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▶ Re-Considering the Nature of Value in Communication Design.....	4
▶ Special section introduction: Examining the Context of Technical Information Use.....	9
▶ What is an Information Source? Information Design Based on ▶ Information Source Selection Behavior.....	12
▶ Technical Communication Practices in the Collaborative Mediascape: A Case Study in Media Structure ▶ Transformation.....	20
▶ User Value and Usability in Technical Communication: A Value-Proposition Design Model.....	26
▶ Designing Online Resources for Safety Net Healthcare Providers: ▶ Users' Needs and the Evidence-Based Medicine Paradigm.....	35
▶ Editorial: Re-considering Research: Why We Need to Adopt a ▶ Mixed-Methods Approach to Our Work.....	46
▶ Review: The Language of Technical Communication.....	51
▶ Review: The Mobile Story: Narrative Practices with Locative Technologies.....	56

Communication Design Quarterly

Communication Design Quarterly (CDQ) is the peer-reviewed research publication of the Association for Computing Machinery (ACM) Special Interest Group on Design of Communication (SIGDOC). CDQ seeks to be a premier source on information and communication design for individuals in industry, management, and academia. CDQ contains a mix of peer-reviewed articles, columns, experience reports, and research summaries on topics of communication and information design, and it is archived in the ACM Digital Library.

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Re-Considering the Nature of Value in Communication Design

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The concept of value is one of the most complex aspects of the communication professions. Most organization, for example, would admit effective communication adds value to almost any process. After all, effective communication helps members of an organization perform tasks more effectively (enhancing the value their work contributes to the organization). It also helps clients/customers view products as meeting their needs – thus contributing value to the individual’s daily life. Yet determining how communication contributes value is a trickier prospect.

(INTER)CONNECTED SOURCES OF VALUE

For individuals in usability-related professions, demonstrating the value one adds would seem relatively easy; the very focus of the field is to identify problem areas and improve product design. But does making something more *usable* inherently make it more *valuable*? If the user never even picks the item up to begin with, the work of the UX professional is moot in terms of value gained by the company. So, is the value usability contributes to an organization inherently subservient – or secondary – to the primary value of marketers: the individuals who get customers to try an item in the first place? Or are the value contributions of UX professionals and marketers ancillary to the engineers who design the products?

This *value spiral* (i.e., who is beholden to whom to gain the opportunity to contribute value) could seemingly go on forever. What it makes clear is value – that factor so many entities focus on – is multifaceted in nature and difficult to assess. Yet as more organizations strive to excel in today’s marketplace, members of

the workforce need to know how they contribute value in order to advocate for what they do and how they do it.

How then to approach this issue? How can one identify and examine the interconnected parts that allow for value to emerge – and be recognized – in a system? The answers can perhaps be found in the paradigm we use when thinking of value.

As the idea of value spirals reveals, the perceived value individuals contribute is connected to the context in which they work and in which their organization operates. Changes in the internal (i.e., organizational) or external (i.e. greater societal) contexts, thus, affect how an individual's actions are seen in terms of what adds value. The intricate connections across such parts means change is a constant, for a shift in one area of this overall system – be it a society or an organization – creates a change in how value is determined and actions are assess in other parts of that system.

ECOLOGIES OF VALUE

In many ways, the contexts in which definitions and expectations of value exist are like an ecological system. In these systems, small changes to the activities of one part of an environment have a ripple effect that eventually causes shifts in how the overall environment operates. To this end, individuals working in communication fields might think of these systems as *ecologies of value* – a complex web of dynamic elements continually in flux and constantly being changed by while also changing the other entities in the world around them.

Understanding such ecologies of value involves identifying the elements co-existing and co-affecting each other in such environments. Within this framework, identifying the ecological variables affecting perceptions of value is particularly important. Once known, individuals can study such variables to see how they work – how they affect and are affected by that individual. In so doing, one can better comprehend ideas of value as driven by this affect-affected by relationship. One can also begin to define what value is (as it relates to what others do or how others use one's work). The individual can then use this definition to monitor how variables affecting ideas of value might shift over time.

IDENTIFYING VARIABLES OF VALUE

The central premise of this ecological model is relatively easy to grasp. The challenge comes with identifying the actual variables individuals need to track to understand value expectations within an ecosystem. The entries in this issue of *Communication Design Quarterly* (CDQ) represent an initial step toward mapping these variables in the context of this greater ecology of value. They do so through a range of genres – from a special section on technical information to a literature-based approach for considering value to an editorial advocating the expansion of how we do research.

The topics, ideas, and approaches in these entries reveal how factors of subject, relationships, materials, contexts, methods, and actions all act as variables in ecologies of value. That is, each of these items affects how individuals perceive the value of something as relating to a given setting. These factors also influence how individuals use communication artifacts to contribute to or enhance the value of their activities in organizational and societal contexts. Interestingly, the contributors to this issue represent a range of backgrounds across national and professional boundaries. They also represent the voices of individuals speaking at different points in their communication-related careers. Thus, while these entries are limited in number, the authors do represent a relatively broad swath of perspectives on value in the field.

This issue of CDQ begins with a special section that examines how the design of technical information can affect the value associated with informational products. Drawing from presentations given at a 2013 international symposium sponsored by the information system research group at Mid Sweden University. Lena-Maria Öberg introduces this section by overviewing the original event and summarizing the papers selected to appear in this special section. This introduction is followed by C. Söderlund and J. Lundin's examination of factors maintenance technicians (i.e., individuals who maintain and repair equipment in manufacturing settings) use in selecting informational materials to assist with work activities. In so doing, they provide important insights on the contextual factors individuals use to determine the value of informational materials in workplace contexts. In the section's

second entry, Jonas Löwgren uses a case study to reveal how a range of individuals and approaches can contribute value to the process of product development if an organization is willing to re-think approaches to production. Through these entries, the authors of this section provide ideas for identifying variables that can affect perceptions of value in complex workplace ecologies.

This focus on value continues in Keshab R. Acharya's entry, which directly examines ideas of value and challenges perceptions of how individuals have approached this topic. In his entry, Acharya argues prior approaches to defining the value one adds (e.g., comparing initial costs against perceived or actual gains) is ineffective. He instead advocates adopting a user-centered approach to value and on defining value in terms of improving the lives of users vs. amassing profits. As such, the user becomes a participant in the process of creating value vs. the recipient of a product design to maximize value (i.e., profits) for a company.

Dawn Opel's entry highlights how the value fields associate with different approaches to conducting and reporting research can lead to cross-disciplinary communication problems. To do so, Opel reviews an interdisciplinary project in which team members collaborated to create informational sources for healthcare organizations. Her analysis reveals how different values associated with Evidence-Based Medicine (EBM) resulted in disconnects affecting how team members approached this common task. In so doing, Opel also presents strategies individuals can use to address such discipline-related value differences when working in multidisciplinary teams.

Next, SIGDOC Chair Claire Lauer extends ideas of value into the realm of research practices. In her essay, Lauer argues current research perspectives that focus only on certain methods of data collection (i.e., qualitative ones) limit the value of academic inquiry by restricting what individuals can investigate and how. Lauer advocates the field adopt a mixed-methods (i.e., qualitative and quantitative) approach to research. She notes how such an approach can contribute value to the field by expanding what we research and how we examine ideas. Lauer then concludes with 10 strategies for adopting mixed-methods approaches into research activities and doing so in ways that add value to such processes.

The issue then concludes with reviews of two books that examine different aspects of professional communication. In the first entry, Sean Moxley-Kelly reviews Ray Gallon's collection *The Language of Technical Communication*. The text, which provides definitions and summaries of 52 terms, offers insights into concepts seen as having value in a given area. The second entry, Adam Strantz' review of Jason Farman's edited collection *The Mobile Story: Narrative Practices with Locative Technologies* discusses how individuals create digital stories/narratives via mobile media. In organizing ideas into six thematic sections, Farman's text identifies variables that can affect how individuals perceive value (and their ability to contribute value) in mobile contexts. Through these reviews, both Moxley-Kelly and Strantz help us expand our understanding of contexts of value by highlighting variables associated with adding/creating value in different situations.

The notion of value often seems founded in the perceptions and perspectives of the viewer. It is the case of "I can't quite define what it is, but I know it when I see it." By thinking of value in terms of complex ecologies of interconnected parts, communication designers can move past limitations of perception-based recognition and identify variables that can guide future actions. The entries in this issue, in turn, provide insights into factors to consider as we re-conceive ideas of value in today's workplace and society.

Special section introduction: Examining the Context of Technical Information Use

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On 9-10 October 2013, the information system research group at Mid Sweden University arranged an international scientific meeting on the theme *Technical Information* (TI). The event's organizers consciously kept the theme broad, but they also intentionally paired this general theme with a number of sub-themes, namely *Organizational Learning*, *Information Design*, *Information Management* and *Organizational Benefit*. The objective of this design was to examine this overall topic from a range of perspectives.

For this event, fourteen researchers from Croatia, the Netherlands, and Sweden participated in a two-day meeting in Östersund, Sweden where they discussed their work and examined possible future work within the field of TI. When the meeting was planned, once central objective was to identify a means of sharing ideas generated by this event with others. This initial objective was the foundation for the special section that appears in this issue of *Communication Design Quarterly* (CDQ).

After reviewing the abstracts submitted for this event, the organizers selected two for development into full manuscripts for this special section: one paper authored by the team of Carina Söderlund and Jonathan Lundin (both from Mälardalen University) and the other entry written by Jonas Löwgren (Linköping University). These entries were selected because both were directed toward the user perspective of TI, and both included thoughts on design. As such, these two entries best fit CDQ's aim of examining design aspects of communication.

The authors of these entries present two very different perspectives, but there are also interesting connections across the ideas reported in the two articles. Both, for example, address an underlying question about what kind of competencies are needed when working as a technical communicator today.

The first entry, by Söderlund and Lundin, presents a study that overviews the process service engineers use to select different information for application in workplace contexts. In this piece, the authors present insights into how the process by which service engineers, as technical professionals, seek information depends on how they, as professionals, define “information” in workplace settings. Söderlund and Lundin find these engineers generally do not use the manuals created by technical communicators; Instead, they often rely on other sources of information. Söderlund and Lundin then conclude with an open question asking if collaborative social media platforms might work as a way for technical communicators to collaborate with service engineers in the sharing of information. This idea is interesting, for the second entry in this special section – the article by Löwgren – almost appears as an answer to this question.

In the section’s second article, Löwgren presents an example of an ongoing research project where TI has been produced in response to new online communication and collaboration practices. In reviewing the communication activities of a particular company (Sigma Technology), Löwgren describes a shift from producer/consumer or designer/user to more collaborative work practices. This shift might provide insights on the evolving role of technical communicators, for the term “producers,” as Löwgren explains, reflections attitudes related to a designed-based research project where a new platform have been designed (DocFactory) to support production and consumption of TI.

The entries by Söderlund and Lundin, and by Löwgren present ongoing research that provides examples of possible, user-focused solutions to real-world communication design situations. As such, these two articles represent a possible shift that could indicate the competencies technical communicators might need to be successful in the modern work context – competencies technical communication educators will need to consider and address in the

future. The authors of the articles in this special section are well aware a shift like this will meet challenges and raise questions about job security, employee responsibilities, and management configuration. Yet the authors of these two entries clearly note something has to be done when it comes to information design in technical communication in order to better meet the needs of users in today's workplace. As such, these two articles provide technical communicators – and technical communication educators – with valuable insights on how to consider, examine, and address such factors.

What is an Information Source? Information Design Based on Information Source Selection Behavior

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ABSTRACT

This article examines information source selection behavior among maintenance technicians and how this behavior might influence the design of technical information. For this entry, “maintenance technicians” are individuals who maintain machine equipment (e.g., generators or bearings) in industrial enterprises, and this process includes the troubleshooting of problems and the repairing of machine equipment. In this entry, the authors use a review of the literature on information source selection behavior to discuss core concepts within the field of source selection behavior. Three of the main concepts examined are “information,” “information source,” and “source preference criteria.” These core concepts function as a frame of reference for discussing how maintenance technicians might select information sources to perform maintenance activities. The authors also use these concepts to review why certain sources are selected for use over others. The results tentatively suggest maintenance technicians prefer information sources that can be adapted to specific workplace contexts.

Categories and Subject Descriptors

H.0 Information Systems: General

General Terms

Documentation, Design

Keywords

information-seeking behavior, information source selection behavior, source preference criteria, information design, technical information and communication

INTRODUCTION

This article examines the information source selection behavior of maintenance technicians and maintenance technicians—or how these individuals seek and select technical information for use in workplace contexts. In so doing, the article also examines how such behavior can provide insights relating to designing technical information to encourage use by these individuals. For the purposes of this article, the authors define a “service engineer,” or a “maintenance technician,” as someone responsible for performing maintenance activities in industrial settings (e.g., repairing rollers in a paper mill). These processes can involve servicing, predicting, troubleshooting, analyzing, and diagnosing the condition of machines and/or repairing equipment.

Maintenance technicians have numerous types of information at their disposal when engaging in such processes. When seeking information to perform a maintenance work task, these individuals select certain sources (Lundin, 2015). Knowing which sources these engineers consider relevant and why is important for researchers and practitioners in information design and technical communication. Through understanding the factors that influence information selection behavior in such contexts, information designers and technical communicators can take steps to create technical information so maintenance technicians will be more likely to use it when performing work tasks. The challenge involves identifying and addressing those factors maintenance technicians considered when determining a relevant or a preferable source of information.

This article examines how and why maintenance technicians select particular source of information when engaged in the task of maintaining machine equipment in an industrial setting. The entry also discusses how technical communicators and information designers might use an understanding of information source selection behavior to develop technical information that will be more readily selected and used by certain audiences. To address this topic, the authors first overview the work tasks of maintenance technicians and the technical information they often use in various work situations. Next, the authors describe the methods they used to investigate this topic. In so doing, they also present core concepts,

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the literature in library and information science note, in relation to information source selection behavior. The authors then explain how such concepts can be applied in a maintenance situation. In so doing, they introduce a source preference criterion that leads to a tentative hypothesis on why maintenance technicians select a specific information source. Next, the authors present a method technical communicators and information designers can use when developing information resources for maintenance technicians and they also discuss future directions individuals might take to explore this topic.

MAINTENANCE TECHNICIANS' WORK TASKS AND THE USE OF TECHNICAL INFORMATION

According to a study Byström and Järvelin (1995), more complex work tasks might require the use of several sources of information. For maintenance technicians, this factor is complicated by their performing of tasks in an industrial setting. Moreover, such tasks are often comprised of several subtasks (e.g., the analysis of machine problems/faults, the forecasts of the condition of machines, and the planning of a suitable maintenance solution). Failure to effectively complete any of these tasks or subtasks can result in a range of negative consequences. Likewise, incorrectly performing a maintenance activity on machine equipment can result in financial losses, damage to the equipment, or even negative effects on the environment. Additionally, if equipment is not effectively maintained, guarantees or insurances that would offset repair costs might be considered invalid, and the equipment's durability could be affected.

In such situations, technical information is central to performing effective maintenance and repair activities. (In this article, "technical information" refers to single modes and multiple modalities across a diverse range of communication channels and media.) To date, however, little research has been conducted on how maintenance technicians seek technical information when performing maintenance activities and work tasks. Yet, technical communication research and research on human-computer interaction demonstrates information sources, such as printed manuals, are generally less preferred (Martin et al., 2005; Aparicio, Costa, & Pierce, 2009) and rarely used as an information source (Ceaparu et al., 2004; Mendoza & Novick, 2005; Novick & Ward, 2006a; Bean, Elizalde, & Novick, 2007).* In fact, users who operate software programs in their work might prefer to consult online help vs. using a printed manual (Ceaparu et al., 2004; Mendoza & Novick, 2005; Novick & Ward, 2006a; Bean, Elizalde, & Novick, 2007). Moreover, computer users at work might not consult any type of information source at all; they might instead simply ignore a problem or to leave it unresolved (Ceaparu et al., 2004). In fact, a common alternative to using technical documentation in workplace contexts seems to be asking someone else to provide an answer or address a problem (Ceaparu et al., 2004; Mendoza & Novick, 2005; Novick & Ward, 2006a; Aparicio, Costa, & Pierce, 2009; Welty, 2011).

Engineers tend to follow a similar pattern when at work, and they often rely on colleagues and information they have produced themselves as a source for addressing problems (Allard, King, & Tenopir, 2009). According to Lundin (2015), such behaviors also apply to maintenance technicians, and they similarly design their own documents, which they use more than formal digital sources of technical information. Interestingly, Lundin's research indicates

maintenance technicians do not use machine manuals when maintaining the machine equipment. These factors and behaviors are important, for manufacturers spend some portion of their product development budget on designing such printed sources of technical information. Thus, the more technical communicators and information designers know about the information source selection behavior of maintenance technicians, the better they can design documentation these users will consider relevant.

METHOD

To examine this topic, the authors reviewed the literature on information source selection behavior to identify core concepts library and information science has noted on information source selection behavior. The authors selected this literature for review based on previous research within that discipline, as well as research related to the domain of production maintenance.** In performing this review, the authors focused on concepts that function as a framework for understanding how and why maintenance technicians seek and select information sources when maintaining machine equipment in an industrial setting.

The search terms the authors used for this process were

- Information-seeking
- Information search
- Information behavior
- Information source selection behavior

The authors limited their search to these terms because they are frequently used in the literature on information source selection behavior. The main databases the authors then searched were

- Web of Science
- Google Scholar
- Science Direct and Information Science & Technology Abstracts (LISTA)

The authors selected these specific sources and databases because they cover a large number of topics, journals, and conferences, and entries on these topics were found mainly in the field of library and information science.***

CORE CONCEPTS AND INFORMATION SOURCE SELECTION BEHAVIOR

For this article, the authors consider "perceived information environment," "information source," "source preference criteria," and "information source horizon" as core concepts that guided the search process. They believe this to be the case because scholars in the library and information science literature tend to use these concepts to describe and explain individuals' information source selection behavior in everyday life settings.

The concept of "information source" is central in literature on information source selection behavior; however, this study found this concept to be vaguely defined in the library and information science literature. In addition, the authors found the concept of "information" is rarely problematized within the research literature in library and information science. To address this factor, the next sections of this entry present definitions of these core concepts and discuss their relations to and applications in maintenance situations in industrial contexts. The objective of examining these core

concepts is to help readers understand how they connect to aspects of use in industrial settings.

Information Source, Source Preference Criteria, and Information Source Horizons

Wilson (1999) illustrates information-seeking and information searching is a part of an individual's information related behavior. According to this perspective, one way of approaching information-seeking is as a subtask of a work task (Byström & Hansen, 2005; Li, 2009). When seeking information, one subtask is to select a source of information to help with completing the task; another is to interact with the information in that source via a process often referred to as *searching*. Based on this idea, an information source can be characterized as both

- An entity an individual selects as a source to search to find information
- The interface with which the individual interacts (i.e., analyses and interprets) when seeking certain information

According to this approach, the authors consider an “information source” part of a larger context referred to as an “environment.” The concept of “information environment” is used in several disciplines, but can have different meanings. Stonier (1990), for example, defines an information environment as a personal context—an individual's previous experiences (“knowledge structures inside the brain”) that influence how someone interprets information (p. 22). In such a case, an information environment is subjective. Thus, when it comes to individuals' information source selection behavior, Savolainen and Kari (2004) maintain an individual is aware of the information sources that surround him/her in a specific everyday environment (i.e., a perceived sources of information in an environment), and this environment changes quite slowly.

Research in library and information science has long examined why individuals seek information, and there are different theories that attempt to explain such behaviors. Belkin (1982), for example, suggests information-seeking is a conscious act individuals perform to obtain information in order to resolve a problem. According to this perspective, an individual needs information because her or his current knowledge is not enough to or is not adequate for solving the problem. For this reason, the individual seeks relevant and preferred information sources. Thus, the need for information triggers an information-seeking task.

It is worth discussing how conscious an individual is of the information-seeking process and how aware a person can be of the judging of information sources and their relevance. There are probably situations where individuals are less aware of their judgment and choices (e.g., when acting on a routine or a habit). Research in judgment and decision making, however, suggests an individual not only makes a decision on the basis of content information, but also on the basis of affective factors (e.g., feelings, as in “I sense this is a good source of information,” such a positive or a negative mood or attitude.) (Bless, Greifeneder, & Pham, 2011).

Such circumstances lead to the concept of “relevance,” which is fundamental in library and information science, though its definition is debated in the field (Saracevic, 2007a and 2007b). What then makes something relevant? Savolainen and Kari (2004) suggest different source preference criteria constitute a foundation individuals use to judge how relevant information sources are in the perceived information environment where information is needed.

It seemingly comes down to preference and what factors influence it. For example, in a study on everyday information-seeking, Savolainen (2008) classified source preference criteria into five groups: Availability of information, accessibility of information, content of information, usability of information sources, and user characteristics.

The results were to some extent contrasted with studies by Barry and Schamber (1998), who reported 10 relevance criteria categories when an individual is in need of information in a work task. These criteria include: Depth/scope/specificity, accuracy/validity clarity, currency, tangibility, quality of sources, accessibility, availability of information/sources of information, verification and effectiveness.

Moreover, in terms of aspects of preference in relation to selecting sources, some research indicates accessibility might be the most prominent factor that affects engineers' selection of an information source (Fidel & Green, 2004). However, even though numerous studies have examined the concept of accessibility, there still seems to be no common definition of it.

When seeking relevant information sources, the individual can imagine and visualize them in a so-called “information source horizon” (Savolainen & Kari, 2004 referring to Sonnenwald, 1999). Which information sources are visualized within this horizon depends upon how relevant individuals judged those sources to be in a given situation. Sources that are considered most relevant and preferred are imagined as being closer to the individual and more likely to be selected. Conversely, sources considered less relevant are often visualized to be farther away and are less likely to be selected. Thus, the information source that seems to be most relevant is often selected first. If an individual finds the source to be not as good as was thought, he or she might then move on to other information sources previously been considered less relevant (Savolainen, 2008).

According to this framework, exposure over time allows individuals to become familiar with different information sources in their everyday life and work environments. Exposure thus affects perceptions of what constitutes a “relevant source” and is thus subjective. There are, however, different source preference criteria that influence the sources of information an individual finds relevant. These source preference criteria are categorized in different ways in the literature. The categories, moreover, do not always have a clear organizational schema because some categories might be sub-categories of others. According to this perspective, source preference criterion is brought to the fore in the interaction between an individual and the source. Thus, while the concept of information source is central in the literature, the concept of information remains vaguely defined.

The Concept of Information in Library and Information Science Literature

It is perhaps not surprising divergent disciplines and scholars relate differently to the concept of “information” (Capurro & Hjørland, 2003; Floridi, 2004; Dodig-Crnkovic, 2006). Information, for example, has been given a multitude of definitions in information science (see Bateson, 1972 and 2000 as well as Stonier, 1990). It is thus important to consider the question “What differences does it make if we use one or the other theory or concept of information?” (Capurro & Hjørland, 2003, p. 396). Within this context, a distinction made in library and information science needs to be considered, namely a subjective or an objective approach to the

concept of information (Capurro & Hjørland, 2003; Hjørland, 2007). Buckland (1991), for instance, suggests information can be described in three different ways, and one of them is as “a thing” individuals experience differently. From this perspective, information is subjective and situation dependent. Stonier (1990), by contrast, argues information is a “property of universe” (p. 17), which means it does not need to be perceived, understood, interpreted or have any meaning in order to exist.

At this point, the information theory of Bates (2005; 2006; 2008) needs to be described in more detail, for it is developed for information-seeking behavior studies and has been applied in empirical research on workspace design (Andersson Schaeffer, 2014) and maintenance technicians’ interpretation and use of technical information when maintaining machine equipment in the process industry (Andersson, 2010; Andersson & Bengtsson, 2009). Bates’ information theory describes the relation of the process of *semiosis* (an individual’s interpretation process) and the concept of information. Information, for Bates, is included in all the parts of semiosis and what constitutes a sign—namely the interpretation, and/or object, and/or expression akin to the theory of Peirce (1867, in E. C. Moore, Ed. 1984).

In Bates’ theory, different sub-types of information (so-called *information forms*) are defined. (While Bates’ theory comprises all living organisms, the scope of the present article is limited to human beings, and only five of Bates’ information forms are dealt with in the article.) Such information forms should not be confused with information as a “thing.” Instead, they relate to patterns formed and transformed between humans and in the human body (experience information), through oral and bodily communication (expressed information), through different modalities such as words, images, and sound (recorded information) on a monitor, or measurement tools, a whiteboard, or a showcase, for example (embedded information). Bates also considers social interaction among people (enacted information) and their interaction with the surroundings as part of this process – for instance a built space or tools and machine equipment. In such situations, the information forms interact with and influence one another.

Bates’ theory has attracted some criticism. According to Hjørland (2009), for example, Bates’ information theory comprises a subjective as well as an objective approach to the concept of information. Hjørland goes on to argue one should choose one of them, but not both. For Hjørland, information cannot simultaneously be an objective phenomenon and carry meaning. That relation in linguistics is arbitrary, and any object can carry any meaning.

However, there is a problem with this criticism. It can be questioned whether an object can carry meaning at all, and there are different theories regarding the relation between an object and its meaning. The relation is not only considered arbitrary, it can be based on similarity as well—as highlighted by Peirce (Peirce, 1867, in E. C. Moore, Ed. 1984, p. 49-59). Moreover, Kress and van Leeuwen (2006) discuss designed artifacts (e.g., technical documentation) and argue signs are not arbitrary: they are motivated “conjunctions” of form and meaning (p. 7). Such an approach is fruitful among design scholars, for they regularly deal with artifacts/services designed by someone for someone and created with an intended function and purpose in mind.

To conclude, in order to understand the concept of information source, it is essential to relate to the concept of information. Moreover, when selecting an information theory, it is relevant for technical communicators and information designers to apply

a theory that considers the relationship between information and a sign. Furthermore, it is relevant to apply an information theory that does not merely describe signs as arbitrary, for such a theory becomes limiting in design thinking.

CONTEXT AND INFORMATION MAINTENANCE TECHNICIANS’ INFORMATION-SEEKING BEHAVIOR

Previous research indicates maintenance technicians (maintenance technicians) interact with several information forms associated with different contexts while analyzing a machine’s condition and deciding on maintenance activities (Andersson & Bengtsson, 2009). According to this perspective, the concept of context can be approached as a phenomenon in which the individual is either excluded and/or included (Johnson, 2003, p.739). There are thus numerous ways of categorizing or describing so-called contextual variables as elements of contexts or contextual factors (e.g., Courtright, 2007, p. 287 and Johnson, 2003 on contexts and information behavior and information-seeking). Sonnenwald (1999), for example, suggests that a broad context may contain narrower contexts, and that a situation happens in a context.

A common and simplified way is to discuss a broad context that includes other contexts in terms of outer, close, and inner context; the boundaries of these contexts are, in turn, defined by the investigator. The idea is contexts influence how an individual interacts with, perceives, and interprets information. To explore such relations, previous research in this area combines the concepts of information and contexts when maintenance technicians maintain machine equipment in industry settings. For instance, if a machine on the shop floor makes disturbing vibrations, a service engineer might confirm abnormal vibration via graphs and alarm symbols (recorded information) by using a computerized maintenance management system (CMMS) and its monitor (embedded information) that relates to inner contexts. In this scenario, as the service engineer tries to find the cause of the vibrations, she or he considers the experiences of fellow maintenance technicians or operators who work with the machine on a daily basis on the shop floor (experienced information). The service engineer and the fellow operator start to communicate (expressed information) in order to discuss the machine’s history of vibrations, which relates to close contexts.

Moreover, the service engineer might consult previously written notes (recorded information) on the machine’s history over time (e.g., previous service and reparations or reconstructions for instance) – notes that relate to inner context. Based on this information, the service engineer can decide on a maintenance activity and stop the production flow immediately, or she or he can plan to wait and instead repair the machine during a scheduled stop time. How maintenance technicians act on the shop floor and how they interact with other maintenance technicians and operators within the industrial setting (enacted information) depends on factors such as the company’s policies, tradition, and culture that all relate to outer contexts.

Accordingly, the interaction of information forms influences the maintenance technicians’ interpretation and use of accessible technical information. For instance, it is not always the case that a service engineer reacts immediately to an alarm symbol indicating a machine fault. Maintenance technicians working with condition monitoring in a process industry use monitor software to regularly check the machines’ status. When a symbol turns red

on the monitor, it indicates a machine fault. This alarm depends on software settings, among other things. Instead of taking more drastic action, the service engineer might consult the written notes regarding the machine's history and/or chat with colleagues about it in order to find additional information or new information. One reason maintenance technicians interact with several information forms in this way before deciding on a maintenance action is to reduce the risk of undertaking unnecessary or wrong and costly activities (Andersson, 2010).

RESULTS AND FINDINGS

The concept of "information source" is vaguely defined in the research of information source selection behavior. Moreover, the concept of "information" is rarely problematized. Hjørland (2009) thus argues, "The physical stuff in itself is not information until it is used as a sign" (p. 643). Information is subjective: it is associated with what is informative for an individual person (Capurro & Hjørland 2003, p. 350). Based on core concepts from literature in information source selection behavior, it appears that when a service engineer seeks information, any form of information can become an information source depending on the process of semiosis. In such cases, it is the information source that is considered a sign, and the source is thus context and situation dependent. It is the information source that will be considered informative or not to an individual.

Overall, a service engineer selects relevant information sources, and this behavior is based on some source preference criteria due to factors such as previous experiences. Whether a source might be considered less relevant or not considered a source at all depends on the service engineer's interpretation process. Accordingly, what is not considered to be a relevant source of information at one point in time might become a relevant information source later on. Through their daily work, maintenance technicians gain an experience and awareness of available information sources. It is reasonable to believe such a perceived information environment is dynamic and might change quite often as information forms relate to contexts. Thus, what is considered an information source is subjective and dependent on the situation. This entry suggests maintenance technicians prefer information sources that can be adapted to the interaction of information forms in a diversity of contexts, namely context adaption.

Maintenance technicians in industrial settings might interact with several information forms when deciding on a maintenance activity (e.g., technical information displayed on a monitor or fellow operators and other maintenance technicians). These forms can be considered information sources that are adapted to contexts because they reflect the interactions of information forms in the industrial setting. Accordingly, context adaptation as a source preference criterion has not specifically been discussed in the library and information science literature.**** However, there are situations where context adaption as a source preference criterion is not brought to the fore as much as in an industrial machine maintenance context. Moreover, the present description of an information source selection behavior may suggest a rational and conscious behavior that, however, is not always the case.

APPLICATION OF FINDINGS IN DESIGN PRACTICE

The findings summarized here suggest an information source is context and situation dependent. They also suggest maintenance technicians prefer and select a relevant information source based on

some source preference criteria. One criterion might be to select an information source that is adapted to or can adapt to contexts due to the interaction of information forms. A designer, however, cannot control which information form/s a service engineer will consider as an information source in a maintenance work task situation. Nevertheless, it is possible to perform empirical studies to gain knowledge of which information sources they select and why.

Information Source Selection Behavior-Based Design

Based on the findings covered in this entry, the authors propose technical communicators and information designers use the following method to better understand and address factors of source selection behavior. This proposed method is based on how and why maintenance technicians select an information source and is particularly relevant in the initial stage of the design process. The approach works as follows:

- Step 1: Map relevant types of information available in the industrial setting—particularly associated with the maintenance activities and work of maintenance technicians. (For instance, the CMMS, work orders, minutes of meetings, visual management boards, machine manuals, and checklists etcetera.)
- Step 2: Identify the maintenance technicians' high-level (main) work tasks when maintaining machine equipment. (Other respondents can be machine operators, or other employees performing maintenance activities.)
- Step 3: Describe what information sources the maintenance technicians use, how often, in what order, and for what work tasks and problems/situations. Note that such a source may include a sign with the object/machine number, colleagues' notes regarding maintenance activities, and other information sources (i.e., that are not designed by a technical communicator).
- Step 4: Analyze why maintenance technicians perceive the selected information sources to be informative—in other words,
 - Determine why are they considered as relevant information sources
 - Analyze why other types of information were not selected by the maintenance technicians

When exploring maintenance technicians' information source selection behavior in a work task situation, new/improved designs may be explored. Assume, for example, the application of the afore-mentioned method indicates the maintenance technicians consider a colleague (e.g., a repair person) as the only relevant information source, for the maintenance technician works in a team that includes this individual. In such a case, technical information can be designed for a mobile phone, which maintenance technicians might quickly and easily make available and/or a social media platform that would support communication amongst colleagues. Another possibility is to design a place (a location) that supports maintenance technicians and their colleagues in the communication of maintenance-related issues.

In both cases, technical information is designed to correspond to the maintenance technicians' information source selection behavior and to the specific information sources a maintenance

technician selects. (However, there may be different reasons why a maintenance technician might interact with it.) For instance, different visualizing techniques provide different possibilities to adapt to a context. Photos of changes in a machine's current state/configuration and surroundings (e.g., rust, oil spill, etc.) are a way to adapt to context. Photos, however, might not be the best choice to convey certain information, as previous research indicates line drawings are actually more readable. Nevertheless, line drawings, like engineering drawings, could also be difficult to interpret, for doing so requires some level of expertise. Moreover, if the machine is rebuilt (reconstructed), the original engineering drawing might no longer be accurate and therefore not adapted to the current contexts in which the machine is being used.

To conclude, existing technical information might not be viewed as a relevant information source only because it is published in another medium (e.g., a mobile phone). The information designer might also have to consider the presentation of the information. If, for instance, an engineering drawing is stored in a mobile phone, a maintenance technician might select the phone because it is easily available. Nevertheless, if photos of the machines' surroundings are not accessible, the maintenance technician may not interact with the phone.

FUTURE DIRECTIONS

Further investigation is needed to better understand context adaption as a source preference criterion. There is also a need for future studies on the methods and techniques used to provide possibilities of adapting technical information to contexts. This entry suggests a method information designers, such as technical communicators, can use to understand maintenance technicians' information source selection behavior. The proposed method has similarities with activity-centered design as well as a context-based design; these methods, however, address a larger design approach and are not specifically based on information source selection.

One way to create possibilities for technical information to be adapted to contexts involves allowing users, such as maintenance technicians, to run the design process and be active as designers of technical information. Björgvinsson, Brandt, and Hillgren (2004), for example, describe how colleagues in an intensive care unit produced videos about common tasks in order to aid peer-to-peer informal learning. Yet doing so might require specialist skills to test and evaluate the instructions. It probably requires knowledge of information design, audio-visual communication, and media production (as well as related to knowledge about humans' cognitive abilities to design readable and useful instructions). Within this situation, the question of how information generated by users can become a relevant, and preferred sources of information need to be further investigated.

A similar (and perhaps more common) approach is to make it possible for an individual to modify the content in a given system: namely, to allow maintenance technicians to add or remove content in a computerized maintenance management system (CMMS). This approach might be in the form of written comments about a machine's condition or engineering drawings or photos of machine equipment and machine components. Nevertheless, it might not be clear how to write or visualize information in a CMMS. More studies are thus needed on how maintenance technicians and their colleagues formulate their maintenance activities, troubleshooting results, etc. in the CMMS for it to become a preferable and relevant information source.

Another method can be co-production of technical information (e.g., via collaborative social media platforms). Technical communicators or other design practitioners can, together with maintenance technicians, jointly create possibilities for technical information to be a preferable and relevant information source. In this case, however, co-production is a novelty and needs further investigation.

Additionally, context-aware applications are available on the market and could be a useful tool for technical communicators to allow users to do things such as filter information based on situational factors (e.g., the users' location, users' interaction trails, etc.). It is common that the applications run on mobile devices and require wireless networks. Context-aware applications, however, are limited to digital media. This situation can be problematic in many industrial settings where wireless networks, the Internet, tablets, or mobile devices might not be present—or allowed (e.g., for safety and security reasons). Interestingly, the findings noted here indicate such an application would need to adapt to the interactions of different information forms in a diversity of contexts in an industrial setting to become a preferable and relevant information source for maintenance technicians.

CONCLUSIONS

It is vital for information designers and technical communicators to understand how and why maintenance technicians select the information sources they do. Why a source of information is selected depends upon an individual's source preference criteria. One source preference criterion suggested in the article is context adaption—namely maintenance technicians prefer technical information that is/can be adapted to the interactions of information forms.

Different forms of information interact in a diversity of contexts, related to a specific workplace context. An individual can thus interpret any information form as an information source, and an information source is, in turn, situation and context dependent. According to this perspective, the information designer (e.g. a technical communicator) designs information; however, it might or might not be considered “informative” to an individual and thus become a preferred or a relevant source of information.

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NOTES

* There are several reasons as to why technical documentation is neglected, for instance because the documentation is physically too hard to handle, too hard to navigate, too basic to be useful, hard to understand, unstylish, or out of date (Novic & Ward, 2006b, on computer software documentation).

** Literature related to epistemological ideas and knowledge theories fall outside the scope of the article and was thus not included in this process.

*** Examples of established journals in this field include the *Journal of the American Society for Information Science and Technology*, *Information Processing and Management*, and the *Journal of Documentation*.

**** Such a viewpoint does, however, provide insights into the concept of situational relevance as defined by individuals such as Borlund (2003).

Technical Communication Practices in the Collaborative Mediascape: A Case Study in Media Structure Transformation

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ABSTRACT

Professional practices in technical communication are increasingly being challenged by the emergence of collaborative media that enable users to access technical information created by non-professionals. At the same time, these technologies also allow technical communicators to provide a continually expanding audience with knowledge and skills needed now more than ever. Through a co-design case study, researchers developed a new and innovative platform for producing and distributing technical information including user-generated content. Moreover, the events of the case included market strategies in which a professional organization moved from a reactive to a more proactive position on collaborative media. In so doing, they outlined a set of new professional roles for technical communicators including editors, curators, facilitators, and community managers.

Categories and Subject Descriptors

H.0 Information Systems: General

General Terms

Documentation, Design

Keywords

social media, collaborative media, institutional policies, professional practices, mixed methods research

INTRODUCTION

This entry addresses the collaborative mediascape—the emerging digital infrastructures empowering people to communicate without the mediation of professional mass media actors. The specific topic examined is what the new communication practices of such contexts mean for technical communication and how these contexts provide new ways for technical communicators to leverage their professional skills. To this end, this article uses a co-design case study to explore new strategies technical communicators can use to collaborate via such media. The entry also reveals how technical communicators can pool their expertise to explore the challenges and the opportunities associated with such contexts.

COLLABORATIVE MEDIA CHALLENGING TECHNICAL INFORMATION

Everyday practices of technology-mediated communication have evolved drastically in recent years, and the most significant changes have to do with participation and collaboration. Traditionally, mass media production was a job for professionals who had access to specialized production tools, skills, and distribution channels, and their audiences were largely media consumers. Today, the distinction between producers and consumers is increasingly difficult to delineate. This situation is perhaps most clearly seen in so-called social media where all content production, curating, and editorial services are often all provided by the users (formerly thought of as consumers) rather than the media platform providers (formerly producers).

More generally, in these contexts, a growing number of non-professionals (i.e., individuals who are not employed to create, curate, or edit online content) engage in media production on various levels. Such engagements range from the most mundane content production and distribution—a simple like or a tweet in social media—to the production of highly competent and sustained artwork, novels, movies, and other creative and expressive media forms. This situation has been dubbed “produsage” (Bruns, 2008), and the people engaging in it can consequently be called

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“producers.” For this reason, we often refer to the class of media affording produsage as “collaborative media” (Löwgren & Reimer, 2013), and such media allow individuals to engage in a range of other practices, including non-professionals engaging in the ongoing redesign of the infrastructures themselves.

The field of technical communication is increasingly considering the significance of this development. It has been noted, for example, that the foundational objective of technical communicators and other technical information producers is to help people get the most out of their technical products. Such an objective, however, is also a concern shared by many producers (Swisher, 2010). In other words, it is increasingly likely a contemporary user of a technical product can find help, guidance, and other useful information created by fellow users and other actors not formally affiliated with the product.

This situation is not really new in itself; people have always tended to seek the advice of knowledgeable friends and colleagues as a complement to official technical information (i.e., materials created by technical communicators). What the rapid growth of collaborative media practices means, however, is the creation and distribution of and ready access to such unofficial information is increasingly produced and published online. As such, this information is becoming available to a wider range of people—including a growing number of individuals outside of one’s networks of personal acquaintances.

It can be argued the emergence and evolution of technical information produsage creates a challenge to established practices of technical communication. After all, such practices historically relied on a mass media structure comprised of a few professional producers creating and distributing technical information to a large number of consumers. A recent special issue of *Communication Design Quarterly*, in fact, focuses on this topic in relation to identifying the most pertinent research questions of the field (Albers, 2013). The contributions to the special issue, moreover, identify a number of open questions connecting to this emerging context—questions such as what are (or should be) the roles of social media producers in technical communication (Arduser, 2013) and what are the top-priority needs for understanding changing user behaviors (Andersen et al., 2013). The call to action presented in that special issue aligns with similar admonitions ranging from the work of Spinuzzi (2002) on moving from a consumer model to a citizenship model, through Kunz’s (2010) three stages of development, to Gentle’s (2012) emphasis on communities, and Lykhinin’s (2012) sense of a paradigm shift.

The sense of urgency and challenge is rather well captured in a recent call for papers (Kimme Hea, 2011) to a special issue of *Technical Communication Quarterly* on the topic of “Social media and the role of the technical communicator.” As the call notes, these [collaborative media] patterns of communication and participation

shift users’ expectations for how they engage information, technology and each other. In these ways, social media facilitate instantaneous interactions among users and enable relatively low-cost, adaptable resources that can address a range of user concerns. As a result, users are finding traditional forms of technical support less appealing and increasingly turning to each other for information and support. Technical communicators thus need to develop effective strategies for understanding and responding to these shifting communication situations. (Kimme Hea, 2011)

To summarize, recent scholarship as indicated here suggests changes in economy, technology, and organizations have rendered social interaction and interpersonal communication increasingly important to the work of technical communicators. Professional trends in this area emphasize collaborative knowledge and content creation as well as focus on distributed work and information spaces. Further, the evolution from writing to curating highlights the significance of building information environments that allow for the production of portable content that can be easily retrieved and repurposed by a range of users across a range of formats.

THE RESEARCH APPROACH: A CO-DESIGN CASE STUDY

These various developments give rise to a central, over-arching question technical communicators need to answer:

How might the mass-medial structures of technical communication practices transform in the direction of more collaborative media practices?

To examine this question, I engaged in a co-design case study with a professional technical information producer. I selected this method of examining this research question because it offered the possibility to experiment with ecologically valid transformation ideas. This approach was also informed by the researchers’ (i.e., my and my collaborator’s) general knowledge of collaborative media practices as well as by the professional technical communicator’s sense of practical, organizational, and financial viability.

The case I selected to study involved Sigma Technology, a medium-sized and quite established Swedish technical communication company with international presence. I selected this particular case for study because of the need for long-term commitment and willingness to change, both of which factors I was confident to find in Sigma Technology. As is often the situation in design research, I drew the methodological framework from participatory action research where the researchers often perform the role of engaging in transformation processes with key stakeholders.

This particular case study started in the fall of 2010 and was still ongoing at the time of the initial writing of this entry (2013). The case is based upon a co-production project where I, as the lead researcher, formed a team that consisted of a small group of professional technical communicators. This team was partially funded by the research and development (R&D) budget of Sigma Technology, and the team took an open-ended and explorative approach to examine the challenge of how Sigma Technology should change its practices in relation to the increasing collaborative-media experience and expectations among its customers and users.

At the same time, the work researched by the team can be described as a longitudinal qualitative case study involving participant observation. In this context, I collected qualitative data in the form of field notes of work in the project team, meetings with other parties within Sigma Technology, and project documents such as internal memoranda, design sketches, specifications, and the like. The findings reported here are the results of an analysis of the qualitative data collected from a review of these materials (i.e., field notes and project documents). The following sections of this entry introduce the professional partner, outline the main activities of the collaborative research process, and present three tentative knowledge contributions.

OVERVIEW OF THE CASE

The company Sigma Technology is a part of the international Sigma Group. It has nine offices in Sweden, including the head office in Gothenburg, and there are also offices in Finland, Hungary, China, Canada and the US. (The total number of employees in the organization is approximately 350 persons worldwide.) Sigma Technology is a technical communication consultancy company that provides services mainly to business-to-business (B2B) customers where technical information is needed for large, custom technical systems. (Technical communicators might, for example, produce information that supports maintenance and troubleshooting.) However, the company is also highly active in business-to-consumer (B2C) markets. As such, the organization's management understands the significance of the changing technical information expectations in relation to the emerging collaborative mediascape.

In 2010, Sigma Technology agreed to undertake a joint project where design researchers and company research and development (R&D) staff would form a team to explore the possible futures of technical communication. As a part of this process, the team would also examine the roles of professional technical information producers, with an ultimate aim to initiate change in the company's business practices.

The R&D staff of Sigma Technology has a history of developing platforms to facilitate production of technical information, and the researchers participating in the project represented the field of interaction design. Predictably, it was decided to start the joint research project by designing a new platform to support production and consumption of technical information. The purpose of the new platform would be to explore and illustrate a more open view of technical communication, including producer as well as professional contributions.* Moreover, the project team felt this direction could accommodate the immediate needs of Sigma Technology's customers as well as the strategic preparations for more radically collaborative production and consumption practices.

However, the design of a new platform meeting short-term as well as long-term goals turned out to be a non-trivial undertaking. The work started with an explorative phase, examining different conceptual directions. The project then moved into detailing a moderately collaborative platform for technical information production and consumption. Still, the momentum of the work left something to be desired—it seemed as if the prototypes made and the stories told in the project did not fully resonate with core priorities within the company. The breakthrough came in early 2011 when the explorative design process was focused on facilitating collaboration in technical information production.

In hindsight, it is obvious that the initial approach of considering production and consumption together was too far removed from Sigma Technology's existing production practices and customer demands to be fully relevant. Reframing the task as one of primarily supporting production made it easier to relate to market demands and existing company practices. Thus, it made more sense for the professionals on the project to devote time and effort to the joint work. The project team then created a rationale in order to connect to the long-term research goals. That rationale was formulated as follows.

Technical information producers in our own company and among our customers will benefit in the short term from using a platform that supports rapid and flexible production. That platform also provides the necessary

infrastructure to go from traditional distinctions between production and consumption to more open, collaborative forms of knowledge management and cultivation. The transition can be made whenever the customers and the markets are ready for it.

From this point on, work proceeded rather smoothly to the point of launching the platform DocFactory, which has now been used and sold by Sigma Technology since 2012 (see <http://sigmatechnology.se/services/docfactory/>).

The next section of this paper provides a little more detail on DocFactory as one of the preliminary research results. First, however, it should be noted that other project activities took place in parallel with the platform development. Most significantly, the researchers were fortunate to be invited into management levels of the company at a relatively early stage. I, for example, was asked to run a half-day workshop for the whole management group during a 2011 retreat on the topic of collaborative-media challenges to technical communication. Importantly, this meant that the joint research project gained visibility and implicit top-level approval. Following the workshop, participating division managers invited me to engage with their technical writers and information architects as well as to meet with some of their more important customers. These mini-interventions generally took the form of jointly exploring the implications of collaborative media practices for technical communication. Specifically they were used for identifying and assessing the new roles available for professional technical communicators in the collaborative mediascape.

The project team considered my engagements with customers as a strategically important activity for the joint research goals based on the idea that creating customer demand for innovation would be the most powerful incentive for the company to actually implement changes. Those changes would position the company for new market segments and give it more of a proactive position. As a researcher, my engagements with company management levels and customers complemented the work in the small project team quite nicely. They enabled me to collect data for a more comprehensive picture of requirements, expectations and transformation processes throughout the company, as indicated in the next section of this paper. (The collaboration between researchers and Sigma Technology is still active at the time of writing, but enough ground has been covered to warrant the formulation of three preliminary results.)

PRELIMINARY RESULTS: PLATFORM AND STRATEGIES

To reiterate, the question underlying the case study reported here was how the mass-medial structures of technical communication practices could transform in the direction of more collaborative media practices. The work so far has yielded three preliminary results, each providing a piece of an answer to that question.

Result 1: A platform for collaborative production and consumption

First, a new software platform has been designed and deployed for collaborative production and consumption of technical information. The platform is called DocFactory, and it amounts to a web-based infrastructure for information management plus a set of tools and interfaces to support the practices of technical information production and consumption. The information architecture is fundamentally topic-based (which represents a challenge to the

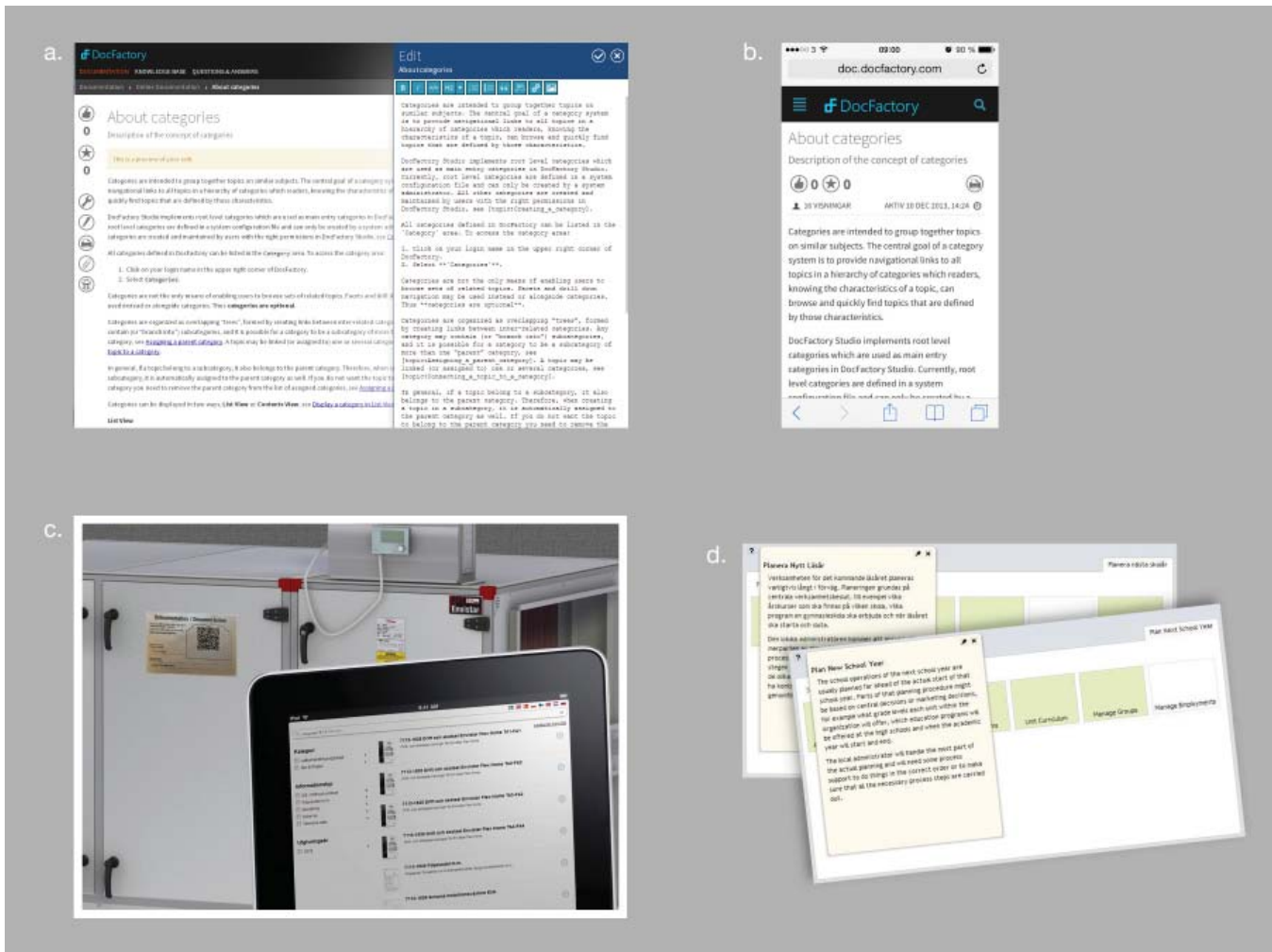


Figure 1: Samples of DocFactory applications, including (a) a conventional production environment for technical information; (b) a simplified technical-information browser for mobile access; (c) a context-specific tablet browser where scanning a QR code on a ventilation system installation filters the technical information to retrieve only the topics pertinent to the current model (the illustration is a montage); (d) integrated language variants of online help information.

legacy document-based practices of many key customers), and finding relevant information in a topic base is supported by faceted browsing integrated with semantically augmented search tools.

The main point of the platform in relation to this paper is that there are no fixed production and consumption configurations. Instead, the architecture allows for the creation of custom components on top of a given topic base. For example, Sigma Technology has used it to develop mobile documentation repositories where users can

- Add local expertise to the generic product information
- Provide maintenance systems offering context-specific support information
- Allow for multi-language online help for software (see Figure 1).

From a research point of view, the design of the software platform and its subsequent use show the significance of a flexible architecture supporting current practices based on mass-medial production. It also represents experimental practices involving produsage and user-generated content.

Result 2: Proactive market strategies

Second, in the course of the joint project, Sigma Technology has started devising market strategies that can be characterized as aiming to move from a reactive to a proactive position on collaborative media. Examples include working with selected customers to start exploring implications of a more collaborative approach to technical communication. They also include organizing a series of annual public events with invited speakers under the heading “The Future of Technical Communication.” Moreover, in the fall of 2011, Sigma Technology commissioned a national survey of its technical communication producers and customers to assess the current level of best practice and expectations for the future.

Briefly, the survey that gathered over 300 responses (mainly from the B2B sector) showed

- Technical information is deemed to be of growing importance
- More than half of the respondents were dissatisfied with the time it takes to find relevant information

- “Social media” were not an integral part of professional technical communication practices but half of the respondents expected them to be within two years

Sigma Technology made significant efforts to publicize the survey results widely, and at the time, these results were presented as the first in a series of annual surveys. The business goal of the survey was to emphasize the leadership of Sigma Technology in the field of technical communication.

The survey, however, did not attract much interest from the ICT trade press; the company’s own evaluation was that the beneficial effects did not justify the costs, and the survey was never repeated. Nevertheless, it demonstrated serious commitment to exploring the collaborative-media requirements and expectations among core customer segments, which must be interpreted as a step beyond the complacency of established mass-medial practices.

Result 3: Internal strategic discussions

Finally, and perhaps most importantly, we can observe internal strategic discussions are starting to take shape inside Sigma Technology. One such discussion concerns the role of the professional technical communicator in a possible future beyond mass-medial practices—a context where most of the technical information is produced by producers and other third parties. Technical writers and information architects within the company increasingly consider, not only in formalized workshops but also in their everyday work, what it would mean to work as an editor, a curator, a facilitator or a community manager (see also Lindh, 2013 for a related study on future scenarios for professional technical communication).

Another strategic discussion starting to appear in the company involves the ultimate concern of technical communication—to help users get the most out of their technical products—and how that concern is in fact shared by several departments in typical product organizations. There is an increasing tendency to seek initiatives across boundaries and specifically to integrate traditional mass-medial development-time technical communication activities (such as producing help systems and user documentation) with activities such as training and support that are conventionally regarded as after-market activities. The general sense in Sigma Technology is software is probably the market sector where this boundary crossing has the best chances of success.

CONCLUSIONS

The work reported here provides a snapshot of how technical communication practices can transform along with the mediascape in which they are situated—or, more generally, how a somewhat entrenched mass media structure can transform in the direction of more collaborative media practices. It is presented here with the intention to draw attention to the changing conditions of technical communication and to provide an example of possible implications. Specifically, it offers three main findings that can serve as the basis for the transformation and development of best practice in similar organizations of professional technical communication:

- Finding 1: The power of production and distribution tools to shape the practice of professional technical communication appears considerable. In order to align with the emergent collaborative mediascape and the resulting expectations among customers and users, it is sensible to seek production and distribution platforms that accommodate the co-existence of and gradual transition from professionally produced content to user-generated content.

- Finding 2: As is inevitably the case in organizational development, change on the grassroots level of technical communicators is facilitated by high-level decisions concerning the position of the company. The case study here showed how decisions to aim towards a more proactive position on collaborative media were implemented, even at considerable cost.

- Finding 3: A successful transformation from a mass-medial production structure to one oriented towards collaborative media implies technical communicators no longer produce content as one of their main tasks. At the same time, the case is clear on the position that this does not imply obsolescence. Quite to the contrary, professional technical communicators see a wealth of meaningful (and ultimately billable) roles in the collaborative mediascapes of technical information, including editorial, curatorial and facilitatory work as well as after-market opportunities including training, support and community building and management.

By learning from and expanding on findings such as these, professional technical communicators—and the organizations that employ them—can better prepare for current and evolving notions of produsage in the modern mediascape.

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NOTES

* It is reassuring to note this approach has recently been identified as a relevant research challenge within communication design. Jones (2013), for example, advocates research approaches including the creation of ecosystems/contexts that support such communities.

** Figure 1c is a montage. The image of the ventilation system is property of IV-Produkt AB, used with permission. The image of the tablet computer is by Justin14, published at Wikimedia Commons, used under CC Attribution Share-Alike 3.0. The rest of the image material is property of Sigma Technology, used with permission.

User Value and Usability in Technical Communication: A Value-Proposition Design Model

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ABSTRACT

This entry defines value from users' perspectives and discusses the need to consider "user value" as an important framework for enhancing product usability in technical communication. Arguing it is essential to involve users in the process of product design, the paper emphasizes the need to recognize users as value co-creators. To further enhance and extend the study of usability, this article proposes a value proposition approach to design and notes such an approach can help communication designers effectively design, test, and deliver materials end users want and value.

Categories and Subject Descriptors

H.0 Information Systems: General

General Terms

Documentation, Design

Keywords

User value, usability, user-centered design, value creation, value proposition design

INTRODUCTION

Today, there is a growing recognition that users are lead stakeholders with whom system designers and developers need to form a collaborative relationship for a successful profession (Barnes, Blake, & Pinder, 2009). Indeed, the collaborative design process allows product designers and developers to recognize the value their work can offer. Peter F. Drucker (2001) has pointed out that "[users] pay only for what is of use to them and gives them *value*" (p. 172, emphasis added). However, the notion of user value for usability in current research in technical communication remains largely unexplored. Perhaps it is because no such established and dedicated theory of value that can guide user-centered design exists in the field. In the study of user value, we might, however, derive some ideas and models from economics, sociology, anthropology, and business – approaches that can extensively benefit the field by focusing activities on generating technical products from users' perspectives.

This entry discusses the need to consider "user value" as an important framework to enhance product usability in technical communication. Arguing usability plays a key role in assessing the extent to which technical products are easy to be used quickly and efficiently by the intended users (Guillemette, 1989; Dumas & Redish, 1999; Alexander, 2013), this article presents perspectives on value as not being the extrinsic and/or intrinsic qualities embedded in technical products. Rather, it views them from the perspective of the individuals' experiences of using the products. More specifically, this entry argues technical communicators need to know how value is created in user experience design – how the process emphasizes user involvement, user knowledge, and user satisfaction. To better align users' knowledge, experiences, skills, and motives with the designers' objectives, I propose value proposition design as an alternative to the often-employed user-centered design approach.

In the following entry, I first analyze the location of "value" in the context of technical communication and usability research. In so doing, I argue current models of usability research seldom embrace a value-centric approach to assessing users' experiences. Next, I present the concept of user value, arguing users play a central

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role in the value creation process. I also discuss the perspectives of usability as involving ease of interface use vs. as creating value via experience within human-interface interactions. I then propose a design model based on value proposition, and in so doing, I assert this model further enhances and extends the study of usability within technical communication. Finally, I conclude by noting future directions for researching this topic.

“VALUE” IN TECHNICAL COMMUNICATION

In technical communication, the concept of value has generally been used to indicate monetary benefits (Mead, 1998), return on investment (Redish, 1995; Ramey, 1995; Redish & Romey, 1993), contributions to organizations (Carliner, 1996), and the importance, worth, or usefulness of technical products (see Mirel, 2002; Scott, 2008; Blythe, Lauer, & Curran, 2014). While Mead (1998) defines value as “the benefit of an activity minus its cost” (p. 354), Hughes (2002) examines value as the degree to which the money invested in producing quality technical products provides an attractive return on investment. Recognizing the need to focus on demonstrating value by incorporating it into everyday work processes, Carliner (1996) suggests technical communicators follow a consistent process in planning and developing information products that meet business needs.

Defining Value

In technical communication, the value concept frequently used in connection with return on investment has been cast as “value added.” For instance, Redish’s (1995) *Technical Communication* article on how technical communicators add value focuses on identifying measurements for value added. By value added, Redish means “generating greater return on investment than the cost of the initial investment” (p. 1). By developing a list of ways to measure value added, Redish and Ramey (1993) argue return on investment can be increased by reducing costs for support, translation, and training. Redish and Ramey also note such value can be achieved by increasing sales, users’ satisfaction, and productivity. Similarly, the Society for Technical Communication (STC)’s Technical Communication Body of Knowledge (TCBOK) database examines the concept of value in terms of increasing corporate revenue or reducing the costs to develop, produce, and maintain product information (Value Proposition, 2016). These perspectives indicate that, in technical communication, value is discussed in terms of relation to financial impact (i.e., cost benefit) associated with the end product. In other words, the typical discussion of value in technical communication examines *profitability* or *cost saving* along with the investment on producing quality user products.

As technical communicators consider the idea of adding value, they should also think about *how* they add value to technical products. This aspect is important, for the process of usability implementation often makes it difficult to determine or establish value in financial terms. Rather, to understand value, technical communicators need to identify

- What is important to users in terms of the objective(s) they are trying to accomplish
- What factors make technical materials easy to learn and effective to use to individuals

This perspective means a product’s value should be perceived a more than only an aspect of the object’s materiality or a system symbol. Instead, that product should also be viewed as an experience gained via interacting with the interface of the product (Boztepe, 2007).

Along these lines, Holbrook (1999) indicates “value resides not in the product purchased, not in the brand chosen, not in the object possessed, but rather in the consumption experience(s) derived therefrom” (p. 8). Such a perspective of value as experience (i.e., where a product’s value is determined by users’ performance and satisfaction) can open up a wider understanding of product usability. Thus, when justifying how they add value to their organizations, technical communicators also need to note how the perspectives of value as experience can offer the potential for assessing product usability. By recognizing users’ needs, expectations, and motives for employing technical materials, technical communicators can produce and develop more usable products with an overall higher added value.

Considering “Value” from Users’ Perspectives

To understand value from users’ perspectives, it is essential to identify

- What aspects motivate individuals to use technical products
- What factors make products important to individuals in a certain contexts of use

In addition to reframing our work as curators, organizers, and facilitators of managing the sources of information in technical products (Frith, 2014), we – as technical communicators – should strive to note how we add value to products. To do so, we need to focus on the functions, purposes, and characteristics considered important by the individuals who use those products. Put simply, value should be viewed in terms of how technical communicators help adapt products to better address users’ particular needs and objectives – thus making items more usable/user friendly.

Swartz (2015) argues for this perspective when he advocates technical communicators can assert their value by maintaining not only quality content, but also quality interactions. (In this case, interactions involve how users interact with a given product.) As Swartz notes, both factors – content and interaction – are outcomes of a process of communication. Thus, simply conveying technical content falls short of conveying how to maximize the full value users might obtain from a given product. That important task – understanding the value one gains via use – is accomplished by having users participate as co-designers who offer “valuable user input” (Andrews et al. 2012, p. 139). It is this input that organizations can employ to modify product design in order to better address user needs and expectations.

Though the value in technical products and/or systems can be assessed from different stakeholders’ perspectives, consideration must also be given to the role of user involvement and user experience when developing products. While users are often seen as important stakeholders in the successful development of technical products, their perspectives are easily overlooked and replaced with the designers’/creators’ perspectives of value (Kujala & Väänänen-Vainio-Mattila, 2009, p. 24). The problem is what the designer considers to be a valuable aspect of a product’s design might not align with what users want or need to maximize the value they can gain from that product.

As people encounter greater quantities of information they need to review and use, technical communicators as designers need to consider how individuals interact with increasingly complex information-rich environments (Albers, 2009). Key here is the idea that, in these environments, value is generally a matter of creating materials that meet the user’s information-seeking needs

in such contexts. In the process of offering value, product value must be generated from the user's point of view and based on their experiences. This is because the value of the product is usually formed by users' actions and motives. In such situations, technical communicators can enhance the value of products via working to design materials that meet user needs associated with such environments.

According to these ideas, value, from a user-focused perspective, can be perceived as affective responses experienced through their interactions with a product. The more effective and efficient the interaction with the product, the more usable it is and the more likely individuals are to view that product as adding value based on how effectively it helps them accomplish a task. The technical communication literature on value, however, has primarily focused on investment gains or the usefulness of products. Such a focus is often taken at the expense of *value as experience* that arises as a consequence of human-product interactions. So, in addition to focusing on efficiency and effectiveness for usability, Mirel (2004) notes how designers should consider the usefulness of product/system usability. She does so by arguing, "separating usefulness from ease of use and focusing primarily on the latter produces a product of incomplete usability" (p. 32).

According to these perspectives, it is also important for technical communicators to recognize the nature of value as "a human motivator" (Cockton, 2006). That is, the more valuable an item is perceived to be (i.e., the more an item adds value to how tasks are accomplished), the more likely (i.e., the more motivated) individuals are to use it. This is because, in such instances, value is influenced by the affective dimensions or users' emotional attachment and involvement with products (Norman, 2004). In other words, users' emotional reactions and attitudes towards products influence their perceptions of value in relation to a product in terms of usability. Thus, value in technical communication should be viewed from users' perspectives as it is created through users' involvement and interactions with the products.

USER VALUE, USABILITY, AND USER-CENTERED DESIGN

Boztepe (2007) defines user value as the "result of the interaction between what the product provides and what the users bring in terms of their goals, needs, and limitations, etc." (p. 57). What Boztepe means is user value emerges at the intersection between individuals and how they use a product. According to Woodall (2003), "the object and the subject are inextricably connected, and value can be ascribed only at the point of evaluation, or union between the two" (p. 5). As the union between the user and the product is established, it is possible to understand how the notion of user value offers possibilities for designing products that are acceptable, attractive, and motivational.

Defining User Value

Marketing literature often employs the term "customer value" to convey the idea of user value. Within this context, Butz and Goodstein (1996) use the term "customer value" to mean "the *emotional bond* established between a customer and a producer after the customer has used a salient product or service produced by that supplier and found the product to produce an added value" (p. 63, emphasis in original). Thus, usability can create deep-level connections for users, and such connections can foster a range of consumer behaviors (e.g., brand/product loyalty) that can add to ideas of value associated with products. When producers fail to

recognize user value or what Butz and Goodstein call an "emotional bond," those producers put their products at risk because users, instead of getting gains, might suffer from design factors that lead to less efficient and effective uses of a product. Such factors can contribute to feelings of frustration, annoyance, and anger among different groups of users.

Naturally, individuals would not feel content using technical materials that fail to eliminate risks they fear in relation to using a product. Accordingly, designers should always attempt to fulfill users' expectations and build trust by establishing an emotional bond between individuals and the products they use. Doing so helps the designers to recognize/conceptualize value from users' perspective. Designers can then use this knowledge of the intended audience to implement practices that make the overall design of a product more usable for – and thus more valuable to – different groups of individuals. In other words, technical communicators as designers and producers need to know how they can establish the emotional bond between users and themselves (the technical communicators). Once the emotional bond is established, technical communicators can better recognize how value is perceived by users. They can then use this knowledge to design products accordingly/meet these expectations. Thus, for value considerations, users and designers should cooperate with each other in decision making during the product design and development process.

The Role of the User in Value Creation

Value creation is a concept increasingly used in marketing theory. Here, however, I employ this concept in the context of user-centered design and usability. I do so to argue that, under certain circumstances, value is a process of co-creation in which both designers and users actively engage to develop truly effective (i.e., valuable or value adding) product designs. That is, in the process of creating value, user involvement plays a key role in

- Identifying what aspects of a product make it more usable – and thus more valuable – to users
- Implementing such factors of usability – and thus value – during the product development process

Though designers are supposed to create financial value out of engagement with users, value creation for designers and users is interrelated.

To understand this relationship, technical communicators need to consider the following questions to add value to a product when designing for users:

- Who creates value in technical materials?
- What is the role of users in value creation during the design process?
- What are the possibilities of co-creating values in user interface design?

By addressing these questions, technical communicators can better understand

- The interactive relationships between the contexts in which individuals use products
- User needs and expectations in such contexts
- Design approaches that can help meet such needs

In considering and addressing such factors, technical communicators contribute to the usability of the product – from a user perspective – and contribute to value creation as defined in terms of meeting user needs.

As Boztepe (2007) notes, if design is “action oriented,” then individuals need to employ an analysis of the action of intended users when designing new materials for them (p. 62). Accordingly, technical communicators as designers should pay considerable attention to the role an action-oriented design plays in enhancing value creation. It is therefore important for technical communicators to know how value is created based upon the designers’ knowledge of users’ skills and experiences. Essentially, when users are left alone to engage in value creation based upon their actions (i.e., how they use something), the individual’s value creation process lies in that person’s own prior experiences of product use. (Consider, for example, how an individual’s limited understanding of the features of his or her cell phone limits the value the individual realizes in terms of what that product can do to contribute to his or her life.) So, value for users is created during usage (value-in-use) by users themselves vs. during design processes and by designers alone. It is the users’ actions – based on how they understand and make use of the design of a product – that determines how valuable that product is to them. (This is in contrast to the idea that the design of the product – vs. how individuals make use of that design – is the central aspect used to determine the value of a product to a user.) In value-in-use, as Grönroos (2011) says, “*value is created by the user for the user*” (p. 288, emphasis in original). As argued, the central idea is that value emerges at the interface between a product and the user.

From the perspective of usability implementation in technical products, value co-creation is possible when an active interaction occurs between designers and users. In other words, for the considerations of value co-creation, designers and users should engage in a dialogical process that “*merge[s] into one integrated process of coordinated actions, where both parties are active, learn together and from each other, and may directly influence each other*” (Grönroos, 2011, p. 290, emphasis original). In order to deliver the value users seek, interactions between designers and users must be highlighted. Such practices enable designers to create and manage value in a way that supports users’ value fulfillment. Along these lines, Wikström (2008) argues users have “an active role to play in both the creation and the consumption of ‘experience activities’” (p. 31). In fact, user experience and involvement have a rich role to play in value creation activities that are highly influenced by product usability.

Perspectives on Usability and User-Centered Design in Technical Communication

In assessing product usability, much of the discussion of user-centered design in technical communication focuses on gaining an understanding of users’ physical and cognitive task performance. This approach, however, does not address the importance of value creation through the kinds of interactive relations necessary for coordinated actions between designers and users. Even in demonstrating the increasing need for usability and usability testing in technical communication, the discussion of user value has not gained much attention in technical communication (see, for example, Breuch, Zachry, & Spinuzzi 2001; Alexander, 2013; Chong, 2016). Usability in the technical communication literature, for instance, has primarily been extensively implemented to assess how easy user interfaces are to accomplish particular tasks with

speed, accuracy, and satisfaction (Nielsen, 1993, 2012; Dumas & Redish 1999; Barnum 2011; Norman, 2013).

Certainly, a growing awareness of usability in technical communication has given rise to much research on effective methods for engaging in user-centered design. Such methods include (but are not limited to)

- Heuristics evaluation (Nielsen & Molich 1990)
- Discount usability (Nielsen, 1993)
- Eye-tracking and concurrent think-aloud protocol (Cooke, 2005, 2010)
- Video highlights (Yeats & Carter, 2005)
- Rhetorical and content analysis (McGovern, 2005)
- Cognitive shortcut (Lentz & De Jong 2009)
- Contextual inquiry (Mirel, 1996)

However, for effective implementation of usability methods in relation to ideas of design and value (as described here), technical communicators conducting such research should also emphasize that users, who determine product usability, must be placed at the center of such activities. The objective is to employ research to better learn and understand what constitutes user value in different contexts where products are used. Based upon such research, technical communicators can develop materials that are more user-centered and thus more value adding by design.

Advocating user-centered design that emphasizes user experience (Redish & Barnum, 2011), user knowledge (Johnson, 1998), and user-participation (Salvo, 2001; Johnson, Salvo, & Zoetewey, 2007), Johnson (1998) argues “the end of technology be refigured in the user: those humans (virtually all of us) who interact with various technologies . . .” (p. 21). Following the path led by Norman (1988), Ehn (1992), Whitehouse (1999), and Johnson (1998), Salvo (2001) also argues for the need to recognize how users’ participation and involvement during the user-centered design process plays a central role to enhance product usability. Recognizing the effectiveness of a participatory method to ensure product usability, Salvo finds collaborative design effective and useful, which “not only relies on participation with users, but defines designer, expert, and user roles in innovative ways” (p. 274). In addition, Salvo argues users’ full participation and dialogic ethics are important for usability implementation. In assessing software and Websites or Web pages, usability has also become increasingly useful to evaluate works technical communicators produce (Johnson-Eilola & Selber, 2007).

Technical communicators and usability scholars have identified that product usability is best determined in consultation with potential users themselves (Gould & Lewis, 1985; Dumas & Redish, 1999; Nielsen, 1993; Johnson, 1998; Barnum, 2002, 2011; Garrett, 2011; Krug, 2014). The sustained interest in user-centered design has shifted the focus from users’ behavior and cognition to users’ affective experience of and involvement in the human-product interaction (Desmet & Hekkert, 2007, p. 57). In fact, the shift of focus has oriented technical communicators to make a complete turn from form to function to communication, and, then, to user experience design. Certainly, the field of technical communication is tremendously growing with the emphasis on usability and user-centered design. Nevertheless, the discussion of how user value is created to enhance usability in technical materials is still scarce.

In sum, because users evaluate a product based on their interactive experiences, determining a product's material value based on aspects that are tangible and measurable is not sufficient to determine the usability of that product. Thus, technical communicators need to look at the interactive relationships between the product, the designer, and the end-user to understand how value is created in interaction design. If we understand user value as the result of a consultative dialogue among these elements, we can learn how the product has the capacity to shape and guide meanings within user experience.

Need to Create User Value in Technical Products

Because user value affects individuals' perceptions of and experiences with technical products and their perceived value, designers should strive to create materials in a way that motivate individuals to use them in particular ways – namely, ways that maximize the value of what the product's design has to offer. To do so, during the value creation process, designers should recognize what is important to users and what users want to avoid. Once user value is created (by meeting user expectations of a given item), designers can develop acceptable and attractive products from users' perspectives. In fact, to recognize what is important and valuable to the user, designers should see their products through users' eyes (Gould & Lewis, 1985; Scott 2008; Simmons & Zoetewey, 2012; Zhang & Kitalong, 2015). Because value arises as a consequence of users' interactions with the product, technical communicators need to consider the process of value creation and user value when they get involved in creating technical materials from users' standpoint. More so, technical communicators must recognize users as important stakeholders in the technical product development and value creation process.

Certainly, technical communicators have already played a key role in advocating for user involvement to improve the quality of technical products (Mackiewicz, 2015). However, quality assurance through value creation in technical documents, systems, and/or services is not sufficient to assert value of usability in technical and professional communication. What technical communicators need to know is how value can be created through technical products and how recognition of user value can help designers fulfill users' rhetorical expectations and needs in the product design process and development.

One way to approach this process is to ask questions such as the following:

- What are the key design factors individuals value while using an interface?
- How do individuals perceive their performance while interacting with an interface?
- What design factors influence an individual's decision-making processes when using an interface to achieve an objective?

To address these questions, technical communicators need to develop their understanding of value as experience (i.e., how individuals actually use the item) and effectively employ the concept of user value in design work.

For usability implementation, adopting a user-centered design approach that focuses on users' cognition and behavior is not enough to address the issue of how and in what ways users create value in interactive products. Instead, it is important to understand

how technical products constitute the sources of value for users. To maintain a perceived high value of technical products in the eyes of users, technical communicators should always consider how they (technical communicators) could design more interactive products users find motivational, enjoyable, and productive in their everyday activities. In other words, technical communicators as product designers and developers should think about how they can apply user approaches most effectively to establish an emotional bond between users and themselves in the process of value creation design.

One way of establishing such user intimacy is to engage perspective users in analyzing product usability and formulating design solutions. As users are engaged as value co-creators during this value creation design process, technical communicators can assume the users' perspectives. Doing so eventually helps technical communicators clearly understand and articulate how user value promotes product usability. Such understanding ultimately allows technical communicators to improve their relationships with users, who are also the stakeholders for the development of successful products.

In essence, adopting a user-centered design approach during the product development process might help identify users' needs, wants, and limitations related to using a product. The approach, however, might not be sufficient enough to understand user value to design and develop acceptable, useful, and attractive products from users' point of view. To create user value for usability in technical products, technical communicators should think about the possibilities of other approaches that can be adopted to enhance the longer-term relationships through interaction design. One such approach is "value proposition design" that can offer an alternative way to enhance usability by understanding the effectiveness of user value in technical communication.

VALUE PROPOSITION DESIGN AND IMPLICATIONS FOR PEDAGOGY

In 1988, Lanning and Michaels defined value proposition as a statement of benefits offered to a customer group and the amount they pay for services or products. A value proposition is not about, in Barnes, Blake, and Pinder's (2009) words,

[T]he facility or experience delivered, not the details of the product of offerings. [It] is not about 'us'—our cleverness, our needs, our expectations, the bells and whistles or our offerings, rather it is about the customers' experience of our offerings in terms of his or her needs and wants. (p. 28)

Unlike user-centered design that focuses primarily on usability goals (and users' characteristics, tasks, and environment), value proposition design aims at delivering users' needs, expectations, experiences, and desires. It does so by enhancing product usability much more effectively through interactive relationships between products, designers, and users.

Value Proposition Design for Usability

According to the STC's TCBOK (2016), "a value proposition situates a profession in the world of industry, government, academia, and non-profit as well as describes the unique value that profession brings to table." Originally, the value proposition concept emerged in the 80s with a McKinsey & Co. project that highlighted the importance of formulating and implementing a superior value a company provides (Lanning & Michaels, 1988).

Following Osterwalder et al. (2014), I propose a value proposition design approach that helps individuals successfully design, test, and deliver what end-users want. According to Osterwalder et al., “The goal of value proposition design is to test ideas as quickly as possible in order to learn, create better design, and test again” (p. 50). In usability studies, value proposition design is akin to iterative design. This process involves using a methodology to implement usability on a cycling process of prototyping, testing, analyzing, refining, and testing the product or process again. There is, however, a significant difference between these two approaches. To begin, “iterative design aims specifically at refinement based on lessons learned from previous iterations” (Nielsen, 1993, p. 32). Value proposition design, by contrast, consists of “the process of designing, testing, building, and managing value proposition over their entire lifecycle” (Osterwalder, Pigneur, Bernarda, & Smith, 2014, p. 79). Value proposition design is thus a never-ending process because the designer needs to evolve value constantly to keep relevant to users.

Designers achieve what Osterwalder et al. call “fit” when users are excited about designers’ value propositions. Such fit happens when designers address important jobs, alleviate pains, and create essential gains users care about. “Striving for fit,” say Osterwalder et al., “is the essence of value proposition” (p. 39). If users get gains from using technical products and/or services, they certainly feel nice to have them. Given these facts, technical communicators must consider methods for involving users during design work. Doing so would allow them to understand how to eliminate barriers that keep users from adopting value propositions in relation to product use. In short, when users participate in the product design and devolvement processes, technical communicators are in more direct contact with users. Such contact helps technical communicators form insights about users as value co-creators.

Users as Value Co-creators

As I have argued, users must be recognized as value co-creators, for their role in defining values for product development is central to effective product usability. Involving users as value co-creators during the design process is thus essential in identifying user value. In the absence of users’ involvement, it might be difficult for designers to gain insights about user value and preferences. In addition, designers might be unable to know about the possibility of guiding the design work from the users’ perception and experience. According to these ideas, in the process of value proposition implementation, both designers and users should share a common understanding of experiences (i.e., when, where, and how a given product is used). This commonality is essential, for it allows both

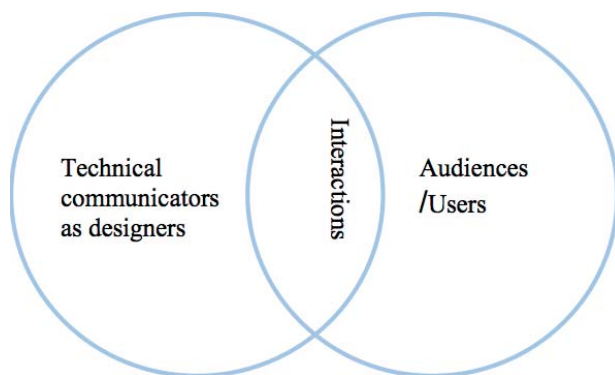


Figure 1: The Interaction-Based Value-Creation Approach

parties to interact with one another and to learn together and from each other. This reciprocal process for value creation can also be seen as a coordinated meaning making in the discourse for enhancing product usability.

Because individuals’ experiences of product use greatly influence how they create and conceive of value through such use, technical communicators should work to develop value proposition in order to facilitate and organize collaboration with their product users. Grönroos (2011) claims that

[T]he [user] as co-producer can influence the firm’s production process. Furthermore, more importantly, . . . the firm gets an opportunity to influence the [user’s] usage process. Because usage at the same time is value creation for the [user], the firm gets an opportunity to take part in his or her value creating process—as *co-creator*” (p. 290, emphasis in original).

Figure 1 shows the value-focused approach in which both users and designers commonly share their world to work together as value co-creators.

As Figure 1 displays, interactions between the designer/technical communicator and users are necessary for value creation. To make such interactions possible, both parties need to share a “common world” (i.e., common understanding of context and conditions in which a product is used) as shown in Figure 1 and indicated by the overlapping area of “Interactions.” This approach means the designer/technical communicator needs to sit together with the user to identify his/her problems and co-create the solution. Accordingly, the value emerges along with the consultative dialogue that leads to the solution when both parties actively interact together. In fact, their interactive roles have the potential to deliver significantly higher value in terms of quality of the resulting experiences, quality of relationships, and quality of deliverables (Barnes, Blake, & Pinder, 2009).

As Figure 1 displays, adopting a value proposition approach allows the product designer/technical communicator to engage in a dialogic relation with the user. The approach also helps the designers understand users as value co-creators within the world shared by the users and the designers themselves. If applied effectively in the field of technical communication, the value proposition design approach can fruitfully enrich the field by “formulating equitable exchange, and from that, a basis of trust for longer term relationships” between communication designers and users (Ballantyne, Frow, Varey, & Payne, 2011, p. 205).

Adopting this approach to product design allows technical communicators to engage in “co-learning and co-development of new skills and knowledge” (Ballantyne, Frow, Varey, & Payne, 2011, p. 208). In fact, as Ballantyne et al. (2011) explain, “Collaborating and learning together with counterparts can become a key strategy for knowledge up-skilling in a complex industrial world in which dialogical communication has the potential for revealing new value creating possibilities” (pp. 208-209). Thus, in technical communication, the value proposition design approach has the potential of recognizing users as value co-creators. It does so by bringing the knowledge, experiences, and values of all involved closer together in ways that allow for more effective/usable design – which leads to increased value based on effective use.

Though value propositions are the essence of a value-focused business approach popularly used in marketing, technical communicators as usability practitioners can benefit from this

approach because “getting value proposition right can save [us] a lot of ‘blood, sweat, tears, and downright loss’” (Barnes, Blake, & Pinder, 2009, p. 55). Furthermore, adopting value proposition design as an alternative approach to the user-centered design approach can assist technical communicators in making choices regarding which jobs, pains, and gains to address and which to forgo when developing materials. In this situation, users’ jobs can be any tasks they try to perform, solve, complete, and satisfy themselves.

Implications for Teaching Technical Communication

Because not all jobs have the same importance to users, identifying which matters more and which are insignificant helps designers to prioritize values in value proposition design. As promoters of user value, technical communication instructors need to consider how they can integrate this approach to maximize value for usability into their pedagogy. Doing so helps students to learn how to invent new value propositions individuals seek when using technical materials.

To invent new value propositions through an interactive design, technical communication instructors can encourage students to adopt this approach for effective usability implementation in the process of technical product design and development. In fact, adopting this approach allows students to think about the importance of mutually developed interactive relationships between product designers and users. When students conduct usability testing of their products, for instance, they should also value interactions they will have with test participants. This is because such interactions help students to know about individuals’ feelings and experiences of using the products.

So, for example, when students design questionnaires for test participants to assess product usability, the students should pay attention to what types of questions they create. For instance, answering the questions such as “Why is this product good?” or “Why is it better than the alternatives?” only help to communicate, but not to *create* value relating to a product. To communicate value means the value is in the product. Period.

It is important for students to know that their role is not only to communicate value, but also to create value. In order to achieve this objective, students should be encouraged to actively interact with test participants during the product design process. As they engage in a dialogic process, students gain an opportunity to know what users want to achieve and what product they are looking for. Students also learn how the product helps users to improve their lives (and thus, see connections individuals draw between enhanced usability and perceived value of item).

The value proposition design approach also helps students better understand how they can create and deliver value. When students develop confidence in using the approach and begin their career in technical communication, they can create products users might find more interactive, more motivating, and more valuable and enjoyable to use. Eventually, students whose perception of usability is still guided by users’ cognition and behavior will learn about the importance of user value. In so doing, they will also learn about the associated ideas of value propositions and the role of users as value co-creators throughout the product design and development process.

CONCLUSION AND FUTURE DIRECTIONS

As the field of technical communication increasingly emphasizes usability and user-centered design, technical communicators need to know how *value* is created in their materials. As the latest progression toward user-centered design focuses on users becoming the subject of design (Redström, 2006), taking user value into consideration can help technical communicators to identify usability issues and solve them from the standpoint of users’ own set of values and assumptions. Thus, one of the most important aspects of product usability should be related to how value is created in technical materials to influence users’ experiences.

Because a product has the capacity to shape and guide meanings within user experience, technical communicators need to consider how value is created in technical products. Such understanding is essential to developing materials that motivate use (i.e., based on ease of use, encourage individuals to make use of them). In the process of designing new products, it is always important to know how users as value co-creators have influential roles to enhance product usability. To really produce acceptable and desirable technical materials from users’ point of view, technical communicators should take user value into account and include the concept of value from users’ perspective as an ultimate goal of design.

In order to create products that signals potential value to users, I proposed a value proposition approach. Such an approach is beneficial because it allows designers to deliver value by engaging users as important stakeholders in the value creation process. Integrating a value proposition design approach into usability research can thus enrich technical communication by encouraging individuals to develop new tools, systems, and services. (Such items could enable users to perform tasks with speed, efficiency, effectiveness, accuracy, satisfaction, and engagement.) I assert that this approach can contribute to a principled and comprehensive consideration of values in the technical product design process and development.

Looking forward, the consideration of user value and the effective implementation of value proposition design model can help technical communicators solve problems users encounter in their everyday activities. As such, one central research questions the field will need to answer is

How can technical communicators scholars, researchers, and professionals increasingly navigate value-laden products from the perspective of creating value as experience for users in different cultural context through better communication product design?

To address this question, technical communicators will have to make a shift of focus from object design to experience design. Such a move is essential so we might better understand the notion of value as experience, rather than the intrinsic or extrinsic qualities of a product.

Finally, I call upon technical communication instructors to critically examine, evaluate, use, and extend the value proposition design approach in teaching aspects of usability in their classes. Doing so is essential, for we – as a field – need a foundation to recognize the value of this approach based on our understanding of usability and user-centered design. As user advocates, technical communication instructors can also encourage students to learn about the importance of user value that is created through a mutually established dialogic

relation between designers and users. By incorporating such an approach into usability research, educators can help students better understand the concept of “users” as value co-creators. This approach will help move technical communication students closer to becoming real practitioners of interaction design.

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Designing Online Resources for Safety Net Healthcare Providers: Users' Needs and the Evidence-Based Medicine Paradigm

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ABSTRACT

As the healthcare system in the United States becomes more complex, so does the information needed for administrators and clinicians to keep apprised of new regulatory and systemic changes. In this article, I use a review and analysis of an online resource project to identify effective practices to educate and support healthcare safety net organizations, or those clinics that serve low-income populations. The project team consisted primarily of healthcare researchers who used a systematic review of the scholarly literature to develop online systems for transmitting information about healthcare payment and service delivery reform to those serving low income populations. As the technical communicator working on this project, the author advocated incorporating concepts of user research and user-centered design to the project team. This research included a survey of provider-users. The analysis of this project revealed that, in the health and medical community, evidence-based medicine and the genre of systematic literature review may be privileged such that provider-user needs for information seeking are not taken into account when designing online communication based on these reviews. Communication designers may need to work with and adapt the work of translation science and knowledge-to-action to develop more user-centered online content for provider education.

Categories and Subject Descriptors

H.0 Information Systems: General

General Terms

Documentation, Design

Keywords

Health Communication, Evidence-Based Medicine, Safety Net Organizations, Healthcare Payment and Service Delivery Reform, Systematic Review, User Research

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INTRODUCTION

The Affordable Care Act (ACA), enacted in March 2010, shapes the contemporary context for health care in the United States. While most Americans may be familiar with the portion of the ACA that expands health insurance eligibility and government-assisted coverage to individuals, another area consists of complex regulatory and systemic changes designed to lower the cost of health care. These include reforms to clinical practice, from payment structuring to technology for recordkeeping. In order for providers to implement these reforms, they must first learn how. For providers who with limited resources, this is a particularly difficult, because they cannot afford to hire others to implement these reforms in person. As a result, many providers require resources to support implementation of ACA reforms. Online resources are one avenue for reaching providers who work in remote areas or are unable to pay for in-clinic support. However, these projects are both expensive and difficult, as they require expertise across health and medicine, technology, and the learning sciences.

The purpose of this article is to address this difficulty in transdisciplinary, collaborative design of online resources for healthcare providers. This entry first reviews the contemporary context of care, particularly as it affects clinical practice for underinsured populations. Next, this entry reviews the habits of mind of health and medical researchers as they present healthcare service and delivery reform through Evidence-Based Medicine (EBM) practices such as the systematic review of literature. Designers of communication may not be familiar with these practices when they first encounter a healthcare communication project. Finally, this entry reviews and analyzes a project in which healthcare researchers and communication experts worked on a team to build an online hub for resources for these providers. This review helps communication designers better understand how to incorporate user research into the design of healthcare communication, when the principles of Evidence-Based Medicine may not readily line up with user-centered design principles.

UNDERSTANDING THE CONTEMPORARY CONTEXT OF CARE

Recent health care payment reform efforts by governmental and commercial payers pose unique difficulties for healthcare safety

net organizations. The Institute of Medicine (IOM) defines safety net organizations as “those providers that organize and deliver a significant level of health care and other needed services to uninsured, Medicaid and other vulnerable patients” (Lewin & Altman, 2000). The IOM further defines “core safety net providers” as those providers who have an open door policy regardless of ability to pay, and includes public hospital systems, federal, state, and locally supported community health centers and Federally Qualified Health Centers (FQHCs), local health departments, and other special service providers (Lewin & Altman, 2000). The Agency for Health Care Research and Quality (2013) reports that safety net providers tend to share traits such as a patient demand that exceeds supply, short staffing, financial difficulties, complex administrative structures and staffing patterns, insufficient staff and human resources, and insufficient health information technology. The most significant reforms to payment structures under the Affordable Care Act are the hardest for safety net providers to adopt because most Medicare and Medicaid providers are reimbursed under a fee-for-service system (flat cost for the service rendered), and these reforms seeks to transition practices to value-based systems such as pay-for-performance, which moves away from reimbursement based on volume to “incentivize quality and efficiency” (American Public Health Association, 2013). This transition in fee structures and delivery of services requires training for staff, changes to administrative procedures, technical support, and other resources that safety net providers just do not have to the same extent as other providers.

In order to address the challenges posed to safety net providers in their involvement in reform efforts, a team of healthcare researchers was awarded a large grant to create an online learning center for networking and support. In this project, healthcare researchers on the project sought to compile a systematic review of literature and to make that review and selected literature available online. Systematic reviews “identify, evaluate, and summarise the findings of all relevant individual studies” and “adhere to a strict scientific design based on explicit, pre-specified and reproducible methods” (“Systematic Reviews,” 2009, p. v). The systematic review genre is an accepted one in healthcare research and particularly valued under an Evidence-Based Medicine (EBM) paradigm: “the conscientious, explicit, judicious, and reasonable use of modern, best evidence in making decisions about the care of individual patients” (Masic, Miokovic, & Muhamedagic, 2008, p. 219). Under EBM, getting to the modern, best evidence is achieved through the vehicle of the systematic review.

This belief has implications for designers of healthcare communication. The decision to publish the systematic review in its original form limits the involvement designers will have in online resource development for healthcare providers. Here, a critical issue arose between the healthcare researchers and the technology team as to how the complex information contained in the systematic review would best be communicated online. The healthcare team sought to place the systematic review online in its original form, without translation or curation (as is more in line with resources for the public). Yet, in this project, the articulated needs of safety net organizations’ providers were for curated and interactive communication such as infographics and webinars. This request aligns with healthcare design for transformation rather than for consumption (Jones, 2013). Communication designers have an opportunity to work in this arena and improve the lives of many people through effective design of online training tools for healthcare providers. However, at this time, designers of health communication may need to advocate for their services—

translation and curation of the systematic review—in order to create more easily accessible and usable online health communication for clinical professionals.

THE EVIDENCE-BASED MEDICINE PARADIGM AND PROVIDERS AS USERS OF ONLINE HEALTH INFORMATION

The study of communication design of health and medical information cannot be divorced from the context of the health and medical professions. As Spoel (2008) remarked, “questions about the nature of healthcare websites are also, inevitably, questions about the nature and values of healthcare relationships and the forms of communication that create and sustain those relationships” (p. 265). In the body literature in medical rhetoric, an interdisciplinary field that informs design of health and medical communication, this is sometimes framed in terms of an expert ethos that serves to maintain control over healthcare processes. For example, Schryer and Sproel (2005) used genre theory to argue the use of modality in doctors’ and medical students’ language (such as “we allow patients to do X and Y”) functions to exert control of health care and is a constructed “professional attitude” (p. 263). This professional attitude produces discourses that “not only deliver information, they structure it as well” (Derkatch & Segal, 2005, p. 139). In this context, the discourse of health and medicine is framed in the literature predominantly vis-à-vis provider-to-patient communication. The study presented here adds to this literature in two ways; first, in the discourse of healthcare researchers designing training tools for providers online, and second, in the discourse of the paradigm of Evidence-Based Medicine (EBM). For communication designers, this is an important distinction, as it is much more difficult to make the case for a need for more design work for healthcare providers if the literature is focused on provider-to-patient communication.

Evidence-Based Medicine (EBM)

The discourse of Evidence-Based Medicine (EBM) heavily structures the design of health and medical information to providers. It does so in both process and product, as an organizing principle for the research process, and in the heavily standardized documentation created from that process. Underlying EBM is the belief that a scientific approach to the accumulation of research results provides the best care standards and, ultimately, the best clinical practice (Stevens, 2001, p. 529). The process of EBM has five components:

1. primary research: collection of relevant, published primary studies
2. evidence summary [systematic review]: review of the literature
3. translation: creation of clinical practice guidelines
4. implementation: creation of standard practices and routines; and
5. evaluation: assess impact or outcomes of new practices. (Stevens, 2001)

Each phase is heavily systematized due to the fact that there are published guidelines and protocols for the creation of each component. The genres for documentation are also rigorously standardized and maintained in specific online and print outlets (Stevens, 2001; Cochrane, 2014).

There are critiques of EBM and the systematic review. One such critique is that it is directed at the individual provider rather than to other stakeholders involved in an implementation process (Wahabi & Al-Ansary, 2011). That being said, how do providers find and engage with new knowledge? We have known for some time that not all providers are similarly situated information seekers, with differences observed by practice specialty, experience level, age, and size of practice facility (Strasser, 1978; Stinson & Mueller, 1980; Ely, Burch, & Vinson, 1992; Gruppen et al., 1987). Research on healthcare providers as information seekers suggests that for under-resourced clinicians working in underserved communities, “repeated contact” from training teams via phone, face-to-face, and “hands on” is helpful for success (Martin et al., 1997). Jones (2013) discusses the differences between how early career physicians and senior physicians approach complex health topics with which they may not be familiar, arguing that early career physicians rely more heavily on documentation, going “by the book” to diagnose and treat patients, whereas more senior physicians will rely more heavily on sense making practices, only relying on external resources such as literature when the case or situation is so complex and esoteric that she cannot rely on patterns and models from past experience. Further, Dee and Stanley (2005) found that nurses closer to the research setting (nursing students) were more likely to take advantage of online databases than clinical nurses. Taken together, this literature suggests that the safety net provider attempting to transition a practice under Affordable Care Act reform efforts would have unique information-seeking habits, but more research is needed to fully characterize them. This literature mainly comes from library and information science, and much of it before the ubiquity of the Internet. Healthcare information is increasingly moving into online spaces that are not housed in journal databases. Communication designers might now work to effectively create online spaces for provider end-users.

Evidence to Impact: Knowledge-to-action (KTA) and Knowledge Translation

Knowledge-to-action (KTA) is another concept that healthcare experts use to describe the larger process to move best evidence from research, such as collected in the systematic review, into practice. Graham et al. (2006) discussed how difficult and complex this concept is to understand through the literature, as it is addressed by many different, interchangeable names (knowledge translation, knowledge transfer, knowledge exchange, implementation, dissemination, diffusion) to refer to many different types of interventions (with practitioners, policymakers, patients, and a range of other stakeholders) (p. 14). There are many published articles in health and medicine offering conceptual frameworks or models for KTA, and call for more empirical research to test theories of KTA (Ward, House, & Hamer, 2009; Graham et al., 2006; Tugwell et al., 2006; Hamm et al., 2013). One such theory, Tugwell et al.’s (2006) cascade for equity-oriented knowledge translation, takes into account disparities between knowledge translation in wealthier communities and poorer communities, showing that the poorest populations have had 50% less success in acting on interventions suggested by the Millennium Development Goals. The barriers discussed reflect similar challenges for U.S. safety net providers with payment and service delivery reform under the Affordable Care Act, and empirical research is needed as to evaluation of knowledge transfer interventions in this context.

More broadly speaking, knowledge translation and integration of EBM into clinical practice is a difficult, complex, and understudied subject. Dadich and Hosseinzadeh (2013) conducted a survey of

Australian primary care clinicians in order to ask which EBM-based sexual health training resources they were aware of, used, and felt were impactful, from fliers and postcards to online training modules. Results indicated that there is value to these clinicians in online training modules for the translation of EBM, but that the expense and time meant that postcards and fliers were more utilized. The authors called for future research to “identify the factors the help and hinder knowledge translation during considerable reform” (p. 498). Wahabi and Al-Ansary (2011) conducted a face-to-face, intensive structured training program in Saudi Arabia, training provider-mentors who may then train other providers in EBM. They noted that participants had a positive attitude about EBM, but were not active seekers of information on their own, many participants desired new skills through this training, and that more research is needed to discern the outcomes of training programs such as this one. Studies such as this are useful for communication designers in that there may be an audience for training information that is designed differently—taking into account the lack of time and resources of many providers.

Connecting Knowledge Translation to the Design of Communication

Work that has yet to be done puts KTA, or knowledge translation or integration, into conversation with design of communication and user experience. EBM value-based perceptions of content may put EBM researchers in disagreement with communication designers in health and medicine, who understand the importance of visual design for users of e-health resources (Lazard & Mackert, 2015). For example, Stevens (2001) discusses translation as including the genres of “published guidelines, clinical pathways, care protocols, algorithms, and care standards” (p. 531). That being said, knowledge transfer experts have begun to explore connections to online and visual resources such as wikis and interactive content to train those conducting clinical trials, and mention usability as a component of the success of the knowledge transfer (Hamm et al., 2013).

The creation of optimal learning experiences for healthcare providers online remains understudied in communication design, yet experts in communication design argue that the ways users learn and experience content online is messy in much the same way that knowledge translation experts argue that knowledge-to-action is messy. As Redish (2014) discusses, many websites are still functioning under a file cabinet model rather than a phone, or conversation between online content and the user (p. 3). However, because the systematic review under the evidence-based medicine paradigm operates much like a file cabinet, the assumption here by EBM-influenced researchers is that consumption of this review, made available online, is all provider-users will need in order to learn and act. Only recently has the patient-centered care movement begun to re-orient the healthcare industry toward a mindset that is more amenable to a user-centered design approach, yet this is largely focused on patient-as-user (Jones, 2013; Bate & Robert, 2008). The research question that began this project extends this to needs of the safety net provider-as-user. More generally, the concept of provider-as-user of online learning content opens up a new area of communication design work that has until recently been the domain of translation science.

BACKGROUND

The context for this survey of provider-users is a \$1.4 million grant-funded project from a private foundation, and the project is designed to address the challenges posed to safety net providers under the

Affordable Care Act. More specifically, the project focuses on how these providers might migrate from cost-based healthcare models to value-based models of operation in order to improve profitability and efficiency. The grant proposal itself was drafted by a group of academics, primarily from healthcare solutions sciences, but with the assistance of other academic and industry consultant partners. The proposal itself sought to create an online center for safety net providers to receive support, resources, and to network.

This project as originally proposed had three components:

- a learning experience center, which consists of a re-granting program to fund individual safety net organizations in their efforts to improve the quality of healthcare payment and service delivery;
- the creation of a learning collaborative, or online hub for a limited community of safety net providers online, in order to learn from technical experts and each other, share resources, and network; and
- a learning resource center whereby information about these reform efforts could be shared with any and all safety net organizations. These resources are provided to assist safety net organizations in their participation in payment and delivery system reform projects.

To discuss and create the learning resource center, the project team needed to agree on what content this space was to present. In the grant proposal itself, the learning resource center is described in part as “a curated and dynamic library of information and research. The library will include a set of specialized topics which can be queried” (Project grant proposal, p. 2). The healthcare experts on the project readily understood this library to be focused on peer-reviewed literature in the area of healthcare payment and service delivery reform. To this end, the healthcare experts on the team created a methodology for this systematic review of this peer-reviewed literature. The write up of this methodology included the following language:

A systematic process was used to select peer-reviewed literature for inclusion in the resource center. We began by creating a list of terms frequently used to refer to each of the safety net sectors. We then defined and categorized search terms into three categories: payment reform, delivery reform, and other. Using these terms, we carried out a series of searches in PubMed and stored the results.

Each search paired commonly used names for an individual sector with all of the terms in one of the three categories mentioned above. This procedure was repeated for each of the six sectors, resulting in 18 unique searches. For example, one search coupled all of the terms referring to FQHCs [federally qualified health centers, or safety net organizations] with the list of payment reform key words. These results yielded any article that contained at least one FQHC and one payment reform term.

After the initial search results were compiled, the articles were rated to determine actual relevance to safety net payment and service delivery reform. This was done by three team members who first individually rated whether the articles were a yes, no, or maybe based on their titles and abstracts. The ratings were then compared and articles in which a consensus yes or no was reached were

either included or excluded from the literature database, accordingly. If one grader rated an article as a maybe, the other grader’s decision took precedence. Finally, if the articles were graded conflictingly, they graders debated the relevance of the article and made a final decision. (Project literature review methodology, 2015)

This methodology underscores the importance of principles of Evidence Based Medicine (EBM) discussed earlier. The focus is on the “procedure” of searching for the most relevant articles for the project, and for then “rating” each article for relevance based on titles and abstracts. The studies themselves, or, the usefulness of content for praxis, is not examined. Under EBM, the goal is to find best evidence: relevant, published scholarly articles. While definition of relevance is not given, it does suggest in the second paragraph that “key words” were used to determine initial results.

With this methodology in place, the healthcare subject matter experts performed their literature review, and then provided me an electronic results folder with hyperlinked articles under the “unique searches” they had chosen. The hyperlinked articles were located in the PubMed database (<http://www.ncbi.nlm.nih.gov/pubmed>). This systematic literature review methodology presented a number of challenges for an online communications project. I presented these challenges to the team. These challenges ranged from basic logistical and technical concerns for the execution of the center, to the potential user experience and impact of the center as training tool for safety net organization representatives. Articulation of these perceived challenges led to the creation of a survey for potential provider-users, or representatives of the safety net organizations.

METHODS AND SURVEY DESCRIPTION

This article focuses on presenting the results of a survey administered to provider-users on the project. Before discussing survey methodology, it is important to disclose how my subjectivity as an embedded technical communicator (with expertise in health and medical communication) on the project affected the survey design and results. Early on in the project, I noticed the healthcare research team had shared epistemological approaches (e.g., belief that locating best evidence can create knowledge) and methodological approaches (e.g., the systematic review as a process of searching and categorization). This became problematic for the rest of the team who did not share these approaches, and did not readily understand why the accumulation and distribution of resources for this learning resource center would be conducted in this way. Non-healthcare researchers working on the technical team were more focused on the creation of a learning experience for end users. (We, for example, were focused on items such as learning more about the end user, mapping the end user’s journey through the online space, and creating a wireframe for the online learning center.) As a result of these differing methodologies, the healthcare team envisioned a mini-PubMed searchable repository of the articles they had located, whereas the non-healthcare researchers envisioned curated content for a dynamic, interactive website. The project managers on the health team had limited compensated hours per week on the project, and they noticed this problem quickly. After lengthy discussions between the technology team (my lab director and I) and the project managers (which were communicated to the lead PI), the entire team became aware of this problem. To address this, we – all members of the team (healthcare researchers and non-healthcare researchers alike) – decided to incorporate a small amount of user research into this stage of the project.

Together, we chose to collaborate on a ten-question survey to be distributed to the safety net providers and end users of the learning resource center as to their needs for resources and support (Appendix A). We collectively decided to use this survey to address this situation because of time concerns (we were facing a deadline to launch the website), and because of ease of contact through email. The survey design, in turn, reflects a give-and-take process from both technical and health team interests – it does do by questions that may have been crafted by me, but tweaked by the health team to include language from the grant proposal. The survey’s design also reflects my role on the project and a degree of bias to see provider-user interests taken into account in the design of the learning center. It does so via aspects such as the choice of Qualtrics as a survey platform, which renders easily on a smartphone and provides relatively simple data analysis to get user research integrated into the project more quickly.

The survey described here was designed to address questions of both the technology team and the healthcare team related to support and resources for safety net organizations. For example, it addressed the interests of the healthcare team through questions such as “What forms of technical assistance could be of benefit to your community health organization?”. (These would later be funded through the re-granting portion of the project.) It also reflected the interest and focus of the technology team through questions such as “How much time in your workday do you have to read resources about improving health care payment and service delivery?”. By addressing the interests and objectives of both groups in this way, the survey served as an effective mechanism for addressing the task at hand because it was perceived as beneficial information gathering for the entire team.

After IRB approval, we (the members of the overall team) sought first to establish contact with the six national umbrella organizations that represent approximately 6500 safety net provider organizations. (These umbrella organizations were selected because they had agreed previously to participate more broadly in the project. For maximum expediency, the recruitment of individuals from these organizations involved circulating a link to the ten-question Qualtrics survey via email to the communications officer or other executive with whom our team had contact within these six national umbrella organizations (Appendix B). Their communications officers then attached the link to the survey via email to approximately 15 safety net organizations in each of their networks. (For purposes of this project, “safety net” organizations were defined as those that provide a significant level of care to low-income, uninsured, and vulnerable populations. Further, Lewin and Altman (2000) defined the composition of the safety net as federal and state programs, public hospitals, community clinics, and local health departments.) This number (15) was chosen by the healthcare team to not overly tax the umbrella groups’ communication officers.

Although we felt this method was the best way to ensure participation, some limitations were obvious. For example, participation would be more representative of those safety net providers who had the most access to technology in their practices or had the time and human resources available to complete the survey. We also gave survey recipients the option of anonymity by making the open text field for personal information optional, but we also realized participation might be influenced by the fact our project would be funding select “early adopter” safety net organizations that showed desire to participate in other areas of the project such as the learning resource center. So, an organization without resources to even begin reform efforts might not have an incentive to provide

information for the project. However, there was no incentive for safety net organizations to respond in a particular manner, for there was no manner of response that would reflect negatively on the respondent. (That is to say, there were no wrong answers for participants, because information-seeking strategies discussed in the survey would not affect eligibility for a grant later in the project.) For these reasons, the members of the overall research team believe respondents gave truthful representations of their needs when answering questions on the survey.

RESULTS AND DISCUSSION

In this section, I will first overview the response rate, potential bias, and demographic information collected on the respondents. Next, I will present the results collected from this project and discuss the three areas pertinent to the systematic review and the creation of the online learning center: time for information seekers, method of transmission of information preferred by information seekers, and modes of communication preferred by information seekers. This section will then conclude with implications for designers of healthcare communication.

Of 90 safety net organizations invited to participate in the survey, we received 41 responses, resulting in a 45.5% response rate. This response rate is less than anticipated, but it is also not altogether surprising given the respondents are under-resourced organizations (i.e., organizations with a legal mandate to serve patients regardless of ability to pay, so demand often outpaces supply of resources). Looking at the respondents’ demographic data compared to the overall population being surveyed (i.e., all safety net organizations) can help to determine bias (Blythe, Lauer, & Curran, 2014; citing Frippiat & Marquis, 2010). The survey collected demographic data via two questions: The first asked respondents to describe their role in their community health organization as an administrator, healthcare service provider, office staff, or other. (“What is the best description of your role in your community health organization?”) Of those individuals who responded to this question (N=35), 21 (60%) answered as administrators, 9 (25.7%) as providers, and 5 as other (with 2 consultants, 1 policy analyst, and 2 dual provider/administrator responses to other).

The other demographic question asked individuals to use fillable text boxes to provide their name, title, organization, and email. From those who responded (N=32), 11 (34%) represented dental organizations, 6 (18.75%) represented tribal health organizations, 4 (12.5%) represented private organizations such as consultancies or networks, 4 (12.5%) represented rural community health clinics, and 4 (12.5%) represented public hospitals.

As previously noted, Lewin and Altman (2000) defined the composition of the safety net as federal and state programs, public hospitals, community clinics, and local health departments. The demographic data in this survey suggests that the respondents do include a small number of private stakeholders (consultants, policy analysts) who do not represent the clinical practice of safety net organizations, yet are involved in reform efforts with them. These responses also seem to indicate the response rate was higher with umbrella organizations representing tribal community health and dental health centers than organizations representing other underserved groups. Despite these results, the respondents appear to represent a cross-section of the different safety net organizations in the United States as composed in the Lewin and Altman (2000) definition), with the majority of responses provided by organizations that have an administrator such as an Executive Director or CEO who completed the survey. This factor might also suggest full-time

administrators rather than clinicians might be more willing or able to participate in reform efforts than other individuals working in such organizations.

These limited survey results do indicate a need for further study of this distinction between administrator and clinician as reform effort information seeker, as this distinction is instructive for the design of communication of healthcare payment and service delivery reform for safety net organizations. Such follow up research on this topic area might include interviews of administrators and clinicians in safety net organizations to have each self-identify roles and practices as they relate to payment and service delivery decision making. This would assist in better understanding of end users for communication related to this topic.

Time for Information Seekers

Respondents were asked how much time in their workday did they have to read resources related to healthcare payment and service delivery reform. As Table 1 shows, 21 (60%) of those who responded (N=35) answered they had 10-30 minutes per day to read resources, with another 10 (28.57%) who had less, and 3 out of those had no time whatsoever. This aligns with studies such as Ramos, Lischeid, and Schafer's (2003) observation of the information-seeking habits of 40 physicians working in family clinics serving underprivileged population.

Physicians' immediate searches to clinical questions were measured, with 66% of immediate searches for information taking less than two minutes each. In the conclusion to that study, the authors argued that "EBM curricula should acknowledge the time limitations of the clinical setting, help physicians become familiar with convenient and available evidence-based sources that yield speedy answers, and explore systematic methods of resolving unanswered questions" (p. 260).

In that study, researchers noted providers' infrequent use of EBM resources such as scholarly articles and guidelines while also observing a very short time in information seeking (Ramos, Lischeid, & Schafer, 2003). Table 1 reinforces this, in that the safety net respondents surveyed here have little time to spend with information about reform efforts. Tables 2 and 3 below speak to the type of sources that respondents use. The results from these survey questions reflect a lack of desire to use EBM sources.

Preferred Method of Transmission of Information

Two questions in the survey related to the nature of the resources preferred by respondents. The first focuses on the nature of the information exchange, from face-to-face to print to digital. The survey asked respondents to rank each method of transmission of health care payment and delivery reform information from 1-6 with 1 being most preferable and 6 being the least preferable of the five

Table 1: Time in Workday for Respondent to Read Resources

Answer	%	Count
None	8.57%	3
Less than 10 minutes per day	20.00%	7
10-30 minutes per day	60.00%	21
More than 30 minutes per day	11.43%	4
Total	100%	35

options. Table 2 shows how respondents ranked the various means of communication.

The results shown here indicate a preference for high-touch and potentially synchronous communication, as face-to-face conversation and webinars were ranked first by 17 of 28 respondents (60.7%). Social media was very poorly ranked, with the overwhelming majority of the bottom-ranked entries. It is interesting to find that email received a higher ranking overall than websites, the latter of which mentioned online articles as a component in the item entry. This preference for email over websites may indicate a desire for materials to be chosen for rather than sought out by respondents on the subject of healthcare payment and service delivery reform.

Modes of Communication Preferred

In Table 3, several items are listed that were discussed by the project team as possibilities for potential integration into the web presence of the project over time. The survey question results presented in Table 3 show how respondents ranked, from 0-5, how likely they would be to use these modes of communication as they relate to healthcare payment and safety reform (0 = not likely, 5 = most likely). The webinar was the most preferred option, with the highest mean score, followed by infographics and visual aids. Scholarly research articles received the lowest mean score, although white papers ranked higher. These results suggest that curated materials are more sought after by respondents (after an opportunity for a more interactive experience in a webinar), whether visual or textual.

Implications for Communication Design

These survey results present interrelated implications for communication designers who work with health and medical partners. In this section, I will discuss two lessons learned from the survey design and results and how these may inform future actions of communication designers (such as myself, here) on interdisciplinary teams.

The first lesson learned—from both the impetus for the survey and the survey results—is the importance of the step of knowledge translation after the systematic review on a health and medical research-focused communication project. The EBM paradigm for use of best evidence in health and medicine does take into account a process for knowledge translation to assist clinicians to bring about action from best evidence available from the scholarly literature. The survey results here suggest that for safety net organizations, knowledge translation work should take into account the time constraints and the most efficient means to access information. If the resources sought after are highly curated materials such as infographics rather than lengthy scholarly works, designers of communication such as technical writers, graphic designers, and user experience professionals have a role to play in the process of creating them. Important to this process will be working alongside collaborators in translation science or those working in knowledge-to-action initiatives to better understand the education and training needs of safety net providers in order for them to make strides in healthcare payment and service delivery reform efforts.

To address such factors when working on projects involving *healthcare researchers* and *provider-end users*, communication designers should consider the following strategies:

- Ask to assess the time and resource constraints of provider-end users: A needs assessment presented early to the research team provides exigency for the design work to curate systematic reviews of literature and guidelines. The survey results in

Table 2: Preferred Means of Contact for Information Seekers

Means	Rank: 1		2		3		4		5		6		Total
face-to-face conversation	35.71%	10	17.86%	5	17.86%	5	17.86%	5	10.71%	3	0.00%	0	28
traditional mailings	3.57%	1	7.14%	2	7.14%	2	14.29%	4	50.00%	14	17.86%	5	28
Email	25.00%	7	35.71%	10	17.86%	5	14.29%	4	3.57%	1	3.57%	1	28
websites (e.g., online articles)	10.71%	3	14.29%	4	35.71%	10	28.57%	8	7.14%	2	3.57%	1	28
social media (facebook, Twitter)	0.00%	0	0.00%	0	0.00%	0	3.57%	1	25.00%	7	71.43%	20	28
webinars	25.00%	7	25.00%	7	21.43%	6	21.43%	6	3.57%	1	3.57%	1	28

this project, as well as other studies summarized here, reveal that safety net providers do not have the requisite time to seek information and interpret it, nor do they prefer to read scholarly or longer form materials. With a user needs analysis in hand, a communication designer can better advocate for a more user-centered design process.

- Use the language of translation to sell communication design services: As the research reported here indicates, healthcare researchers are familiar with knowledge translation as a way to communicate EBM to wider publics. While they may not readily see providers as a wider public, a communication designer can make the case that the unique needs of safety net providers require the translation and curation of learning materials to fit these needs.
- Look for grants and other resources earmarked for knowledge translation to fund your work: While communication design may not be the terminology currently employed to discuss knowledge translation, communication designers have much to offer in this critical area. In this project, the problem of conflicting methodologies between healthcare team and technology team may have been averted had the grant proposal specified the work of the technology team was in fact knowledge translation work. Funding agencies that are more familiar with knowledge translation, or knowledge to action, would more readily see the value in communication design.

Secondly, designers of communication should be aware that safety net provider-users are not a visible stakeholder in technology support projects such as this online learning center. Reform efforts are driven largely by those stakeholders with resources to initiate them such as private foundations and consultancies. The limitations of this survey further demonstrate the difficulties in achieving consensus by decision makers in a user-centered approach to design of online resources, and once again the difficulties in finding and listening to the voices of safety net providers in this conversation in order to learn more about their needs and to assist them with learning resources and support. The potential bias with regards to participation may be that the organizations that responded had an administrator with enough time and support in order to respond (and also were connected enough with the umbrella organization to read and respond to the email with the survey invitation). But

even these respondents answered that they had little time to spare on information seeking, preferring support in-house or through webinars. The design of an online learning resource for safety net organizations will need to take into account issues of provider-user needs and whether accessibility to an online resource is even possible for many under-resourced clinics.

To address such factors when working on projects involving *online training of safety net providers*, communication designers should consider the following strategies:

- Identify all stakeholders: As the research presented here indicates, the investments of different stakeholders in a project such as this one may vary tremendously, or may not even be visible. Safety net support projects such as the one presented here receive funding by sources removed from the safety net clinics and hospitals. It may require some digging to identify the actual end user to an online learning tool such as the one contemplated here. For example, in this project we found a blurred line between administrator and clinician. In order to find out, questions that may appear to be more about healthcare subject matter expertise become about the design of communication. Gathering information about all stakeholders—including end users—avoids confusion in what is being designed and why.
- Commit to a role of user advocacy in professional health and medical training: The EBM paradigm for knowledge sharing does not put the user of that information first. Instead, as the analysis here shows, communication strategies are driven by the procedures for EBM-focused knowledge creation. This is not to suggest that EBM is an incorrect framework for knowledge creation, only that improvements to learning tools for healthcare providers will only come when EBM is put into conversation with user-centered design. Designers of communication are in a unique position to advocate for safety net provider-users and for the value of their work. This will help achieve the shared goal of putting EBM knowledge into practice for all providers.

Table 3: Preferred Modes of Communication for Information Seekers

Field	Minimum	Maximum	Mean	Std. Deviation	Variance	Count
Scholarly research articles	0.00	5.00	2.62	1.28	1.65	34
Mainstream media articles	1.00	5.00	2.91	0.98	0.96	32
Written summaries of current research	0.00	5.00	3.46	1.32	1.73	35
Infographics or other visual aids showing current research	2.00	5.00	3.82	1.04	1.09	34
Short videos	1.00	5.00	3.36	1.12	1.26	33
Webinars	2.00	5.00	3.94	1.03	1.06	34
White papers	1.00	5.00	3.50	1.09	1.19	34
Other: (1 write-in: “face to face training at area meetings”)	N/A	N/A	N/A	0.00	0.00	1

CONCLUSION

These survey results offer a first glimpse into the challenges for safety net organizations to gather the training and resources necessary to participate in healthcare payment and service delivery reform efforts under the Affordable Care Act. The challenges indicated in the survey results are namely time and desire for materials that simply are not currently available. These results are indeed a first glimpse, however, and have several limitations. The subjectivities of the researchers, both the health team and the technical team, influenced the study design, in that the survey asks questions about several aspects of the project related to its funding; for instance, content issues and social media usage (see Appendix A). Meanwhile, the technical team, of which I was a member, sought to bring user needs to light, but negotiated wordings of survey questions and the limited circulation of the survey invitation. The limited findings possible here point to the direction of the need for further study, particularly research in the clinical setting to observe learning processes unique to safety net organizations and health care payment and service delivery reform.

Even though they were limited, these survey results assist communication designers in thinking through the ways that different stakeholders make sense of complex health and medical information. Health and medical researchers here relied on the paradigm of EBM (and the systematic review genre in particular) to train others about healthcare payment and service delivery reform. Meanwhile, administrators and clinicians running safety net healthcare organizations surveyed did not desire to learn about this issue in this format.

When discussed in this manner, it seems like a matter of preference only, but, when considering the ramifications of not learning about healthcare payment and service delivery reform—failure to adopt changes to safety net health clinics that would allow for more efficient and cost-effective care—the preference to learn a certain way becomes a much graver issue. The design of learning can reflect

social assumptions and political agendas, and a critical design process can help to uncover these to create more transformative learning experiences (Barab et al., 2007). More work is needed to braid together knowledge translation from the systematic review with the design of communication in order to train clinicians seeking to turn knowledge into action.

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APPENDIX A

The Survey Instrument

In this Appendix, the survey question text is presented in Roman text. Italicized text represents a synopsis of respondents' options for response.

1. We are currently in the process of designing a resource center for safety net payment and service delivery reform. Which would you consider valuable topics for consideration to be included? Respondents were given five thematic areas to rank from "very valuable" to "not valuable" and then "other" with a corresponding open text field.
2. What forms of technical assistance could be of benefit to your community health organization? Check all that apply. Respondents were given the options of a consultant, collaborative opportunities to network, and assistance with evaluation of reform initiatives, as well as "other" with a corresponding open text field.
3. How much time in your workday do you have to read resources about improving health care payment and service delivery? Respondents were given four options from none to more than 30 minutes per day.
4. What is your preferred means for receiving information about health care payment and delivery reform? Please rank the following: Respondents given six items to rank: face-to-face conversation, traditional mailings, email, websites, social media, and webinars.
5. What modes of communication would you be most likely to use concerning the improvement of health care payment and service delivery reform topics? Respondents given 8 types and an "other" option with open text field.
6. Do you visit any other websites to receive information about issues related to health care and your organization? Yes or no responses.
7. If yes, please list those websites below: Respondents given an open text field.
8. If you use social media, how much do you use each of the following platforms: Respondents given options of four social media platforms and asked to rank from 1-5 for low to high usage.
9. Would you use social media for work purposes, to view or discuss information about health care delivery and payment reform issues? Respondents given Yes, Possibly, and No as options.
10. What is the best description of your role in your community health organization? Respondents given options of administrator, healthcare service provider, office staff, or "other" with open text field.
11. To help us in the development of this project [name redacted], please enter your name, title, the name of your organization, and your email address in the text box below. Thank you for your assistance. Open text field provided to respondents.

APPENDIX B

Email to Communications Officers Soliciting End User Participation

Hi [Officer Name],

I am excited to share with you that we have begun preparing the website for the safety net payment reform resource center. As we move forward, I would like to introduce you to our content development expert, Dawn Opel. Dawn is a postdoctoral research fellow at ASU's Nexus Lab and has extensive experience creating websites that prioritize user experience.

Dawn has designed a very short online survey to better understand what content would be most useful to your members regarding payment reform. Once you receive the survey link from Dawn, would you please send it to approximately 15 of your members? (A copy of the survey is attached for your review).

The survey results, which we will share with you, will guide the Resource Center to provide resources that truly help [Umbrella Organization's] members adapt to payment and service delivery reform efforts.

Thanks!

[Signature of PI and Program Director]

Editorial

Re-considering Research: Why We Need to Adopt a Mixed-Methods Approach to Our Work

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ABSTRACT

In this editorial, Lauer argues for expanding our methods of research to include a greater emphasis on quantitative and mixed-methods approaches. This expansion will compliment and help frame the qualitative data collection we already prioritize in the fields of writing studies and design. Lauer discusses the benefits of a mixed-methods approach and presents ten recommendations for how scholars, especially those who may be new to quantitative methods, can learn and employ these methods. Lauer suggests that we need to value this more comprehensive approach to data collection in order to better answer the many questions that remain uninvestigated in our field.

Categories and Subject Descriptors

H.0 Information Systems: General

General Terms

Documentation, Design

Keywords

methods, mixed methods research, qualitative research, quantitative research, research, professional practices

FIRST, A LITTLE BACKGROUND...

As the youngest in a very loud and enthusiastic family, I was constantly voicing my opinions, but such opinions were swatted down like flies, dismissed quickly and completely by my older, and thus “wiser,” siblings. The truth was, as the youngest in my family, I had a built-in lack of ethos (i.e., no one took me seriously). I could never be seen as credible by simply making a claim or telling a good story. In my family, to be taken seriously, you have to present *evidence*.

Those early familial encounters shaped my entry into the field of rhetoric and composition, and my evolution as a scholar of technical writing and design. Over the past several years, I have conducted a range of research in the areas of computers and writing, visual communication, design, and technical communication, and developed a course in research methods for our masters of technical communication program at Arizona State University (<https://cisa.asu.edu/degree/technical-communication>). In this time I have been dissatisfied with the slow pace with which programs in the field have adopted more quantitative and mixed-methods approaches to research. My own disciplinary training was almost entirely in the realm of qualitative and ethnographic research. Yet I believe the questions we need to investigate as researchers could benefit from an expansion of our methods into the realm of quantitative research. In this entry, I reflect upon this needed expansion and offer encouragement for researchers who might not yet have had the training or experience needed to pursue these methods in their research.

IS THERE REALLY A NEED FOR QUANTITATIVE METHODS?

Only in the last decade of writing studies research have we begun to see a shift from research that focuses primarily on qualitative methods to an acknowledgment of the importance of quantitative and mixed methods in our work. In this context, Rich Haswell (2011) made the case for incorporating more quantitative approaches to research in the field of composition, arguing “Especially during hard times, hard data are a godsend” (p. 185). Moreover, digital humanities

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scholars have shown us how computers can process huge amounts of text in very little time and discern patterns we might never have known existed. And in the last four years, composition researchers have sponsored an “International Conference on Writing Analytics” and more recently developed a journal by the same name. (See <http://toolsforwriters.com/writing-analytics-data-mining-and-student-success/>).

Since the days of Flower and Hayes (1981), many have argued that writing is simply too complex and socially situated of an activity for researchers to even attempt to quantify the process by which writers compose. This may be true. However, the failure to even consider quantitative methods in any of the work we do negates the instances in which aspects of composing, writing, and designing—and the administration and other rhetorical activity around such work—can, in fact, be measured, counted, and systematically compared. And those measurements and comparisons do not replace the need for more qualitative data. Rather, they compliment and often provide additional verification of the qualitative data we collect.

There are valid concerns with how quantitative methods can make it all too easy to reduce complexity down to mere numbers and declare certain numerical data more credible just because it can be counted. However, writing studies minimization of quantitative forms of research has resulted in doctoral programs that focus exclusively on rhetorical/textual analysis and ethnographic observation at the expense of methods that might help us answer research questions in more comprehensive ways. Mixed-methods approaches can provide researchers with important ways of systematizing, framing, and triangulating the claims they are making.

THE BENEFITS OF MIXED METHODS

Haswell (2011) identifies four reasons for making a place for quantitative methods in our research:

- *Insight.* Quantification can “see” phenomena that unaided human perception cannot, especially in situations that swamp observers with complex washes of data.
- *Transgression.* Quantification can change the way teachers and administrators conceive of their field, sometimes debunking myths that have prevailed for decades.
- *Challengeability.* Quantification employs methods deliberately designed to make possible the support or falsification of its findings.
- *Persuasion.* Quantification offers a kind of conviction that may move many stakeholders in the fields of discourse, rhetoric, and literacy, serving as agent of social, political, disciplinary, and instructional change. (188)

I have pursued quantitative methods in my own research for all of the reasons advocated by Haswell. This approach has allowed me to see patterns in large collections of texts and participant responses (e.g., Lauer 2015; Lauer, 2014a; Blythe, Lauer, & Curran, 2014; Lauer 2013b; Brumberger & Lauer, 2015; Lauer & Brumberger, 2014). Mixing quantitative and qualitative methods has also given me the tools to “test” strongly held assumptions in our field (e.g., Lauer, 2013a), and has provided pathways for future researchers to replicate my research and test my findings. A mixed-method approach has also helped me persuade entities outside of my immediate field, and academia in general, about the importance of rhetoric, writing, and design issues (Lauer and Brumberger, 2016; Lauer, 2015; Lauer, 2009).

Communication Design Quarterly 4.3 2016

Because I utilize a range of methods in each study I conduct, I have been successful in placing my research in well-respected journals in the fields of writing studies and technical communication. Yet, as a reviewer for those same journals, I cannot say the same about the research that I have been asked to critique (and often must recommend be rejected) largely because of a failure in methods.

SO WHAT IS THE ROOT OF THIS PROBLEM?

Unfortunately, research methods are taught inconsistently and incompletely across programs and specializations, often without an emphasis on quantitative and mixed-methods. It is hardly the fault of novice researchers when their research falls short of rigorous peer review. Yet the limitations created by the lack of knowledge on how to conduct basic mixed-methods research (from surveying to coding to text mining to data visualization to statistical analysis) is being felt across the range of our interdisciplinary fields. Moreover, there have been calls from grad students and young scholars in the field for greater guidance in how researchers can effectively design and enact more comprehensive research approaches.

So how do we, as the members across a range of fields, address this issue? Providing comprehensive solutions to this question would require considerable text and input from myriad scholars. For the purposes of this entry, I would simply like to voice a few recommendations for young scholars who find themselves with research questions that they may not know how to begin investigating.

TEN RECOMMENDATIONS

The following are my recommendations for getting started and staying engaged with a mixed-methods approach to research. Researchers can often succumb to the many voices telling them what *not* to do (sometimes in their own heads). This is a list that, instead, tries to encourage researchers by suggesting simple things you can and should do to broaden the scope of your methods and conduct more dynamic research studies.

1. Talk to people outside of your field and ask them how they would approach certain questions. Early on as an assistant professor, I befriended a professor in applied psychology whose office was down the hall from mine. I remember chatting with him about some research questions I wanted to pursue but was feeling stuck about. I had avoided investigating my questions using quantitative methods because I had never learned such methods and I was pretty convinced that there was too much about the composing (in this case, designing) process that just couldn’t be quantified. After hearing my concerns, he boasted “I can quantify anything!” To me this was an obnoxious and untrue statement. As if! But working with someone who operated with a worldview that “anything can be quantified” did have the effect of opening up my perspective to things that actually *could* be quantified that I had never considered before. And from this relationship emerged a research project and article in which the quantifiable data we collected provided the frame in which we were able to discuss the qualitative aspects of student work in really rich ways. That article (Lauer & Sanchez, 2011) was nominated for the CCCC Best Article on Pedagogy or Curriculum in Technical or Scientific Communication the following year.

2. Learn the basics. If you come from a more qualitative research background, skip (for now) the opinion pieces by scholars who are problematizing methods you never learned properly in the

first place and pick up a book on research methods from technical communication or social sciences. Hughes and Hayhoe's (2008) book *A Research Primer for Technical Communication* provides chapters on "The research phases and getting started" or "how to" chapters such as "Reviewing the Literature", "Conducting a Quantitative Study", and "Conducting Surveys." These kinds of foundational chapters provide good starting points for individuals new to such approaches.

3. Use the fear you feel that you don't know what you're doing and channel it to help you become a better researcher. Good research is about making sure you collect the right kind of data to be able to investigate your question. So what should you do if you have no experience in a method of data collection that might be the right method for your project? My career is comprised of a long list of methods I had never engaged with before I had a project that required me to learn them. Early in my career I spent a lot of time regretting that I had not learned such methods in grad school. But then, realizing the futility of that regret, I forged ahead and tried to talk to the right people and design my studies in the best way I knew how. Was I nervous? Totally! The first time I administered a survey, I hoped against all odds that I hadn't missed something hugely important in my design. But that fear is what helps us do a better job. In my fear of not missing anything in the survey, I was extra careful to talk to people and to test what I had designed first. But in addition to fear, effective researchers need to embody a high level of motivation and confidence. Which leads us to...

4. Believe in the importance of what you're doing. One thing that helped with my confidence is that there were things I really wanted to figure out, and if I wasn't going to be the one figuring them out, then who would? For instance, I really wanted to figure out why some of my students were having more trouble than others learning design principles in my visual communication class. I also wanted to figure out how our field was defining and using certain technological terms and if there were patterns in our use that influenced our programs and scholarship. I was interested in learning how technology influenced the idea generation process in design. I was also curious about whether I should require design students to spend time writing about their designs, or if they would benefit from spending more time actually designing instead. And I was curious about what styles of feedback and what particular terms might be most effective to use when providing feedback on design assignments. And these are just a few of the ideas I've been able to explore thus far. There are so many questions that need investigating in our field and there simply aren't enough scholars to explore them all. We owe it to our students and larger society to conduct research and do so to the best of our abilities. Taking that responsibility seriously can help motivate you to learn new methods and forge ahead with the confidence it takes to do the very best you can to investigate the questions that need investigating.

5. Know what you don't need to know. You don't need to know everything there is to know about all approaches to research. It's more useful to be familiar with a range of methods and then identify the particular development and analysis challenges for which you can bring in other people to help. In an article I co-authored about effectively designing online surveys to meet the needs of both researchers and users (Lauer, McLeod, & Blythe, 2013), my collaborators and I argue that knowledge with programming and statistical processing are not necessary skills for researchers to have when designing online surveys from scratch. But what is necessary is finding the people who have those skills sets and who can contribute to your research in those areas.

6. Extend theory...by TESTING it. Theory helps us understand how the world operates. But it should not be the stopping point of our research. If you feel like you're starting to notice trends or patterns in the ways we communicate and interact in the world, reflect upon those. Theorize them. But don't stop there. As you theorize, also think of ways you can collect data to test your theories.

7. Embrace the relationship that naturally exists between numerical data and descriptive data. Just as "love and marriage go together like a horse and carriage," the quantifiable elements of a research project often provide a useful frame in which we can discuss the qualitative elements. While you are collecting statistical data, or calculating the frequency with which a phenomenon occurs, you can simultaneously collect richer, more descriptive data that illustrates the process and shows what is really happening behind the numbers. In my study investigating the relationship between technology and idea generation in the design process, I surveyed groups of students and collected numerical data about the extent to which they had experience with technology or sketching, the extent to which they used technology or sketching in their design process, and the amount of time they spent on each phase of their design process. In addition to this numerical data, I asked them to reflect, through open-ended responses, on their attitudes toward and use of both sketching and technology throughout their process. The numerical and descriptive data combined helped frame and illuminated students' design processes more fully and revealed patterns about the use of both sketching and technology among different groups.

In two of our more recent publications (Lauer & Brumberger, 2016, Brumberger & Lauer, 2015), my colleague Eva Brumberger and I collected 1500 job ads in technical communication and user experience to mine them for information about job titles, types, locations, and salaries, as well as characteristics, competencies, products, and knowledge of technologies that were being asked of applicants. We counted and coded the attributes in the job ads and looked at how they compared to similar studies. But we didn't stop there. The categories we developed from this phase of the study helped inform the next phase, for which we were awarded a grant from the Conference on College Composition and Communication, to go into the workplace and observe workers who had the kinds of jobs we had found in the job ads. We observed eight communicators in the workplace for twelve hours each. We interviewed them at the start and end of our observations. We collected a great deal of qualitative observational and interview data that put a face to the attributes we had catalogued in our analysis of job ads. In this respect, each kind of data illuminated the other. The categories we developed out of the job ad analysis helped us interpret and organize the observational and interview data we collected in the embedded workplace research. The observational data richly illustrated, expanded, contextualized, and complicated many of the trends we noticed in the ads.

8. Think creatively about how to collect more data and more varied data. There is such a thing as collecting too much data. However, more often than not, young researchers rely on single extensive examples to illustrate their points, and such examples can be dismissed as anomalies pretty easily. Just take this year's presidential race and the almost-daily discussion about what kind of person represents the Republican Party. Donald Trump is the Republican nominee, and in a single-example argument you could make the case (using compelling primary voting evidence) that he represents the Republican Party. But if I am a reviewer of your

argument (and I happen to be a John Kasich supporter), I can dismiss your argument with my own evidence and perspective.

In all forms of research you need to have more than an N of 1. Otherwise your research can be dismissed as cherry picking and very easily refuted by a single contrary example. If I can dismiss your paper with an “I don’t think what you’re telling me holds up” or “How do I really know what you’re saying is true?” then you have not collected enough data nor is it varied enough in its scope for you to use it to defend your perspective. It is certainly never the case that an argument can be defended against all refutes. But it is also very difficult to refute sound data.

9. Understand that well-designed research doesn’t depend on a certain outcome. What can help you to design studies that collect sound data is to approach each study as though you don’t have a vested interest in what the data reveals. All outcomes are interesting and have value.

When I designed my study to test whether having students write reflective assessments (in the form of client letters) improved the quality of their designs (Lauer, 2013a), I was testing a well-established assumption in the field that reflective assessment was A Good Thing. I had always believed (and still do) that reflective assessment helps students learn more about their rhetorical choices and communicate more effectively with clients. But at the same time, I was really strapped for time in my design class, and I genuinely wanted to know whether having my design students write so extensively about their designs was actually helping them produce better designs. In this case I was able to construct a study and collect data in a blind manner, without researcher bias, because I knew that no matter what the data said (whether reflective assessments did or did not improve design quality, and in what ways), it would be interesting and beneficial for me, and other teachers, to know.

The other advantage to designing studies that are open enough to support any outcome is that we often end up being open to the development of new categories and findings. In my study investigating the relationship between technology and idea generation in the design process, the prevailing narrative in the field was that hand sketching was the best way to develop ideas in the initial design phase. Yet I had noticed students using technology in interesting ways to generate ideas as well. And that gave way to another question too: what about those students who had no experience with either? What did they do? I wasn’t sure if I would find the answer, but once I started combing through the data, there it was. And it wasn’t either of the binary categories that I had observed and that had been discussed in the literature. It was something new. Over and over, inexperienced students cited generating ideas for their designs “in their heads” – without using sketching or technology. Because I was open to other options in my data analysis, I was able to notice this new category and theorize what we, as teachers, could do with it.

10. Imagine an audience that extends beyond people in your immediate field. Research should be public and researchers should be public intellectuals. It’s easy to dismiss those outside of academia (or our own fields) as not understanding or appreciating our research. Yet, in the end, if we can make our research accessible to those outside academia, we can extend our impact and further justify the importance of our contributions as teachers and researchers. This doesn’t have to be difficult. Do things that matter to you; but try to show, using accessible language, how they can matter to others as well.

FINAL THOUGHTS

I started my career in academia valuing my teaching above all else. Teaching was what led me to pursue a graduate degree in the first place, and research was simply something I would do on the side. For me that perspective has completely flipped; now I consider myself a researcher first, and a teacher who is informed by her research, second. It is exactly the act of doing research and reflecting upon the results of that research that make me a better teacher. But there is so much research to be done and there are so many ways in which our research methods can continue to expand and evolve and improve. One of those ways is to entertain more quantitative and mixed-methods in our research. My reflections above are intended to provide a way forward toward that end. I hope you will continue designing studies that answer the questions that need answering. Our fields—and the larger public—are counting on you!

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Book review

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Gallon, R. (2016). *The Language of Technical Communication*. Laguna Hills, CA: XML Press.

Ray Gallon's collection *The Language of Technical Communication* attempts to standardize the terminology used in the field by offering concise definitions for 52 key terms, each authored by a contributor with relevant expertise. As a reference work, this book resists summarization. In this review, I will instead assess the text according to criteria appropriate for a reference: ease of use, selection of included terms, and quality of the definitions provided. Although Gallon forwards no explicit thesis, by prioritizing information related to content management, the book does make a claim about the future of communication design. Individuals who are new to the field or whose responsibilities are expanding into content management will find *The Language of Technical Communication* valuable, while scholars and experienced communication designers will appreciate the contributors' consistent emphasis on the future of the discipline.

To begin, *The Language of Technical Communication* is meant to be scanned quickly for needed definitions (rather than read cover-to-cover), so accessibility is an important concern. Due to its clear and regular structure, communication designers should find this book to be materially as well as linguistically accessible. Terms are divided into five categories:

- "Core Concepts" describes the essential terminology used in the field, including "Content," "Usability," and "Metadata," which will be immediately recognizable to most communication designers.
- "Technical Concepts" describes processes and technical systems for "creating, managing, and delivering" content (p. 5) – terms

such as “Topic-Based Authoring,” “Content Architecture,” and “Learning Management System.”

- “Standards and Conventions” reviews “standards-based approaches” (p. 5) to managing content and includes terms such as “XML Document Editing Standards” and “Controlled Language.”
- “Deliverable Presentations” reviews formats for the delivery of content. This section includes terms such as “HTML,” “PDF,” “Print,” and “Infographics.”
- “Future Directions” predicts how emerging technologies such as “Augmented Reality” and “Wearables” will impact technical communication.

Definitions average around 300 words, and each definition is divided into three sections: “What is it?” and “Why is it important?” are briefly addressed, while “Why does a technical communicator need to know this?” occupies the majority of each definition. A lengthy contributor bio (including contact information) is also provided for each entry. Importantly, each two-page definition is presented in language that is accessible to a novice. Only one definition includes any form of visualization (perhaps a missed opportunity to increase the accessibility of this information).

Of course, users can only find terms the editor selected for inclusion in the overall text, so the selection of those terms is important. In his preface, Gallon accedes that technical communicators are “a varied, multi-talented lot, and we do a huge variety of things” (p. 7). He also notes choices regarding what terms to include were made in a way that “the list not be limited to technical *writing*, but include all aspects of technical communication” (p. 7). A completely comprehensive reference work is perhaps impossible for technical communication, and the editorial choices made narrow – without decreasing – the usefulness of the book. The longest section, “Core Concepts,” does reflect the diversity of the discipline, although many topics are necessarily addressed only in broad strokes. Other sections are more focused, abandoning some of the trends highlighted in “Core Concepts.” For instance, usability testing is an important

responsibility that increasingly falls within the purview of technical communicators (Chong, 2016), and “Usability” is included in “Core Concepts,” but discussions of usability do not appear in other sections of the overall text. Mapping and other forms of data visualization, graphic design, and collaborative processes are all topics that are addressed primarily or exclusively in “Core Concepts.”

The terms included in the collection suggest technical communication and communication design is a discipline focused on the production and management of text-heavy content that is flexibly deployed across multiple digital formats. Technical systems and authoring tools feature prominently, particularly for how they allow content reuse. Terms related to these issues include “Single Sourcing,” “Content Variables,” “Content Architecture” and many more. Fourteen of the terms that appear in Gallon’s book are shared with *The Language of Content Management*, another publication in this series (by XML Press), although some of the definitions are revised. Other industry trends that are well represented in *The Language of Technical Communication* include a shift towards mobile, on-demand content consumption, the growth of online learning, and the need for globally localized content. Ultimately, *The Language of Technical Communication* is primarily about the tools and systems of technical communication – elements of the discipline that are particularly relevant to the professional consultants that designed the book and contributed most of the content.

Finally, we must consider if the definitions included here provide appropriate information to meet the user’s needs. Few of the terms in *The Language of Technical Communication* are proprietary to communication design, meaning general definitions for them are widely available. (Wikipedia, for example, contains a number of articles about XML.) But, as mentioned, contributors prioritize answering the question, “Why does a technical communicator need to know this?” This factor grounds the definitions provided in the particularities of the discipline, something general resources cannot do. Specifically, contributors consistently attend to emerging trends in communication design and predict the significance of their terms into the future. Even the definition for the venerable content delivery system “Print” explains the opportunities presented by

recently developed print-on-demand technology. Apart from this, definitions are diverse in their approach. Some contributors offer examples of how their term is used, emphasizing its importance by describing a variety of applications. Others focus on the value that a particular practice provides to an organization, or on the needs of the user. Still others provide tips and tricks on how to implement a practice.

The definition of “Indexing” is a particularly strong but representative example of the kind of information provided by *The Language of Technical Communication*. Jan Wright, a consultant who provides indexing services, defines indexing as “A set of organized, easily-navigated and concise terms and phrases linked to locations in content, giving users fast access” (p. 46). Indexing is important because it provides “users with a bottom-up tool for navigating content... democratizing all concepts for easy retrieval (p. 46). Wright contributes a lengthy description of why a technical communicator needs to know this. She describes how indexing compares to other ways of accessing content, emphasizing the breadth – indexed content supports “the many ways users search for information” and “a wide variety of readers.” She follows this with an extended metaphor comparing indexing to “a double-headed fork with tines at both ends” (p. 47) in order to help the reader understand how indexes are used in practice. Wright then describes practices used when implementing indexing. While not comprehensive enough to guide an implementation of indexing, the description of these practices would be helpful for a communication designer using indexed content.

The Language of Technical Communication will be valuable for new communication designers struggling with the variety of work required by their position and the associated terminology. It will also be particularly useful to the writer untrained in the technical side of the discipline (e.g., someone who doesn’t know DITA from DocBook). For the experienced technical communication practitioner, this book is most likely to be useful when adopting content management responsibilities or operating in a group that is inconsistent in their application of important terms – someone in need of developing a “common understanding of these terms and their importance” (p. 9). It’s difficult to imagine an experienced

communication designer reaching for this book to look up, for instance, PDF. Yet, anyone wondering about the longevity or ubiquity of that file type will find answers clearly presented in a way that emphasizes the needs of communication designers.

It should be noted that *The Language of Technical Communication* is not written for an academic audience. However, scholars of communication design might choose to cite it when defining terms in their own writing. Additionally, Gallon's goal that the book be "valid and applicable into the foreseeable future" (p. 5) means the information here offers insights into the trends practitioners face.

Whereas Scott Abel and Rahel Anne Bailie's *The Language of Content Strategy* (2014), the previous book in this series, dealt with a relatively new, emergent field of expertise, communication design has a more established history. Abel and Bailie's book represented a concerted effort to collapse an inconsistent vocabulary into a single standard, which was needed because multiple stakeholders were competing to popularize their preferred terms (Anderson & Batova, 2015). But technical communication has a much longer history and wider shared knowledge base. This factor does not invalidate the goal of providing quintessential definitions, but it does make any effort a partial one. Ultimately, 52 definitions is insufficient to fully represent the discipline, and a more clear description of the book's goal would help practitioners interested in using this material.

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Book review

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Farman, J. (Ed.). (2014). *The Mobile Story: Narrative Practices with Locative Technologies*. New York, NY: Routledge.

The Mobile Story: Narrative Practices with Locative Technologies edited by Jason Farman brings together communication designers and theorists to offer numerous approaches for creating digital stories in an age of mobile, locative media. Contrasting the popular conception that mobile devices are a distraction, Farman argues the growing ubiquity of mobiles has led to their interface disappearing through daily use (p. 5). Users no longer need to consciously focus their attention on their devices and can instead seamlessly use such devices for everyday tasks. Due to this growing familiarity, the projects in the book “seek to “defamiliarize” people with their places and the technologies that mediate those places” (p. 5) in order to push interface to the forefront of users' attentions and see how mobiles provide a unique lens through which they interact with the world around them.

Recent scholarship on mobile technology and communication (Kalin & Frith, 2016; Kimme Hea, 2009; McNely, 2015; Pflugfelder, 2015; Pigg, 2014; Rivers, 2016; Swarts, 2007) has focused on the power of mobile devices to contextualize and situate writing in physical locations. When writing can be done “anywhere,” the constraints and affordances of writing location come into play. The contributors to *The Mobile Story* likewise explore mobiles as a way to generate “site-specific storytelling” (p. 6) that connects stories created by writers, artists, and designers to their site and medium of creation. By focusing on stories and storytelling as subjective experience, the collection further highlights the ability of mobiles to layer the differing perspectives of the storyteller, the readers, and others together as part of the communication act (p. 9).

Broadly studied through media such as digital narratives, mapping, mobile games, and art installations, this collection offers communication designers a number of guiding theories and practical approaches for developing mobile applications and services that connect users to the places and spaces they inhabit every day. For academics interested in communication design, exploring such locative practices leads to further discussions of the increasing capabilities of mobile devices (through GPS, push data, and increased network coverage) and what that means for mobile users who are now able to write, access, and share information with others in public spaces.

The collection is divided into six parts, each with three to four chapters exploring theories and practices of mobile storytelling. Part I, “Narrative and Site-Specific Authorship,” opens with Farman’s essay contextualizing the themes of the collection. Next is Brett Oppegaard and Dene Grigar’s case study of the Fort Vancouver mobile storytelling application in which the authors study the various relationships—between content and medium; people, time and space; people themselves; and people and information—that emerge through locative storytelling practices. Part I ends with Adriana de Souza e Silva and Jordan Frith’s chapter on location-based social networks and their ability to attach data to physical locations. They write, “...embedding information in locations contributes to change their intrinsic meaning (the presentation of location), but it also influences new patterns of mobility through the city by the linking of locations” (p. 45). Such movement generates new stories and perspectives through the locations that users choose to link both physically and digitally. For communication designers, the chapters in part I explain how stories can affect users and provide an approach to telling these stories through mobile technologies.

Part II, “Design and Practice” focuses on practical methods to creating mobile stories that connect users to local environments starting with Jeff Ritchie’s overview of affordances and constraints to using mobile devices. In his chapter, Mark Sample argues locations are not compelling, but stories are. Based on his students’ playing of an alternate reality game *Haunts*, Sample positions GPS as a storytelling medium for connecting technologies to narrative

practices. Susan Kozel further complicates stories and technologies through her study of the project *IntuiTweet* where dancers shared movements and sensations through Twitter. The embodiment of the movements themselves combined with the log generated by Twitter highlights the asynchronous nature of many of these storytelling technologies. The part concludes with John Barber's chapter on Walking-Talking, a proposed locative sound-narrative project. Drawing comparisons to the practices of the flâneur, Barber argues that such a project "can provide opportunities for disbursed participants to create and share collaborative storytelling without the need, or necessity, for a centralized structure" (p. 106). These specific cases offer readers real world examples of mobile storytelling projects and their effects on user practices.

"Space and Mapping," part III of the book, explores how stories can be told through mobile mapping technologies. In this section, Didem Ozkul and David Gauntlett's essay links cognitive mapping practices and memory as a form of storytelling embedded in the fabric of city living today. Next, Lone Koefoed Hansen studies Dutch artist Esther Polak's use of GPS to trace paths of movement and how such practices can turn into stories of experience. Lastly, Paula Levine looks to mobile mapping as a way to foster empathy by "collapsing geographies to mix *here* with *there*" (p. 144) and layering geographically distinct areas together. In each chapter, stories are built not just from maps themselves, but from the practice of mapping as an activity. Practitioners interested in mapping technologies and GPS will find the examples in these chapters useful for creating similar projects that connect space and storytelling to engage users with the world around them.

Part IV, "Mobile Games," opens with Ben Bunting's essay on geocaching and the ability of locative games to create engaging game worlds tying the player to his or her environment. Rowan Wilken's chapter similarly positions game worlds as locally-situated spaces through an examination of Blast Theory's games promoting interaction with nearby strangers. Next, Bryan Alexander looks to the increasing capabilities of mobile devices in creating "Storygames" (p. 194) that combine narrative practices with play. Part IV ends with an examination of non-locative mobile game practices by Marc Ruppel. His counterexamples further

contextualize mobile games through the wider lens of mass media. Together, these chapters provide readers with specific examples of how to use mobile games and game theory to create memorable user stories.

“Narrative Interfaces,” part V of the collection, examines various platforms for creating mobile narratives. First, Gerard Goggin and Caroline Hamilton trace reading from novels, to cell phones, e-readers, and locative devices. Through this examination they argue, “with the establishment of second- and third-generation digital mobile phone technologies and the associated user cultures surrounding them, these devices became a site for inspiring creative experimentation with narrative formats and modes” (p. 227). Larissa Hjorth’s chapter focuses on cell phone novels specifically through a study of Japanese cellphone novels written by-and-for women as a new space for user-generated content. Finally, the essay by Jennifer Chatsick, Rhonda McEwen and Anne Zbitnew looks at narrative interfaces through the practices of the Visual Storytelling Club in Toronto, a group of college students with intellectual disabilities using iPads to express themselves. In each chapter, interfaces are examined as a way for communication designers to utilize stories to drive user experience with locations, technologies, and other users.

Part VI concludes the collection through examining “Memory, History, and Community” and the effects of mobile stories on public, local spaces. In this section, Alberto S. Galindo studies the “Explore 9/11” mobile app from the National September 11 Memorial as an oral narrative. Due to the different media functions of the app, “Explore 9/11” “not only proposes a way to negotiate and incorporate storytelling and oral history with a mobile device; it also questions the role of the reader, spectator, and listener as their tasks easily interact and evolve, depending on the section of the app being used (p. 270). In chapter 19, Claire Ross et al. discuss their *QRator* project, which creates an interactive museum experience using QR codes to generate personal connections between objects in the museum and museum-goers. In the final chapter, Mark C. Marino looks at two Los Angeles-based story projects and the many marginalized voices that can be heard through such mobile, locative projects. As an end to the collection,

Part VI focuses on the real-world impact of mobile storytelling and is useful for communication design practitioners who can use the techniques presented to examine their own communication projects and the impact they have on public spaces.

Together, the backing theories, cases, and practical approaches presented in *The Mobile Story* provide communication designers with a wide range of possibilities for studying storytelling as a mobile, locative experience. Through the focus on storytelling, the collection offers teachers, designers, and practitioners new ways to tailor user experiences, public writing, embedded media, and social activities for a growing society of mobile writers and readers. Beyond simply telling narratives through mobile and locative technologies, storytelling puts designers, writers, and users on equal footing through the ability to layer data in physical spaces and promote a range of unique experiences and contributors. As such, the essays in this edited collection themselves offer numerous theory-backed cases for studying mobile devices as vital interfaces for interacting with and experiencing everyday locations.

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