

## Conclusion

We have described a framework for naming in computer systems based on the Principles of Contrast and Conventionality. We argue that the goodness of names cannot be evaluated by examining properties of the names as freestanding lexical entities, but only by determining how names are interpreted by system users. We have proposed three ways in which names can be good: (1) When they adhere to Contrast and Conventionality—by affiliating conventional meanings with conventional names or by affiliating new meanings with new names; (2) When they are general, i.e., are conventional for as many users as possible; and (3) when they have unique meanings for the set of situations in which they are employed.

We presented two individual naming decisions that were analyzed according to these guidelines. To determine what was conventional, we recorded the work language of users and developers while they were focusing on local tasks and when they were explaining their work, and we supplemented these with ethnographic field notes that described the situations in which the conversations occurred. We analyzed this data collaboratively to make convincing assignments between meanings and names. To determine what was general, we compared the conventional language of different users and developers in the study. To determine uniqueness, we looked for counterexamples (i.e., situations in which we could demonstrate that a name was being used to convey more than one meaning).

We would like to explore whether the guidelines we developed could be recast in a more productive way or whether there are other guidelines that could further limit and thus simplify the task of choosing names. Also, this study offers no guidance about how new names for new meanings should be generated. We suspect there are pragmatic guidelines that could aid in devising names that suggest their intended meaning to users yet still maintain the important property of contrasting with names that have *relevant* conventional meanings.

## Work-Oriented Design at Xerox

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**F**or over 10 years, a network of researchers and product designers at Xerox Corporation have been exploring the relevance of work practice studies and applications codesigned for product development. Our network comprises a small, heterogeneous and geographically dispersed community within the company. Together, we draw expertise from the fields of anthropology, sociology, computer science, human factors, graphics design, psychology and industrial design.

Our collaboration crosses organizational boundaries from Xerox's research center to its product development teams. Our studies of work practice involve on-site interviewing combined with video recording and analysis of everyday work activities. Our codesign efforts are aimed at developing advanced applications for new technologies in collaboration with their intended users. Together, these activities are aimed at a more work-oriented approach to systems design within the company.

Our strategy throughout the years has been to engage in a range of activities from basic research to product development, working to build more productive interactions between the two areas. In our research, we are looking for new ways of getting access to the details of everyday work practices in multiactivity, technology-intensive work settings. In our development efforts, our projects come out of specific product programs. The sites of our studies range from administrative offices to law offices, libraries, bookstores, an industrial manufacturing firm and a metropolitan airport. The products involved include new technologies for image processing, for text-based retrieval, for document creation, scanning, storage and access, and for on-demand publishing.

For example, the work-oriented design approach is being used in the refinement of new image processing technologies designed to bridge between paper and electronic information domains. At an industrial manufacturing site we are developing a detailed understanding of how order forms are annotated with highlighting, color, and text.

These annotations are made by multi-

ple individuals attempting to coordinate activities that cross organizational boundaries and are distributed in time and space. This understanding is helping shape the functionality of the image processing technologies. By providing developers with visual representations of how the work of processing orders is supported by the annotations, and by viewing videotapes of the people engaged in the work, we are exploring with developers and work practitioners how computationally active marks on paper might support this work.

We also are examining how new text database retrieval technologies might be designed to help attorneys at a law firm locate documents from a forms file of model documents. These model documents are used as starting points in the creation of new documents.

Based on our understanding of how the form file is currently used, we are building a prototype application that relies on the existing text-based retrieval software but is customized for this particular activity. In design sessions with the attorneys, we are exploring the utility of the prototype application by allowing them to search for documents from their forms file that have been scanned into an electronic database. In this way we are able to look for requirements on electronic document databases, the value added by on-line access, and the resources lost without the paper medium.

Across these projects, we are concerned with the following problems:

- finding general lessons for product design in site-specific investigations;
- representing work practices in ways that do not reduce them to disembodied task analysis, work processes or data flow diagrams; and
- using prototypes or other provocative artifacts for cooperative design of future technologies with users.

The driving force behind our approach is the conviction that attempts to hand-off the results of field studies to product designers and developers are bound to fail. Instead, we are aiming for a situation in which we have ongoing relations with relevant work-sites, a cumulative body of knowledge about technologies-in-use in those sites, new ways of representing what we learn, and new ways of conveying those lessons to others not directly involved in our studies and projects. The long-term goal is a new source for innovation within Xerox—an imagining of what could be based on a knowledge of what is. **E**

These are some of the many naming issues we would like to examine in future work.

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