New Technology for Empowering Virtual Communities

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INTRODUCTION

In an essay entitled, *The Next Information Revolution*, Peter Drucker (1997) compared the existing business environment to conditions in the sixteenth century within the emerging publishing industry. Up until the mid 1500s, the people who controlled the industry were skilled printer craftsmen. By the end of the century, a major shift had occurred as publishers replaced craftsmen as the industry leaders. What had happened, according to Drucker, was that the focus shifted from the "T" in IT to the "I." Drawing an analogy to the present, Drucker suggested that the current information revolution will have a transformational effect on society only when new technology realizes its potential impact on the *meaning* of information.

This article describes a hybrid social software and hypermedia authoring system, referred to as *HyLighter*, which may fit Drucker's definition of transformational technology. *Social software* (also referred to as social networking software) is a broad category of Internet applications for connecting individuals and forming virtual communities using various forms of computer-mediated communication. *Hypermedia* refers to a computer environment in which multiple linkages enable users to navigate from one segment of audio, video, graphic, or textual data to another segment. HyLighter builds on the affordances of these and related technologies to extend the capacity of the document as a medium for the social construction of *meaning*. In the process, HyLighter aims to improve individual and group performance in a wide range of domains and interdisciplinary problem areas, improve the quality of instruction, and develop proficient learners (i.e., strate-

gic, self-regulated learners who know how, when, and where to apply appropriate learning activities across various content areas) (Hartman, 2001).

This article also describes an advanced adaptation of HyLighter, referred to as *Coalesce*, which is currently under development. When fully realized, Coalesce will help users merge ideas together from many sources into a unified whole that expresses a new perspective. The process identifies important ideas in multiple texts and exposes a range of views on selected points among a group of users. It also coordinates group activities in organizing and elaborating on the ideas of authors and readers toward achieving a cohesive, meaningful whole. In sum, HyLighter emphasizes responding to a document and social analysis whereas Coalese empasizes the social construction of a new document through social analysis and synthesis. Such new and emerging technologies supports a type of knowledge-building process aimed at empowering virtual communities engaged in knowledge intensive enterprises in a world awash with information.

OVERVIEW OF SOCIAL ANNOTATION PRACTICES

During the Middle Ages, scholars used the margins and spaces between lines of manuscripts to engage in dialogue with other readers. The same physical copy of a manuscript was passed around a community, and selected annotations were customarily retained when scribes made new copies (Wahlstrom & Scruton, 1997). With the arrival of the printing press and movable type in the fifteenth century, the printed word became the

primary means for the spread of ideas and ideologies. As Gutenberg's invention revolutionized the spread of information, shared or social annotation practices largely faded away. The role of *reader as co-author and member of a community engaged in a collaborative search for meaning* generally changed to a largely private activity. At the same time, annotation practices became more personal, idiosyncratic, and ubiquitous, as demonstrated by Marshall's (1998) analysis of used textbooks from a college bookstore.

With the arrival of the computer and networking technologies, the storehouse of human knowledge began to expand rapidly and move from largely printed matter toward largely text-based digital archives (e.g., Google Print, 2004), and increasingly toward multimedia digital archives (e.g., Artstor, 2004). At the same time, social annotation practices re-emerged as various forms of social annotation systems spread across the digital landscape. Today, a wide variety of tools and systems exist that allow users to annotate Web-based or other data via the Web or other Internet protocol for various purposes (e.g., the product review feature in *Amazon.com* and the seller rating feature in *ebay* are, essentially, annotation tools).

Annotation is most commonly understood as adding emphasis (e.g., underlining, highlighting, special markings) or critical or explanatory notes to a text. Within the diverse professional communities that work with information systems and resources, annotation covers a much wider territory and is a much fuzzier concept. Essentially, annotation is viewed as unstructured *metadata* (i.e., data about data), which is added after the creation or capture of the original object and, generally leaves the original object unchanged. It is unstructured in the sense that annotation, like text in general, does not conform to a predictable structure (Gilliland-Swetland, 2000; Shabajee & Reynolds, 2003).

On the most general level, social annotation systems differ in who can add annotations to objects in the system and who can read the annotations (e.g., personal use only, shared among members of a team or community of practice, or widely available for public/social purposes). Considering basic functions, social annotation systems create annotation objects (usually text-based, but can be audio or pictorial) with certain attributes, including content, author, date-time stamp, URL of the annotated information object (usually a document but, increasingly, audio, graphic, or video files) and information about placement of the annotations.

Brown and Duguid (1996) pointed out that documents not only deliver information but also build and maintain social groups. From their perspective, the document is a medium for the negotiation of meaning, and, on this basis, they have recommended developing technology to improve the means of negotiation. Technology for collaborative or social annotation appears to be the kind of technology that Brown and Duguid have advocated. In order to realize the full value of social annotation, systems are required that users can easily adapt to various contexts of use and requirements of different epistemic cultures, that is, "those amalgams of arrangements and mechanisms … which, in a given field, make up how we know what we know" (Cetina, 1999, p.1). At this time, however, what we understand about how to implement and manage social annotation systems to empower virtual communities is mostly uncharted territory.

THE HyLighter SYSTEM

HyLighter is a synthesis of hypermedia authoring, social annotation, and related applications functioning within a browser-based network. The design of HyLighter embodies certain conjectures about learning and teamwork drawn from the existing research and theory base of the learning sciences. The technology supports collaboration and coordination of group processes through unique visualization and collaboration capabilities. Although HyLighter has certain features and functions in common with other kinds of collaborative and social software (e.g., electronic communication and conferencing tools, collaborative management and writing systems, blogs, and wikis), HyLighter supports learning communities and document-centered work groups in a number of unique ways.

HyLighter has the capacity to merge annotations from multiple readers for a single document or multiple documents and represent composite displays of the *collective annotation* of a group. The system provides an array of tools for (a) structuring and managing digital conversations and other forms of asynchronous and synchronous modes of interactions within and across documents (e.g., Word, PDF, html, image files and, eventually, audio and video files) and (b) enhancing such documents by adding annotations to documents for eliciting responses from project members and linking to related text, graphic, sound, animation, or video

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