End User Development
and Meta-Design:
Foundations for Cultures of Participation

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ABSTRACT

The first decade of the World Wide Web predominantly enforced a clear separation between designers and consumers. New technological developments, such as the participatory Web 2.0 architectures, have emerged to support social computing. These developments are the foundations for a fundamental shift from consumer cultures (specialized in producing finished goods) to cultures of participation (in which all people can participate actively in personally meaningful activities). End-user development and meta-design provide foundations for this fundamental transformation. They explore and support new approaches for the design, adoption, appropriation, adaptation, evolution, and sharing of artifacts by all participating stakeholders. They take into account that cultures of participation are not dictated by technology alone: they are the result of incremental shifts in human behavior and social organizations. The design, development, and assessment of five particular applications that contributed to the development of our theoretical framework are described and discussed.

Keywords: Application Domains, Creativity, End-User Development, Knowledge-Based Software, Meta-Design, Very High-Level Languages

INTRODUCTION

Cultures are defined in part by their media and their tools for thinking, working, learning, and collaborating (McLuhan, 1964). In the past, the design of most media emphasized a clear distinction between producers and consumers (Benkler, 2006). Television is the medium that most obviously exhibits this orientation (Postman, 1985) and in the worst case contributes to the degeneration of humans into “couch potatoes” (Fischer, 2002) for whom remote controls are the most important instruments of their cognitive activities. In a similar manner, our current educational institutions often treat learners as con-
sumers, fostering a mindset in students of “consumerism” (Illich, 1971) rather than “ownership of problems” for the rest of their lives (Bruner, 1996). As a result, learners, workers, and citizens often feel left out of decisions made by teachers, managers, and policymakers, denying them opportunities in taking active roles in personally meaningful and important problems.

The personal computer can produce, in principle, an incredible increase in the creative autonomy of the individual. But historically these possibilities were often of interest and accessible only to a small number of “high-tech scribes.” 

*End-user development (EUD)* (Lieberman, Paterno, & Wulf, 2006) is focused on the challenge of allowing users of software systems who are not primarily interested in software per se to modify, extend, evolve, and create systems that fit their needs.

What the personal computer has done for the individual, the Internet has done for groups and communities. The first decade of the Internet use was dominated by broadcast models and thereby extended the existing strong separation of “designers” and “users” imposed by existing media. *Meta-design* (Fischer & Giaccardi, 2006) is an evolving framework to exploit computational media in support of collaboration and communication in fostering cultures of participation.

**END-USER DEVELOPMENT (EUD)**

Familiarity with software applications has become an essential requirement for professionals in a variety of complex domains: architects, doctors, engineers, biochemists, statisticians, and film directors (among many others) all depend on the mastery of various collections of applications (Eisenberg & Fischer, 1994) in their areas of expertise. These applications, to be at all useful, must provide domain professionals with complex and powerful functionality. However, in doing so, these systems likewise increase the cognitive cost of mastering the new capabilities and resources that they offer. Moreover, the users of these applications will notice that “software is not soft”—that is, that the behavior of a given application cannot be changed or meaningfully extended without substantial reprogramming effort.

The need for end-user development is not a luxury but a necessity: computational systems modeling some particular “world” are never complete; they must evolve over time because (1) the world changes and new requirements emerge; and (2) skilled domain professionals change their work practices over time—their understanding and use of a system will be very different after a month and certainly after several years. If systems cannot be modified to support new practices, users will be locked into existing patterns of use.
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