Mining Usability Information from Log Files: A Multi-Pronged Approach

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This position paper has been prepared for a workshop concerned with issues and experiences surrounding logged data for on-line communities. We briefly describe relevant elements of a field study conducted at the National Institute of Standards and Technologies (NIST) of a group of welding engineers using a collaborative system. These elements include: a description of the work group and their on-line environment, a characterization of their work processes, and a short description of the collected data. Additionally, we present our experiences and issues encountered during the analysis of our data in the context of a categorization of techniques for analysis of sequential data.

The work group was comprised of five principal participants, who were not all co-located. Their on-line environment was a shared, rooms-based, collaborative system with a WYSIWIS (what you see is what I see) whiteboard backdrop. Data organization within rooms is configurable by its occupants in how they organize various tools housing their data, documents, and graphics. The system provides for synchronous and asynchronous user interactions, but importantly these interactions are in the context of relevant data.

The work processes in this experiment were characterized by several full group meetings (for planning and coordination), interspered with periods of individual activity (asychronous work), and smaller coordination meetings of two or three team members around the "hand-off" of output from a task used as input for another task.

The native version of the collaborative system produces a server-based log-file that contains information deemed too rudimentary for capturing the types of data needed for usability analysis. A negotiation ensued between the software vendor and the analysts regarding additional instrumentation of the collaborative system. Issues surfaced during the negotiation that are pertinent to the workshop focus. For example, since logging at a fine granularity could impact system performance adversely, the vendor strongly recommended logging at a courser granularity than the analysts wanted. There were also issues with providing enough information in each log entry to make the individual entries abstractable into something meaningful and being able to reasonably log a similar level of granularity for each of a wide variety of tools within the application. The result was a supplemental log file that contained many compromises, but more data than was provided in the base server log. The information collected in the server logs was supplemented by questionnaire and interview data.

We found two kinds of issues emerging during our data analysis: data issues and analysis-technique issues. The data issues centered around granularity and not knowing what to log before the analysis started. Before starting the experiment, we expected to use exploratory data analysis to zero in on interesting user interactions and behaviors. This strategy worked fairly well. However, during the analysis phase, we found that there were some interesting tracks of investigation that could not be fully explored because of insufficient data granularities logged to support deep levels of investigation. The analysis-technique issues centered around being able to abstract the logged data to meaningful levels, putting the data in context (with the users' goals and experiences), and matching the logged data (and its abstractions) to qualitative evaluation data (e.g., user satisfaction questionnaire data).

The log data captured during the field study is sequential, as it is ordered by time. We believe this ordering is important to preserve during analysis. For example, one interesting question to explore during analysis is how did use of the system change over the course of the study? Therefore, we present our experiences and

issues encountered during the analysis of our data in the context of a categorization of techniques for analysis of sequential data.