Information products in the electronic environment: from users´ experience to information ecology

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Abstract

The paper explains the concept of information ecology. Differences between traditional library and information ecology are described. A model for the research of information ecology of the academic environment is presented. Characteristics of human information behavior in the electronic environment based on two research projects at Department of LIS in Comenius University Bratislava are presented. People prefer easy access, horizontal bouncing and less intellectual concentration in information processing. In relevance judgements non-linearity, flexibility, rich context, information discovery, and quest for the origin of the source prevail. Other features of a new model of relevance in the electronic environment are depicted in a concept map as a result of our research project. Information products in the electronic environment are determined as a means of information transformations including interactions, dynamism, sharing, personalization. New networked architectures lead to new genres of information products based on user-generated content (weblogs, wikis, folksonomies). In conclusion information ecology of information products in the electronic environment is suggested based on networking, dynamics, object re-use, visualization, and value-added services.

Introduction

Human information behavior in the electronic environment is studied in information science since 1990s. Simply put it refers to how individuals handle information. It is marked by easy access, quick online reading, and social networking. In human information behavior we can see integration between library traditions and modernity of the electronic information world. With respect to information products two questions arise. *How should information science and practice of libraries respond to new information products in the electronic environment? Is information ecology a productive concept for information products?* We suppose that users´ experiences in the electronic environment and collaborative information use make an impact on information products and services.

In this paper we would like to point to the concept of information ecology that could integrate users´ behavior patterns and emerging products in the electronic environment. We will briefly outline differences between traditional library paradigm and information ecology. A model for research of the information ecology in the academic information environment will be explained.

Results of two research projects of the Department of LIS, Comenius University Bratislava are briefly reported on. Knowledge of library users´ behavior in Slovakia and relevance judgments of doctoral students confirms changes in communication, products and services. A concept map of relevance judgments in the electronic environment visualizes features of the use of electronic resources. Based on this we will develop a new concept of information ecology for information products in the electronic environment. This concept could help understand why information products often fail and how knowledge can be made more visible and better used and re-used in different contexts.

Information ecology

The concept of information ecology emerged from information management and information behavior studies. Information ecology represents complex relationships between humans and technologies while using information in communities and organizations. Davenport and Prusak (1997) determined information ecology as making information meaningful. They explained why technology is not enough for success of information products. Another concept of information ecologies (Nardi and O´Day 1999) is based on relationships between information technologies and people in transforming information to knowledge. Information ecologies are places where people use tools and in social relations help each other in information activities. They cover procedures, goals, values of communities supported by technologies.

Based on environmental psychology an ecological constructionist model of user information behavior was developed (Nahl 2007). It integrates affective, cognitive and sensorimotoric parts of information activities. Ecological model of information seeking and use (Williamson 2005) depicts a social actor involved in settings of information needs, personal, physical, working and social contexts. Information ecology is also connected with studies of affective information behavior (Nahl, Bilal 2007). Emotions influence the use of information as well as relationships to information technologies. Information seeking and use are directed by an affective filter. Another model depicts the affective information behavior ecology (Given 2007) based on students´ information behaviors in macro- and micro-emotional contexts. Many authors call for more attention to affective dimensions of information environments.

Information ecology: a model of differences from traditional library

Our concept of information ecology is based on ideas of those authors who emphasize meaningful information activities in the information environment. We regard knowledge of information behavior of different social actors as crucial part of information ecology. Another component is formed by tools that can help clean information environment. The tools manage better knowledge organization in the electronic information environments.

Information ecology can be explained by comparison between traditional library communication and features of digital libraries or institutional repositories. Institutional repository is usually composed of digital sources based on intellectual outputs of academic institutions. It covers services, products and tools that document the intellectual and cultural life of a university or other institution (Schmitz 2008). Information products are here split into many different document forms and information objects that support education and research. It is closely connected with academic community (producers, users, designers, managers, librarians, etc.). Some authors state that a repository is represented by digital library and a publishing system (Borgman 2007). These changes influenced the concept of information product. As an example, we can mention a model of new ecological environment as compared to traditional library (fig.1). This model is based on results of two research projects on users´ behavior in Slovakia.

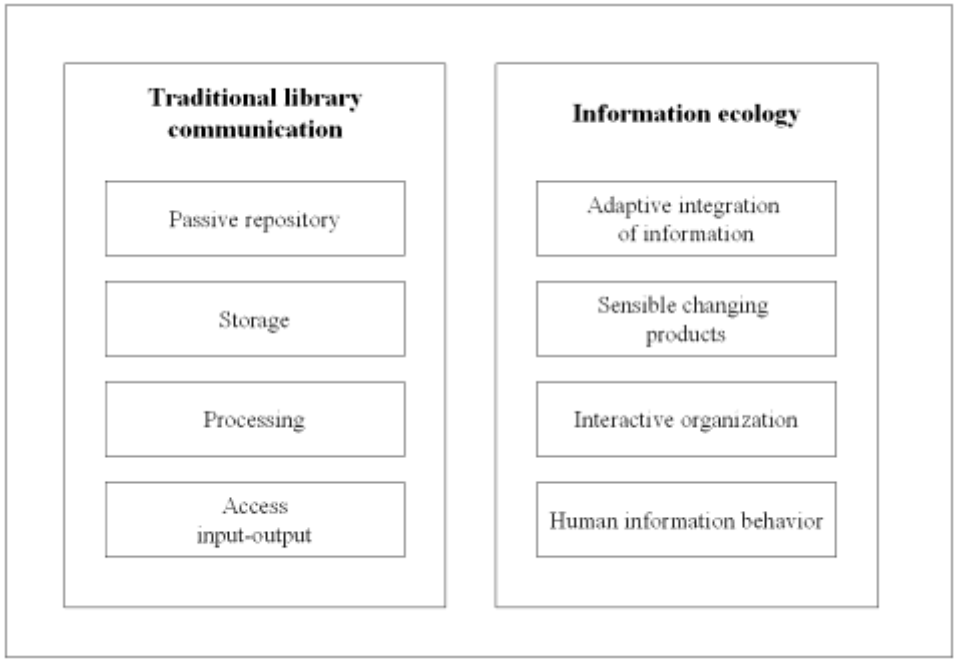

Fig.1 Comparison of traditional library communication and information ecology

As we can see the information product as part of information ecology is changing, flexible, interactive and embedded in information activities of social actors (e.g. in students´ learning, citizens´ information use, education and research of scientist and educators). The concept of information ecology of information products is derived from these results. Ecological characteristics of information environment are determined as mixture of sources, systems and services managed by a social actor.

Information ecology of the academic information environment – a model

Information ecology of information products is based on information objects reuse, interactivity and social collaboration. Ecological components come from users´ experiences and knowledge organization in a digital library or an academic repository. This situation is depicted in our model for research of information ecology (fig.2).
In the centre of the activity triangle we place the social actors (teachers, researchers, students, managers) who perform information activities and use tools for manipulating digital objects. The setting is the space of digital library and institutional repository. The model outlines two components: activities of social actors: production, registration, certification, distribution, archiving and updating, and components of digital repository (information objects, communicative activities, added value, representation, technologies). In interactions between these two components we can follow continuity and discontinuity of scholarly communication in digital environments (formal and informal communications, collaboration, quality control, information overload, knowledge production). The model can be verified by surveys of information behavior of social actors in the academic community. Pathways of students, researchers, and managers can be followed. Aspects for analysis include relevance assessment, organization of information, publishing, collaboration, information overload. In the second part we plan run experiments regarding organization of information in a sample of electronic students´ works. Comparison of several open source tools for knowledge organization (E-Prints, D-Space and C-maps) is planned. Concept maps could help transform information to knowledge in different functions of academic communication.

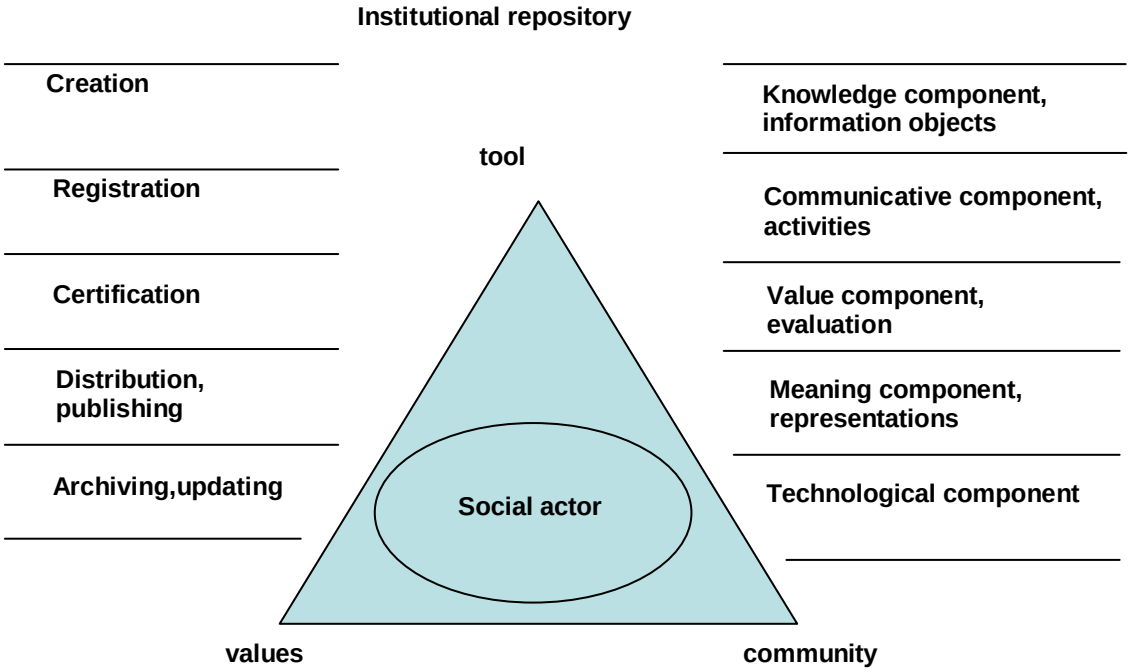

Fig. 2 Model for research of information ecology of the academic information environment

Human information behavior

Library users

Since 2002 we have studied users of information and library services in Slovakia in two research projects. We developed original concepts of surveys of academic libraries users and relevance assessments by doctoral students. Our concepts were adopted for other similar surveys of users,, reading and information literacy in Slovakia.

Results of the first project (Steinerová et al. 2004) suggest that human information behavior in the electronic environment is marked by easy access, quick online reading, visual features and social networking. With "Google generation" information processing is mainly horizontal. Interactive revolution is a driving force for innovations in information seeking in libraries. Collaboration and community-based interactions, cognitive mapping and visualizations in the electronic environment help users make sense of information. Behavior patterns prove deep changes in information use in the electronic environment. Users prefer horizontal bouncing between webpages and do not concentrate so much on intellectual information processing. We can state that people changed into creators, sharers and consumers of information, especially through information products in mobile and networked environments (Dempsey 2009). Information products and libraries "invade" into peoples´ everyday life, and into education, learning, business and social activities.

Relevance behavior

Results of the second project on information use pointed to emerging patterns of relevance in the electronic environment. Relevance behavior of doctoral students follows the preferences of flexible features, interactivity and collaborative use. Hierarchy and associations of knowledge organization support relevance judgments (Steinerová, Grešková, Šušol 2007).
A model of relevance in the networked environment builds on efficient electronic information processing, which integrates creation, seeking and use. Relevance in this environment is marked by non-linearity, flexibility of navigation, high-level visualization, and collective information processing.
As an example we can mention one concept map of this research (fig.3, relevance in the electronic environment). The map visualized essential features of relevance based on opinions of our students. It confirmed determination of relevance not only by user needs but also by technological development. The map determines differences emerging from the use of electronic resources and electronic publishing. Main activities as verification, navigation and content manipulations are described. Quest for the origin of the source is marked by scattered information, serendipity, information discovery, rich context, and non-linearity. Relevance judgments are enhanced by advanced technological features of both interfaces and search engines. Students confirmed that they used electronic sources frequently, but it is conditioned by contexts: topics, disciplines, tasks. In the electronic environment they appreciated topicality, speed, findability, multimedia, linking. They agreed that manifold mediation in electronic texts make the construction of meanings more complex.

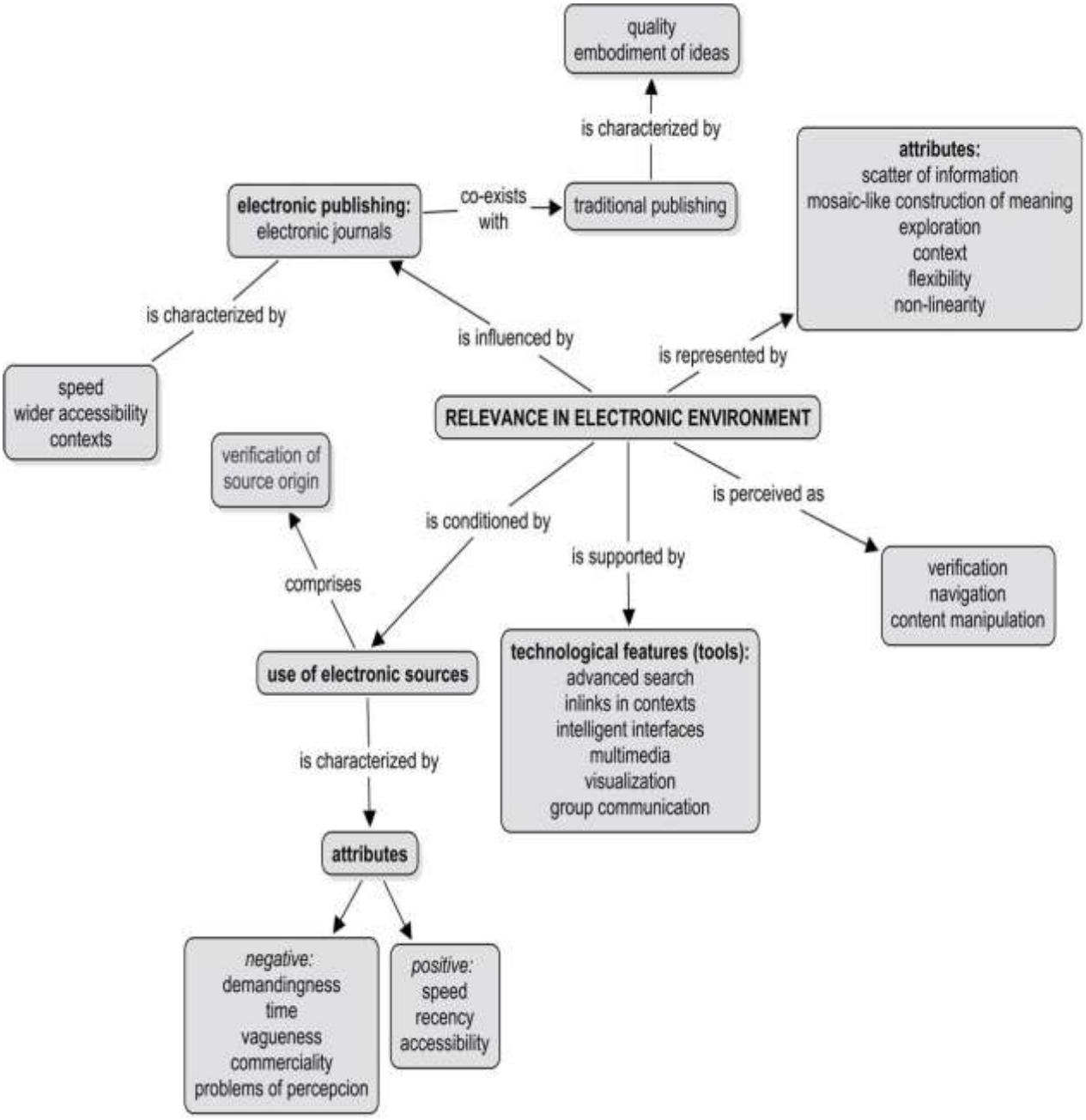

Fig.3 Concept map Relevance in the electronic environment

Information products in the electronic environment

Information products can be defined as outputs of analytical and intellectual information activities of information professionals which offer added value for specific user communities. Information products in the electronic environment are subject to challenges and changes caused by interactivity, open electronic communication and user-generated content. Information products are also means of transformation of information to knowledge. They offer to users added value based on a certain level of analysis and synthesis, interpretation, reshaping and new organization and presentation of information. In narrower sense information products serve for specific needs of users aimed at support of decision-making. Information products provide users with contexts for better understanding and use of information. Information products in the electronic environment are connected with interests of user communities and organizations. Their main functions are making knowledge visible,

facilitating exchange and communication of knowledge and representation of values and memory of organization. They often fail because they are not related to business objectives, do not follow standards, work with fragmented knowledge, lack policy and lack expertise of information professionals (Orna 2007).

New genres of information products in the electronic environment can be divided into those that imitate traditional information products (journals, books, analytical reports) and those typical for online environments (signal RSS feeds, knowledge organization tools, e-books, websites and portals, etc.). Interactive principles and social experience of users is embodied in such examples as blogs, folksonomies, social media, and digital libraries. Electronic networked information products depend on technological equipment and integrated features of hypertext and multimedia searching. Information products are also connected with electronic publishing. It can be interpreted both as advantage (speed, economic saving, archiving, global access, overcoming time and space) and disadvantage (data protection, information overload, limited user groups, proliferation of production, too much dynamics and changes in texts, copyright issues).

Users´ experience in social networking, sharing content, games and entertainment cause the increasing demand for new services and products. Information science can help figure out the most demanding characteristics and integrate them with traditional services and products.

Networked activities scale new products and services into new architectures. Separate components (digital objects) are disintegrated for storage and integrated into a mosaic in the outputs. Some applications like Google, Wikipedia or Facebook become a new paradigm for information use. Users expect new products and new media that copy known principles and offer rich functionality (e.g. "an Amazon-like model").

Many products are connected with features of games and self-directed experimenting. New communication and content services emerge quickly (e.g. Twitter, Jaiku). New business models integrate alerting, security and other information services available in mobile ways. The communication pattern is parallel (listen and watch) and leads to enrichment of one´ s own experience. Even learning and text reading is influenced by the use of music and videos.

Information products in the electronic environment can be **categorized** into simple products which transformed content into electronic media (e.g. CD), online products (imitation of traditional journal, dictionary, encyclopedia), new products (web sites, blogs, portals, digital libraries, web archives, e-books, products of e-learning), signal products (RSS feeds), and knowledge organization tools (social tagging, ontologies).

Information products in the electronic environment gained a strong business dimension. Internet Marketing definitions (2009) define information product as each product which provides information and the content is prior to physical / electronic forms. *User-generated content (UGC)* is a typical feature of new electronic information products in web 2.0. It means that content (texts, videos, photographs, and music) is created by users and customers. User-generated content can be understood in broader sense as well (as feedback in communication including e-mails, mailing lists, chatrooms). Most typical examples emerged with web 2.0 features, such as adding comments, evaluation of content. Users add value by creative use – classification, tagging, commenting, annotating, discussion. User-generated products are democratic, interactive, decentralized, shared, and open.

Blogging is one of the most spread services based on user-generated content. Weblog is a page that regularly communicates information and comments on various topics (private or professional issues). Other user-generated products are parts of wiki pages and other social software tools that support people in collaboration and document creation. Folksonomies are open classificatory systems generated by users through which they add keywords to content. They map thinking and help organize and visualize information. Information in these products can be found in various multimedia forms (from text to photographs and videos).

Information ecology and information products

Following the information ecology concept we can determine ecological characteristics of information products in the electronic environment. Ecology of information products can be found in 1. creation of content (users) and in 2. use of the content (creative, collaborative, based on mash-ups and special patterns of knowledge integration).
Contribution of information ecology concept to practice of new systems, services and products is the enrichment of contexts and holistic view on creation and use of information. Information electronic products become part of new ways of communication in short-term groups (e.g. classroom) or longer term groups (family, friends). Social, community part of information products emerge in a variety of places and spaces. Information ecologies (Nardi, Day 1999) can then be understood as these places including libraries, theaters, hospitals. Services can be tailored to social networking activities and mobile devices. In this light information products follow principles of emergent user-generated services at websites. Information ecology of information products resonates with the following ecological aspects:

- *Complex networked information environment.* Information products are consolidated and integrated into users´ behavior, information styles and relevance judgments. Academic libraries should provide new, higher level information products based on heterogeneous resources and services. New configurations of information products within academic knowledge networks should address needs of users (personalization, collaborative tagging, atomizing and remixing content). New business strategies for e-products (e-journals, e-book, etc.) are needed. More precise user models are challenge for semantic-aware applications and smart objects (e.g. TrueKnowledge, SemantiFind, Hakia, Calais for information seeking).
- *New philosophy of information sources.* The chain content – service – product cannot be interpreted as linear or stable any more. Many decisions from library managers and decision-makers are important in the networked environment. They should consider especially strategy of building electronic sources, collaborations, external services and use of other systems such as e-learning and e-science, student record systems etc.
- The most important ecological factor of information products in the electronic environment is *the added value.* It emerges as part of dynamic processes of creation and use, especially knowledge organization, visualization, collaboration. Knowledge of users´ behavior can be mirrored in marketing of new information products. Analyses of pathways of users in the electronic environment can help form meaningful value-added information and marketing strategies.
- New products emerge also from *the rise of new media*. Media ecology (Leverette 2003) describes complex interplay between humans, technologies, media and the environment. Traditional catalogs are affected by adaptive personalization and network effects and include contexts the for use of content.
- Ecological aspects of information products can help consolidate the academic information environment. Marketing of new information products is based on users´ behavior in the electronic environment. Information products are closely connected with niche in communities, electronic resources management and new media formats. Social awareness, privacy, and trust will be important issues of new ecological information products.
- Support of relevance behavior (Steinerová 2008) by *visual features* of systems and new tools of knowledge organization is part of new "ecological" philosophy of information products. Tag clouds aid users in relevance decisions. *Object re-use and mash-ups* can be examples of a new direction for information products development.

Conclusion

Information ecology of information products emerged from networked information environment. The concept can help respond to technical and cultural challenges of information behavior and use. New features knit information together by disintegration and integration of knowledge in the electronic environment. Added value comes from re-use of digital objects and visual presentation of information. Users´ behavior can be included into marketing and design of information products.

New ecological theory of information products is needed so that electronic environment advantage can be applied. Sophisticated architectures and knowledge organization will be integrated in future products with more precise user model and semantic rich contexts.

Our concept of information ecology is based on knowledge of information behavior of different social actors, but also on tools that can help clean information environment. In search for these tools we emphasize better knowledge organization, information literacy and relevance judgments.

Information habits of students in the electronic environment indicate that simplicity, visual appeal and immediacy dominate the information use. Information ecology can help build new models of navigation, personalization and visualization of knowledge.

Note

The paper was supported by research project KEGA 3/7275/09 Information studies in conditions of web 2.0 and new technologies (INWENT).

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