Chapter 6
WOAD:
A Framework to Enable the End-User Development of Coordination-Oriented Functionalities

Federico Cabitza
Università degli Studi di Milano-Bicocca, Italy

Carla Simone
Università degli Studi di Milano-Bicocca, Italy

ABSTRACT
In this article, we present WOAD, a framework that was inspired and partly validated within a 2-year observational case study at a major teaching hospital. We present the WOAD framework by stating its main and motivating rationales, outlining its high-level architecture and then introducing its denotational language, LWOAD. We propose LWOAD to support users of an electronic document system in declaratively expressing, specifying and implementing content- and event-based mechanisms that fulfill coordinative requirements and make users aware of relevant conditions. Our focus addresses (a) the user-friendly and yet formal expression of local coordinative practices based on the work context; (b) the promotion of awareness of both these conventions and the context to enable actors to quickly respond; (c) the full deployment of coordination-oriented and context-aware functionalities into legacy electronic document systems. We give examples of LWOAD mechanisms taken from the case study and discuss their impact from the EUD perspective.

THE NEED FOR EUD IN DIGITIZING DOCUMENT-MEDIATED COOPERATIVE WORK
The fact that documents are ubiquitous means to support work activities is well known. Their initially undifferentiated role has been more recently investigated and articulated to understand why documents, which are so natural and widespread, still create problems when they are transformed into digitized counterparts, not only when electronic documents are used as stand-alone artifacts but, above all, when they are parts and components of an electronic document system (Braa & Sandahl, 2000; Sellen & Harper, 2003). Therefore, they mediate collaboration between
actors. The solution to this paradox calls for stronger involvement of users in the definition and maintenance of functionalities that support them in accomplishing their duties and coordinating their actions. These functionalities closely relate to how users read and write their paper-based artifacts and to the often implicit conventions that regard the use and interpretation of documents. A very inspiring domain in which to motivate this claim and highlight requirements for a EUD-based solution is the health-care domain. In this domain, investment policies in ICT are usually focused on what are called secondary purposes, that is, rationalizing care provision for cost savings and standardizing reporting to enable clinical research and business intelligence. This leads to the design of Electronic Patient Records (EPR) where document structures and functionalities are aimed at supporting information inscription and use according to data quality and usability criteria (Cabitza & Simone, 2006), which tend to neglect (or heavily overlook) the primary purposes (Berg & Goorman, 1999) of doctors and nurses: namely keeping track of the patient’s illness trajectory, supporting discussion on clinical cases, information exchange in shift hand-over, order handling and care reporting for accountability issues. The additional effort of articulation work on the clinical record is then usually left to practitioners; often as well as the burden of reconfiguring their coordinative practices once their habitual paper-based artifacts have been digitized (Winthereik & Vikkelso, 2005).

In this context, document templates and masks are usually imposed on practitioners from above, irrespectively of their coordinative needs. Even in the best case where documents are cooperatively and participatorily defined, they tend to be given to actors just once, which would neglect the frequent tuning activities and adjustments that coordinative mechanisms require for their negotiated and participated nature (Divitini & Simone, 2000; Schmidt & Simone, 1996).

Our observational studies in two wards of a large provincial hospital in Northern Italy confirmed other reports from the CSCW literature (e.g., Berg, 1999; Fitzpatrick, 2004; Heath & Lu, 1996) on how practitioners try to reconcile primary and secondary purposes on the artifacts of daily use to make them useful both to store and retrieve information but also to support mutual learning, knowledge sharing and coordination of caring activities. To this aim, actors define, renegotiate and evolve ad-hoc practices, peculiar conventions, and agreed interpretations that are local and unique to their work settings.

Our research question is then how to facilitate this local management in a sustainable way. The paper aims to give a contribution in this direction by presenting a design-oriented framework that has been deeply influenced and partially validated in our field study in the above mentioned hospital (Cabitza & Simone, 2007). In fact, the development of the framework has been intertwined with the incremental analysis of the setting and with its validation. This trajectory is not completed but currently covers the main part of the research path: namely, i) understanding the kind of functionalities users need to take full advantage of their documental systems; ii) identifying a way to express the functionalities in a compositional, incremental and flexible manner; iii) defining an architecture where the functionalities can then be implemented, validated and, above all, maintained and kept aligned with the ever-changing needs and conventions of a community of users.

The next sections describe two main components of the framework—the architecture and language—and illustrates the field study and the rich real-life conventions on which we tested the framework. Then, Section 5 discusses the main findings of the case study, Section 6 illustrates the visual prototype we used as a proof-of-concept of the findings related to mechanism specification, and finally Section 7 sums things up and sheds light on current and future directions of our research in the EUD field (Liebermann, Paternó, & Wulf, 2006a).
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