore the importance of a balanced, human-centered approach to AI integration, which not only enhances usability but also safeguards user rights and promotes equitable access. Addressing these challenges will require proactive measures, such as integrating user feedback into AI development and ensuring transparency in algorithmic decision-making. These steps can help build trust and ensure that the technology aligns with the diverse needs of Sundhedsjournalen's users. While generative AI demonstrates immense potential, its implementation in sensitive fields like healthcare requires a nuanced understanding that extends beyond technical considerations. An interdisciplinary approach is crucial to addressing the societal, cognitive, and ethical dimensions of integrating AI into platforms like Sundhedsjournalen.

2.6 Studying AI: An Interdisciplinary Approach

In their seminal work, Artificial Intelligence: A Modern Approach (Peter and Russell 2021), Stuart Russell and Peter Norvig explore and define the field of AI, including its logic, history, perceptions, development, and applications.

Artificial Intelligence, while fundamentally a subfield of computer science, encompasses numerous academic disciplines that contribute to its research, development, and understanding. The complexity of designing intelligent systems that can mimic or surpass human capabilities requires knowledge beyond algorithms and computation. Interdisciplinary collaboration has been vital to AI's evolution. We highlight several key disciplines important

for understanding AI:

- **Cognitive Science** helps model human cognition, enabling AI developers to create systems that attempt to mimic or simulate human thinking processes—especially reasoning, learning, and problem-solving. Key concepts such as neural networks are inspired by how the human brain processes information (Fan et al. 2019). Cognitive sciences also explore learning theories that inform the design of machine learning algorithms.
- **Mathematics** provides the fundamental theoretical framework for developing algorithms that power AI. Concepts such as calculus, probability theory, and linear algebra are essential for understanding how AI algorithms function. Mathematics facilitates the analysis of AI decision-making and helps us understand how AI can operate in tandem with humans.
- **Computer Science** serves as the technical infrastructure for building AI. While mathematics provides the theoretical foundations, computer science applies these ideas in practice. Core areas such as algorithm design, programming, and machine learning architectures enable AI to perform complex tasks and scale effectively across various infrastructures.
- **Sociology** offers insights into how AI technologies shape—and are shaped by—societal contexts. Through the lens of sociology, we can explore the societal impacts of AI on human behavior, develop a deeper understanding of ethical considerations, and help ensure that AI development and applications align with broader social values and principles.

Understanding these disciplines is crucial not only for the theoretical foundations of AI but also for addressing the ethical, social, and cultural implications of AI technologies. This interdisciplinary approach aligns with the competencies of our master's program in techno-anthropology, emphasizing the importance of integrating diverse perspectives in the analysis and implementation of technological innovations. To ground these interdisciplinary insights in practice, the following section explores current implementations of AI in healthcare, illustrating the potential and limitations of these technologies.

2.7 Examples of AI-use in healthcare

As we explore the potential of integrating AI into Sundhedsjournalen, it is important to acknowledge that AI technologies are already making significant strides in the Danish healthcare sector. These existing applications illustrate the practical benefits of AI and establish a foundation for further innovation in patient-centered platforms. Some notable examples in Denmark include, but are not limited to:

AI in Diagnostic Imaging and Radiology

AI has been effectively utilized to enhance diagnostic processes in radiology. For instance, Radiobotics developed RBfracture, an AI-driven tool designed to detect fractures, effusions, and lipohemarthrosis with high accuracy. Trained on over 300,000 images from diverse clinical settings, RBfracture assists clinicians by providing precise radiographic interpretations, expediting diagnoses, and improving treatment outcomes(Radiobotics 2024).

Similarly, emergency departments in the North Denmark Region have implemented an AI solution that automatically reads X-rays to identify fractures. This system reduces waiting times for patients with orthopedic injuries by quickly ”clearing” cases that do not require hospital treatment. Since its implementation, the AI has analyzed thousands of examinations without overlooking significant fractures, enhancing efficiency and patient satisfaction in high-pressure environments (Healthcare-Denmark 2024).

AI in Emergency Call Centers

In the Capital Region’s emergency services (Region Hovedstadens Akutberedskab), an AI model has been implemented to assist dispatchers in identifying cardiac arrest cases during emergency calls to 1-1-2. Developed in collaboration with the Danish company Corti, the system analyzes live call data to recognize patterns indicative of cardiac arrests. Trained on over 150,000 emergency calls, the AI can detect 10% more cardiac arrest incidents and does so 10 seconds faster than human operators alone. When the AI identifies a potential cardiac arrest, it alerts the dispatcher, enabling them to quickly guide the caller in providing life-saving first aid and to dispatch emergency services promptly. This technology enhances the efficiency of emergency response without replacing human expertise. The success of this implementation has garnered international attention, with findings published in the journal JAMA Network Open. Plans are underway to expand the use of AI to identify other time-critical conditions, such as strokes and meningitis (Corti 2024)(Region Hovedstaden 2021).

AI in Patient Monitoring and Safety

In the realm of patient care, Teton.ai introduced an AI-powered system that assists nurses by monitoring patient movements and analyzing patterns to predict potential falls or urgent care needs. This technology has led to an 83% reduction in patient falls by proactively alerting staff to intervene before incidents occur. Additionally, by automating routine checks and documentation, the system reduces the workload on nursing staff, allowing them to dedicate more time to direct patient care (Teton.ai 2024).

AI in Administrative Processes

Administrative efficiency is another area where AI has shown considerable impact. Capio Private Hospital collaborated with Corti to enhance patient consultations and documentation. Corti’s AI solution automates the transcription of consultations into structured notes and generates diagnosis and procedure codes. This automation results in faster processing, greater accuracy, and improved control for doctors over patient treatment journeys

(Healthcare-Denmark 2024) (Corti 2024).

AI in Cancer Screening

Efforts to optimize breast cancer screening in the Capital Region led to the adoption of **Transpara AI**, developed by Human Bytes. This tool assists radiologists by using pattern recognition algorithms to evaluate mammograms. Preliminary results indicate that Transpara AI can save up to 30% of radiologists' screen time and provide faster responses to patients, demonstrating AI's potential to enhance efficiency without compromising diagnostic quality (Human Bytes 2024) (Healthcare-Denmark 2024).

Relevance to Our Research

These few examples demonstrate that AI is actively enhancing various aspects of healthcare in Denmark, including diagnostics, patient safety, and administrative tasks. While these applications primarily focus on areas such as imaging analysis, patient monitoring, and administrative efficiency, they illustrate the growing role of AI in healthcare settings. Although the current implementations do not all revolve around Generative AI specifically, they provide valuable insights into how AI technologies are being integrated into healthcare systems. These cases serve as inspiration and establish a foundation for exploring additional use cases of AI, including the potential to improve patients' understanding and engagement with their own health data. By acknowledging these existing applications, we can consider how AI might be further utilized to address challenges related to the complexity of medical information and accessibility for patients on platforms like Sundhedsjournalen. This sets the context for our research, which aims to investigate how AI-based tools could be implemented to enhance patient experiences, taking into account user perspectives and the practical challenges of handling sensitive health data.

2.8 Introduction to the Problem Statement

The integration of AI-driven technology into established platforms like Sundhedsjournalen raises critical questions about implementation, stakeholder expectations, and user needs. Our research, conducted in collaboration with the "Styringsgruppen"—a consortium comprising representatives from Sundhed.dk, Sundhedsjournalen, MedCom, the Danish Health Department, and other key institutions—aims to provide actionable insights for implementing AI in Sundhed.dk and Sundhedsjournalen.

- What must be considered when implementing AI-driven systems into established platforms to enhance users' accessibility to and comprehension of healthcare data?
- How can AI-driven systems improve the mediation, interpretation, and reliability of healthcare data while addressing user challenges?
- What do users expect, understand, and fear from AI technology in the context of

their experiences with Sundhedsjournalen, and how can these insights guide implementation?

By addressing these questions, we aim to contribute to the enhancement of healthcare services through explorations into the potential impacts and possibilities created by a potential integration of AI technologies, considering both technological possibilities and user perspectives.

2.9 Problem Statement

Throughout our problem analysis, we have established the foundational context for this thesis by examining the challenges faced by Sundhedsjournalen users, the economic and practical potential of AI integration, and the interdisciplinary considerations required for implementing AI-based solutions.

"How might AI-driven systems influence and improve the mediation, interpretation, and trust in healthcare data within established platforms, while addressing ethical considerations and user needs?"

Ultimately, we aim to provide the 'Styringsgruppen' with actionable insights on how AI-driven systems could address these challenges by enhancing data mediation, improving accessibility, and fostering trust in healthcare platforms, all while aligning with patient needs and ethical considerations

3 Boundaries

3.0.1 Establishing the Scope

: To address the problem statement effectively, this thesis operates within a defined scope that prioritizes specific aspects of the broader Sundhed.dk platform. The focus is on Sundhedsjournalen and its role as a mediator of healthcare data for patients. This chapter outlines the rationale behind these boundaries, detailing the focus on patients as the primary user group, the exclusion of other Sundhed.dk functionalities, and the implications for the analysis of AI's potential within this context. By narrowing the scope in this way, the research ensures a clear and actionable framework for exploring the challenges and opportunities of AI-driven systems in healthcare. By focusing specifically on Sundhedsjournalen, this research contributes to understanding how AI-driven systems can address interpretive challenges in healthcare data, offering insights applicable to similar platforms beyond the Danish healthcare context.

3.0.2 A patients-user perspective

The decision to focus on patients stems from their unique reliance on Sundhedsjournalen to access and interpret personal healthcare data. Patients are positioned as the most immediate and diverse group of users, ranging from those with limited digital literacy to individuals with more advanced understanding of their health conditions. Unlike healthcare professionals, who possess specialized training and access to alternative tools, patients rely heavily on Sundhedsjournalen to bridge the gap between complex medical information and their own understanding. By centering the analysis on patients, this thesis aligns with its overarching goal of examining user perspectives and their interactions with digital health platforms. This focus also resonates with the theoretical framework of postphenomenology, which emphasizes the role of technology in mediating human experiences. Through the lens of AI, the research seeks to understand how generative systems might shape the interpretive relationship between patients and their healthcare data. In doing so, the study prioritizes a demographic that stands to benefit most from AI-mediated improvements while simultaneously addressing their concerns and expectations.

3.0.3 Delineating Sundhedsjournalen and Sundhed.dk

Sundhedsjournalen is one of many functionalities within Sundhed.dk, which serves as Denmark's central digital health platform. While Sundhed.dk provides a wide range of services—including appointment scheduling, prescription renewals, and general health information—this thesis narrows its focus to Sundhedsjournalen's specific role as a repository of personal health data. The decision to exclude other functionalities is rooted in their divergence from the core focus of this thesis. Administrative features such as appointment booking are primarily transactional in nature and lack the interpretive challenges that characterize Sundhedsjournalen. By contrast, Sundhedsjournalen engages users in the complex task of understanding their own health information, making it an ideal case study for examining AI-driven systems. This focus enables the research to delve deeper into the interpretive and mediating aspects of AI technologies, ensuring that the findings remain relevant and actionable. Sundhedsjournalen's unique positioning within the digital health ecosystem provides a rich context for exploring the intersection of user needs, technological mediation, and ethical considerations.

3.0.4 Ethical and Analytical Considerations

Focusing exclusively on Sundhedsjournalen also facilitates a more targeted exploration of ethical considerations, particularly those related to AI integration. Ethical concerns such as data privacy, algorithmic bias, and transparency are magnified in contexts where sensitive health information is mediated through digital platforms. Patients' trust in AI-driven systems is directly influenced by how these systems handle personal data, explain their outputs, and ensure fairness across diverse user groups. While addressing these ethical concerns is critical for fostering user trust, they also present challenges in balancing transparency, usability, and technical feasibility. For instance, making AI systems more explainable may require trade-offs with efficiency or simplicity. These tensions underline the importance of situating AI development within a nuanced understanding of user needs and ethical imperatives.

The narrowed scope enables the thesis to address these concerns within a defined and relevant context, ensuring that ethical considerations are not treated as abstract or peripheral issues. Instead, they are directly tied to the interpretive challenges faced by patients and the potential of AI to mediate these challenges effectively. This targeted approach ensures that the findings contribute meaningfully to discussions around the responsible integration of AI in healthcare. Moreover, limiting the scope to Sundhedsjournalen allows the analysis to provide actionable insights for the platform's development team, ensuring that the research has practical relevance. By concentrating on a single, well-defined feature of Sundhed.dk, the thesis avoids diluting its focus and provides a clearer path for exploring the implications of its findings. With these boundaries defined, the next chapter outlines the methodological approach taken to investigate how AI-driven systems might mediate

healthcare data on Sundhedsjournalen, addressing the interpretive challenges and user needs identified in this chapter.

4 Methods

By employing qualitative methods, we can explore how informants perceive, interpret, and engage with their world. This approach allows us to capture experiences and gather insights that are difficult to quantify using structured tools like questionnaires. This chapter outlines the scientific approach adopted in the thesis and the methods used to gather data as applied throughout its course. We elaborate on the reasoning behind selecting and incorporating these approaches and methods into the thesis framework, as well as their practical application in data gathering and analysis.

4.1 Scientific approach

4.1.1 Postphenomenology in Methodology

Postphenomenology, as developed by Don Ihde and expanded by Peter-Paul Verbeek, is a scientific approach within the field of Science and Technology Studies (STS) that builds on phenomenology, a philosophical tradition analyzing the relationships between humans and their world (Selinger 2006; Van Den Eede 2012). Unlike positivist approaches that seek to objectively define reality, phenomenology emphasizes how reality is experienced, focusing on the intentional relationship between human perception and the environment (Ihde 2009). Ihde's work extends phenomenology by introducing the concept of technological mediation, arguing that in a world shaped by technology, human-world relations are fundamentally mediated by technological artifacts (Ihde 2009). This perspective does not treat technologies as mere tools but as active mediators that shape human practices and perceptions (Rosenberger 2013). Verbeek further advances this view, asserting that subject and object are co-constituted, bridging the separation between them (Verbeek 2005). In the context of this research, postphenomenology provides a lens for exploring how Sundhedsjournalen mediates users' interactions with healthcare data and how AI might reshape these mediations. Specifically, it informed the design of semi-structured interviews by emphasizing the co-constitutive relationship between users and the platform. For example, interview questions were designed to investigate how users interpreted the data presented by Sundhedsjournalen and imagined AI-driven systems altering this experience. This aligns with Verbeek's argument that technology actively transforms human

perceptions, offering a framework for analyzing user interactions with both current and envisioned systems (Rosenberger and Verbeek 2018).

Postphenomenology also guided the data analysis by focusing on themes such as transparency, accessibility, and user trust. This approach allowed the thesis to explore not only how users currently engage with Sundhedsjournalen but also their expectations and concerns regarding AI's role as a mediator. By applying this framework, the research ensures a nuanced understanding of how technologies mediate human experiences, contributing to broader discussions around the ethical and effective integration of AI in digital healthcare platforms.

4.1.2 Postphenomenology in a Digital Context

Digital platforms operate in a virtual space where interactions occur through interfaces and algorithms, rather than through physical tools. This shift requires methodologies that capture the nuances of digital mediation, as the nature of engagement in digital contexts often differs significantly from traditional interactions. This shift in how users interact with technology necessitates methodologies that can capture the unique aspects of digital engagement. As Lee and O'Connor argue in Data and the Digital Society: Data in Action, digital environments not only facilitate communication but also reshape the very nature of user experience, creating new dynamics in the relationships between users and technology. They emphasize that *understanding digital interactions requires methodologies that are sensitive to the ways in which technology alters human experiences and vice versa* (Lee and O'Connor 2021). Given this context, it is imperative for methodologies in digital settings to adapt to the fluidity and complexity of these interactions. Traditional research methods may fall short in capturing the dynamic and evolving nature of user experiences in digital environments. For example, qualitative methods such as interviews are crucial for exploring how users engage with digital tools like "Sundhedsjournalen," allowing for deeper insights into their perceptions and experiences. A postphenomenological and techno-anthropological perspective aids this adaptation by emphasizing the relational dynamics between users and technology, highlighting how their interactions co-constitute perceptions and practices. Lee and O'Connor further stress the importance of recognizing the transformative nature of digital engagement, where the lines between user and technology blur, necessitating methodologies that can effectively explore these complexities (Lee and O'Connor 2021).

4.2 Literature Review

The literature search for this thesis was structured into two phases: an initial search for foundational literature that contextualizes the thesis within the broader academic discourse, followed by the acquisition of supplementary resources that provide additional insights into the use and users of Sundhedsjournalen.

4.2.1 Preliminary Literature Search

To establish a foundation for this research, we conducted a systematic search of relevant literature across three key databases: PubMed, CINAHL, and Embase. These databases were chosen for their broad coverage of healthcare, technology, and interdisciplinary studies. Our goal was to identify studies addressing the role of AI in healthcare platforms, particularly in relation to patient engagement and the interpretation of healthcare data. We used a Boolean search string to guide our exploration: ("Artificial Intelligence" OR "AI") AND (implementation OR application) AND ("healthcare platform" OR "patient engagement") AND ("user perception" OR "experience"). This search was designed to capture themes relevant to our research question, focusing on how AI technologies mediate user interactions with healthcare platforms. To ensure the literature reflected current developments, we limited our search to articles published within the last ten years.

The team worked collaboratively to review the search results, filtering articles through a multi-step process. First, we independently assessed the titles of all retrieved articles to exclude irrelevant studies. Next, we reviewed the abstracts of shortlisted articles to refine the selection further. Through these steps, we aimed to identify studies that were both relevant and high-quality, forming a strong foundation for our theoretical and analytical work.

Inclusion Criteria:

- Studies exploring AI-driven systems in healthcare platforms.
- Research addressing patient interaction, engagement, or data interpretation challenges.
- Peer-reviewed articles published in English.

Exclusion Criteria:

- Studies focused solely on clinician or developer perspectives.
- Articles unrelated to healthcare platforms or user engagement.
- Non-peer-reviewed materials or opinion pieces.

Addressing Limitations: While the search process was systematic, we recognize certain limitations:

- By restricting the review to English-language publications, we may have excluded relevant insights from non-English studies.
- Our focus on peer-reviewed literature excluded gray literature, which might have offered additional practical perspectives.
- As with any database search, biases inherent in indexing and algorithmic filtering could have influenced our results, potentially overlooking interdisciplinary or emerging research.

To mitigate these limitations, we employed a rigorous review process and cross-referenced our findings with recurring themes in the literature. By using multiple databases and clearly defined criteria, we aimed to ensure the breadth and relevance of the selected studies while acknowledging the constraints of the approach.

4.2.2 Supplementary literature

The acquisition of supplementary literature involved an exploratory approach, where references from foundational articles were scrutinized for additional relevant materials. A key aspect of this phase was the partnership with styringsgruppen at Sundhedsjournalen, which provided access to valuable resources and data that enriched the understanding of users of the Sundhedsjournalen platform. Collaboration with peers, our collaborators at Sundhedsjournalen and academic supervisors further facilitated the identification of pertinent literature related to AI, its implementation in various systems, and the handling of healthcare data. This phase was more freeform and less structured, that allowed for supplementary literature to be acquired throughout the thesis process The integration of supplementary literature deepens the exploration of the empirical, theoretical, and analytical dimensions of the thesis. Instead of adhering to a strict chronological structure, this literature was organized thematically to provide a cohesive understanding of the subject matter. Furthermore, as empirical data generation reveals new insights, relevant supplementary resources will be retroactively incorporated into their relevant sections, with the intent of providing a comprehensive and coherent narrative throughout the thesis

4.3 Recruiting Informants

In this specific project, informants were recruited from various fields through a range of connections. One set of informants were recruited through our contacts at Styringsgruppen, which provided us access to a user panel associated with Sundhedsjournalen. Members of this user panel are assumed to be familiar with Sundhedsjournalen, having either used it actively in the past or still using it. Other informants where recruited from primarily personal connections, such as reaching out to friends, family, and other acquaintances. The intention was to cast a wide net, interviewing a diverse array of participants, not only

in themes of age, gender, and occupation, but also regarding their assumed familiarity with Sundhedsjournalen.

For the informants recruited from the Sundhedsjournalen user panel, our contacts at the styringsgruppen distributed a general message to the entire panel. This message, co-created with us, outlined the details of the project, introduced who we are, and explained why we were interested in speaking with them. Special emphasis was placed on the option for in-person interviews for members of the user panel located in or around the Aalborg area. As a result of this outreach, six individuals initially expressed interest in participating. However, two of them stopped responding, leaving us with four informants who became our first interviewees. The interviews were scheduled via email, accommodating their preferences: two informants opted for in-person interviews, while the other two preferred online interviews conducted over Microsoft Teams. This approach ensured flexibility and accessibility for all participants. Following this initial round, additional informants were recruited, as previously mentioned, through personal contacts. These informants were briefed in a manner similar to the members of Sundhedsjournalen's user panel. We reached out to 15 potential informants, eight of whom expressed interest in participating. As with the first round, these informants were offered the option of in-person or online interviews to suit their preferences

We ended up with the following array of informants:

Informant Number	**Age**	**Occupation**
1	30's	Midwife
2	50's	Math Teacher
3	40's	Nurse
4	30's	Researcher
5	20's	Sales Consultant
6	30's	Developer
7	30's	Social Services
8	30's	Security Consultant
9	20's	Student
10	30's	Event Manager

Some informants were recruited through our contacts at Styringsgruppen, which facilitaded access to a user panel associated with Sundhedsjournalen. Members of this user panel are assumed to be familiar with Sundhedsjournalen, having either used it actively in the past or still using it. This group of interviews and informants, which we will refer to as our prior informants or prior interviews, differs from those conducted during this project, which will simply be referred to as the informants and the interviews. While the prior interviews may function as supplementary data, they are specifically mentioned and defined here, as the interviews conducted for this thesis were based upon and developed

from these prior interviews, which will be explained in more detail in Chapter 4.4.1. This distinction is made to clarify the order of events and avoid confusion for the reader, as we intend to include and utilize these prior interviews in our analysis.

4.3.1 On Names and Anonymity

The data collected in this project qualifies as personal data. To respect our informants' privacy and comply with General Data Protection Regulation, all names and potentially sensitive information have been altered or edited to ensure informant anonymity. Verbal consent was obtained from each informant at the start of the interview, with clear communication that they could revoke consent or request omissions in the data at any time. Recorded interviews were transferred to a secure computer, and transcriptions were stored in password-protected, account-secured cloud storage. After assigning pseudonyms, all mentions of real names were removed from written records. Any names mentioned in regards to informants, such as the ones mentioned prior in section 4.3, use the names assigned to the informants by us.

4.4 Data Gathering and Processing

This section outlines the methodological approach used to gather and process empirical data, with interviews serving as our primary ethnographic research tool. We conducted interviews as the main method for exploring users' relationship with Sundhedsjournalen, as well as their perceptions, understanding, and engagement with AI technologies. In total, 8 interviews were carried out for this thesis, with an additional 4 interviews being included as data from a prior series of interviews.

4.4.1 Semi-Structured Interviews

Our approach to semi-structured interviews, as detailed in the book Interview by Steinar Kvale and Svend Brinkmann, is based on the principles of qualitative research interviews. Kvale and Brinkmann emphasize the importance of conversational skills in conducting effective interviews, particularly the ability to ask thoughtful questions and maintain engaging dialogue. Through these interviews, we aimed to access the emic perspective, understanding how participants articulate and interpret their own experiences. This approach enabled us to capture participants' specific views, actions, and worldviews within a flexible conversational framework (Svend and Kvale 2015). A core element of the interview method, as discussed in *Interview*, is the exchange of perspectives. Knowledge is generated through the verbal interplay between interviewer and informant, with insights emerging from this interaction. Kvale and Brinkmann describe how interviews differ from everyday conversations by being structured yet flexible, with the interviewer guiding the discussion toward relevant topics while responding thoughtfully to participants' answers

(Svend and Kvale 2015). In line with our postphenomenological framework, the conversational nature of interviews also reflects the relational dynamics between users and technology. By engaging with participants in conversation, we aimed to understand how AI within Sundhedsjournalen might shape and mediate their engagement with the platform. This approach aligns with postphenomenology's focus on the co-constitutive relationship between humans, technology, and the world (Ihde 2009). The semi-structured format allowed us to balance thematic focus with flexibility, providing a guide with open-ended questions that could be adapted based on each participant's responses (Svend and Kvale 2015).

Our initial interview guide was developed prior to our prior series of interviews, partially in collaboration with the Styringsgruppen from Sundhedsjournalen. Following a topic-oriented approach, the guide contained thematic research questions translated into conversational queries to make the research question more approachable in a natural setting. By rephrasing the research questions, the semi-structured interview aimed to elicit more natural and spontaneous responses, fostering a stronger conversational dynamic than a traditional interview. When conducting semi-structured interviews, it is essential for the researcher to prepare by familiarizing themselves with the field, including relevant technologies and key actors (Svend and Kvale 2015). With this preparation, we understood that our prior series of informants would likely be familiar, if not experienced, with using Sundhedsjournalen and its related systems, as noted in 4.3. Therefore, the interview guide for the prior series of interviews included direct questions about the informants' use of and engagement with Sundhedsjournalen. For the second series of interviews, however, we assumed that these informants might not have prior experience with Sundhedsjournalen. This assumption was based on our own lack of prior interaction with the platform before engaging with it for the purposes of this thesis. Consequently, the interview guide was adapted to include more open-ended inquiries about their potential expectations or assumptions about Sundhedsjournalen, while still retaining the flexibility to explore more specific topics if the informant demonstrated familiarity with the platform. Throughout, the original objectives of the interview guide were preserved

4.4.2 Treatment of Interviews

During our interviews, we used a combination of phone and laptop-based audio recording tools to capture the sessions, alongside Microsoft Teams for live transcription of the dialogues. The audio recordings provided a reliable way to revisit the interviews for transcription or analysis later on, allowing us to ensure accuracy if any technical issues arose with one of the recordings, such as poor sound quality or interruptions in the middle of the interview(Svend and Kvale 2015). Using multiple recording methods helped safeguard the integrity of the data, ensuring it could be fully understood and interpreted. Microsoft Teams was chosen as the platform for both our online and in-person interviews, taking advantage of its live transcription feature. While the transcription feature is not flawless, it

laid a helpful groundwork for our own manual transcriptions, allowing us to avoid starting from scratch. We utilized the Improved Language method for transcribing, a process that refines the readability of the text without altering the original meaning, by eliminating redundant words and verbal fillers like ”um” or ”hmm...”(Brooks 2021). In addition to Teams' transcription tool, AI was used to assist with transcribing recorded interviews, as discussed in subsection 4.6.

The decision to use Improved Language stemmed from its ability to streamline and enhance the clarity of the transcriptions, helping to remove confusion caused by sentence fragments or repetitive filler words. Since our focus is on understanding the informants' experiences with Sundhedsjournalen, we chose to prioritize the intent and meaning of their responses over the exact phrasing. As a result, we excluded elements that could distract from the core content. However, it's important to recognize that this process could be seen as altering the informants' original words. To mitigate this, we ensured the transcriptions were revised only for clarity and readability, preserving the intended message. As an added precaution, we offered informants the opportunity to review and provide feedback on the transcriptions, without allowing significant changes that might affect the authenticity of their statements

4.4.3 Coding

To properly analyze the data collected during our interviews, we determined that it was necessary to code the data using a theme-driven approach. This is a deductive method aligned with our Postphenomenology framework, where the interview content is sorted by predefined themes (Svend and Kvale 2015). Based on our research question, initial impressions, and group discussions, we created a list of over 10 predefined themes. The goal of coding was to organize quotes and observations into relevant categories, providing a structure for discovering and classifying them under appropriate themes. Once the themes were established, we color-coded them and applied the corresponding colors to relevant quotes and passages from the transcriptions that aligned with each theme. These highlighted segments were then extracted into separate documents to consolidate all text related to each theme. This not only helped organize the data but also fostered a shared understanding of their purpose and intent among the thesis members.

Figure 4.1: A screenshot of our initial predefined themes, as they appeared in our online documents, which served as our brainstorming space

The themes evolved throughout the coding process—some merged, some were refined, and others were discarded. By reading through the transcriptions with the themes in mind, we identified new themes, discarded irrelevant ones, and adjusted the context of existing ones. Thus, the coding process involved both deductive, theme-driven coding and inductive, data-driven coding. This iterative process allowed us to narrow the list of themes down to six: *Experience with Sundhedsjournalen*, *Experience with AI*, *Challenges of Sundhedsjournalen*, *Suggestions*, *Fears and Worries*, and *Translation v. Rephrasing*. These themes serve as the foundation for our analysis, enabling us to extract a broad and insightful set of data from the interviews.

4.5 Addressing Limitations

While the methodological approach outlined in this chapter establishes a framework for exploring the research question, it is important to acknowledge certain limitations that shaped the thesis. These limitations contextualize the scope of the research and inform its interpretation, ensuring transparency in the processes of data collection and analysis.

4.5.1 Scope of Participant Perspective

This research focuses exclusively on patients as users of Sundhedsjournalen, deliberately excluding perspectives from other stakeholders such as healthcare professionals, system developers, and policymakers. While this focus allows for a detailed exploration of patient experiences, it inherently omits broader system-level insights. Future research could complement these findings by incorporating the perspectives of these additional stakeholders, enriching the understanding of AI integration within healthcare platforms

4.5.2 Qualitative Nature and Generalizability

As a qualitative thesis, the findings are not intended to be statistically generalizable to all users of Sundhedsjournalen or other digital healthcare platforms. Instead, the research aims to provide in-depth insights into specific user experiences and the mediating role of AI technologies. This limitation aligns with the thesis's postphenomenological framework, which emphasizes the examination of specific human-technology relationships over universal claims.

4.5.3 Impact of Ethical and Technological Contexts

Finally, the thesis is influenced by the specific ethical and technological contexts of the Danish healthcare system, including its policies on data privacy and digital health integration. While these contexts provide a rich foundation for the research, they may limit the applicability of findings to systems in other regions with differing technological infrastructures or regulatory landscapes.

4.6 Usage of AI Within the Thesis

Generative AI was utilized for tasks such as proofreading, providing feedback, and enhancing the quality of text, as well as assisting with the transcription of recorded interviews. In addition, the cover image was generated using AI. However, it was not used to generate content for the thesis itself. To safeguard informant data, only locally hosted AI models were employed for transcription, with OpenAI's Whisper being the primary tool. In addition, any data exposed to an AI model follow the principles we briefly outline in section 4.3.1, with sensitive data and names already having been changed beforehand.

5 Applied Theory

This chapter introduces the theories of Postphenomenology and the HCAI, both of which serve as the foundation for our analysis. We outline the key concepts of each theory, discuss how they inform our scientific approach, and explain our rationale for selecting them for this project. By applying these theories, we aim to examine both the relational dynamics between users and technology and the broader social processes that shape technological development and meaning.

5.0.1 Postphenomenology as a Theory

In section 4.1.1, we explained how postphenomenology serves as our scientific approach and framework for our project. In this section, we will then elaborate on it's use as a theory in our analysis. As we recounted earlier, postphenomenology examines how interactions between humans and technology shape people's understanding of themselves and their world. Through these interactions, technology does not merely serve a functional role; it influences human perspectives, shaping how individuals interpret and engage with their surroundings. People integrate technology into their daily lives, which affects their experiences and the ways they perceive reality. In this sense, technology becomes a lens through which humans make sense of the world around them (Ihde 2009).In this project, we aim to explore and deepen our understanding of how users relate to and perceive the technologies of Sundhedsjournalen and AI. We investigate how users might perceive AI within the context of Sundhedsjournalen. Furthermore, we consider how an AI system's implementation within the platform might influence their worldviews and interpretations. By exploring these perspectives throughout our interviews, we seek to understand how digital tools, within the reciprocal relationship between humans, technology, and the world, shape the way humans relate to their environment.

One way of achieving this understanding, can be done through a key aspect of postphenomenology, the meditation approach. Coined by technology philosophy professor Peter-Paul Verbeek, the mediation approach offers a framework for understanding how technology shapes human perception and interaction with the world. At the heart of this theory is the concept of mediation, which challenges the traditional view of humans and technology as separate, interacting entities. Instead, Verbeek emphasizes that these elements

should be seen as interconnected, each shaping the other within their relationship (Verbeek 2005).This dynamic suggests that mediation arises not from technology alone but from the reciprocal influence between humans and technology. Through their use of technology, humans not only alter their actions but also reshape their experience of the world, transforming how they perceive and engage with reality (Verbeek 2005). To analyze the mediation within the human-technology relationship, we examine interactions between humans and technologies. This extends beyond mere functionality, challenging the view of technology as simply a tool. Technologies are designed for use, and their design and ease of use should align with human intentions and goals. Individuals often approach technology with specific objectives, and ideally, technology should support these goals as effectively as possible. However, it is crucial to recognize that these goals and intentions are not formed in isolation—they are, in part, shaped by the technology itself. This dynamic interaction calls for a more nuanced understanding of human-technology relations. Ihde identifies four key types of analytical relations that characterize how the body engages with technology within the context of postphenomenology; *Embodiment relations*, *Hermeneutic relations*, **Background relations** and **Alterity relations** (Ihde 2009). These four are now elaborated upon;

- **Embodiment relation:** In his relation, technology merges with the user, acting as a medium through which they engage with the world. A phone, for instance, becomes a transparent means to communicate with others, rather than the object of focus itself.**
- **Hermeneutic relation:** This relation involves people interpreting the world through technology. In this case, technology merges with the world rather than with the person using it. Certain aspects may still require human analysis and interpretation. An example of this would be a GPS device: it displays a location's coordinates or route, which the user must interpret to understand where they are or how to proceed.
- **Background relation:** This is when technology forms the context for human experience and actions but remains hidden or only indirectly engaged with. An example would be the quiet hum of a ventilation system in the background while navigating a building; it subtly influences the environment but isn't directly interacted with.
- **Alterity relation:** This relation describes a dynamic where humans interact with technology as if it were an "*other*," distinct and separate, rather than as a transparent tool. Here, the technology itself is the primary focus of attention, and the surrounding world recedes into the background. This relation is commonly seen in interactions with autonomous systems or machinery that require direct engagement, such as interacting with a robot or using a voice assistant (Ihde 2009).

Understanding and examining these relations in the context of Sundhedsjournalen, its users, and the potential implementation of AI systems within its platform allows us to deepen our understanding of the technology-human relationship as reflected in the data

we have gathered. For example, in an alterity relation, technology appears as an entity separate from the user, shaping interactions where the individual perceives the technology as a distinct 'other.' This means that users engage with the technology as something outside themselves, interpreting it as a unique presence within their experience. When users view their health data on the platform, for instance, they might experience the information as if it comes from an independent, interpretative source. This interaction illustrates how the platform can present data as something external, allowing users to potentially perceive it as an autonomous **other** that offers insights into their health—even though the data may have been originally documented by a doctor or another healthcare professional.

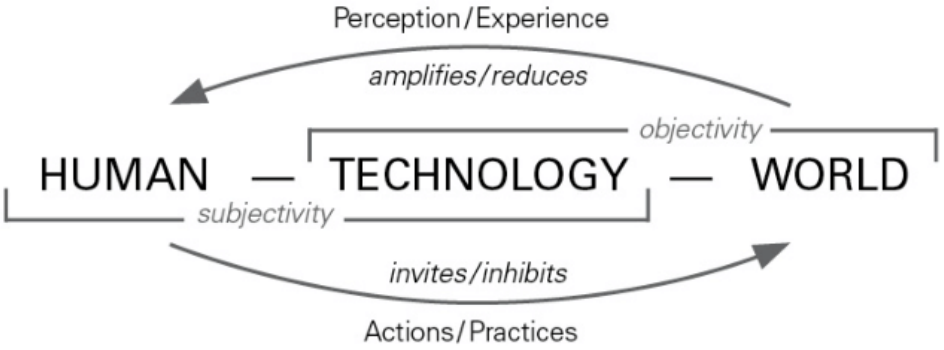

Figure 5.1: The Mediation of Technology (As based on Verbeek's descriptions) (Hauser, Oogje, and Wakkary 2018)

Verbeek explains technological mediation by dividing it into two perspectives: The mediation of perception and experience, which influences how individuals perceive or experience their world through the relationship between humans and technology, and the mediation of action or praxis, which emphasizes how people interact with their environment and how technology shapes their actions and decisions in life (Verbeek 2015). Each technology is initially crafted with a specific intention—an embedded purpose shaped by the designer's vision. Yet, when users engage with it, this intended purpose can evolve, giving the technology a flexibility to serve various roles or meanings. This means that responsibility for the mediation process is not solely on the designer; instead, it arises dynamically within the relationship among the designer, the user, and the technology itself (Verbeek 2015). Ultimately, mediation is a collaborative outcome, influenced by the intentions of designers, the affordances of the technology itself, and the interpretations brought by users. This makes it essential to understand how users perceive digital solutions and what these solutions communicate to them, particularly when developing new technologies.

5.1 Human-Centered AI

Another approach which has influenced our work and thinking about AI technologies, is Human-Centered AI (HCAI). HCAI is a comprehensive, holistic approach that prioritizes human needs, values, and experiences in the design, development, and deployment of AI systems. This approach encompasses a wide range of considerations, including usability, user experience, transparency, accountability, and the societal impact of AI. (Shneiderman 2022) HCAI aims to help develop AI technologies that are not only technically proficient but also socially responsible, aligning with human values and enhancing human capabilities.

These values are particularly relevant in the implementation of new technology, especially when working with healthcare data and technologies, as in our case. It is worth noting that HCAI is a vast field, and a full explanation of it is beyond the scope of this thesis. However, there are key components and takeaways that we believe are exceedingly important to incorporate when working with rapid and constantly evolving AI technology. These principles resonate well with the approaches we, as technoanthropologists, use to help companies and users adopt technology, particularly tools that use AI.

HCAI partially originates from Human-Centered Design and aims to assist developers, researchers, and companies by providing a framework for developing AI technology that prioritizes human needs and development. Ben Shneiderman and Fei-Fei Li have been some of our primary sources on HCAI and its framework. Shneiderman explains the need for people working in AI development to adopt an HCAI approach with the following quote:

> *"A human-centered approach will reduce the out-of-control technologies, calm fears of robot-led unemployment, and give users the rewarding sense of mastery and accomplishment."*
> - **Ben Shneiderman** (Shneiderman 2022, p. 4)

5.1.1 Framework for HCAI

Shneiderman explains that the HCAI framework makes it clear how to:

- Design for high levels of human control and a high degree of automation to enhance human performance.
- Understand the situations where full human control or full automation is necessary.
- Avoid risks associated with excessive human control or excessive automation. Achieving these goals will also support human self-efficacy, mastery, creativity, accountability, and social connections.

This understanding is further deepened with the two major aspects of HCAI is based on, which both acts as a foundation, and a goal of applying HCAI when working with the

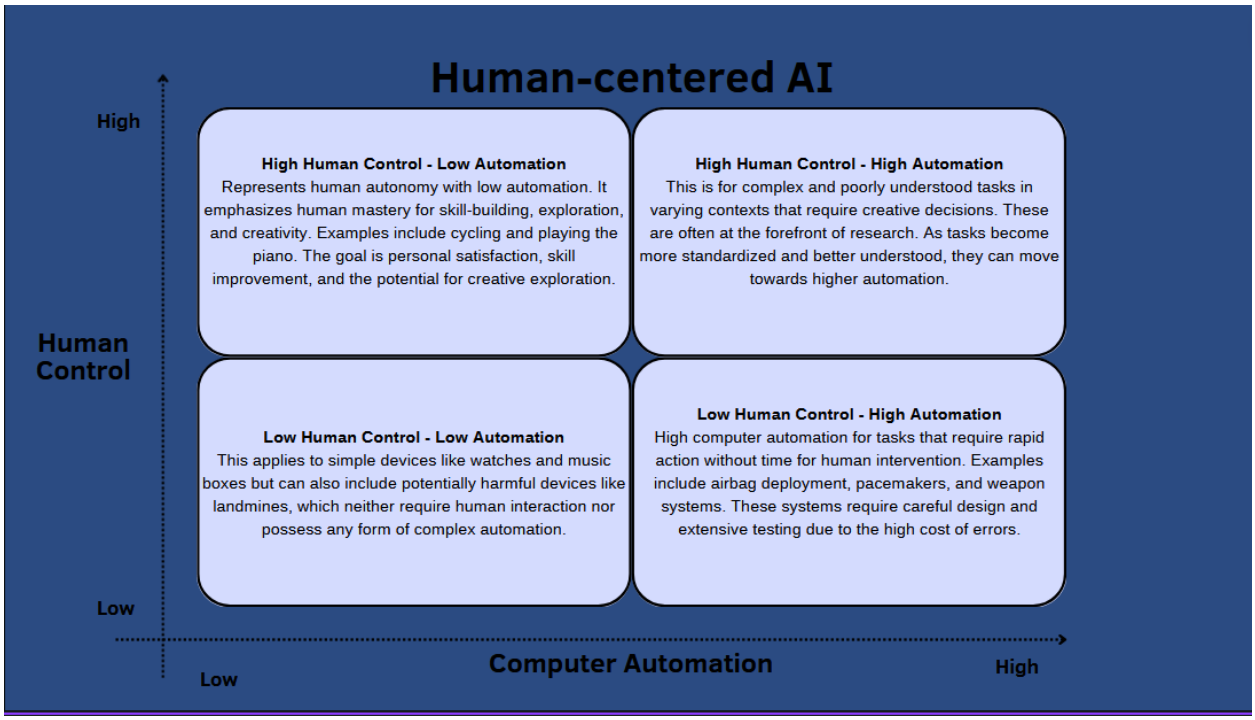

Figure 5.2: Human-Centered AI - Understanding levels of Automation and Human Control (Shneiderman 2022) (Mølskov 2023)

implementation of AI-technologies and tools, the Process and the Product:

- **Process**: Human-Centered AI is grounded in experience design methods, such as stakeholder analysis, user observation, usability tests, iterative improvements, and a continuous evaluation of human performance, using systems that apply AI in its various forms.
- **Product**: Overall, HCAI-systems are intented and designed to act as tools that empower, extend, amply and generally improve human performance, while still emphasizing and ensuring human control.

Although we do not *directly* work on implementing any AI technologies throughout this thesis, HCAI provides us with a relevant framework of ideas on how to approach potential implementation while ensuring a high level of human control where necessary.

Figure 5.2 is a visualization inspired by Ben Shneiderman's work. It illustrates how various tasks, assignments, and types of work necessitate a thorough understanding and consideration of the tasks before effectively implementing a solution. The framework aims to ensure that the designers, developers and other implementers, give proper considerations to the actual purpose and goal of the technology they are implementing.

The figure depicts four quadrants, based on Shneiderman's assertion that two essential dimensions are vital for a comprehensive HCAI framework: the degree of *Human Control*

and the extent of *Computer Automation* (including AI automation).

- **Upper Right Quadrant:** This area involves complex and poorly understood tasks in various contexts that require creative decision-making, often at the cutting edge of research. As these tasks become more standardized, they may transition to higher levels of automation.
- **Lower Right Quadrant:** This quadrant is characterized by high computer automation for tasks that require swift action without human intervention. Examples include airbag deployment, pacemakers, and weapon systems. Such systems need meticulous design and rigorous testing due to the severe consequences of errors.
- **Upper Left Quadrant:** This quadrant highlights human autonomy with minimal automation. It focuses on human expertise in skill-building, exploration, and creativity. Examples include activities like cycling and playing the piano, where the objectives are personal satisfaction, skill enhancement, and creative exploration.
- **Lower Left Quadrant:** This quadrant includes simple devices like watches and music boxes, as well as potentially dangerous items like landmines, which require neither human interaction nor complex automation.

This framework enables HCAI designers to assess their systems and provides guidance on integrating various ideas into a system or product (Shneiderman 2022, p. 57-69)

We believe the framework and critical thinking on AI technologies are highly applicable to the ”Forbedret Borgervisning” thesis we are advising on. This aligns with the fundamental idea in Human-Centered AI that emphasizes the continuous evaluation and questioning of the nature of the work and implementation being done.

Further explaining the framework depicted above, Shneiderman emphasizes that designers and engineers should consider the purpose or goal of a given technology. For instance, certain tasks are preferred by humans for enjoyment or mastery, like riding a bike or playing musical instruments. However, when the goal is to ensure reliability, safety, and trustworthiness, Shneiderman argues that both high automation and significant human control are generally preferable. This is especially crucial when working with cutting-edge technologies in impactful areas like healthcare.

5.1.2 Bridging Postphenomenology and HCAI

The integration of postphenomenology and HCAI provides a robust theoretical foundation for examining AI's role in Sundhedsjournalen. Postphenomenology uncovers how the platform currently mediates user experiences, while HCAI frames the potential for AI to enhance these mediations responsibly. Together, these frameworks enable a nuanced exploration of both the interpretive challenges faced by users and the ethical considerations required for AI implementation.

This dual approach ensures that the thesis remains grounded in user experiences while also contributing to broader discussions about the design and ethical integration of AI systems in healthcare. By bridging these frameworks, the research advances a user-centered perspective that prioritizes both the relational dynamics of technological mediation and the practical implications of AI-driven design.

6 Analysis

In this chapter, we analyze the insights gathered from interviews with users of Sundhedsjournalen, applying a postphenomenological lens to explore how they perceive and interact with the platform, as well as their views on the potential integration of AI. Using the mediation framework established in our Theory chapter, we examine how the participants' experiences with the platform shape their understanding of healthcare data and inform their expectations of AI-driven functionalities. Our analysis is structured to highlight key themes that emerged from the interviews, focusing on both the relational dynamics between users and the platform and the potential role of AI as an interactive tool in healthcare. By concentrating on the ways technology mediates user experience, we seek to uncover how these interactions influence their engagement with their own health data, providing insights into how AI could be thoughtfully integrated to enhance user interaction and comprehension within Sundhedsjournalen.

6.1 Postphenomenology in Analysis

As outlined in the introduction to this chapter, our analysis uses postphenomenology to explore how users perceive and interact with Sundhedsjournalen. Drawing on the framework established in the Theory chapter, this section elaborates on how postphenomenology is employed to interpret the insights gathered from the interviews. Postphenomenology offers a perspective that focuses on the ways technology mediates human experiences and actions. By applying this lens, we examine how users' interactions with Sundhedsjournalen influence their understanding of healthcare data and their expectations for AI integration. Specifically, we analyze these interactions through the four types of human-technology relations—embodiment, hermeneutic, background, and alterity—revealing the multifaceted ways in which the platform shapes user experiences. Rather than viewing Sundhedsjournalen merely as a tool for accessing information, this approach allows us to delve deeper into the mediated relationships users have with the platform. These mediations shape not only how users engage with their health data but also how they imagine the potential role of AI within the system. The sections that follow present our findings, highlighting key themes and insights derived from the interviews.

6.2 Perception of Sundhedsjournalen

This section examines how users perceive Sundhedsjournalen, focusing on their experiences with its usability, presentation of healthcare data, and their expectations for its future development. Drawing on the postphenomenological framework outlined in the Theory chapter, we explore how the platform mediates users' relationships with their health data, shaping their understanding and engagement.

6.2.1 Usability and Accessibility

Informants described varied experiences with the accessibility and usability of Sundhedsjournalen, which can be understood through the lens of postphenomenology. As a technological mediator, Sundhedsjournalen facilitates access to health data, but the way it shapes these interactions varies significantly among users, highlighting distinct relational dynamics. One informant shared their experience with blood test results:

> *"I remember seeing some complex data after a blood test—it didn't make much sense to me. It would be great if AI could summarize that, though it must be carefully tested to avoid errors"*
> - **Informant 3, excerpt from interview.**

This statement reflects a clear desire for AI-driven features that reduce the cognitive load associated with interpreting complex medical data. By summarizing results and providing actionable insights, AI could address the interpretative challenges users face when engaging with platforms like Sundhedsjournalen. Within a postphenomenological framework, this imagined role of AI represents a transformation of the hermeneutic relation, where AI becomes a co-mediator that not only presents data but also shapes the user's understanding of it. However, the informant's emphasis on accuracy highlights a tension: while users seek interpretative clarity, trust in the system depends on ensuring that AI-mediated insights are reliable and contextually appropriate. This tension underscores the interplay between the promise of AI and the challenges of ensuring its responsible application in sensitive domains such as healthcare. The mediation process described by the informant also necessitated external resources to fill in gaps, shifting the relational dynamic away from reliance on the platform itself. This example illustrates a hermeneutic relationship, where Sundhedsjournalen acts as a lens through which the user interprets health data. The informant's difficulty in understanding complex test results highlights how the platform mediates access to information but falls short in facilitating comprehension. While the platform delivers raw information, it does not actively support the user's interpretive needs. The suggestion of AI-driven summarization reflects an imagined enhancement to this mediation, transforming complex datasets into insights that are more accessible and actionable for users. The emotional dimension of these mediated interactions also surfaced in the interviews. Another informant reflected:

> *"When I accessed my pathology report, I didn't fully understand the implications of the numbers or terminology. It felt overwhelming, and I worried more than I probably needed to"*
> - **Informant 2, excerpt from interview.**

Such emotional strain highlights how the lack of interpretive clarity shifts the hermeneutic relation, turning a platform meant to empower users into a potential source of uncertainty or even dread. These usability challenges underscore how Sundhedsjournalen mediates users' access to healthcare data, influencing their ability to engage with and interpret complex medical information. The platform currently acts as a passive mediator, providing access but failing to support users' interpretative needs. This finding aligns with the thesis's broader focus on exploring how AI-driven systems could reshape this mediation by offering tools that actively assist users in understanding and contextualizing their health data. These tools not only address informational clarity but also have the potential to alleviate the emotional burden users experience when navigating complex or ambiguous medical results. By bridging the interpretive gap, AI could transform Sundhedsjournalen from a static resource into an interactive co-mediator, fostering both trust and emotional resilience in users.

Furthermore, Sundhedsjournalen's mediation extends beyond informational clarity, influencing users' emotional engagement with their health. The emotional strain caused by unclear data reflects a breakdown in the hermeneutic relation, amplifying users' anxiety rather than alleviating it. In contrast, some informants described moments of seamless integration, where Sundhedsjournalen became a natural extension of their routines. For example, one informant noted

> *"I check my results when I feel something is off. It's quick, and I don't have to wait for the doctor's office to call me anymore."*
> - **Informant 1, excerpt from interview.**

This reflects an embodiment relation, where the platform fades into the background, allowing the user to focus on their health rather than the tool itself. For these users, the mediation process enhances their sense of control and engagement with their health data, demonstrating how Sundhedsjournalen can successfully align with everyday practices. While some users experience Sundhedsjournalen as an embodied tool, others encounter a more distant relationship, where the platform requires deliberate effort to navigate and interpret. However, other informants experienced a more disconnected relationship with the platform. Statements such as *"I feel like it's written for doctors, not patients"* and *"It's hard to navigate if you don't already know what to look for"* where common, even among informants who had expressed prior or later in the interview to have no issues with using Sundhedsjournalen or interpreting their data. This highlights an instance where Sundhedsjournalen mediates through an alterity relation, positioning itself as an *other* that users must actively engage with to access information. Rather than seamlessly supporting their

needs, the platform becomes an external object that users must interpret and navigate. This relation underscores the challenges users face when the mediation process feels distant or obstructive. Informants also expressed a desire for more support in navigating these relational dynamics. One suggested:

> *""Sometimes, I feel like the information is written for doctors, not for patients. If it could just say something like 'everything looks normal,' that would save a lot of time and confusion-"*
> - **Informant 7, excerpt from interview.**

These findings suggest that Sundhedsjournalen mediates user understanding in highly variable ways, shaped by individual familiarity and comfort with the platform. This variability underscores the complexity of its relational dynamics, ranging from seamless integration to moments of disconnection and frustration.

6.2.2 Presentation of Data

Informants frequently discussed the way Sundhedsjournalen presents health data, emphasizing its role in shaping their understand and engagement. For many, the platform's reliance on distinct medical values and technical descriptions often create circumstances that hinder comprehensions, as illustrated by an informant;

> *"It's easier to check if my blood count is within normal limits than to interpret what my latest scan results mean regarding the progression of my condition"*
> - **Informant 1, excerpt from interview.**

This reflects a hermeneutic relation, in which Sundhedsjournalen serves as an intermediary that users must interpret to enagge with their health data. The clarity and accessibility of this mediation may vary depending on the type of information being provided. While simpler mertrics are easier to understand, more complex results often leave users feeling uncertain or that they have to rely on external sources for interpretation and explanations. As a result, visual aids and contextual explanations where commonly suggested by informants as ways to enhance their experience and interaction with the platform. These suggestions reflects how adjustments to the hermeneutic mediation process, such as incorporating visual aids or color coding, could make data interpretation more intuitive and reduce the cognitive effort required from users.

These findings suggest that the presentation of data plays a critical role in shaping users' experiences with Sundhedsjournalen. The platform's current way of presenting data—both in how it is displayed, the language it uses, and its related terminology—mediates users' interactions in ways that are often functional but can also be inaccessible. This, in turn, highlights the diverse relational dynamics that users experience based on the complexity and format of their data.

6.2.3 Future Expectations

Our informants frequently shared their expectations for how they imagine Sundhedsjournalen could act and function in the future, especially with regard to the possible integration of AI. These expectations often revolved around enhancing accessibility and adapting the platform to better support users' understanding of their healthcare data. Essentially, the expectations centered on improving the mediation of the platform itself. An example of this type of expectation can be seen in this informant excerpt:

> *"Sometimes, medical language is overwhelming. If AI could provide straightforward explanations like, 'Your test results are within normal parameters,' it would help alleviate unnecessary worry"*
> - **Informant 6, excerpt from interview.**

This prompts consideration of how AI might reshape hermeneutic relations by potentially acting as a more intuitive interpreter between users and their healthcare data. Several informants envision how the raw, technical information presented to them via Sundhedsjournalen might be mediated by AI, allowing the platform to potentially provide simplified interpretations, such as summaries or contextual explanations. This could reduce the cognitive effort required to interpret and understand their own data, potentially helping users feel more confident in their understanding. Overall, these expectations reveal how informants perceive the potential of AI to transform their interactions with Sundhedsjournalen, particularly by addressing the limitations of the current mediation processes. While these ideas are speculative, they point to a desire for more fluid and user-centered interactions that align with the relational dynamics already present in the platform. These insights collectively highlight user concerns about data accessibility and expectations for AI-driven improvements

6.3 Systemic Barriers in Health Care Data Mediation

In the prior section, certain challenges related to Sundhedsjournalen, such as perceived usability and trust, were explored. In this section, however, we shift focus to the broader systemic and infrastructural barriers that shape the platform's mediation of health data and, in turn, influence how users interact with and perceive it. By examining these barriers through the lens of postphenomenology, this analysis extends beyond individual usability to investigate the relational dynamics disrupted by fragmented data, technical limitations, and the integration of AI. These systemic challenges reflect the platform's technological intentionality, which prioritizes professional use, creating barriers for patients and shaping their relational dynamics with the platform.

6.3.1 Inconsistent and Fragmented Data

The fragmented and inconsistent presentation of health data is a key barrier in users' experience with Sundhedsjournalen. As the platform integrates data from various healthcare providers, discrepancies frequently arise, undermining trust and clarity. These inconsistencies disrupt the seamless mediation of information, requiring users to reconcile conflicting data sources and navigate complex medical terminology without adequate contextual support. For example, an informant reflected on the challenges of navigating fragmented data:

> *"I felt like there was missing information in my record—it's frustrating when things don't add up."*
> - **Informant 9, excerpt from interview.**

This statement reflects a breakdown in the hermeneutic relation, where users rely on the platform to interpret and consolidate their health information. The inability to clearly present or explain complex data, such as imaging results, amplifies the distance between users and their health information. From our theoretical perspective, this breakdown can be linked to Sundhedsjournalen's technological intentionality. Designed initially for healthcare professionals, the platform mediates information in ways that prioritize clinical precision over patient accessibility. This misalignment leaves users to rely on external resources or healthcare professionals to bridge interpretative gaps. These interpretative challenges are not isolated incidents but part of a broader systemic issue tied to the platform's infrastructural complexity. Addressing these challenges requires not only improved data synchronization but also design approaches that emphasize intuitive engagement, potentially transforming Sundhedsjournalen into an embodied mediator that enhances users' interaction with their health information. Additionally, the fragmented nature of data presentation impacts the background relations within the healthcare ecosystem. Sundhedsjournalen, as an infrastructural platform, plays a vital but often unnoticed role in facilitating the flow of health data. However, when records are incomplete or inconsistencies arise, the platform's unobtrusive mediation collapses, becoming a source of frustration for users. One informant noted:

> *"I noticed there are things I expected to be written down in my health records but weren't. That was disappointing because it affects how doctors understand your case."*
> - **Informant 9, excerpt from interview.**

This quote underscores how incomplete or missing data not only challenges users' understanding but also creates discrepancies between their personal experiences and the information recorded in the system. Such gaps highlight how Sundhedsjournalen's professional-centric design overlooks the need for patient-friendly mediation. AI-driven tools could address these issues by synchronizing data in real-time, flagging discrepancies, and consolidating fragmented information into coherent summaries. By doing so, the platform

could reconfigure its technological intentionality to better align with patient needs. Furthermore, the systemic nature of these issues suggests that the problem lies not just in how data is presented but also in the infrastructural processes that feed information into the platform. Delays in updating records, inconsistencies in data synchronization, and differences in terminology across systems all contribute to a mediation process that feels disjointed and inaccessible to users. Informants frequently described how these challenges impacted their ability to use the platform confidently, with one noting:

> *"Sometimes, medical terms are overwhelming, and you end up second-guessing everything you thought you understood about your own health."*
> - **Informant 4, excerpt from interview.**

This statement highlights the relational tension between users, the platform, and healthcare providers. The fragmented nature of Sundhedsjournalen's mediation creates a relational dynamic in which users must actively interpret, question, and reconcile information from multiple sources. Instead of seamlessly integrating into their healthcare routines, the platform becomes a source of cognitive and emotional labor. Ultimately, these systemic issues reveal the complexity of Sundhedsjournalen's mediatory role. By failing to provide a cohesive and consistent interpretation of health care data, the platform disrupts users' hermeneutic relations with their health information, leaving many to rely on external support to make sense of their medical records. Addressing these barriers will require not only technical solutions, such as improved data integration and synchronization, but also a deeper consideration of how the platform mediates users' trust and understanding of their health. These insights collectively highlight user concerns about data accessibility and expectations for AI-driven improvements

6.3.2 Understanding Health Data

Systemic barriers in Sundhedsjournalen, such as fragmented and inconsistently presented data, often translate into cognitive challenges for users attempting to understand their health information. Informants frequently described difficulties interpreting medical terminology and numerical results, particularly when these lacked sufficient context or explanation. These challenges underscore how the platform's mediation often fails to bridge the gap between raw data and user comprehension, leaving individuals to grapple with their health information independently. One informant expressed frustration over the technicality of the information when checking their blood test in Sundhedsjournalen:

> *"Blood test data during COVID didn't make much sense to me—it felt very technical and hard to wrap your head around."*
> - **Informant 6, excerpt from interview.**

This reflects a breakdown in the hermeneutic relation, where users feel like they cant rely on the platform to interpret and contextualize their health information. The reliance on raw, technical data further exemplifies the platform's technological intentionality, which

prioritizes professional-level detail over accessibility for lay users. AI tools could reconfigure this relation by offering intuitive features such as natural language explanations, personalized summaries, and real-time feedback on health metrics, reducing the cognitive burden experienced by users. The emotional dimension of these cognitive barriers also emerged as a recurring theme in the interviews. One informant noted the overwhelming nature of diagnostic reports received after they had undergone a treatment in which they had been sedated:

> *"Most of the information was quite hard to understand unless I had been present and awake for the treatments myself."*
> - **Informant 9, excerpt from interview.**

This highlights how cognitive barriers amplify emotional strain, disrupting both embodiment and background relations. Users not only struggle to engage with the platform intuitively but also feel disconnected from the underlying infrastructure that should support their interaction. By leveraging AI to simplify medical terminology and present data in accessible formats, Sundhedsjournalen could reduce these barriers and foster more cohesive relational dynamics. Otherwise, this emotional strain is closely tied to the platform's technological intentionality, which prioritizes clinical precision over accessibility, creating a relational dynamic that distances users from their health information rather than empowering them. For many users, this disconnect results in a reliance on external resources, such as healthcare professionals or internet searches, to bridge the interpretative gap. AI could play a pivotal role in mitigating these challenges by reshaping the platform's mediatory function. For example, natural language processing could translate medical terminology into accessible language, while machine learning algorithms could provide contextual explanations tailored to individual users. By addressing these pain points, AI has the potential to transform the hermeneutic relation, shifting Sundhedsjournalen from a source of confusion to an intuitive tool that enhances understanding and alleviates anxiety. Moreover, informants frequently emphasized their desire for a platform that not only presents data but also supports their ability to make sense of it independently. This reflects a broader demand for a shift in the platform's intentionality—from serving healthcare professionals to prioritizing patient-centric design. Despite these challenges, users frequently expressed a desire for improvements that could reconfigure their relationship with Sundhedsjournalen. One informant suggested:

> *"Sometimes I feel like the information is written for doctors, not patients. If it could just say, 'everything is fine,' that would save a lot of stress."*
> - **Informant 7, excerpt from interview.**

This recommendation aligns with a shift in technological intentionality, where AI could enhance the platform's mediatory role by reducing cognitive barriers and creating a more patient-friendly interface. By integrating features such as dynamic summaries and visual aids, Sundhedsjournalen could transition from a professional-centric design to one that

prioritizes accessibility and user empowerment.

6.3.3 Dual Roles: Infrastructure and Interactive Platform

Sundhedsjournalen operates along a dual spectrum, functioning both as an infrastructural platform and as an interactive tool, depending on how users engage with it. For some, the platform's role aligns with background relations, serving as a largely invisible infrastructure that mediates the flow of health data between healthcare providers and patients. In this capacity, Sundhedsjournalen facilitates access to critical information without requiring direct, frequent interaction, acting as a contextual layer within the healthcare ecosystem. However, for others, the platform transitions into a more prominent role as an interactive tool. These users engage with Sundhedsjournalen actively to interpret test results, track medical records, or manage chronic conditions, encountering the platform in hermeneutic relations or even moments of alterity relations when its functionality feels obstructive or confusing. One informant highlighted the platform's infrastructural role, describing how they rely on it indirectly:

> *"I don't check it often, but I know my doctor can pull up my records if needed. It feels like it's there when I need it, but not something I interact with daily."*
> - **Informant 5, excerpt from interview.**

In this context, Sundhedsjournalen functions as a background mediator, facilitating access to health data without drawing attention to itself. This represents a scenario where the platform integrates seamlessly within the healthcare system, offering indirect support without requiring active user involvement. For these informants, Sundhedsjournalen operates as an infrastructural platform—dependable yet largely unnoticed—illustrating its ability to provide subtle mediation when its design aligns with user expectations. These background interactions emphasize the platform's influence in shaping users' expectations of healthcare technologies, fostering trust when the system performs as intended and users are not compelled to intervene actively. On the other hand, some informants described more frequent and direct interactions with Sundhedsjournalen, revealing cases where its role shifts from underlying infrastructure to a prominent, interactive platform. This change often introduces cognitive and emotional challenges, as users must actively navigate and interpret the provided information. Unlike the seamless mediation of background relations, the platform in these instances demands attention and cognitive effort, becoming a focal point of interaction. For some, Sundhedsjournalen's professional-oriented design leads to friction, as it does not fully account for the needs of non-expert users. This transition highlights moments of hermeneutic—and occasionally alterity—relations, where users must engage with the platform as a distinct entity to accomplish their goals. One informant noted

> *"I log in regularly to check my blood results and appointments, but sometimes it feels like I'm not the intended audience. It's like reading something written for*

someone else."
- **Informant 2, excerpt from interview.**

This observation underscores the platform's transition from being a background mediator to a more visible and interactive entity. For these users, the professional-centric structure of the platform introduces challenges, requiring them to navigate technical jargon and piece together fragmented information. This transition may result in moments of alterity relations, where the platform feels like an external 'other' instead of a seamless part of the healthcare experience. AI-driven solutions have the potential to address these challenges by consolidating dispersed data and simplifying complex medical terminology, thereby minimizing frustration and enhancing the platform's mediatory function. For those directly engaging with Sundhedsjournalen, AI could enable hermeneutic clarity, making data interpretation more intuitive and lowering cognitive barriers. Meanwhile, users relying on the platform as underlying infrastructure could benefit from features like real-time data updates and automated notifications for critical health events. This dual functionality highlights the importance of accommodating diverse user needs. Whether functioning as a background system or an interactive interface, the platform must support both passive and active user interactions, ensuring its mediatory role promotes trust, clarity, and accessibility for all. These systemic barriers underscore the importance of trust and ethical considerations, which are further explored in the next section.

6.4 Trust and Ethics in AI

Trust and ethical considerations significantly shape users' perspectives on the implementation of AI systems within healthcare platforms like Sundhedsjournalen. Through our interviews, informants highlighted concerns about transparency, privacy, and the ethical implications of data recording. These themes not only reflect individual apprehensions but also point to systemic challenges that affect the adoption and design of AI-driven functionalities.

6.4.1 Privacy and Ethical Boundaries

Privacy concerns were a recurring theme throughout the interviews, with informants frequently questioning how their data was managed, who had access to it, and the ethical implications of what was recorded. Trust in AI systems is directly linked to transparency around data security and its usage. As one informant noted:

"I want to know who has access to my information. If it's only used within Sundhedsjournalen, fine. But if others outside the system can see it, I'd feel very uncomfortable."
- **Informant 4, excerpt from interview.**

This perspective highlights the relational tension that arises when users are uncertain

about the boundaries of data access. The mediation of trust relies on the system's ability to establish clear and enforceable limits on who can interact with users' data. Without this clarity, users perceive the technology as potentially misaligned with their personal values, which reduces their willingness to engage fully with AI-driven functionalities. The ethical dimensions of data collection itself were also a significant point of contention. Informants questioned the necessity of recording specific details that seemed irrelevant to their healthcare. For example, one informant expressed discomfort over what they saw as intrusive data points:

> *"Why does it matter if I showed up late for my appointment? It feels like they're keeping track of things that don't concern my health"*
> - **Informant 3, excerpt from interview.**

Adding such details introduces a form of mediation that some users may perceive as unnecessary. This perceived overreach can shift the platform's purpose from enabling user empowerment to one of surveillance, resulting in an experience that feels intrusive rather than supportive. This dynamic highlights the critical need to align data practices with user expectations, ensuring that recorded information has a clear and meaningful role within the care context. Beyond concerns about relevance, informants also pointed to the impact these practices have on their sense of autonomy. One informant shared thoughts on the broader implications of having their data collected without explicit consent or involvement:

> *"It's not just about the data—it's about feeling like you have control. If they're recording things I don't know about or don't agree with, it feels like I'm not the one in charge of my health information anymore"*
> - **Informant 1, excerpt from interview.**

This emphasizes the significance of how users perceive their control over personal information. When users sense a loss of agency, trust in the platform diminishes. Rather than instilling confidence and security, the platform risk being intrusive or overreaching, leading to feelings of unease and detachment. These worries bout control also extend to the possible misuse of sensitive data. One informant voiced unease regarding the sharing of their data beyond its intended healthcare context:

> *"If my data is used for research, I want to know about it and consent to it. But if it's sold to insurance companies or anyone else, that's a complete breach of trust*
> - **Informant 6, excerpt from interview.**

This statement reflects a significant perception: that the boundaries of data use must be transparent and explicitly communicated. Any ambiguity or suggestion that data might be commodify intensifies distrust. Users expect healthcare platforms to prioritize their well-being and respect their privacy above all else. When these expectations are unmet, the perception of the platform's alignment with user interests weakens, leading to feelings

of alienation and apprehension. Ethical boundaries in data collection also intersect with the emotional impact of these practices. One informant described how certain details, recorded during a vulnerable moment, felt unnecessary and judgmental:

> *"When I was hospitalized, they wrote down things about my family visits and who was there. It felt so unnecessary—like I was being judged for something personal"*
> - **Informant 2, excerpt from interview.**

This underscores the deeply relational nature of data practices. Even the seemingly neutral act of recording information conveys intentionality, which influences the user's emotional experience. The intentionality embedded in the design of AI systems—what they choose to record, analyze, and present—plays a pivotal role in shaping users' trust. By mediating these interactions with transparency, clear purpose, and respect for user agency, AI systems have the potential to foster empowering relationships, rather than perpetuating fear and mistrust.

6.4.2 Ethical Implications of AI in Healthcare

Informants frequently raised ethical concerns about the role of AI in healthcare decision-making, particularly regarding its capacity to influence, guide, or even override human judgment. The overarching theme in this discussion centers on the balance between AI as a supportive tool and AI as a potential determinant in healthcare outcomes. While not directly related to their own experiences with Sundhedsjournalen or how AI might impact that platform, several informants expressed apprehension about AI systems on a broader scale. Specifically, they voiced concerns about the potential use of AI by medical professionals, worrying that doctors' autonomy could be undermined by an over reliance on such systems:

> *"If the doctor just follows what the computer says, where does their expertise come in? AI should assist, not decide."*
> - **Informant 3, excerpt from interview.**

The topic of how doctors and other medical professionals might interact with or mediate through AI-driven systems was not introduced by us during the interviews, as our focus was primarily on the user-end experience of the platform. However, when discussing potential concerns and challenges regarding the implementation of such systems, the conversation frequently drifted toward the issues outlined above. This concern encapsulates a critical tension: users value the expertise and judgment of healthcare professionals and fear that over reliance on AI might diminish their active involvement. Whether or not if this fear has any basis in reality, is not important, as it serves to underscores the importance of maintaining a collaborative dynamic, where AI tools are perceived as complementary aids rather than substitutes for human expertise. The risk of automation bias—where professionals might defer to AI recommendations without sufficient scrutiny—highlights the need for careful integration of AI systems. From a relational perspective, this tension

reflects the hermeneutic challenge AI introduces: users and providers must navigate a balance where AI's interpretive capabilities support human decision-making without undermining its authority. Conversely, another informant highlighted how AI could augment human decision-making, framing it as a supportive tool

> *"If AI can provide a second opinion, that's valuable. It's like having another specialist in the room to help the doctor"*
> - **Informant 7, excerpt from interview.**

This perspective offers a more optimistic view of AI as a tool that enhances the diagnostic and interpretative capacities of healthcare providers. By framing AI as a second opinion, the informant highlights its potential to serve as an additional layer of expertise, complementing rather than replacing human decision-making. This interpretation aligns with the embodiment relation, where AI integrates seamlessly into the healthcare process, becoming an extension of the provider's skill set. However, this positive perception is likely contingent on the AI being transparent, accurate, and aligned not only with the user's needs but also with the professional's goals. These factors often determine whether the tool fosters trust or becomes a source of friction. Ethical concerns were also raised regarding the biases inherent in AI systems, especially in how they prioritize specific data or outcomes. One informant directly challenged the presumed neutrality of AI in decision-making:

> *"Who decides what's important for the AI? If it's programmed by people, their biases will be in there too. That's worrying when it's about my health"*
> - **Informant 5, excerpt from interview."**

This comment highlights a fundamental issue in the design and implementation of AI: the biases that can be inadvertently encoded in its algorithms. The informant's concern reflects an acute awareness of how human values and priorities shape the technological intentionality of AI. In this context, users perceive the AI as a potentially autonomous mediator that might prioritize systemic goals or implicit biases over individual patient needs. This perception creates an alterity relation, where the AI feels detached from the user's lived experience and personal context. Addressing these concerns requires an ethical design approach that prioritizes fairness, inclusivity, and user-centered intentionality to ensure that AI systems align with diverse patient perspectives. The relational dynamics of care were another prominent theme. Informants reflected on how AI could reshape the patient-provider relationship, potentially disrupting the embodied and interpersonal aspects of healthcare. Finally, accountability emerged as a critical ethical concern, with informants questioning where responsibility lies when AI systems influence healthcare outcomes. One informant remarked:

> *"If something goes wrong, is it the doctor's fault or the AI's? I don't want to hear excuses; I just want to know someone is accountable"*
> - **Informant 8, excerpt from interview.**

This statement underscores a critical challenge in healthcare mediated by AI: the potential diffusion of accountability. For users, a lack of clarity about who bears responsibility for decisions made by AI-driven systems can create unsettling relational dynamics, undermining trust in both the platform and the individuals presumed to oversee it. This reflects the risk of ambiguous intentionality in how AI is often presented, where users perceive the technology as operating autonomously, disrupting the relational flow of trust and responsibility within the healthcare ecosystem. To address these concerns, healthcare platforms must establish clear accountability frameworks, ensuring that AI integration reinforces rather than erodes the relational bonds between users, medical professionals, and the platform itself. These findings emphasize the importance of ethical AI design, bridging into the HCAI analysis that follows.

6.5 HCAI Analysis

While the analysis so far has primarily focused on postphenomenological mediation and its relational dynamics, the following sections incorporate principles from Human-Centered AI (HCAI) to deepen the exploration. HCAI emphasizes designing AI systems that balance automation with human oversight, fostering user autonomy while addressing ethical and usability challenges. By integrating HCAI, the analysis examines how these principles can address the interpretative and ethical issues raised by informants, offering insights into AI's role as a co-mediator in healthcare platforms like Sundhedsjournalen.

6.5.1 Balancing Automation and User Oversight

In exploring user perspectives on AI integration within Sundhedsjournalen, informants expressed both enthusiasm for AI's potential and reservations about its implications for control and oversight. These concerns underscore the importance of balancing automation with user agency—a central tenet of HCAI. This balance is particularly critical in the sensitive context of healthcare, where misinterpretation or loss of user autonomy can have significant emotional and practical consequences. One informant emphasized their apprehension about overgeneralization in AI interpretations, highlighting the need for systems to remain responsive to individual contexts:

> *"Well, the AI isn't perfect and might hallucinate or change the context. It could lead to conclusions that aren't correct, and you might act on them without realizing."*
> - **Informant 8, excerpt from interview.**

This comment reveals a recurring tension in the interviews: while users recognize the efficiency AI could offer, they are concerned about the accuracy and contextual appropriateness of its outputs. Such concerns reflect a fear of losing interpretative control, where the technology might provide misleading or overly generalized insights. From an HCAI perspective, this highlights the importance of designing AI systems that actively involve

users in the interpretative process. Empowering users through tailored insights ensures that AI complements their decision-making rather than undermining their confidence or autonomy. A failure to meet these expectations risks eroding user trust and shifting the relational dynamic to one of dependence or alienation. Transparency emerged as a critical factor in mediating trust in AI systems. One informant highlighted the importance of understanding how AI arrives at its conclusions:

> *"I'd trust AI more if it cited credible sources and explained its reasoning. Transparency is crucial for trust"*
> - **Informant 6, excerpt from interview.**

This emphasis on explainability reflects a central principle of HCAI: ensuring that AI systems provide not only accurate outputs but also clear and accessible reasoning. Informants frequently linked their confidence in AI to their ability to engage critically with its outputs, emphasizing that trust is undermined when AI systems operate as opaque "black boxes." By offering insights into how conclusions are reached, transparent systems allow users to make informed decisions, maintaining their role as active participants in their healthcare journey. This dynamic reinforces collaboration between users and AI, aligning with the HCAI vision of AI as a facilitator of human autonomy. Despite these concerns, informants expressed optimism about AI's potential to complement their interpretative processes. The ability to simplify complex medical language and reduce cognitive burdens was frequently highlighted as a significant advantage. One informant remarked:

> *"AI could help simplify terms into something understandable for non-specialists, especially for patients without a healthcare background"*
> - **Informant 1, excerpt from interview.**

This narrative illustrates the dual role users envision for AI: as a tool to enhance understanding and a partner that respects their autonomy. Simplification and actionable insights were particularly valued by informants, reflecting their desire for systems that bridge the gap between technical complexity and everyday usability. However, such systems must also ensure that users retain the ability to verify and question outputs, reinforcing their sense of agency and trust. Informants' reflections underscore the importance of balancing automation with oversight, ensuring that users remain central to the interpretative process rather than being displaced by the technology.

6.5.2 Trust, transparency, and User Oversight

The interplay between trust, transparency, and user oversight emerged as a central theme in informants' responses, underscoring the importance of clear and understandable AI processes within Sundhedsjournalen. Transparency, in particular, was highlighted as a prerequisite for fostering trust and ensuring users feel confident in their engagement with the platform. However, the relationship between transparency and usability revealed complex challenges, particularly when automation obscures decision-making processes. One of the most pressing concerns expressed by informants was the perception of AI systems as *black boxes*. Users frequently described feelings of uncertainty about how AI-generated outputs were derived, which often led to hesitation in relying on the system. As an informant noted:

> *"I'd need it to be transparent, in the sense that I could imagine it would feel more reliable if it listed it's sources somehow or explained it's process."*
> - **Informant 10, excerpt from interview.**

This skepticism aligns with HCAI's emphasis on transparency as an ethical and practical necessity. By making decision-making processes visible, AI systems can uphold accountability and foster user trust. Transparency, in this context, acts as a mediator, bridging the gap between users and the automated processes underlying AI recommendations. Through clear explanations, AI systems might not only improve user trust but also enhance their overall engagement by fostering a sense of collaboration rather than alienation. However, transparency alone is insufficient if it overwhelms users with excessive detail. One informants account exemplifies this challenge:

> *"The platform allows me to explore my health but can also overwhelm with too much detail. It's a double-edged sword."*
> - **Informant 4, excerpt from interview.**

This highlights the tension within HCAI between transparency and usability. While transparency fosters user oversight, presenting overly technical or dense information can create cognitive strain and hinder understanding. HCAI principles emphasize that transparency must be implemented in a way that respects user cognitive capacities, balancing clarity with accessibility. Informants also expressed a need for flexibility in AI design to accommodate diverse user expectations. For some, detailed interpretive clarity was paramount, while others prioritized simplicity and efficiency. An informant offered a suggestion that AI could summarize complex information to reduce stress:

> *"Summaries for lab results, upcoming screenings, or even general health overviews would save so much time and reduce stress."*
> - **Informant 5, excerpt from interview.**

This divergence in expectations underscores the complexity of designing AI systems that support varied forms of user engagement. The diversity of these responses highlights

the relational dynamics between automation and oversight, where transparency is not a fixed solution but a shifting construct that mediates trust and interaction. Finally, the role of automation itself surfaced as a key point of reflection. Informants expressed varying degrees of comfort with automated decision-making processes, often shaped by how much oversight they perceived themselves to have. While some viewed automation as a useful tool for efficiency, others raised concerns about its potential to undermine user agency. These observations point to a broader tension between the benefits of automation and the potential erosion of control, suggesting a dynamic interplay between trust, transparency, and user empowerment.

6.5.3 Designing for Interpretive Clarity

Informants frequently highlighted challenges in interpreting complex healthcare data presented through Sundhedsjournalen, particularly in cases where technical language or raw outputs required significant effort to understand. This reflects a critical aspect of AI integration: how systems mediate users' interpretive processes and shape their understanding of personal health information. Several informants described moments where unclear or overly detailed data created barriers to comprehension. Jeppe, for instance, noted:

> *"Sometimes I feel like I need a medical degree to make sense of what I'm reading. It's hard to know if the numbers are good or bad without help."*
> - **Informant 7, excerpt from interview.**

This statement illustrates how the platform's current mediation of health data requires users to engage external knowledge sources or rely on professionals to fill interpretive gaps. Within the context of AI, informants expressed hope that automation could alleviate these challenges by summarizing complex information or highlighting key insights. However, the tension between simplifying data and maintaining its accuracy emerged as a recurring theme. Interpretive clarity also extends to how AI presents recommendations or insights. An informant reflected on her experience with unclear summaries, stating:

> *"It's frustrating when things aren't explained properly. Even if it's meant to be helpful, I want to know why certain things are being flagged."*
> - **Informant 5, excerpt from interview.**

This highlights the relational dynamics of interpretive clarity, where users seek not only accessible information but also contextual explanations that provide deeper meaning. The absence of such clarity can lead to mistrust or disengagement, as users struggle to align system outputs with their personal understanding of health data. Through this lens, interpretive clarity becomes a mediator of trust and engagement, shaping how users interact with both the platform and the AI system. Informants expressed a preference for systems that actively assist in interpretation without oversimplifying or omitting critical details. This desire reflects a nuanced perspective on clarity: users value assistance that enhances their understanding without diminishing the complexity of the underlying information.

The diversity of user experiences suggests that clarity is not a universal concept but a dynamic one. Some informants, like Nina, sought transparency in explanations, while others prioritized brevity and ease of use. These varying preferences reveal a complex interplay between clarity, usability, and user expectations, underscoring the relational nature of AI-mediated interpretation.

6.5.4 Ethical Dimensions in AI mediation

One of the most prominent challenges expressed by informants was the difficulty in interpreting complex medical information presented on Sundhedsjournalen. Many users struggled to make sense of their healthcare data, describing feelings of confusion and frustration when faced with unfamiliar terminology or raw, uncontextualized results. These reflections align with a core principle of HCAI: designing systems that support users in navigating complexity while maintaining trust and usability. One informant described their experience with medical test results:

> *"I got my blood test results back, but I didn't know what half the numbers meant. It's stressful because you're left guessing whether something is wrong."*
> - **Informant 5, excerpt from interview.**

This statement captures the anxiety that arises when users are left to interpret data without adequate support. The frustration described by this informant reflects a recurring theme across the interviews: Sundhedsjournalen provides access to information but falls short in making that information comprehensible. From an HCAI perspective, this highlights a gap in the platform's design—while it fulfills its role as a data repository, it does not actively mediate the user's understanding of that data. Users must rely on external resources, such as internet searches or consultations with healthcare professionals, to contextualize their results, creating unnecessary cognitive and emotional burdens. Another informant expressed a desire for AI-driven summaries, emphasizing the potential for such features to reduce cognitive burdens and improve accessibility:

> *"It would be so helpful if AI could just summarize the important parts for me—what I should pay attention to and what's normal."*
> - **Informant 3, excerpt from interview.**

This comment reveals an imagined role for AI as a co-mediator, transforming raw data into actionable insights. Informants frequently articulated that such tools could alleviate the overwhelm associated with interpreting technical medical language, allowing users to focus on critical aspects of their health. By summarizing key points and flagging anomalies, AI could reduce the effort required to engage with healthcare data meaningfully. However, informants were also quick to note that such functionality must prioritize accuracy and transparency to maintain user trust. The importance of these qualities was further emphasized by one informant, who warned of the potential for AI to exacerbate confusion if it lacked accountability:

> *"If the AI makes mistakes or doesn't explain why it's saying something, it just adds to the confusion."*
> - **Informant 2, excerpt from interview.**

This statement underscores a critical tension in the design of AI systems: the need to simplify complex information while ensuring that users can understand and trust the outputs. For these informants, explainability was as important as accuracy. When AI systems fail to provide clear reasoning for their conclusions, they risk alienating users and undermining their sense of agency. HCAI emphasizes the importance of transparency and accountability in such systems, ensuring that users are empowered to question and validate AI outputs rather than feeling obligated to accept them uncritically. These narratives reveal the dual responsibility of AI systems in healthcare: reducing complexity while fostering user autonomy. Informants envisioned tools that not only simplify information but also contextualize it, offering guidance that is tailored to individual needs. By adhering to HCAI principles, Sundhedsjournalen could enhance its role as a mediator of healthcare data, alleviating user anxiety and promoting a more confident engagement with personal health information. Ultimately, interpretative clarity is not just a matter of simplifying language but of creating a system that supports meaningful and informed interactions between users and their data.

6.5.5 Summary of HCAI Analysis

The analysis highlights how Human-Centered AI principles can guide the integration of AI into Sundhedsjournalen, balancing automation with user oversight. Informants emphasized the importance of transparency, interpretive clarity, and ethical design to build trust and foster meaningful interactions. By prioritizing user empowerment and aligning AI functionalities with human values, Sundhedsjournalen can become a more intuitive and trustworthy platform for healthcare data mediation.

7 Discussion

Integrating AI into platforms like Sundhedsjournalen represents a significant shift in how users interact with healthcare data. These platforms mediate the relationship between users and their health information, shaping comprehension and engagement. The analysis revealed that Sundhedsjournalen's current mediatory role is constrained by fragmented data presentation, inaccessible terminology, and a lack of contextual support. Informants highlighted how these limitations affect their ability to interpret healthcare data, underscoring the need for tools that enhance mediation.

AI-driven systems offer opportunities to address these challenges by supporting users in navigating complex medical information and fostering trust through transparency. However, these systems must also navigate ethical and relational dynamics. Concerns about algorithmic bias, data privacy, and the opacity of AI-generated insights emphasize the importance of designing systems that empower users while maintaining accountability. This discussion synthesizes these findings, focusing first on postphenomenological insights into mediation before exploring trust and ethical considerations through the lens of Human-Centered AI.

7.1 Postphenomenological Insight on Mediation

From a postphenomenological perspective, Sundhedsjournalen serves as a hermeneutic mediator, shaping how users interpret and engage with healthcare data. The analysis highlighted instances where this mediation falls short, particularly when fragmented or overly technical information hinders users' ability to draw meaningful conclusions about their health. These moments of disconnection reveal the fragility of technological mediation, where the user's relationship with their health data is disrupted. AI-driven systems have the potential to enhance this mediatory role by amplifying users' interpretive capacities. Rather than offering isolated features, AI acts as a tool that strengthens the relational dynamics between users and their healthcare information. By addressing interpretive barriers and contextualizing complex data, AI can transform Sundhedsjournalen into a more effective mediator, aligning with postphenomenology's concept of hermeneutic amplification.

At the same time, AI introduces new relational dynamics. While it offers solutions to existing challenges, it also reshapes the user's interaction with their healthcare data and the platform itself. These shifts must be critically examined to ensure that AI enhances the co-constitutive relationship between users and technology, rather than creating new barriers. Maintaining this balance is essential for ensuring that AI-driven systems serve as supportive mediators, empowering users without undermining their trust or autonomy

7.2 A Human-Centered Approach to Sundhedsjournalen

A key consideration arises when determining where an AI-enhanced Sundhedsjournalen should ideally be placed within the HCAI framework, as explained in Figure 5.2, and how best to achieve that placement. Shneiderman argues that technologies situated in the upper-right quadrant, combining high human control with high automation, are critical for tasks requiring both human judgment and advanced computational support. This balance is essential for enhancing human performance, ensuring safety, and fostering trust in AI systems. Shneiderman particularly emphasizes this approach in contexts like healthcare, where the stakes are high, and reliability and human oversight are paramount. This perspective aligns with our findings, which emphasize users' challenges in understanding complex healthcare data and their preference for tools that simplify this information while maintaining trust and control. For example, informants described difficulties in interpreting technical language or raw data in their health records and expressed a desire for AI systems that could provide timely, clear explanations to reduce cognitive and emotional burdens. The ability to access understandable health data independently was frequently noted as empowering, particularly in regards to sensitive or critical information where, comprehension could prove critical. At the same time, our analysis highlights that trust in AI systems is closely tied to transparency and user oversight. Informants expressed concerns about opaque systems and emphasized the need to understand how AI-generated conclusions were reached. These findings reflect the necessity of balancing automation with human involvement—a core principle of HCAI—to ensure users remain active participants in interpreting their health data.

Maintaining a high level of human control or influence is especially critical when dealing with potentially life-altering or life-threatening conditions. Developers and designers must prioritize the accuracy and reliability of AI-generated outputs to safeguard against misinformation. Early-stage implementation of such systems should be limited to less critical healthcare scenarios, allowing for iterative refinement and confidence-building before expanding their scope. When contextualized within the HCAI framework, these considerations align with Shneiderman's proposal that healthcare technologies should generally aim to occupy the upper-right quadrant of the model. As illustrated in Figure 7.1, the long-term goal involves leveraging improvements in AI model capabilities to gradually increase automation while preserving human oversight. However, this transition must account for

not only the technical capabilities of the AI but also the expertise and readiness of the developers and stakeholders responsible for its deployment.

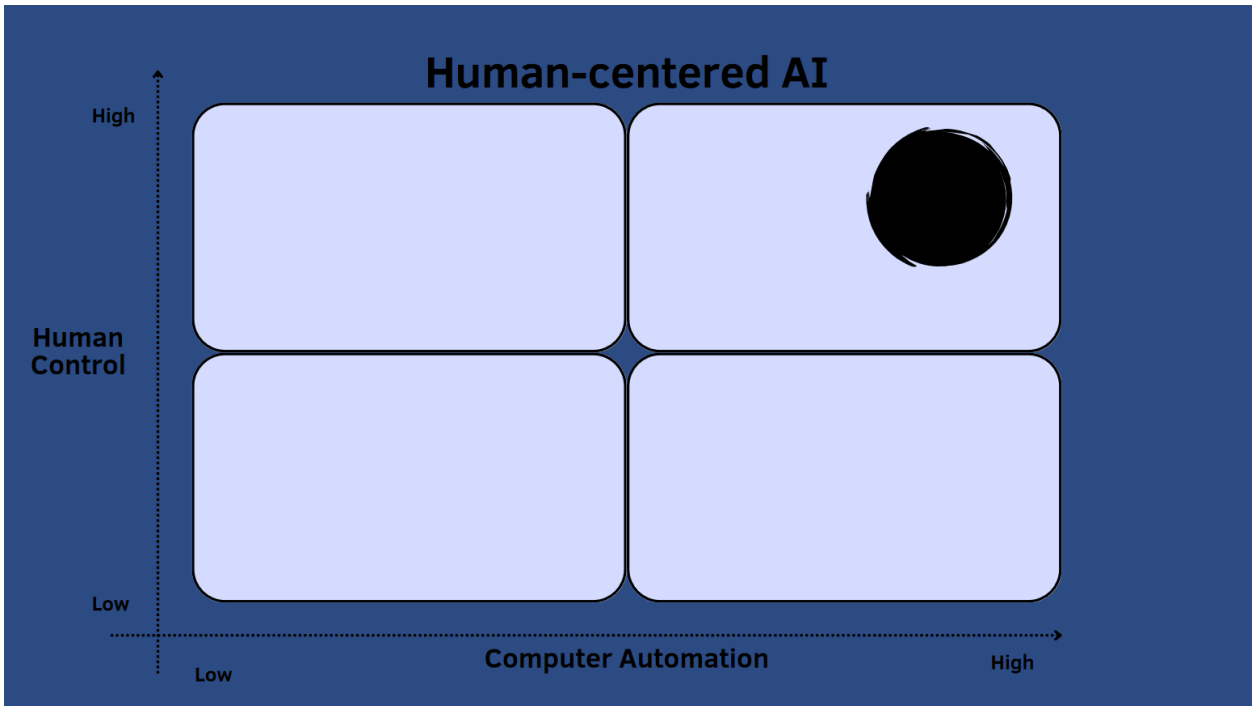

Figure 7.1: Where we argue an AI-enchanced Sundhedsjournal should optimally aim for, with an HCAI approach

These considerations advocate for iterative and agile deployment. Developers working on Sundhedsjournalen should ensure that AI systems are introduced incrementally, starting with tasks where the efficacy and reliability of the model have been thoroughly demonstrated, such as providing simplified explanations for routine lab results. This approach minimizes risks while building user trust and ensuring alignment with HCAI principles.

Patienthåndbogen as a Mediator of Healthcare Data

Patienthåndbogen is a digital encyclopedia designed to assist users in understanding medical terminology. It is independent of commercial interests and is owned by the five Danish regions and the Danish Regions association. The resource contains approximately 3,000 articles and 2,000 illustrations, created by healthcare professionals, and provides simplified explanations aimed at lay users. Accessible through hyperlinks embedded in Sundhedsjournalen, it serves as one of the primary tools for bridging the gap between professional terminology and user comprehension (Region-Sjælland 2024) (Sundhed.dk). Despite its potential, Patienthåndbogen faces challenges in fully mediating healthcare data for patients. Inconsistencies in the application of hyperlinks and gaps in user awareness reduce its effectiveness of mediating knowledge for the users of Sundhedsjournalen. Some users

remain unaware of its existence, while others find its dictionary-style design less intuitive than expected. These issues limit its ability to act as a reliable bridge between medical language and user understanding, leaving many patients reliant on less credible third-party sources.

From a HCAI perspective, addressing Patienthåndbogen's limitations requires tools that ensure consistency, usability, and accessibility. These gaps highlight the need for more advanced solutions to support user comprehension of complex health data. We argue that Retrieval Augmented Generation (RAG) offers such a solution, building on Patienthåndbogen's strengths while addressing its shortcomings. The following section explores how RAG can enhance the accessibility and reliability of healthcare data mediation.

7.2.1 Retrieval Augmented Generation

Retrieval Augmented Generation (RAG) enhances the control and validity of AI models by grounding their outputs in curated, domain-specific datasets. This architecture addresses challenges identified in our analysis, such as the inconsistent accessibility of tools like Patienthåndbogen and users' expressed needs for transparent, trustworthy, and contextually relevant explanations of healthcare data (Lewis et al. 2020). By integrating a pre-trained AI model, such as GPT-4 or Llama, with a validated dataset like Patienthåndbogen, RAG ensures that responses are both accurate and transparent. This approach aligns with principles of HCAI, which prioritize user trust and autonomy, and reflects a postphenomenological perspective by emphasizing how technology mediates user interactions with healthcare information.

Key user concerns from our analysis that RAG could address include:

- The need for accessible and comprehensible explanations of complex medical information.
- Distrust in opaque "black box" AI systems that lack transparency.
- Over-reliance on third-party tools like Google, which may lack credibility or contextual relevance.

Implementing a RAG architecture allows developers to restrict the AI model's scope to relevant healthcare topics and validated sources like Patienthåndbogen. This minimizes the risk of generating irrelevant or inaccurate information and mitigates issues such as "hallucinated" facts in AI-generated responses (Lewis et al. 2020). By grounding answers in Patienthåndbogen, RAG ensures that users receive tailored and trustworthy explanations while maintaining confidence in the system.

Our experience with RAG architectures during internships has demonstrated measurable improvements in the reliability and contextual relevance of AI-generated outputs. These

outcomes highlight RAG's potential to address users' concerns effectively, offering a pathway for Sundhedsjournalen to enhance its mediation of healthcare data.

Process of Retrieval Augmented Generation

The diagram (Figure 7.2) below illustrates how the RAG architecture integrates a curated database into the AI model's workflow, ensuring contextually relevant and validated outputs.

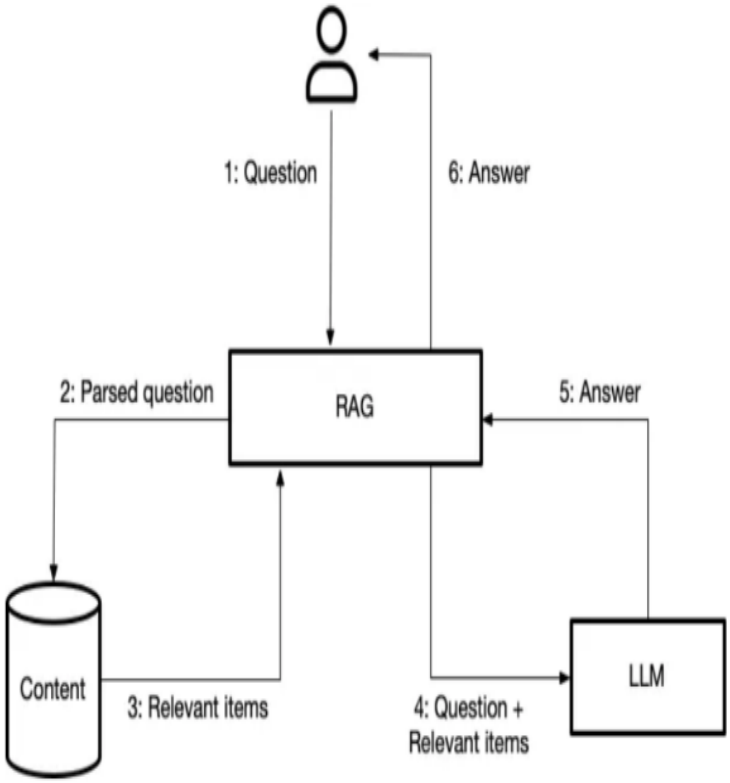

Figure 7.2: A simplified visualization of how RAG-architecture works (Ainomic 2023)

The steps involved are as follows:

1. **Question Input**: The user submits a query, such as requesting an explanation of medical journal entries or test results.
2. **Question Parsing**: The RAG system parses the query to determine its context and requirements.
3. **Retrieval of Relevant Items**: The system searches a curated database, such as Patienthåndbogen, for relevant information related to the query.

4. **Combination of Question and Relevant Items**: The retrieved information is combined with the original query to create a context-rich input.
5. **LLM Processing**: A pre-trained language model processes the input to generate a response tailored to the query.
6. **Answer Output**: The system delivers the response to the user, complete with contextual explanations and citations to the source material.

This structured process minimizes risks associated with ”hallucinated” information, a common challenge LLMs where the AI generates incorrect or fabricated responses (Lewis et al. 2020). By grounding outputs in a validated dataset like Patienthåndbogen, RAG enhances the system's reliability and trustworthiness, ensuring users receive accurate and contextually appropriate information, especially relevant when working within a critical field such as healthcare. In the case of Sundhedsjournalen, Patienthåndbogen offers a robust first-party database to serve as the foundation for RAG. While the platform already provides hyperlinks to Patienthåndbogen within some journal entries, these features are inconsistently applied and lack interactivity. A RAG implementation could dynamically integrate Patienthåndbogen's content into user interactions, offering real-time, tailored explanations directly within the platform.

For example, users querying their health data could receive AI-generated responses that simplify complex medical information while citing Patienthåndbogen as the source. This approach fosters trust by ensuring transparency and credibility. Furthermore, developers could adjust the level of adherence to the validated dataset during implementation, providing flexibility while maintaining rigorous standards. By leveraging RAG's capabilities, Sundhedsjournalen has the potential to transform how users interact with their health data. This approach not only bridges the accessibility gap but also aligns with HCAI principles by emphasizing transparency, user empowerment, and the integration of AI as a supportive tool rather than a replacement for human decision-making.

7.2.2 Red Teaming

We also find it relevant to mention *Red Teaming* as a practice that should be adopted by Sundhed.dk when implementing AI models. Red Teaming, in the context of generative AI, involves proactively testing and evaluating AI models to uncover and mitigate potential vulnerabilities, biases, and harmful behaviors. This practice simulates adversarial attacks to expose weaknesses, ensuring the AI system's safety, reliability, and alignment with user trust and transparency expectations identified in our analysis.

Developers should Red Team their models by generating adversarial prompts to test model defenses and align AI outputs with established safety standards. This aligns with the HCAI framework by emphasizing iterative improvement, transparency, and accountability in AI development. By identifying potential threats and continuously refining AI models, Red

Teaming helps safeguard against risks such as data leaks, algorithmic bias, and misinformation, which are critical concerns for a platform like Sundhedsjournalen (IBM Research 2023). As with most approaches, we suggest practicing this iteratively and proactively. Over the years, as AI capabilities have increased, so too have the methods for *jailbreaking* these systems, exposing vulnerabilities that could lead to reputational and functional risks for Sundhedsjournalen (Grimm 2024). Red Teaming is an essential method to combat these risks, identifying potential jailbreak techniques and designing specific guardrails to address them. This process is comparable to the role of white-hat hackers in cybersecurity, who preemptively address vulnerabilities before they are exploited maliciously. From a postphenomenological perspective, Red Teaming ensures that AI systems mediate user interactions with technology responsibly, shaping trustworthy and effective experiences. By reinforcing the safeguards against unintended outcomes, Red Teaming supports Sundhedsjournalen's role as a reliable mediator of healthcare data, empowering users without compromising safety or transparency.

We believe combining existing development processes with regular Red Teaming is essential to ensure ongoing model robustness and security. This integrated approach enables Sundhedsjournalen to proactively address potential threats, continuously enhance AI model safety and reliability, and align with the long-term goals of user trust, ethical AI, and sustainable innovation.

8 Prerequisites

In this final section before the conclusion, we outline the our suggestions for prerequisites for implementing AI technologies into user-centric platforms such as Sundhedsjournalen. These prerequisites are grounded in the findings from our analysis and discussion, reflecting both empirical insights and theoretical considerations. They are intended to act as a guide for Styringsgruppen, for creating AI systems that are technically robust, ethically sound, and aligned with user needs for proper mediation of healthcare-data.

Ensure High Level of User Oversight and Control While Generative AI presents potential for improving user interaction with healthcare data, maintaining a high level of user oversight is paramount. As emphasized in the HCAI framework, balancing automation with human control ensures that users and developers can trust and manage the AI systems deployed. Achieving this involves:

- **Minimizing Risks of Misinformation**: Employing a Retrieval Augmented Generation-architecture ensures that AI outputs are grounded in validated sources such as Patienthåndbogen. As discussed in 7.2.1, this approach reduces the likelihood of errors and enhances the reliability of AI-generated responses. By grounding outputs in trusted resources, the system maintains interpretive clarity that can serve to strength user trust in the platform and the integrated AI.
- **Developer Expertise and Red Teaming**: Developers must possess a thorough understanding of the AI model's functionality and limitations. As highlighted in 7.2.2, adopting a proactive "Red Teaming" approach is essential for identifying vulnerabilities, preventing jailbreaks, and maintaining adherence to safety standards. This iterative stress-testing ensures robust performance before deployment, mitigating risks effectively, critical when working with sensitive health-care data.

Ensure the Implementation is an Iterative Process

AI implementation must be flexible and adaptive, reflecting the evolving nature of Generative AI and the dynamic healthcare context. To align with the field of AI's rapid advancements, iterative processes are essential. This involves:

- **Step-by-Step Integration:** Start by deploying the AI in less critical contexts, allowing

for incremental testing and refinement. For example, initial implementations could focus on explaining routine lab results rather than providing insights into complex or life-threatening conditions. This ensures the system can be validated in low-risk scenarios before scaling to more critical applications.

- **Continuous Learning:** Implementation teams must remain agile and informed about technological developments to ensure the system evolves alongside emerging capabilities. This iterative approach allows developers to refine the system continuously, minimizing risks while maximizing long-term effectiveness and user alignment.

Prioritize Patient-Centered Design

Enhancing the end-user's interaction with the platform is a core goal of AI implementation. As highlighted throughout the analysis, design considerations must prioritize accessibility, clarity, and meaningful user engagement:

- **Intuitive Interfaces:** Interfaces should be user-friendly and enhance the patient's lived experience. Drawing on user perspectives from 6.2.1, the AI should simplify interactions, making healthcare data more accessible without adding unnecessary complexity. This aligns with findings on improving usability and engagement for diverse types of users.
- **Value-Driven Design**: The tools must align with user needs, providing meaningful assistance while respecting individual autonomy and understanding. As emphasized in the analysis, prioritizing interpretive clarity can ensure that the AI complements users' decision-making processes rather than overwhelming or replacing them.

Maintain Transparency and Trust

Trust is a cornerstone of AI adoption in sensitive contexts like healthcare. To build and sustain trust, transparency must be prioritized, as emphasized in the HCAI framework and analysis findings:

- *Preserving User Autonomy*: Users must retain the ability to access original, unaltered data alongside AI-generated outputs. As noted in 6.4, this preserves their autonomy and can aid in fostering confidence in the AI's role as a supportive tool rather than an intrusive or controlling entity.
- *Explainability and Source Attribution*: Clearly communicating how the AI generates its outputs, including its reliance on validated sources like Patienthåndbogen, ensures transparency and accountability. As discussed in 7.2.1, this helps users understand and trust the system while ensuring that its role remains clear and aligned with their expectations.

Following the development of these recommendations, we presented our findings and suggestions to Styringsgruppen during a collaborative meeting. This meeting served as an

opportunity to share the practical and theoretical insights outlined in this thesis, including the proposed implementation strategies such as the adoption of a RAG framework, iterative deployment processes, and Red Teaming practices.

Our suggestions were positively received by the members of Styringsgruppen, who recognized their relevance to the challenges faced by Sundhedsjournalen. They expressed that the proposed strategies align with their ongoing efforts to enhance the platform and would be valuable as they continue exploring how AI could contribute to that end. Additionally, the presentation addressed many of their initial questions and concerns about AI, as well as the complexities of implementing it in a healthcare context.

9 Conclusion

This thesis originated from an interest in the potential of Artificial Intelligence to mediate and enhance the interpretation of healthcare data, particularly through its integration into Sundhedsjournalen, a cornerstone of Denmark's healthcare data infrastructure. This led to the following problem statement:

"How might AI-driven systems influence and improve the mediation, interpretation, and trust in healthcare data within established platforms, while addressing ethical considerations and user needs?"

Key findings from this thesis reveal that while AI-driven systems hold significant promise in addressing challenges faced by users of Sundhedsjournalen—such as complex medical jargon and fragmented data presentation—their implementation must strike a careful balance between automation and human oversight. Informants consistently emphasized the importance of trust, transparency, and ethical considerations, with particular attention to safeguarding data privacy, ensuring factuality, and maintaining accountability. These dimensions are central to fostering meaningful mediation that enhances, rather than undermines, users' comprehension of their healthcare data. From a theoretical perspective, the application of postphenomenology underscored the co-constitutive relationship between users and technology, wherein both mutually shape each other's roles and experiences. The analysis demonstrated how potential AI-driven systems could disrupt existing mediation dynamics by introducing new forms of interaction and interpretation. For example, informants highlighted how AI's ability to translate medical terms into layperson-friendly language or aggregate data across fragmented systems could fundamentally alter how users relate to their healthcare information. These shifts were shown to have dual potential: they could potentially empower users with clearer insights and ability to interpret their data, or weaken them if the systems lack transparency or perceived reliability.

The findings align with the principles of Human-Centered AI, which provide a guiding framework for addressing the barriers in regards to Sundhedsjournalen mediation, as uncovered in the thesis. Grounded in this approach, the potential of AI systems to improve interpretative clarity and accessibility becomes apparent, yet it also demands iterative and inclusive development processes. Practical approaches, such as implementing

a Retrieval Augmented Generation system to ground AI outputs in validated sources like Patienthåndbogen, can address concerns around accuracy and reliability. Additionally, adopting Red Teaming practices ensures that AI systems remain robust against vulnerabilities and unforeseen misuse, while iterative deployment processes—starting with low-risk areas like routine test explanations—can help refine the system based on user feedback and build trust incrementally. However, systemic and cognitive barriers remain significant hurdles to effective AI implementation. Issues such as inconsistent data presentation, fragmented information sources, and the dual role of Sundhedsjournalen as both infrastructure and interactive platform highlight the necessity for thoughtful and adaptable design strategies. These barriers reflect the broader complexity of integrating AI into established healthcare platforms, where user trust and ethical considerations cannot be treated as secondary to technical innovation. The thesis contributes to ongoing discussions about the responsible integration of AI in healthcare by advocating for a development approach that prioritizes responsible and user-focused development and the relational dynamics between users and the platform. Addressing these complexities can help Sundhedsjournalen navigate the integration of AI technologies to enhance the mediation of healthcare data in ways that are thoughtful and inclusive.

Ultimately, this research highlights that a successful integration of AI into Sundhedsjournalen requires navigating the interplay of technical possibilities, user expectations, and ethical considerations. It reinforces the importance of prioritizing iterative, user-informed design processes that respect and accommodate diverse user experiences. Future research could build upon these findings by incorporating perspectives from healthcare providers, developers, and policymakers, thereby addressing system-wide challenges and opportunities. Such an approach would not only refine the practical applications of AI but also deepen our understanding of its role in shaping healthcare mediation and interpretation. As a practical outcome, the prerequisites for AI integration were presented to Styringsgruppen, who responded positively and indicated their potential use in guiding future development. This collaboration highlights the relevance of the research and its contributions to shaping Sundhedsjournalen's future advancements.

Bibliography

Ainomic. 2023. *Mastering Retrieval-Augmented Generation with LLM, LangChain, and Python.* Last accessed d. 05-06-2024 https://blogs.ainomic.in/mastering-retrieval-augmented-generation-with-llm-langchain-and-python-7496b67cbc2a.

Andersen, Jens Riis, Oskar Harmsen, Kim Rants, and Philipp Schröder. 2023. *Det økonomiske potentiale af GenAI i Danmark.* Last accessed 06-06-2024. Available online: https://www.mckinsey.com/dk/our-insights/det-okonomiske-potentiale-af-genai-i-danmark, November.

Anna Juhl Pedersen, Pernille Have & Rasmus Thomsen, Louise Vang Jensen. 2019. *Et solidt afsæt for strategisk udvikling af sundhed.dk*.* Last accessed 15-02-2024, February.

Brockman, Greg, Christy Dennison, Susan Zhang, et al. 2018. *OpenAI Five, OpenAI.* Last accessed d. 12-02-2024 Link: https://openai.com/research/openai-five.

Brooks, Annette. 2021. *What Are the Different Types of Transcription.* Sidst tilgået d. 02-06-2024. https://www.upwork.com/resources/types-of-transcriptions.

Byford, Sam. 2016. *Google's AI wins first game in historic match with Go champion, The Verge.* Last accessed d. 12-02-2024 Link: https://www.theverge.com/2016/3/8/11178462/google-deepmind-go-challenge-ai-vs-lee-sedol.

Chui, Michael, Eric Hazan, Roger Roberts, Alex Singla, Kate Smaje, Alex Sukharevsky, Lareina Yee, and Rodney Zemmel. 2023. *The Economic Potential of Generative AI: The Next Productivity Frontier.* Last accessed 06-06-2024. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#introduction, June.

Copeland, B.J. 2023. *Artificial Intelligence, Britannica.* Last accessed d. 06-04-2024 Link: https://www.britannica.com/technology/artificial-intelligence.

Corti. 2024. *Corti - Healthcare AI.* Last accessed on November 5, 2024. https://www.corti.ai.

Fan, Jingato, Lu Fang, Jiamin Whu, Yuchen Guo, and Qionghai Dai. 2019. "From Brain Science to Artificial Intelligence." Last accessed d. 23-09-2024, *Engineering*.

Grimm, Dallin. 2024. *'Godmode' GPT-4o Jailbreak Released by Hacker — Powerful Exploit Was Quickly Banned.* Accessed: 2024-06-06. https://www.tomshardware.com/tech-industry/artificial-intelligence/godmode-gpt-4o-jailbreak-released-by-hacker-powerful-exploit-was-quickly-banned.

Hauser, Sabrina, Doenja Oogje, and Ron Wakkary. 2018. *Technological mediation (based on Verbeek's descriptions)*. https://www.researchgate.net/figure/Technological-mediation-based-on-Verbeeks-descriptions_fig1_325704578. PNG.

Healthcare-Denmark. 2024. *Digitalisation of Healthcare in Denmark.* https://healthcaredenmark.dk/media/sghmh0in/digitalisation_2024_onlineversion.pdf. Last accessed on 08-10-2024.

Human Bytes. 2024. *AI Solutions Mammography*. Last accessed on November 5, 2024. https://humanbytes.ai/mammography/.

IBM Research. 2023. *What is red teaming for generative AI?* Accessed: 2024-06-06. https://research.ibm.com/blog/what-is-red-teaming-gen-AI.

Ihde, Don. 2009. *Postphenomenology and Technoscience: The Peking University Lectures.* Albany, NY: SUNY Press.

Lee, Eliot P. H., and Laura A. O'Connor. 2021. *Data and the Digital Society: Data in Action.* Bingley, UK: Emerald Group Publishing Limited.

Lewis, Patrick, Ethan Perez, Aleksandara Piktus, Fabio Petroni, Vladimir Karpukhin, Naman Goyal, Heinrich Küttler, et al. 2020. "Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks." Last accessed d. 06-06-2024 https://arxiv.org/pdf/2005.11401, *arXiv*.

Mølskov, Jonas. 2023. "Technoanthropology and Generative AI: An Exploration in Practice." Last accessed d. 03-06-2024.

Peter, Norvig, and Stuart Russell. 2021. *Artificial Intelligence: A Modern Approach, Global Edition.* Pearson. ISBN: 1292401133.

Radford, Alec, Karthik Narasimhan, Tim Salimans, and Ilya Sutskever. 2018. *Improving Language Understanding by Generative Pre-Training.* Last accessed d. 09-02-2024. https://cdn.openai.com/research-covers/language-unsupervised/language_understanding_paper.pdf.

Radiobotics. 2024. *RBfracture™: AI-powered, automatic detection of trauma-related findings.* Last accessed on November 5, 2024. https://radiobotics.com/solutions/rbfracture/.

Region Hovedstaden. 2021. *Forskning: Opsigtsvækkende studie med kunstig intelligens kan ændre verdens akutberedskaber*. Last accessed on November 5, 2024. https://www.regionh.dk/om-region-hovedstaden/akutberedskabet/nyheder/Sider/Forskning-Opsigtsv%C3%A6kkende-studie-med-kunstig-intelligens-kan-%C3%A6ndre-verdens-akutberedskaber.aspx.

Region-Sjælland. 2024. *Alt hvad du skal vide om sygdomme - Patienthåndbogen*. Last accessed d. 05-06-2024 https://www.regionsjaelland.dk/sundhed/alt-hvad-du-skal-vide-om-sygdomme/patienthaandbogen.

Rosenberger, Robert. 2013. "A Case Study in the Postphenomenology of Imaging: The Astronomical Image." *Human Studies* 36 (4): 455–478.

Rosenberger, Robert, and Peter-Paul Verbeek. 2018. *New Perspectives on Postphenomenology: Beyond Ihde*. Bloomington, IN: Indiana University Press.

Roser, Max. 2022. "Artificial intelligence is transforming our world — it is on all of us to make sure that it goes well." Last accessed d. 06-04-2024 https://ourworldindata.org/ai-impact, *Our World in Data*.

Selinger, Evan. 2006. "Postphenomenology: A Critical Companion to Ihde." In *Postphenomenology: A Critical Companion to Ihde,* edited by Evan Selinger, 1–22. Albany, NY: SUNY Press.

Shneiderman, Ben. 2022. *Human-Centered AI*. Oxford University Press.

Sundhed.dk. 2024a. *Kvartalvis Survey Q1*. Last accessed 15-02-2024, February.

———. 2024b. *Min Sundhedsjournal*. https://www.sundhed.dk/borger/min-side/min-sundhedsjournal/. Last accessed on 08-10-2024.

———. 2024c. *Sundhedsjournalen for Healthcare Professionals*. https://www.sundhed.dk/sundhedsfaglig/hjaelp-sundhedsfaglig/informationsmateriale/sundhedsjournalen/. Last accessed on 08-10-2024.

———. *Patienthåndbogen*. Last accessed 06-06-2024. https://www.sundhed.dk/borger/patienthaandbogen.

Svend, Brinkmann, and Steinar Kvale. 2015. *Interview*. 20–21. https://hansreitzel.dk/products/interview-bog-15828-9788741263779.

Teton.ai. 2024. *Advanced Patient Monitoring*. Last accessed on November 5, 2024. https://www.teton.ai/.

Van Den Eede, Yoni. 2012. *Tracing Technology: Time, Space and Place in Technological Imagination*. Lanham, MD: Rowman Littlefield.

Vaswani, Ashish, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N. Gomez, Lukasz Kaiser, and Illia Polosukhin. 2017. “Attention Is All You Need.” Last accessed d. 05-06-2024 https://arxiv.org/pdf/1706.03762, *arXiv*.

Verbeek, Peter-Paul. 2005. *What Things Do: Philosophical Reflections on Technology, Agency, and Design.* University Park, PA: Penn State University Press.

———. 2015. *Beyond Interaction; A Short Introduction to Mediation Theory.* 26–31. University of Twente.