Metadata, Knowledge Management, and Communications

Mark Wolfe
University of Calgary

Abstract: The increased volume and complexity of information available via the Internet and other networked information and communications systems (ICTs) have heightened the need for more efficient and effective ways of searching on-line resources. Technologies involving automated and human-operated software continue to evolve in meeting these needs but process and standardization remain key problems in determining who will do the work and how data and software programming should be structured to maximize the effort. The problem is exacerbated by database and search tool customization, as a widening range of organizations attempts to adapt the "metadata" technologies and approaches to unique information environments and resources. This paper overviews metadata in its current application and development as an Internet technology, and points to its relevance to communications—a field that has yet to embrace the movement thematically.

Résumé: La complexité et le volume croissants de l'information disponible sur Internet et autres systèmes d'information et de communication en réseau ont augmenté le besoin de moyens plus efficaces pour faire une recherche en ligne. Les technologies employant des logiciels automatisés et non-automatisés continuent à évoluer pour subvenir à ces besoins, mais la difficulté des procédures et le manque de standardisation présentent des défis dans le choix de travailleurs et dans la programmation de données et de logiciels de manière à maximiser leur rendement. La fabrication sur commande de bases de données et d'outils de recherche exacerbe ce problème. En effet, un éventail croissant d'organisations essaie d'adapter les technologies et approches de la métadonnée à des ressources et environnements informatiques différents. Cet article passe en revue le développement et l'application actuels de la métadonnée en tant que technologie d'Internet, et souligne sa pertinence pour les communications—un domaine qui jusqu'à présent n'a pas élaboré la thématique de ce mouvement.

Introduction

The proliferation of information and communications technologies (ICTs) has resulted in a world drowning in digital data. In response are the efforts of a growing cohort of information, library science, and ICT professionals to evolve public domain software coding aimed at increasing utilization of on-line resources

Mark Wolfe is a doctoral candidate in the Faculty of Communication and Culture at the University of Calgary, 2500 University Drive N.W., Calgary, AB T2N 1N4. E-mail: mwolfe@ucalgary.ca

***Canadian Journal of Communication*, Vol 25 (2000) 539-552**

while effecting efficiencies in networked resource discovery. In turn, content providers and managers are refining and adding this coding to existing programming —such as the Hypertext Markup Language (HTML)—to aid discovery and access to everything from word processing documents to slide presentations to animation and video clips.

These resources or information "objects" are described using metadata terms that require awareness up front of who might wish to access them, how they might want to acquire them, and, ultimately, what they might want to use them for. As such, the metadata movement instigates an evolutionary leap over simple text-string matching because describing information resources on the basis of uses turns on understanding the *meaning* of a resource in the context of users. Investing information resources with a semantic dimension lands metadata squarely in the purview of communications research and scholarship because of the social contexts that information use implicates, as well as the shift to a content-driven movement in a social economy overwhelmingly enamoured of and dominated by the technical world of hardware, software, and network development.

In this article, I provide an overview of the development of metadata tools by way of pointing to one area within communications where the shift to a non-engineering-centric approach to information management has particular import. First, metadata will be described briefly in the context of some current tools and applications. Sketching its historical and conceptual origins will then reveal metadata as capstoning a shift from an engineering-based focus on information systems to one emphasizing information as the product of social actors embedded in cultural networks. Knowledge Management (KM) is used as an example of organizational (re)design that reflects this emphasis, and communications is depicted as the critical enabler in attempts to align KM initiatives with and within the cultural life of an organization. In concluding, broader implications of metadata for communications study will be raised.

What is metadata?

By definition, metadata is any data that takes other data as its object. Data entered into a database field, for example, is a form of metadata because it takes other data —such as a person's actual phone number—as its object. Accepting that, the software code used to define and set parameters for a field becomes a form of meta-metadata since it manages the (meta)data inputted into a field that in turn refers to actual data in the world. Metadata in this context manages other data with no thought or consideration as to how the information ultimately will be accessed, who might be using it and for what purpose, or even if the data is used at all. For software programming purists, this is the only true metadata because the software code that determines, for instance, which name comes first in a "Name" field, or if an "Address" field accepts just zip codes, Canadian postal codes, or both, is transparent to or literally "beyond" the user.

By contrast, "bibliographic" metadata involves adding information to on-line resources to further describe them so that anyone seeking content of the sort con-

tained therein is likely to discover them in a search attempt. The information added derives from any of a growing number of public domain metadata tools that allows managers to "tag" documents and portions thereof with meaningful descriptors—the most universal set of which to date derives from pioneering efforts of the U.S.-based Online Computer Library Center in the mid-1990s to achieve working consensus on a core of descriptive elements, now known as the Dublin Core. Figure 1 is a Web page of the on-line version of the *Canadian Journal of Communication* displayed in the Hypertext Markup Language (HTML)—the language used to build most pages on the Web—that also uses ten Dublin Core metatags to structure the document.

Figure 1: HTML and Metatags from the On-line Version of the CJC

```
  <html>
  <head>
  <link title="cjc styles" rel="stylesheet"
type="text/css" href="cjc.css">
  <!-- START Dublin Core metatags -->
  <meta name="DC.Title" content="CURRENT ISSUES"> <meta
name="DC.Creator" content="Canadian Journal of
Communication, CJC">
  <meta name="DC.Subject" content="CJC, Canadian Journal
of Communication, CJC-On-line, Communication,
Communications, Journalism, Journal, Canada">
  <!-- For papers the description field should contain
the abstract -->
  <meta name="DC.Description" content="Canadian Journal
of Communication, A journal of research and scholarship
encompassing the field of communication and journalism
studies giving emphasis to Canadian work and Canadian
issues.">
  <meta name="DC.Publisher" content="Canadian Journal of
Communication, CJC">
  <meta name="DC.Date" content="2000-05-10">
  <meta name="DC.Type" content="table of contents">
  <meta name="DC.Format" content="html/text">
  <meta name="DC.Identifier" content="07053657">
  <meta name="DC.Language" content="en">
  <meta name="DC.Relation" content="CURRENT ISSUES, table
of contents">
  <!-- END Dublin Core metatags -->
```

Metatagging enriches a page as a searchable resource by augmenting its on-line visibility with "elements"—the date, format, publisher, etc. descriptors included in the example above—that correspond to what searchers are apt to use as search criteria when seeking content-specific materials. Content creators and/or managers that use metadata, then, need to care a great deal about the word processing files, spreadsheets, overhead presentations, video clips, and so forth,

being described and have at least working familiarity with their range of application—again, how the resource is apt to be used and how seekers of materials are apt to search for them. Thus, in effect metadata comprises structuring a document on the basis of what it *means* to people and hence its semanticity. Structuring resources to be searchable in multiple ways reflects the reality of how people become aware of resources—a date, last name of an author, an issue number, and so forth—and often have only these snippets of information to go on. More to the point, though, structuring resources semantically affords a researcher greater accuracy in resource discovery and hence greater efficiency in search efforts. In the aggregate, it also effects global network efficiencies if people are spending less time on clogged information highways and more time actually working.

Some current applications

On-line Computer Library Center and the "Dublin Core"

Metadata finds a natural home in a domain that has been generating and using it since at least the time of the Alexandrian library. It is little coincidence, then, that one of the initial drivers of metadata activity and resources is the On-line Computer Library Center (OCLC)—created in 1967 by a consortium of colleges and universities in Ohio and originally called the Ohio College Library Center. Situated initially in the main library of Ohio State University, the OCLC in 1981 changed to its present name to reflect the significance of computers in new forms of librarianship—specifically networked and on-line access library resources—emerging at the time. Today, OCLC serves more than 30,000 libraries of all types in the U.S. and 65 other countries and territories.

The OCLC offers myriad services related to data description and management, including: automated data cataloging, data conversion (print to digital, digital to HTML, XML, etc.), linking services, and training and on-line tutorial resources. The OCLC is also known for giving rise to the *Dublin Core Metadata Initiative* (DCMI or DC for short)—so named for the organization's original workshop held by in Dublin Ohio in 1995. The DC comprises a core of 15 "elements":

Title	Format
Creator	Identifier
Subject	Source
Description	Language
Publisher	Relation
Contributor	Coverage
Date	Rights
Type	

The Dublin Core is just that—a core group of document descriptors meant to be augmented and built upon. Hence, the above list of elements is described as "simple Dublin Core," "unqualified Dublin Core," and "DC 1.0." DC 1.0 has been stable since 1996, as attested to by the degree to which it has been adopted by Web-based resources through HTML tagging. Enhancements to DC 1.0 were conceived from the outset, and were seen as arising from local enhancements made by users and from emerging consensus on qualifiers designed to enrich the core elements with semanticity. Hence, the distinction between simple or "unqualified" Dublin Core and "qualified" Dublin Core or "DC 2.0." An example of qualified Dublin Core would be augmenting the DATE field beyond a simple text-string value to reflect other information, such as date received, date last modified, date last published, and so forth.

Since 1999, a number of issues have surfaced through DCMI workshops and undertakings that identify key concerns with element qualification, including formalizing processes for evolving Dublin Core to meet diverse requirements, determining what type of document is to be standardized and by whom, which qualifiers are priority, and how qualified Dublin Core can proceed and still be interoperable with parallel metadata initiatives. The DCMI works through several bodies to achieve standardization, including the Internet Engineering Task Force (IETF), the European information standardization forum (CEN), the North American equivalent (NISO), and, as discussed below, the World Wide Web Consortium.

The World Wide Web Consortium (W3C) and the Resource Description Framework

A strong proponent of metadata enhancement tools is the World Wide Web Consortium (W3C), under the direction of Web founder Tim Berners-Lee. As detailed below, Berners-Lee's work in establishing the Web was templated on previous programming he undertook in the early 1980s to facilitate collaborative work among physicists at CERN. The W3C's main contribution to current efforts to standardize and deploy metadata tools is through its development of the Resource Description Framework (RDF). According to the W3C, the RDF mechanism

> is a foundation for processing metadata; it provides interoperability between applications that exchange machine-understandable information on the Web. RDF emphasizes facilities to enable automated processing of Web resources. RDF metadata can be used in a variety of application areas; for example: in resource discovery to provide better search engine capabilities; in cataloging for describing the content and content relationships available at a particular Web site, page, or digital library; by intelligent software agents to facilitate knowledge sharing and exchange; in content rating; in describing collections of pages that represent a single logical "document"; for describing intellectual property rights of Web pages, and in many others. RDF with digital signatures will be key to building the "Web of Trust" for electronic commerce, collaboration, and other applications. (Lassila, 1997, n.p.)

RDF is complementary with extensible markup language (XML), also a W3C technology. XML affords greater semanticity in a document without requiring pre-defined vocabularies be authored into the knowledge environment being searched. It does this by allowing the creation of new elements on the fly. These elements might be pieces of content, such as the "education" section of a job hunter's on-line resume, or other types of objects—including other bits of XML programming itself. To get around the possibility of duplicate identities for on-line resources, XML uses "Namespacing" to make each document on the Web unique, thereby precluding the possibility of conflicting resource addresses.

IMS Global Learning Consortium and the CAREO project in Alberta

The IMS Global Learning Consortium (IMS) was created in 1997 as a project within the National Learning Infrastructure Initiative of Educause, a U.S.-based but international and non-profit organization dedicated to shaping and enabling transformations in higher education through technology. IMS specifically describes its primary focus as deriving specifications for synchronous and asynchronous distributed learning environments with emphasis on Web-based applications. The group has been developing and promoting an open (non-proprietary) metadata-aware search tool for both networked and multimedia applications (CD-ROM/DVD-ROM). In addition to developing powerful search technology, the consortium is also developing tools for distributed learning activities that involves the location and use of education content but also progress tracking, reporting learner performance, and student record exchange between institutions.

IMS metadata uses Microsoft-developed programming for specific functions and to some extent can be seen as a bridge between the community-based efforts of the OCLC/Dublin Core and full-blown commercial metadata operations such as The Metadata Company.

A local example of metadata development in the education setting is the Campus Alberta Repository of Educational Objects (CAREO), a component of the BELLE multimedia project (CANARIE Learn program). CAREO was proposed in 1999 to help address the cost, inefficiencies, and lack of synergy typical to courseware development. Using tools developed by IMS and the non-profit Educational Object Economy organization, CAREO is now in the process of developing a repository site "for the collection and distribution of educational objects created and catalogued by Alberta educators." The types of objects being catalogued include: simulations, tutorials, multimedia exercises, PowerPoint™ presentations, databases, quiz programs, calendars, and other utilities.

Creating a central warehouse for digitized educational objects depends heavily on metadata resources for the description and qualification of data "objects" that comprise the information resource. The end result is a location educators and others can access where accessible information resources will be first and foremost discoverable (turn up in metadata searches), but also aimed at being modular (can stand alone; not be dependent on an entire course design) and interoperable (can plug and play across existing hardware and software platforms).

Some issues

The proliferation of information and communications technologies (ICTs) has emphasized metadata as a control technology that aims to better manage existing information flows while standardizing approaches for structuring future information resources. Communities of primarily non-corporate information professionals have advanced the development and levels of consensus in metadata approaches. These approaches can be seen as benefiting information stakeholders whose interest in metadata initiatives include:

- optimizing information resource discovery, thereby effecting efficiencies in time and bandwidth usage;
- ensuring information remains an integral feature of the public domain, thereby underscoring universality of access and democratic principles;
- ensuring standards-driven interoperability at the outset, thereby avoiding the mistakes of the personal computer industry; and
- re-emphasizing the value of the content, and the role of content creators and users, in whose service ICTs are designed in the first place.

Several issues, however, challenge metadata development as we go forward. These include:

- *Legacy:* What is the best way to re-purpose the vast tracts of existing content? Human metadata agents are more flexible and creative but slow and costly, while taxonomic approaches by artificial intelligence programming are productive but notoriously inflexible and unreliable.
- *The future:* Who is going to assume the labour of metadata application as we go forward? Who is going to pay for it?
- *Interoperability:* As more corporate players enter the scene with proprietary systems, will they overpower the "market" already established at the grassroots level and once again introduce ICT incompatibility barriers?
- *Cross-cultural:* What are the barriers to the original promise of universal application? How do different cultures handle information resources?

Historical perspective: Technique versus content

Metadata reflects a shift in the larger information technology (IT) innovation cycle from its engineering phase to diffusion and uptake in society, but this is nothing new. Metadata reaches back to at least ancient Sumer, when it occurred to property owners and bureaucrats that impressing tokens on clay bullea would be an efficient way of describing and tracking the physical tokens sealed within. The innovation itself was but a brief yet critical moment: it not only concretized notions of numerosity but led more or less directly to the development of cuneiform—a technology itself devised in response to the increased content requirements of a burgeoning and professionalized city-state economy (Schmandt-Besserat, 1991, 1996). Nonetheless, in an economy driven by and obsessed with

hardware and the latest gadgetry, it sometimes comes as shock to realize that in practical and operational fact, a technology's tenure and application becomes entrenched, expansive, or even revolutionary only after it is embedded in the culture: what changed Europe is neither the technical advent of the printing press nor the economics of press and paper production, but their deployment by social agents in cultural undertakings. New media as such ultimately reassert the role of content and content providers because it is in their service as social agents that new communications media arise at all.

Metadata: Pre-electronic

In his seminal 1945 article for *Atlantic Monthly* magazine, war-time presidential advisor Vannevar Bush openly complained about the increasing amount of information scientists needed to manage to do their jobs—that is, keep abreast of the explosion of scientific literature resulting from and following myriad war-time breakthroughs (i.e., radar, plastics, rocketry, etc.). He then went on to describe an information management technology he planned on calling the *Memex*. *Memex* was described as a photosensitive, micro-fiche-producing machine that scientists could use to manage literatures on any subject. *Memex*, however, was no simple retrieval and archiving mechanism. The machine was conceived to facilitate on-going interaction with data so that a scientist could augment data retrieved by adding his own knowledge and opinions, and sharing the enhanced data with others by swapping microfilm files. *Memex* was also thought of as being automated to the extent that the user could enter search criteria into the machine via a keyboard and instruct it to search its microfilm files for appropriate document matches. *Memex* was never built, however, because, by 1946, the ENIAC electronic computer had already proved its worth. Within a decade, IBM was producing its first large-scale mainframe computers for private use.

Xanadu and metadata

With the computer revolution of the 1960s and 1970s, information demands increased factorially. Even worse, the development of "open" information systems and sources—such as the World Wide Web—resulted in massive increases in the amount of unstructured data widely accessible. Because this open or unrestricted component of the global network has developed so quickly, and to such an extent, information specialists have only recently begun tackling the issue of how to better manage these data.

One of the key features of the *Memex* that resurfaced in the 1960s was the idea of "linking" documents with related/relevant contents. The *Memex* proposed using a document viewer that could display the equivalent of two pages side by side. When the user wanted the contents of one document to automatically facilitate the calling up of a related document when desired, he would use his keyboard to hole-punch the respective fiche in a way that would bring up both documents for viewing when desired. In the 1960s, Ted Nelson conceived of a computer-based method for effecting the same linking function. Like the *Memex*, *Project Xanadu*—for which the software code has now been released—was

designed to structure data by allowing users to augment an original document by adding data to it. The added data could be anything from simple references to related works to personal marginalia-type commentary, to full-blown analysis and/or critique. Subsequent users accessing the original document on their own *Memex* machine would have the option to review the additions as well as add their own commentary. In addition to annotation, links between an original document and all the enhanced or revised versions would be automatic. This would allow the user to retrace a document's evolution step by step. It also was designed to help resolve copyright issues by ensuring the original document producer would automatically be paid a royalty for the right to access that document.

Tim Berners-Lee and the World Wide Web

Linked documents are the essence of the Net as we know it today, but lack of standards for describing documents and the information we use to search for them is an ongoing concern for World Wide Web creator Tim Berners-Lee. Berners-Lee was working for the European Particle Physics Lab (CERN) in 1980 when he wrote a small program called *Enquire* to "keep track of the complex web of relationships between people, programs, machines and ideas" (Berners-Lee, 1997, n.p.). The vision of the World Wide Web he proposed nine years later was based on this basic concept. Reflecting both the interactive and linking attributes of the *Memex* and *Xanadu* projects, Berners-Lee's original vision of the Web comprised a system "not only easy to 'browse,' but also easy to express oneself":

> In a world of people and information, the people and information should be in some kind of equilibrium. Anything in the Web can be quickly learned by a person and any knowledge you see as being missing from the Web can be quickly added. The Web should be a medium for the communication between people: communication through shared knowledge. For this to work, the computers, networks, operating systems and commands have to become invisible, and leave us with an intuitive interface as directly as possible to the information. (1997, n.p.)

Instead, as Berners-Lee puts it, the Web today resembles a "glorified television channel" that has an almost viral-like growth trajectory away from its initial aim of meeting the group work need. However, the original vision is being recaptured in the form of highly-structured portals, organizational intranets, and knowledge management technologies that take seriously the notion of shared knowledge in expressive or collaborative domains. Indeed, plurality and idiosyncrasy are maybe the only stable attributes in an ever-evolving technology where innovation depends less on machines and gadgets and more on who needs what to leverage information resources for which community of users.

Relevance to communications: Knowledge management

> "Societies, like lives, contain their own interpretations. One only has to learn how to gain access to them."—Clifford Geertz

The focus on cultural dynamics of content creation and co-ordination lands metadata initiatives squarely in the purview of communications scholarship and prac-

tices. By drawing on the multiple disciplines informing it, communications as a field can engage with culture-driven technologies such as metadata on various levels. One area of emerging significance to organizational communication where metadata comes directly to bear is knowledge management.

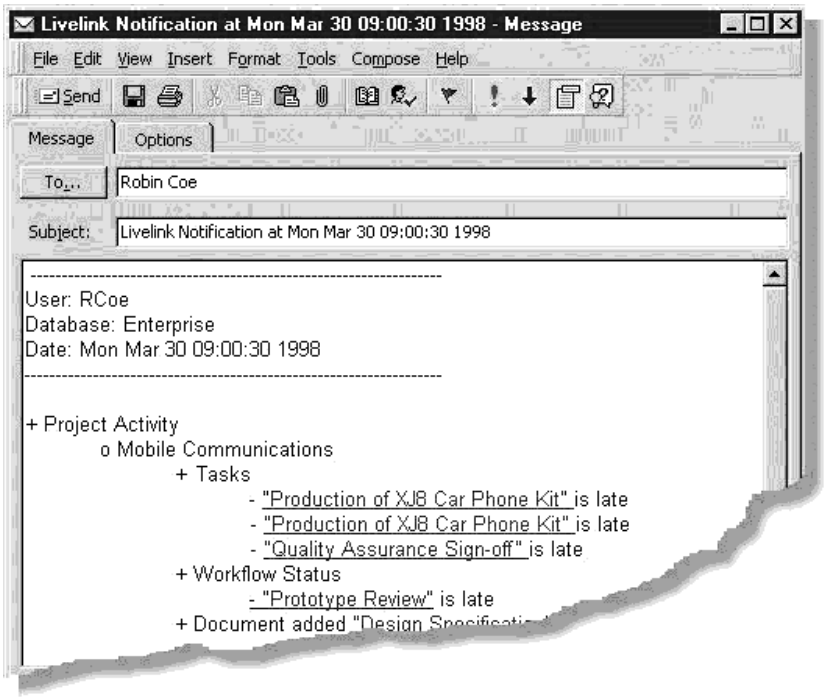
Undertaken by organizations seeking more from their knowledge resources, knowledge management comprises both technology- and people-centric approaches to organizational design. The former is a functional interpretation of knowledge emphasizing the design and deployment of ICTs to effect collaborate workspaces and communications media for better capture, organization, and co-ordination of knowledge that is explicit—rules and regulations, best practices, manuals, and so forth encoded in some form of data. The latter adopts a cultural approach emphasizing organizational designs that aim to encourage and capture the interaction of tacit knowledge—the overall stocks of knowledge that social agents have to bring to bear on tasks that often fall outside of job descriptions, projects parameters, guidelines, and so forth.

The two approaches usually overlap to some degree, but the explosion of so-called knowledge management software betrays the extent to which organizations favour the functional approach. This reflects traditional management emphasis on process and function as key policy determinants and uses compliance mechanisms to monitor and ensure employee use of systems.

Figure 2 is a screen capture of the demo for Livelink, a program developed by the OpenText corporation that shows information managed visually by nesting items by subject and promotion (level of indentation). The hierarchical, nested information structure depicted in Figure 2 is an example of heavily "engineered" programming that makes rigid assumptions about users while offering them no way to modify the program to better fit idiosyncratic work styles. For example, a group within an organization might very well prefer to see data in flow-chart form, or in an icon-based interface, or use a rolodex metaphor such as Apple's original HyperCard™ program.

Metadata is a useful tool even in the so-called "shrink wrap" or closed systems because, while format and user expectations are relatively fixed, the system itself is somewhat organic in the way documents, notes, and other media become part of the overall repository of digital resources. However, knowledge management software products that are imposed on a worker population "out of the box" run the risk of alienating individuals or entire groups whose cognitive styles and personal work habits do not match the structure of the software programming (Wright, 1999). Worse, because the program itself is often looked on as the central means for inculcating a knowledge management culture, the effort merely repeats the very command and control mistakes of traditional organizations that knowledge management was conceived to overcome in the first place. Shrink-wrap solutions are attractive because the entry cost is low but most KM efforts built merely around software hide the costs of adaptation (i.e., compliance), and that is before factoring in even a functional metadata component.

Figure 2: A Screen Capture of the Demo for Livelink



People or tacit-based designs, on the other hand, are common to creative environments such as research and development, media and advertising, software engineering, teaching, and consulting. Metadata comes to bear in these environments because knowledge is conceived in principle as residing primarily, if not exclusively, in the heads of social actors and thus requires information processes and resources to map the habits of those from whom knowledge tends to be created, codified, and shared. Bibliographic metadata tools such as XML are useful because they allow a more interpretative micro approach to resource development without compromising the information needs of the organization or world at large. In the hands of a culturally savvy information professional—someone whose knowledge of the organization's culture is itself a tacit aggregate of impressions, experiences, and social encounters—interpretative metadata is *in situ*.

Typically, however, knowledge management is enlisted as a weapon against stagnation, brain drain, and lack of competitiveness precisely because the organization lacks interpretative agents—either by job description or by lacking a culture of interpretation itself. This explicitly or in effect becomes a communications issue because, lacking the tacit knowledge of a culturally savvy interpretative agent (librarian, human resources personnel, public affairs, or employee communications staff), the KM practitioner(s) enlisted will need methods of identifying, measuring, and evaluating the behaviours, contact points, and needs of

social agents in the organization where knowledge and culture are taken up and reproduced. Communications is crucial in environments where knowledge management is understood first and foremost as "a cultural thing" because the communications perspective understands knowledge flows as being built on communication flows, which, in turn, reflect the information needs of a given unit. Metadata is relevant to communications because, in the context of information systems, it is the means by which the data resources ultimately succeed or fail in meeting these needs. Data systems designed without the social complexity of content and content user issues in mind, and which are simply imposed on people, only encourage the familiar IT dyad where the value of the keepers of the data, in effect or actuality, often exceeds the value of the data itself (Davenport & Prusak, 1998).

Implications: Metadata and communications

A public domain approach to an increasingly sophisticated but standards-based suite of metadata information management tools has reasserted the role of content and content providers while avoiding compatibility problems such as those experienced in the personal computer industries. Likewise, knowledge management efforts at organizational design that de-emphasize systems approaches in favour of the idiosyncratic contours of knowledge flows have reasserted the role of the work itself and the workers involved. Communications provides the key perspective from which to understand an organization's knowledge contours, and is essential in grounding KM initiatives that aim to map onto them. The relationship between metadata and knowledge management, however, comprises more than a nice and tidy parallel because the former can be a mission-critical tool deployed in the service of the latter. This heightens the need for vigilance because who ultimately structures an organization's resources—that is, whether it is management, IT, information services, human resources, or communications—will temper the extent to which the biases of professional territorialism common to each can be overcome to reflect the actual needs of workers on the line. Operationally, the situation is further complicated when factoring in issues regarding gender, telecommuting, cultural diversity, and external environmental pressures (such as competition and regulation).

However, other issues arise in metadata efforts which, broadly speaking, are of relevance to communications research and methodologies at large:

1. Worries that business would fall victim to computers-for-computers'-sake solutions arose at the outset from within the IT establishment itself (DeCarlo, 1967), were extended to society at large (Ellul, 1964; Heim, 1987; Schiller, 1981), and are now considered endemic to the "traditional economic misconceptions of technology" (Soete, 1995, p. 37). In spite of the warnings, the track has been littered with expensive and rigid information systems that have asserted the primacy of the programming and information gatekeepers over the use or content of the information but ultimately failed to deliver efficiencies, let alone empowerment. Communications is well positioned to draw on

its attention to social systems and organizational theory and methodologies to better inform and prepare management for the complexities of information as a social phenomenon.

2. Organizations sometimes refer to their information environment as an information or knowledge "market" but then proceed to invest in hugely expensive information systems that focus exclusively on how data is captured and moved around. The long-standing conflation of information and data with knowledge is part and parcel of what the bibliographic metadata movement aims to overcome by focusing on needs and uses of information buyers and sellers. Describing an organization's information use as comprising an information or knowledge market makes sense, however, only to the extent that a market itself is seen as a "culture." This is well described even within economics, as Abolafia puts it when he reminds us that a transaction is never dyadic but a result of people "embedded in a network of important social relations and culturally embedded in a meaning system of norms, rules and cognitive scripts" (in Callon, 1998). The semanticity of bibliographic metadata addresses the element of meaning up front and underscores the importance of information cultures and information *as* culture.
3. Understanding the specifics of information use in a culture commonly fails in either not recognizing the importance of culture as a social phenomenon or, worse, assuming the culture of an organization equates to the mission statements of management. Hence, statements from management such as: "We have a culture of [IT] use in our organization." Not surprisingly, in these environments, culture becomes a function of compliance as opposed to people willingly sharing knowledge in largely informal ways and interacting on a basis of trust. Like metadata itself, culture is where you find it and rarely comes from vision statements. Communications is good at finding culture by looking at the communication patterns and dynamics that underpin it.
4. Drilling down further still, isolating key cultural elements within a group or organization often requires identifying specific dynamics of interpersonal relations. Ethnomethodological approaches to communications that focus on discourse analysis (e.g., Boden & Zimmerman, 1991) can be useful in highlighting power relationships that are transparent or otherwise not open for discussion in the organization. Keying on power alignments reveals where the organization's information/knowledge "silos" exist—individuals or groups that horde information and knowledge—and takes the first step to approaching the issue of trust.
5. Identifying power alignments, in turn, raises the question of who is articulating the organization's values and processes. This is relevant at the metadata level because somebody has to do the actual labour of structuring information resources, and the language they use in reflecting these values and processes is critical. However, an organization that has drilled down from 1 through 4 above has hit bottom where they can now leverage the distinction between

data and use their awareness of the specifics of their information culture to build metadata-structured repositories accordingly. As part of this building from the bottom up process, communications then comes into play operationally by helping ensure key stakeholders have been identified and best practices are encoded and disseminated in cost-effective ways.

References

Berners-Lee, Tim. (1997). *Realising the full potential of the Web.* Based on a talk presented at the W3C meeting in London. URL: http://www.w3.org/1998/02/Potential.html

Boden, Deirdre, & Zimmerman, Don H. (Eds.). (1991). *Talk and social structure: Studies in ethnomethodology and conversation analysis.* Cambridge, UK: Polity Press.

Callon, Michel. (Ed.). (1998). *The laws of the markets.* Oxford; Malden, MA: Blackwell & The Sociological Review.

Davenport, Thomas H., & Prusak, Laurence. (1998). *Working knowledge: How organizations manage what they know.* Boston: Harvard Business School Press.

DeCarlo, Charles R. (1967). Changes in management environment and their effect upon values. In Charles A. Myer (Ed.), *The impact of computers on management.* Cambridge: MIT Press.

Dublin Core Metadata Element Set, Version 1.1: Reference Description. URL: http://purl.oclc.org/dc/documents/rec-dces-19990702.htm

Dublin Core Metadata Initiative. URL: http://purl.oclc.org/dc/

Ellul, Jacques. (1964). *The technological society.* New York: Vintage.

Heim, Michael. (1987). *Electric language.* New Haven, CT: Yale University Press.

Lassila, O. (1997, November 13). Introduction to RDF metadata. URL: http://www.w3.org/TR/NOTE-rdf-simple-intro-971113.html

Schiller, Herbert I. (1981). *Who knows: Information in the age of the Fortune 500.* Norwood, NJ: Ablex.

Schmandt-Besserat, Denise. (1991). *Before writing: From counting to cuneiform.* Austin, TX: University of Texas Press.

Schmandt-Besserat, Denise. (1996). *How writing came about.* Austin, TX: University of Texas Press.

Soete, Luc. (1995). (Constructive) technology assessment: An economic perspective. In Arie Rip, Thomas J. Misa, & Johan Schot (Eds.), *Managing technology in society* (pp. 37-56). London: Pinter.

Wright, Kirby. (1999). Lecture notes for "Knowledge Management and Communications Technologies" (LIS 598). Offered through School of Library and Information Studies, University of Alberta, Edmonton, AB.

Useful Web sites

World Wide Consortium: http://www.w3.org/XML/1999/XML-in-10-points

Semantic Web: http://www.semanticweb.org/

Online Computer Library Center: http://oclc.org/oclc/menu/home1.htm

Metadata.net: http://metadata.net/

CAREO at the University of Calgary: http://www.ucalgary.ca/commons/careo/

XML—The XML Industry Portal: http://www.xml.org/

Netera Alliance—Alberta's Advanced Internet Organization: http://www.netera.ca/belle/