

# From Content Organization to User Empowerment

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**Abstract.** If the network has become the computer, search is in the process of becoming its interface. This transformation impacts the design of future digital libraries. On the content side, innovations in contextual search are driving a new precision level compared to existing search paradigms inherited from the web. On the user side, search will have an equally profound impact. Closed loop designs connecting social computing and search is transforming libraries from a static repository to a dynamic learning and collaboration space.

**Keywords:** Search, contextual search, contextual navigation, analytics, conversational relevance, social computing, digital libraries.

## 1 Search Driven Service Architectures

Search is emerging as the orchestration framework for user-centric architectures, offering innovative functionality for re-engineering both the user experience and the data access layers that support it. In the world of the Web, the evolution from Web 1.0 toward Web 2.0 has seen a global transition from monolithic services, centralized content models and managed communities, to a new democracy of empowered users, personalized information access, and user-driven communities.

In this new ecosystem of information, evolution favors services that are “mashups” of component functionalities, resulting in complete interaction environments that are focused by user intent and customized to specific tasks or discovery goals. This Lego-model of information sources and services opens up many new opportunities for service orchestration within digital libraries. Capabilities in search driven service architectures include: the ability to connect to open components/services; the ability to track and utilize behavioral information; the ability to integrate components loosely to support “agile” development cycles; the ability to bridge information between independent sources; the ability to connect user experiences to social networks; and the infrastructure to provision these services through multiple channels as appropriate to the user.

## 2 Content Organization Based on Contextual Metadata

Contextual search developments enable searches to be restricted to structural parts of documents, such as paragraphs, sentences, patent claims, formulas or any entity of

interest. Documents are no longer a blob of information serving as the atomic retrieval unit. Hence, content organization can focus on both *global* and *contextual* metadata. Global metadata includes author, publication year, journal etc. Contextual metadata will on the other hand typically be derived by automated means producing concepts, entities and numerical quantitation. These metadata can be encoded as XML markup within the semantic context they occur in the document. Before, names of people, locations, formulas, dates, scientific concepts were blended together and effectively lost in the search index; now, they are contextually related facts waiting to be exploited. The richness of the surrounding context drives significant precision improvements for search, discovery and analytics across contextual metadata.

### 3 The User Revolution: Search Is the Portal

If the network has become the computer, search is in the process of becoming its interface. In doing so, search introduces a paradigm shift within digital libraries from content organization to user empowerment. Traditionally, both digital libraries and supporting technologies have focused on the aggregation, organization and management of information. Going forwards, innovation will increasingly focus on user centric approaches to information management. Search is fundamentally a user centric technology. The core purpose of search is to decode the information provided by content authors and *reorganize* the information in a factual and relevant way according to the users's intent and context. Hence, search is emerging as the key technology for transitioning content centric services to a user centric paradigm.

Search is no longer a small box inserted in portal frameworks. Future information portals need to capture intent and context from users in order to improve precision and user efficiency in real-time. The future information portal is driven by matching algorithms. The future information portal *is* search. Search driven portals provide an algorithmic opportunity to engage in smarter communication with users. The user experience can be dynamically shaped by joining, integrating and re-configuring data to present customized views and analytics of information from many different formats and sources.

Furthermore, closed loop designs connecting social computing and search is transforming libraries from a static repository to a dynamic learning and collaboration space. Social searching will change methods for content organization, metadata management and workflow around digital libraries.