The Research Methodology Cybrarium: An Interactive Prototype

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THE RESEARCH METHODOLOGY CYBRARIUM:
AN INTERACTIVE PROTOTYPE

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With this prototype, we demonstrate a new type of knowledge infrastructure which significantly extends the capabilities of current web-based research networks and electronic journals.

A research cybrarium is an electronic space for creating, synthesizing, and disseminating research knowledge across a community. In contrast to current electronic libraries and web-based research networks, a cybrarium engages the contributor of knowledge in an active dialog in which it identifies relationships to already incorporated knowledge, provides feedback based on content, synthesizes knowledge and involves other researchers who have stakes in the subject. A cybrarium is different from current web-based journals because of its capability to synthesize knowledge in a dynamic, self-organizing way that cumulates a body of validated knowledge.

We present an interactive prototype of such a system to prove feasibility. The prototype stores knowledge in different units, not only in traditional papers but also as definitions of concepts, problems, subject areas, etc. As new knowledge is added it is compared to existing knowledge. Mechanisms exist to automatically detect relationships and procedures exist to eliminate conflicts. The structure of knowledge emerges through the contributions. It is dynamic and self-organizing. While in an electronic journal the structure is predefined — typically around different subject areas — in our prototype, the structure is a result of the contributions and their relationships; it may change with every contribution. Our cybrarium has different dimensions of knowledge (concepts, papers, subject areas, problems). There is not one predominant ordering or access criteria. While in web journals navigation is link-based, in our cybrarium prototype, navigation often involves pattern-matching searches where case-specific knowledge maps are generated at run-time (e.g., subject-areas with sub-areas, concepts and texts for specific types of knowledge). The system also differs from electronic journals in interaction behavior. While journals do not differentiate different modes of interaction, the prototype interacts with a person who wants to learn from the knowledge differently than with a reviewer who wants to validate knowledge. Not only may knowledge be represented differently, the system also draws different conclusions from the way data is retrieved by the participants in different modes. By observing interaction paths, the system may learn about perceived or missing relationships between knowledge. Furthermore, our cybrarium prototype is active. It may take initiative by notifying researchers that changes have occurred in which they are interested. It may send e-mail to other researchers, asking them to solve questions or participate in discussions.

Using an electronic version of a traditional paper, we first show how knowledge is added to the cybrarium. We demonstrate how the tool identifies overlaps with existing concepts, synthesizes knowledge and informs researchers who have stakes in the subject about the new submission and resulting changes. We then present the process of extracting knowledge from the system and show how a reader’s actions may dynamically alter the structure of knowledge. Finally, we discuss the implications of our prototype. We believe that such a tool can provide the core of a new and highly effective infrastructure for research.