SUMMARY

- Explores limitations of the concept of document design and defines information design
- Describes the three levels at which design occurs
- Suggests the strengths and limitations of this framework

Physical, Cognitive, and Affective: A Three-part Framework for Information Design

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This is an exciting time for technical communicators. We're moving from a focus on the tools used to produce content, like help authoring tools and desktop publishing programs, to a focus on the content itself (Carliner 2000). According to JoAnn Hackos (2000), sponsors of our work now expect us to add value through innovative approaches to information because we have already achieved the cost savings promised by automating the production processes.

In some cases, innovative approaches involve experimenting with new ways of presenting content. As many readers are already aware, we're embedding information into the user interface, called *embedded user assistance* and *electronic performance support* (Marion 1997 and 1998), and developing knowledge management systems that capture, store, transform, and disseminate the information that's crucial to our businesses (Thurman 1999). In some cases, we're even designing and developing the interaction between computers and users, an activity called *interaction design* (Hewett and others 1996).

In some other cases, the innovative approaches we adopt involve developing a single base of content that can be used in many ways. For example, some organizations print books and display information online drawing from the same source file. Others use a single source file for publishing very different versions of the content, such as one version intended for a training course and another intended as a user's guide (Kostur 1999).

Design is an essential ingredient to the success of all these efforts. For example, to develop an online interaction, a technical communicator must not only write the message presented to users, but must first predict users' goals, moods, and motivations, and gear the message accordingly. If several different types of users encounter the same content, then the communicator must also discover this difference and display a message that's tailored not only to the context and mood, but to the type of user.

Similarly, to develop a single base of content that can be used in a variety of media systems and contexts, technical communicators must identify all the potential uses of information, then prepare designs that accommodate all these different uses (Hackos 1999). In some cases, technical communicators must coordinate the designs for several related communication products because they will be based on the same source of content.

This concept of design broadens the role of technical communicators beyond the traditional boundaries of writing and page design. Up-front efforts are far more complex than defining the audience and purpose of the communication product. In most cases, a communication product has several audiences and purposes, and is developed in conjunction with related documentation, as well as marketing and training materials. Budgets, schedules, existing technology infrastructures, and corporate cultures place boundaries on the solutions available to design challenges. Because of this complexity, some organizations tackle work in two separately planned and budgeted phases.

This broadened focus of our role also taxes our existing approaches to document design and serves as the subject of this article. Specifically, this article first explores the limitations of the prevailing concept of document design. Next, it offers a definition of information design–a framework meant to broaden the popular perspective on design in our field. The article then describes in detail the three types of design activities involved in technical communication: physical design, cognitive design, and affec-

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tive design. Last, this article suggests the strengths and limitations of this framework. Three appendixes describe the implications of this framework for the teaching of technical communication to majors in the field, to the practice of technical communication in industry, and to research in the field.

LIMITATIONS OF THE PREVAILING CONCEPT OF DOCUMENT DESIGN

For nearly 20 years, technical communication has been guided by a concept called *document design*, which was introduced by Felker, Pickering, Charrow, Holland, and Redish in their 1981 book, *Guidelines for document designers*.

Document design is

> *a field concerned with creating texts (broadly defined) that integrate words and pictures in ways that help people to achieve their specific goals for using texts at home, school, or work. (Schriver 1997)*

According to Redish (2000), document design has two dimensions:

1. The overall process of developing a successful document

2. The way the information is presented on the page or screen (layout, typography, color, and so forth)

Although the definitions accommodate both, the practice of technical communication has tended to focus almost exclusively on the second dimension. For example, consider this advertisement for a session for technical communicators on designing Web pages that was held at a recent conference:

> *The magical formula for designing successful Web pages is:*
>
> *content + writing style + layout = information design*
> . . . .

Where are the readers' goals in this magical formula? Where is the process of selecting the content?

This focus on text and appearance is not an isolated one. Consider informal comments by many technical communication students who study document design. They want to learn how to design pages, failing to recognize that a well-designed page only addresses the surface—and does not compensate for an unusable product design or an incompletely thought-through technical concept. Too often, technical communicators begin software documentation assignments by choosing a help authoring system. Only afterwards do they consider the content the users need "help" with.

Somehow, the practice of design as improving the appearance of pages and screens has replaced the concept of design as problem-solving, even though published definitions of document design suggest otherwise. Perhaps that's because the source material is primarily a series of guidelines of dos and don'ts for technical communication products—a cookbook of sorts. Although few read the source material any more (the original *Guidelines* are out of print), technical communicators still focus on discrete issues, such as the most appropriate font color and size, and the most usable arrangement of information on the screen.

Even when we consider document design as the overall process of developing a successful document, that process has been drastically altered in the past 20 years. For example, the introduction of desktop publishing in the 1980s significantly shortened the production cycle, but added technology issues that limited some design options and often moved responsibility for copyediting and producing graphics and camera-ready copy to the technical communicator. Similarly, the emergence of online help and Web sites expanded our choice of media, and the number of media in which we needed to comfortably communicate. We had to learn how to communicate online and how to design screens. Although the guidelines for document design offered direction, they did not always transfer to the new medium.

Recognizing this limitation, other approaches have been offered to supplement the concept of document design. Many of these broader approaches emerge from practice or studies of practice:

- **Writing as a problem-solving activity** That is, technical and professional writing are intended to communicate for a specific purpose (Flower 1989).
- **Task-oriented writing** That is, content should be structured to assist people with specific tasks that they need to perform, rather than as documentation of features and functions from which users must infer how to perform the desired tasks.

Somehow, the practice of design as improving the appearance of pages and screens has replaced the concept of design as problem-solving, even though published definitions of document design suggest otherwise.

- **Minimalism** That is, users can become productive quickly with a limited amount of instruction, but technical communicators have to carefully choose which information to provide—and which to leave out (Carroll 1990).
- **User-centered design** That is, following certain principles of design can make information easier to use and requires less documentation of products and their interfaces (Norman 1990). Technical communicators' interest in these design principles rose as information for consumers and novice users became a significant part of the work.
- **Human performance technology** That is, technical communication activities attempt to assist individuals and groups in achieving goals. Emerging from the field of instructional design, performance technology (also called performance-centered design) involves more than imparting knowledge and skills. It requires that the designer make sure that users have the proper resources and promote supportive attitudes and cultures so that performers can accomplish these goals (Stolovich and Keeps 1999; Bowie 1996).
- **Bottom-line impact** That is, communication products should be linked to the organizational goals and financial performance of the organizations that commission them (Robinson & Robinson, 1989).
- **Process-maturity** That is, the quality of products is related to the maturity of the process that developed it (Hackos 1994).

Each approach addresses a different limitation of document design, but none comprehensively incorporates the strengths of other approaches or describes the relationship of each issue to the others.

Perhaps these limitations of document design have spurred some technical communicators to embrace a notion called information design. Indeed, some call themselves information designers or information architects. Privately, these people often identify themselves as information designers to say "I'm not a technical stenographer," "I do more than wordsmith programming specifications or make pages and screens look good." Like architects of buildings, information designers look at the bigger picture: what problem is the client trying to solve, what can they bring into play to address the problem, and how does this solution support the larger business situation?

But what is information design? The Vienna-based International Institute for Information Design (1997) admits that information design

> *can be hard to define, because it is an interdisciplinary approach which combines skills in graphic design, writing and editing, illustration, and human factors. Information designers seek to combine skills in these fields to make complex information easier to understand.*

Design must also help designers develop their instincts for choosing "right" solutions.

Without a precise definition that distinguishes information design from document design, and without offering an alternative to document design, information design may look like nothing more than a marketing ploy.

Recent professional and scholarly activities have attempted to make information a topic of academic discussion. Most academic discussion has occurred in the circles of architects and graphic designers. For example, architect Richard Saul Wurman's 1996 *Information architects* presents case studies of practical information that has been designed for effective, easy use. The edited collection *Information design* (Jacobson 1999) primarily applies graphic and architectural design theory to the design of communication products. Neither of these books really presents a practical definition of information design, however.

A DEFINITION OF INFORMATION DESIGN

Before offering a more comprehensive definition of information design, a consideration of design in general might be appropriate. According to Rowland (1993),

> *Some argue that a science of design is possible and represents an important goal. Cross, reporting on a number of studies in design, argues that design is quite different from science. While scientists focus on the problem, on discovering the rule that is operating, designers focus on the solution, on achieving the desired result. (p. 81)*

He concludes that design is ultimately a series of personal choices based on a subjective sense of what is "right."

In other words, design is a problem-solving discipline. It considers more than the appearance of the designed product, but also the underlying structure of the solution and its anticipated reception by users. Because design is focused on solving problems, a design theory must provide more than a series of guidelines about discrete characteristics of the solution; it must focus designers on identifying problems and supplying a framework for identifying and considering the interrelated issues that must be addressed in a solution. Design must also help designers develop their instincts for choosing "right" solutions.

TABLE 1: DEFINITIONS OF INFORMATION DESIGN

- Information design is concerned with making information accessible and usable to people. (David Sless 1990)
- Information design is the intentional process in which information related to a domain is transformed in order to obtain an understandable representation of that domain. (Peter J. Bogaards 1994)
- Information design is the defining, planning, and shaping of the contents of a message and the environments it is presented in with the intention of achieving particular objectives in relation to the needs of users. (*ID news* 1999)
- Information design helps explain things and uses language, typography, graphic design, systems and business process improvement as its key tools. Information design is focused on users and is committed to using usability and other research and testing to find out whether its products actually achieve their objectives. (*Text matters* 1996)
- Information design is the art and science of preparing information so that it can be used by human beings with efficiency and effectiveness.

◆ *Most of these definitions were found on the Web site of the International Institute for Information Design.*

Table 1 lists many definitions that have been offered for information design. Some are no different from the definitions of document design that we have already seen, with their primary focus on text and pictures. Others take a broader view, focusing on defining the problem and designing effective solutions for problems in communication.

If information design primarily focuses on issues of appearance and text, it is not distinct from document design, nor does it solve the problem of the limited focus of document design in most current practice and research.

Information design must therefore have a broader focus, one that encompasses not only graphics, text, and reader goals, but also the goals of the sponsor who commissioned the text. Therefore, information design may be better defined as:

> *Preparing communication products so that they achieve the performance objectives established for them. This process involves*
>
> *1. Analyzing communication problems*
> *2. Establishing performance objectives that, when achieved, address those problems*
> *3. Developing a blueprint for a communication effort to achieve those objectives*
> *4. Developing the components of the planned communication effort solution*
> *5. Evaluating the ultimate effectiveness of the effort*

Some of the terms in this definition have specific meanings.

- *Performance objectives* are observable, measurable tasks and business goals that users should be able to perform, the conditions for doing those tasks, and the level of acceptable work (Mager 1997b).
- *A blueprint* is a detailed design plan for a document that indicates not only the content to be presented, but the extent and format of the presentation (Kostur 1999).

Inherent in this definition of information design is the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model that is widely used in instructional design (Gustafson 1991) and is similar to models used in software engineering.

A MODEL OF INFORMATION DESIGN

This new model I propose approaches information design on three levels. This model is adapted from the three levels that theorists in education and instructional design consider when designing courses (Dick and Carey 1990).

- *Physical*, the ability to find information
- *Cognitive* (intellectual), the ability to understand information
- *Affective* (emotional), the ability to feel comfortable with the presentation of the information (comfort with the information itself might not be possible, depending on the message)

In the next three sections, I address each of three levels in detail, explaining what it is, how it relates to current research and discussions of technical communication, and naming the elements of design and some of the key design issues addressed. Figure 1 summarizes this model.

The Physical Level: Helping users find information

The first type of design is the physical. From the users' perspective, good physical design lets them find information of interest easily. For example, if users seek information about the DOS command "dir," can they easily locate that information? The physical level also concerns the general appearance of information.

The design issues associated with the physical level typically are those associated with the traditional practice of document design. These issues include:

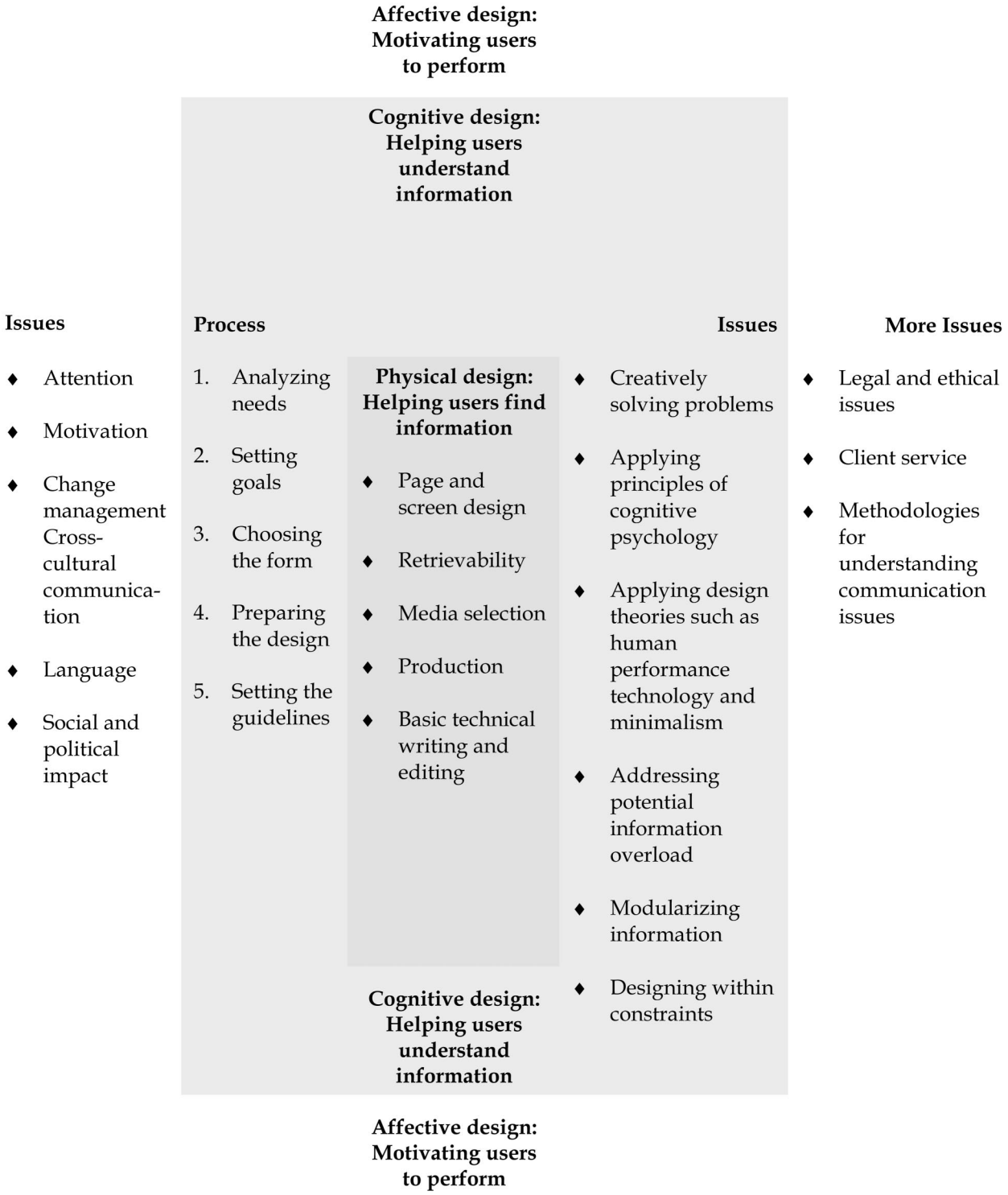

Figure 1. Physical, cognitive, and affective—A three-part model of design for technical communication products.

- *Page and screen design*, which refers to placing information on a page or screen so readers can easily locate it. Elements of page and screen design include:
  - *Layout*, or placement of information
  - *White space*
  - *Headings*, which readers can scan to find information
  - *Type*, which can help or hinder the search and reading process
  - *Graphical devices*, which can call readers' attention to key elements of information
- *Retrievability aids*, which are devices that help readers locate information in a document. These aids include tables of contents, site maps, indexes, links, running headers and footers, and tabs.
- *Media selection*, which refers to choosing the appropriate means of physically delivering the information to users. Information can be delivered in print, online, through video or audiotape, or through a live connection.
- *Production*, which refers to the process of preparing a communication product for duplication and distribution to its intended readers. Elements of production include:
  - Copymarking text to conform to style guidelines
  - Preparation of graphics and other media elements
  - Integration of text, graphics, and other media elements into a master copy
  - Preparation of materials for printing, CD duplication, and similar processes
  - Packaging
  - Software—or tools—for preparing text, graphics, and other media elements
- *Basic technical writing and editing*, which refer to the skill of preparing text that conforms to an agreed-upon style. Examples of text preparation include composing instructions in the active voice and preparing scientific articles according to the guidelines for authors of the intended publication.

Physical design plays an important role in the overall design of communication products. But physical design elements are only cosmetic if information designers do not consider them as part of a larger, goal-oriented framework. That's where the cognitive level plays a key role.

People who call themselves information designers typically address cognitive design issues.

The Cognitive Level: Helping users understand Information

The second level of design is the cognitive or intellectual level. That is, once readers find information, can they understand it and make use of it? For example, once readers find the description of the "dir" command, can they follow the instructions and actually use it?

People who call themselves information designers typically address cognitive design issues. Richard Saul Wurman, for example, calls this "the understanding business" (1989).

Cognitive design primarily focuses on the design process: adequately defining the users' performance goals and preparing a solution that addresses them. Mirel (1999) suggests the need for technical communicators to shape instructions around the problems that people actually experience in work contexts and adopting problem-based instruction. The instructional systems design (ISD), which is widely used by instructional designers (Foshay 1997; Wedman and Tessmer 1993; Zemke and Lee 1987), offers a framework for such a model.

Although cited as a model, ISD is actually a process for designing instructional programs so that they achieve key learning objectives (Dick and Carey 1990). In this process, however, ISD provides a structure for considering the many questions that must be addressed when analyzing and defining the problem, and devising its solution. For example, ISD addresses issues such as usability (in its call for clear objectives and formative evaluation), adjusting to the styles of different levels of learners, and re-using or adapting existing courses (if they meet the stated objectives of the proposed course).

In the sense that it follows a sequence of activities to identify the users and their performance goals, and provides them with the right information at the right time, cognitive design can be seen as a process. Specifically, the cognitive design process consists of the following activities.

1. *Analyzing needs*, to assess the following:
   - The business need underlying the request for a communication product
   - The situations that drive users to seek information or assistance, called scenarios or use cases (Nurminen and Karppinen 2000), that describe the type of need motivating the search, and that specify the goals that readers hope to accomplish to resolve the situation
   - The tasks that readers must successfully complete, listed in the likely order in which they'll be performed, when achieving the goals that drove them to search for assistance
   - The motivations, needs, and experience of the key groups of anticipated readers
   - Constraints affecting the ability to successfully produce the communication product, such as a must-

meet completion date, not-to-exceed budgetary limit, expectations of quality, quirks in the corporate culture of the requesting or producing organization, and personalities involved in the project (Hackos 1994; Robinson and Robinson 1989; Rossett 1987)

2. *Setting goals for the project*, which includes:
   - Establishing observable and measurable business and content objectives. Business objectives, for example, define how the communication product directly or indirectly contributes to the revenues of the sponsoring organization, contains their expenses, or assists in meeting corporate, industry, or government regulations placed on the sponsoring organization (Carliner 1998). Content objectives describe, in observable and measurable terms, the main and supporting tasks that readers should be able to perform after using the communication product (Hackos 1994; Mager 1997b).
   - Planning a comprehensive evaluation to ensure that the communication product meets its objectives. Mager (1997a) notes that planning an evaluation first helps designers visualize the end result and then helps them design for success. A comprehensive evaluation employs several types of assessments, including assessments of reader satisfaction (such as a reader's comment form), usability, and business performance (Carliner 1997).

3. *Choosing the form of the communication product,* which involves choosing:
   - The genre (or type) of communication product, such as a user's guide, help system, tutorial, or job aid. In the field of rhetoric, a *genre* may be defined as a language system that contains "typified responses to events that recur over time and across space and that emerge in the social context of communication practices" (Berkenhooter and Huckin, cited in Killingsworth 1996, p.107). Each given genre has a group of characteristics associated with it. To be fully considered as an example of a specific genre type, a communication product must contain all those associated characteristics (Foss 1995). Readers bring a set of expectations to a communication product based on its form. For example, readers expect user's guides to provide step-by-step procedures for the most common tasks, a table of contents that immediately directs them to the task, and illustrations. They also expect that the step-by-step procedures will be written in the imperative mood.
   - The communications medium for delivering the product to users, an issue also considered as part of physical access

4. *Preparing the design of the communication product*, which is similar to the way an architect prepares blueprints for a building. As architects develop a floor plan, elevation drawings, and schematics to describe exactly how a building will look and how its internal systems function when completed, so information designers prepare:
   - The structure of the communication product, as represented by an *information map*, which is a diagram that shows the structure of information in a communication product, much as a floor plan shows the location of rooms in a building and a flowchart shows the sequence of activities in a program. This representation of the structure should also include the front and back matter of the communication product.

     Note that technical communicators have traditionally prepared outlines to represent the structure of proposed communication products. Anecdotal experience suggests that sponsors and users can more easily follow information maps.
   - A sample section of the communication product, to formalize the initial design and serve as a model for subsequent discussion, evaluation, and other sections. A sample section is similar to the model that many architects prepare for proposed buildings. It shows the fusion of visual and verbal.
   - Detailed storyboards or thumbnails detailing—screen-by-screen or page-by-page—which objectives are covered, how the content associated with those objectives will be presented (graphically, through video or audio, or in text) and which production and programming elements are needed to realize these plans. Storyboards are like the elevation drawings that architects prepare for buildings, which show how a building looks from a variety of perspectives such as the front, back, and sides.
   - Specifications of designs for recurring types of pages or screens, such as pages containing procedures or introductions to new sections. Specifications would cover such issues as layout, margins, type, and required and recurring graphical images.

     Information designers prepare separate blueprints for each communication product, even if those products are related to one another.

5. *Setting the guidelines:*
   - Product guidelines, including the editorial guidelines (style guide, dictionary, and a list of any exceptions), production specifications (such as packaging for online products and printing specifications), and technical specifications for authoring (such as the configuration of authoring workstations). Product guidelines for communication products are like the specifications for architectural plans, which identify the types of materials to be used in a building such as the types of pipe and moldings.
   - Project guidelines, including the schedule, budget, and staff. Waiting until after the communication prod-

uct is thoroughly designed before providing a detailed project schedule and budget for final completion ensures more accurate and complete budgeting. Projects estimated before such plans have been developed can exceed estimates by as much as 20 to 25 percent. Because estimates developed after design plans are finalized are based on more thorough information, estimates provided at this point in a project are typically within 2 to 3 percent of estimates (Foshay 1997). Project guidelines are like the construction plan for a proposed building.

Although essential for the communication product, the design process is only one part of cognitive design. The other part involves defining the intellectual capacities and needs of users and crafting an appropriate solution to meet those needs. Designers can consider these issues from a number of perspectives.

Creative problem solving explores the boundaries the designers place on their work. In some cases, designers work within existing formats and proven formulas. In others, designers innovate new approaches, breaking beyond the formulaic. In some cases, designers rely on trusted tools (for most technical communicators, those are words); in others, they test new ones (for many technical communicators, they might be icons and other graphics).

Cognitive psychology explores the ways in which the human brain processes information. By applying this knowledge, information designers can "pre-digest" information to minimize the amount of cognitive processing needed, just as LactAid® pre-digests lactose so that people with a lactose intolerance can eat and drink dairy products.

Design theories such as human performance technology, minimalism, user-centered design, and constructivism also inspire cognitive design. Although each cognitive design theory has a unique definition, their goals are remarkably similar: providing users with the most appropriate information, at the exact time and place they need it.

Because users are routinely exposed to more messages from the media than they can effectively assimilate, information designers must also consider information overload. Some recommended solutions to this problem involve changes in physical design, such as communicating through visuals rather than words. Other proposed solutions involve changes in cognitive design, such as creatively structuring information and practicing "benevolent censorship," that is, removing less essential information (Wurman 1989).

Another consideration for cognitive design is reusing or modularizing information. In some instances, organizations can effectively reuse information, either in part or in whole. For example, television news organizations often use the same story in several different newscasts, editing the story to fit the length and slant of the new program. In other instances, organizations might mix and match information, such as creating a new manual for Model B by adapting the existing manual for Model A–with the fewest necessary modifications. Or, an organization might let readers mix and match modules of information so that they can effectively customize communication products based on their specific needs. To design information once and use it again in a variety of contexts, with few or no changes, requires careful design of individual units of information and thorough consideration of all possible uses.

The issues associated with affective design typically fall into an emerging realm called communication design.

A final issue of cognitive design is reconciling design plans with business realities. Most technical communication projects are constrained by budgets, schedules, editorial guidelines, or some combination of these. According to Schriver (1999), expert document designers can deftly coordinate design and business priorities, yet few design models actually incorporate all or even most of these issues.

The Affective Level: Motivating users to perform

The last level of design is the affective, designing the communication product for its optimum emotional impact. That is, if users can find the information they need and understand it, is it written in such a way that users will want to use it and perform the intended tasks? For example, if users can find and read information about the "dir" command, will they want to use it, after all?

The issues associated with affective design typically fall into an emerging realm called communication design. Following are the elements of affective design.

Attention Before users can perform the tasks describe in communication products, they need to feel compelled to read about them. As professionals in the fields of advertising, book publishing, and training, among others, have learned that getting positive attention is essential to the success of a product, so technical communicators are learning the same lesson.

Motivation After attracting readers' attention, technical communicators must motivate readers to use information in the communication product. For example, "must" people use information to perform their jobs better, or is the information "nice to know" but of little immediate value? Users' attitudes vary with their motivation, and technical

communicators must address attitudes to successfully transfer information about tasks.

Change management (also called transfer of technology) The technology described in technical communication products often has the potential to change the way users work or live. But how prepared are users for the change? How can the communication product address the anxiety and apprehension that are often byproducts of such change?

Language (also called word choice) Although the grammar of a language or the lexicon of a technical discipline often dictates the choice of word used to express an idea, in many other instances, this choice derives from the conscious decision to project a particular image. For example, some people insist on using technical language to gain credibility with technical readers, even if simpler terms might express the same concepts. In other instances, words that seem innocuous to the communicator carry strong meanings for the audience. The Plain Language movement investigates the use of language and its impact on readers (Mazur 2000), as does the field of rhetoric, which many cite as the primary discipline from which technical communication emerges.

Cross-cultural communication Communication products are often published by people who have little or nothing in common with the intended users. The issue of communicating across national cultures and languages has been well documented (Hoft 1995), but one need not leave the neighborhood to find cultures different from one's own. Other types of cultural differences that technical communicators need to address includes occupational cultures (Trice and Beyer 1993), urban versus suburban cultures, and socioeconomic cultures within the same national and language groups.

Social and political impact Even the most seemingly benign message can carry with it a variety of social and political implications. For example, how does the message affirm or undermine the existing political structure of the organization that supports it? Researchers and theorists in technical communication focus much of their energy on this issue, though it receives little attention from practicing professionals.

Legal and ethical issues The process of communicating technical information often encompasses a variety of legal and ethical issues, such as copyright, privacy, and implied and stated promises. For example, when preparing to publish a marketing database, Lotus encountered a public angry about the potential invasion of privacy (Gurak 1999). Intel encountered a similar challenge when the public learned that the Pentium III chip could send a computer's serial number without the user's knowledge.

Client service Although most literature on document design emphasizes the primary role of the user (Schriver 1997; Dumas and Redish 1993), that technical communicators write for users is a "myth" (Sakson 1996). Rather, technical communicators prepare works for hire that are commissioned by sponsors, such as the development or marketing organization inside a company, or an external client.

Therefore, one of the primary concerns for technical communicators should be meeting the needs of these sponsors who commission our work. In many instances, meeting sponsors' needs involves work beyond the scope of writing and editing. It requires building trust and confidence in the sponsor. This can be done by anticipating the impact of decisions on individuals and the organization, regularly communicating the status of projects, and following widely understood processes (Fredrickson 1992; Carliner and Fredrickson, in press).

Methodologies for understanding communication issues One of the most significant debates within the community of researchers in technical communication is that of research methodology. Researchers debate the role of heuristics and critical research (Charney 1997). To what extent should communicators trust empirical research and to what extent must they rely on critical thinking (Sauer 1997)? The study of communication design encourages the exploration of such issues.

Affective design often poses some of the greatest challenges to technical communicators. Technical communicators often seek formulaic approaches to complex issues of communication design. As professionals, we must avoiding giving too much credence to simplistic catalogs of rules like "the five issues to avoid when writing for international audiences." Perhaps it is this tendency that has limited document design from being used in its fullest definition. The complexity of these issues defies simplistic responses.

Rather, these complex issues involve anticipating the impact of communication on the intended audiences and the sponsors who commission the work. They involve addressing the negative fallout that might result from too

Affective design often poses some of the greatest challenges to technical communicators.

little analysis of the communication product. That is, communication design is a form of "documentation therapy" in which technical communicators diagnose communication and performance issues and offer reasoned recommendations for resolving them.

STRENGTHS AND LIMITATIONS OF THIS FRAMEWORK

Several strengths characterize the three-part framework of this design model—its physical, cognitive, and affective levels. The first is that it realistically reflects the broad focus of today's technical communicators. Over the past two to three decades, technical communicators' responsibilities have grown from being wordsmiths of technical specifications to designing and testing user interfaces. This model acknowledges that broader role.

A second strength is that the framework incorporates the diverse work of technical communicators into a single frame of reference. Some technical communicators work on desktop publishing, others design interfaces, and still others consult on various aspects of change management. This design model encompasses all those roles and places them in an appropriate context.

A third strength of this framework is that it addresses many of the issues raised in the academic community of technical communicators, but which are given only passing acknowledgment in the practitioner community. This design model works to close the gap between those who teach technical communication and those who practice it. Although the framework does not necessarily resolve many of the current debates and incorporates viewpoints that are not shared by all groups within the technical communication community, it does provide a voice for diverse approaches and lets designers determine for themselves how to resolve the differences.

A final strength of this framework is that it incorporates the growing influences of several related fields. For example, in its process orientation, the model displays the influences of software engineering (Hackos 1994) and instructional design (a field that is also called instructional or educational technology). In its acknowledgment of the physical, cognitive, and affective, the framework acknowledges the influences of educational psychology and instructional design. In its emphasis on measurement and evaluation, the framework acknowledges the influences of adult learning theory and business management.

But the model admittedly suffers from some limitations. The first is that it is prescriptive. That is, the model prescribes the way practice should work; actual practice could substantially vary from the framework as is suggested by studies of the actual use of models of instructional systems design process (Zemke and Lee 1987; Wedman and Tessmer 1993).

A second limitation relates to the first: an overlap among the three levels. For example, although they are listed as elements of physical design, writing and substantive editing skills are also elements of cognitive and affective design. Naming an issue and placing it within the context of the framework calls attention to the issue, but does not always adequately describe its full breadth. In any case, clear distinctions among the different but related issues do not always exist.

Finally, the framework incorporates research and theory, but does not directly emerge from it. That is, it provides a structure for considering many issues addressed by the research and how that structure relates within the larger context of the everyday world. But the framework itself is the creation of one mind; it did not emerge from the direct, scientific observation or review of working technical communicators.

IMPLICATIONS OF THIS FRAMEWORK

If it gains acceptance, this framework can have a wide and varied effect on the field of technical communication.

At the least, this design framework might refocus design efforts away from a preoccupation with physical design elements to the potentially more fruitful exploration of the problem-solving process. Physical design elements would be considered not only in terms of the way they promote readability in general, but in terms of how they specifically help readers address the goals they have for a given text.

At the most, this design framework might influence education, practice, and research in technical communication. The three appendixes—"Implications of this model for teaching technical communication," "Implications of this model for practice," and "Implications of this framework for theory development and research"—suggest some specific applications of the model. TC

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APPENDIX A: IMPLICATIONS OF THIS FRAMEWORK FOR TEACHING TECHNICAL COMMUNICATION

This model has two implications for teaching technical communication. The first implication affects a course often called document design. The other pertains to the curricula for undergraduate, master's, and PhD programs in technical communication. (Underlying this discussion is an assumption that the professional practice of technical communication is more all-compassing and complex than the relatively simple task of preparing a pre-defined set of technical information for publication; this discussion does not pertain to service courses in technical communication.)

Courses in document design (and related topics)

Courses that teach document design—usually courses with the title Document Design or Advanced Technical Writing—might be renamed Information Design and could address each level of the framework and emphasize design as problem-solving rather than design as something that enhances appearance.

Many students presume that document design refers primarily to desktop publishing skills, so a course might begin by meeting this expectation and focusing on issues of physical design. Then the course could expand students' concept of information design with a unit on cognitive design, in which they would be introduced to the process-oriented approach to designing information. Such a course might close with a unit on issues of affective design.

The amount of time devoted to a particular level would vary by the educational level and need of students in the class. For example, if a class consists primarily of under-

TABLE A1: POSSIBLE TOPICS FOR EACH UNIT IN A COURSE BASED ON THE FRAMEWORK OF INFORMATION DESIGN

Physical Design	Cognitive Design	Affective Design
♦ Page and screen design	♦ Needs analysis	♦ Attention
♦ Technical writing	♦ Objectives	♦ Motivation
♦ Following templates and guidelines	♦ Evaluation	♦ Cross-cultural communication
♦ Editorial style	♦ Genres of technical communication	♦ Change management
♦ Copymarking symbols	♦ Media selection	♦ Customer service
♦ Production	♦ Organization	♦ Legal and ethical issues
	♦ Prototyping	
	♦ Writing for different media	
	♦ Establishing templates and guidelines	

graduates, the course might devote more time to issues of physical design. If a class consists primarily of master's students, it would devote more time to issues of cognitive design, and if a class consists primarily of PhD or PhD-bound students, it would devote more time to issues of affective design. Table A1 suggests a list of topics that an instructor might address in each of the units.

Because cognitive design is central to the professional practice of technical communication, graduate curricula in the growing number of technical communication programs should require a course in cognitive design. In addition (not in place of), graduate students in cognitive design courses should survey the various design models underlying our field and related fields, such as minimalism, performance technology, user-centered design, and interaction design. A separate course on design models might provide students with opportunities to compare and contrast them and the disciplines and viewpoints from which they emerge, as well as consider their theoretical implications to practice.

Implications to curricula for majors in technical communication

In her model of education for human resource development, Verna Willis (1990) proposes that a bachelor's degree train students to "do," a master's train students to lead the effort of doing (either by managing it or serving as the lead designer), and a PhD prepare students to be consultants or researchers. This three-tiered model transfers nicely to technical communication and suggests appropriate curricula for majors at each of the levels.

Education at the bachelor's level could emphasize competency in physical design and introduce the two other types of design. Through courses such as document design, technical writing, technical editing, specialized types of writing, and production techniques, students could develop mastery in this area of design. Internships would reinforce these competencies.

Education at the master's level could emphasize competency in cognitive design. Through courses such as information design, audience analysis, cognitive psychology, industrial design, instructional games and simulations, usability testing, project management, people management, evaluation methodologies, and case studies in information design and development, students could develop mastery in this area of design. For students in terminal degree programs, projects could introduce the practical complexities of cognitive design. For students in other degree programs, research projects could help them identify and experience the boundaries separating the different types of design.

Education at the PhD level would assume competence in physical and cognitive design, and could emphasize competency in affective design, as well as the traditional competencies in research. Through courses addressing topics such as ethics in communication, communication law, human performance technology, minimalism, advanced audience analysis, qualitative research techniques, and consulting skills, students could develop competencies in these areas. Furthermore, dissertation projects could expose students to a variety of affective design issues from the viewpoints of readers and of project sponsors.

At each level, the curriculum should emphasize the dichotomy of broad thinking and a strong attention to detail, a dichotomy that Schriver identified as crucial to success as an information designer (1999). That is, experts in this field can apply specific style guidelines and explain why those style guidelines matter on a particular project.

TABLE A2: POSSIBLE COURSES FOR EACH LEVEL OF A CURRICULUM BASED ON THE FRAMEWORK OF INFORMATION DESIGN

Bachelor's

To prepare students for entry-level work in technical communication, they might take courses with generic titles such as:

- Overview of technical communication
- Information design
- Media selection
- Technical writing
- Specialized writing, such as computer documentation and medical writing
- Technical editing
- Production of print and online products
- Scientific and technical presentations
- Information design methodology

Master's

To prepare students at the master's level, the curriculum might include a combination of courses on pure and applied theory and methodology, such as:

- Information design
- Cognitive psychology
- Industrial design
- Needs analysis (which includes audience and task analysis, environmental assessment, and the preparation of objectives)
- Evaluation methodologies for technical communication products (which includes usability testing, as well as other types of tests and critical analyses)
- Survey of genres in technical communication (such as instruction manual, tutorials, and catalogs)
- Design techniques (such as interface design, instructional games and simulations, and intelligent agents)
- Project management and planning
- Transfer of technology

PhD

To prepare students at the doctoral level, the curriculum might include a combination of courses on advanced topics in technical communication, research skills, and analysis:

- Survey of research methods
- Qualitative research techniques
- Experimental and survey research techniques
- Ethics in communication
- Communication law
- Business models in technical communication
- Survey of communication theories (such as human performance technology, minimalism, and user-centered design)
- Consulting and teaching skills
- Society and technology

Table A2 suggests which content might be appropriate at each level.

APPENDIX B: IMPLICATIONS OF THIS FRAMEWORK FOR PRACTICE

This framework has implications to practice, management, and career development in technical communication.

In terms of practice

This framework suggests two fundamental changes to the way that practicing professionals approach our work. The first is writing measurable objectives as well as an evaluation of those objectives before beginning any design or writing activities. Such an approach assumes that technical communication products help users do something, rather than providing them with data that users, in turn, must figure out how to apply. Although this is not a common practice among technical communicators, it is a common practice among instructional designers (Wedman and Tessmer 1993) and marketing communicators.

This failure to focus on objectives or develop instruments for evaluating our work ultimately affects the quality of technical communication products. When goals for an individual communication product are not defined, the results often fail to please either the user or the sponsor who commissioned the communication product.

The second fundamental change is following a more broadly defined and detailed process to develop communication products. Although many organizations follow a process, it varies widely among organizations and not all organizations follow one. This is the primary issue underlying the Software Process-Maturity Model and Hackos's adaptation of that model to technical communication projects (1994). In contrast, most instructional designers follow a version of the basic instructional systems design (ISD) process when developing their courses and tutorials (Wedman and Tessmer 1993). This ISD process serves not only as the organizing structure for everyday work in the field but also as the foundation for most academic programs and training curricula on instructional design.

In terms of management

This framework first identifies the breadth of responsibilities to be addressed when someone designs a communication product. Of course, actual responsibilities vary, depending on the skills of the staff actually designing and developing the communication product.

This fact suggests that managers might use this framework as a tool for assigning responsibilities and projects within a department. Departments that have reached a higher level of maturity in their processes typically have a more clearly delineated set of responsibilities, based on experience and skills (Hackos 1994). Managers might assign projects primarily requiring physical design—such as revisions and small, already planned documents—to workers whose strongest skills are writing, editing, and page design. Managers might assign projects that are less defined, such as new communication products and those requiring extensive re-design, to workers whose strongest skills are in cognitive and affective design. Similarly, managers might assign project management responsibilities to workers who have strong process skills. Finally, managers might assign projects requiring an understanding of the emotional impact of decisions—such as strategic planning efforts and projects with difficult clients or clients who have an unusually strong sense of ownership—to workers skilled in affective design.

Departments whose processes are less structured face similar types of challenges but might not have the luxury of assigning workers in such a way. Managers facing these types of challenges assign workers as best as they can, but look for ways to complement the strengths of the people assigned to a project with coworkers and temporary workers who have other strengths.

In terms of career development

This framework suggests how technical communicators committed to long-term careers in the field might approach and chart our careers. Each type of design suggests a different level of skill and a range of training and development opportunities. For example, after mastering the physical design (the first level), technical communicators might master the skills of cognitive design. After mastering cognitive design, communicators might master the skills of affective design.

Although the relationship of the three levels to the different types of jobs in technical communication might seem clear to many readers, explicitly stating those relationships has value to others.

Following this framework also helps technical communicators ensure their ongoing competitiveness with other types of communicators who compete for technical communication jobs. For the work to have its ultimately intended impact, technical communicators must often develop training courses or lead in the development of user interfaces. Because technical communicators have often lacked core skills in these areas, the assignments have gone to other groups. For example, by mastering a process-oriented approach and developing skills at writing objectives and designing evaluations, technical communicators will garner the skills needed to successfully compete for assignments in technical training. By mastering design processes and interface design principles, technical communicators will develop the skills we need to successfully lead interface design efforts.

As a practical result of learning these new skills, technical communicators will not only earn a competitive edge in the market place, but also strengthen our profession and increase its perceived value to end users and the people who sponsor our work.

APPENDIX C: IMPLICATIONS OF THIS FRAMEWORK TO THEORY DEVELOPMENT AND RESEARCH

This framework offers an opportunity to perform significant research and differentiate theory in technical communication from that in related disciplines, such as composition theory, instructional design, and "generic" rhetoric and composition. Most of the opportunity to perform new and relevant work in this field occurs in opportunities for academic research into applications of cognitive and affective design.

Research and theory on physical design

Both practicing professionals and researchers are interested in the effects of specific design on readability. That interest includes both the readability of words and phrases and the effect of visual design elements like white space and typography.

Kostelnick and Roberts (1998) note that research into physical design falls into two categories: *universal* (applying in general to all communication products) and *contextual* (applying to a specific communication challenge). The problem with using universal research, however, is that by the time researchers can publish their results, the technology on which the research is based is often outdated.

As a result, contextual research might be more practical to approach. Contextual research supports the framework that says that ultimately design must address a specific communication need rather than adhere to an isolated series of guidelines. Although a design element might prove effective in

This framework suggests how technical communicators committed to long-term careers in the field might approach and chart our careers.

universal research, it might not prove effective in the context of the urgent needs of business and industry.

Research on cognitive design

Although researchers conducted much research into the technical writing process during the 1970s and 1980s, most of that research focused on shorter projects (less than 50 pages) prepared by non-writers writing in academic and government settings. Most of the professional work of technical communication is large projects (over 50 pages or screens) performed by technical communicators (some formally trained, others not) in commercial organizations. As a result, research on the writing process provides limited direction for designing larger communication products.

The model suggests a process with several design stages. Research into the professional practice of technical communication could confirm the actual design and development process and suggest heuristics for approaching problem definition, goal setting, and design stages.

Research might also address the issue of designing reusable information, explore the limits of the "benevolent censorship" of technical information, and examine the application of scenarios (also called *use cases*) as a means of evaluating the effectiveness of technical communication products (that is, did these products achieve the performance goals established for them?). These issues have received some notice within the field, but only limited, systematic inquiry.

Another area of theoretical inquiry is the application of performance models from training and software design to technical communication. These models broaden the focus from an individual communication product to the larger context in which people use that product, and have transformed both of the other disciplines in which they have been used. At the least, because our work complements work in training and software design and, at the most, because this model suggests that our work is performance-based, we need to explore these models and apply them to the mainstream of technical communication.

Research on affective design

The community of researchers and theorists in technical communication conduct an ongoing conversation about issues of affective design, including issues of cross-cultural communication, ethics, and the social and political impact of communication products.

One area that has received little attention by researchers is that of sponsorship in the design and development of technical communication products. For example, how might the funding for a project affect the final result? That is, if a project is funded on a fee for service basis, would the result be different if it were funded by an apportionment (a flat percentage of a development budget)? Similarly, how does the placement of technical communication groups within an organizational structure affect our work? For example, how would placing technical communicators in a product development organization compare with placing us in a marketing organization? Finally, how do funding sources and reporting structure relate to the overall of the work performed and value added by technical communicators? Such research could influence current research into the political and social dimensions of technical communication.

These issues have received some notice within the field, but only limited, systematic inquiry.

A final thought

These research topics are is not necessarily new. Many of them appeared in the research agenda that the STC established in 1996. Areas of inquiry that STC has encouraged include:

- Job skills and knowledge
- Audience analysis and understanding
- Designing new documentation processes
- Information dissemination tools
- Collaboration and team-based projects
- Hardcopy and online evaluation
- Settings for writing and internationalization
- Professional, social, and environmental trends
- Research models for technical communication

Unfortunately, many of the topics on this list still beg for in-depth or additional inquiry. The more topics on this agenda that are addressed, the better the research can confirm, extend, or contradict this three-part model that I have proposed.

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