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Digitization of the Huddle-Board in the Sonnenhof Operating Room

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Abstract. This study investigates the transition from analog to digital Huddle-Boards within the operational environment of a hospital. By analyzing the current analog system and implementing a digital prototype, the study aims to measure efficiency, usability, and overall system improvements. A combination of observational analyses, surveys, interviews, and usability studies were conducted to assess the potential benefits of digitization. The results highlight significant time savings, increased accessibility, and enhanced usability of the digital system compared to its analog counterpart.

Keywords. digital Huddle-Board, usability, system analysis, process optimization

1. Introduction

The goal of Lean Management is to optimize processes, minimize waste, and maximize value creation. A key tool in this approach is the Huddle-Board, a visual aid used for process visualization and management. It can take various forms, such as flip charts, whiteboards, or customized marker boards [1]. In many hospitals, Huddle-Boards are employed to enhance communication and coordination within teams, serving as a platform for discussing current tasks, problems, and solutions during daily huddle meetings. Huddle-Boards positively impact team communication, efficiency, and patient safety outcomes [2, 3]. Traditionally, most hospitals, including those in the Lindenhof Group, still rely on analog Huddle-Boards that depend on physical materials such as printed schedules and manual updates. These processes are often time-consuming and prone to errors [4]. The analog systems are widespread, but they present challenges such as inefficiency and limited access to real-time data [3].

This study introduces a digital alternative designed to modernize processes and enhance overall efficiency. The project encompasses an analysis of the current analog workflow, development and testing of a digital prototype, and evaluating its usability through real-world application. The primary objective is to assess whether the digital system offers tangible improvements in efficiency, user experience, and resource allocation. By transitioning to a digital Huddle-Board, hospitals aim to reduce manual effort, improve communication, and enable more dynamic decision-making [5].

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2. Method

2.1. Observation Analysis, questionnaires and interviews

The study employed systematic and unsystematic observations to analyze task durations, and staff interactions, providing insights into analog and digital system performance. Additionally, questionnaires and interviews were conducted before and after implementing the digital Huddle-Board: pre-implementation surveys assessed the analog system, while post-implementation surveys evaluated usability, satisfaction, and benefits.

2.2. Usability Study

A detailed usability study was performed using task-based evaluations. Participants were instructed to complete predefined tasks on the digital system, such as scheduling and information retrieval. Key metrics such as time taken, ease of navigation, and user satisfaction were measured using the System Usability Scale (SUS), providing a standardized assessment of the digital system's performance.

3. Results

3.1. Implementation of the digital Huddle-Board "infOPhuddle"

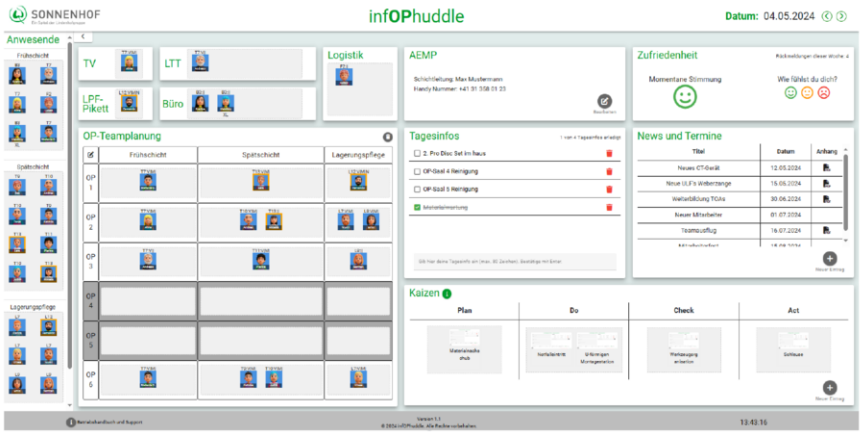

Figure 1: Prototype of the digital Huddle-Board "infOPhuddle"

The digital Huddle-Board system serves as the central platform for streamlining operational processes in the Sonnenhof operating room. Running on Windows Server 2022 with Nginx and a Node.js backend, it processes data from the workforce management system Polypoint via XML files and stores it in an MSSQL database. The Vue.js and Pinia frontend ensures a user-friendly interface, communicating with the backend via APIs for secure, real-time updates and efficient functionality. A firewall and monitoring ensured performance, while a maintenance plan guaranteed system integrity. The prototype of the digital Huddle-Board can be seen in Figure 1.

The most important functions include real-time staff planning for operating rooms. The system also facilitates the exchange of critical information, allows for

structured feedback collection, and supports continuous improvement through Kaizen principles by identifying and optimizing processes and problem areas.

3.2. Study results for the analog Huddle-Board

The analog Huddle-Board system exhibited several inefficiencies. Employees often had to go back and forth between their workstations and the Huddle-Board to access or update information. The reliance on printed documents resulted in increased resource consumption and higher operational costs. Additionally, the analog system was less adaptable to sudden changes, often leading to delays in communication. Observations revealed that preparing the analog board took approximately 12 minutes and 30 seconds, involving tasks such as printing, manual arrangement of documents, and physically walking to the board.

3.3. Study results for the digital Huddle-Board

The digital Huddle-Board addressed many of the limitations observed in the analog setup. With centralized access to information and remote viewing capabilities, employees could access and update schedules without unnecessary movement. The intuitive design reduced the time required to plan and execute tasks. The ability to integrate real-time updates significantly improved workflow efficiency. he ability to integrate real-time updates significantly improved workflow efficiency. The preparation time for the Huddle-Board was reduced to 5 minutes and 32 seconds.

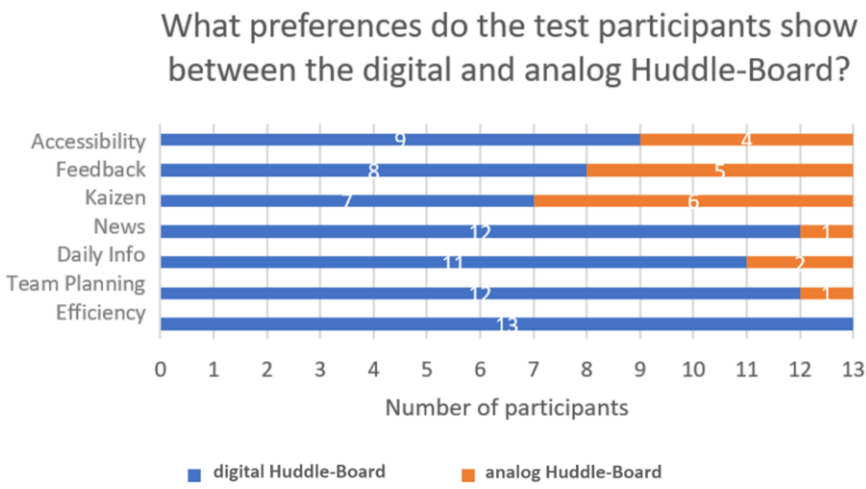

Figure 2: Evaluation – Preferences between digital and analog Huddle-Boards

The evaluation of the digital Huddle-Board utility received overwhelmingly positive feedback. On a scale from 0 (negative) to 10 (positive), nine out of thirteen participants rated it with the highest score of 10, indicating very high utility. The usability test included 14 tasks, such as accessing and modifying team schedules, editing sterilization information, reviewing and acknowledging news updates, generating and exporting PDF reports, and sending feedback through the integrated email system. Additionally, participants were asked about their preferences regarding the components of the Huddle-Board, comparing the analog and digital versions. The digital Huddle-Board, as shown

in Figure 1, was evaluated against the analog version, with the results displayed in Figure 2. The analysis clearly indicates that the digital version was preferred across all components, demonstrating its superior utility and efficiency.

4. Discussion

Despite the increasing prevalence of lean management in the healthcare sector, there are not many studies that examine the use of digital Huddle-Boards in particular [3]. In this study, which examined the use of the newly developed Huddle-Board, remarkable improvements were found between the analog and digital Huddle-Board in terms of efficiency, ease of use and user preference. Preparation time dropped from 12 minutes to 5 minutes and 32 seconds, a 46% reduction, by eliminating tasks like printing and walking to the board. The digital system, preferred for its superior functionality, scored 88.5 on the System Usability Scale (SUS). Feedback highlighted real-time access, fewer manual tasks, and cost savings, enhancing convenience and efficiency.

The digital Huddle-Board streamlined surgical workflows by removing redundant tasks, boosting efficiency and productivity. Its high SUS scores reflect intuitive design, fostering user satisfaction. Frequent use supports real-time communication and decision-making, while centralized, up-to-date information reduces risks from outdated data, improving patient outcomes. The real-time integration of personnel information through the interface with the workforce management system was particularly beneficial, improving team coordination and planning. Moreover, the ability to access the Huddle-Board from any PC improved flexibility and ensured that information was always readily available to staff.

Additionally, the structured arrangement of information led to better organization and reduced the risk of information loss. Cost savings were achieved through decreased paper usage and reduced administrative workload. Nevertheless, the introduction of the digital Huddle-Board also incurred new electricity costs, which are expected to be outweighed by the achieved efficiency gains. Suggested improvements include customization options and automated data integration to further enhance usability and efficiency. The successful deployment of the digital Huddle-Board during the testing phase demonstrates its potential for broader implementation in other operating rooms or related healthcare environments.

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