Enhancing communication and root cause analysis skills in healthcare through a medical murder mystery game

Development and evaluation of an Alexa skill prototype - An explorative study

Master Thesis

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by
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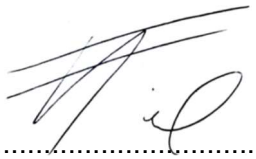
Declaration

I declare that I have developed and written the enclosed Master Thesis completely by myself, and have not used sources or means without declaration in the text. Any thoughts from others or literal quotations are clearly marked. This work was not used in the same or in a similar version to achieve an academic grading or is being published elsewhere.



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Preface

The idea for this master thesis arose from my great fascination for murder mystery games and my develope to design a prototype with as much creative freedom as possible. The potential for promoting communication is probably clear to anyone who has ever played a murder mystery game, and so concrete research questions quickly arose.

Therefore, I would especially like to thank my supervisor Anita Kidritsch for accepting my proposal with enthusiasm and for always supporting me in small and big questions. I can only wish every other person to have a coach like Anita, who enriches you with motivation, constructive ideas and joy from the very beginning. Furthermore, I would like to thank Christian Freisleben-Teutscher for reading through my master thesis and providing concise valuable feedback towards the end.

Thanks also to Naemi Wessely for motivating me and supporting me with brainstorming and proofreading.

Furthermore, I would like to thank all the people who tested my prototype and sometimes gave me very positive compliments about the final result. Each time was a pleasure to see the game in use and to listen to the exciting discussions about the mysterious case.

Abstract

Introduction: In high-income countries, up to one in ten patients suffer harm during hospitalization due to iatrogenic factors (Slawomirski et al., 2017), with 50% of these incidents being preventable (de Vries et al., 2008). Serious games like murder mystery games offer a safe environment for learning essential competencies to prevent these incidents, including communication, collaboration and root cause analysis, however further exploration of these games is necessary as this method has not yet been extensively researched (Kavanaugh et al., 2022).

Aim: This thesis has the purpose of developing an easy access murder mystery game as an Alexa skill to enhance communication and collaboration in healthcare teams.

Method: The master thesis was conducted in three consecutive steps: narrative literature research, prototype development and prototype evaluation. The results of the literature research served as the basis for the development of a low-fidelity prototype which was tested for usability (SUS), user experience (UEQ) and the ability to enhance communication (quantitative questionnaire).

Results: The literature review resulted in a rough guide to create a medical murder mystery from scratch. The usability evaluation resulted in a SUS-Score of 80.8, which corresponds to the 90th percentile. The results of the UEQ were heterogeneous. While hedonic qualities (stimulation, originality) with a mean-hedonics-score of 2.19 and attractiveness with an attractiveness score of 2.16 were above average while pragmatic qualities (perspicuity, efficiency, dependability) were below average with a mean-pragmatic-score of 1.09. The communication questionnaire revealed that the subjects primarily considered the murder mystery game as a learning opportunity and perceived the teamwork as very positive.

Conclusion: Apart from the moderate to poor rating of the pragmatic qualities, the murder mystery game performed well overall in usability and user experience evaluation, improving team communication and was perceived as a useful tool for promoting team collaboration.

Kurzfassung

Einleitung: In einkommensstarken Ländern erleidet bis zu jeder zehnte*r Patient*in während des Krankenhausaufenthalts einen Schaden aufgrund iatrogener Faktoren (Slawomirski et al., 2017), wobei 50 % dieser Vorfälle sind auf vermeidbare wären (de Vries et al., 2008). Serious Games wie Murder Mystery Spiele bieten eine sichere Umgebung zum Erlernen wesentlicher Kompetenzen zur Verhinderung dieser Vorfälle, einschließlich Kommunikation, Zusammenarbeit und Ursachenanalyse, wobei diese Methode noch nicht umfassend erforscht wurde (Kavanaugh et al., 2022).

Ziel: Ziel dieser Arbeit ist die Entwicklung eines leicht zugänglichen Murder Mystery Spiels als Alexa-Skill zur Verbesserung der Kommunikation und Zusammenarbeit in Gesundheitsteams.

Methode: Die Masterarbeit wurde in drei aufeinanderfolgenden Schritten durchgeführt: narrative Literaturrecherche, Prototypenentwicklung und Prototypentests. Der entwickelte Prototyp wurde auf Benutzerfreundlichkeit (SUS), Benutzererfahrung (UEQ) und die Fähigkeit zur Verbesserung der Kommunikation (quantitativer Fragebogen) getestet.

Ergebnisse: Die Literaturrecherche ergab einen groben Leitfaden für die Erstellung eines medizinischen Murder Mystery Spiels von Grund auf. Die Usability-Bewertung ergab einen SUS-Score von 80,8, was dem 90. Perzentil entspricht. Die Ergebnisse des UEQ waren heterogen. Während die hedonischen Qualitäten mit einem mean-hedoic-score von 2,19 und die Attraktivität mit einem Attraktivitätsscore von 2,16 überdurchschnittlich ausfielen, lagen die pragmatischen Qualitäten mit einem mean-pragmatic-score von 1,09 über dem Durchschnitt. Der Kommunikationsfragebogen ergab, dass die Probanden das Murder Mystery Spiel die Teamarbeit als sehr positiv empfanden.

Zusammenfassung: Abgesehen von der mäßigen bis schlechten Bewertung der pragmatischen Qualitäten schnitt das Murder Mystery Spiel bei der Bewertung der Benutzerfreundlichkeit und Benutzererfahrung insgesamt gut ab, verbesserte die Teamkommunikation und wurde als nützliches Instrument zur Förderung der Teamzusammenarbeit wahrgenommen.

Table of content

1 Introduction

Medical education and training play a pivotal role in shaping competent healthcare professionals capable of delivering safe and effective patient care. However, the healthcare landscape is complex, with a multitude of challenges, including iatrogenic harm and communication breakdowns, that can compromise patient safety (WHO, 2019). In countries with high-income economies, as much as one in ten patients experiences harm during hospitalization due to iatrogenic factors (Slawomirski et al., 2017). A staggering 50% of such incidents stem from preventable adverse events (de Vries et al., 2008). In the pursuit of elevating patient safety, addressing iatrogenic harm necessitates two crucial aspects: identifying the root causes of past errors through causal analysis and implementing corrective actions (Shojania et al., 2002). Moreover, enhancing communication and collaboration among healthcare providers is imperative to mitigate these risks and fortify patient safety (Charité – Universitätsmedizin Berlin, 2018; Coburn & Croll, 2011).

Innovative approaches to medical education have paved the way for engaging and effective learning experiences. Serious games, a versatile instructional strategy, have gained prominence across various medical disciplines and educational settings (Wang et al., 2016). These games offer a safe environment to develop competencies such as communication, problem-solving, and root cause analysis without subjecting actual patients to risk (Allery, 2004). Among these, a genre of games known as murder mystery games has gained popularity in general entertainment contexts (Xiong et al., 2023) but has yet to be extensively explored within medical education (Kavanaugh et al., 2022). These games, characterized by their deductive nature, task participants with collectively solving a fictional criminal narrative (‘Was Ist Ein Krimidinner?’, 2023), or in a medical rendition, dissecting a patient case to discern its underlying cause. This objective is achieved through verbal interactions among participants, demanding both analytical skills and effective communication. The potential of murder mystery games to enhance these competencies has been demonstrated in a limited number of studies (Aburahma & Mohamed, 2015; Kavanaugh et al., 2022; Maynor et al., 2022; Smeraglio et al., 2021).

1.1 Problem

Despite the recognition of murder mystery games' potential to enhance patient safety, research on their efficacy in improving communication and root cause analysis skills remains limited (Aburahma & Mohamed, 2015; Kavanaugh et al., 2022; Maron & Bosso, 1991; Maynor et al., 2022; Prewett et al., 2013; Smeraglio et al., 2021). Furthermore, none of the existing literature provides comprehensive insight into the foundational principles governing the design of medical murder mystery games, leaving those interested in creating such games to navigate a landscape necessitating significant experience and research. Another hindrance to the adoption of these games is the relatively high preparation effort required. Before gameplay, various materials must be printed, adding substantial time and personal requirements, particularly when coordinating multiple concurrent game sessions (Maynor et al., 2022). Additionally, a person (either a game master or a participant) usually needs to familiarize themselves with the game's setup and mechanics, as murder mystery games can vary in structure, and participants may have no prior experience with the genre.

1.2 Aim

The present research seeks to address these gaps by developing a comprehensive guide for the creation of medical murder mystery games, aimed at simplifying the process of game development and reducing associated burdens. This guide will form the basis for the creation of a prototype murder mystery game. In order to enhance user engagement, the prototype was designed as an Alexa skill (Create Alexa Skills Kit, n.d.), capitalizing on the voice-based interaction medium to minimize material and preparation requirements. The resulting prototype will undergo usability testing and user experience evaluation, and its impact on team communication will be assessed.

1.3 Research questions

Based on the problem and the aim, three research questions were formulated that are to be addressed in this study.

RQ1. *What key principles can guide the development of a medical murder mystery game to improve communication and root cause analysis skills between medical providers, and how can it be technically implemented as an Alexa skill?*

- A narrative literature review is to be carried out on which a murder mystery prototype will then be developed as an Alexa skill

RQ2. *How do people with a healthcare education rate the usability and user experience of a medical murder mystery game as an Alexa skill?*

- This question should be answered by using the system usability scale (SUS) and the user experience questionaire (UEQ).

RQ3. *How do medical professionals perceive team communication and collaboration during a medical murder mystery game?*

- This question should be answered with a quantitative questionnaire which determines the self-perceived team communication and cooperation

2 Background and related work

This section provides a comprehensive analysis of the structure of murder mystery games, bringing together relevant articles on the subject. The focus of the prototype is on improving patient safety by promoting root cause analysis skills and team communication and collaboration. Accordingly, section 2.1.2 explains the principle of root cause analysis and how it can be applied in a murder mystery game. The construction of the case study (explained in the methods section) within the murder mystery story is based on common mistakes in the medical environment, which have been identified and summarised in this chapter. The structure of murder mystery games is then discussed and some existing examples are explained in more detail. Finally, an explanation of the technical background of the frameworks and applications used for the development of Alexa skills and HTML web pages is given.

2.1 Patient safety and medical errors

Patient safety is concerned with the reduction and prevention of risks, errors and harm that may occur due to the increasing complexity of patient care in healthcare (WHO, 2019). Key concepts of patient safety are, on the one hand, interprofessional collaboration in healthcare teams and, on the other hand, learning from errors and adverse events (Charité – Universitätsmedizin Berlin, 2018; WHO, 2019).

2.1.1 Patient safety by improving communication and collaboration

The exchange of information within healthcare teams, whether verbal or non-verbal, is a fundamental skill in interdisciplinary everyday hospital life. Improved communication in medical teams contributes significantly to increasing patient safety (Charité – Universitätsmedizin Berlin, 2018). In order to maintain a high level of patient safety in an increasingly complex hospital environment, it is crucial to promote effective communication and collaboration (Weller et al.,

2014). This can be done, for example, through joint team training that either teaches specific communication strategies (e.g. ISBAR, Call Out) or through simulations (e.g. VR) in which patient scenarios are dealt with together (Buljac-Samardzic et al., 2020; Weller et al., 2014). Alternatively, this can be achieved by improving organisational and structural processes in medical facilities (e.g. introducing protocols and defined workflows) (Buljac-Samardzic et al., 2020; Weller et al., 2014). Murder mystery games fall into the domain of simulations and offer a safe way to practice team communication in a protected environment (Weller et al., 2014). Instead, the importance of organisational and structural processes should be emphasised during the prototype game.

2.1.2 Patient safety through learning from errors using root cause analysis

One way to implement learning from medical errors is to analyze the causes. Root cause analyzes offer a systematic approach to assessing, analyzing and treating problems (Charité – Universitätsmedizin Berlin, 2018). The principle states that the actual cause of a specific problem is rarely apparent at the time of the error or incident, but subsequent analysis of sources of error can help uncover sources of error and prevent future events (Charité – Universitätsmedizin Berlin, 2018). A root cause analysis is a defined process that examines all possible factors related to an incident to uncover what happened, why it happened and what can be done to prevent a recurrence (Charité – Universitätsmedizin Berlin, 2018). Cause-effect diagrams or fishbone diagrams can be used in root cause analysis. Fishbone diagrams can be used to identify factors that led to a specific effect (Charité – Universitätsmedizin Berlin, 2018). Each fishbone is a group of factors that can lead to errors such as materials, individual factors, communication and processes/organization (see Figure 1). In the course of the cause analysis, all possible factors that could be relevant in this patient case are then determined for each group in order to obtain an overview of the error factors. Healthcare providers need to be trained to be able to perform a root cause analysis (Charité – Universitätsmedizin Berlin, 2018; Smeraglio et al., 2021). This can happen in a playful way through murder mystery games (Kavanaugh et al., 2022; Smeraglio et al., 2021). A murder mystery game is actually a type of root cause analysis. Players must find out what caused the victim's death. A medical murder mystery allows students to learn about the process of root cause analysis and develop solutions to improve patient safety (Kavanaugh et al., 2022; Smeraglio et al., 2021).

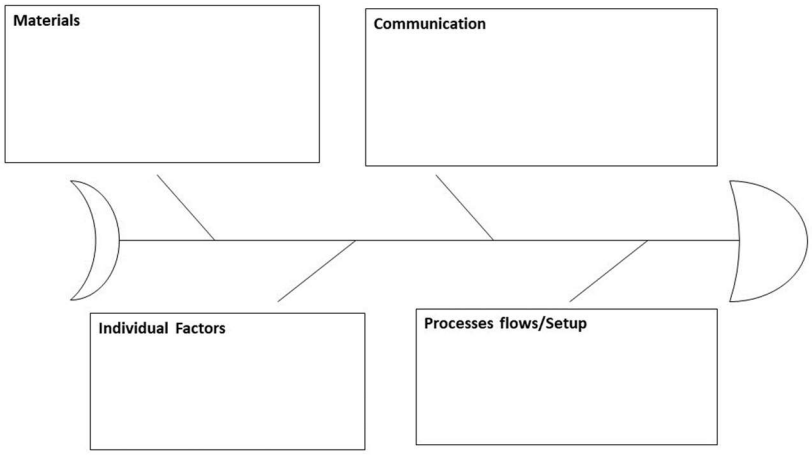

Figure 1 - Blank fishbone diagram

2.1.2.1 Types of errors in the medical setting (Charité – Universitätsmedizin Berlin, 2018, pp. 166–177)

In order to be able to carry out a root cause analysis, it is necessary to understand what types of errors exist and how they can be prevented. Information was obtained from the chapter "Learning from errors to prevent harm" from the model curriculum of Charité – Universitätsmedizin Berlin (2018, S. 166–177) and is presented in this chapter.

In healthcare, errors can occur in two ways: during planning and during the execution of measures. Planning errors can be based on either rule-based or knowledge-based errors. Rule-based errors occur when an incorrect rule is applied, e.g. an incorrect diagnosis. Knowledge-based errors occur when a healthcare provider is confronted with an unknown situation and takes the wrong action. Execution-based errors include either taking the wrong action or failing to take an action, such as forgetting to administer a medication.

Individual and situational factors make health professionals and learners prone to error. Individual factors include limited memory, fatigue, stress, hunger, illness, language and cultural differences, and dangerous behaviours. Due to limited memory capacity, it is impossible for many health professionals today to remember the large amount of information required in the health sector. It is therefore important that learners learn to ask for help and use checklists rather than relying solely on their memory. Fatigue, stress, hunger and illness can also

lead to errors in healthcare. It is important that learners are aware of their condition and take care of themselves in order to perform their tasks to the best of their ability. To this end, healthcare professionals can use reminders such as HALT to watch for hunger, anger, lateness and tiredness. Learners should also be aware of the problems caused by language barriers and cultural differences, and understand the extent to which patients and their relatives can understand verbal and written instructions. In addition, learners should avoid dangerous behaviour and always be aware that interacting with patients is a privilege that should not be taken for granted.

In medicine, situations with an increased risk of error can arise due to various factors. These factors include, for example, the lack of experience of learners, time pressure, inadequate controls and processes, and a lack of information. Before a learner or novice performs a treatment on a patient for the first time, it is imperative that it is adequately practised and performed under supervision. Time pressure is a temptation not to take appropriate action. To avoid inadequate checks, providers should build good relationships with the interprofessional team, which can carry out checks when working together. Inadequate processes may result in a person being forced to use equipment or techniques about which they are not adequately informed. Finally, inadequate information, incorrect or incomplete documentation can lead to adverse events. Therefore, it is essential that healthcare providers regularly review the information recorded to ensure that it is up to date and accurate.

2.1.2.2 Concrete errors in medical settings

In order to facilitate the selection of one or more errors for each professional group in the development of the murder mystery game, potential sources of errors have been compiled. For this purpose, suitable sources of error were taken from the so-called never events from the Swiss Patient Safety Foundation (Stiftung Patientensicherheit Schweiz, 2021b) and summarised in Table 1. The concept of never events refers to serious incidents related to clinical treatments that could have been avoided by appropriate prevention measures and that resulted in harm to patients (Stiftung Patientensicherheit Schweiz, 2021a). Utilizing never events can be useful for designing murder mystery games, where one or more potential serious errors can be selected and tailored to each professional group. For the selected specialties of nursing, dietetics, radiology technology and medicine, potential errors for the design of the murder mystery game can be identified from the list in Table 1. In the field of physiotherapy, on the other hand, all adverse events and errors from the list are improbable to

impossible, as physiotherapists are not allowed to perform procedures like administering medications or performing MRIs in their clinical practice. Consequently, the most common adverse events in physiotherapy were taken from Kinoshita et al. (2022) and are presented in Table 2.

Intervention mix-up (Performing an intervention at the wrong intervention site or patient)
Implantation of an incorrect medical device
AB0- or HLA-incompatible transfusion and transplantation (Wrong blood group or wrong resus factor)
Unintentional leaving of foreign bodies (Leaving needles, suture material, swabs and drapes, instruments and cannulas, osteosynthesis material, puncture cannulas, catheters and drains in the patient's body)
Misdosing of high-risk medication (Prescription errors, Calculation errors, Administration errors, Incorrect use of administration utensils (infusion, insulin pens, etc.), Mix-ups in dosage units, Patient identification errors)
Incorrect route of administration medicinal product (Incorrect thecal administration of i.v. chemotherapeutics, Incorrect intravenous administration of medicines intended for oral or stomach tube administration, Patient identification errors)
Too rapid administration of high-risk medication (Incorrect bolus administration of drug concentrates, Administration of drug concentrates as a free-flowing infusion instead of via syringe pump, Incorrect use of administration utensils)
Metallic objects in the MRI magnetic field (Failure of vital monitoring or therapy equipment not suitable for MRI, Heating of metallic objects on the patient, Magnetic attraction of the inserted metallic objects)

Table 1 - List of possible errors for a murder mystery story from the never events list from Stiftung Patientensicherheit Schweiz (2021b)

In addition to the never events, case studies from Charité – Universitätsmedizin Berlin (2018) were identified, which could also be used to create the murder mystery story and are presented in the following section:

- A pregnant patient was admitted to the emergency room because of back pain and was accidentally given oxytocin for induction of labour instead of the labour inhibitor tocolytic. This mix-up led to a premature birth and neonatal problems caused by the hectic pace and understaffing of the maternity ward (Charité – Universitätsmedizin Berlin, 2018, p. 176).
- Another patient accidentally received an antidiabetic drug instead of the required antibiotic after a tooth extraction. The resulting overdose of the antidiabetic drug led to hypoglycaemic shock, which had to be treated in the emergency room (Charité – Universitätsmedizin Berlin, 2018, p. 191).
- In another case, a patient was accidentally given an overdose of the antibiotic gentamicin over several days, which led to kidney failure, hearing loss and eventually the patient's death (Charité – Universitätsmedizin Berlin, 2018, p. 275).
- A life-threatening treatment error due to lack of communication between nurses and doctors resulted in a patient being administered a high dose of adrenaline (epinephrine) intravenously instead of intramuscularly as recommended (Charité – Universitätsmedizin Berlin, 2018, p. 277).

Common errors in physiotherapy
Decreased consciousness and low mood due to a drop in blood pressure
Falls
Peripheral intravenous tube removal
Epidermal peeling
Nasogastric tube removal

Table 2 - Common errors by physiotherapists from Kinoshita et al. (2022)

2.2 Murder mystery games

Murder mystery games are deduction games in which a fictional crime story is to be solved (‘Was Ist Ein Krimidinner?’, 2023). These games are often used as team building games and, like many other deduction games, belong to the semi-cooperative games. This means that one group plays against another group or, as in the case of murder mystery games, against an individual who takes on the role of the murderer. Murder mystery games are already being used occasionally

as educational games. A narrative literature search found several articles dealing specifically with the use of murder mystery games as educational games (Aburahma & Mohamed, 2015; Barros et al., 2019; Jaschek et al., 2019; Kavanaugh et al., 2022; Klopfer et al., 2005; Macchi & Ridle, 2012; Maron & Bosso, 1991; Maynor et al., 2022; McCarty, 2021; Persky et al., 2007; Smeraglio et al., 2021). The studies by Kavanaugh et al. (2022), Maynor et al. (2022) und Smeraglio et al. (2021) were the only ones that had a comparable game mechanic structure to the planned master thesis but describe only very imprecisely or not at all how the game was developed and structured. All other articles on the subject of medical or general murder mysteries were unsuitable as literature for this master thesis, since either the playful approach was missing or the implementation showed completely different game mechanics. Up to this point in time, there has also been little scientific literature on the general structure of murder mystery games. Only Stockdale (2021) describes how the story of a murder mystery game can be structured. Therefore, in the following section, the game design principles of Schell (2012) were applied and existing commercial murder mystery games were analysed in terms of their game elements mechanics, story, technology and aesthetics within the framework of this master thesis and a concrete plan for the structure was created.

2.2.1 Murder mystery game elements

Mechanics

Each game follows a particular way of storytelling, but it is different from that of a film or a book in that it requires a particular game mechanic to determine the way in which players can experience the story and acquire information (Schell, 2012, p. 79). Game mechanics encompass all the rules and procedures of a game, including the goal of the game and the methods by which players can try to achieve that goal (Schell, 2012, p. 79). The goal of a murder mystery is, as it's name says, to solve a murder mystery. The narrative mechanics of murder mystery games, and thus the methods used to achieve the goal, are characterised by interactive interstitial scenes and strictly predetermined interactions, as described by Carstensdottir et al. (2019) in their article on scripted scenarios. To identify additional rules and procedures of murder mystery games, existing murder mystery games from Blaubart (2019) and Kosmos (2019) and Articles from Hoare (2020) and Jennings (2002) were used as a reference. At the beginning of the game, the players are introduced to the case through an introductory story in which the circumstances and the case are presented. This is followed by three rounds, each of which usually consists of a scripted dialogue that the players read aloud together. The scripted dialogue is followed by an

open discussion round in which secret information are discussed. Each player is given information about the case that is known only to him/her in order to express suspicions about other people or to clarify inconsistencies. After the three rounds, a guilty person/murderer is jointly determined and the case is solved.

Schell (2012) again divides the mechanics of games into the sub-items of space, objects, actions, rules, skills and probability. The space in audio-based games is often purely imaginary, as there is neither a game board, a virtual space nor a physical space in which the players or characters can move. Objects in an audio-based murder mystery game are the characters themselves, the secret information and documents which contain information about the case. Each player can perform the actions of accusation and defence. The rules of murder mystery have already been explained above. Cognitive and social skills are necessary to play a murder mystery, as the players have to draw conclusions from the given information and make decisions about who is to blame for the victim/patient's condition. They also need to be able to pass on information to others and convince them of their ideas. In murder mystery games, the aspect of probability and chance is usually hardly taken into account. In the course of the game, the players' actions do not lead to a random outcome, but are strictly predefined. However, it is important to make sure that each role in the game has a similar probability of being the perpetrator. This is crucial for a balanced game. In addition, clues should not be formulated too specifically to leave room for interpretation. This allows for stimulated communication between the players.

Story

A story is a sequence of events (Schell, 2012, p. 80) that can be structured in different ways in games. There can be a clear structure with a set beginning and end, or multiple paths that the player can take to get to different endings (Carstensdottir et al., 2019). Carstensdottir et al. (2019) identified six different types of story structures in games, including linear, branching, backward, swept, hidden, and opportunistic stories. Unlike many other games, murder mystery games tend to be linear, meaning there is only one possible game path and the story has a fixed beginning and end (Carstensdottir et al., 2019). A linear story structure offers the advantage of a coherent, controlled narrative experience for the players, but also the disadvantage that each game can only be played once (Carstensdottir et al., 2019).

As already mentioned, there are hardly any scientific articles on the systematic structure of murder mystery games. Therefore, additional information was

collected from the website you-dunnit.com. This platform enables the independent creation of murder mystery games and provides information on the structure of a murder mystery story on its website (Hoare, 2020). In addition, existing murder mystery games by Blaubart (2019) and Kosmos (2019) were used as a template for identifying the structure of a murder mystery story. The following points are to be determined when creating a murder mystery story and are treated and defined in more detail for this master thesis in Chapter 4.1.2 Development of the murder mystery game story (Blaubart, 2019; Hoare, 2020; Kosmos, 2019; Stockdale, 2021):

- Subject and setting
- Characteristics and background story of the characters
- Motives and possibilities of each character
- Connections between the characters and to the victim
- culprit/murderer
- False tracks and red herrings

Technology

In games, the technology determines the medium through which the story and aesthetics are transported (Schell, 2012, p. 81). There are various technologies that can be used in games, ranging from simple pen-and-paper games to sophisticated computer games. Text-based approaches are often found in murder-mystery games, where dialogue and other information is conveyed in writing on paper. This is especially true for classic board game variants of murder mystery games like Blaubart (2019) and Kosmos (2019), where role booklets are distributed to the players that contain all the necessary information. Dialogue and secret information are presented in writing, while introductory and resolution texts can be provided in written or audio form. Although detective games were found in the Alexa skill store, there were no murder-mystery-style games as intended in this master thesis.

Aesthetics

In murder mystery games based on audio or text, the imagination of the players is strongly challenged. The choice of words used to create images in the minds of the other players plays an essential role in the aesthetic quality. In addition, the aesthetics of the game also depends on the way in which the dialogues between the characters are conducted. Gamers often find murder mystery games more

entertaining when the conversations are conducted in a humorous and theatrical manner.

2.2.2 Existing murder mystery games

To date, there are only a limited number of articles on murder mystery games, and even fewer follow a structure similar to that intended in this master thesis. Three articles, namely those of Kavanaugh et al. (2022), Maynor et al. (2022) and Smeraglio et al. (2021), have a comparable structure. In the following section, these three articles are analysed and the most relevant findings for this master thesis are summarized.

2.2.2.1 Who killed Mr. Brown? A hospital murder mystery in a pharmacy skills course

In this article, Kavanaugh et al. (2022) analyse a specific murder mystery game they developed with the aim of optimizing interdisciplinary communication and root cause analysis skills within medical teams. As part of the doctoral program in the Department of Pharmacy, the authors subjected the developed game to an evaluation by doctoral students. The structural conception of the game included three discrete phases: an introductory phase, a main game phase and a final phase for reflecting on causes and answering a questionnaire on teamwork. The main game phase lasted 80 minutes and was divided into three consecutive scenes: an opening scene introducing the game plot and characters, a second scene revealing laboratory results, and a third scene revealing the key clue to solving the simulated murder case. The subjects were introduced to each game scene through collaborative dialogues and were asked to fill out a root cause analysis sheet at each stage to stimulate subsequent discussions. The characters acting in the game represented two nurses, two pharmacists, a doctor and the patients wife.

The authors' conclusion highlights that the murder mystery game promotes critical thinking skills, supports dynamics within the team and can stimulate individual self-reflection. Furthermore, the authors concluded that an appropriate group size combined with a diversified composition of participants is necessary to ensure high participation of all participants. The group size of six chosen by the authors proved to be appropriate to ensure a wide diversity of opinions and realistic to allow character roles in the group discussions while ensuring ease of participation and freedom of expression. Another interesting aspect of the study was a quantitative questionnaire on communication that participants completed independently, measuring the perceived effectiveness of communication and collaboration in the team.

2.2.2.2 Emergency in Ethics: An innovative approach to game-based active learning in interprofessional ethics training

Maynor et al. (2022) describe in their publication the development and evaluation of a constructed murder mystery game with the primary objective of deepening awareness of ethical issues and promoting interdisciplinary ethical decision-making, while at the same time strengthening team collaboration. The evaluation of the game involved a total of 504 students from various health care courses, including dental hygiene, dentistry, exercise physiology, health informatics and information management, medicine, medical laboratory science, nursing, occupational therapy, pharmacy, physiotherapy, public health and speech therapy.

The game concept consisted of three substantial phases, namely an initiating introductory phase, a core game phase and a final post-active phase in the collective. The core elements of the game were divided into four rounds, in which the participants had to collect and pass on specific information in the first three rounds. In the final round, the players were asked to make ethical decisions in the context of the patient case based on the knowledge they had previously acquired on a given worksheet. At the beginning of the game, the players were given an individual player handbook containing confidential information that had to be shared with fellow students at certain points in time in order to adequately cope with the scenario. The fictional roles within the game were represented by the patient himself, a sibling of the patient, an ER doctor, an ER nurse, a medical laboratory scientist, a pharmacist, an occupational therapist, and a hospital care manager. Each team consisted of six to eight participants.

The authors' conclusion underscores that the murder mystery is effective in introducing a substantial number of individuals to the ethics of healthcare. However, despite the central importance of the game, the authors pointed out the logistical challenge of providing several murder mystery games for several groups at the same time, especially as physical game material.

2.2.2.3 The Mystery Dinner RCA: Using Gamification and Simulation to Teach Root Cause Analysis

In the course of a study by Smeraglio et al. (2021), subjects participated in an exercise to convey the conceptual understanding of root cause analysis. Participants were presented with a medical case based on a real-life incident and appropriately modified to meet the pedagogical intentions. The game was performed in groups of four to 30 people, with the group size being limited to ten

for selected activities within the game, with variable sizes depending on the subjects available. The total duration of the game was about 90 minutes and was evaluated by medical professionals at different stages of their training, which were anchored in various departments and were in mixed groups.

The structure of the game guided the participants step by step through the root cause analysis process, which was divided into nine specific steps. Slipping into the roles of the medical team of a hypothetical patient, the players focused their efforts on extracting information from dialogues read together, which should give them information about mistakes made. These errors were recorded in a fishbone diagram, after which a conclusion was finally drawn as to the probable cause of the patient's condition.

The authors summarize that the establishment of an interdisciplinary dynamic was possible because the role profiles of the game characters showed universal background information with information about systemic solutions. They also state that even less experienced educators could conduct the workshop, which would open up a broader target group for the use of the game.

2.3 Technological background

Basic technical knowledge about programming an Amazon Alexa skill, using Node.js and Socket.io, and doing API calls are required to develop the murder mystery prototype. In this subsection, it is explained which technical services were used, why they were chosen, and how to use them, with a more detailed explanation of accessing the Airtable data through the Alexa skill and Node.js using API calls in Section 2.3.3.

2.3.1 Amazon Alexa

Amazon Alexa is a cloud-based voice service that enables natural language interaction with everyday technologies (Amazon Alexa Official Site, n.d.). Alexa skills can be understood as "apps" for Alexa that are controlled with the voice and perform tasks such as playing music, playing games or listening to the news (Create Alexa Skills Kit, n.d.). One of the most important benefits of Alexa is the merging of different services into a single service, the Alexa Voice Service (AVS). The AVS integrates speech-to-text (Amazon Lex), text-to-speech (Amazon Polly), and backend logic (Amazon Lambda), eliminating the need to combine separate services into a single service (About the Alexa Voice Service (AVS) Interaction

Model, 2020; Kaminski, 2017). When a voice command is given, Automatic Speech Recognition (ASR) translates the spoken language into text. As displayed in Figure 2, the meaning of the command is then captured with the Natural Language Understanding (NLU), processed with the skill and finally converted into a speech output with the Text-to-Speech (TTS) service (About the Alexa Voice Service (AVS) Interaction Model, 2020; Kaminski, 2017).

Alexa skills can be developed using either the Alexa skill Kit (ASK) or v (Voiceflow, n.d.). ASK uses a text-based programming language while Voiceflow uses a visual programming interface. ASK allows for richer programming as there are no restrictions on code, while Voiceflow uses ready-made blocks of code (Fachhochschule St. Pölten, 2020). In both cases, the certification takes place via the ASK. In this work, programming was carried out with Voiceflow, as this enables a prototype to be created quickly and does not require extensive prior knowledge (Fachhochschule St. Pölten, 2020).

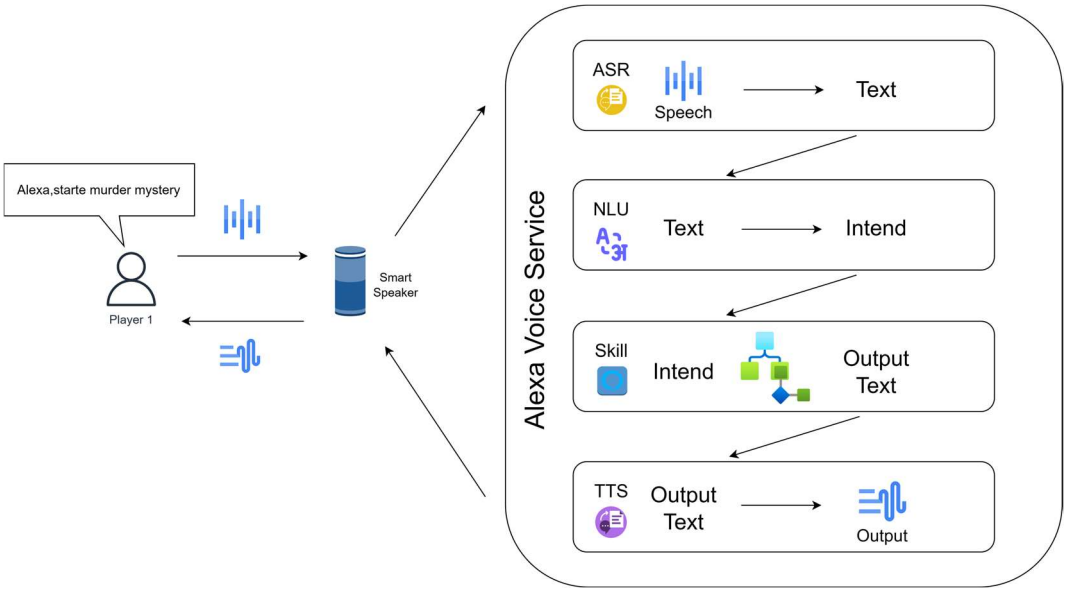

Figure 2 - Alexa voice service workflow nach Kaminski (2017)

Deciding on the suitability of an Alexa skill as an adequate solution for a given task can be done using the checklist provided on the official Alexa Developer website, as listed in Table 3 (Design Principles, n.d.). In the specific context of the murder mystery prototype, the Alexa skill has the primary function of asking the user whether a new game round should be started and, if so, playing the corresponding round. This task is characterized by limited variability and a limited range of possible answers. Nevertheless, the review based on the established

criteria shows that criteria three to five are not met. The information density of the texts transported by Alexa is high and the answers generated are not short, since the skill conveys details about the course of the game and the storyline of the game, which takes about two to four minutes. Due to the fact that the murder mystery game is a one-time event that is not carried out in a repeated manner, there is no need to perform the task frequently. It is unclear whether tasks are accelerated or simplified using Alexa compared to the existing alternatives and what the entertainment value is in the context of the Alexa solution compared to an alternative approach. Although only two of the seven questions were definitely answered positively, the final choice for the technological realization of the murder mystery game focused on the use of the Alexa skill and the Alexa Voice Service. This results from the simple programmability and the simple access to a text-to-speech functionality through the Alexa system. The latter function allows real-time conversion of written texts into spoken language. With the help of this function, the text content to be conveyed can be modified quickly and easily in the development process, which means that the development of the prototype can be designed variably.

1. The conversation to complete the task has predictable patterns with little variability	✓
2. The choices are simple and limited in number	✓
3. Low information density of the language, both from the customer and from Alexa	×
4. Answers to a customer's questions would be specific and brief	×
5. The task is repeated frequently	×
6. The task would be quicker and/or easier with Alexa than with the available alternatives	?
7. The task would be more fun with Alexa than the alternative	?

Table 3 - Decision support whether Alexa skill is the right choice from *Design Principles* (o. J.)

Amazon's developer website lays out the five essential design principles relevant when designing voice interactions for Alexa skills, namely 'be natural', 'be brief', 'be contextual', 'be multimodal' and 'be trustworthy' (Design Principles, n.d.).

The goal of these design principles is to allow users to communicate with the skill as naturally as possible, which feels like interacting with a human interlocutor (Be Natural, n.d.). It is essential that the user clearly recognizes when an answer is expected and what exactly is being asked. It should be avoided to include multiple questions in a single prompt text. In addition, it is essential that the user can use a variety of different formulations, all of which the skill understands (through extensive training of the skill with numerous example sentences) (Be Natural, n.d.).

Communication with the skill should be concise (Be Brief, n.d.). This principle cannot be fully implemented when developing a murder mystery prototype, as the skill's responses include a summary of the patient example each round, which often takes several minutes. Thus, the response time of the skill exceeds the requirement of this principle. However, the intention can still be pursued to reduce to a minimum the interaction steps required to reach the relevant information of the patient example.

The skill should provide information in the appropriate context (Be Contextual, n.d.). When using the skill for the first time, a detailed explanation of the function should follow. In later courses, there is no need for reintroduction, just specific information relevant to the user at that point in time (Be Contextual, n.d.).

The conceptual design of the skill should be multimodal (Be Multimodal, n.d.). Although the primary function of the skill does not require a visual display, selected information can also be presented on a display to enrich the user experience (Be Multimodal, n.d.). With regard to the murder mystery prototype, there is a need to show the dialogue and secret information on a display anyway, since this functionality cannot be implemented within the Alexa skill. As a result, this additional information is presented via an HTML web page.

Last but not least, the skill should also ensure the element of trustworthiness (Be Trustworthy, n.d.). In the context of the murder mystery prototype skill, the only information requested is the user's game progress, making the importance of trustworthiness of little relevance in this context.

2.3.2 Node.js and Socket.io

Node.js is an open source framework for server-side programming in JavaScript, with a large number of libraries and is based on Google's V8 JavaScript engine (Tilkov & Vinoski, 2010). Node.js can run asynchronous code, which means that Node.js can run multiple tasks simultaneously while maintaining high performance (Tilkov & Vinoski, 2010). Socket.IO is software for creating real-time

applications with a possibility of bidirectional communication between the server and the client (Cadenhead, 2015). It can be used for different types of applications such as real-time dashboards, chat systems, and multiplayer games (Cadenhead, 2015).

Listing 1 shows how the connection is established on the server side via SocketIO (io.on()) and how data is then waited for (socket.on()) to be transmitted, which is then output via the console. Listing 2 shows how a connection is established on the client side via SocketIO and how data is transmitted from the client to the server (socket.emit()). The installation and more detailed application of Node.js and Socket.IO is described on their respective websites (Introduction | Socket.IO, 2023; Introduction to Node.Js, n.d.).

```
io.on('connection', async (socket) => {

  socket.on('groupnumber', async (msg) => {
    console.log("Got group number: " + msg);
  });

});
```

Listing 1 – Server side Socket.IO code

```
var socket = io();
socket.emit('groupnumber', gruppenNummer);
```

Listing 2 – Client side Socket.IO code

2.3.3 Airtable

Airtable is a collaborative software-as-a-service platform that enables users to create streamlined databases without code (Hsu, 2023). The platform provides a spreadsheet-like user interface in which data can be entered as datasets and various types of data can be stored (Hsu, 2023). With regard to the choice of a database for this master thesis, Airtable was chosen because it is a free no-code database with positive reviews. Additionally, YouTube has good tutorials on how to integrate Airtable with Voiceflow (Voiceflow, 2021), and the Airtable developer website provides a simple explanation of how to access the Airtable table via an API (Airtable | API Reference, n.d.).

Airtable uses API keys for authentication (Airtable | Authentication, n.d.). API keys are a unique key generated for each Airtable user. These keys are used to

authenticate with Airtable and access the tables and data created by the user. To access the Airtable API, a request must be authenticated with the API key. Listing 3 shows an example GET request to an Airtable table with the table name 'MM Progress'. This command queries all data from the 'MM Progress' table and then outputs it to the console. The queried data can be filtered in advance using certain commands (e.g. 'sort', ...) or can then be processed further by the program.

```
const API_KEY = '--------------';
const BASE = 'app3WpBka6eTK2jpN';
const TABLE_NAME = 'MM Progress';
const base = new Airtable({ apiKey: API_KEY }).base(BASE);

base(TABLE_NAME).select({
  sort: [{ field: "Round", direction: "asc" }],
}).eachPage(function page(records, fetchNextPage) {
  console.log(records);
}, function done(err) {
    if (err) { console.error(err); return; }
```

Listing 3 - Airtable API authentication and GET request in Node.js

A GET request in Voiceflow is shown in Figure 3. The Voiceflow block also accesses the 'MM Progress' table via an API call (underlined in blue, the space corresponds to %20 in Unicode) and is already pre-filtered with a 'sort' command and then stored in the 'einleitungsTxt' variable to be processed further or output in the next step. For security reasons, the actual API key is not shown in the figure.

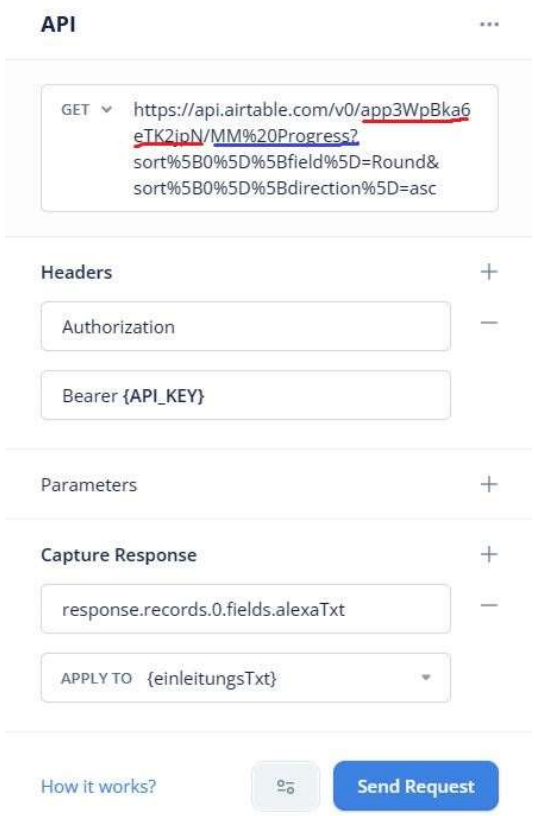

Figure 3 - Airtable API GET-request in Voiceflow

3 Methods

The master thesis was conducted in three consecutive steps in the sense of a design-based research approach: narrative literature research, prototype development and prototype evaluation (Rudloff, 2023). The results of the literature review served as the basis for the development of a low-fidelity prototype. In the next step, the developed prototype was tested by test persons for usability and user experience by means of two questionnaires. The prototype was adapted in an iterative process after the first and third rounds of testing based on the results of the field notes and further design considerations. In this process, the first adjustments focused exclusively on the story, while the second adjustment concerned exclusively the technology architecture. As part of this prototype evaluation, the subjects' perception of team communication and cooperation was also determined with a quantitative questionnaire.

3.1 Literature review

A narrative literature search was carried out on the search engines of Google, Google Scholar, Pubmed, Elicit (Elicit, n.d.) on the following topics and the snowball method was also applied: murder mystery games in general and in a medical context, basic principles of game design, playful learning, Errors and adverse events in the medical setting, promoting communication in health teams, methods for promoting communication and patient safety, Alexa skill design. Some of the results of this literature review have already been presented in chapter 2 and were also used for the prototype development and presented in the following chapter.

3.2 Prototype development

Based on the results of the literature research, a prototype for a murder mystery game was developed. Relevant guidelines and criteria for game design were extracted from the literature and applied to the development of the game, starting with the game mechanics. Using the mechanics as a foundation, a storyline was

developed, considering the insights provided in Section 2.2.1. After that, a low-fidelity wireframe prototype was realised as an Alexa skill using Voiceflow and two web pages were programmed with Visual Studio Code (Visual Studio Code, n.d.) in Node.js. The Alexa skill guides the players through the plot of the game and provides all relevant auditory information. Through the web pages, written information of the game is made available.

Shortly after the completion of the first prototype version, the first prototype test run was carried out. Errors and inconsistencies in the story structure and the dialogue and secret information texts were corrected after the first round of testing. These were only minimal mistakes and name mix-ups when writing the game texts, which had no influence on the flow of the game. In addition, the technology architecture of the prototype was adapted after the third round of testing to allow multiple groups to play simultaneously. The exact procedure of the prototype development is described in section 4.1.

3.3 Prototype evaluation

The murder mystery prototype was evaluated by five groups in terms of usability, user experience and communication improvement. The recruitment and evaluation process is described in this chapter.

Recruitment of participants

To increase the objectivity of the assessment and reduce bias, it was planned to recruit test subjects from interdisciplinary teams that the author of the master thesis does not know personally. For this purpose, the training departments of the Austrian Academy of Physicians and the Academy for Continuing Education and Training in the MTDG Professions were first contacted to recruit suitable test subjects. However, this approach proved unsuccessful. Due to time constraints, the original second plan of asking students of the master's programme in Health Assisting Engineering at the FH Campus Wien for support in recruiting test subjects was discarded. Instead, the third planned option was resorted to and personal contacts such as work colleagues, fellow students and acquaintances of the author were approached and divided into groups. Another group of test subjects was acquired by the supervisor of the master thesis.

Inclusion criteria:

- Age over 18 years
- Completed training in a health profession according to the Austrian Federal Ministry of Social Affairs, Health, Care and Consumer Protection (BMSGPK, 2020)

Exclusion criteria:

- People who drop out of the prototype test because they are not able to use an Alexa skill.
- People who do not meet the inclusion criteria but take part in the testing because a group size of 5 is required to play the prototype game

Participants

During development, the game was designed for a fixed group of 5 players, which is why all tests were planned with five participants. A total of five test runs were carried out, four of which were with five people each and one with four people (group 4). In group 4, one participant cancelled at short notice due to illness, which meant that the author of the master thesis took on a role, namely that of the dietitian in the dialogues and the disclosure of clues. However, he stayed out of the discussions on the secret information. In another test run (group 3), two persons without a medical background were used as subjects to reach the number of five participants. These individuals thus did not meet the inclusion criteria and their questionnaires were excluded from the data analysis.

The characteristics of the participants in the tests of the individual groups are shown in Table 4. The average age of the subjects is young at 27 and somewhat unevenly distributed in the groups. The murder mystery experience in the teams was very unevenly distributed. Groups 1 to 3 had zero or one person who had played a murder mystery before the prototype test, while groups 4 and 5 had only one person with no experience of murder mysteries. The frequency of each profession and the allocation of the groups are listed in Table 5, where it can be seen that a large proportion (81%) of the subjects consisted of paramedics, physiotherapists and radiology technologists. You can also see that the interdisciplinary professions were unevenly distributed in the groups. While group 1 consisted of five different professions, there were a maximum of two different professions in groups 2 to 5. This uneven distribution resulted from the way the subjects were recruited. The distribution of frequency of smart speaker use among the participants is shown in Table 6. About half use the smart speaker daily or several times a week. The other half use smart speakers less frequently

or never. The group members from group 1 and 2 knew each other between one and two years. In groups 3 and 4, the participants knew each other for less than one year. Group 5 had known each other the longest, for over five years.

Group No.	Group size	Inclusion criteria fulfilled	Mean Age (SD)	Murder Mystery experience	Prototype Version
1	5	5/5	26,2 (2,9)	0/5	V1
2	5	5/5	31,0 (4,6)	1/5	V1
3	5	3/5	26,7 (6,4)	1/3	V1
4	4	4/4	23,0 (2,0)	3/4	V2
5	5	5/5	28,4 (2,3)	5/5	V2
total	24	22/24	27 (4)	10/22	3xV1/ 2xV2

Table 4 - Characteristics of the test groups

Profession	Total No. of Participants (% of Total)	in Group				
		1	***2***	***3***	***4***	**5**
Paramedics	7 (32)	-	-	2	-	5
Physiotherapy	6 (27)	1	-	1	4	-
Radiology technology	5 (23)	1	4	-	-	-
Nursing	2 (9)	1	1	-	-	-
Speech therapy	1 (5)	1	-	-	-	-
Biomedical analytics	1 (5)	1	-	-	-	-
total	**22 (100)**	**5**	**5**	**3**	**4**	**5**

Table 5 - Distribution of the participating medical professions in the groups

Frequency of smart speaker usage	***No. of Participants (of whom own a smart speaker)***
Daily	2 (2)
Several times a week	8 (8)
Less frequently	7 (1)
Never used	5 (0)

Table 6 - Smartspeaker usage frequency among participants

Organization and procedure of the prototype test

The prototype tests were carried out in Vienna and St Pölten between March and April 2023. During the prototype tests, the Alexa skill was run on a laptop and not on a smart speaker. There were two reasons for this. Firstly, Alexa skills run just as well on laptops and smartphones as on a smart speaker, so the hardware has no influence on the use of the prototype. On the other hand, the author of the master thesis did not own a smart speaker and did not want to buy or borrow one. The prototype tests were set up as shown in Figure 4. The five test subjects sat around a table on which two laptops were placed (except group 3, which only used one laptop). One laptop ran the Alexa skill from the Alexa app and opened the web page with the dialogues, while the other laptop only displayed the web page with the dialogues. By using two laptops, all test subjects could see one of the two screens clearly. In addition, each subject used their own smartphone to access the website with the secret dialogues. The author of the study was present during the tests in order to be able to intervene in the event of major problems and to carry out field observations on the function and correct operation of the prototype (for group 3, the author was present online). Before the start of the game, each subject received a piece of paper with a flow chart of the game, a link to the dialogue website, a QR code to the website with the secret information and a secret code which they would later need to access the secret information. The test persons had to enter the link on the prepared laptop and scan the QR code with their smartphones. After a brief introduction to the testing process and an explanation of the game by the study author, the test subjects were asked to start the Alexa skill and follow the instructions. After completing the murder mystery game, the test subjects filled out three questionnaires to rate their experience in the game. The usability of the prototype was measured with the System Usability Scale (SUS), the user experience with the User Experience

Questionnaire (UEQ) and the communication with a questionnaire derived from the study by Kavanaugh et al. (2022) has been translated into German.

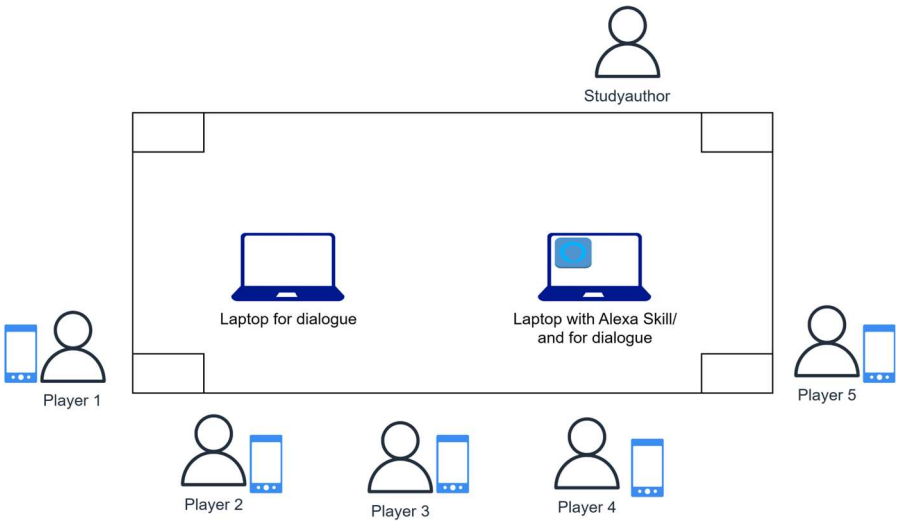

Figure 4 - Setup of the prototype test

Measuring instruments

SUS: The System Usability Scale consists of ten items and provides a comprehensive insight into subjective usability ratings (Brooke, 1995) and shows reliable accuracy even with small samples of 10 to 12 subjects (Sauro, 2010). Ratings were made on a scale of one to five from "strongly agree" to "strongly disagree" (Brooke, 2013). The SUS score obtained, between 0 and 100, reflects the overall usability of a system. The value is calculated according to Brooke (1995) guidelines. The SUS value is not a percentage and should not be interpreted as such, as Brooke (2013) and Sauro (2018) state. The German version of the SUS is used to evaluate the prototype.

UEQ: The UEQ is a 26-item quantitative questionnaire for the subjective evaluation of the user experience and takes about three to five minutes to complete (Schrepp et al., 2017). The questionnaire captures the dimensions of attractiveness, perspicuity, efficiency, dependability, stimulation and novelty (Schrepp, 2023). The questions in the UEQ are formulated using contrasting adjectives, and users rate their agreement or disagreement on a Likert scale from one to seven (Schrepp et al., 2017). The UEQ is considered reliable from about 20 to 30 subjects (Schrepp, 2023). The German version of the UEQ was used for the evaluation of the prototype. On the website of the UEQ there is an analysis tool for evaluating the test results (User Experience Questionnaire (UEQ), n.d.).

Communication questionnaire by Kavanaugh et al. (2022)*:* The questionnaire developed by Kavanaugh et al. (2022) consists of 10 questions rated on a 5-point Lickert scale from *Strongly disagree (1)* to *Strongly agree (5)*. These questions capture subjects' perceptions of four aspects of communication and collaboration within the group during the activity: the effectiveness of group communication (questions 1 to 3), the professionalism of discussions (questions 3 and 4), the understanding of the activity as a learning opportunity (questions 5, 6 and 8) and teamwork (questions 7 and 8) (Kavanaugh et al., 2022). Although the questionnaire has not yet been tested for reliability and validity, it was chosen because it had already been used in a similar murder mystery game and no adequate validated questionnaire was available to investigate communication and/or collaboration during the intervention. Other questionnaires on interprofessional communication and collaboration (such as ICCAS, W(e)Learn, ...) from the National Center for Interprofessional Practice and Education (Assessment and Evaluation, n.d.) did not accurately capture what was intended to be measured or were too time-consuming to administer.

Data analysis

The data was analysed using descriptive statistics, with the statistical characteristics presented in both tabular and graphical form. The UEQ data analysis tool on the UEQ website was used to analyse and plot the UEQ results (User Experience Questionnaire (UEQ), n.d.). The demographic data and the results of the SUS questionnaire and the communication questionnaire were analysed and then visualised using a python script (Python, 2023) in Google Colab (Google Colaboratory, n.d.).

The SUS score was calculated according to Brooke (1995). Since the first question of the SUS ("I think that I would like to use this system frequently") was interpreted differently by different people, the evaluation was inconsistent. Some interpreted the question as specifically asking them to rate this game, which resulted in a low score due to its uniqueness, as regular use does not make sense in context of murder mystery games. Others understood the question as intended, namely in relation to similar games, and awarded more points accordingly. Due to this different interpretation, the SUS score was additionally calculated excluding the first question, as recommended by Lewis & Sauro (2017), as it has only a minor impact on the overall SUS score.

4 Results

This chapter presents the results of this master thesis. Section 4.1 provides a brief guide for the future creation of murder mystery games. The results of the usability and user experience testing are presented in sections 4.2.1 and 4.2.2, where the raw data of the SUS was analysed with Python and the UEQ with Python and the evaluation tool from the UEQ website. Following this, the results of the communication questionnaire are presented as boxplots in section 4.2.3. Finally, the author's field notes recorded during the prototype tests are presented in section 4.2.4.

4.1 Development of a medical murder mystery on a smart speaker

Rules and procedure	3 rounds, 80-90 minutes activity duration, 5 players, each player must engage in dialogue and discussions of secret information to solve the case *Procedure:* – General initiation by Alexa – 3 rounds: 1) round initiation by Alexa, 2) read dialogue together, 3) study of secret information, 4) disclosure and discussion of secret information, 5) root cause analysis using a fishbone diagram – Alexa resolves the case
Goal	*All:* determine the correct cause for the poor general condition of the patient *Insider:* Lure other players onto the right track without being recognized as an insider
Method to achieve Goal	Share individual knowledge with fellow players and carry out root cause analysis

Table 7 - Murder mystery game mechanics guide

Theme and setting	Define the following points: – Patient history and diagnosis – sudden/gradual worsening of the patient's condition – Medical field – Intramural/extramural
Character backgrounds	Give each character a short background history one or two characteristics from the following list: – *limited memory, fatigue, stress, hunger, illness, language and cultural differences, and dangerous behaviours*
Treatment errors of each character	Choose one treatment error per character (from Table 11)
Root cause	Select one treatment error from the treatment errors above, which will be the root cause of the patient condition. Possibly let more than one character be responsible
Connections between the characters	Each character accuses and defends someone once and is accused and defended by someone once
False leads and red herrings	Red herrings can be placed in introduction, dialogue and documentation

Table 8 - Murder mystery game story guide

The four fundamental components of games include mechanics, story, technology and aesthetics. The results of the development process of these four components are now described in this subchapter and serve as a guide for future developments of medical murder mystery games. The game mechanics from this prototype described in section 4.1.1 and summarized in Table 7 can basically be used unchanged when designing new medical murder mystery games as described. For the development of the story, all key components described in section 4.1.2 and listed in Table 8 must be defined and worked out in detail as texts when developing a new murder mystery game. The technological implementation will be explained in detail in section 4.1.3. This master thesis does not go into detail about the aesthetics.

4.1.1 Development of the murder mystery game mechanics

Rules and procedure: The prototype game follows the typical structure of other murder mystery games and consists of three rounds. During development, the game was conceived and designed for a fixed group of 5 players, based on the findings of Persky et al. (2007), which recommend a group size between 4 and 6 players. Adapting the game for a different number of players would have involved considerable effort in developing the plot and game mechanics and was therefore not done. Each player receives individual secret information about the patient case in the three rounds and must share this knowledge with other players in order to successfully solve the case.

At the beginning of the murder mystery game, the rules of the game are explained to the players by the study author using a flow chart in Figure 5. The game consists of a general introduction by Alexa, followed by three rounds of play and a final resolution of the case by Alexa. The introduction explains the flow of the game and the goal of the game. Each of the three game rounds consists of five steps, including a round introduction by Alexa, a shared dialogue, reading secret information, revealing and discussing these clues, and finally a root cause analysis using a fishbone diagram.

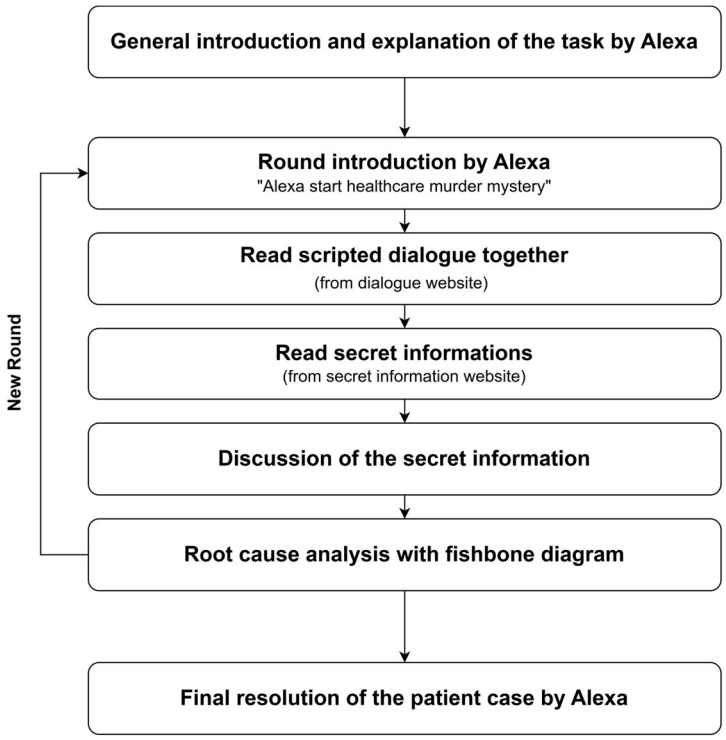

Figure 5 - Game flowchart

Game Objective: Most murder mystery games have a semi-cooperative game objective in which one player takes on the role of the murderer and tries to convince the other players of his or her innocence, while all the other players try to solve the murder case and identify the perpetrator (Blaubart, 2019; Kosmos, 2019). In contrast, the prototype presented has a cooperative game objective where all players work together to identify the error that caused the patient's condition. However, one person in the game has more information than the other players and knows from the beginning the correct cause that caused the patient's condition (like the murderer in a classic murder mystery game). This person must try to convince the other players of this cause without arousing suspicion that he or she already knew about it beforehand, because at the end there is a vote on who might have already known from the beginning what the correct cause might have been. With a person who already knows the cause of the patient's harm from the beginning, the circumstance in health care is simulated that employees sometimes do not dare to address or report the mistake of a co-worker or supervisor.

Methods to achieve the game objective: During the three rounds of the game, information about the patient case is gradually revealed through dialogue and the disclosure of secret information. In the first round, the secret information refer to individual factors that can lead to errors and are not so much used to solve the case as to point out individual error factors and to provide a loosening entry into the game. In the second round, one possible cause for patient harm is revealed per character, but all causes are invalidated by another character with conclusive arguments. Defending each other against the accusations among the characters should improve team cooperation after the initial accusations. In order to find the correct cause of the patient harm, all hypotheses must be checked by the players and errors found in the counter-arguments to one of the expressed hypotheses.

4.1.2 Development of the murder mystery game story

The following section explains how the key components for the creation of a murder mystery story, defined in the background chapter, were specifically identified and defined for the prototype of this master thesis. The summary of the story creation process is presented at the beginning of this section in Table 9.

Theme and Setting	*Patient, diagnosis and medical field:* Patient with total hip arthroplasty and type 2 diabetes. Gradual worsening of the patient's condition Orthopaedic department
Character Backgrounds	
Doctor	Inexperienced
Physiotherapist	Inexperienced
Nurse	Sickness, stress due to understaffing in patient care
Dietitian	Limited memory: must care for father at home
Radiology technologist	Stress and hunger due to lateness
Treatment errors of any character	
Doctor	Incorrect entry of a drug in a patient's medical record, resulting in too high dose.
Physiotherapist	Head injury from falling
Nurse	Incorrect route of administration of a medicine, resulting in too rapid absorption into the bloodstream
Dietitian	Diabetes medication incorrectly adjusted
Radiology technologist	MRI performed on patient with pacemaker
Root cause	Doctor + Nurse + Physiotherapist
Connections between the characters	Professional, collegial relationship between the characters + see Figure 6
False tracks and red herrings	Swabs in the surgical area (dialogue 1) Pelvic CT (patient file) Renal thrombus hypothesis (dialogue 3) Patient's visual impairment (introductory text) and respiratory problems (dialogue 2)

Table 9 - Summary of the story creation results

- *Subject and setting/ diagnosis and medical field*

Due to the medical background of the prototype, there is the possibility to set the storyline either in the intramural or extramural area, whereby the choice fell on the intramural area. The next decision, made at a later stage of development, concerned the subject area in which the story was to be set. Here it was important to ensure that the patient's symptoms and treatments matched the characters' treatment errors, which would be established later. Due to the wide range of treatment options and thus the possibilities for error for different professions, it was decided that the fictional patient should have a total hip replacement and type 2 diabetes. In addition, a decision had to be made as to whether the patient's condition should be presented in the story as a sudden emergency or as gradual damage over several days. This choice was made only after identifying and selecting the possible motives and fell on gradual damage.

- *Characteristics and background story of the characters/ individual error factors of each character*

In the development of the characters, both their professions and individual sources of error were conceived. Given the overall goal of promoting interprofessional cooperation in the medical setting, professions that typically work together in interdisciplinary teams within hospitals were chosen. The characters were designed as a doctor, physiotherapist, nurse, dietitian and radiology technologist. The individual sources of error from section 2.1.2.1 were distributed among the characters, taking care to cover all factors as comprehensively as possible. This resulted in the allocation of the factors to the respective characters shown in Table 10.

Doctor	Inexperienced
Physiotherapist	Inexperienced
Nurse	Sickness, stress due to understaffing in patient care
Dietitian	Limited memory: must care for father at home
Radiology technologist	Stress and hunger due to lateness

Table 10 - Assignment of the error determinants to the characters

– *Motives and possibilities of each character/ treatment errors of any character*

	patient harm within minutes	patient harm within days to weeks
Doctor		
– Wrong diagnosis and therefore wrong treatment.		x
– Incorrect route of administration of a drug, resulting in too rapid absorption into the bloodstream.	x	x
– Incorrect entry of a drug in a patient's medical record, resulting in too high or too low dose of the drug.	x	x
– Drug injected into spinal cord instead of veins	x	
– Item forgotten in the operating area		x
Physiotherapist		
– Head injury from falling	x	x
– Dizziness due to drop in blood pressure during therapy	x	
– Dizziness due to hypoglycaemia during therapy	x	
– Patient exhausted from therapy	x	
Nurse		
– Incorrect infusion rate	x	
– Forgotten to give medication		x
– Incorrect route of administration of a medicine, resulting in too rapid absorption into the bloodstream	x	x
– Overdose of medication	x	x
Dietetician		
– Incorrectly adjusted diabetes medication	x	x
– Forget to ask about a food allergy and prescription of the wrong diet	x	
– Dietary supplement overdose	x	x
Radiology technologist		
– Contrast medium given to Patient with allergy to it	x	
– MRI performed on patient with pacemaker	x	x
– Exam performed on wrong side of body		x
Any		
Patient mix-up due to lack of patient identification	x	x

Table 11 - Possible patient harms by different professions

The plot of the game differs from what the term "murder" mystery might suggest, as it does not involve a murder case, but instead uncovers a medical error on the part of a health professional. This eliminates the usual murder motive and replaces it with the need to work out for each character in the game one or more

potential sources of error through which the patient could be harmed. Based on the listed sources of error in chapter 2.1.2.2, individual potential sources of error were elaborated for each of the five occupational groups in the murder mystery game, which are listed in Table 11. After a thorough analysis of the mentioned possibilities to harm the patient, it was decided to design the story with a gradual deterioration of the patient's condition. In addition, it was decided to include in the story only one source of treatment errors for each character. This decision was made because the integration of several sources of error per character would have made the game more complicated, would have required longer rounds of discussion and thus the planned game duration of 60 to 90 minutes could not have been adhered to.

- *Culprit, murderer/Root cause*

In the plot, the goal is not to assign blame or directly identify a culprit. Rather, it is about identifying the underlying cause that may have led to the patient harm. This is to emphasise the importance of teamwork and how several people can work together to prevent patient harm. The illustration further highlights that patient harm caused by a single person's error can often be prevented if multiple people are involved in the process and control mechanisms are applied. Therefore, for the story of this prototype, a root cause is established where three people at once could have prevented the patient harm. The doctor accidentally entered the wrong dose into the patient's record, the nurse noticed the mistake but forgot to correct it and subsequently became ill. The physiotherapist also suspected a mistake (this information is given to the player at the beginning of the game, but he must try to lead the other players on the right track without revealing his secret knowledge directly). However, he did not dare to approach the doctor because she had already reprimanded him when he drew her attention to a possible mistake in the operating room.

- *Connections between the characters and to the victim*

Within the elaboration of a murder mystery story, it is common for the characters to have some connection to each other or to the victim of the play, be it in the form of family, business or romantic relationships, in order to make the plot more dynamic and engaging (Hoare, 2020). In relation to the storyline of this master thesis, a purely professional relationship between the characters was intentionally chosen (all characters belonged to the patient's medical treatment team), as well as a pure relationship between practitioner and patient (victim), in

order to emphasise the professional interaction between the characters. Nevertheless, it is quite conceivable to include family or romantic relationships between the characters in future medical murder mystery stories. However, it should be taken into account that this could possibly have an impact on the professionalism of the communication, especially if the players interpret their roles particularly intensively.

Unlike other murder mystery games where players accuse each other and have to defend themselves against these accusations, in this game the accusation of one teammate is refuted by the statements of another teammate instead of being reinforced by new clues. This approach aims to promote cooperation and mutual support. Therefore, relationships were defined as to who accuses and defends whom in rounds 1 and 2 (see Figure 6). Each player accuses and defends one teammate in both rounds. In the section "motives and possibilities of each character" it was determined that the doctor mistakenly entered the wrong dosage of a medicine in the patient's record, which is brought forward as an accusation by the radiology technologist (see Figure 6, red line between radiology technologist and doctor). The nurse defends the doctor by claiming that he noticed the mistake and had it corrected (see Figure 6, green line between nurse and doctor). All other accusations and defences were chosen so that ultimately each player accuses once and accuses someone once, and each defends once and is defended once.

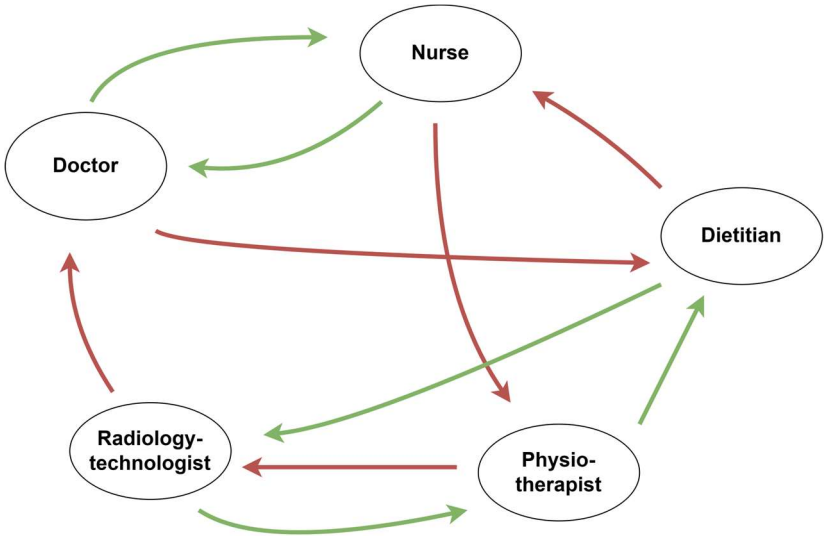

Figure 6 - Route of the accusations (red) and defences (green)

- *False tracks and red herrings*

False leads that concern the medical case but have nothing to do with the actual incident are often used in murder mystery games to complicate the plot and create confusion (Stockdale, 2021). In the developed prototype version, red herrings were incorporated into dialogue and patient records, as well as additional symptoms not directly related to the actual case. These red herrings include items such as an almost forgotten swab during surgery, a CT scan of the hip noted in the patient's record, consideration of whether blood clotting medication was dosed incorrectly and could lead to a thrombus in the kidney, and symptoms such as breathing problems and vision impairment.

4.1.3 Development of the murder mystery game technology

There exist two iterations of the prototype. The first version (see Figure 8) was used in the first three tests, while the second version (see Figure 7) was employed in the final two tests. In the first version, the simultaneous use of the prototype by several groups was not possible for technical reasons. Given that the Alexa skill was accessible to the public and could potentially be used by multiple groups simultaneously, there was a concern regarding potential interference between groups. To enhance the prototype's reliability, a minor adjustment was introduced. Participants were required to input their group number at the beginning of each round. All other aspects remained unchanged. However, this modification resulted in decreased reliability. The Alexa skill only understood the voice input of the queried group number if the group number was announced in digits and even then, only unreliable. Nevertheless, this subchapter only deals with the individual components of the current prototype version, but overall technology architecture of prototype version 1 is shown in Figure 8 at the end of this section.

Prototype version 2 (see Figure 7)

All relevant game information is stored in two airtable tables and a server data store. The first table (Airtable database 1) contains the texts that are played by Alexa and texts that players can open on their smartphones. The second table contains information about the progress of the respective game groups. The tables and files are accessed via an Alexa Smart Speaker using the Alexa Voice Service (access to Airtable database 1 and 2) and via two servers that can be

accessed via HTML web pages from a smartphone (access to Airtable database 1 and 2) and a laptop (access to Airtable database 2).

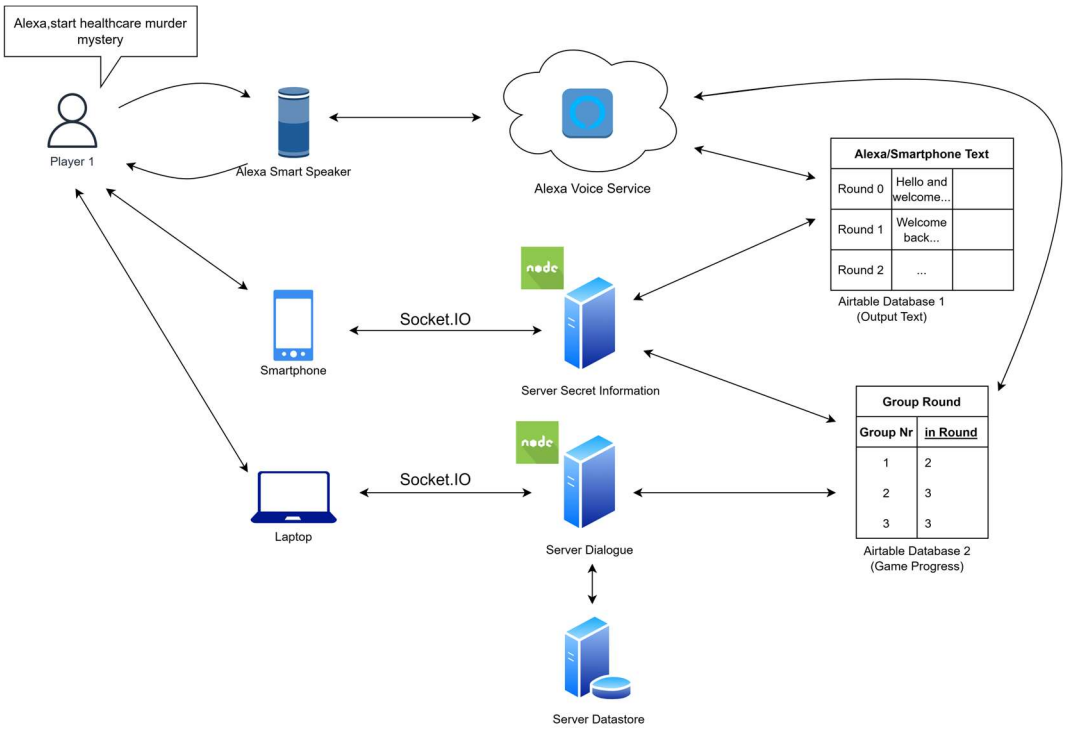

Figure 7 - Overall technology architecture prototype version 2

The structure of the Airtable database 1 is shown in Table 12. Line 1 (round 0) stores the introductory text that Alexa outputs at the beginning and in which all general information about the structure of the game is conveyed. Lines 2 to 4 (rounds 1 to 3) store the respective text that Alexa outputs before each new round, in which collected information from the previous rounds is summarised and new information is announced. In addition, lines 2 to 4 store the secret information of the individual rounds that the players receive each round via their smartphone. In line 5 (round 4) the text for the resolution of the case that Alexa gives out is stored. Row 6 (round 5) was added because the logic of the Alexa code requires it. The second table stores the progress of the group. The structure of Airtable database 2 is shown in Table 13. At the beginning of the game, a new group is assigned a group number. This group number is queried after each round and the round the group is currently in is stored in the column "inRound" and updated after a new round is completed. The server data storage contains PDF and image files that can be accessed from the laptop.

Round	**Alexa text**	**Nurse text**	**Physio text**	**…**	**…**
0	Alexa Game-Introduction Text			…	…
1	Alexa Round-Introduction Text 1	Secret Information Nurse Round 1	Secret Information Physio Round 1	…	…
2	Alexa Round-Introduction Text 2	Secret Information Nurse Round 2	Secret Information Physio Round 2	…	…
3	Alexa Round-Introduction Text 3	Secret Information Nurse Round 3	Secret Information Physio Round 3	…	…
4	Alexa resolution Text		Secret insider resolution	…	…
5	Finished	Finished	Finished	…	…

Table 12 - Airtable database 1/ output text

GroupNr	inRound
1	5
2	5
3	3
…	…

Table 13 - Airtable database 2/ game progress

Prototype version 1 (see Figure 8)

In the first version of the prototype, the game progress was not saved in database 2 as in the current version, but in database 1 via an additional column called "Checklist". At the end of each round, the line in database 1 was checked off with the word "check". If a round was checked and the Alexa skill was restarted, the skill recognized the checked round and started the next unchecked round. The two websites also accessed database 1 to determine game progress.

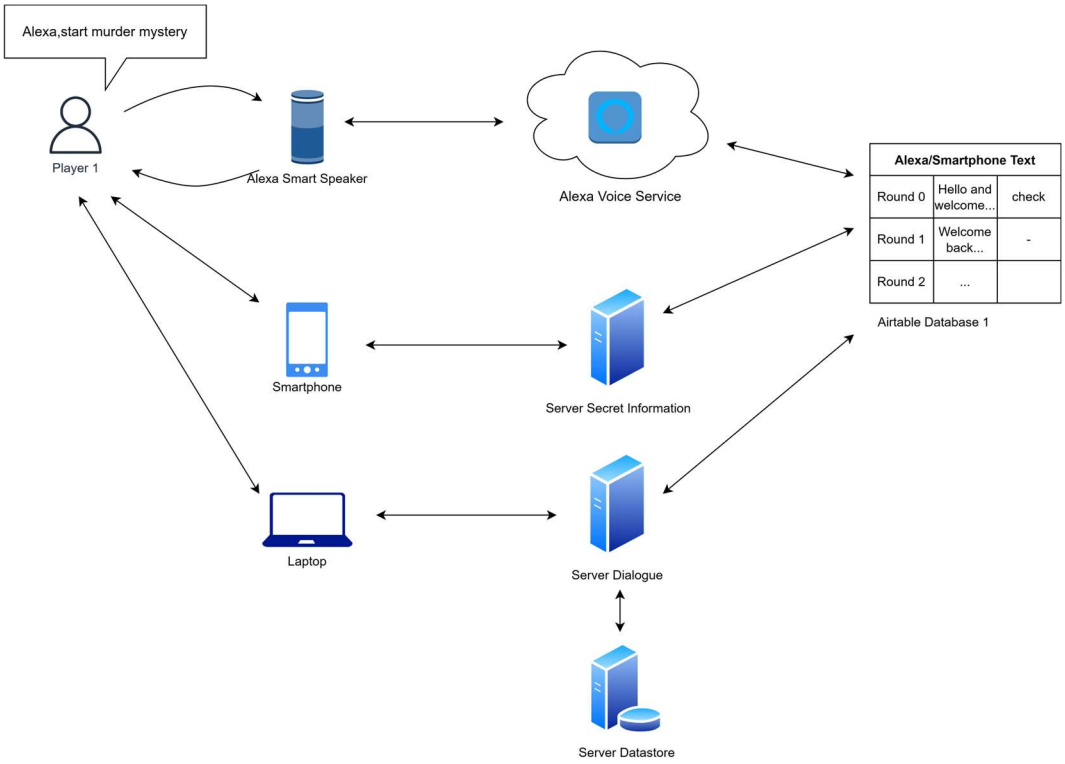

Figure 8 - Overall technology architecture prototype version 1

4.1.3.1 Technology architecture Alexa skill

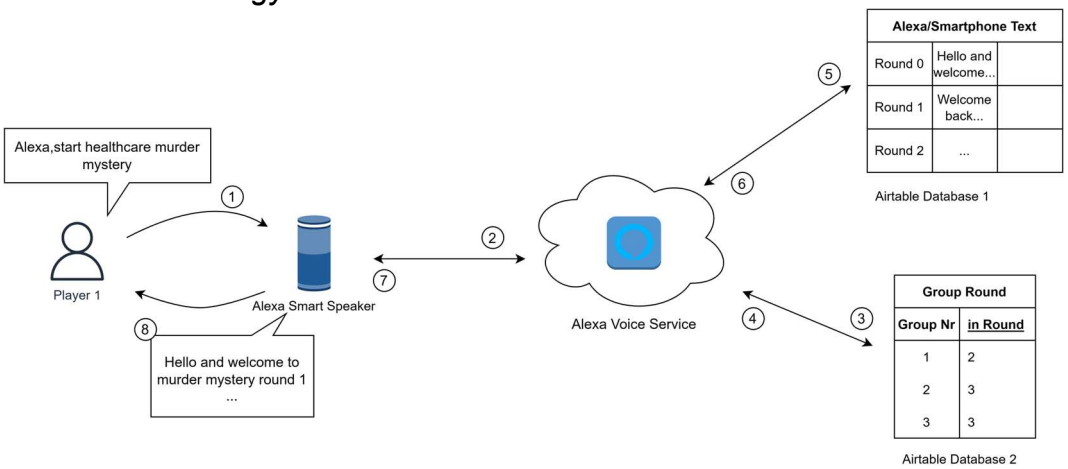

Figure 9 - Technology architecture of the Alexa skill

The Alexa skill is started by using the voice command "Alexa, start healthcare murder mystery". The skill is executed via the Alexa Voice Service, which accesses the Airtable database 2, after querying the group number, to determine the current status of the group. The corresponding text for the current round is

then retrieved from the Airtable database 1 and transmitted to the Smart Speaker, which then plays the text back verbally. The programming of the skill was implemented in Voiceflow. The simplified flowchart of the Alexa skill is shown in Figure 10. The comprehensive flowchart can be found in appendix A.

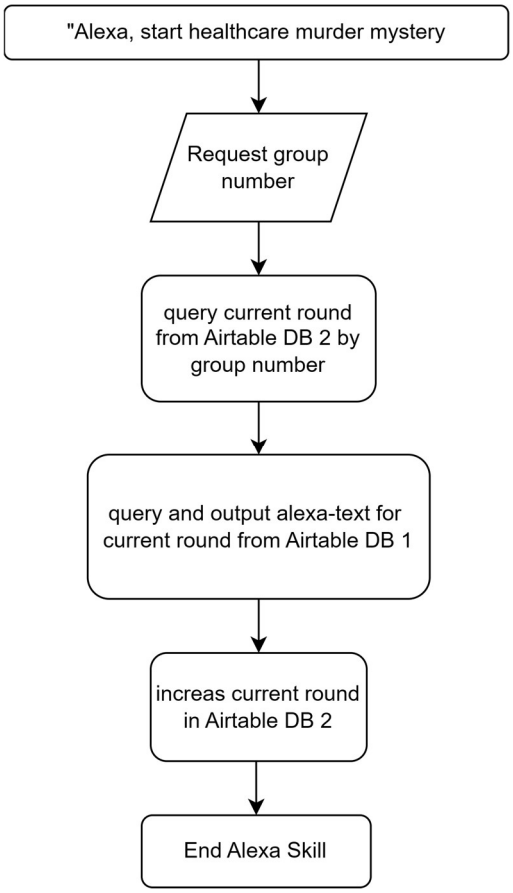

Figure 10 – Simplified Alexa skill flowchart

4.1.3.2 Technology architecture dialog website

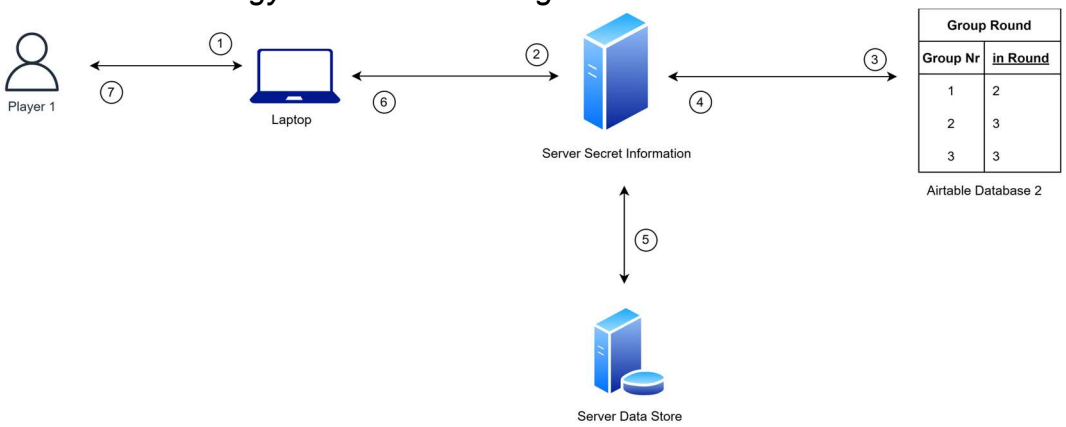

Figure 11 - Technology architecture of the dialogue website

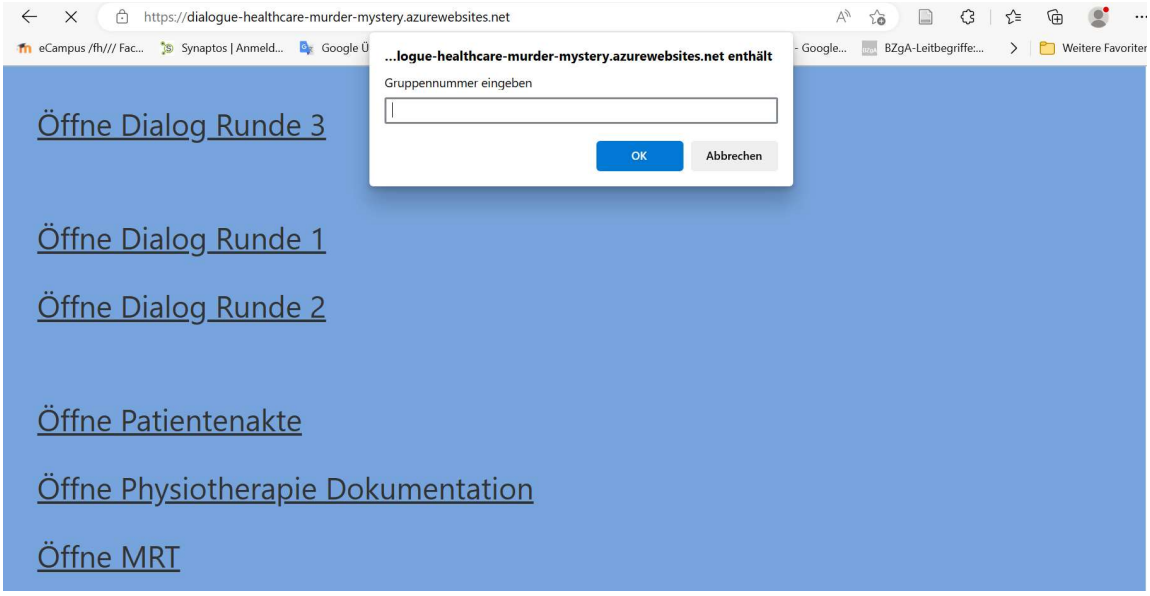

Figure 12 - Dialogue website user interface

After initiating the round through the smart speaker, players are given access via a laptop to a website where dialogue, medical records, documentation and medical reports are provided. Depending on the round in progress, different documents will be made available to the players. Here, the game progress from the Airtable database 2 is retrieved from the server in order to then access the data store and make the files relevant to the current round available on the website. The airtable data is accessed via an API call as described in Section 2.3.3. The website's user interface was deliberately kept simple and only

contained links to open the documents of the respective round (see Figure 12). Communication between the server and the web client is done via Socket.IO.

4.1.3.3 Technology architecture secret information website

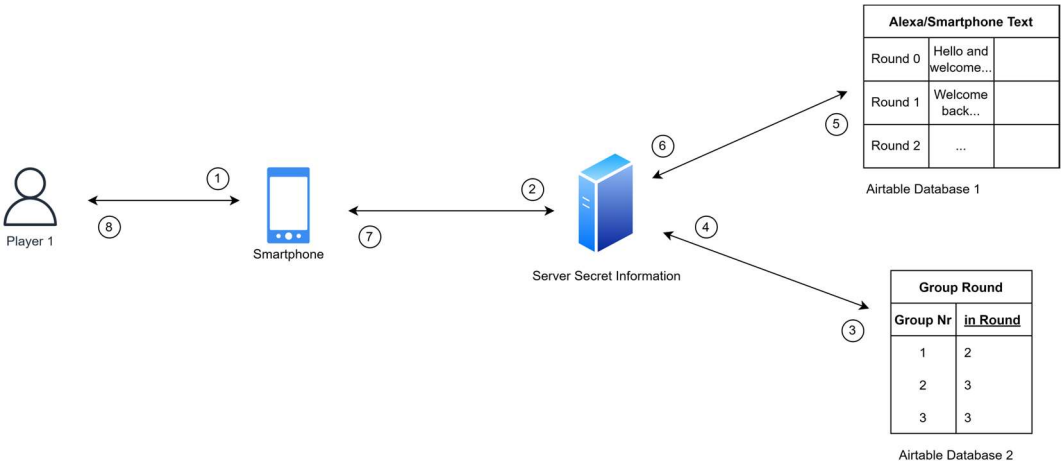

Figure 13 - Technology architecture of the secret information website

After the dialogue, the participants access a website via their smartphones from which they receive secret information that helps solve the case, as shown in Figure 13. This website accesses a server that retrieves and processes data from Airtable database 1 and 2. In Airtable database 2, after entering the group number, it is determined in which game round the group is. Based on this round number, information from Airtable database 1 regarding the secret information for the current round is retrieved and transmitted to the server. The server then makes the information of the current round available to the players' smartphone browsers. The players then choose their character's profession and, by entering a secret number, which acts as a digital key, obtain the information relevant to their character on their smartphones. The implementation of this key ensures that the confidential information of other players cannot be accessed either intentionally or unintentionally. This secret number is given to players at the beginning of the game along with the character description. The communication between the server and the web client takes place via Socket.IO, as does both dialog websites. The airtable data is accessed using the methods described in Section 2.3.3 by means of an API request by the server. The user interface of the smartphone secret information web page is shown in Figure 14.

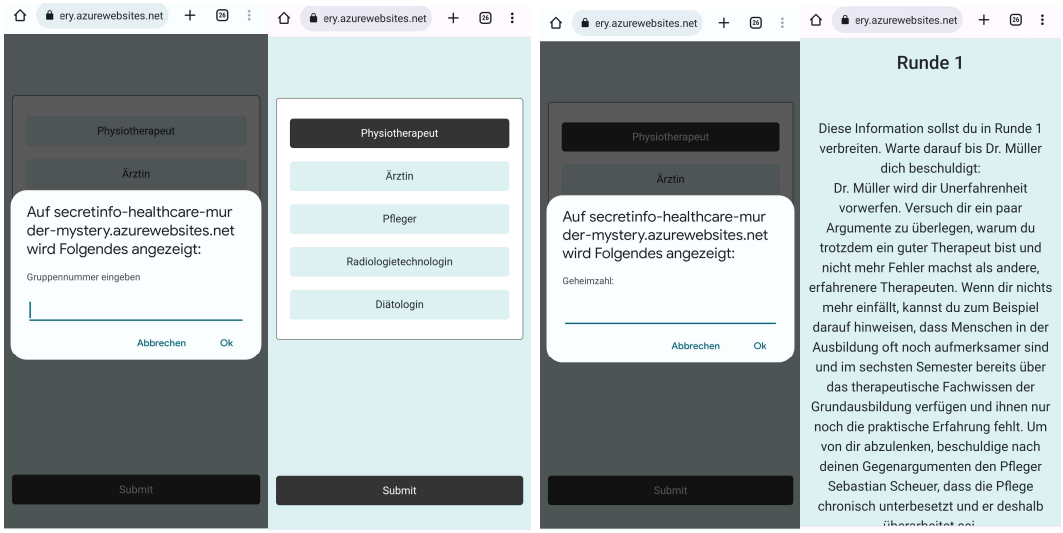

Figure 14 - Smartphone website's user interfaces 1) enter group number 2) choose profession 3) enter secret number 4) secret information displayed

4.1.4 Development of the murder mystery game aesthetics

Compared to other aspects of the game, the aesthetics of the game received the least attention, although it is just as important as the other three areas. A large part of the game involves communication among the players. Considerations of aesthetics could include costumes, room design, background music and other elements, but were not considered for this prototype. A minor aesthetic component was considered in relation to the technological applications. However, the introductory text, which is output via a smart speaker, and the two web pages were not developed from a specific aesthetic point of view, but according to the experience and subjective judgement of the author of the master thesis. The web pages were designed with practicality and simplicity in mind.

4.2 Evaluation of the prototype

4.2.1 Evaluation of usability

The evaluation of the SUS score resulted in a value of 76.9. This corresponds to the 78th percentile and is rated as acceptable, with the product being rated as "good" and receiving a grade of B (Sauro, 2018). Due to the different interpretations of the first question, the SUS score was also calculated without considering this question (Lewis & Sauro, 2017). The adjusted SUS score is 80.8, which corresponds to the 90th percentile. This is also considered acceptable, rated "excellent" and given an A grade (Sauro, 2018). The interpretation of the individual values is shown in Figure 15. The adjusted SUS score was used for the subsequent analyses.

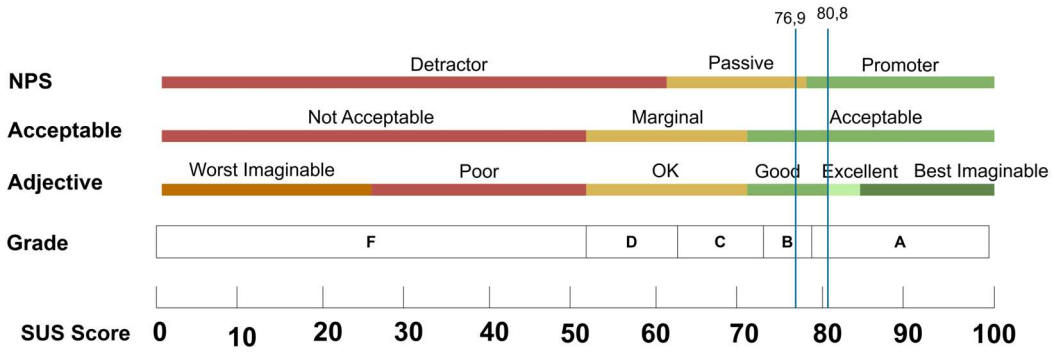

Figure 15 - Interpretation of the SUS score (adjusted and unadjusted) according to Sauro (2018)

In addition to determining the overall SUS score (80.8), the SUS scores for each group were also calculated to identify differences in usability ratings between groups. Despite the small group size for each SUS score, these calculations provide insight into the divergent assessments of the groups (see Figure 16). While the SUS scores in group 1 (86.7) and group 2 (87.2) were above the overall mean-SUS score (red line), the SUS scores in groups 3 (68.5) and 5 (76.1) are below the overall mean. In group 4 (80.6), the SUS score is the same as the overall mean. Due to the limited number of subjects (n) per group, the standard deviation is generally relatively high. Within groups 3, 4, and 5, the dispersion of the individual SUS scores among participants in the respective group is notably wide, leading to a particularly high standard deviation within these groups.

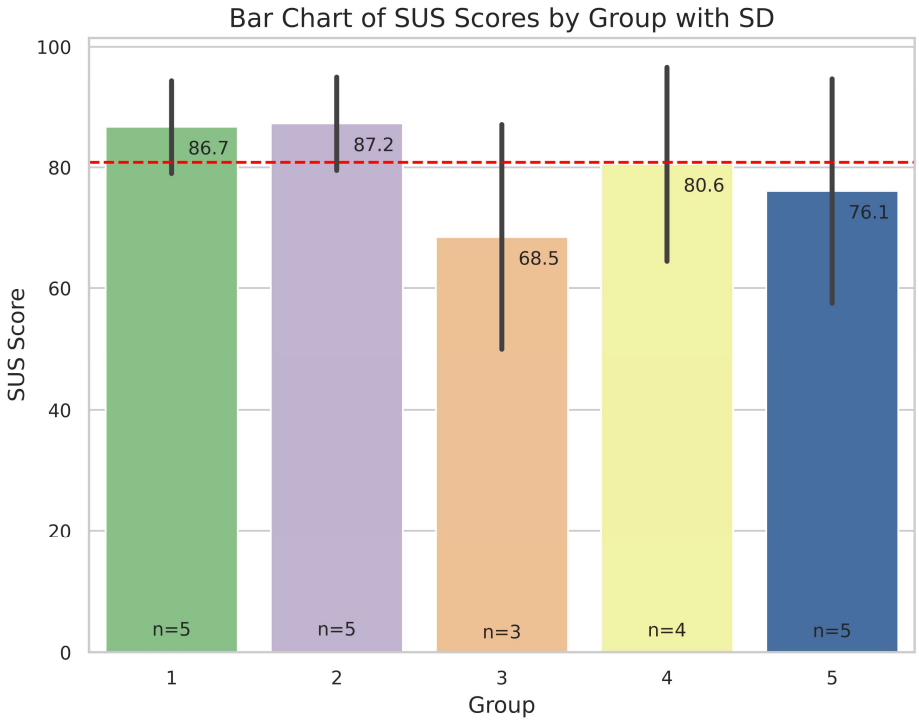

Figure 16 –Adjusted SUS-Score by group

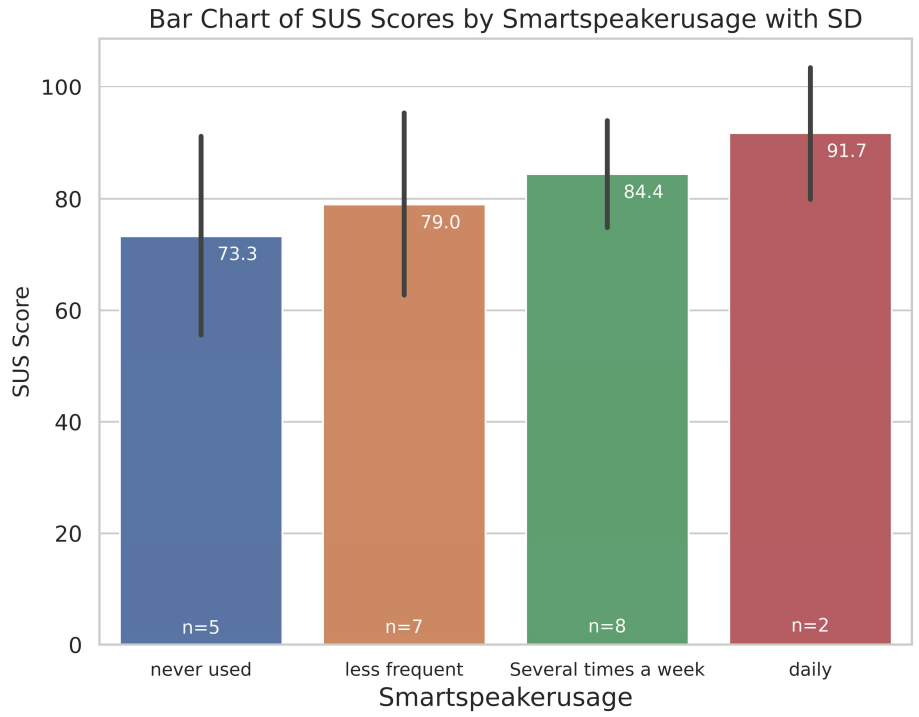

Figure 17 - Adjusted SUS-Score by smart speaker usage

In addition to the breakdown of the SUS score into the individual groups, the average SUS score was determined depending on the average smart speaker usage (Figure 17) and experience with murder mystery games (Figure 18). There is a slight but continuous and non-significant trend in relation to the use of smart speakers. The SUS score increases successively with average smart speaker usage, while experience with murder mystery games does not seem to have a noticeable impact on the game's usability rating.

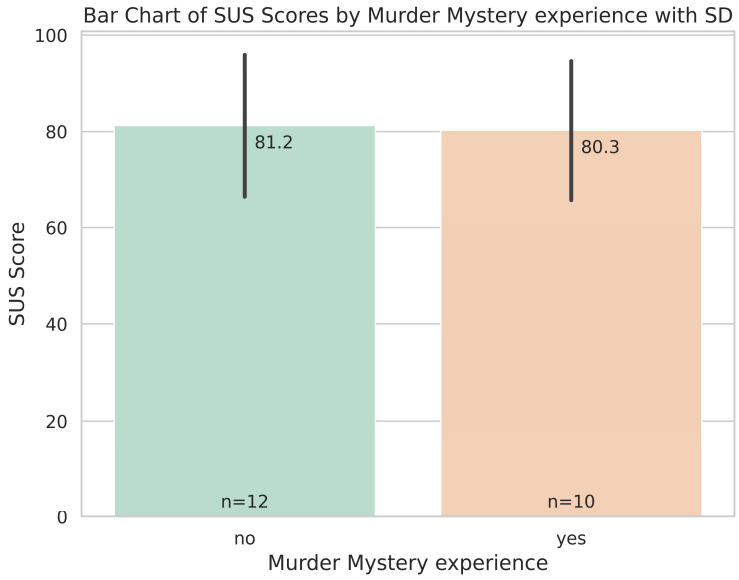

Figure 18 - Adjusted SUS-Score by murder mystery experience

4.2.2 Evaluation of the user experience

The value range of the UEQ is from -3 to +3. One item of the UEQ showed a negative mean value, namely "unpredictable/predictable" (-1.0). All other items of the UEQ were evaluated positively. The elements "good", "friendly" and "innovative" performed particularly well with a value of 2.5 each, followed by "inventive" and "creative" with 2.4.

Compared to other products in the UEQ benchmark dataset, the murder mystery game's mean scores exceeded Attractiveness = 2.16 (95% CI = ±0.31), Stimulation = 2.00 (95% CI = ±0.34) and Novelty = 2.39 (95% CI = ±0.26) significantly outperformed the mean (within the best 10% of results). They were slightly above average at Perspicuity = 1.46 (95% CI = ±0.33), while

Dependability = 0.88 (95% CI = ±0.27) and Efficiency = 0.94 (95% CI = ±0.40) were moderately below average (see Figure 19). In the aggregated scales, hedonic qualities (stimulation, originality) with a mean-hedonics-score of 2.19 and attractiveness with an attractiveness score of 2.16 achieved better results than pragmatic qualities (perspicuity, efficiency, dependability) with a mean-pragmatic-score of 1.09.

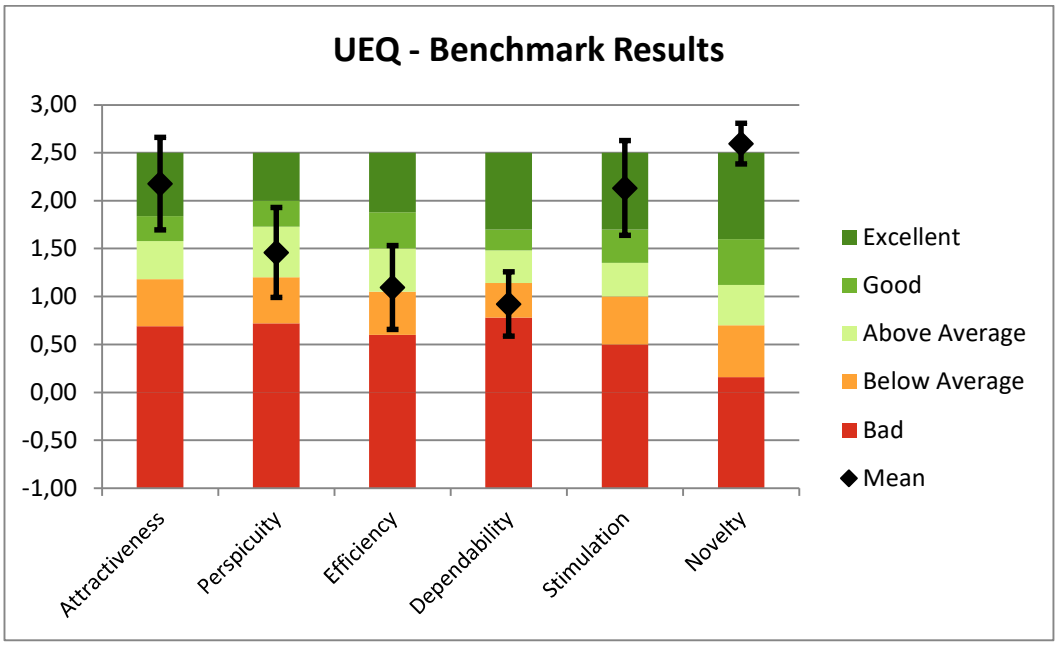

Figure 19 - Benchmark of the UEQ scales ratings with mean and CI

The differentiated calculation of the UEQ scores per test group shows that groups 3 and 5 rated the prototype worse than the other groups for the pragmatic qualities, similar to the SUS score (see Figure 20). The hedonic qualities and attractiveness were rated about the same by all groups. Only group 1 rated the user experience positively above average in all categories. Due to the limited number of subjects per group, the UEQ score in the individual groups also has a wide confidence interval.

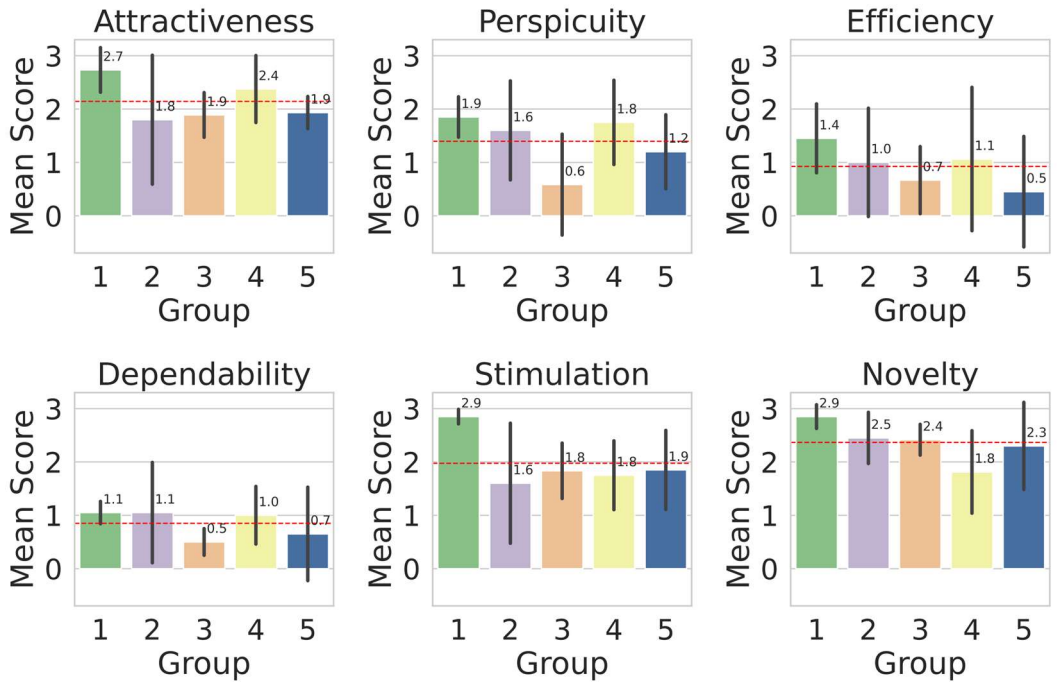

Figure 20 - UEQ scale attributes per group with CI and overall mean attribute values (red line)

4.2.3 Evaluation of team communication

As shown in Table 14 and Table 15, on average, participants agreed or strongly agreed with each question (COMMQ-1 to COMMQ-8). They strongly agreed (mode = 5) with questions COMMQ-2, COMM-3, COMMQ-5, COMMQ-6, COMMQ-7, COMMQ-8, agreeing most strongly with questions COMMQ-6 and COMMQ-8. This means that the subjects primarily considered the activity as a learning opportunity and perceived the teamwork as very positive. However, there were also a few ratings of 2 (*disagree*) and 1 (*strongly disagree*) for questions COMMQ-1, COMMQ-2, COMMQ-4 and COMMQ-5, partly reflecting disagreement about the effectiveness of communication skills, active listening, professional communication and effective collaboration within the given parameters. When analysing the results by group, it can be seen that the negative answers came from people in groups 3 and 5. The question COMMQ-4 was answered worst by group 5 with a mode of 2 (disagree). Group 1 also rated the prototype best in the questionnaire on communication, with a mode of 5 for each question.

Communication survey questions (COMMQ- 1…8)	**Mode***
1. Practiced effective communication skills between all members of the group	3,4
2. Actively listened to one another regarding new ideas and thoughts about the case	5
3. Communicated clear and thoughtful ideas that were relevant to the case	5
4. Communicated with one another in a controlled and professional manner	4
5. Worked effectively within the constraints of the activity to find the solution to the case	5
6. Embraced our assigned roles and operated within case instructions	5
7. Worked together to correctly identify the solution to the case	5
8. Followed the instructions of the case and operated within the constraints of the activity appropriately	5

Table 14 - Communication survey questions with mode

*5-point Likert Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Communication question	**Frequency of attribute selection per question**				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
COMMQ-1	0	1	**8**	**8**	5
COMMQ-2	0	2	0	7	**13**
COMMQ-3	0	0	2	9	**11**
COMMQ-4	1	4	4	**8**	5
COMMQ-5	1	0	2	5	**14**
COMMQ-6	0	0	0	3	**19**
COMMQ-7	0	0	2	6	**14**
COMMQ-8	0	0	0	5	**17**

Table 15 - Frequency of attribute selection per question from the communication questionnaire; most frequently chosen answer is bold

4.2.4 Reflective field notes

During the game, the study author was present and took general field notes on the function of the prototype and the general atmosphere in the group. In summary, it can be concluded that the introductory text delivered by Alexa is too long, the second prototype version is less reliable due to comprehension issues with the group number query, and the websites are easy to use with only one issue. The Notes from individual groups are presented below in keyword form.

Group 1: Very long discussions on the root cause of the case. A lot of enthusiasm among the participants; Too long introductory text by Alexa skill; A few logical errors in story or incorrect explanation in introductory text; Are not noticed by subjects and do not influence discussions and conclusions; (Faults were corrected before test run with group 2); Hardly any ambiguities when using the Alexa skill; No problems (with the exception of one test person who had problems entering the secret number) when using both websites; Partly unclear about further procedure; Can be resolved by subjects by looking at the flow chart; Red herring brings appropriate confusion to the discussion; Unnatural communication with Alexa skill

Group 2: Too long introductory text by Alexa skill; Order of accusations in round 1 mixed up because one subject does not accuse anyone when it is their turn and then another starts accusing anyone; Filling in the fishbone diagram is forgotten in rounds 1 and 3; Hardly any ambiguities when using the Alexa skill; No problems using both websites

Group 3: Alexa skill cannot be started at the beginning of the test for inexplicable reasons; Game is therefore launched via Voiceflow's prototype testing feature instead; Operating the Alexa skill did not seem self-evident; The person who played the physiotherapist did not understand the role of the insider and did not try to put other players on the right track with their secret information; No problems using both websites

Group 4: Test persons start by scanning the QR code on the smartphone before starting the Alexa skill; Prototype version 2 used for testing; This changed the operation slightly; Subjects now had to announce the group number; Alexa skill did not understand multi-digit numbers, only digits; Sometimes several attempts per round are necessary to start the skill correctly; Unnatural communication with Alexa skill; No problems using both websites

Group 5: Prototype version 2 used for testing; Same problem as group 4, but even more attempts per lap needed to start the prototype correctly; Subjects wished to make secret information from previous rounds available on their

smartphones in later rounds in order to be able to call up old information again for discussion; Unnatural communication with Alexa skill due to skill unpredictability; No problems using both websites; Nevertheless, a lot of enthusiasm during the discussions among the participants

5 Discussion

This chapter discusses the strengths and weaknesses of this prototype in relation to the three research questions and concludes with a discussion of the limitations of this thesis in answering these questions.

5.1 Key principles to develop a medical murder mystery game

This master thesis deals with a topic for which there is currently no established scientific guide. While Stockdale (2021) provides a rough guide to designing general storylines for murder mystery games, it lacks specific guides, particularly in the context of medical scenarios. Therefore, a rough guide was developed in this work, which focuses on the creation of game mechanics and story of medical murder mystery games, as described in chapter 4.1. The conception of the murder mystery story entailed various challenges: On the one hand, the identification of treatment errors from various professional groups that could lead to similar symptoms with comparable onset times, as well as the development of refutations for hypotheses that assume these errors as the cause of the patient harm. The attribution of accusations and defences between characters also required careful consideration, especially if the cause was to be traced back to more than one character. Additionally, writing compelling dialogue and secret information for each character has been a significant challenge in creating medical murder mystery games. It should be noted that the introductory text by Alexa skill was very long and somewhat incomprehensible in the current prototype. In future games, a shorter and simpler explanation should be written for the introduction.

The selection of the Alexa skill as a technical platform should be viewed critically. Particularly problematic was the mediocre quality of the German text-to-speech voice output, which occasionally resulted in unintelligible words. The second version of the prototype was designed to be played by more than one group simultaneously to make multiple concurrent game sessions, as originally planned, referring to Maynor et al. (2022). However, the plan to make improve

the skill in an iterative process ended up being making the skill less reliable, as there were technical problems when entering multi-digit numbers by voice (when querying the group number). The Alexa skill didn't reliably capture these numbers. To get around the problem, the tens and ones digits of the numbers had to be pronounced individually as separate digits. Even then, there were errors in detection, which resulted in the Alexa skill having to be restarted at least once during testing in groups 4 and 5, which caused delays. So, to make the Alexa skill more reliable when multiple groups are playing at the same time, another solution is necessary. Probably the simplest solution would be to find a way to make the skill reliably understand the verbally prompted group number. Then the skill could be used as designed and be used by multiple groups at the same time. A much more elegant but more complicated solution would be to store game progress along with personal information such as user ID or name, as described on the Amazon developer website (Request Recognized Speaker Contact Information for Use in Your Skill, n.d.). Some participants from group 5, on the other hand, expressed a desire to use a traditional graphical user interface (GUI) similar to the dialog and secret information websites instead of the Alexa skill with voice input.

5.2 Usability and user experience of the murder mystery game

Despite the challenges of voice input, the murder mystery prototype achieved an overall SUS score of 80.8 on a smart speaker, which is an A rating (Sauro, 2018). However, there were differences between the different groups. Groups 1 and 2 rated the prototype significantly more positively than the other groups, as expected, since in these two groups no technical problems occurred during the tests, unlike in groups 3, 4 and 5. While the technical error that occurred in groups 4 and 5 occurred, the problem with group 3, which occurred when starting the Alexa skill, remains unknown. This difference in the usability rating was not only evident between the different groups, but also between subjects with different levels of experience in using smart speakers (see Figure 17). Participants with more experience using smart speakers rated the application more positively than those with less experience or those who had never interacted with a smart speaker before. This result of the SUS reinforces the previously discussed idea of using GUI instead of voice input. This is because the majority of people nowadays use GUIs on their smartphones on a daily basis, while voice inputs are only used by around 50% of users and are thus less common (Kinsella, 2020). However, it might also be sufficient to give people with

no experience in using smart speakers a brief introduction to using such devices before the actual game in order to increase the usability of the smart speaker game for this people.

The results of the UEQ showed heterogeneity in the different dimensions. On the one hand, a less positive assessment was noted in terms of the pragmatic qualities, which could possibly be due to the unreliability of the voice input in the prototype. However, it should be noted that the murder mystery game was developed with lower efficiency requirements, and the Efficiency attribute in the UEQ may not be most important for evaluating the prototype. The moderately rated mean of 1.46 in the Perspicuity dimension means that the prototype is only slightly above average compared to the UEQ bench mark (Schrepp et al., 2017; User Experience Questionnaire (UEQ), n.d.). It could possibly be improved with more detailed instructions at the beginning of the game. Nevertheless, the moderate mean-pragmatic-score illustrates the need for further development of the technical implementation of the game. As previously mentioned, implementation using a classic GUI or even as paper form or simple PDF documents could be considered. In contrast to the less positive mean-pragmatic-score is the excellent performance of the prototype in terms of hedonic qualities and Attractiveness (Attractiveness = 2.16 (95% CI = ±0.31), Stimulation = 2.00 (95% CI = ±0.34) and Novelty = 2.39 (95% CI = ±0.26)). These above-average scores show that healthcare workers generally find murder mystery games engaging and novel (best UEQ scores on the items "good", "friendly", "innovative", "inventive" and "creative"). These results underline, the potential of such games as exciting alternatives to traditional classroom teaching for learning root cause analysis skills and team communication in healthcare as Kavanaugh et al. (2022), Maynor et al. (2022) and Smeraglio et al. (2021) state it in their articles.

5.3 Communication and collaboration during the murder mystery game

The use of murder mystery games can serve to promote communication and team dynamics in healthcare and to make quality improvement measures tangible in a protected setting (Kavanaugh et al., 2022). To determine to what extent the murder mystery game actually contributed to improved communication and collaboration, the quantitative questionnaire by Kavanaugh et al. (2022) used. The results showed that participants strongly agreed on six out of eight questions. From this it can be concluded that the they perceive the prototype as a

tool to promote teamwork and communication (Kavanaugh et al., 2022). In particular, on team collaboration (questions 7 and 8) and on the perception of the activity as a learning opportunity (questions 5, 6 and 8), all questions achieved a mode of 5. The professionalism of the discussion (questions 3 and 4) was rated positively overall, but with slightly different results, namely a mode of 5 for question 3 and a mode of 4 for question 4. Question 4 in particular ("Communicated with one another in a controlled and professional manner") received a mode of only 2 (disagree) from group 5. This means that the participants in this group did not seem to perceive the communication as professional throughout, which is consistent with the observations of the study author who was present. The members of this group sometimes accused each other in a friendly and playful, but also medically unprofessional manner. This could be largely due to the fact that murder mystery games deliberately aim for conflict and steer communication in an accusatory direction from a playful perspective in order to stimulate interaction and increase fun. It was therefore to be expected that the communication would not always be purely professional, since the playful character could tend to override this aspect. In addition, all participants in group 5 already had experience with murder mystery games, which means that they were familiar with the process and therefore perhaps had more confidence in communicating. Nevertheless, this rating should be taken seriously, because despite the playful approach, professionalism should not be neglected. It may be necessary to make the dialogues and secret information less accusatory and more cooperative. The questions on the effectiveness of group communication also achieved positive results. The participants felt that they listened actively during the game and were able to communicate their ideas clearly. The generally favorable outcomes in communication assessment suggest that the group size of five appears suitable, aligning with findings by Maynor et al. (2022), which recommended group sizes ranging from six to eight, as well as with the results of Kavanaugh et al. (2022), who employed a group size of six in their game.

Table 15 shows that for questions 1 to 5, the prototype received overall positive to very positive ratings, although there are also a few ratings of 2 (disagree) and 1 (strongly disagree). This indicates that at least a few participants felt that either themselves or others had not actively participated in the communication. Kavanaugh et al. (2022) investigated the main problems related to the use of their prototype using a qualitative questionnaire. In particular, they identified the design of the activities themselves (e.g. ambiguity about the next steps in the game) and identification with the assigned character role (character can contribute little to the case) as key challenges. It is possible that similar reasons

could have led to the occasional lower scores in the communication questionnaire in this master thesis.

5.4 Limitations

Various limitations are noted in this work. A limitation results from the acquaintance of the study author to the subjects. It was not possible to recruit independent participants due to the lack of consent from the requested organizations to provide independent subjects and the time pressure in recruitment. This may have resulted in the subjects evaluating the prototype more positively than independent individuals would have done.

Another limitation of this master thesis is the comparatively young average age of the test group. Younger individuals tend to be more tech-savvy and could learn to use devices like smart speakers more quickly. In older people, the evaluation of the prototype in the SUS and UEQ could possibly be less positive. Nevertheless, the available data indicate that the experience with smart speakers influences the usability and user experience of the prototype (see Figure 17). Future research could therefore examine older people's ratings and impressions, as well as evaluate the effectiveness of a brief introduction to the use of smart speakers prior to gaming activity on user experience. Furthermore, it could be researched whether smart speakers represent the optimal technology for murder mystery games or which user interface might be better suited. A classic graphical user interface (GUI) might be a simpler alternative.

Another limiting factor arises from the deletion of the first question of the SUS due to ambiguity regarding the question formulation in relation to games that can only be played once and the resulting inconsistent answering of the question. Although Lewis & Sauro (2017) argue that removing the first SUS question has little impact (0.66 point mean difference) on the overall result, this adjustment slightly detracts from the content of the adjusted SUS score. For future studies of murder mystery games and the SUS score, the first question should be formulated more generally and not specific to the present prototype.

Following the prototype testing, an article was identified stating that the SUS score has hardly been evaluated for smart speaker applications and questions whether its adoption is appropriate for such applications (Zwakman et al., 2021). As an alternative, the Voice Usability Scale by Zwakman et al. (2021), which is based on the SUS and was specially designed for the evaluation of voice interfaces. However, this questionnaire has not yet been studied as extensively

as the SUS, which in turn would have limited the comparability of results. Nevertheless, an additional evaluation of the smart speaker application with the Voice Usability Scale could be interesting.

Another limitation concerns the communication questionnaire. This questionnaire has not been validated and has only been used in one study so far. Nevertheless, this questionnaire was chosen because it is easy to use compared to other questionnaires for assessing team communication and the validity with regard to communication and cooperation was considered satisfactory. Nevertheless, it is necessary in future studies to examine the changes in communication caused by the murder mystery game using a validated questionnaire. In addition, it would be important not only to record the changes in the communication, but also to query the acquired specialist knowledge and in particular the knowledge about the implementation of root cause analyses, as this is one of the stated goals of the prototype. Furthermore, in future work, the prototype could be compared with other measures to promote root cause analysis skills using null hypothesis significance testing.

It should be critically reflected that no test run was carried out before the first round of testing. This could have provided information about logic errors in the story or problems and errors in the functionality of the prototype. This was mainly due to the fact that the prototype was completed shortly before the first round of prototype testing took place and so there was no time left for a pre-test. Nevertheless, the prototype worked well from the first test run onwards and there were only minimal errors in the story and in the process (e.g. the wrong name was mentioned in the summary of Alexa, in the introduction it was said that test persons should enter a link, but in reality a QR code is to be scanned). In addition, it must be criticised methodologically that the prototype was changed after the third test round by adding the query of the group number. Originally, this was intended as a minimal change to make the prototype more robust against technical problems during simultaneous use. Instead, however, this has led to more unreliable performance in the second version of the prototype, resulting in poorer usability and user experience results.

6 Conclusion

In this master thesis, a rough guide for the creation of medical murder mystery games was developed to improve the communication and root cause analysis capability of medical professionals. Additionally, the technological implementation as an Alexa skill was described. Although the use of the Amazon Alexa voice service for the game was a promising idea, some challenges arose during testing. The mediocre quality of the German text-to-speech voice output and problems with the recognition of voice inputs, especially with multi-digit numbers, but also the lack of reliability of the prototype led to delays and primarily affected the pragmatic qualities of the user experience.

The subjects' evaluation of the prototype yielded mixed results. While the SUS score was excellent overall and the game was perceived as interesting and novel, the mean-pragmatic-score of the UEQ was rather average to below average. A change to a classic GUI and button and mouse clicks as input options could improve the user experience.

Apart from the technical challenges and the moderate to poor rating of the pragmatic qualities, the murder mystery game scored well overall in improving team communication and was perceived by the participants as a useful tool to foster team collaboration. The following improvement could be considered for the game mechanics, namely to make the dialogues and secret information in the game more cooperative and to promote the professionalism of communication. However, it must then be questioned again whether the game could lose attractiveness and stimulation if it is even less competitive.

Some limitations should be noted in this study. The use of subjects with previous acquaintance to the study author might have led to a more positive evaluation. Future studies should therefore be conducted with independent subjects. The young average age of the subjects could also have influenced the results. It would be interesting to test the game with older subjects and to investigate the effect of smart speaker experience on usability and user experience in more detail. In addition, for future studies, the use of a validated questionnaire to assess team communication and trained professional knowledge regarding root cause analysis skills would also be interesting.

In general, it can be hypothesized that medical murder mystery games hold promises in enhancing communication and teamwork among healthcare professionals and can serve as an interesting alternative or even be superior to traditional teaching methods in promoting communication and root cause analysis skills. They may one day actually be incorporated into the curriculum of health profession education or used in hospital wards as workshops to promote communication. Furthermore, the hypothesis can be made from the results that graphical user interfaces are possibly more suitable than voice interfaces or that voice interfaces at least require more experience to be usable. This leads to the following questions: Does playing murder mystery games improve team communication and the root cause ability in the healthcare sector? Are graphical or voice user interfaces better for technical implementation of murder mystery games? Another question to explore could be the technical feasibility of allowing multiple groups to participate in the prototype without requiring frequent group number prompts or identifying potential adjustments within the Alexa skill to enhance the comprehension of group numbers.

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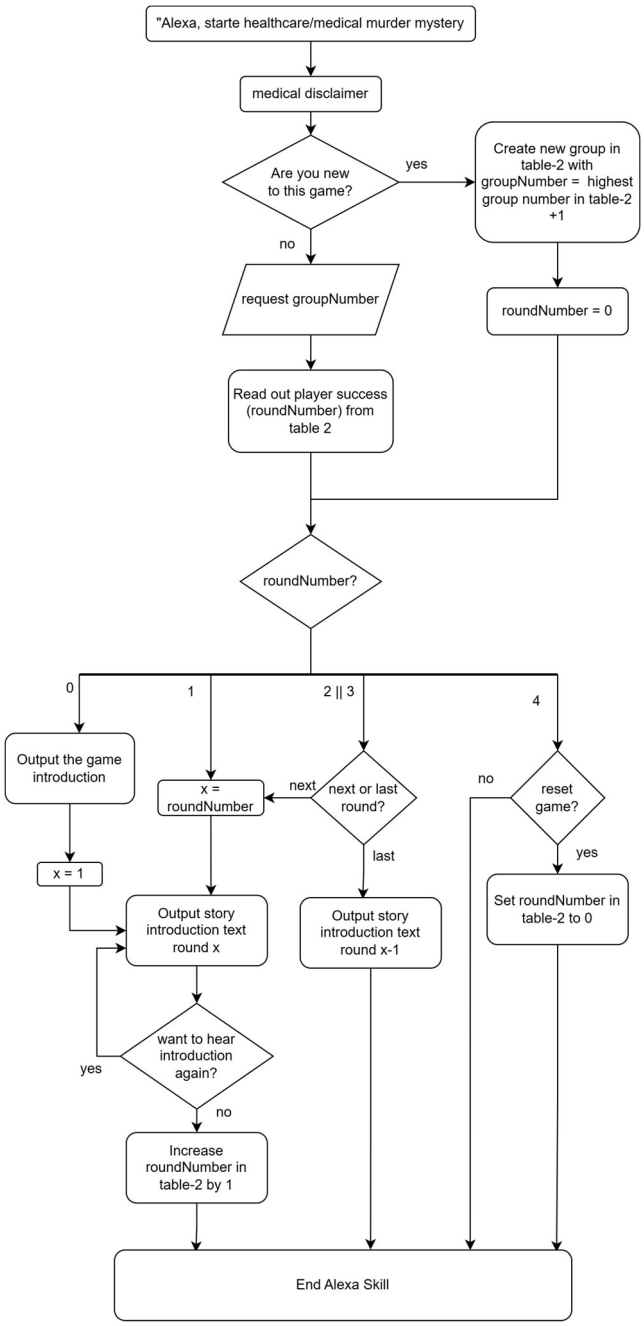
Appendix

A. Alexa skill flowchart (full version)



B. Declaration of consent (german version)

Teilnehmer*inneninformation und Einwilligungserklärung zur Teilnahme an der Studie

Entwicklung eines audiogestützten Murder Mystery-Spiels zur Förderung der intra- und interprofessionellen Kommunikation und Zusammenarbeit in Gesundheitsteams - eine explorative Studie

Sehr geehrte*r Teilnehmer*in!

Wir laden Sie ein an der oben genannten Studie teilzunehmen. Die Aufklärung darüber erfolgt in einem ausführlichen Gespräch.

Ihre Teilnahme an dieser Studie erfolgt freiwillig. Sie können jederzeit ohne Angabe von Gründen aus der Studie ausscheiden. Die Ablehnung der Teilnahme oder ein vorzeitiges Ausscheiden aus dieser Studie hat keine nachteiligen Folgen.

Studien sind notwendig, um verlässliche neue Forschungsergebnisse zu gewinnen. Unverzichtbare Voraussetzung für die Durchführung einer Studie ist jedoch, dass Sie Ihr Einverständnis zur Teilnahme an dieser Studie schriftlich erklären. Bitte lesen Sie den folgenden Text als Ergänzung zum Aufklärungsgespräch sorgfältig durch und zögern Sie nicht Fragen zu stellen.

Bitte unterschreiben Sie die Einwilligungserklärung nur

wenn Sie Art und Ablauf der Studie vollständig verstanden haben,

wenn Sie bereit sind, der Teilnahme zuzustimmen und

wenn Sie sich über Ihre Rechte als Teilnehmer an dieser Studie im Klaren sind.

1. Was ist der Zweck der Studie?

Der Zweck dieser Studie ist es, ein audiogeführtes Spiel zur Förderung der Kommunikation und Zusammenarbeit auf die Nutzererfahrung und, von Nutzer*innen, wahrgenommene Veränderung der Teamkommunikation zu überprüfen.

2. Wie läuft die Studie ab?

Diese Studie wird an mehreren Standorten durchgeführt und es werden insgesamt ungefähr 20 Personen daran teilnehmen.

Zu Beginn der Erhebung erfolgt eine kurze Einführung durch den Studienautor, über die geplante Vorgehensweise. Anschließend testen Sie gemeinsam mit drei oder vier anderen Studienteilnehmer*innen den Prototypen, was voraussichtlich etwa 45min dauern wird. Dabei spielen Sie ein vom Studienautor entwickeltes kooperatives Spiel, bei dem die Hauptaufgabe darin bestehen wird mit den anderen Studienteilnehmer*innen zu kommunizieren. Im Anschluss gibt es ein kurzes Abschlussgespräch und danach werden demographische Daten Nutzungserfahrung (User Experience Questionair) und Nutzbarkeit (System Usability Scale) der Studienteilnehmer*innen mit 3 Fragebögen erhoben.

Ihre Teilnahme an dieser Studie wird einmalig voraussichtlich etwa 1,5 Stunden dauern.

3. Worin liegt der Nutzen einer Teilnahme an der Studie?

Es ist nicht zu erwarten, dass Sie aus Ihrer Teilnahme an dieser Studie gesundheitlichen Nutzen ziehen werden.

Spielerische Lösungen zur Förderung der Kommunikation in Gesundheitsteams, können in Zukunft möglicherweise Teamzusammenarbeit und -kommunikation verbessern. Mit der Teilnahme an der Studie leisten Sie einen wichtigen Beitrag zur Erforschung der Gestaltung dieser Anwendungen und damit möglicherweise zur Vermeidung von Behandlungsfehlern und Verbesserung der Patient*innensicherheit.

4. Gibt es Risiken, Beschwerden und Begleiterscheinungen?

Generell ist mit keinen Risiken zu rechnen, da die Aufgabe bei dieser Studie Großteiles das Kommunizieren mit anderen Personen ist.

6. Was ist zu tun beim Auftreten von Symptomen, Begleiterscheinungen und/oder Verletzungen?

Sollten im Verlauf der Studie irgendwelche Symptome, Begleiterscheinungen oder Verletzungen auftreten, melden Sie diese bitte dem anwesenden Studienautor.

7. Wann wird die Studie vorzeitig beendet?

Sie können jederzeit auch ohne Angabe von Gründen, Ihre Teilnahmebereitschaft widerrufen und aus der Studie ausscheiden, ohne dass Ihnen dadurch irgendwelche Nachteile entstehen.

Es ist aber auch möglich, dass das Studienteam entscheidet, Ihre Teilnahme an der Studie vorzeitig zu beenden, ohne vorher Ihr Einverständnis einzuholen. Die Gründe hierfür können sein:

Sie können den Erfordernissen der Studie nicht entsprechen;

Die Studienleitung hat den Eindruck, dass eine weitere Teilnahme an der Studie nicht in Ihrem Interesse ist;

8. Datenschutz

Bei den Daten, die über Sie im Rahmen dieser klinischen Prüfung erhoben und verarbeitet werden, ist grundsätzlich zu unterscheiden zwischen

jenen personenbezogenen Daten, anhand derer Sie direkt identifizierbar sind (z.B. Name, Geburtsdatum, Adresse, Bildaufnahmen...),
pseudonymisierten (verschlüsselten) personenbezogenen Daten, bei denen alle Informationen, die direkte Rückschlüsse auf Ihre Identität zulassen, durch einen Code (z. B. eine Zahl) ersetzt bzw. (z.B. im Fall von Bildaufnahmen) unkenntlich gemacht werden. Dies bewirkt, dass die Daten ohne Hinzuziehung zusätzlicher Informationen und ohne unverhältnismäßig großen Aufwand nicht mehr Ihrer Person zugeordnet werden können und
anonymisierten Daten, bei denen eine Rückführung auf Ihre Person nicht mehr möglich ist.
Der Code zur Verschlüsselung wird von den verschlüsselten Datensätzen streng getrennt und nur an Ihrem Prüfzentrum aufbewahrt.

Zugang zu Ihren nicht verschlüsselten Daten hat der Studienautor. Die Daten sind gegen unbefugten Zugriff geschützt. Zusätzlich können autorisierte und zur Verschwiegenheit verpflichtete Beauftragte der FH St Pölten sowie Beauftragte von in- und/ oder ausländischen Gesundheitsbehörden und jeweils zuständige Ethikkommissionen in die nicht verschlüsselten Daten Einsicht nehmen, soweit dies für die Überprüfung der ordnungsgemäßen Durchführung der klinischen Prüfung notwendig ist.

Eine Weitergabe der Daten erfolgt nur in verschlüsselter oder anonymisierter Form. Auch für etwaige Publikationen werden nur die verschlüsselten oder anonymisierten Daten verwendet.

Sämtliche Personen, die Zugang zu Ihren verschlüsselten und nicht verschlüsselten Daten erhalten, unterliegen im Umgang mit den Daten der EU-Datenschutz-Grundverordnung (DSGVO) sowie den österreichischen Anpassungsvorschriften in der jeweils gültigen Fassung.

Im Rahmen dieser klinischen Prüfung ist keine Weitergabe von Daten in Länder außerhalb der EU vorgesehen.

Sie können Ihre Einwilligung zur Erhebung und Verarbeitung Ihrer Daten jederzeit widerrufen. Nach Ihrem Widerruf werden keine weiteren Daten mehr über Sie erhoben. Die bis zum Widerruf erhobenen Daten können allerdings weiter im Rahmen dieser klinischen Prüfung verwendet werden.

Aufgrund der gesetzlichen Vorgaben haben Sie außerdem, sofern dies nicht die Durchführung der klinischen Prüfung voraussichtlich unmöglich macht oder ernsthaft beeinträchtigt, das Recht auf Einsicht in die Ihre Person betreffenden Daten und die Möglichkeit der Berichtigung, falls Sie Fehler feststellen.

Sie haben auch das Recht, bei der österreichischen Datenschutzbehörde eine Beschwerde über den Umgang mit Ihren Daten einzubringen (www.dsb.gv.at).

Das gemäß DSGVO vorgesehene Recht auf Löschung Ihrer im Rahmen dieser klinischen Prüfung verarbeiteten Daten steht Ihnen aufgrund von Regelungen des 2. Materien-Datenschutz-Anpassungsgesetzes 2018 nicht zu. Im Falle einer klinischen Prüfung nach dem Arzneimittelgesetz ist auch das gemäß DSGVO vorgesehene Recht auf Datenübertragbarkeit durch vorgehende Regelungen des 2. Materien-Datenschutz-Anpassungsgesetzes 2018 außer Kraft gesetzt.

Die voraussichtliche Dauer der klinischen Prüfung ist sechs Monate. Die Dauer der Speicherung Ihrer Daten über das Ende der klinischen Prüfung hinaus ist durch Rechtsvorschriften geregelt.

Falls Sie Fragen zum Umgang mit Ihren Daten in dieser Studie haben, wenden Sie sich zunächst an den Studienautor. Dieses kann Ihr Anliegen ggf. an den/die Datenschutzbeauftragte/n der FH St Pölten weiterleiten.

Datenschutzbeauftragte/r der FH St. Pölten: datenschutz@fhstp.ac.at

9. Entstehen für die Teilnehmer*innen Kosten? Gibt es einen Kostenersatz oder eine Vergütung?

Durch Ihre Teilnahme an dieser Studie entstehen für Sie keine zusätzlichen Kosten. Eine Vergütung für eventuelle Reisekosten ist nicht vorgesehen.

Möglichkeit zur Diskussion weiterer Fragen

Für weitere Fragen im Zusammenhang mit dieser Studie steht Ihnen der Studienautor gerne zur Verfügung. Auch Fragen, die Ihre Rechte Teilnehmer*in an dieser Studie betreffen, werden Ihnen gerne beantwortet.

Name der Kontaktperson: Thomas Tippl +436647922966

Einwilligungserklärung

Name des Teilnehmenden in Druckbuchstaben:

.....

Geb.Datum: .....

Ich erkläre mich bereit, an der Studie „Entwicklung eines audiogestützten Murder Mystery-Spiels zur Förderung der intra- und interprofessionellen Kommunikation und Zusammenarbeit in Gesundheitsteams - eine explorative Studie“ teilzunehmen.

Ich bin von …… ausführlich und verständlich über den Studienablauf, mögliche Belastungen und Risiken, sowie über Wesen, Bedeutung und Tragweite der Studie, sich für mich daraus ergebenden Anforderungen aufgeklärt worden. Ich habe darüber hinaus den Text dieser Teilnehmer*innenaufklärung und Einwilligungserklärung, die insgesamt fünf Seiten umfasst gelesen. Aufgetretene Fragen wurden mir vom Studienteam verständlich und genügend beantwortet. Ich hatte ausreichend Zeit, mich zu entscheiden. Ich habe zurzeit keine weiteren Fragen mehr.

Ich werde den Anordnungen, die für die Durchführung der Studie erforderlich sind, Folge leisten, behalte mir jedoch das Recht vor, meine freiwillige Mitwirkung jederzeit zu beenden, ohne dass mir daraus Nachteile für meine weitere Betreuung entstehen.

Ich stimme zu, dass meine im Rahmen dieser Studie erhobene Daten wie im Abschnitt „Datenschutz“ dieses Dokuments beschrieben verwendet werden. Eine Kopie dieser Teilnehmer*inneninformation und Einwilligungserklärung habe ich erhalten. Das Original verbleibt beim Studienteam.

.....
(Datum und Unterschrift des Teilnehmenden)

.....
(Datum, Name und Unterschrift des Studienteams)

C. Evaluation questionnaire (german version)

Fragebogen Teil 1 – soziodemographische Daten

1. Alter:

2. Geschlecht:

3. In welchem Gesundheitsberuf haben sie eine Ausbildung gemacht:

☐ Ärztin/Arzt	☐ Gesundheitspsychologin/ -psychologe	☐ Apothekerin/ Apotheker	☐ Kardiotechnischer Dier
☐ Zahnärztin/ Zahnarzt	☐ Psychotherapeutin/ -therapeut	☐ Tierärztin/ Tierarzt	☐ Medizinische Assistenz
☐ Klinische Psychologin/ -psychologe	☐ Musiktherapeutin/ -therapeut	☐ Medizinphysikerin/ -physiker	☐ Medizinische Masseuri Heilmasseurin/-masseu
☐ Hebamme	☐ Zahnärztliche Assistenz	☐ Gesundheits- und Krankenpflegeberufe	☐ Sanitäterin/Sanitäter
☐ MTDG - Gehobene medizinisch-technische Dienste	☐ keine Auswahl trifft zu		

Wenn MTDG welcher:

4. In welchem Jahr haben Sie die Ausbildung in diesem Gesundheitsberuf beendet:

5. Wie häufig verwenden Sie einen Smart Speaker (Amazon Echo, Google Home, …) im Durchschnitt?

täglich ○ mehrmals pro Woche ○ mehrmals pro Jahr ○ seltener ○ noch nie verwen

6. Besitzen Sie einen Smart Speaker?

○ ja ○ nein

7. Haben Sie schon einmal an einem Murder Mystery (Krimidinner) teilgenommen?

○ ja ○ nein

Benutzen Sie die Skala, um zu bestimmen, inwieweit Sie der Aussage zustimmen oder nicht zustimmen:	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme voll und ganz zu
Am Ende dieser Aktivität hatte ich das Gefühl, mein Team…					
– hat effektive Kommunikationsfähigkeiten zwischen allen Mitgliedern der Gruppe geübt.	•	•	•	•	•
– hat sich gegenseitig aktiv zugehört, wenn es um neue Ideen und Gedanken zum Fall ging.	•	•	•	•	•
– hat klare und durchdachte Ideen, die für den Fall relevant waren, vermittelt.	•	•	•	•	•
– hat auf kontrollierte und professionelle Weise miteinander kommuniziert.	•	•	•	•	•
– hat im Rahmen der Aufgabenstellung effektiv gearbeitet, um eine Lösung für den Fall zu finden.	•	•	•	•	•
– hat die ihnen zugewiesenen Rollen angenommen und sich an die Anweisungen des Falles gehalten.	•	•	•	•	•
– hat zusammengearbeitet, um die Lösung des Falles zu finden.	•	•	•	•	•
– hat die Anweisungen des Falles befolgt und sich angemessen an die Vorgaben der Aktivität gehalten.	•	•	•	•	•

Bitte beurteilen Sie auf der folgenden Skala, inwieweit Sie den Aussagen zustimmen. Bewerten Sie in dieser Skala bitte nur die Smart Speaker Anwendung, nicht das Spiel selbst.

	lehne völlig ab				stimme völlig zu
1. Ich denke ich würde diese Smart Speaker Anwendung regelmäßig nutzen.	0	1	2	3	4
2. Die Smart Speaker Anwendung erscheint mir unnötig kompliziert.	0	1	2	3	4
3. Ich finde, die Smart Speaker Anwendung ist einfach zu benutzen.	0	1	2	3	4
4. Ich denke, ich brauche technische Unterstützung, um die Smart Speaker Anwendung nutzen zu können.	0	1	2	3	4
5. Ich finde, dass die verschiedenen Funktionen der Smart Speaker Anwendung gut integriert sind.	0	1	2	3	4
6. Die Smart Speaker Anwendung erscheint mir uneinheitlich.	0	1	2	3	4
7. Ich glaube, dass die meisten Leute die Benutzung der Smart Speaker Anwendung schnell erlernen können.	0	1	2	3	4
8. Die Smart Speaker Anwendung erscheint mir sehr umständlich zu benutzen.	0	1	2	3	4
9. Ich fühle mich bei der Benutzung der Smart Speaker Anwendung sehr sicher.	0	1	2	3	4
10. Ich musste einiges lernen, um mit der Smart Speaker Anwendung zurecht zu kommen.	0	1	2	3	4

Bitte geben Sie Ihre Beurteilung zum Spiel Medical Murder Mystery ab.

Um das Produkt zu bewerten, füllen Sie bitte den nachfolgenden Fragebogen aus. Er besteht aus Gegensatzpaaren von Eigenschaften, die das Produkt haben kann. Abstufungen zwischen den Gegensätzen sind durch Kreise dargestellt. Durch Ankreuzen eines dieser Kreise können Sie Ihre Zustimmung zu einem Begriff äußern.

Beispiel:

attraktiv	O	⊗	O	O	O	O	O	unattraktiv

Mit dieser Beurteilung sagen Sie aus, dass Sie das Produkt eher attraktiv als unattraktiv einschätzen.

Entscheiden Sie möglichst spontan. Es ist wichtig, dass Sie nicht lange über die Begriffe nachdenken, damit Ihre unmittelbare Einschätzung zum Tragen kommt.

Bitte kreuzen Sie immer eine Antwort an, auch wenn Sie bei der Einschätzung zu einem Begriffspaar unsicher sind oder finden, dass es nicht so gut zum Produkt passt.

Es gibt keine „richtige“ oder „falsche“ Antwort. Ihre persönliche Meinung zählt!

Bitte geben Sie nun Ihre Einschätzung des Produkts ab. Kreuzen Sie bitte nur einen Kreis pro Zeile an.

	1	2	3	4	5	6	7		
unerfreulich	○	○	○	○	○	○	○	erfreulich	1
unverständlich	○	○	○	○	○	○	○	verständlich	2
kreativ	○	○	○	○	○	○	○	phantasielos	3
leicht zu lernen	○	○	○	○	○	○	○	schwer zu lernen	4
wertvoll	○	○	○	○	○	○	○	minderwertig	5
langweilig	○	○	○	○	○	○	○	spannend	6
uninteressant	○	○	○	○	○	○	○	interessant	7
unberechenbar	○	○	○	○	○	○	○	voraussagbar	8
schnell	○	○	○	○	○	○	○	langsam	9
originell	○	○	○	○	○	○	○	konventionell	10
behindernd	○	○	○	○	○	○	○	unterstützend	11
gut	○	○	○	○	○	○	○	schlecht	12
kompliziert	○	○	○	○	○	○	○	einfach	13
abstoßend	○	○	○	○	○	○	○	anziehend	14
herkömmlich	○	○	○	○	○	○	○	neuartig	15
unangenehm	○	○	○	○	○	○	○	angenehm	16
sicher	○	○	○	○	○	○	○	unsicher	17
aktivierend	○	○	○	○	○	○	○	einschläfernd	18
erwartungskonform	○	○	○	○	○	○	○	nicht erwartungskonform	19
ineffizient	○	○	○	○	○	○	○	effizient	20
übersichtlich	○	○	○	○	○	○	○	verwirrend	21
unpragmatisch	○	○	○	○	○	○	○	pragmatisch	22
aufgeräumt	○	○	○	○	○	○	○	überladen	23
attraktiv	○	○	○	○	○	○	○	unattraktiv	24
sympathisch	○	○	○	○	○	○	○	unsympathisch	25
konservativ	○	○	○	○	○	○	○	innovativ	26

D. Overall game texts (introductions, dialogues, secret information) (german version)

Spielcharaktere und Patient:

Ärztin: Dr Angela Müller. Frau Müller ist 31 Jahre alt, hat vor einem halben Jahr ihr Medizinstudium abgeschlossen und ist seit zwei Monaten im Spital tätig.

Pfleger: Sebastian Scheuer. Herr Scheuer ist 36 Jahre alt, und die Person mit der längsten Erfahrung im Gesundheitsbereich. Seine Ausbildung zum Pfleger hat er vor 14 Jahren abgeschlossen. Seither arbeitet er im Spital

Physiotherapeut: Georg Hagenbeck. Herr Hagenbeck ist 23 Jahre alt und Physiotherapiestudent im 6 Semester und steht kurz vor der Abschlussprüfung. Dies ist sein letztes Praktikum, das er für seine Ausbildung absolvieren muss.

Radiologietechnologin: Ella Hahn. Frau Hahn ist 41 Jahre alt und seit 10 Jahren im Beruf. Die Radiologietechnologieausbildung ist bereits ihr dritter Bildungsweg. Zuvor war sie 3 Jahre Zahnarztassistentin und davor 9 Jahre Büroangestellte in einem Bauunternehmen.

Dietologin: Carla Rose. Frau Rose ist 29 Jahre alt und hat die Ausbildung zur Diätologion vor 7 Jahren abgeschlossen. Seither hat sie an drei verschiedenen Spitälern gearbeitet. Im jetzigen Spital ist sie seit 3 Jahren.

Patient: Albert Fischer. Herr Fischer ist 58 Jahre alt, gelernter Tischlermeister und fährt in seiner Freizeit gerne Fahrrad und spielt mit seiner Frau Schach. Vor 8 Tagen, am 7. Februar 2023, wurde er im Hubertusspital aufgenommen und am 10. Februar wurde ihm wegen einer Hüftarthrose eine Hüfttotalendoprothese implantiert. Vor zwei Monaten wurde bei Herrn Fischer Diabetes Typ 2 diagnostiziert.

Runde 1:

Einleitung

Hallo und herzlich willkommen zum Medical Murder Mystery. Mein Name ist Alexandro und ich werde euch heute durch das Spiel führen und gemeinsam mit euch versuchen den Fall zu lösen. Wie ich sehe, habt ihr das Spiel korrekt gestartet. Auch bei allen weiteren Runden könnt ihr das Spiel mit den Worten „Alexa starte medical Murder Mystery“ starten. Danach werdet ihr gefragt, ob ihr das Spiel mit der nächsten Runde fortsetzen wollt oder ob ihr die letzte Runde noch einmal hören wollt. Wählt die gewünschte Option und hört genau zu und achtet auf Details. Wenn ihr meine Erläuterung aus irgendeinem Grund beenden wollt, könnt ihr das jederzeit tun, indem ihr „Alexa Stopp“ sagt. Das Spiel ist in drei Runden gegliedert. Jede Runde beginnt mit einer kurzen Erläuterung von mir. Danach folgt ein geskripteter Dialog, den ihr gemeinsam laut vortragen sollt und in dem ihr wichtige Informationen zum Fall erfahrt. Passt also gut auf, damit ihr keine Details verpasst. Im Anschluss an meine Einführung folgt eine Diskussionsrunde, in der ihr euch gegenseitig geheime Informationen über eure Kolleginnen und Kollegen verratet und gemeinsam über mögliche Behandlungsfehler von euch und euren Kolleginnen und Kollegen diskutiert. Um Zugang zum Dialog zu gelangen, benötigt ihr den Link vom Blatt, das euch vom Spielleiter ausgeteilt wurde. Um zu den Geheimen Informationen zu gelangen, scannt den QR-Code vom Blatt. Ihr werdet dann jeweils zu einer Webseite weitergeleitet. Auf der Website mit den geheimen Informationen stehen euch die 5 Berufsgruppen zur Auswahl. Wählt eure Berufsgruppe und drückt den „Submit“-Knopf. Dann wird ein Fenster erscheinen in dem Ihr den Geheimcode, der auf eurem Zettel steht, eingeben müsst, um zu den geheimen Informationen zu gelangen. Wenn ihr mit dem Dialog und den Diskussionen fertig seid, startet mich erneut mit den Worten „Alexa starte medical Murder Mystery“ und die nächste Runde beginnt. Zu Beginn von Runde 2 und Runde 3 fasse ich alle wichtigen Informationen zusammen, die ihr während des Dialogs und der anschließenden Diskussion herausgefunden habt oder hättet herausfinden sollen. Die genauen Umstände zum Fall und eure Aufgaben erfahrt ihr nun direkt im Anschluss von mir. Habt ihr bis hierher einmal alles verstanden?

Gut dann beginne ich jetzt mit der Einleitung zum Spiel. Ihr befindet euch im Hubertusspital, ein Spital, in dem Ihr gemeinsam auf der Orthopädischen Abteilung arbeitet. Heute ist der 15. Februar 2023. Gemeinsam mit euren Kolleginnen und Kollegen bildet ihr das Kernteam zur Behandlung eines Patienten, Herrn Fischer. Herr Fischer ist ein äußerst netter Herr, 58 Jahre alt und seit 8 Tagen im Hubertusspital. Vor 5 Tagen wurde bei Ihm über einen Zugang am seitlichen Oberschenkel eine Hüfttotalendoprothese, also ein künstliches Hüftgelenk implantiert. Die OP verlief ohne Komplikationen und alle hier anwesenden Personen waren bei der Operation dabei. Seither hat sich der Zustand des Patienten ohne, bislang erkennbaren Grund, zunehmend verschlechtert. Er gibt Schwindel, Kopfschmerzen, eine Sehminderung, leichte bis mäßige Atembeschwerden und eine allgemeine Schwäche an. Einen kurzen Auszug aus der Patientenakte findet ihr auf der Website, auf der Ihr auch den

Dialog findet. Schaut euch die Patientenakte kurz durch um ein genaueres Bild von Herrn Fischer zu bekommen. Zusätzliche Informationen bekommt ihr zu einem späteren Zeitpunkt. Ihr vermutet, dass es sich um einen unerkannten Behandlungsfehler handelt. Eure Aufgabe besteht nun darin, herauszufinden, was nach der Operation passiert sein könnte, was die Symptome des Patienten erklärt. Dazu reisen wir nun in der ersten Runde gedanklich zum Tag der OP zurück. Öffnet wenn ich fertig erklärt habe, mit dem Laptop den Link, auf dem Blatt, das euch ausgehändigt wurde. Damit gelangt ihr zur Patientenakte die ihr auch kurz überblicksmäßig anschaut und ihr gelangt auf der Website zum ersten Dialog, den Ihr dann gemeinsam laut durchlest. Wenn ihr damit fertig seid, scannt den zweiten QR-Code mit der Überschrift, Geheime Informationen. Schaut euch nur die Informationen an, die für eure Person bestimmt sind und zeigt niemandem eure Informationen am Smartphone. Nehmt euch dazu ein bis zwei Minuten Zeit und fangt dann mit der Diskussion über individuelle Fehlerquellen an. Im Anschluss startet mit der Ursachenanalyse dieses Falls. Tragt dazu alle von euch gefundenen individuellen Fehlerfaktoren in das entsprechende Feld des Fischgrätendiagramms, das euch vom Spielleiter ausgeteilt wurde, gemeinsam ein. Das Diagramm soll euch ein wenig dabei helfen einen Überblick über die verschiedenen Fehlerquellen zu behalten.

Dialog Runde 1

Ärztin: Guten Tag, mein Name ist Dr. Angela Müller und ich leite heute diese Hüft-TEP-Operation bei Herrn Fischer. Herr Fischer ist 58 Jahre alt, hat einen implantierten Herzschrittmacher und als Nebendiagnose Diabetes mellitus Typ 2. Ich bin mir nicht sicher, ob sich alle hier kennen, für mich sind es zumindest ein oder zwei neue Gesichter, deshalb möchte ich, dass sich alle kurz vorstellen. Wir haben noch Zeit, der Patient wird gerade vom Anästhesisten vorbereitet.

Pfleger: Hallo, wir kennen uns ja schon und haben auch schon ein paarmal zusammen im OP-Saal und auf der Station zusammengearbeitet, aber vollständigkeitshalber, mein Name ist Sebastian Scheuer, ich bin 36 Jahre alt und bin seit 14 Jahren als Pfleger tätig. Ich bin schon mein gesamtes Berufsleben in diesem Spital tätig.

Radiologietechnologin: Dann mach ich gleich weiter, ich bin Ella Hahn, 41 Jahre alt und seit 10 Jahren als Radiologietechnologin tätig, seit 6 Jahren in diesem Spital. Ich glaub viel mehr gibt es beruflich nicht über mich zu sagen.

Physiotherapeut: Ich bin Physiotherapeut in Ausbildung. Derzeit bin ich in meinem vorletzten Praktikum im 6. Semester, also schon auf der Zielgerade und freue mich heute dabei sein zu dürfen, um die OP zu beobachten. Ich bin etwas aufgeregt, es ist zwar nicht die erste Operation, bei der ich zusehe, aber ich finde es immer noch sehr ungewohnt. Ach ja und mein Name ist übrigens Georg Hagenbeck.

Diätologin: Ja dann bleib ich noch übrig, mein Name ist Carla Rose, seit 7 Jahren bin ich Diätologin und seit 3 Jahren hier im Spital. Ich bin heute bei dieser

OP anwesend, weil mich Frau Dr. Müller gefragt hat, ob ich zusehen möchte, weil ich in meiner Ausbildung nie das Glück hatte bei Operationen zusehen zu dürfen. Und da ich heute alle Patienten bereits abgeschlossen habe, hab ich mich dazu entschlossen das Angebot anzunehmen.

Ärztin: Gut, der Anästhesist hat gerade den Patienten freigegeben, er ist sediert, dann kann die OP losgehen. Herr Scheuer, das präoperative Antibiotikum hat der Patient von ihnen erhalten?

Pfleger: Korrekt, Herr Fischer hat vor 60 Minuten 80mg Gentamicin intravenös erhalten.

Ärztin: Dann setze ich den ersten Schnitt…

(Diätologin liest folgenden Kontext vor: „Die OP schreitet voran und verläuft ohne unerwartete Ereignisse. Es folgt noch eine letzte CT-Aufnahme und der Verschluss der Operationsnarbe.“)

Ärztin: Die Prothese ist platziert, die Bewegungstest wurden soeben durchgeführt. Frau Hahn, führen sie bitte noch ein abschließendes Kontrollröntgen durch, um sicherzustellen, dass die Prothese nach der Bewegung weiterhin richtig sitzt.

Radiologietechnologin: Verstanden, ich werde führe das Röntgen durch, bitte alle kurz zurücktreten.

Ärztin: Dankeschön, die Prothese schein richtig platziert und stabil zu sein. Dann werde ich nun mit dem Verschluss der Narbe fortfahren.

Physiotherapeut: Frau Dr. Müller, ich glaube, Sie haben einen Tupfer im Operationsgebiet übersehen.

Ärztin: Wie bitte, wer behauptet das?

Physiotherapeut: Es sah nur so aus, als wollten Sie die Narbe schon komplett verschließen, aber ich denke, da ist noch ein Tupfer drinnen.

Ärztin: Was fällt Ihnen ein, mir so etwas zu unterstellen? Ich weiß, was ich tue, und ich habe den Tupfer im OP-Gebiet im Blick. Sie sollten sich auf Ihre Aufgaben konzentrieren und mich meine Arbeit machen lassen.

Physiotherapeut: Es tut mir leid, ich wollte nicht respektlos sein, aber es schien mir, als ob etwas übersehen wurde.

Radiologietechnologin: Okay, bevor das hier noch weiter ausdiskutiert wird unterbreche ich das mal. Wenn wir hier fertig sind, mache ich mich gleich auf den Weg. Heute ist wieder extrem viel los und ich bin wegen vieler kurzfristiger Operationen mit den Routineuntersuchungen komplett im Verzug.

(Diätologin liest folgenden Kontext vor: „Startet nun mit der Offenlegung der geheimen Hinweise und führt im Anschluss eine Ursachenanalyse zu den individuellen Fehlerfaktoren durch“.)

Geheime Hinweise Runde 1

Radiologietechnologin über Ärztin:

Du hast die Aufgabe die Diskussionsrunde zu starten. Verwende dazu folgendes Argument: Dich stört das übertrieben selbstbewusste Auftreten von Frau Dr. Müller. Immerhin ist sie erst seit einem Jahr mit ihrem Medizinstudium fertig und erst am Beginn der Facharztausbildung. Wegen eines Personalmangels in der Orthopädie muss sie bereits jetzt einfache Operationen selbstständig durchführen. Beschuldige Frau Dr. Müller, dass sie noch viel zu unerfahren ist und möglicherweise einen Operationsfehler gemacht hat.

Verteidigung von **Ärztin** und Anschuldigung an Physiotherapeuten:

Frau Hahn wird dir Unerfahrenheit vorwerfen. Versuch dir ein paar Argumente zu überlegen, warum du trotzdem eine kompetente Ärztin bist. Wenn dir nichts mehr einfällt, erwähne zum Beispiel noch, dass du zur OP-Vorbereitung immer die STEP-Methode, eine Methode zur strukturierten Kommunikation, anwendest. Wenn du deine Gegenargumente vorgebracht hast, beschuldige den Physiotherapeuten Herrn Hagenbeck, um von dir abzulenken, dass er noch in der Ausbildung ist und deshalb noch mehr Fehler macht.

Verteidigung von **Physiotherapeuten** und Anschuldigung an Pfleger:

Diese Information sollst du in Runde 1 verbreiten. Warte darauf bis Dr. Müller dich beschuldigt:
 Dr. Müller wird dir Unerfahrenheit vorwerfen. Versuch dir ein paar Argumente zu überlegen, warum du trotzdem ein guter Therapeut bist und nicht mehr Fehler machst als andere, erfahrenere Therapeuten. Wenn dir nichts mehr einfällt, kannst du zum Beispiel darauf hinweisen, dass Menschen in der Ausbildung oft noch aufmerksamer sind und im sechsten Semester bereits über das therapeutische Fachwissen der Grundausbildung verfügen und ihnen nur noch die praktische Erfahrung fehlt. Um von dir abzulenken, beschuldige nach deinen Gegenargumenten den Pfleger Sebastian Scheuer, dass die Pflege chronisch unterbesetzt und er deshalb überarbeitet sei.

Behalte diese Information in dieser Runde auf jeden Fall für dich, denn nur du hast diese Information:
 Du weißt mehr über diesen Fall als alle denken. Du bist dir ziemlich sicher, dass du weißt, was passiert ist, aber du traust dich nicht, deine Vermutung mit jemandem zu teilen, weil du nicht erneut unangenehm auffallen willst. Dr. Müller hat dem Patienten zu viele Antibiotika verschrieben. Herr Scheuer wird später sagen, dass er es bemerkt und korrigiert hat. Aber er hat es nicht korrigiert, er wird krank und seine Kollegen verabreichen die zu hohe Dosis. Dieser Umstand führt zu Symptomen des Patienten. Versuche in den späteren Runden, wenn Frau Hahn diese Theorie vorbringt, deine Kollegen unauffällig davon zu überzeugen. Zeig aber nicht zu offensichtlich, dass du diese geheime Information hast.

Verteidigung von **Pflege** und Anschuldigung an Diätologin:

Herr Hagenbeck wird dir vorwerfen, dass du überarbeitet bist. Das wirst du kaum abstreiten können. Versuche trotzdem, gute Gegenargumente zu finden, warum du trotzdem keine Schuld am Zustand des Patienten trägst. Wenn dir nichts mehr einfällt, erwähne zum Beispiel noch, dass du sehr erfahren bist und schon seit 14 Jahren als Pfleger arbeitest. Wenn du dich verteidigt hast, beschuldige, um von dir abzulenken, die Diätologin Carla Rose privat sehr gestresst zu sein, da sie sich zu Hause um einen Pflegefall kümmern muss und deshalb bei der Arbeit vielleicht häufiger abgelenkt ist.

Verteidigung von **Diätologin** und Anschuldigung an Radiologietechnologin:

Herr Scheuer wird dir vorwerfen, dass du zu Hause einen privaten Pflegefall betreust und deshalb bei der Arbeit häufiger abgelenkt bist. Das stimmt, du pflegst deinen Vater, bei dem vor einem halben Jahr Demenz diagnostiziert wurde und der seitdem bei dir lebt. Erwähne diese Tatsache als Verteidigung und bestreite, dass dich dieser Umstand besonders von der Arbeit ablenkt. Vielmehr ist die Arbeit eine willkommene Ablenkung von zu Hause. Überlege dir weitere Gegenargumente, warum du denkst, dass du trotz privater Ablenkung konzentriert bei der Arbeit bist. Um nach deinen Gegenargumenten von dir abzulenken, beschuldige dann die Radiologietechnologin Frau Hahn, dass sie heute unpünktlich war und deshalb bei allen Patienten im Verzug ist. Außerdem weißt du, dass sie wegen der Verspätung noch nichts gegessen hat, was bei einer 12-Stunden-Schicht nicht gerade förderlich ist.

Verteidigung von **Radiologietechnologin**:

Frau Rose wird dir vorwerfen, dass du zu spät zur Arbeit gekommen bist und dass du mit deinen Patientinnen und Patienten im Zeitplan zurück bist, und leider ist das auch wahr. Sie wird dir auch vorwerfen, dass du noch nichts gegessen hast, was auch stimmt. Überlege dir jetzt schon Gegenargumente, warum du trotz Verspätung und Hunger deine Arbeit gewissenhaft erledigst und nicht für den Zustand des Patienten verantwortlich bist. Wenn dir nichts mehr einfällt, erwähne zum Beispiel noch, dass du die Intervallfasten-Methode anwendest und oft längere Essenspausen einlegst und dies für dich nichts Ungewöhnliches ist.

Runde 2

Einleitung

Hier bin ich wieder, euer Alexandro. Da wurde doch einiges in der Diskussion offenbart, was ihr vermutlich noch nicht über euren Kolleginnen und Kollegen gewusst habt. All diese individuellen Faktoren machen medizinische Leistungserbringer anfällig für Fehler. Wie zum Beispiel die Unerfahrenheit von Herrn Hagenbeck, der noch in Ausbildung ist und Frau Dr. Müller, die erst vor kurzem ihr Medizinstudium abgeschlossen hat und jetzt schon Operationen selbstständig durchführen muss weil in der Orthopädie derzeit Personalmangel herrscht. Oder private Probleme, die von der Arbeit ablenken, wie bei Frau Rose, die Ihren Vater pflegt. Sie behauptet zwar, das würde sie nicht von der Arbeit ablenken aber, einen Angehörigen zu pflegen, kann manchmal sehr herausfordernd sein, auch wenn man sich das selbst nicht eingestehen will. Aber auch Faktoren wie Stress, Müdigkeit und Hunger, wie bei Herrn Scheuer der in der Arbeit fast unter Dauerstress steht und Frau Hahn, die zu spät zur Arbeit gekommen ist und deshalb heute besonders gestresst und zudem noch hungrig ist. Jeder ist selbst verantwortlich für die Aufmerksamkeit und die regelmäßige Kontrolle seines oder ihres Wohlbefindens während der Arbeit. Es gibt viele Gedächtnisstützen, um seinen eigenen Allgemeinzustand gelegentlich zu überprüfen. Eine davon heißt HALT. H steht für hungrig, A für angry, L für late und T für tired. Man soll sich folgende 4 Fragen selbst stellen: Hat man genug gegessen? Wie sieht es gerade mit den eigenen Emotionen aus? Ist man spät dran oder im Verzug mit seiner Arbeit? Und wie wach und aufmerksam ist man bei der Arbeit. Wenn man sich diese Fragen einmal vor oder während der Arbeit stellt, kann man in etwa einschätzen, wie gut das eigene Handeln an dem Tag sein wird. Aber genug von den individuellen Faktoren, die zu Fehlern führen können. Ziel von euch ist es, herauszufinden, was mit Herrn Fischer passiert ist. Öffnet im Anschluss an meine Erläuterungen wieder die Dialog Website am Laptop und lest dazu den nächsten Dialog gemeinsam laut durch. Danach folgt die nächste Diskussionsrunde, in der ihr wieder geheime Hinweise offenbart, um somit möglicherweise der Lösung einen Schritt näher zu kommen. Die Hinweise bekommt ihr wieder über euer Smarphone. Nach der Diskussion führt die Ursachenanalyse weiter durch und tragt die neuen Informationen aus dieser Runde in das Fischgrätendiagramm bei Prozesse und Materialien ein. In der nächsten Szene befindet ihr euch wieder im Hubertusspital. Es ist der 14. Februar 2023 und der Zustand von Herrn Fischer hat sich seit seiner Operation nach und nach verschlechtert. Ladet die Website mit dem Dialog und den Geheimen Hinweisen neu, um Zugang zu Dialog und Hinweisen für Runde 2 zu erhalten.

Dialog Runde 2

Physiotherapeut: Entschuldigung Frau Dr. Müller dürfte ich bitte bei der Visite von Herrn Fischer dabei sein. Ich war bei der OP dabei und mich würde interessieren, wie sein derzeitiger Zustand ist.

Ärztin: Ja sie dürfen an der Visite teilnehmen, soweit ich gelesen habe, betreuen Sie Ihn ja auch, dann können Sie später auch gleich über den Zustand in den Therapien berichten. Alles klar, dann starten wir. Nur für alle als kurze Info, ich wende beim nächsten Patienten die sogenannte ISBAR Methode zur strukturierten Kommunikation an. Wir besprechen jetzt Herrn Fischer, ein 58-jähriger Patient mit Hüftgelenkarthrose. Vor einer Woche wurde Herr Fischer in unserem Spital aufgenommen und vor vier Tagen hat er von mir eine Totalendoprothese bekommen. Und, oh was für ein Zufall alle hier Anwesenden waren auch bei der OP dabei.

Radiologietechnologin: Ah Sebastian jetzt sehe ich dich erst, du bist wieder vom Krankenstand zurück. Wie geht's dir? Wie viel Tage warst du jetzt im Krankenstand, zwei?

Pfleger: Nein drei sogar, wenn man den ersten Tag noch dazu zählt. Ich an dem Tag zwar in die Arbeit gekommen, habe aber sofort gemerkt, dass ich zu schwach bin und nach einer Stunde wieder nachhause gefahren. Ich fühl mich noch nicht komplett fit aber zumindest wieder arbeitsfähig. Und bei unserem derzeitigen Personalmangel kann möchte ich meine Kollegen und Kolleginnen nicht im Stich lassen.

Diätologin: Na hoffentlich steckst du uns nicht auch alle an. Ich war diesen Winter schon zwei Mal krank, ich möchte kein drittes Mal mit Fieber zuhause liegen.

Ärztin: Na gut, bevor wir hier alle durcheinander reden, unterbreche ich sie gleich mal und mache weiter mit der Patientenbesprechung. Immerhin sollte diese Kommunikation strukturiert sein. Die Situation des Patienten ist gleichbleibend schlecht. Herr Fischer klagt seit gestern über vermehrte Kopfschmerzen, Schwindel und leichte Atemprobleme in Ruhe. Außerdem zeigt der Patient seit gestern Vormittag plötzlich auftretende Hörprobleme. Der Herr hat einen Typ 2 Diabetes, der vor 2 Monaten diagnostiziert wurde. Er wurde daraufhin von unserer Kollegin, Frau Carla Rose auf sein Diabetesmedikament eingestellt.

Diätologin: Ja genau. Derzeit bekommt Herr Fischer Metformin, ein orales Medikament zur Blutzuckerreduktion und spritzt sich mehrmals täglich Insulin. Wir sind noch dabei die richtige Dosis zu finden, da der Blutzucker bis zur letzten Kontrolle vor drei Wochen leicht geschwankt hat, aber derzeit auf einem guten Weg.

Ärztin: Gut. Von meiner Seite gibt es sonst wenig neues zu erzählen. Leider konnten wir noch nicht herausfinden, was der Grund für die Kopfschmerzen und die Atemprobleme ist. Ich werde für heute eine Spirometrie bei Herrn Fischer ansetzen. Hat jemand von Ihnen noch irgendetwas bei einer Behandlung oder Untersuchung beobachtet, was zur Lösung dieses Falles beitragen könnte?

Physiotherapeut: Ich konnte das Gleichgewichtstraining und die Gangschulung nur vor der OP durchführen. Seither ist Herr Fischer kaum belastbar und ich

muss meine Therapie immer in Rückenlage mit ihm durchführen. Meistens ist er bereits nach etwa 10 Minuten zu erschöpft zum Weitermachen.

Pfleger: Frau Hahn wenn ich mich richtig erinnere ist in der Patientenakte von Herrn Fischer eine MRT- und CT-Untersuchung eingetragen. Gab es dabei irgendwelche Auffälligkeiten?

Radiologietechnologin: Ich denke ich hatte ihn nur bei der CT-Untersuchung. Beim MRT könnte ich mich zumindest nicht an ihn erinnern. Im CT war er unauffällig.

Pfleger: Ok, vielleicht habe ich mich auch verschaut aber ich war mir eigentlich ziemlich sicher, dass es seine Akte war.

Ärztin: Gut sie beide klären das noch. Dann schauen wir weiter zum nächsten Patienten.

(Diätologin liest folgenden Kontext vor: „Startet nun mit der Offenlegung der geheimen Hinweise und führt im Anschluss eine Ursachenanalyse zu den Punkten Prozesse und Materialien durch“.)

Geheime Hinweise Runde 2

Pfleger GH2:

Versuche dich gegen die Anschuldigung deiner Kollegen mit eigenen Argumenten zu verteidigen. Wenn dir nichts mehr einfällt, gibt es eine Kollegin oder einen Kollegen, der geheime Informationen hat, mit denen er dich verteidigen kann. Lies dir folgende Texte durch und wenn du merkst, dass jemand angeschuldigt wird, den du verteidigen sollst, bringe deine Argumente vor.

Du hast in der physiotherapeutischen Dokumentation von Herrn Fischer gelesen, dass Herr Hagenbeck am Tag nach der Operation einen Stehversuch mit ihm unternommen hat, ohne dabei den Blutdruck des Patienten zuvor zu kontrollieren. Herrn Fischer wurde schwindelig und er stieß sich den Kopf am Bett. Herr Hagenbeck hat daraufhin die Therapie abgebrochen. In Rückenlage besserte sich das Schwindelgefühl, aber nach dem Sturz hatte er mäßige Kopfschmerzen. Erwähne deine Entdeckungen in der Diskussionsrunde und öffne dabei die physiotherapeutische Dokumentation (auf der Dialog Webseite) als Beweis. Merke an, dass der Patient eine unentdeckte Hirnblutung haben könnte. Das könnte den Schwindel, die Kopfschmerzen und die allgemeine Schwäche von Herrn Fischer erklären.

Verteidige Frau Dr. Müller mit folgendem Argument, wenn diese von Frau Hahn beschuldigt wird: Du hast bemerkt, dass Frau Müller die Antibiotikamenge falsch in die Patientenakte von Herrn Fischer eingetragen hat. Du hast ihm die korrekte Dosis (1x täglich 200mg i.v.) verabreicht und den Fehler im Stützpunkt gemeldet.

Ärztin GH2:

Versuche dich gegen die Anschuldigung deiner Kollegen mit eigenen Argumenten zu verteidigen. Wenn dir nichts mehr einfällt, gibt es eine Kollegin oder einen Kollegen, der geheime Informationen hat, mit denen er dich verteidigen kann. Lies dir folgende Texte durch und wenn du merkst, dass jemand angeschuldigt wird, den du verteidigen sollst, bringe deine Argumente vor.

Du hast folgendes in der diätologischen Dokumentation nachgelesen und wirfst Frau Rose folgendes vor: Herr Fischer bekommt täglich 500mg Metformin und zusätzlich mehrmals täglich eine geringe Dosis Insulin zur Behandlung seines Diabetes Mellitus. Er führt die Insulintherapie selbstständig durch und wurde erst vor kurzem umgestellt. Stelle die Vermutung in den Raum, dass Herr Fischer möglicherweise Fehler bei der Dosierung der Diabetesmedikamente macht und vielleicht dadurch permanent einen Unterzucker hat. Das würde Schwindel, Kopfschmerzen und allgemeine Schwäche erklären.

Gib folgenden Sachverhalt zu, um Herrn Scheuer zu verteidigen, wenn man ihn beschuldigt: Du musst einen Fehler gemacht haben, als du Vendal in die Patientenakte eingetragen hast. Du wolltest Herrn Fischer Vendal intramuskulär verordnen. Vendal zur intramuskulären Gabe ist im Krankenhaus derzeit nicht verfügbar, daher muss auf die intravenöse Verabreichung zurückgegriffen werden. Die intravenöse Verabreichung ist somit korrekt.

Physiotherapeuten GH2:

Versuche dich gegen die Anschuldigung deiner Kollegen mit eigenen Argumenten zu verteidigen. Wenn dir nichts mehr einfällt, gibt es eine Kollegin oder einen Kollegen, der geheime Informationen hat, mit denen er dich verteidigen kann. Lies dir folgende Texte durch und wenn du merkst, dass jemand angeschuldigt wird, den du verteidigen sollst, bringe deine Argumente vor.

Folgendes kannst du Frau Hahn vorwerfen: Du hast bei deiner Recherche gesehen, dass sich in der Patientenakte von Herrn Fischer ein MRT-Befund befindet. Möglicherweise hat Frau Hahn die Patientenidentifikation nicht durchgeführt und fälschlicherweise Herrn Fischer statt seines Zimmerkollegen zum MR abgeholt. Du weißt, dass Herr Fischer einen Herzschrittmacher implantiert hat, und hast bei deiner Recherche herausgefunden, dass dieser nicht MR-tauglich ist. Der implantierte Herzschrittmacher von Herrn Fischer könnte während der MRT-Untersuchung beschädigt oder auf die Werkseinstellungen zurückgesetzt worden sein. Dies könnte zu einer Herzinsuffizienz führen und die Verschlechterung des Patienten erklären.

Frau Dr. Müller wird Frau Rose vorwerfen, dass sie den Patienten vielleicht falsch auf die Diabetesmedikamente eingeschult hat. Du kannst aber bestätigen, dass in die Blutzuckerwerte, die du jedes Mal vor deiner Therapie misst, immer im Normalbereich waren. Öffne dazu als Beweis deine physiotherapeutische Dokumentation (auf der Dialog Webseite).

Diätologin GH2:

Versuche dich gegen die Anschuldigung deiner Kollegen mit eigenen Argumenten zu verteidigen. Wenn dir nichts mehr einfällt, gibt es eine Kollegin oder einen Kollegen, der geheime Informationen hat, mit denen er dich verteidigen kann. Lies dir folgende Texte durch und wenn du merkst, dass jemand angeschuldigt wird, den du verteidigen sollst, bringe deine Argumente vor.

Du hast die Aufgabe, die neue Runde zu eröffnen. Konfrontiere Herrn Scheuer mit folgender Feststellung: Dir ist in der heutigen Therapieeinheit aufgefallen, dass bei Herrn Fischer Vendal (ein Morphin zur Schmerzlinderung) intravenös verabreicht wird. Du weißt aber, dass Vendal bei Herrn Fischer intramuskulär verordnet ist. Eine falsche Verabreichungsform könnte zu einer zu schnellen oder vermehrten Aufnahme des Medikaments in den Blutkreislauf führen. Die Folge können Schwindel, Blutruckabfall und eine Atemdepression sein.

Nutze folgendes Argument, um Frau Hahn zu verteidigen, wenn sie von Herrn Hagenbeck beschuldigt wird einen Fehler gemacht zu haben: Du hast den MRT-Befund geöffnet und dabei gesehen, dass sich auf dem Bild kein künstliches Hüftgelenk befindet. Das MRT ist also nicht von Herrn Fischer, sondern vom Zimmerkollegen und vermutlich hat Frau Hahn dieses nur in die falsche Patientenakte gespeichert. Öffne zum Beweis den MRT-Befund auf der Dialog Website.

Radiologietechnologin GH2:

Versuche dich gegen die Anschuldigung deiner Kollegen mit eigenen Argumenten zu verteidigen. Wenn dir nichts mehr einfällt, gibt es eine Kollegin oder einen Kollegen, der geheime Informationen hat, mit denen er dich verteidigen kann. Lies dir folgende Texte durch und wenn du merkst, dass jemand angeschuldigt wird, den du verteidigen sollst, bringe deine Argumente vor.

Konfrontiere Dr. Müller mit der folgenden Entdeckung, die du bei deiner Recherche über den Patientenfall gemacht hast: Du hast festgestellt, dass die Antibiotikatherapie falsch in den OP-Nachbehandlungsplan eingetragen wurde. Statt der üblichen Dosis von 1 x täglich 200 mg Gentamicin ist diese Dosis 3 x täglich verordnet worden. Erhält Herr Fischer möglicherweise die dreifache Menge an Antibiotika? Eine Überdosierung von Antibiotika kann unter anderem zu Schwindel, Kopfschmerzen und Sehstörungen führen.

Herrn Hagenbeck wird von Herrn Scheuer vorgeworfen bekommen, dass der Patient in seiner Therapie gestürzt ist. Um diese Anschuldigung etwas zu entkräften, verwende folgendes Argument: Du weißt, dass nach dem Sturz von Herrn Fischer in der Physiotherapie eine kurze Untersuchung mit der Glasgow Coma Scale (GCS) zur Beurteilung des Bewusstseinszustandes von dem Neurologen Dr. Watson, deinem Ehemann, durchgeführt wurde. Mit 15 Punkten weist die GCS nicht auf ein Schädel-Hirn-Trauma hin.

Runde 3

Einleitung

Ich sehe, ihr seid mit der zweiten Diskussionsrunde fertig. Ich fasse noch einmal zusammen, was wir in der letzten Runde herausgefunden haben. Die Symptome von Herrn Fischer haben sich deutlich verschlechtert. Er hat jetzt allgemeine Schwäche, Schwindel, Kopfschmerzen, Atembeschwerden und Hörprobleme. Trotzdem wissen wir noch nicht, was diese Symptome verursacht. Ihr habt einige gute Theorien über mögliche Ursachen aufgestellt, aber welche ist die richtige und ist überhaupt eine davon richtig? Da wäre zum einen die These, dass Frau Hahn bei Herrn Fischer fälschlicherweise ein MRT gemacht hat, obwohl er einen Herzschrittmacher implantiert hat. Frau Rose kann aber zeigen, dass auf dem MRT kein künstliches Hüftgelenk zu sehen ist und es sich somit um eine Aufnahme von Herrn Fischers Zimmerkollegen handelt. Oder was ist mit dem Vorwurf gegen Herrn Scheuer? Er hat Herrn Fischer das Morphium falsch verabreicht. Statt in den Muskel hat er die verordnete Menge intravenös injiziert. Morphium ist kein Hustensaft, eine falsche Dosierung kann zu schweren Nebenwirkungen führen. Aber Dr. Müller sagt, die intravenöse Gabe seien korrekt, sie habe sich nur verschrieben. Bleiben wir bei Frau Dr. Müller. Anscheinend war der Verordnungsfehler beim Morphium kein Einzelfall. Sie hat die falsche Antibiotikamenge in die Patientenakte von Herrn Fischer eingetragen. Herr Scheuer sagt aber, er habe den Fehler rechtzeitig erkannt und Herrn Fischer die richtige Menge gegeben. Dann gibt es noch den Vorwurf gegen Frau Rose. Sie soll Herrn Fischer falsch auf das Blutzuckermedikament eingestellt haben, aber Herr Hagenbeck kann bezeugen, dass der Blutzucker während seiner Therapiesitzungen immer im Normbereich war. Bleibt noch Herr Hagenbeck. Herr Fischer ist während seiner Therapie auf den Kopf gefallen. Aber Frau Hahn denkt, dass der Test der durchgeführt wurde eine Hirnblutung unwahrscheinlich macht. Aber kann man sich bei jeder dieser Aussagen sicher sein? Oder irrt sich vielleicht jemand der anwesenden Personen? Öffnet nun im Anschluss an meine Erläuterungen wieder die Website am Laptop und lest dazu den letzten Dialog gemeinsam laut durch. Im Anschluss führt die Ursachenanalyse für die Spalte Kommunikation durch und überlegt euch für alle drei Runden, welche Fehlerquellen bei der Kommunikation passiert sein könnten. Danach folgt die finale Diskussionsrunde. Ihr bekommt keine neuen geheimen Hinweise. Stattdessen habt ihr noch einmal alle Dialoge und Patientenakten und Befunde zur Verfügung, um darin nach Ungereimtheiten zu suchen. Überlegt welche Hypothese am plausibelsten ist und entscheidet euch gemeinsam für eine. Ihr müsst euch einig sein. Erst dann könnt ihr mich ein letztes Mal starten und erfahrt dann von mir die finale Auflösung. In der folgenden Szene befindet ihr euch wieder im Hubertusspital. Es ist der 15. Februar 2023 und der Zustand von Herrn Fischer hat sich seit gestern weiter verschlechtert. Ladet die Dialogwebsite neu, um Zugang zum Dialog für Runde 3 zu erhalten.

Dialog Runde 3

Ärztin: Guten Morgen, ich hoffe, ihr hattet alle einen schönen Valentinstag. Zumindest diejenigen, die gestern Abend nicht arbeiten mussten. Aber gut, heute ruft trotzdem wieder die Pflicht. Beginnen wir mit dem Besuch bei Herrn Fischer. Seit gestern ist sein Kreatinwert so stark angestiegen, dass wir beschlossen haben, ihn an die Dialyse anzuschließen. Die Atembeschwerden haben sich laut Herrn Fischer etwas gebessert. Der Auslöser seiner Symptome ist nach wie vor unbekannt.

Diätologin: Könnte es sein, dass die Blutgerinnungsmedikamente bei Herrn Fischer falsch dosiert wurden? Möglicherweise hat sich ein Thrombus gebildet und blockiert nun die arterielle Versorgung der Niere?

Pfleger: Das ist sehr unwahrscheinlich. Die Medikamente wurden laut den Aufzeichnungen richtig gegeben, die Blutgerinnungsfaktoren im Blut passen und die Niere ist kein typisches Organ, das von einem Verschluss durch einen Thrombus betroffen ist.

Radiologietechnologin: Konnten wir nun schon alle gestern aufgestellten Hypothesen zur Ursache der Symptome verwerfen? Vielleicht sollten wir noch einmal genauer überlegen, wo jemandem von uns ein Fehler passiert sein könnte.

Physiotherapeut: Gute Idee. Vielleicht hilft eine Ursachenanalyse weiter. Gehen wir noch einmal alle Hypothesen durch, überlegen, durch welche individuellen und systemischen Umstände die Fehler entstanden sind und wie plausibel die Gegenargumente sind.

Ärztin: Einverstanden. Sehen Sie sich alle noch einmal alle Eintragungen in die Kurve, alle Dokumentationen und Befunde durch. Vielleicht haben wir eine der Hypothesen zu voreilig verworfen. Der Verlauf des Patienten ist sehr untypisch und ich weiß nicht, was der Grund sein könnte.

(Diätologin liest folgenden Kontext vor: „Führt nun direkt im Anschluss an den Dialog die Ursachenanalyse zum Thema Kommunikation durch. schaut euch noch einmal alle Dokumentationen und Patientenakten an und entscheidet euch dann gemeinsam für eine Ursache“.)

Finale Auflösung:

Ein letztes Mal darf ich euch Herzlich Willkommen zum Medical Murder Mystery begrüßen. Ihr habt also eine Entscheidung getroffen. Dann möchte ich euch nicht länger auf die Folter spannen und beginne nun mit der finalen Auflösung. Unglücklicherweise haben sich bei der Behandlung mehrere Fehler gleichzeitig ereignet. Jeder hätte das Potential gehabt, einen ernsthaften Schaden bei Herrn Fischer hervorzurufen. Zum Beispiel der Sturz in der Therapie von Herrn Hagenbeck. Stürze gehören zu den häufigsten unerwünschten Ereignissen in der Physiotherapie. Manchmal sind Stürze aber nicht vermeidbar. Häufig kann der Therapeut den Sturz aber zumindest noch abmildern. Wie auch in diesem Fall. Herr Hagenbeck konnte den Sturz von Herrn Fischer noch abfangen, sodass er nur leicht gegen die Bettkante stieß, was zu keiner ernsthaften Kopfverletzung geführt hat, wie auch die Untersuchung des Neurologen ergeben hat. Eine weiter Fehlerquelle sind falsch dosierte Medikamente, wie bei Herrn Fischer und den Diabetesmedikamenten. Nur hat Frau Rose bei der Einschulung keinen Fehler gemacht. Herr Fischer nimmt seine Medikamente korrekt ein. Gelegentliche Unterzuckerungen können bei Diabetikern vor allem am Anfang vorkommen. Häufig spüren diese Personen den Unterzucker und können etwas dagegen unternehmen. Dann wäre da noch Frau Hahn und du Unklarheit mit dem MRT. Es ist wahr, Herr Fischer hat einen Herzschrittmacher, der nicht MRT-tauglich ist. Allerdings hat auch das Argument von Frau Rose gestimmt, dass der MRT-Befund gar nicht von Herrn Fischer ist, sondern wie sie richtig vermutet hat von seinem Zimmerkollegen. Damit kann ein Fehler bei der Patientenidentifikation zu einer großen Gefahr werden. Aber glücklicherweise nicht in diesem Fall. Bleiben noch Herr Scheuer und Frau Doktor Müller. Herr Scheuer hat durch seine jahrelange Erfahrung sowohl beim Schmerzmedikament Vandal, als auch bei den Antibiotika die korrekte Applikationsweise beziehungsweise Menge gewusst. Nach so vielen Jahren im Beruf kennt man die Dosierungsvorschriften in und auswendig. Trotzdem hat er einen gravierenden Fehler gemacht, der uns zur endgültigen Auflösung des Falls führt. Kurz bevor er krankheitsbedingt nachhause gegangen ist, hat er einer Kollegin seine Patienten übergeben. Dabei hat er auch den Fehler bei der Antibiotikamenge erwähnt. Diese Information hat die ebenfalls gestresste überarbeitete Kollegin wieder vergessen und nicht in die Patientenakte übertragen. An den darauffolgenden Tagen war Herr Scheuer krank und ein unerfahrener Kollege hat die verordnete Menge dreimal anstatt einmal täglich verabreicht. Eine kurze Unaufmerksamkeit oder Unstrukturiertheit mit weitreichenden Folgen. Glücklicherweise wurde der Fehler noch rechtzeitig entdeckt und Herr Fischer erholte sich wieder vollständig. Eine Überraschung gibt es aber noch. Es gab eine Person unter euch, die von Anfang an gewusst hat, was passiert ist. Nehmt euch dazu eine halbe Minute Zeit, unterhaltet euch dabei nicht sondern überlegt nur für euch selbst, wer diese Person gewesen sein könnte. Zählt dann bis drei und zeigt gleichzeitig auf die Person, von der Ihr denkt, dass sie Bescheid wusste. Der oder die Insiderin muss sich dann offenbaren und eine finale Erklärung vorlesen. Die Erklärung findet diese Person auf der Website mit den geheimen Hinweisen.

Physiotherepeut Aufklärung zum Schluss:

Ja, es ist wahr, ich hatte schon länger den Verdacht, dass Herr Fischer zu viel Antibiotika bekommt. Ich war mir aber nicht sicher, ob es stimmt und wollte nicht wieder Frau Dr. Müller zu Unrecht beschuldigen, einen Fehler gemacht zu haben. Ich trage also eine Mitschuld, genau wie Herr Scheuer und Frau Dr. Müller. Ich weiß, dass es meine Pflicht gewesen wäre, jemanden auf diesen Fehler aufmerksam zu machen, auch wenn das bedeutet, einem Vorgesetzten einen Fehler zu unterstellen. Aber ich glaube, dass auch vieles an den Abläufen in diesem Krankenhaus verbessert werden muss, weil bei guten Kontrollabläufen solche Fehler gar nicht erst passieren können.