

Simonsen, J., Hertzum, M., and Karasti, H. (2015). Supporting clinicians in infrastructuring. In *Proceedings of the Fifth International Workshop on Infrastructures for Healthcare* (Trento, IT, June 18-19), 4 pp. University of Trento, Trento, IT.

# Supporting Clinicians in Infrastructuring

Jesper Simonsen  
Roskilde University  
Denmark  
*simonsen@ruc.dk*

Morten Hertzum  
University of Copenhagen  
Denmark  
*hertzum@acm.org*

Helena Karasti  
Luleå University of  
Technology, Sweden  
*helena.karasti@ltu.se*

**Abstract.** As part of a longitudinal research engagement with a Danish hospital, we currently investigate how the clinical staff incorporates into their practices electronic whiteboards (eWB) that have the potential to coordinate patient transfers between departments within the hospital. Drawing from the notion of infrastructuring, we carry out an infrastructural analysis of eWBs and approach our joint efforts as unfolding and continuing the configuration of participatory design activities. We identify a need for local support and novel competences among the clinicians in order for them to engage in infrastructuring, especially when it concerns interdepartmental coordination.

## Introduction

This paper focuses on the infrastructuring by clinical staff in relation to the introduction and enactment of eWBs at a Danish hospital where the aim is to interconnect all departments. We draw from the notion of infrastructuring as it has been explored in the participatory design tradition for both analyzing the phenomenon and doing design (Karasti, 2014). We see particular analytical relevance in the notion's situated, contextual and relational basis, emphasis on sociotechnical imbrication and attention to extended scopes and increased complexities. We see design as an ongoing configuration and unfolding design-in-use activity. In our empirical setting, we specifically investigate infrastructuring as the *activities needed, or taking place, when heterogeneous groups of clinicians strive to facilitate their cooperation by configuring, reconfiguring, developing, and establishing local protocols and standards for using the eWB as part of their joint practice.*

Based on our research collaboration with the Danish healthcare sector (Hertzum and Simonsen, 2011) we identify five organizational levels spanning a continuum from global to local, see Figure 1. New large-scale systems, such as electronic patient records (EPRs), are typically approached in a top-down manner with initial focus on the international, national, and regional levels. For example, the current implementation of the EPIC EPR (epic.com) in two of the five regions in Denmark involves an effort to reduce the number of clinical guidelines with 90% (from 50,000 to 5,000), thereby eliminating “redundant” guidelines and implementing uniform “best practices” throughout the two regions. In contrast, the introduction, configuration, and appropriation of the studied eWB have been approached bottom-up and focused on the regional, departmental and – increasingly – interdepartmental levels (Rasmussen et al., 2010; Lassen and Simonsen, 2014).

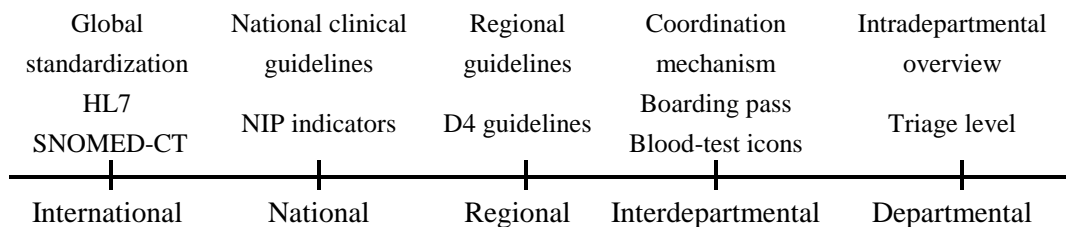


Figure 1. Organizational levels associated with the Danish healthcare sector.

Infrastructural analysis focuses on the eWB not as a ‘thing’ but a ‘relation’, more readily responding to questions of ‘when’ than ‘what’. Thus, we will follow the reach of infrastructuring within and across the organizational layers as the activities and extents to do with the eWB unfold and needs become increasingly articulated (Karasti, forthcoming).

## The Need to Support Infrastructuring Activities

We have followed the design, implementation and use of the eWB since it was introduced at two of the emergency departments in Region Zealand in 2009 (Rasmussen et al., 2010). Presently, the eWB is being introduced in all departments at all hospitals in the region. Nykøbing Falster Hospital, the site of our ongoing project, was the first hospital in Denmark replacing dry-erase whiteboards with an eWB infrastructure interconnecting all the departments. The eWB is highly configurable and has the potential to provide a shared overview of department-specific information about each patient, including patient location (room), triage level, diagnosis, attending physician/nurse, status of clinical care plan, blood test results, etc. The eWB has the potential to open for new ways of coordinating patient transfers, including a shared ‘boarding pass’ that gives the status of the preparations of a patient for operation and, thereby, shows how close the patient is to

being ready for transfer to the operating room (OR). It is, however, complicated to establish new eWB-mediated ways of interdepartmental coordination. The hospital departments are traditionally quite autonomous, each having their own culture and procedures, and there is little incentive to use the eWB in a manner that would benefit other departments (Lassen and Simonsen, 2014).

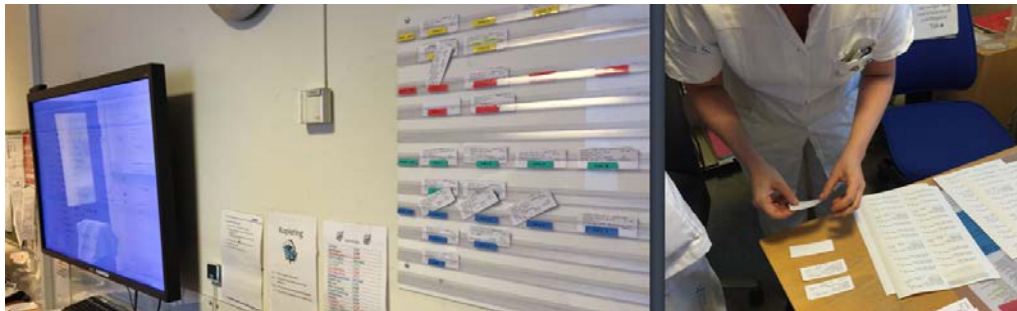


Figure 2. eWB (left), manual board (middle), arranging printed labels for the manual board (right).

Figure 2 depicts a snapshot example from a parenchymal surgical department (PSD) and illustrates their struggles with the new eWB infrastructure. The manual WB was replaced, but another manual board still remains after the introduction of the eWB. The manual board shows the sections of the department (color coded to ease orientation) and contains printed labels with the name and address of the patients occupying a room. The PSD uses the address, which indicates the distance from the patient's home to the hospital, as a criterion for prioritizing the operations. The eWB does not currently show vacant rooms (rooms with no label on the manual board), patient addresses, or color-coded sections because no one in the PSD knows how to configure it. Hence, it appears at this point that the manual board enables infrastructuring by clinicians to a larger extent than the eWB.

Patients at the PSD are transferred to and from the OR. The OR treats patients from several surgical wards as well as acute patients from the emergency department. The eWB, deployed at both PSD and OR, has the potential to support the mutual scheduling and transferring of patients between PSD and OR. This will, however, require adaptations of the eWB infrastructure. At present, knowledge in the PSD about the OR's operation schedule is obtained orally, mostly via phone calls. The OR's prioritization of the operations is visible on their eWB but not on the PSD's eWB. The PSD has no estimates of the point in time at which their patients might be operated by OR. The OR surgeons could, probably, make such estimates with reasonable accuracy but they have little incentive to make them explicit by, for example, recording them on the OR's eWB. Without explicit estimates of the operation times, the OR surgeons need not explain when the schedule is shifted due to the arrival of acute patients that must be operated immediately. This might be a favorable situation for the OR surgeons but it entails that the PSD clinicians lack information that could improve their planning.

Infrastructuring in terms of configuration of the eWB, negotiations among departments, and adaptations of interdepartmental work practices is necessary for the eWB to become successful. This infrastructuring does not simply happen; it must be supported. So far we have identified needs for: (1) general orchestration of infrastructuring activities; (2) analyses of interconnected departments' procedures and practices; (3) interdepartmental models of cooperation; (4) establishment of new cooperative procedures and terminology; (5) reconfigurations of the eWB and knowledge about how to make them; (6) communication and implementation of new practices for the use of the eWB; and (7) monitoring, evaluation, and follow-up on changes, interventions and the need for further initiatives.

## Conclusion

We have studied departmental practices to reveal associated socio-technical complexities. With our focus on interdepartmental coordination of patient transfers the scope of infrastructuring is expanded horizontally within the hospital. Some of the identified needs, such as new procedures and terminology to alleviate cooperation, will also necessitate expansion of scope in order to, for instance, align with regional, national, or even global guidelines and standards (as depicted in Figure 1). Infrastructuring as a longitudinal activity intertwined with ongoing clinical work is challenging. Our studies indicate a need for support and competence building in order for clinicians to be able to engage continuously in the infrastructuring activities necessary to make an infrastructure such as the eWB successful. We believe similar support and competences are needed to implement and evolve larger-scale infrastructures such as an EPR.

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