Aligning Inner and Outer Visions of Technical Communication: Reflections Beyond Traditional Technical Writing

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Technical communication is often misunderstood by those outside the profession or the academic field. These outside perceptions of our work, generally based on extremely limited and narrow notions of the field, can influence the opportunities available to technical communicators. In this paper, three faculty members from the University of Washington's Department of Technical Communication describe their academic assumptions and research activities that range far beyond traditional areas from technical writing such as writing, editing and production. They describe projects that represent the expanding boundaries of the field of technical communication, spanning domains (including medicine, corporate, and public service), methods (including contextual inquiry, content analysis, case studies, and log-file analysis), and solution types (including content management, user driven content, computer mediated communication, and strategic management of systems). What these projects share is a broad vision of the field of technical communication and a broad vision of the contributions that technical communication professionals have to offer.

Keywords: technical communication, research in technical communication, medical education, digital libraries, strategic management of information

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Introduction

Most people have little difficulty distinguishing between activities performed by their doctor during a routine clinical visit and the field of medicine. While these activities are related, most people know that taking histories, prescribing medication, and examining patients are very different (and far more narrowly defined) endeavors than designing and conducting clinical trials and double-blind studies or developing protocols and healthcare policies. Why then do so many people equate the field of technical communication with performing the daily operational tasks of technical writing—drafting, editing and production?

Technical Communication was largely born during World War II in response to issues stemming from the introduction of new technology to huge numbers of military personnel. While this often meant a focus on the writing of technical manuals, the general issues of supporting a mass audience in the adoption and effective use of new technology ranged far beyond technical writing. Thus even in its beginnings, the field of technical communication could not be limited to the "traditional" issues of writing, editing, and production.

Today in the United States, academic, government and industrial centers of research and development increasingly recognize the value that technical communicators bring to projects that range far beyond technical writing. Following are three projects involving faculty in the University of Washington's Department of Technical Communication that illustrate this increasingly broadening nature of the field. These projects address issues related to web-based education, digital libraries, and strategic management of information.

Project One: Supporting Learning-at-Large

The Arthritis Source[1] is an informational website that provides extensive, authorized arthritis-related information to users with access to the Internet. The original *Arthritis Source* was developed in 1995 by Dr. Frederick Matsen of the University of Washington. The Arthritis Source has served as a testbed for research and development since 1999. Work on the Arthritis Source has focused on (a) adding more content, (b) extending existing content, and (c) helping users find relevant information. In addressing these issues, we have endeavored to find solutions that are scalable (we can continue to expand the website) and enhancable (we can make changes with reasonable levels of effort). The work has been and continues to be a grass-roots effort in the sense that people who volunteer their time and effort make much of the work possible.

[1] The Arthritis Source is located at http://www.orthop.washington.edu/arthritis.

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Figure 1 presents the main page of the current site. The site has a number of distinguishing features.

Figure 1. Main Page of the Arthritis Source

- Template-based content: Content in the site is organized into articles, and the site currently contains over 100 articles. New articles are written according to templates designed around major article categories (e.g., conditions, medications, surgeries, etc.). The templates, which are sequences of questions that authors must answer, specify the coverage and sequence of the article content and provide standardized headings and keywords.
- Multiple Access Paths: Users can access site content through multiple paths including browsing, standard keyword search, and our own question-based navigation. Our implementation of the question-based navigation matches user questions to template questions (rather than matching user questions to site content), and asks users to select from among the suggested questions. When users click on one of the suggested questions, they are taken to content that addresses the question.
- Embedded Evaluation. The site includes many forms of embedded evaluation. Users can rate content on simple scales, submit feedback through email, participate in online surveys, and participate in formal online studies.

Examination of Arthritis Source activities illustrates the breadth of Technical Communication. At the heart of the Arthritis Source is a need to effectively communicate technical information about medical conditions, treatments, drugs, therapies, etc. to a variety of users. Clearly, standard issues of effective writing and audience analysis are vital. Work in the context of the Arthritis Source provides a broad perspective on what such issues can entail. Furthermore, work on the Arthritis Source requires a significant number of design issues contributing to the ultimate goal of designing effective communication. The following sections discuss these issues of audience analysis, effective writing, and design in the context of the Arthritis Source.

Audience Analysis

Audience analysis is critical to effective technical communication. An understanding of the audience can lead to a better understanding of the opportunities and challenges in technical writing. In the context of the Arthritis Source, we have asked: What are the distinguishing features of the audience of web-based health information systems, particularly in the domain of arthritis? As Schiver (1997) points out, there are multiple perspectives on audience analysis – from an intuitive perspective to an empirical perspective. Our approach to audience analysis has been significantly empirical (Liu, K., Turns, J., and Wagner, T., 2001; Tanada, A., Turns, J., and Wagner, 2001a; Tanada, A., Turns, J., and Wagner, 2001b; Tanada, A., Turns, J., and Wagner, 2001c; Tanada, A., Turns, J., and Wagner, 2001d; Turns, J.A. and Wagner, T., 2002; Turns, J. and Liu, K., 2000). We have drawn upon a variety of mechanisms for gathering data to

understand our audience. These data collection mechanisms have included an online survey (with over 400 respondents), a semi-structured phone interview (with 20 participants), observations of informal educational activities (with approximately 75 participants), and collection of user questions (from over 300 users).

Through these mechanisms we have gained knowledge about our audience's purpose, their self-identified roles when interacting with the information source, their background knowledge, their location and culture, circumstances of use, and cognitive and perceptual abilities. For example, we have found that typical visitors of the Arthritis Source are individuals with an arthritic condition, between 41-60 years of age, and live in North American suburban communities with easy access to general practitioners and specialists. They typically use search engines or follow website links to find information on the Internet (Turns, Liu, and Wagner, 2000). We have learned that users often have significant misconceptions about the nature of bone spurs, misconceptions that can affect how people process the information on the website (Liu and Turns, 2001). Influenced by ideas from the learner-centered design movement, we have characterized our data on the three learner characteristics of diversity, engagement, and growth (Turns and Wagner, 2002). We have also documented a small number of general goals and a large number of specific information needs in the content of the system. This empirical, research-level audience analysis has influenced our design including the design of the templates (i.e., the template structure is based on the needs of the audience) and the need for the question-based navigation (i.e., because of the wide number of specific information needs).

Authoring

One goal of the Arthritis Source work has been to support growth in the amount of content authored. Another goal has been to make it possible for other groups to create informational site content based on our lessons about content creation. Clearly, the authoring of technical content is critical to the technical communication profession. Technical communication professionals work hard to perfect their skills at writing content that is readable, simple, clear, and effective. A challenge of the Arthritis Source work has been the recognition that our team cannot be the authors of the content, nor can we assume that formal technical writers will be the authors. Thus, our goal has been to find ways to help others effectively author technical content.

We are addressing this issue with the creation of the content templates, where the templates communicate the needs of the audience to the future authors (Shuyler, K, Wagner, T., Macklin, S., Louie, A., Shelton, B., Maddox, E., Turns, J., and Matsen, F., 2002). Additionally, we have created a web-based environment where authors write articles using these templates. The support environment provides additional writing resources, such as example text and navigation between the authoring environment and the published article. Collectively, the templates, example text, and the writing environment serve to scaffold (or support) the authors in being able to effectively write materials for their audience. These features function as a form of online help.

We are currently engaged in evaluation of these processes by working with doctors and medical students who are creating content using the templates. In our evaluation, we are looking at their perceptions of the template, the quality of the resulting article, and challenges that the authors face. We are also exploring the porting of this template-model to other domains, such as the

creation of a legal "well-ness" informational website and the creation by students of a website on alternative, environmentally friendly building methods (e.g., straw bale construction). Finally, we are exploring how the template-authoring process enables diverse models for ultimately getting the content authored. For example, one model involves students working together to fill out the templates with an overseeing faculty member signing off on final content. The key issue here is that our role as technical communication professionals has not been to write content but rather to support the effective writing of content.

Designing Communication Support by Designing Information, Inquiry, Community, and Learning Support

To support effective communication we also need to design at several other levels. In a view of technical communication principled on technical writing, the essential design activity is that of writing content. Within the Arthritis Source project, our users are clearly readers who will read the content that we provide. Therefore it is clear that we need to attend to the design of quality content.

Because of the electronic nature of the Arthritis Source, our design efforts also include flexibility in supporting users' access to information and efforts to work through their inquiries. For example, because the content is on the web, our web designer role includes the design the navigation through the content. We also have great flexibility in designing the information itself – both in terms of the organization of information as well as the visual properties of the information (e.g. fonts and colors). Because our audience analysis has shown us the extent to which our users come with specific questions, we recognize the need to design to support the user's inquiry – helping the user get to the information they wish to read. This recognition has led to our design of the question-based navigation that enables users to find and read content relevant to their overarching question.

We are also significantly involved in designing to create community and designing to support learning. By framing the Arthritis Source as supporting a community rather than simply an information source, we have been able to identify a number of powerful roles that users can play that support the effective communication of content. The users in the community can contribute to the evaluation of the content (by rating content), to the scope of the content (by submitting requests for information), and by interacting with other members of the community (by seeing the questions that others have asked). We envision, at some point, permitting users to get information by letting them interact with other members of the community. By framing the Arthritis Source activities as learning activities, we can talk about the role of scaffolding to help users be successful from the beginning and the need for content to help users overcome possible misconceptions. We have also adopted the learner-centered design (LCD) framework for characterizing our audience (Soloway et al., 1994). The LCD framework suggests that key characteristics of learners include diversity, a need for support for engagement, and growth in knowledge. Thus, our technical communication efforts to support the effective communication of technical content have included a breadth of design activities.

Closing Remarks

To be effective, the Arthritis Source needs to be able to successfully communicate content to its users. An investigation of the Arthritis Source activities provides a window into an inner vision of Technical Communication – a vision of Technical Communication as the collection of activities necessary to accomplish this effective communication. The investigation clearly points to the breadth of the field of technical communication.

Project Two: Lessons from a Digital Library

The EServer Tech Comm Library is a web portal for the field of technical, scientific and professional communication—planned from the outset to help clarify online representations of the profession.[2] The site provides a detailed annotated bibliography of online resources in the field, provides ratings, reviews and discussion of these works (currently 1,500 in all), and publishes a few original papers as well.

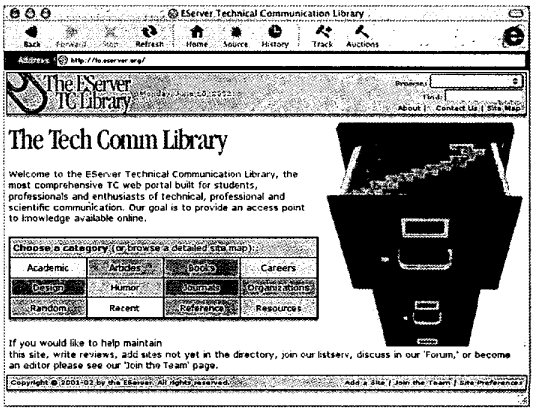

Figure 2. EServer Tech Comm Library Home

The site was created in a collaboration between the University of Washington TC Department and the nonprofit academic publisher EServer. It was begun after a UWTC research group noted curious dichotomies in TC websites in April 2001. We found that some sites were dedicated to practitioners, publishing information primarily about tools and techniques. Others were written for academic audiences, with resources for teaching and publishing, with some discussion of future directions for the field. A third category of websites was dedicated to fields surrounding tech comm, including usability, human-computer interaction and content management, but did not identify themselves explicitly with our field. There seemed to be links connecting these discrete categories of site, but no evidence of any coordinated efforts to span the divide to provide a uniform 'TC' interface to these audiences.

So the research group chose to develop a database-driven web portal, with a user-centered design approach to target all three audiences within a single interface, to provide resources to people in the field while also providing a coherent representation of the field to those new to it. Today the site has both advisory and editorial boards whose members include university faculty, professionals with industry experience, and editors who represent practitioners' interests in several specialties. In our work to create and develop the resource, we encountered three specific issues arose which may speak to the design choices needed to clarify 'reflections' of professional communication currently widespread both within and outside the field. It has grown in the past twelve months to become the most comprehensive single web portal dedicated specifically to technical

[2] The EServer Technical Communication Library is available online at http://tc.eserver.org/.

Three Issues: Multiple Audiences, Usable Portal Interfaces, and Online Community

Based on early research on genres targeted simultaneously to multiple consumer audiences (Clark 1988 and Straub 1993), we sought to develop a web application which would interest all three constituencies mentioned above. Some categories from the home page were created specifically to suit particular groups ('Academic,' 'Careers,' and 'Organizations,' for example), though the system was also designed to display search results that combine academic, professional and practitioner perspectives, in order to enable a cross-pollination we felt was not found in other online resources.

The site's extensive use of the familiar genre of the 'web portal' assisted greatly in this task. The majority of users quickly recognized the interface and high-end users (roughly 25% of visitors) make use of the site's detailed 'Site Preferences' interface to customize the display of information to provide a customized interface to the information on the site.

The site development involved iterative usability testing, including early web surveys, then focus groups and two traditional usability testing protocols in order to improve the website interface. The findings from this testing told us that our audience had more exacting standards than other reported users for website design (Meaney 1998, Nielsen 2000), and this required reallocation of resources in order to develop improved search interfaces, more accessible navigation, and detailed display of ratings statistics, among other details.

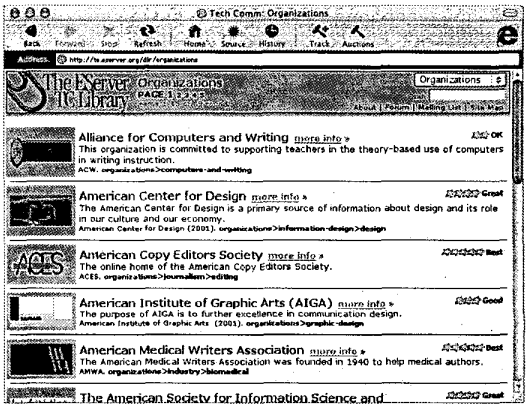

Figure 3. TC Library 'Portal View' of Contents

In an early stage, users identified one problem with web portals to be the long, user-unfriendly URL addresses generated by the conventional HTTP 'GET' method of sending query information to a webserver. Therefore, the team added a German software product, Pardeikes Welcome, to modify category URLs. For example, the TC Library revised its URL addresses so that rather than natural HTTP GET request URLs for resources in design specializing in usability, such as:

http://tc.eserver.org/tc.lasso?c1=categoryall&op1=bw&cat=/design/usability&-maxresults=15&-sortorder=ascending&-sortby=title&-search

the URL of TC Library for such a category will appear as the more-succinct:

http://tc.eserver.org/dir/design/usability

The resulting page is still dynamically-generated from a server database, but the system masks the database query and displays a more familiar URL address. From log analysis we can ascertain that this has met with highly successful results; fully 20% of requests for specific categories come from users' 'bookmarks'—a significantly higher percentage than is common for web portals (Healy 1999).

Our user interface also provided numerous other search interface elements, including a four-level hierarchy of categories, full-text search, search by rating and by particular authors or publishers, as desired, and an interface to customize the sorting and display of results.

Though commercial interest in the 1990s in online community has made many users cynical and problematized some contemporary attempts to develop online community facilities (Werry 2000), the Tech Comm Library extended a model found in the Society for Technical Communication's (STC's) academic programs database, adapting the model to permit active participation by our users. Though the STC website has access to a internal database of current members (and uses this to restrict access to online archives of its journals), the STC Academic Programs Database permits anyone to add or modify information about any academic program. This has worked for them because the technical communication community is small and relatively closely-knit, and so no reported cases of 'hacking' the site have interfered with its open access. And open access permits their database to remain more up-to-date and accurate than would be the case without community input.

The Tech Comm Library followed the STC model, with 'add site' and 'update site' interfaces to allow our users to add resources to or edit resources in the directory. This has worked remarkably well, with over 600 sites so far having been added by users outside the original project team—only two of which were deemed inappropriate, and removed by the editorial board. The 'Join the Site' page lists the names of everyone who has added resources to the website. And web survey testing informs us that the site's recognition of contributors has increased participation in both the site's LISTSERV and threaded web discussion forums.

Announced on January 1st 2002, the Tech Comm Library's audience has grown rapidly; as of June 2002, it hosts between six and eight thousand visitors per month. The range of visit length peaks between two and seven minutes, significantly longer than the reported standards for other web portals (Ramey 2000). Since January 1st, the site has grown to have links from 571 other websites, which has caused it to move up to the 12th among Google results of searches for 'technical communication.'

To be effective, the TC Library needs to communicate two things to its users: both the relevant content to address their interests, and an overall view of the site as reliable and consistent with technical communication 'best practices' (Miller 1979). The techniques discussed above provide one contribution to current work into how to integrate specific and general visions of the field.

Project Three: Technical Communicators and the Strategic Management of Information

The evolving perspective of technical communication means that technical communicators are ideally suited to address the complex, multidisciplinary issues surrounding effective use and management of information.

In 1998, the National Research Council (NRC) launched a series of planning meetings to position itself to take advantage of what was perceived as "an extraordinary opportunity to learn... how various factors, including current management structures and practices, impact...

risk that threatens serious damage to information and other critical infrastructures."[3] The initial focus of these meetings was on vulnerabilities stemming from "the interconnectedness of complex 'systems of systems'" and a goal was set to gather comparable data on such a complex system both before and after the December 31, 1999 rollover. The organizing committee recognized that key issues ranged beyond technology, focusing on effective human and organizational communication of critical information. For this reason a technical communicator was chosen to lead the effort.

In early 1999 the IEEE became a sponsoring partner of the project. In mid-1999, the NRC team began working with U.S. Air Force personnel to set up a case study of Y2K and the Air Force. Sets of interviews were conducted at a stateside (CONUS) and overseas (OCONUS) base both before and after the end-of-year rollover. These interviews involved not only working groups on these bases but also policymaking units. Supporting phone interviews were conducted throughout the project. Then on April 14, 2000 an all day Air Force-wide Y2K Lessons Learned Workshop was held in Washington, D.C.

The resulting story was that of an extremely large, highly diverse, technologically dependent, global organization and its efforts to address a widely dispersed, simultaneous threat to its information infrastructure (Haselkorn, forthcoming). The story of the United States Air Force and Y2K was neither simple nor straightforward. It involved numerous diverse and interrelated elements that were changing over time; it presented many seemingly contradictory perspectives; but most importantly it was a story rich in hard-won, often painfully acquired insights.

Y2K was a unique event for the Air Force, as it was for most organizations that rely on information and communication technology (ICT) to accomplish their mission. The Air Force response to Y2K evolved over a more than five-year period. It ultimately involved thousands of people throughout 108 bases interacting in varying, often non-traditional ways to address perceived threats. In addition, hundreds more people at numerous major Air Force units were active in developing guidance and support packages and in monitoring their implementation, while personnel involved in the acquisition, design, development, fielding, maintenance, security, and use of systems and applications also responded from their particular perspectives. Whatever the state of an organization's strategic management of ICT, Y2K stressed existing practices in ways that had never been stressed before.

To understand the story of the Air Force and Y2K, it was necessary to understand a wide array of critical issues pertaining to the evolving strategic management of information and the "new infrastructure" that makes this information so potentially powerful. The case study provided lessons under three interrelated headings: (1) lessons for managing ICT complexity, (2) lessons for aligning organizational and ICT strategies, and (3) lessons for managing ICT risk, including infrastructure protection and assurance. In each area, lessons were derived from the analysis of interrelated and dynamic responses of various Air Force elements to the perceived threats of Y2K.

[3] Statement of Work, "Managing Critical Infrastructure Vulnerabilities Arising from System Interdependencies: Lessons for the Air Force from Y2K," 16 August 1999.

The fact that Y2K did not result in widespread catastrophic failures has led many people to quickly forget this experience, yet the lack of obvious impact actually made it a richer source of critical lessons for strategic management of information and communication technology. Rather than being a story of fundamental flaws and cascading effects, it was a story of maintenance and modernization, life-cycle management of systems and software, functional interdependency and continuity, guidance policies and certification, system ownership and responsibility, training and organizational roles, security and information assurance, and system vulnerability and robustness. Y2K tested the evolving Air Force system for management, modernization, and protection of information and its supporting infrastructure.

The end result of this work was partly specific to the United States Air Force and the conclusions and recommendations were tailored to its interests and needs. However, it was not just the story of an Air Force problem. Every organization that relies on ICT to accomplish its objectives faces the same difficult challenge—how best to manage the totality of their ICT assets within the context of their organizational environment and strategic objectives. The challenges of managing information and its supporting infrastructure are common to all modern organizations; the Air Force is far from alone in facing them.

As demonstrated in this project, technical communicators are uniquely suited to uncovering and recognizing the general value of complex lessons related to the use and management of information.

Conclusion

We have presented three projects where technical communicators are bringing critical value to wide-ranging issues related to information and supporting technology. This value stems from our unique focus on the human aspects of these endeavors.

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Dr. Geoffrey Sauer is an Assistant Professor of Rhetoric and New Media in the UW TC Department at the University of Washington. His doctoral work at Carnegie Mellon studied information architecture in content management systems, particularly those employed in cooperative electronic publishing systems. His recent work, including his forthcoming book Negotiating Internet Culture, studies relationships between the past of publishing and challenges faced by technical communicators today confronting the task to remediate new media without replicating the limitations that 'old media' placed upon professional writing yet somehow continuing to take advantage of the forces which encourage rapid adoption of electronic document systems.

Dr. Jennifer Turns is an Assistant Professor of the Department of Technical Communication (TC) in the College of Engineering at the University of Washington. Dr. Turns' research interests include audience analysis, user-centered design, information design, learning, and the role of technology in learning. For the past two years, she had led the audience analysis research efforts associated with the Arthritis Source website--a website devoted to providing user centered health information to learners-at-large. She is currently helping the Arthritis Source team organize the content development, website evaluation, and user interactions around a knowledge building community framework.