Electronic Health Records: What an EHR Is Not, Generating It Is

Hertzum, Morten; Simonsen, Jesper

Electronic Health Records: What an EHR Is Not, Generating It Is

Morten Hertzum, University of Copenhagen, Denmark, hertzum@hum.ku.dk

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

In writing about theory Weick (1995) shifts the focus from theory to theorizing. He writes (p. 385): "*Products of the theorizing process seldom emerge as full blown theories, which means that most of what passes for theory in organizational studies consists of approximations. […] These substitutes for theory may result from lazy theorizing in which people try to graft theory onto stark sets of data. But they may also represent interim struggles in which people intentionally inch toward stronger theories.*" In a similar vein we consider it more rewarding and productive to focus on the process of generating electronic health records (EHRs) than on a generation of EHRs, be it the current one or the next. It is our aim to facilitate clinicians in their interim struggles to generate, inch by inch, an EHR that supports them in their clinical work. This generating is about configuring the EHR and the clinical work practices for each other. We contend that it is an open-ended process, at least temporally, and that it is best performed by specifying and pursuing usage effects in an iterative manner.

It may be tempting to assume that EHRs can and should be finalized prior to their introduction into use. The advantages of such a process would include that EHR development and clinical work could be kept separate and, consequently, that EHR development would cause minimal disturbance to patient treatment. Torkilsheyggi and Hertzum (2017) find that many of the clinicians at a hospital that introduced a new system expected it to be ready for use when deployed. It was not. Rather, hospital management expected the clinicians to engage in configuring the system to derive maximum benefit from it. The clinicians expressed three reservations against receiving a system that had not been fully configured for their work practices. First, they held that configuration during use delayed the point in time at which they would start to benefit from the system. Second, they experienced uncertainty about what changes it was possible to make to the system by configuring it and what clinical activities to target with the configuration work. Third, they were not interested in spending time configuring the system at the expense of having less time for the treatment of their patients. While these reservations must be taken seriously, we argue that they also imply unrealistic expectations that make it difficult to succeed in introducing EHRs. Evidence shows that the change processes involved in benefitting from technology are continuing, emergent, gradual, improvisational, open-ended, and opportunity-based in addition to anticipated, planned, and specified (e.g., Carroll et al., 1991; Luna-Reyes et al., 2005; Orlikowski, 1996; Simonsen & Hertzum, 2008).

We propose that to benefit from EHRs, hospitals need to work systematically with configuring EHRs and work practices for each other. While this work must begin well before go-live, it also needs to continue long after go-live. Otherwise hospitals risk that the change process congeals prematurely (Tyre & Orlikowski, 1994) and that the EHR yields less benefit than it could have (Ashurst et al., 2008). The possibilities for adapting EHRs and work practices to each other after go-live are vastly improved by the configuration facilities of advanced EHRs. We are especially interested in three topics concerning how appropriately configured EHRs and work practices may be generated:

Effects-driven IT development, which is an instrument for achieving benefit from EHRs by focusing on the effects pursued by introducing the EHR. Effects-driven IT development consists of specifying the

effects to be achieved, working to realize them, assessing whether they have been realized, and iterating if they have not or if new effects emerge (Figure 1). Using effects-driven IT development we have, for example, worked with hospital departments to make it less demanding for clinicians to maintain an overview (Hertzum & Simonsen, 2011) and to enable clinicians to spent more time with the patients (Hertzum & Simonsen, 2016). Extensive configuration facilities improves the possibilities for working with effects realization after go-live. We see this as an approach to work systematically with quality improvement during the local implementation of EHRs (Simonsen et al., 2018). By documenting the quality improvement the effects-driven approach provides evidence in support of the new way of working. As a result the new way of working is, probably, more likely to be inscribed in procedures, which is an important means of organizational development in healthcare.
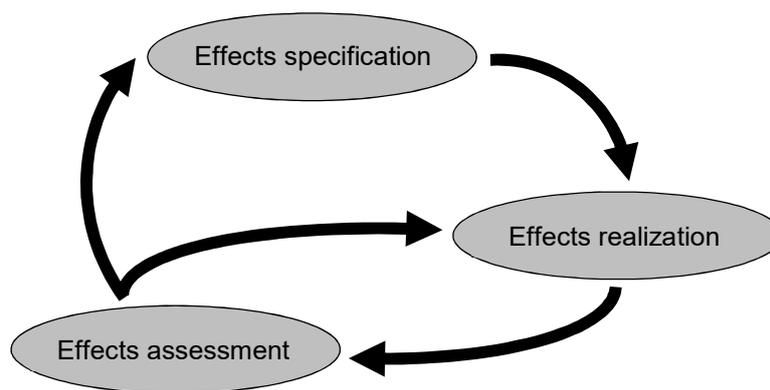

Figure 1. Effects-driven IT development (Hertzum & Simonsen, 2011).

Pilot implementation, which is about trying out new EHRs, or EHR modules, and associated work practices on a restricted scale to learn prior to full-scale implementation (Hertzum et al., 2012). Pilot implementation involves preparations in terms of planning and design, technical configuration, and organizational adaptation. These preparations are followed by a period of pilot use and result in learning about the system, its implementation, and use (Figure 2). We have, for example, worked with a hospital stroke unit to learn from the pilot implementation of an early EHR that replaced paper records and with municipal healthcare centers to learn from the pilot implementation of a new information system (Hertzum et al., 2012). Because the use of an EHR in a hospital department depends in numerous ways on its use in the other departments of the hospital, the core EHR system will normally be rolled out across the entire hospital at once. Thus, most pilot implementations of EHRs will concern EHR modules or reconfigurations of selected EHR facilities. These pilot implementations generate local learning about the modules/reconfigurations and associated work practices and will, thereby, benefit subsequent hospital-wide implementation. We want to know more about how pilot implementations may support hospitals in using EHRs to transform healthcare and under what conditions pilot implementations are a useful tool.

Local competences, which is about cataloging the competences that are needed locally to configure EHRs and work practices for reach other. Before EHRs became configurable their technical design was the realm of software engineers, who had the competences to work with the technology. With the introduction of configurable EHRs technical design is increasingly completed by clinicians after the EHR has gone live. Thus, the clinicians configure the EHR as well as adapt their ways of working in response to the EHR. Doing this requires competences that the clinicians may possess or need to acquire (Simonsen et al., 2015). We are interested in ascertaining which competences the hospitals need locally to be able to use their new EHRs to transform healthcare.
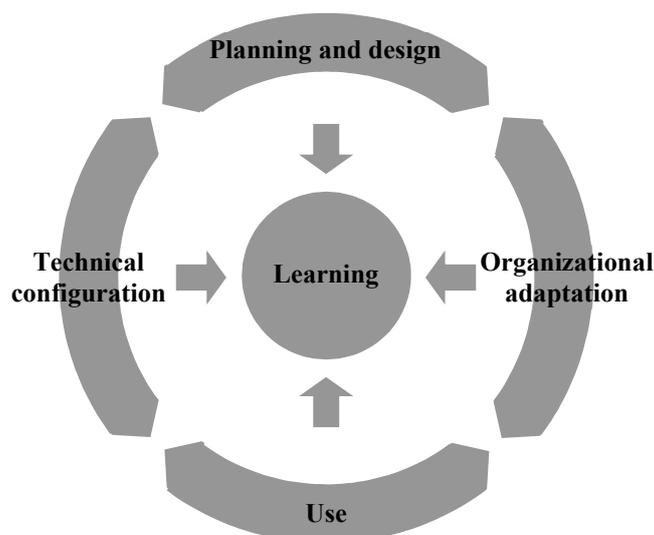
Figure 2. The elements of a pilot implementation (Hertzum et al., 2012).

We are currently working to establish projects with Bispebjerg Hospital and Nykøbing Falster Hospital about their implementation and use of the Epic EHR, *Sundhedsplatformen*. At Bispebjerg Hospital, Sundhedsplatformen was introduced in May 2017 and the Abdominal Center is inclined to take an effects-driven approach to achieving benefit from its facility for early warning scores. Iterative experimentation is needed to arrive at safe, efficient, and appreciated practices for setting and responding to early warnings. These experiments could take the form of pilot implementations to reduce the risks and inconveniences of receiving too few or too many warnings during the period of calibrating the early warning scores. Nykøbing Falster Hospital introduced Sundhedsplatformen in November 2017 and is interested in working with us to utilize its facilities for interdepartmental communication to make it safer for patients to be transferred from the intensive care unit to a general ward. The desired effect is to reduce the number of preventable deaths occurring within the first 24 hours of this transfer. This project requires local competences in, for example, building new Epic templates for interdepartmental communication.

References

Ashurst, C., Doherty, N. F., and Peppard, J. (2008). Improving the impact of IT development projects: The benefits realization capability model. *European Journal of Information Systems, 17*(4), 352-370.

Carroll, J. M., Kellogg, W. A., and Rosson, M. B. (1991). The task-artifact cycle. In J. M. Carroll (Ed.), *Designing Interaction: Psychology at the Human-Computer Interface* (pp. 74-102). Cambridge, UK: Cambridge University Press.

Hertzum, M., Bansler, J. P., Havn, E., and Simonsen, J. (2012). Pilot implementation: Learning from field tests in IS development. *Communications of the Association for Information Systems, 30*(1), 313-328.

Hertzum, M., and Simonsen, J. (2011). Effects-driven IT development: Specifying, realizing, and assessing usage effects. *Scandinavian Journal of Information Systems, 23*(1), 3-28.

Hertzum, M., and Simonsen, J. (2016). Effects of electronic emergency-department whiteboards on clinicians' time distribution and mental workload. *Health Informatics Journal, 22*(1), 3-20.

Luna-Reyes, L. F., Zhang, J., Gil-Garcia, J. R., and Cresswell, A. M. (2005). Information systems development as emergent socio-technical change: A practice approach. *European Journal of Information Systems, 14*(1), 93-105.

Orlikowski, W. J. (1996). Improvising organizational transformation over time: A situated change perspective. *Information Systems Research, 7*(1), 63-92.

Simonsen, J., and Hertzum, M. (2008). Participative design and the challenges of large-scale systems: Extending the iterative PD approach. In J. Simonsen, T. Robertson and D. Hakken (Eds.), *PDC2008: Proceedings of the Tenth Anniversary Conference on Participatory Design* (pp. 1-10). New York: ACM Press.

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: University of Trento.

Simonsen, J., Hertzum, M., and Scheuer, J. D. (2018). Quality development in healthcare: Participation vs. accreditation. *Nordic Journal of Working Life Studies, in press*.

Torkilsheyggi, A., and Hertzum, M. (2017). Incomplete by design: A study of a design-in-use approach to systems implementation. *Scandinavian Journal of Information Systems, 29*(2), article 2.

Tyre, M. J., and Orlikowski, W. J. (1994). Windows of opportunity: Temporal patterns of technological adaptation in organizations. *Organization Science, 5*(1), 98-118.

Weick, K. E. (1995). What theory is not, theorizing is. *Administrative Science Quarterly, 40*(3), 385-390.