

INTRODUCTION

Effective cooperation across multi-disciplinary teams, departments and localities is a prerequisite for performance quality in highly specialized fields such as healthcare. In such organizations, large-scale clinical information systems are deployed to manage the complex flows and interchanges of patient information across the entire organization. When the multi-faceted requirements for information technologies to support the cooperative work processes are not met, alternative, unofficial work practices (i.e., workarounds) could potentially emerge. We illustrate how the combination of three concepts (workarounds, shadow systems and boundary infrastructures) capture unofficial work practices at complementary levels of an organization and can thus help to identify unmet information needs in computer supported cooperative work (CSCW) environments more reliably.

BACKGROUND

The HF/E concept of *workarounds* refers to a mismatch between a technology's intended use and how it is operated. The second concept, *shadow systems*, is defined as the unofficial as compared to the official information system, which supports CSCW processes where the official system does not (Behrens, 2019). The third concept, *boundary infrastructures*, is conceptualized as the entirety of all information systems that are used to organize information and CSCW across communities of practice (Bowker & Star, 1999). The concepts and their corresponding organizational level are illustrated below (fig. 1).

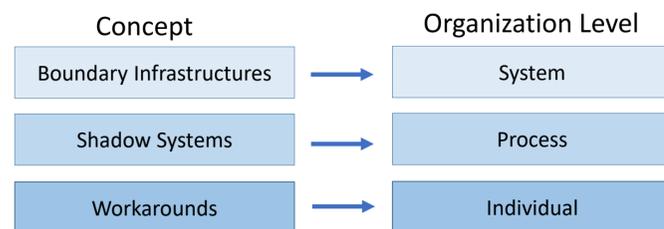


Figure 1. Mapping of Concepts to the Organizational Level

OBJECTIVES

Based on ethnographic research in a clinical advisory center, we use the identified concepts to illustrate how cooperative work practices permeate different levels of the organization (see Figure 1) and how a combination of the identified concept can be used to gain valuable insights into individual, process-related and system-level requirements for effective cooperation of complex organizations.

METHODOLOGY

Data Collection

To gain insights into the everyday work practices in a clinical advisory center, we used *ethnographic methods* for data collection conducting in-situ observations and semi-structured interviews. That is, employees with different functions within the clinical advisory center were accompanied throughout their workday and/or interviewed about their work practices and the different tools they used in for everyday work.

Analysis

After transcription of the field notes and interviews, the aggregated and anonymized data were analyzed in a two-step process: (1) categorizing (i.e. assigning) of the data into interprofessional communication spaces, pathways, and tools – both physical and digital (Rashotte, et al., 2016), (2) iterative coding of the ethnographic data inspired by grounded theory. This allowed for a focused coding process while retaining a connection to the categories identified as relevant for interprofessional communication spaces. Triangulation was done for both observations and interviews of the participants and across professional functions.

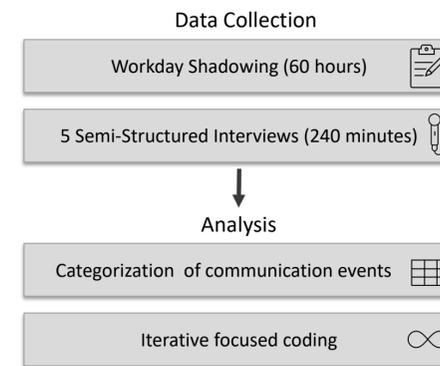


Figure 2. Ethnographic Study Design

RESULTS

Figure 3 illustrates how members of the advisory center have established unofficial work practices at different levels of their organization:

- Workaround at the individual level:** Employees used Excel files to facilitate the retrieval of patient information and for quick matching of digital data with analogue patient files that could not as easily be accommodated through the official clinical information system (CIS).
- Shadow system at the process level:** A shared server structure functioned as a shadow system complementing the official CIS by providing a solution to host the Excel files that were generated as workarounds and additional functions needed to support everyday cooperative work practices between employees of the advisory center. For instance, the shared server hosted a folder to exchange Word documents between administrative personnel and physicians that were used to prepare the advisory sessions in the upcoming days.
- Boundary infrastructure at the system level:** The boundary infrastructure comprising all (in)formal, digital, and analogue infrastructures was used to facilitate information exchange between departments. Especially for documentation processes not one but the entirety of all information systems was used simultaneously by different employees to work on, exchange, and document data files. This finding highlights the essential role and interconnectedness of both formal *and* informal information systems in everyday work practices in this advisory center.

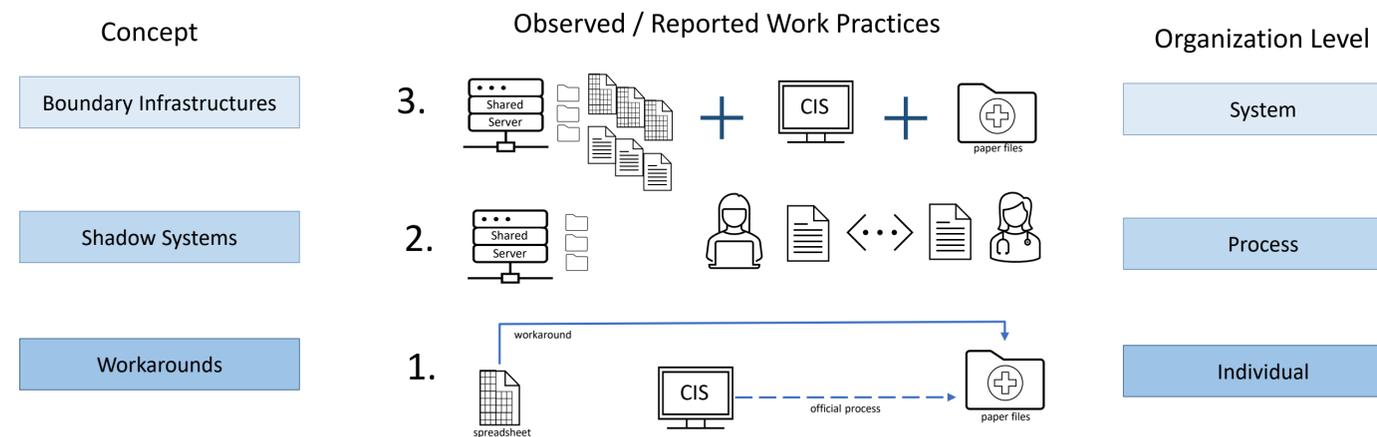


Figure 3. Relation of Work Practices to Concepts and Organization Levels

DISCUSSION

The results suggest that the boundary infrastructures supporting effective cooperation across the advisory center are based on the *interplay* between the clinic's official information system, digital artefacts (files and folders) on a shared server structure, analogue paper files, and a set of workarounds that individuals use to get their work done.

The observed practices highlight the *substantial system-level enhancements* to the official clinical information system required to satisfy the information needs for cooperation. The multidirectional use of digital artifacts on the shared server (the shadow system) highlights process-related requirements that cannot be met by the official clinical information system and the various workarounds illustrate the need for support of work at the individual level.

Thus, the three concepts (workarounds, shadow systems, boundary infrastructures) provide important complementary perspectives on organizational functioning and help to understand cooperative work practices and related information needs, which permeate across all levels of an organization.

CONCLUSIONS

To understand cooperative work practices and identify unmet information needs in organizations, multiple conceptual perspectives are needed to allow insights into work practices both across and at each level of an organization. Specifically, our findings suggest that combining the concepts of boundary infrastructures (a system-level concept), workarounds (an individual-level concept), and shadow systems (a concept focusing on collaborative work processes) helps to widen the perspective of system analysts and provides a fuller picture of information systems requirements in computer supported cooperative work environments than any conceptual lens by itself. Whether and in what way these concepts may be successfully applied to work system analyses in other domains is subject to empirical test.

REFERENCES

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