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Incorporating User Participation in EHR Procurement: Pilot Implementation Before Vendor Selection

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Introduction

Information systems are increasingly procured rather than made. This shift is premised on the presence of configurable standard systems that meet the generic needs of many customers and can be customized to the specific needs of individual customers through a process of configuration (Bansler & Havn, 1994; Pollock et al., 2007). Configuration is preferable to development from the ground up because it is cheaper, faster, and less prone to error, but it also implies that fundamental design decisions are inherent in the standard system and cannot be changed through configuration. Thereby, multiple design decisions are no longer made during the design process that used to precede development for the customer but, instead, during vendor selection. For that reason, it becomes important to ask: *How can user participation in vendor selection be organized to enable users to contribute effectively to the procurement process?*

This paper argues the position that the shift from development to procurement is an opportunity for basing procurement decisions on pilot implementations. Following Hertzum et al. (2012), a pilot implementation is *"a field test of a properly engineered, yet unfinished system in its intended environment, using real data, and aiming – through real-use experience – to explore the value of the system, improve or assess its design, and reduce implementation risk."* The pilot implementation described in this paper involved that a single hospital unit used a vendor's electronic health record (EHR) for five days as part of the tender and bid process. During these five days, the hospital gained experience with the EHR by using it for real clinical work and by collecting evaluation data.

Background

Most work on participatory design (Hertzum & Bossen, 2024), user-centered design (Larusdottir et al., 2023), and other approaches to human-computer interaction (Hornbæk et al., 2025) bypass procurement in favor of a focus on user participation in open-ended design activities. In contrast, procurement is a more regulated process, especially for large systems.

The procurement of an EHR is a large investment that warrants care and clear criteria. Typically, EHR vendors are invited to submit tenders, which are competitively assessed through an elaborate scoring process. Priestman et al. (2019) describe a UK case in which more than 3400 items were individually scored on a 0-6 scale. These scores, made by clinicians and other prospective users, were compared with the vendors' self-scoring. For 80 (2%) of the items, the user and vendor scores differed by at least two scale points and

required extensive clarification during the subsequent dialogue with the vendor. Despite the resource-extensive scoring exercise, Priestman et al. (2019) find that it *"provided relatively poor distinction between suppliers"*. A reason for the poor distinction was that the basis for the scoring was the vendor's specification (the tender). Because all vendors could provide rather similar functionality, their specifications did not clearly distinguish among vendors and, thereby, provided a suboptimal basis for the scoring exercise. The scoring exercise did, however, foster deep understanding in the hospital trust of what it needed from an EHR and helped create a committed team with a mix of clinical, operational, and support backgrounds (Priestman et al., 2019).

Usability tests have been introduced in EHR procurement as a supplement to specification scoring because they provide insight into what users can in practice do with the EHR as opposed to what its specification stipulates that it can in principle be used for. Tyllinen et al. (2019) report from a Finnish case in which two competing EHRs were usability tested during the procurement process. The same 18 users tested both EHRs on typical and important tasks. The users, who were experienced physicians and nurses, worked in pairs and were instructed to switch the person operating the keyboard and mouse halfway through the test of each EHR. Each test session lasted at most 90 minutes and comprised 45 tasks grouped into 3 scenarios (ordering/managing medication, medication administration, and scheduling appointments). While these scenarios merely covered a subset of the full EHR functionality, the test revealed consistent differences among the two EHRs. One of them performed better on all five test metrics: successful task completion, errors, perceived learnability, satisfaction, and overall usability. On this basis, Tyllinen et al. (2019) conclude that the difference in usability between the two EHRs could be revealed even with fewer metrics, thereby saving evaluation resources.

Despite user participation in specification scoring and usability testing, the implementation of EHRs is often troubled and fraught with frustration (e.g., Ebad, 2020; Hertzum et al., 2022; Sæthre et al., 2025). For example, the Finnish procurement process described above resulted in the procurement and implementation of an EHR that was subsequently experienced as helping to improve the quality of care by only 9% of physicians and 26% of nurses (Hertzum et al., 2022).

Case

In 2005, the clinical process module of CSC Scandihealth's EHR was pilot implemented at the stroke unit of Roskilde Hospital, Denmark (see, Hertzum & Simonsen, 2008). The pilot implementation was part of the activities in the vendor's bid for the contract of delivering its EHR to all hospitals in Region Zealand. In preparation for the pilot implementation, the EHR was configured for the stroke unit. These preparations involved workshops with clinicians to determine the patient information they needed access to, technical configuration of the EHR to display this information, and additional workshops with clinicians to finetune the EHR displays. To give a realistic impression of performance, records for 300,000 patients were also migrated to the EHR before its pilot use. The preparations spanned a five-month period and culminated in using the EHR for five days, 24 hours a day. During these five days, the EHR was available on all computers in the stroke unit and replaced all previous records, which at the time were paper records. To simulate the full implementation of the EHR across the entire hospital, a back office was established and staffed around the clock by the vendor. Record entries that involved

paper transactions with other hospital wards were simulated by having the back office continuously monitor the EHR, identify such entries, mail them in the conventional fashion, wait for the results, and immediately type them into the EHR. This Wizard-of-Oz process meant that the clinicians at the stroke unit experienced the EHR as if all transactions were fully digitalized.

To learn about planned changes, the pilot implementation involved measurements of the difference between the prior use of paper records and the pilot use of the EHR. Baseline measurements of the use of paper records were performed while the EHR was being prepared for pilot use, and similar measurements were performed during pilot use. The measurements focused on three clinical activities: team conferences (conducted every morning on weekdays and involving that physicians, nurses, and therapists walked through the admitted patients), ward rounds (conducted after the team conference by the chief physician to assess each patient), and nursing handovers (conducted at the start of every nursing shift to hand over information from the nurses on the past shift to those on the new shift). The EHR had positive effects on all three activities. Most notably, mental workload (measured by the NASA task load index) tended to decrease during team conferences and ward rounds.

In addition to the planned changes, some changes emerged spontaneously because the clinicians' work practices changed as a result of possibilities afforded by the EHR. These changes were captured through observation and interviews. For example, the nurses engaged in collective reading at their handovers, during which the EHR screen was shown on a projector and, thereby, visible to all handover attendees. The electronic records were inspected by the group of nurses, who collectively interpreted the status and condition of the patients, guided by the nurse team leader. The team leader navigated the EHR and read selected passages aloud to draw attention to them and set a shared flow in their reading. This collective reading was an unanticipated change in the nurses' work practice and experienced as positive. With paper records, the nursing handovers had proceeded as an oral report given by the nurse team leader, who scanned each patient's record and read key information out loud; patient records had seldom been seen by nurses other than the team leader.

Conclusion

The shift from development to procurement makes pilot implementation a feasible means of user participation in the procurement of information systems. Contrary to specification scoring and usability testing, pilot implementations let users experience the tested system in its intended environment and for doing real work. As the studied case illustrates, this realworldness provides a strong basis for assessing the system and its fit to the organization. In addition, the preparations for a pilot implementation are an opportunity to become acquainted with the vendor's technical staff and get a sense of how easy, or difficult, it is to configure their system. The case also illustrates that the pilot implementation consumed more resources than a usability test would have consumed. However, the cost of pilot implementations remains a small fraction of the contract for systems the size of EHRs. It may be a larger issue in the contract-negotiation process that pilot implementations reveal the identity of the competing vendors.

References

Bansler, J. P., & Havn, E. C. (1994). Information systems development with generic systems. In *ECIS1994: Proceedings of the Second European Conference on Information Systems* (pp. 707–715). Nijenrode University Press.

Ebad, S. A. (2020). Healthcare software design and implementation—A project failure case. *Software - Practice and Experience*, *50*(7), 1258–1276. https://doi.org/10.1002/spe.2807

Hertzum, M., Bansler, J. P., Havn, E., & Simonsen, J. (2012). Pilot implementation: Learning from field tests in IS development. *Communications of the Association for Information Systems*, *30*(1), 313–328. https://doi.org/10.17705/1CAIS.03020

Hertzum, M., & Bossen, C. (2024). Participatory design. In C. Stephanidis & G. Salvendy (Eds.), *Human-Computer Interaction: User Experience Methods and Tools* (pp. 246–265). CRC. https://doi.org/10.1201/9781003495161-10

Hertzum, M., Ellingsen, G., & Cajander, Å. (2022). Implementing large-scale electronic health records: Experiences from implementations of Epic in Denmark and Finland. *International Journal of Medical Informatics*, *167*, article 104868. https://doi.org/10.1016/j.ijmedinf.2022.104868

Hertzum, M., & Simonsen, J. (2008). Positive effects of electronic patient records on three clinical activities. *International Journal of Medical Informatics*, *77*(12), 809–817. https://doi.org/10.1016/j.ijmedinf.2008.03.006

Hornbæk, K., Kristensson, P. O., & Oulasvirta, A. (2025). *Introduction to human-computer interaction*. Oxford University Press. https://doi.org/10.1093/oso/9780192864543.001.0001

Larusdottir, M., Cajander, Å., & Roto, V. (2023). User-centered design approaches and software development processes. In J. Vanderdonckt, P. Palanque, & M. Winckler (Eds.), *Handbook of Human Computer Interaction* (pp. 1–24). Springer. https://doi.org/10.1007/978-3-319-27648-9_104-1

Pollock, N., Williams, R., & D'Adderio, L. (2007). Global software and its provenance: Generification work in the production of organizational software packages. *Social Studies of Science*, *37*(2), 254–280. https://doi.org/10.1177/0306312706066022

Priestman, W., Collins, R., Vigne, H., Sridharan, S., Seamer, L., Bowen, D., & Sebire, N. J. (2019). Lessons learned from a comprehensive electronic patient record procurement process—implications for healthcare organisations. *BMJ Health & Care Informatics*, *26*(1), e000020. https://doi.org/10.1136/bmjhci-2019-000020

Sæthre, E., Ose, S. O., Krokstad, S., & Gismervik, S. Ø. (2025). "Terrible stuff. We've been had": Hospital staff reactions to a new electronic health record and implications for employee well-being – A qualitative study. *International Journal of Medical Informatics*, *204*, article 106039. https://doi.org/10.1016/j.ijmedinf.2025.106039

Tyllinen, M., Kaipio, J., & Lääveri, T. (2019). Usability analysis of contending electronic health record systems. In *Proceedings of the ITCH2019 Conference on Information Technology and Communications in Health* (pp. 430–435). IOS Press. https://doi.org/10.3233/978-1-61499-951-5-430