

Navigating Stakeholder Dynamics in the Development Process of AI in Healthcare

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ABSTRACT

This thesis explores the integration of artificial intelligence in the healthcare sector, focusing on the roles and influences of various stakeholders in the development process. Through nine interviews with professionals from healthcare and AI development, six key categories emerged: AI Integration in Healthcare, Advantages and Disadvantages of AI, Development Process, Stakeholder Roles and Influence, Institutional Logics and Values, and Managing Challenges and Stakeholder Dynamics. Besides the significant potential to improve healthcare, such as enhancing diagnostic accuracy and patient care, this study highlights the challenges and drawbacks of AI, including explainability and data security.

Furthermore, this research demonstrates the importance of stakeholder cooperation, showing how developers, healthcare professionals, patients, healthcare managers and regulatory bodies all play different but interconnected roles in the development process. Effective communication and cooperation among them are crucial for achieving the common goal of improving healthcare. The study also addresses difficulties related to ethics and transparency. Gaining the trust of patients and professionals requires ensuring that AI technologies are unbiased and interpretable. Moreover, healthcare experts must be involved in the development process for AI tools to be clinically relevant and user-friendly.

The thesis offers valuable insights into the interactions between stakeholders in the AI development process for healthcare. It underlines the necessity of continuous collaboration, ethical considerations and balance between innovation and regulation to fully realize the benefits of AI in improving healthcare delivery.

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Keywords

AI, Artificial Intelligence, Healthcare, Stakeholders, Development, Institutional Logics

1. INTRODUCTION

In today's world, Artificial Intelligence (AI) is present in various fields and it has become increasingly important due to its potential to improve and transform different processes in the field of business, education, entertainment and also healthcare (Brown, 2019).

According to Nilsson (1982) Artificial intelligence refers to a field of computer science concerned with creating systems that can accomplish tasks that normally require human intelligence (as cited in Waardenburg and Huysman, 2022). Unique about AI systems is that they can autonomously make connections between large amounts of data points and adjust their parameters accordingly using learning algorithms (Waardenburg and Huysman, 2022). However, not all AI systems are the same. As specified by Russel (2021), designs for AI systems vary enormously depending on where the system is going to be operated and the requirements of the task.

With the demand in healthcare further increasing and treatment methods becoming more complex, AI can be used to perform key healthcare tasks such as diagnosing and monitoring patients (Reddy et al., 2020). Today, AI is already used in areas such as radiology and is implemented in equipment like CT or MR machines (Siemens Healthineers, 2023). Key benefits of AI currently include automation and data analytics, which improve productivity and efficiency – crucial factors given the shortage of healthcare workers (Preston, 2023). Moreover, AI is seen as being very efficient in processing and analyzing large amounts of data to support decision-making or provide proper feedback (Kaplan and Haenlein, 2019). Despite these advantages, the potential of AI in healthcare is still underutilized.

However, the integration of AI in healthcare comes with challenges and concerns. Concerns, which have a vital impact on slowing down the further development and adoption of AI in healthcare. Although AI should be unbiased and without prejudice towards its user, it reflects the biases and the data they are trained on, resulting in a potential disadvantage of certain groups of people. Even if it is guaranteed that the AI system is designed completely neutral in its basic form, it has to be trained that way to function properly (Reddy et al., 2020). Therefore, there is the responsibility to train it in a way that it remains objective and does not lead to false diagnoses. Especially in the field of healthcare, this could have significant consequences. Additionally, it is important to maintain up-to-date data to prevent decreases in performance of the algorithm (Shaw et al., 2019). With these immense amounts of sensitive patient data, the risk and potential of security breaches has to be minimized as much as possible (Shaw et al., 2019). It is essential to take these pros and cons into consideration when developing AI systems. Not taking them into account can lead to misunderstandings and eventually to rejection.

While there is a vast majority of healthcare workers thinking that AI can improve the quality of healthcare, the study conducted by Abdullah and Fakieh (2020) indicated that employees are also afraid of AI potentially replacing them. Another study by Nitiéma (2023) shows that not all stakeholders think positive about AI in healthcare. While there is enthusiasm, there are also concerns about patient care quality and the future of healthcare professions. Furthermore, the patients' lack of trust in AI systems could be a possible barrier to their acceptance and result in unwillingness of use. Then, the challenges for managers, employees and states (Kaplan and Haenlein, 2019). Managers have to adapt their leadership style in order to assess the skills of their employees and identify the best position for them in a system where AI and humans work together. Employees have to

adapt to significant changes in their work environment get used to work with a new technology. Even though it is unlikely that AI will replace entire jobs completely, there will be positions where AI is going to take the position of a human. Finally, states face the challenge of strictly controlling AI to prevent issues and mistakes and determine consequences if they occur. Hence, research shows that there are many different opinions as well as positive and negative aspects about AI in healthcare. Following the previous statements, the development of AI in the healthcare industry is affected and influenced by different stakeholders. A stakeholder is a party that has an interest in an organization and can either affect or be affected by its actions (Fernando, 2023). In this research, all parties are considered stakeholders that are interested, involved or influenced by the development of AI products for healthcare.

Furthermore, this research focuses on potential different goals, interests, and the individual institutional logics and approaches of these stakeholders when looking at the clinical use of AI. Understanding these differences is crucial because they influence how stakeholders take their decisions, which can have an impact in the development process of AI. This is where the consideration of competing interests is essential. As Greenwood et al. (2011) illustrate, institutional complexity arises when organizations must navigate conflicting logics and interests from diverse groups. Ramadani et al. (2024) have shown that these conflicts do also occur in the healthcare setting with stakeholders having different priorities. Therefore, while each stakeholder might bring unique priorities in the development process, there could be a potential for conflicts.

Since the main objective of this research is to explore the development process of AI in healthcare, the focus is on the stakeholders involved in those processes. The research addresses which stakeholders are involved, how they interact, and how they influence the AI development process. This includes addressing concerns, patient care, and balancing innovation with regulation. Additionally, this research examines how these stakeholders balance potential differences regarding interests and institutional logics. Therefore, the leading research question is as follows:

“How do the roles, interactions, and institutional logics of key stakeholders influence the development of AI in healthcare, and what actions do they take to balance between possible competing opinions and interests to enhance collaboration?”

Despite the increase in research on AI in healthcare, several gaps remain. While the technical capabilities and potential of AI are extensively covered by existing literature, there is limited understanding of the intricate dynamics between different stakeholders involved in the development process of AI systems in healthcare. Previous studies have not sufficiently addressed how the development of AI tools is affected by the varying influences of the stakeholders and how they deal with potential competing opinions and institutional logics.

1.1 Research Objective

The goal of this research is to clarify the roles, interests, influences, and interactions of various stakeholders in the development process. By examining how different parties balance potential competing interests and institutional logics, this study seeks to provide insights into the collaboration strategies that enhance the development of AI tools in healthcare.

1.2 Academical Relevance

The developers of AI for healthcare also have to cope with different stakeholders. Due to varying roles, some have a greater influence on the whole development process, while others have less. Miller (2022) defines those who are affected by AI, but do

not have any power to impact, as passive stakeholders. These stakeholders can include end users and certain individuals in the society.

As previously mentioned, research has explored the different views of stakeholders on AI in healthcare, highlighting positive, negative, and challenging aspects about it. Nevertheless, there is a lack of connection between these aspects and the institutional logics of the various stakeholders involved.

It is unknown how much influence these stakeholders have, and how certain differences are managed. This is crucial to understand, because it can guide the development of more effective collaboration strategies and ensure that all relevant perspectives are considered. Moreover, potential conflicts can be identified and addressed early on and provide a smoother integration of AI in healthcare. This research should clarify how different institutional logics affect and relate to each other. This is beneficial not only for research of AI for healthcare, but also other areas where different stakeholders are affected by the technology and have to interact with each other. It provides insights into how AI technologies can be developed to meet the diverse needs and values of various stakeholders, including healthcare providers, policymakers, and end users. According to Vo et al. (2023), stakeholder engagement ensures that AI systems align with the expectations of those stakeholders and therefore promoting better adoption and implementation.

1.3 Practical Relevance

The knowledge gained from this research shows which stakeholders have more, and which stakeholders have less impact on the development process of AI for healthcare. It indicates the importance of that stakeholder when certain decisions have to be made and shows how these stakeholders deal with their interest differences regarding AI in healthcare.

This knowledge facilitates further research on how to improve procedures between developers, healthcare professionals, and end-users, as well as methods to increase the influence of certain stakeholders. Eventually, this could result in an enhanced use of AI in the healthcare industry and improved development effectiveness.

For the future use and implementation of healthcare products, both current and in development, it is important to consider changes that could potentially increase or decrease the influence of various stakeholders. Especially in the healthcare industry, anticipating and addressing potential challenges early in the development process can effectively leverage the potential of AI. This would lead to better adoption rates, ethically sound and user-centered technology, and, most importantly, enhanced patient care.

2. THEORETICAL FRAMEWORK

This section outlines the main components of the research. First, artificial intelligence (in healthcare). Second, the different stakeholders. Third, the development of AI for healthcare. Lastly, the institutional logics. Together these form the base for the research question.

2.1 Artificial Intelligence (in Healthcare)

Artificial Intelligence is defined as a system with the ability to interpret external data correctly, learn from such data, and use those learnings to achieve specific goals and tasks through flexible adaptation (Kaplan and Haenlein, 2019). This capability is necessary in many different areas and industries for proper functioning and efficiency, as it can manage volumes of data no human could ever handle.

AI in healthcare is already present in many different areas, such as treatment, prognosis, diagnostics, and monitoring. According

to Davenport and Kalakota (2019), different research studies suggest that AI can perform as well as or even better than humans at key healthcare tasks, such as diagnosing diseases. The same article noted that radiologists are already outperformed by today's algorithms at spotting malignant tumors.

Another study by Pee et al. (2018) demonstrated that AI-based medical imaging diagnostic systems are already in use that inspect computed tomography (CT) images and often provide diagnoses with greater efficiency and accuracy than humans.

AI can also improve resource efficiency in healthcare by undertaking repetitive and routine tasks like patient data entry, review of laboratory data, and imaging results. This gives clinicians more time to provide direct care for patients (Reddy et al., 2020). Another study reveals how effective AI tools in healthcare are compared to humans and how the results can assist human professionals with their diagnoses (Lebovitz et al., 2022).

It was also suggested that despite rapid progress and investments in AI, caution is essential due to the technical limitations of current AI technologies (Reddy et al., 2020). These limitations include legal responsibilities, potential bias, and the understanding of how these systems work.

This is directly related to the development process of AI systems and the goals of the stakeholders influencing them. More specifically, the link between the development process of AI systems and their current use in healthcare lies in how stakeholders set their goals and requirements for the creation and adjustment of these systems.

2.2 Stakeholders

Research has shown that there is a variety of different stakeholders that are involved in the development process of AI. According to Hogg et al. (2023), these are the five key stakeholder groups that have different views on clinical AI: (1) Developers, (2) Healthcare Professionals, (3) Patients, Carers and the Public (4) Healthcare Managers and Leaders (5) Regulators and Policy Makers.

2.2.1 Developers

This group of stakeholder are developing the whole AI system. They often require both technical and clinical expertise for effective interaction with multiple stakeholders but are still affected by defensive attitudes from healthcare organizations and patients who distrust the industry with their access to all the sensible data that is needed to train the AI (Hogg et al., 2023).

2.2.2 Healthcare Professionals

Healthcare professionals (HCPs) are the main users of these AI systems. According to Hogg et al. (2023), perspectives on AI often varied, but AI systems were considered valuable when they took care of simple and repetitive tasks, improved patients outcomes or widened individuals' scope of practice. It was also mentioned that care provision could be improved in terms of quality and reach if clinical AI was properly aligned with familiar ways of working.

2.2.3 Patients, Carers, and the Public

In addition to HCPs, this group of stakeholders is most affected by these AI systems. The main issue perceived by this stakeholder group could be the transparency (Hogg et al., 2023). Properly informing the patients, carers, and the public about how these systems work and what they are used for would reduce the fear and anxiety perceived by those people.

2.2.4 Healthcare Managers and Leaders

This group is responsible for the successful implementation of these AI systems and must carefully select which tools are likely to relieve workforce pressure and determine where, how, and for

whom they should be applied (Hogg et al., 2023). Since clinical AI sometimes absorbs simple aspects of clinical work, increasing the concentration of more demanding tasks within clinical workflows, managers emphasized considering staff well-being

2.2.5 Regulators and Policy Makers

Lastly, this group of stakeholders is responsible for regulating these AI systems, both in terms of how these tools are deployed to new sites and how they may evolve through everyday practice (Hogg et al., 2023). According to the same literature, these regulations and policies are essential due to concerns about legal responsibility if clinical AI becomes dominant, potential bias of certain AI systems, and to ensure consistency of care.

2.3 Development of AI for Healthcare

As AI is changing the world we live in, and as these technologies are used in crucial decision-making processes like cancer detection, different interest groups across the world (e.g., IEEE, ACM) have defined ethical guidelines and principles to ensure responsible AI usage (Balasubramaniam et al., 2023). One major drawback is the lack of transparency in AI systems. Studies by Chazette and Schneider (2020) have highlighted explainability as a key requirement that improves transparency. Therefore, according to Balasubramaniam et al. (2023), transparency and explainability are identified as key quality requirements of AI systems. When developing AI systems, the developer must decide which AI models to choose. Considering the previously mentioned aspects, an explainable AI (XAI) technique that makes the model interpretable and transparent to clinical users can help address these issues (Jin et al., 2023)

Especially for healthcare, the model is crucial for further implementation. Therefore, AI systems must be both usable and understandable by those who are actually using them. In the study by Chen et al. (2023), it was stated that, from a human-centered design perspective, transparency is not a property of the machine learning model. Additionally, following human-centered design principles in highly specialized and high-stakes domains is challenging due to limited access to end users and the imbalance of knowledge between users and developers. This is particularly an issue because, as previously mentioned, the fact that so many people don't understand how this technology works leads to its avoidance (Hogg et al., 2023). Also, even though the level of influence among the stakeholders may not be clear, it is important to include various stakeholders when developing AI for healthcare. They are not only using these systems but are also experts in the field. They have the best knowledge of how to approach diagnosing and treating diseases.

In summary, both the developers and users (or those affected by the development process) should be more informed about each other's interests. This mutual understanding enables developers to create AI systems that are more aligned with the needs and expectations of users and should be considered a necessity. Specifically, in the context of healthcare and AI, involving medical professionals in the development process is essential. Their expertise and understanding of healthcare practice is a benefit to create technically good products which are clinically relevant and user-friendly. Furthermore, this expertise aids with the critical factors of transparency and explainability. By doing so, developers can enhance trust and eventually lead to further adoption in healthcare settings. An important takeaway is the need for ongoing communication and collaboration between developers and users throughout the entire development process, and that it is crucial to listen to feedback from different parties in order to meet real-world needs.

2.4 Institutional Logic

Stakeholders involved in healthcare and AI could possibly operate under different institutional logics. These logics represent distinct norms and values, which can lead to misunderstandings and conflicts as they build the fundament of how certain things are perceived and consequently affects their decisions. Understanding each other's institutional logics and overcome differences is therefore important for effective collaboration and the success of AI in healthcare. Nevertheless, before this can be further investigated, it has to be clarified what institutional logic is.

According to March and Olsen (2009), an institution is a relatively stable set of rules and well-founded practices where certain roles are assigned, and actors have to act and behave according to the norms and values within that institution. As per Leite and Ingstrup (2022), Institutional logics are a set of practices, assumptions, values, beliefs, and rules that are socially constructed. Individuals rely on these to organize and understand their work, guiding how to function within social situations. In the context of this study, these logics guide stakeholders in their decision-making about how to operate and behave in social situations with other parties. Instead of focusing only on the individual or only on the societal structure, institutional logics focus on how these two points are intertwined (Sirén-Heikel et al., 2022).

There are seven ideal-typical societal-level institutional logics: community, corporation, family, market, profession, religion, and state (Thornton et al., 2012). Importantly, an institution can have multiple institutional logics, and these different logics can even be contradictory and not rational (Fang et al., 2023). For example, a firm that highly values sustainability might produce cheap throw-away products for high profit. This reflects the contrast between long-term goals on one side and short-term vision on the other. Moreover, according to the same study, it depends on the institutional logic of certain stakeholders how they view technology. Therefore, knowing the logic of the stakeholder is essential. It is crucial not only when making decisions related to AI but also for understanding how actors in separate fields construct organizing principles, practices, and norms. Additionally, these different framings influence identity and sense-making, create shared narratives, and shape theories for seeing the world (Ocasio et al., 2017; Thornton et al., 2012, as cited in Heike et al., 2022).

In this context of AI in healthcare, institutional logics can be seen as a framework and underlying principles that guides stakeholders in their decision-making. For instance, these decisions could include, but are not limited to, priorities in patient care, ethical standards, or regulatory topics. Organizations face institutional complexity whenever they confront incompatible prescriptions from multiple institutional logics. It is essential to examine how plural institutional logics are experienced within organizations and how organizations respond to that complexity (Greenwood et al., 2011). Moreover, it is not only the number of different institutional logics that contributes to the complexity but also the relative (in)compatibility between these logics (Greenwood et al., 2011). For effective collaboration during the development process, understanding how these plural logics coexist and how organizations navigate and adjust to potential conflicting demands is essential.

3. RESEARCH METHODOLOGY

The following section explains the research methodology and research design. It includes how the necessary data was collected and how the collected data was analyzed to answer the research question and fulfill the research objective.

3.1 Research Design

This research is qualitative research, utilizing interviews to gather data. Qualitative research focuses on understanding real-world problems through the collection and analysis of non-numerical data, such as interviews, observations, and text analysis (Tenny et al., 2022). Rather than addressing how many or how much, it addresses how and why. This research employs an interview study approach to explore the interactions and influences of the stakeholders in a real-life setting. An interview study collects qualitative data through structured, semi-structured, or unstructured interviews to learn about the experiences, perspectives, and interactions of the participants (Jamshed, 2014). In this research, a semi-structured interview approach was used. While there is a predetermined framework of questions, this method allows flexibility in order and phrasing, enabling more natural and in-depth exploration of topics.

Following that, the primary focus is on the various stakeholders, their potential interest conflicts, and their differing levels of influence. The emphasis is on AI system used in healthcare (e.g., diagnostic and imaging of diseases/cancer, etc.). This was operationalized to evaluate how these different stakeholders influence and cooperate with each other. The data was collected from individuals who are either operating within the sector or are directly affected by it.

Understanding how different stakeholders and their opinions affect the development process for such a crucial AI tool is essential. This involved examining the different roles from each party throughout the entire process.

3.2 Data Collection

The data collection was performed by conducting interviews. The respondents were stakeholders that are involved in the development of AI for healthcare and can give relevant information about it. The focus was on their involvement, the involvement of other stakeholders, the different roles and their institutional logics.

Therefore, the research population consists of individuals working for firms that function as stakeholders in the development process of AI in the healthcare industry, as well as those working in fields that use imaging techniques and can provide relevant information.

Before the interview, the purpose of the research and the intended use of data were explained. Consent to record the interview was also requested. Then, the interview was conducted, and afterwards, there was time to answer potential questions from the respondent.

In 9 interviews data was collected from professionals working in different areas with varying expertise, genders, ages, and experience (see Table 1.). This minimizes potential bias and ensures a variety of views and opinions.

Participant ID	Role	Gender	Industry
P1	Product Manager	M	Imaging Tech. Development
P2	Image Analysis	F	Imaging Tech. Development
P3	Research Scientist	M	Medical Device Manufacturer
P4	AI Development	M	Imaging Tech. Development

P5	Project Manager	F	Manufacturing & Develop. Imaging. Tech.
P6	Software Developer	M	Manufacturing & Develop. Imaging Tech.
P7	Sales	M	Manufacturing & Develop. Imaging Tech.
P8	Radiologist	F	Hospital
P9	Administration	M	Hospital

Table 1: Interview Participants

The data collection was stopped once no more relevant or new data emerged, and all the necessary information to answer the research question was available.

According to Guest et al. (2006) this so-called data saturation, based on the data set, is usually reached after twelve interviews, although basic elements are present after six. However, other research by Hennink and Kaiser (2022) has shown that data saturation in qualitative research typically occurs within 9 to 17 interviews. Outliers exist, with sample sizes ranging from 5 to 24 interviews, which highlights the variability in achieving data saturation based on study design and goals (Hennink and Kaiser, 2022).

In this research, saturation was reached after 9 interviews. This conclusion is supported by the fact that themes started repeating and no new information was emerging.

3.3 Data Analysis

After the interviews were conducted, they were transcribed using a software and then analyzed. The analysis included reviewing and filtering both the notes and the recordings for the most essential and necessary information that were needed to answer the research question.

The coding of the interviews was done using the program ATLAS.ti. Braun and Clarke (2006) emphasize the importance of making the analysis process transparent and argue that thematic analysis should be claimed as the method of analysis to ensure clarity within qualitative research reporting and avoid any confusion. Therefore, the analysis adheres to the framework proposed by Braun and Clarke (2006), which outlines six phases of thematic analysis.

To start, the recordings of the interviews are transcribed into written form and read through several times. This is done not only to check for potential transcription errors but also an essential part of the initial step to become familiar with the data. The next step is the coding, more specifically, inductive coding. Inductive coding, also referred to as open coding, is a method used in qualitative research to analyze textual data by coding the data without being predicated to any theories, constructs, or concepts (Chandra and Shang, 2019). It is important to keep an open mind to the potential meaning of the data and code for as many potential themes and patterns as possible. For example, statements like “AI can increase the quality of healthcare by freeing up doctors' time” were coded as “Efficiency” and “it should just be more tailored towards the true risks and not about what people might think can be dangerous” as “Regulatory Challenges”. This was done with all the transcripts.

Following that, the focus shifts to examining these codes and collecting them under potential themes. For this, codes with similar content were grouped together and checked for broader patterns in the data. These themes summarize the significant

aspects of the data and provide a comprehensive understanding of the research findings

In this research, the data was organized into six major themes. The first theme, **AI Integration in Healthcare**, encompasses the various ways AI is used and incorporated into healthcare settings. The second theme, **Advantages and Disadvantages of AI**, addresses the perceived benefits and drawbacks of AI by healthcare professionals. The third theme, **Development Process**, focuses on the different stages of creating AI systems for healthcare. It also touches on important points about stakeholder engagement, which are further explained in the fourth theme, **Stakeholder Roles and Influence**. This theme discusses the various stakeholders that are involved in the development process of AI in healthcare. The fifth theme, **Institutional Logics and Values**, explores the underlying principles and norms that guide stakeholders' decision-making and their behavior. Lastly, the sixth theme, **Managing Challenges and Stakeholder Dynamics** focuses on how stakeholders interact and navigate various challenges during the development of AI in healthcare.

Organizing the data into six themes provides a structured analysis of the key aspects influencing the development of AI in healthcare. Furthermore, it offers a clear framework and helps in understanding the connections between each of these aspects. With this approach, the research question can be answered, and valuable insights can be offered to stakeholders aiming to leverage AI to improve healthcare. The final step involves producing a report that clearly represents the main accomplishments of the research to the reader, explains the reasoning behind different opinions, and gives a concise answer to the research question.

4. RESULTS

The results from the conducted interviews provide a comprehensive view of the different roles and actions of the various stakeholders involved in the development process of AI in the healthcare sector. Appendix B offers a visualization of this.

The aim of this research was to explore how different stakeholders influence the development process and understand the dynamics between them regarding competing interests and contributions. By categorizing this topic into themes, a deeper understanding of those interactions, challenges, and contributions was achieved, providing an organized analysis of the critical aspects.

The analysis of the interviews revealed six key themes that align with the research objective. These themes are AI Integration in Healthcare, Advantages and Disadvantages of AI, Development Process, Stakeholder Roles and Influence, Institutional Logics and Values, and Managing Challenges and Stakeholder Dynamics. The results underline the interplay of the different stakeholder groups, the variety of influences, and the reasoning behind their decisions.

4.1 AI Integration in Healthcare

The integration of AI into healthcare is transforming the medical landscape, offering new opportunities across various sectors. This theme is about the current state and future outlook of AI, including anticipated advancements and developments that might be integrated into healthcare in the future. The interviewees highlighted both positive impacts and challenges associated with current AI technology.

4.1.1 Current Situation

The interviewees indicated that AI has a positive impact in several areas of healthcare and is able to help the professionals providing better care for their patients. Across the different

sectors, AI is seen as more and more important. According to P9, AI is becoming *“a crucial part of healthcare”* and is already assisting professionals in multiple aspects. Further, P8 highlighted *“AI is making significant progress in healthcare, especially in areas like radiology, pathology, and patient management”* and P4 explained that *“AI technology is significantly reducing errors in medical imaging, particularly in mammograms used to detect breast cancer”*. Some of the healthcare professionals also pointed out the evolving regulatory landscape and how *“they really try to catch up in the market”* (P1). P5 also stated that we are seeing more regulations. But those *“are ensuring the quality of the product”*. However, P5 also said, that *“there is a delicate balance needed because excessive regulations can also hinder innovation”*. Similarly, P6 described the current situation as *“both exciting but also challenging”* and P7 highlighted the essential role of AI in advancing healthcare, but noted the importance of balancing regulations with innovation. Even though it can be seen that there are good and bad sides about the strict regulations, P9 pointed out something crucial. Eventually, *“there are real human beings involved and affected by the technology”* and that the rules therefore should be as strict as possible.

4.1.2 Future Outlook

Looking ahead, all of the interviewees agreed that the potential of AI is not fully used yet and that stakeholders expect AI to play an important role in every aspect of healthcare. P5 said that AI *“will enhance the accuracy and efficiency of diagnostics and create personalized treatment plans tailored to each individual, significantly improving patient outcomes”*. P8 shared a similar view and mentioned *“predicting disease outbreaks might be possible in the future”*. It was then added that the focus is generally efficient and effective patient management. P6 also underlined that and predicts that *“in the next 10 to 20 years, AI will become a fundamental part of healthcare, enhancing accuracy and also helping with treatment and all the administrative tasks”*. Additionally, both P2 and P3 expect that AI will become a standard tool for healthcare professionals that will help with high workloads and very time consuming tasks.

Nevertheless, it is clear that the overall goal is not to replace healthcare professionals, rather to support them. P1 even explicitly said, *“All of the doctors feel like you're going to replace us, but no, that's not the idea”*. Similar with P2, who said, *“I don't think it's going to replace physicians, definitely not”* and *“that the human eye is still very, very important”*. Likewise P8, which said *“I think replacing is also something that we won't be talking about for the next couple of years. It is essential that a human oversees everything”*. Generally none of the interviewees really thinks that AI is going to fully replace healthcare professionals in the near future, but rather support them with their work. According to P1 it is about making the job *“more enjoyable”*. Those jobs in which doctors might be replaced are for jobs that *“take a lot of time, but don't take too much mental capacity”* (P1) or with *“things that basically cannot go wrong”* (P3). P1 even further elaborated on this topic and the reason why healthcare professionals really shouldn't be too pessimistic about AI. Since *“the workload within the medical sector isn't going down in the next year. If you would do nothing, it would increase and increase. So what you could try and do is to let this workload increase less by supporting the doctors, making the system more efficient”* (P1).

4.2 Advantages and Disadvantages of AI

AI in healthcare brings many benefits, for example improvements in efficiency or enhanced accuracy in diagnostics. However, alongside these advantages, there are also challenges and drawbacks. Issues related to data privacy, lack of

transparency in algorithms and concerns regarding job security among healthcare professionals are important things that have to be addressed. This theme is both about the advantages and disadvantages of AI and the things that come with the broader adoption of AI in healthcare.

4.2.1 Advantages

All of the interviewees highlighted the positive impact AI technology has on their field or on healthcare. One significant advantage is the enhanced diagnostic accuracy AI provides. The effectiveness of these technologies is extremely helpful, especially in detecting diseases quickly and accurately, and potentially saving lives by initiating treatments as soon as possible. P7 even explicitly mentions the detection of cancer and how important it is *“to diagnose diseases like that as early as possible because every day counts and can make a huge difference in the further success of the treatment”*.

Furthermore, it was said that AI greatly improves efficiency by automating routine tasks. Multiple professionals specified that there is more time for personal treatment due to that. P4 said that AI *“can increase the quality of healthcare by freeing up doctors' time for more personal interaction with patients and personalized care”*. Similarly P3 mentioned that AI *“will allow healthcare professionals to use their time for treating patients for other face-to-face interactions”* and P6 highlighted that rather spending time on tasks AI can do, doctors can *“focus on patients who need their attention most”*. As observed, this is not only about efficiency but also the overall quality of healthcare that improves due to more time for personalized healthcare and treatments. Another big advantage mentioned by the professionals is that AI is not affected by humane limitations. P2 said that *“it's as good on Friday afternoon as on Monday morning”* and P3 talked about the *“real-time guidance of tools”* that improves *“the precision and outcomes of surgical procedures”*.

4.2.2 Disadvantages

Despite the numerous advantages mentioned before, there are also numerous disadvantages and challenges. First of all, the professionals pointed out the issue of data privacy and security. P3 even mentioned that *“patient privacy is one of the major concerns”* and that it can be *“quite restrictive when trying to develop AI algorithms that need large amounts of data”*. P6 and P8 remarked similar things and mentioned that there are concerns from the patients regarding their sensitive data that is processed by AI.

Another problem that was drawn attention to by the interviewees is the potential bias by AI, noting that *“AI can only be as good as we teach it basically”* (P6). This was also brought up by P3, which said the *“limited generalizability and vulnerability to bias”* are a problem *“because algorithms are only as good as the data they are trained on”*. This issue calls attention to the need for diverse and comprehensive data sets to train AI systems effectively and accurately. Unluckily, this is not as easy. These previously mentioned problems are linked to each other. As already said, the training process of AI is very important and needs a lot of data. However, *“you really need nice data sets”* (P2), and to get those data sets, patients have to be asked for consent. Since patients are already really concerned about their data privacy, this is not as easy as someone would think. According to P2, *“that's not pushed enough”*. *“If it's not asked, then it cannot be used. And that really decreases the amount of data that can be used for research. And especially for more rare diseases, that's a pity”* (P2).

Additionally, the majority of the interviewees talked about the concerns of healthcare professionals about the possibility of losing their job due to AI, which also leads to skepticism towards

AI technology. P3 went into detail with this problem and said *“many AI tools work like a black box, and it's not easy or even possible to follow the reasoning or how the algorithm got the answer. So understandably, doctors and healthcare professionals don't fully trust these devices”*.

Besides the concerns of the professionals, there is also the issue with the explainability of AI. P6 also talked about this and said that it is *“quite difficult to explain sometimes”*. Yet, another reason causing this skepticism is the lack of knowledge. P6 pointed out that *“we need more education on AI...to fully realize the AI's potential”* and P4 said that *“it can be hard to explain to healthcare professionals that AI is there to help, not replace them”*. It can be seen, if healthcare professionals are not fully educated and therefore unwilling to adapt to AI technology, the full potential and all the advantages won't come to shine. Nevertheless, even if this is the case, there is also the cost of those technologies. P9 said *“those machines, those technologies, are not really cheap”* and *“if we just spend all the money on technology...that wouldn't be sustainable”*. Further, P5 also mentioned that *“it's also a question of costs”*.

In conclusion, while AI offers many benefits for healthcare quality, it also presents several challenges that shouldn't be disregarded. Addressing these disadvantages is crucial for the successful use of AI in healthcare and using the full potential out of the given advantages.

4.3 Development Process

The development process of AI systems in healthcare requires thorough planning and proper collaboration between the various stakeholders involved. The entire process includes, but is not limited to, identifying clinical needs, extensive testing, and ensuring compliance with all guidelines to guarantee safety and reliability. This theme focuses on the complexities of the development process for AI technologies in healthcare.

4.3.1 Process Involvement

According to the interviewees, the whole process typically begins with identifying clinical needs and areas where AI could be an overall improvement. P8 explained that the initial step would be *“to pinpoint clinical demand where AI can deliver significant benefits”* such as the detection of certain diseases or patterns in medical imaging. Similarly P5, who said *“the process typically starts with identifying a specific healthcare problem that we could address with AI”*. And even though all the stakeholders are important, hospitals and healthcare professionals play a major role at this stage of the development phase. It was mentioned by several interviewees that the whole process usually begins with them. P5 said that *“the process begins with identifying what is needed by talking to healthcare professionals”*. Likewise P4 and P9, who said that the development starts with the ideas of the healthcare professionals.

Followed by that, there is the evaluation if the idea is feasible. This is an important step before moving into the development phase. According to P5, *“if feasible, we move into development involving various stakeholders, including healthcare professionals, software engineers, and hardware companies”*. Almost all interviewees indicated that they are involved in all the steps of the development process, from beginning to end, emphasizing the importance of cooperation during the whole process. This *“ensures our products meet the highest standards of quality and safety, complying with all regulations and meeting customer needs”* (P5). Further, P9 highlighted their role in providing clinical expertise and data for development and the participation in testing phases to ensure that the technology works effectively in a real-life setting. This testing is a crucial part and was mentioned by several interviewees. There is a need

for plenty of data to do proper testing in clinical settings, and lots of documentation necessary in order to get an approval by the regulatory parties. P6 elaborated on this that *“it undergoes intensive testing which also includes clinical validation and there are really strict guidelines we have to stick to”*. Also P1, that said *“you develop it, there’s extensive testing afterwards, there’s clinical evaluation, and there’s a high documentation load as well”*.

4.3.2 Regulatory Approval

One of the most crucial, aspects of the development process is the regulatory approval. The laws and regulations are extremely strict, and so are the regulating bodies in charge of them. They are necessary to guarantee safety and reliability of AI tools, which in turn foster the trust among the user and developer and protect the patients. This trust is vital, especially because the way AI is working is not always as easy to clarify. P6 said that AI *“is quite difficult to explain sometimes, it is crucial that it can be trusted”*. Due to that, P3 noted *“regulatory bodies such as the FDA are developing regulations around AI. One of the main concerns is patient privacy, and Europe has implemented the GDPR to tackle this”*. Those regulations can be quite restrictive sometimes, and as P2 puts it, *“we might go a bit overboard in thinking about safety”*. However, overall, it is seen positively *“because they have to decide that your products are actually safe. I mean everyone can claim that their product is safe but it doesn’t mean it is safe”* (P1).

The process of obtaining regulatory approval involves extensive testing, documentation and compliance with guidelines set by regulatory bodies such as the FDA or CE certification. Referring to that, P2 stated that *“you perform validation studies, it needs to get approved by a certain organ, you need to get certification, you need to have all your documentation in order and so on”*. Comparably P1, which said that *“you have to send this to a notified body, that’s the authority that will then check if your product has been designed according to the correct guidelines and that means that you have to show them exactly how your process was”*. So even if they are necessary, strict regulations are also considered as *“a double-edged sword”* (P7). There might be challenges when it comes to releasing new products or innovations, thus, *“a delicate balance”* (P5) is needed. Even more, P2 stated *“it should just be more tailored towards the true risks and not about what people might think can be dangerous”*. All in all, the interviewees generally agree that strict regulations are beneficial as they ensure the safe application of AI technologies in healthcare, ultimately protecting patients and ensuring high standards in healthcare.

4.4 Stakeholder Roles and Influence

A variety of stakeholders, each with their own perspectives and influences, are involved in the development process of AI in healthcare. This theme focuses on the different roles and influences of these stakeholders and how their interactions and contributions affect the effective use of these technologies.

4.4.1 Healthcare Providers

AI systems for healthcare are developed with input from healthcare providers, therefore, they play a crucial role in the entire process. They are the primary users of these technologies, offering vital information about practical application and clinical requirements. Furthermore, their involvement usually begins at the initial stages, identifying particular healthcare problems that AI may be able to address. P9 specified that they are involved in identifying needs and providing the clinical expertise and the data for the development. P8 also said their *“feedback during the testing phase is really important for these tools”* and P5 mentioned that *“regulatory bodies and healthcare providers are particularly crucial”*. So by the interviewees, healthcare

providers have an immense influence. This influence is critical in shaping the development of AI systems to match with real needs, improving the overall quality and effectiveness of healthcare.

4.4.2 Patients

Patients are central to the AI development process as they are the ones affected by those technologies. Even though their influence might not seem as direct as that of the healthcare providers, it should not be neglected. P2 said that they are cooperating with physicians who *“also talk to patient associations to talk about what the desire of the patient is”*. Furthermore, multiple interviewees highlighted that their input is essential to shape AI tools effectively, and P8 talked about the significance of their data to training AI tools. This is particularly important as patients could also deny that their data is used for research, which, according to P2, is even more problematic with rare diseases where data is already rare. Not only that, but patients could also deny to attend the whole treatment if they do not feel comfortable or safe. Therefore, they have full control in the end. This was also brought up by P4 which said *“depending on the issue, there is always someone who decides in the end, whether it’s the patient, the hospital, or another party”*.

4.4.3 Developers

Developers are responsible for creating and refining AI algorithms and machines. They must work extensively with other stakeholders and collaborate with healthcare professionals to understand clinical needs to ensure that their AI tool meets exactly the necessary requirements. Furthermore, they have to adhere to all guidelines provided by the regulatory bodies in order to be able to release their product. Here, according to P1, it also depends on what exactly is planned and whether the product has to be certified again. Also, every developer who was interviewed claimed to be involved in every stage of the development process. P6 explained *“we’re involved in all of these stages from initial research and data collection to model development, testing, and also the approval part”*.

4.4.4 Regulatory Bodies

Regulatory authorities ensure the safety and reliability of artificial intelligence tools. P1 and P3 imply the importance of regulatory frameworks and guidelines. They emphasize that they help to ensure compliance with safety and quality, but also in achieving the required standards for product approval by institutions like the FDA and CE certification. P6 discussed that guidelines from the EU and United States are really strict, however, *“these regulations can sometimes also slow down further processes, releases, and more. That is something that we really have to balance. But at the same time, they are also really important to build trust in AI applications in healthcare”* (P3). P4 and P7 highlighted the crucial role of regulatory bodies in ensuring the safe and reliable use of AI in healthcare. Generally, all interviewees agreed that the regulatory bodies are the most significant stakeholders, or at least one of the most significant.

4.5 Institutional Logics and Values

Developing AI for healthcare is not only a technical challenge but also a matter of norms and values. Ensuring patient safety, maintaining high ethical standards, and fostering collaboration among different stakeholders are fundamental for the effective development of AI technologies in the medical field. This section will explore the core values and principles upheld by the different stakeholders, focusing on their commitment to patient safety and quality, ethical practices, and group efforts. These values are important for guiding development and continuous improvements of AI solutions, ensuring they not only enhance

healthcare results but also align with the mission of delivering high quality patient care.

4.5.1 Patient Safety and Quality

One of the most evident findings of the study is that patient safety and quality are always top priorities. This emphasis on patient care influences how stakeholders manage challenges and make decisions, reflecting the institutional logics and values prevalent among the parties involved. P9 demonstrates the focus on patient well-being and high quality of care by stating that the most important thing to them “is the well-being of the customer or the patient...high quality of care is our top priority, and in my opinion, that should be the top priority for everyone working in the healthcare industry”. P8 highlights the importance of patient safety and ethical practice by mentioning that “trust and care for patients is fundamental in healthcare”. Furthermore, P5 underlines the necessity of safety and reliability in AI products to gain public trust, while P4 prioritized high standards in breast cancer research and treatment. P7 and P2 both underscored the importance of accuracy and reliability in AI to ensure patient safety. Lastly, P1 reiterated the commitment to patient care and quality in AI development, emphasizing the improvement of healthcare.

4.5.2 Ethical Practice

Ethical behavior is a fundamental value for stakeholders in AI healthcare development. “We develop AI-enabled technologies that are secure, safe, and effective, ensuring fairness and non-discrimination” (P5). Additionally, P3 addressed the AI values that guide their obligations, summarized in a so-called AI compass. “We have developed the AI compass to guide our commitments to the users of our AI technologies” (P3). It includes principles such as beneficial use, fairness, non-discrimination, quality, accountability, human control, oversight, privacy, security, and transparency, all meant to ensure that the patient’s interests come first. P4 emphasized the need for ethical practice in AI, demonstrating the necessity of providing meaningful advice to doctors while also guaranteeing patient safety. P7 highlighted the company’s dedication to ethical practices and transparency in AI product development. Finally, P2 underscored the importance of ethical standards in developing reliable AI solutions.

4.6 Managing Challenges and Stakeholder Dynamics

4.6.1 Collaboration and Cooperation

The successful application of AI in healthcare depends on stakeholder collaboration and cooperation. Stakeholders work together to ensure AI tools meet clinical needs, regulatory standards, and ethical guidelines. P9 observed that all stakeholders involved seek the same goal of optimal healthcare. “Those stakeholders who are involved in healthcare also have the same priority of good healthcare, and I think we’re all thinking similarly with that” (P9). Additionally, “partners who share a commitment to quality and patient safety” (P5) should be prioritized and collaborated with. P4 underlined the necessity for collaborators who share their perspectives on healthcare and effective treatment – “We look for partners who share our view on healthcare since there’s a lot on the line”. P7 emphasized that workshops help in understanding different viewpoints and further noted the necessity of collaborating with partners that share similar principles to achieve the best quality of AI solutions. P2 stated that teamwork and balancing opposing interests are required to produce the best results.

Moreover, P1 emphasized the need of constant feedback and cooperation in balancing the interests of many stakeholders, saying that “collaboration with stakeholders ensures high-

quality AI products”. The interviewees acknowledged that sharing the same norms and values is not always a necessity for a collaboration, however, “if a company comes to us with different norms and values, we wouldn’t start this strategic partnership as quickly. Where you really get intertwined” (P1). Moreover, P4 said “It’s good that there are no major differences as it’s important to put patient care and quality first”.

4.6.2 Effective Communication and Stakeholder Balance

Balancing the interests of many stakeholders is critical for the effective integration of AI in healthcare, and communication is the key for achieving this. P9 stated the need to balance innovation with safety. “It is really important that a certain level of safety is ensured and that those companies are following the guidelines because, as I said, there are real human beings involved and affected by the technology” (P9). P5 emphasized the necessity of open communication and regular meetings to handle disputes early on and guarantee alignment with common goals. P4 discussed the importance of cooperation between stakeholders, noting that different opinions are addressed through continuous communication and collaboration. Further, P7 pointed out the necessity of teamwork and balancing opposing interests to get the greatest results, and P1 noted the need for continuous feedback and cooperation to balance the interests of various stakeholders, also regarding the adaptation to regulatory changes. This was highlighted by explaining that as technology progresses and other companies develop superior products, “all of the sudden your technology is outdated. And that literally means that the regulatory agency will say to you ‘Okay you have to keep up because we have improved performance here so we’re expecting improved performance from you as well.’” (P1).

These findings demonstrate the complicated environment of AI integration in healthcare, presenting the advantages, difficulties, and collaborative efforts necessary to create and execute effective AI solutions. While AI integration provides various benefits, there are also considerable challenges. Crucial points include the ability to adapt to changes and maintain flexibility in the development process. Stakeholders play critical roles in these processes, ensuring that AI tools satisfy high levels of safety and quality. Lastly, a dedication to patient safety, ethical practice, and teamwork is essential for the effective adoption of AI in healthcare. The underlying institutional logics and values have a significant impact on how stakeholders act and make decisions. Since the findings show that the stakeholders share common values and goals, major conflicts due to institutional logics do not arise, and differences can be resolved through effective communication.

5. DISCUSSION AND IMPLICATIONS

This section interprets and analyzes the findings by revisiting the key themes identified in the results and linking them to existing literature. It addresses similarities and differences, and presents theoretical and practical implications. The aim is to offer an understanding of the dynamics between the stakeholders in the development process.

5.1 Discussion

This study has demonstrated that the integration of AI in healthcare offers significant opportunities, especially in enhancing efficiency, diagnostic accuracy, and supporting decisions. Those findings align with those of Oyneiyi and Oluwaseyi (2024), who noted similar benefits in medical imaging. However, this research also highlighted the regulatory challenges. The results show that patient safety is more important than innovation and technical advancements, which is why technical advancements are sometimes slowed down due to that.

This aligns with Olwawade et al. (2024), which argue that despite the potential of AI revolutionizing patient care and enhancing diagnostic precision, regulatory and ethical considerations must be addressed to leverage all its benefits. The importance of regulatory frameworks is also mentioned by Khalifa and Albadawy (2024), who emphasize the responsible use of AI in healthcare.

Overall, these perspectives illustrate the balancing act between the promotion of innovation and maintaining strict safety regulations.

While there are several benefits such as reducing errors in medical imaging, assisting in patient management, reducing workload and more, there are also significant disadvantages. Major issues shown in the results are transparency and the ethical use of AI technology. It is still difficult to explain what this technology does with all the data and how it works. Khalifa and Albadawy (2024) stress the need for AI systems to be explainable and interpretable. This is also further highlighted by Akrinola et al. (2024), who talk about the ethical and accountability issues and the need of transparency. This study adds to this need of transparency and accountability issue.

Even if AI has the potential to greatly improve healthcare practices, its success depends on resolving ethical and transparency issues.

As evident from this research, it is important that several parties are involved in the development process. This aligns with literature which highlight that the process must involve multiple stakeholders to address the diverse needs and concerns within the sector. Jesso et al. (2022) point out in their study how important it is to include clinical users in the development process of AI. They note, that there is still an inconsistency which has to be addressed in order to maximize the benefits of these tools within healthcare. Furthermore, Scott et al. (2021) draw attention towards the mixed attitudes towards AI in healthcare by different stakeholders, highlighting the importance of their involvement during the development process in order to increase acceptance and therefore improve healthcare quality.

The involvement of various professionals not only addresses several concerns, like fear of job displacement, but is essential in order to align the capabilities of AI systems with their clinical needs.

Talking about Stakeholder Roles and Influence, the main stakeholders identified during the interviews match the ones that Hogg et al. (2023) outline, namely developers, healthcare professionals, patients, healthcare managers and regulatory bodies. However, during this research it became clear that their relative influence varies. Considering this, Ho et al. (2019), emphasize the necessity of collaboration between all the stakeholders to ensure responsible and ethical development and implementation of AI applications. This research has shown that there is a difference between what actually exists, and what an ideal environment would look like, proving the lack of consistency mentioned earlier.

In short, effective collaboration and communication among the stakeholders is essential for balancing different interests and achieving common goals in the development process of AI systems in healthcare. However, it is not always as it should be.

Lastly Institutional Logics and Values and Managing Challenges and Stakeholder Dynamics. Institutional logics have a significant impact on stakeholder behavior and their decision-making. The results of this research show that a successful cooperation of stakeholders during the development process is closely related to the norms and values of each firm. Many interviewees stressed about the importance of finding partners who share their norms

and values. Some even explicitly mentioned what they look for in their cooperation for developing AI products. This supports Hidefjäll et al. (2023), who state that the institutional context of innovation in healthcare has a major impact on its future success.

With the stakeholders prioritizing patient care and emphasizing the importance of collaboration and a strong commitment to patient safety and quality care, this mostly aligns with the Profession Logic as defined by Thornton et al. (2012). This logic highlights the values of expertise, high standards, and professional norms and practices. Therefore, this research revealed no significant conflicts or competing interests arising from institutional logics. This contrasts with the findings of Fang et al. (2023), who identified various institutional logics in their paper that often coexist in tension and eventually lead to conflicts.

Furthermore, this research has shown that potential conflicts and challenges can be managed through effective communication and shared commitment. This is also supported by the findings of Almost et al. (2016), who pointed out that effective conflict management within healthcare teams also heavily relies on clear communication and shared commitment to conflict mitigation.

In summary, the successful integration of AI in healthcare requires an approach that respects the institutional logics and values from the different parties involved, and underscores the need for alignment among them to achieve the highest possible success.

5.2 Implications

5.2.1 Theoretical Implications

This study contributes to the existing knowledge of AI in healthcare by providing a detailed analysis of stakeholder roles and the influence of institutional logics during the development process. It adds on to the research conducted by Hogg et al. (2023), who identified key stakeholder groups but did not further investigate the complex relationships among them. The findings reveal that the stakeholders not only play distinct roles but also interact in ways that significantly impact the development and implementation of AI tools with the need of effective collaboration. For example, the guidelines given by regulatory parties directly affect the developers, which then again impacts the possibilities of the healthcare provider who wants to meet the needs of the patients.

Therefore, the findings contribute to understanding how stakeholder influence and institutional logics shape the development process. This research reiterates the importance of including healthcare professionals, or those stakeholders directly affected by AI, in the development process to ensure that the technology meets clinical needs and ethical standards (Jesso et al., 2022). It also emphasizes the importance to balance between innovation and regulatory requirements to promote acceptance and trust in AI (Khalifa and Albadawy, 2024). Furthermore, while Ho et al. (2019) mentioned the importance of collaboration between all the stakeholders, this research indicated that this is not always the case, as some stakeholders are not fully involved in the development process. This does not necessarily imply that their participation is unimportant. Rather, that missing out on involvement of all stakeholders can lead to missed insights and, with that, missed opportunities for improvement and potentially better outcomes.

Lastly, this research highlights the role of institutional logics in shaping stakeholders' perceptions and behaviors. It mitigates conflicts and improves collaboration. Although it might seem that the interviewed stakeholders are more likely to cooperate with those who share their norms and values, this is not always the case. Differences can be communicated. Therefore,

understanding differing logics is crucial for an effective collaboration.

5.2.2 Practical Implications

With the findings of this research there are multiple practical implications. For AI developers it is recommendable to prioritize a human-centered design approach by involving those using the technology or are affected by it from the beginning of the development process. As demonstrated in this research, this step is crucial and might help addressing issues with transparency, explainability and trust issues that were mentioned by Chen et al. (2024) and Balasubramaniam et al. (2023).

Furthermore it is advisable to have continuous stakeholder engagement throughout the AI development process. Receiving regular feedback from the different stakeholders (e.g healthcare professionals, patients, regulatory bodies) can also help in refining the tools. Additionally, as seen in this research and also in previous research by Tursunbayeva and Renkema (2022), it is advisable to counter the fear and resistance of AI tools by possible educational programs showing the capabilities and benefits of AI in the healthcare setting without replacing humans. Lastly, there are some recommendations for policymakers and regulatory bodies. While it is essential to keep them strict for safety and ethical practices, regulations should be tailored to the current state of AI and flexible enough to adapt to the rapid advancements.

6. LIMITATIONS AND FURTHER RESEARCH

6.1 Limitations

Despite the valuable insights gained from this research, there are several limitations that should be acknowledged.

First there is the sample size and diversity. While this study was based on interviews with professionals coming from different backgrounds, the limited number of 9 interviews may not fully capture the full variety of experiences and perspectives in this field. Although these interviews provided a substantial amount of qualitative data, a larger and more diverse sample size and variety of firms is superior. Also, the available time those individuals had for the interviews was sometimes pretty limited.

Second, there is the temporal constraint. The research provides a snapshot of how AI is currently used in healthcare. Due to the rapid technological advancements in this field, these results could become outdated relatively quickly.

Another limitation is the subjectivity of the participants. While gathering individual perceptions and experiences is essential to understand stakeholder dynamics, this subjectivity can cause bias. This implies that the findings might reflect the personal views of the interviewees rather than an objective reality. However, these subjective insights are valuable as they provide an understanding of the stakeholders' perspectives. In addition to that, professionals from different companies or positions might have completely different opinions and perceptions than the interviewees in this research.

6.2 Further Research

Building on the limitations and findings of this study, there are several directions for further research in the field of AI in healthcare.

Future research should aim to include a larger and more diverse sample size. This would ensure a more comprehensive representation of experiences and perspectives from professionals working in various roles and fields. With a wider variety of firms and stakeholders a better understanding of diverse opinions and practices could be achieved.

Moreover, long-term studies should be conducted to monitor developments over a longer time frame. This approach would allow researchers to observe how the use of AI evolves over time, providing deeper insights into trends and long-term effects.

Next, mixed approaches should be used in future research. Combining quantitative surveys with objective measurements and qualitative interviews. This approach could assist in mitigating the issue of potential bias within the research.

Lastly, to address potential distortion of results in future studies, researchers could conduct follow-up interviews to verify and clarify initial responses and encourage open communication in order to improve data accuracy and reliability.

In addition to these points, it would be interesting to investigate the long-term effects of the integration of AI in healthcare and the outcomes of patients.

7. CONCLUSION

With this research, the different roles and relationships of stakeholders involved in the development process of AI for healthcare were analyzed in order to answer the following research question:

“How do the roles, interactions, and institutional logics of key stakeholders influence the development of AI in healthcare, and what actions do they take to balance between possible competing opinions and interests to enhance collaboration?”

The study identified 5 key stakeholders: patients, developers, healthcare providers, healthcare managers and regulatory parties. Each group has a distinct yet interconnected role in the whole process. The concerns, safety, and data of patients are central to the development process. The success of AI tools is greatly influenced by patients' trust in these systems. Developers create and refine AI algorithms. They collaborate with healthcare professionals and ensure compliance with laws and regulations. Healthcare providers are the main users of AI systems and those who provide essential clinical insights and feedback during the development stage. Healthcare managers supervise the implementation of AI tools and guarantee that they are used in an effective but sustainable way. Regulatory parties are responsible for the safety and reliability of AI tools through strict regulations and guidelines.

Further, Institutional logics and values significantly shape interactions between the parties and decision-making processes. These institutional logics refer to the norms, values, and beliefs that guide how stakeholders act or perceive and approach issues. While there can be potential for conflicts, this research highlights the importance of balancing competing interests and cooperation between stakeholders with open communication and regular feedback. Understanding and negotiating potential differences are vital for bringing different opinions together and aligning opposing perspectives towards a common goal.

Ultimately, this research advances the knowledge of stakeholder roles and the influence of institutional logics on the development of AI in healthcare, offering insights that can be used to enhance the overall development process.

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Appendix A

Interview outline.

Before I start with the interview, I will discuss the following topics with the interviewee:

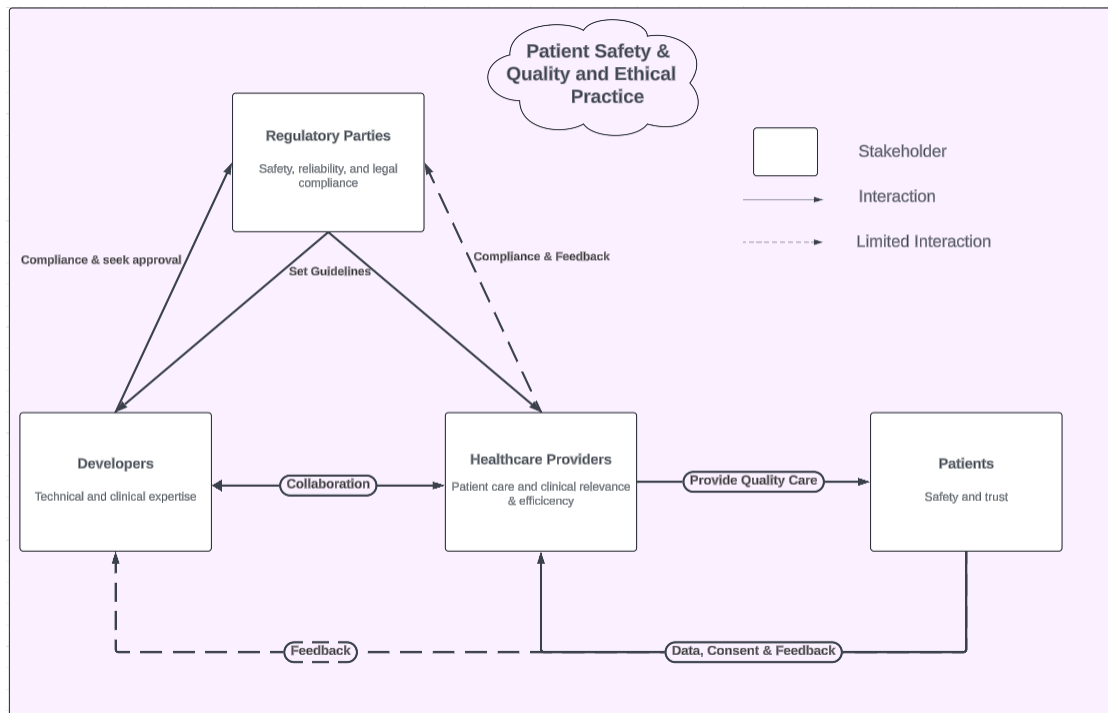
1. Introduce myself and explain the purpose of this interview
2. Inform about how the data will be used
3. Ask for consent for recording and data collection
4. Ask if everything is clear and if there are any questions

In the following are the questions and the topics that were discussed during the interviews. After those questions, there was room for questions by the respondent.

Topic	Questions
Introduction	<ul style="list-style-type: none"> -What is your current function? -How did you get to [organization] and how long are you already there? -Prior experience (with AI or within healthcare sector)?
General AI in healthcare	<ul style="list-style-type: none"> -How is the current situation with AI in healthcare (laws, regulations, development, application) and what do you think about it? -Where do you see AI in healthcare in 10/20/more years (the future of AI in healthcare)? -What do you think are the biggest advantages and disadvantages of AI in healthcare? -Do you think the current potential of AI is fully used?
Design and Development	<ul style="list-style-type: none"> -How does the process work (start to final product)? -Where is your organization involved in these processes? -Do you think stricter laws and regulations are beneficial for the development process?
Stakeholder roles & influence	<ul style="list-style-type: none"> -Where do you see the influence you and your organization have for the design & development process of AI for healthcare? -Do you think it is appropriate/too much/too little? Why? -What are your organizations interests for the use of AI? -What other stakeholders are involved and with which stakeholders are you working with? -Which stakeholder has the most influence/which the least? (most important stakeholder?) -Why is that the case and your opinion on that (appropriate/too much/too little)? -How do these different stakeholders cooperate with each other (also in case of e.g conflicts, different opinions etc.)?
Institutional Logics	<ul style="list-style-type: none"> -Which norms and values does your organization stick to when talking about AI in healthcare? -Why are these so important to you? -Where do norms and values differ between stakeholders? -Do you think it is good that there are differences/no differences? -Are/were there any conflicts due to different norms and values? -Are you/your organization looking for partners with similar or different norms and values? If so/if not, why?

Appendix B

Visualization of Results.



The model visualizes the different relationships and interactions between the stakeholders.

Developers: Collaborate with Healthcare Providers (Healthcare Managers & Healthcare Professionals) to ensure AI tools meet clinical needs.

Healthcare Providers: Provide good healthcare to the patients and use the information and feedback they get from the patients for the collaboration with the developers.

Patients: Provide data, consent, and feedback regarding clinical needs and use of AI tools to HCP. In some situations also provide direct feedback to the Developers.

Regulatory Parties: Set the guidelines and ensure AI tools meet all the standards. While both Developers and HCP are constantly interacting with them, the interaction between HCP and Regulatory Parties is not as extensive as with the Developers.

While there were no real competing interests identified, even potential conflicts are avoided due to continuous communication, collaboration and the common goal of improving healthcare in terms of patient safety, healthcare quality and ethical practice.