A composing model for technical writing: Bringing together current research in composition and situational constraints upon the technical writer

Roderick Michael Hendry

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A Composing Model for Technical Writing: Bringing Together Current Research in Composition and Situational Constraints upon the Technical Writer

A Thesis
Presented to the Faculty of California State University, San Bernardino

In Partial Fulfillment of the Requirements for the Degree Master of Arts in English Composition

by Roderick Michael Hendry June 1985
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Bringing Together Current Research in Composition and
Situational Constraints upon the Technical Writer

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ABSTRACT

As technology continues to advance, and as the users of that technology possess diverse backgrounds and expertise, the need and importance of technical writing continues to expand. With this growth, we need to understand what exactly technical writers do and how to help them do it better. Various definitions attempt to explain technical writing on the basis of subject matter and/or purpose. Yet, in the transfer of information, the cognitive processes of both the writer and the user must also be considered. The writer must structure the technical information in such a way that users, drawing upon their own frameworks of knowledge, will be able to make correct inferences. The writer must know what kinds of knowledge the user brings to the reading task.

Interviews with people actually working in the field as well as texts on technical writing indicate a general view of writing as a product. According to current composition research, however, considering writing as a process seems more accurate.

Using the process composing models of Linda Flower and John Hayes, and Mike Rose, I develop a model which reflects current composition research and constraints placed upon the technical writer. The major implication of the model is that writers will write more effectively if they view writing as a problem-solving activity. As such, the writer must use flexible rules, plans, and strategies and work in an expedient manner to solve the problem of writing.
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INTRODUCTION

In his book, *Billions for Confusion* (1963), Malden Grange Bishop claims that billions of dollars are lost every year in government documents because of poor technical writing. The problem of poor technical writing may be caused in part by the vast amount of documentation (e.g. operation, maintenance, and design manuals) generated within the field. One technical writer whom I interviewed illustrated this point by humorously referring to an anecdote which she had recently read. In developing a jet engine, she said, a company knows to move into the production stage when the documentation weighs one half the weight of the proposed engine. "Even successful companies have their share of poor technical writing. Apple computer's Profile Disk Drive manual contains a recent example: "Your Profile Drive is packed in a cardboard shipping carton. After you open the carton, remove the top layer of thick, foam material and you will find a small cardboard box lying on top of the drive. The box contains this manual" ("Just How Bad is Documentation?" 24).

Despite these problems, the field of technical writing is evolving into a recognized profession within business and industry. The breadth of the role that technical writers play in organizations is as varied as the companies employing them. Some companies place little emphasis on the function of technical writing, while other companies, especially those whose products must be used by non-technical people, place a
great deal of emphasis on their technical writing staffs.

Perhaps one of the trends set forth by John Naisbitt in his book, *Megatrends* (1982), partly accounts for the increasing need for good technical writers. One of the major shifts within our society involves moving from an industrial base to an information base. As scientific and technical knowledge expands, the exchange and accessibility of that knowledge will be critical. Information will be the most important resource as energy (oil, nuclear, electricity) was for the industrial age and as natural power (air, wind, water) was for the agricultural age. According to Naisbitt, the information society actually had its beginnings in 1956 and 1957, during a decade which was the height of America's industrial power. The turning point was in 1956 when blue-collar workers were outnumbered by white-collar in managerial, technical, and clerical positions. Individuals, for the first time in history, worked with information instead of producing goods. And, by 1982, over sixty percent of the work force was involved with information. Naisbitt arrives at this number by including teachers, programmers, clerks, secretaries, accountants, stock brokers, managers, insurance people, bureaucrats, lawyers, bankers, and technicians.

The second major event which ushered in the information age occurred in 1957 when the Russians launched Sputnik, the first communications satellite put into orbit around the
earth. This event supplied the "missing technological catalyst in a growing information society" (12-14).

Daniel Bell, a Harvard sociologist, one of the first to elaborate on the implications of the information age, originally referred to it as the post-industrial age. Bell pointed out that in this new society information would be the strategic resource. Naisbitt adds that the "life channel" of the information age is communication. He supports his claim with some interesting statistics pointing to an ever deepening, unwieldy base of information:

--Between 6,000 and 7,000 scientific articles are written each day.

--Scientific and technical information now increases 13 percent per year, which means it doubles every 5.5 years.

--But the rate will soon jump to perhaps 40 percent per year because of new, more powerful information systems and an increasing population of scientists. That means that data will double every twenty months. (15-24)

Finally, according to Naisbitt, "In this literacy-intensive society, when we need basic reading and writing skills more than ever before, our education system is turning out an increasingly inferior product" (19). Juggling these statistics, one quickly realizes that as more of our students become employed in business and industry, more
emphasis needs to be placed on understanding technical writing and its role within the private sector and on understanding how to effectively train our students.

Another reason for emphasizing the need for better training involves legal responsibility. Some technical writers work within safety management departments where they are accountable for what gets put into writing. For example, one bulletin, "Quality and the Law," used at TRW, states: "...a bad document is worse than no document at all, once litigation becomes a real possibility" (Grant, Section 3.0). The author of the article concludes that engineers who recognize this possibility should watch not only what they say but also how they say it. Simple attention to the content is not enough.

Traditionally, technical writers have not been specifically trained for the field. One technical publications group manager told me that technical writers have tended to be engineers or technicians who enjoyed writing and were subsequently taken into technical writing departments. It was a profession people found themselves in rather than pursued; however, technical writing is now beginning to see itself as a profession, and not simply a secondary function. Technical writers are beginning to develop more of a self-awareness both for their field as a whole and for their individual function in particular.

One of the problems for technical writing as a
profession is the vagueness which surrounds the field. Technical writing shares the same inherent ambiguity as do terms such as grammar, style, and rhetoric. This ambiguity has resulted in an inability to understand clearly the role of technical writing. Hence, technical writing has been somewhat of an anomaly both in education and business.

Nevertheless, the field of technical writing has been around since just before the turn of the century. In fact, the first books to be published specifically on the subject were Sir T. Clifford Allbutt’s Notes on the Composition of Scientific Papers, originally published in 1904, and Thomas Arthur Richard’s A Guide to Technical Writing (1908).

Alan Lytel points out, however, in his book, Technical Writing as a Profession (1959), that professional technical writing developed mainly as a result of World War II. It was during this time that many writers were hired to produce a multitude of publications on operation, design and maintenance of technical equipment. After the war, technical writers were called upon during space exploration efforts to work on defining complex systems and processes.

In addition to pointing out the origin of technical writing, Lytel asserts that technical writers and publishing companies connect industry, business, government and the public (qtd. in Alred, Reep, and Limaye 10). Mary Fran Buehler, from Jet Propulsions Laboratory, suggests another perspective on this "connecting" function of technical
writing. She believes that technical writing bridges the gap between what C.P. Snow termed "the two cultures" (Interview). According to Snow, there are two polar groups in our society: "Literary intellectuals at one pole--at the other scientists...Between the two a gulf of mutual incomprehension" (4). Further on, Snow adds:

It is dangerous to have two cultures which can't or don't communicate. In a time when science is determining much of our destiny, that is, whether we live or die, it is dangerous in the most practical terms. Scientists can give bad advice and decision-makers can't know whether it is good or bad. (98)

Snow also castigates literary intellectuals, "who incidentally while no one was looking took to referring to themselves as 'intellectuals'" (4). He argues that while scientists may have a generally poor literary background, literary intellectuals not only have a poor scientific background but also have an almost anti-scientific feeling. Having rebuked both sides, he calls for a change in perceptions and says that in order to bridge the gap this change must first occur in our educational system. Though a change in the educational system will not completely solve the problem, without it the real issues cannot be contended with (100).

Technical writers may supply a type of bridge between
the two cultures. If this is true, the bridge stands without being truly connected to either side, for it exists outside of both groups; technical writers are firmly affiliated with neither science nor the humanities. Perhaps with the flux of technical data and the need not only to manage the data but also to improve upon its efficiency, the field of technical writing will truly bridge the two cultures. In order to fulfill this role adequately, the need and importance of professionally-trained technical writers is paramount.

In this study, I attempt to provide a definition of technical writing and develop a composing model which brings together current research on how writers go about writing and how constraints, peculiar to the technical writing field, affect the technical writer. Analysis of these constraints is derived from technical writers, whom I interviewed for the purpose of this study. The thesis begins by considering a number of attempts to define technical writing, culminating in a proposed working definition. In the next chapter, I first discuss the methodology used for choosing the technical writers whom I interviewed in order to gain their perspective, then categorize and present their perceptions. In the chapter about composing models, I present an overview of what the technical writer’s task involves and some current publications which attempt to address a number of constraints and needs involved in technical writing. Finally, I discuss traditional composing models and process composing models,
specifically focusing on the process models developed by Linda Flower and John Hayes, and Mike Rose. I then propose a composing model, utilizing current research and addressing the added needs of the technical writer. The model results in some interesting implications, both for business and for the classroom.
TOWARD A DEFINITION OF TECHNICAL WRITING

The field of technical writing is in a state of flux, a state of developing self-awareness and an understanding of its role in business as well as within the educational community. A composing model for technical writing cannot be developed without a clear understanding of what makes technical writing distinctive. Although no truly comprehensive definition presently exists, there have been many attempts to define the field. These definitions for technical writing may be based upon subject matter, linguistics, thought processes, or purpose. None of these definitions, however, addresses the cognitive dimensions involved in information transfer. A definition for technical writing should include the cognitive aspects, both those of the writer in developing the discourse and those of the user in interpreting the discourse.

Subject Matter

For most definitions of technical writing one of the major distinctions is subject matter. The type of information which technical writers must develop or revise is of a technical nature (e.g. science, engineering, industry). Margaret D. Blickle and Martha E. Passe offer such a definition in their book, Readings for Technical Writers (1963):

Any attempt...to define technical writing is complicated by the recognition that exposition is often creative. Because technical writing often
employs some type of the devices of imaginative writing, a broad definition is necessary. Defined broadly, technical writing is that writing which deals with subject matter in science, engineering, and business. (3)

In their book, *Technical Writing* (1978), Gordon Mills and John Walter also use subject matter as a basis for defining technical writing. They further define what is meant by technical subject matter by offering four characteristics which delineate the subject: 1) concern with scientific and technical matters; 2) use of conventional report forms and a scientific vocabulary; 3) commitment to accuracy and objectivity; 4) attention to complex tasks (e.g. descriptions and classifications) (3-5). One other consideration which is not mentioned here is that most technical writers must be comfortable in designing or substantiating charts and graphs.

Kinneavy's (1971) discussion of what he terms "reference discourse" develops further the writer's concern with a technical subject. Reference discourse, he writes, which includes scientific, exploratory, and informative prose, attempts to "designate or reproduce reality." The subject at hand is its main concern. It is characterized by factuality, comprehensiveness, and the use of inductive and deductive reasoning (qtd. in Cooper, Courts, and Odell 3).
Linguistics

In his article, "What is Technical Writing?" Robert Hays emphasizes linguistic constraints in defining technical writing. Though he stresses the psychological attitude of the technical writer as that of "utter seriousness," he spends the majority of his article elaborating upon his contention that technical style demands a "specialized vocabulary, especially in its adjectives and nouns." He contends that engineers and technicians, rather than simply taking another course in English composition, need to take a course in technical writing in order to learn the proper use of technical terms, particularly the distinction among similar words with different meanings.

He cites the need to distinguish between words such as acceleration and velocity. "Acceleration is calculated as change in velocity per unit of time, whereas velocity is a measurement of the time spent in traveling a certain distance in a given direction." Another example is torque and power—"torque means force...times power. Power means work per unit of time." At the end of the article, Hays also states that technical writing requires more than skill in using words: "The technical writer must know his subject, be able to record data and manipulate formulas, and have skill in constructing graphs" (3-8).

Thought Processes

This type of consideration, though having little direct
follow-up research, is based upon studies directed by A.J. Kirkman, of the Welsh College of Advanced Technology in Cardiff. Kirkman and his group have been investigating reasons or causes for weak, ineffective technical and scientific writing. The premise of their research is the assumption that there are two major types of thought processes—associative and sequential—each with its own mode of expression. "Associative thought" is endemic to subject areas such as history, literature, and the arts. In this type of expression relationships are more chronological, spatial, and emotional in nature. "Sequential thought" occurs more aptly in the fields of science and mathematics, where relationships between ideas are restricted to a tightly logical order. The weakness of much scientific writing, suggests Kirkman, results from forcing an associative framework upon scientific material. More exactly, he states:

The important distinction is that sequential contexts call for comparatively inflexible lines of thought and rigid, impersonal forms of expression, whereas associative contexts permit random and diverse patterns of thought which can be variously expressed. (qtd. in W. Earl Britton 11)

Considering thought processes in differentiating between technical and non-technical prose is without question interesting. Kirkman's claim, however, attempts to make separation where it cannot be made. One might argue that
sequential thinking, such as logical argumentation, is a type of associative thought process. Rather than being dichotomous, sequential thinking could be perceived as being a part of associative thinking. For instance, persuasion, which one can only assume Kirkman would place under associative thought, does involve an appeal to the emotions, yet it can also involve an appeal to logic, both inductive and deductive. This seems to agree with the perspective of classical rhetoricians such as Aristotle, Cicero, and Quintilian. In constructing persuasive arguments, the speaker has three modes of persuasion: ethos (an entreaty founded upon the speaker or writer's own moral character), pathos (an entreaty to the emotions of the audience), logos (an entreaty founded upon logic).

Purpose

The technical writer's purpose is one final distinction used to define the field. Robert Penn Warren and Cleanth Brooks in *Understanding Poetry* (1960) state that the main distinctive quality of scientific writing is its aim at "absolute precision." Though literature in general also represents a "specialization of language for the purpose of precision, [it] aims at treating kinds of material different from those of science," particularly in regard to feelings, attitudes, and interpretations (4-5). Another author, W. Earl Britton, in, "What is Technical Writing? A Redefinition," supports
this idea of "absolute precision," saying:

[The primary characteristic of technical writing] lies in the effort of the author to convey one meaning and only one meaning in what he says. That one meaning must be sharp, clear and precise, and the reader must be given no choice of meanings; he must not be allowed to interpret a passage in any way but that intended by the writer. (11)

This statement by Britton makes sense, but one may question how possible it actually can be. It seems more appropriate to say that this is what business and industry would like to be true and is more wishful thinking than actuality. I will discuss this further later in this section.

W. Earl Britton continues by pointing out that imaginative literature may have more than one interpretation, and that makes it universal; conversely, if a piece of technical writing has more than one interpretation, it becomes useless. He also provides an analogy by comparing imaginative prose to a symphony and technical prose to a bugle call. A symphony, depending upon the time of its performance, and the conductor, may have several interpretations by its listeners. A bugle call, however, conveys precise meanings: get up, come to mess, retire.

Britton’s analogy does not carry as far as it should since one can contend that the bugle call’s message is not purely intrinsic (as Britton would contend meaning is intrinsic in technical
writing). The meaning becomes clear only within a situational context, and with the assumption that the listener interprets the context as intended. For a nineteenth century fort soldier, the reveille may be a call to rise and eat, or rise and fight.

Other individuals have attempted to combine a number of previous characteristics, some based on the appearances of technical writing, others on the act of writing technically. For instance, John Walter, having based his conclusions on examining hundreds of technical documents concluded that each of the documents shared the same type of style, format and content (qtd. in Dobrin 228).

In getting at what technical writers do, John Harris states, "Technical writing is the rhetoric of the scientific method" (qtd. in Dobrin 229). Similarly, Charles Stratton asserts that a technical writer in "a particular art, science, discipline, or trade...helps audiences approach subjects" (qtd. in Dobrin 229). Both of these authors tend to look at the technical writer as one who objectively takes technical information and translates it for those who must use it. This translation is unobstructed by the writer; that is to say, technical writing is the clear window through which the observer may understand the technical material.

Mary LaRoche also addresses this concern for precision. She begins her article, "Technical Writing in the Picaresque Mode: A Perspective from Experience," by
pointing out how our understanding of the composing process has radically changed over the past few years. Yet, she asserts, this new perspective has not been applied to technical writing because of the assumption that the rhetorical context wherein technical writing occurs is relatively limited. She maintains that this assumption is not borne out in practical experience. In fact, technical discourse of any seriousness is of necessity created by the writer from the writing context. The writing situation cannot by itself determine the meaning of a document for the writer or editor; the writer must interpret and present the information. As LaRoche states, "technical discourse is a lamp upon rather than a mirror of the world it represents."

Further in the essay LaRoche speaks from her own experience on the creative aspect of the technical writer. She claims that the technical writer, in presenting the information, determines the significance of the information by placing it in context. To illustrate this point, she describes a situation wherein she was responsible for helping an army officer prepare an article for an army magazine. The officer was the head of the army's exploratory research department on the development of tanks, and the article was on the anticipated design for the next generation of tanks. At the time of the writing the officer had not determined whether tanks would increase or decrease in size. One day, she explains, he came in saying that tank development would
have to continue in its current trend—larger and more versatile. She then began the introductory paragraph of the article saying that ever since World War II tanks had been growing in size and power and that the advantage of versatility (more fire power, five men crews) and more protection had always outweighed the advantage of maneuverability of the smaller tanks.

A few days later, however, the officer came in declaring that the Swedes were right; present tanks were already too large and newer tanks would need to be smaller. Accordingly, LaRoche revised the introductory statement to say that although tanks had grown in size and versatility since WW II, the advantages of smaller, maneuverable, less expensive tanks would result in a smaller configuration for future tanks. As she states, "the data were the same, but the context had changed" (61).

It is this creative aspect of writing which most definitions tend to slight. Though the material may be technically or scientifically precise, both the language used to describe the material and the writer are imprecise. IBM may be one of the first companies to recognize this. Their technical writers are referred to as "information developers," the term giving credence to the creative act of writing over the consideration of purely objective transfer. Perhaps the confusion for some people results from their belief that language is precise, as a mathematical equation
is precise; they may come to this conclusion because of the lexical constants within dictionaries, words being discrete bits of meaning. Unfortunately, the act of writing, stringing words together in a syntactically meaningful way is not so constant (Dobrin 233).

David Dobrin provides one of the better discussions regarding language’s lack of precision. He refers to a number of definitions which presently exist, some of which are not included here since they do not add to the defining categories already mentioned. He is concerned about the vagueness of terms used in present definitions. For instance, he too cites W. Earl Britton’s injunction for “one meaning and only one meaning” to be conveyed. He questions what Britton means by “one meaning” and concludes that Britton is recommending a high level of specificity; if more than one meaning is possible, we should specify just what we mean. Nonetheless, Britton’s definition is ambiguous. A second concern is that most definitions do not make a distinction between linguistic and cognitive objectivity, the second type inferring the interaction between the writer and the material.

His main concern, though, lies in the assumptions which underlie existing definitions. He contrasts the traditional “universalist” view and the “monadist” view (terms which he states are George Steiner’s):

Those taking the universalist view believe a
sentence can mean a particular thing and that precisely that meaning can be understood; those taking the monadist believe that what someone means is indeterminate and can never be precisely understood. The universalist might describe language as a collection of data: the monadist a group of adumbrations. (234)

Further he adds:

I am suggesting that the injunctions of clarity, precision, logic, objectivity, and univocality, the injunctions which we have accepted in deference to and imitation of the technology we imagine our writing gives privileged access to, are not absolutes but axiomatic fictions of a particular group...Hence I suggest the following definition of technical writing:

Technical writing is writing that accommodates technology to the user. (242)

While he follows his definition by defining his terms, exactly what he means is difficult to determine. He refers to "writing" in terms of the monadist view. "Accommodate" expresses for him the reciprocity between technology and the user. He sees technology as having an invasive quality, and "in an invasion, who is accommodating whom, invader or invaded, technology or user, depends on the power of each."
Accommodation also points to the secondary role which technical writing plays. Finally, he prefers "user" over reader since technology is intended to be used (243). This is his most insightful addition to defining technical writing.

James Britton, in his article, "The Composing Process and the Functions of Writing," uses the aspect of participation to distinguish between types of writing. His framework of discourse includes three major types of writing set on an overlapping continuum:

\[ \text{Transactional} < \text{Expressive} \quad \text{Poetic} \]

The range from expressive to transactional represents "language in the role of participant," while the spectrum from expressive to poetic represents "language in the role of spectator." Parallel to the way language functions is the way readers respond to the experience. As participants, we read in order "to get things done." Thus, our evaluation is based on self-interest and our hopes and fears of an outcome. The organization of an utterance in this category will be guided by efficiency in carrying out some end outside itself. For Britton this type of writing may operate on two levels: an operating level (informing, instructing, or persuading people); an intellectual level (problem solving, speculating, theorizing). The second major response for the reader to language is as a spectator. This is not to imply that a
reader of a good novel does not participate or sense involvement in the story line and the characters, but this type of involvement is vicarious rather than real (16).

Britton's continuum is broad, yet it helps to place technical writing—writing used "to get things done"—within other modes of discourse. According to Britton's schema, technical writing has affinity with a number of other modes whose object is also to cause an outside effect. Yet technical writing also has characteristics which separate it from other types of writing in the same "participatory" category, perhaps the most identifiable being subject matter.

One might even consider a finer separation between science and technical writing. Dobrin attempts this in his article, stating that scientific writing includes theories which attempt to explain how our world functions. To disprove any part of the discourse would involve a refutation of the whole. Conversely, in technical writing, the subject matter has distinctive parts, which if questioned, do not discount the whole of the utterance, for instance, "nut A fits bolt B." If this is not true the rest of the discourse is generally unaffected (231).

Clearly, most definitions of technical writing focus on structural characteristics since these are the most obvious. Only a few attempt to take into account the cognitive constraints and the creative aspects which are involved. The difficulty which I find with most existing definitions is
that they are either incomplete, contain vague terms, or contain terms which have a multiplicity of implied meanings. Accordingly I offer the following definition: The technical writer shapes technical discourse (e.g. material dealing with scientific information or specialized skills), structuring its framework to accommodate the cognitive framework of a user. The type of subject matter, format, and style generally set this discourse apart from other kinds of discourse.
INTERVIEWS: METHODOLOGY AND GENERAL CONCLUSIONS

The definitions considered in the previous chapter provide a theoretical understanding of the technical writing field. However, a composing model for technical writers must also reflect the actual practical constraints upon and concerns of the technical writer. Informal interviews with individuals from seven companies provided very interesting insights; specifically, their views on how they see their role as technical writers, how they go about fulfilling their function as writers, and what their major concerns are. (Refer to the appendix for background on these companies, the names of the persons interviewed, as well as transcriptions from two of the interviews.)

The individuals in this sampling, six men and three women, ranged in ages from early thirties to late fifties. They ranged from technical writers to managers of technical writing departments. One also teaches a technical writing course at U.C.L.A. extension. They have from one to twenty years experience in the field, and their job functions ranged from mainly editing, to both editing and generating original material, to supervising.

General Conclusions

I have grouped the responses of those whom I interviewed into five major categories: their perceptions of the ideal technical writer; the role of the technical writer; ideas about composing; regard for readability; and
major problems and concerns within the field.

To support and further develop my own conclusions, I will include some of the results from a questionnaire about how technical writers/editors view their field circulated at the 29th International Technical Communication Conference in 1982. The 28-item questionnaire was developed by Mary Fran Buehler, Alberta Cox, and Lola M. Zook. Zook compiled the responses in her article, "Technical Editors Look at Technical Editing." The questionnaire was also given to others who responded by mail, the total number of respondents adding up to sixty. The experience level of those completing the questionnaire ranged from beginners to those with twenty years of experience. Zook's sampling included thirty-eight editors, seventeen editor/managers, and eight managers.

The Ideal Technical Writer

Four of the interviewees stated a preference for a technical writer who is an engineer or technician first, a writer second. One stated that the writer should have understanding of the field, and more importantly, should be able to ask the right questions. For another, background in engineering was important because his experience suggested that it was easier to train an engineer how to write rather than to teach a writer engineering basics.

Though all agreed on this point, others qualified their
statements as optimum situations, saying that it was in fact more the ideal than the real. The ideal candidate should have a degree in English, journalism or communications, along with a degree in the specialty. One commented that the most effective technical writer brings together two things, both writing, the communication side, and some technical knowledge about the field. These are the ideal candidates, but he added, they are "not the only ones by a long shot." Though this is preferred, a compromise usually occurs. The company most often hires an engineer who can write to work with design engineers and to be directly involved with the design process. Another individual who has specific training in writing or communication will then edit the engineer's work before it is published.

A fifth person asserted that because technical writing involves "many non-discursive, non-linear-text kinds of symbol systems like mathematics, other languages--Greek, computer language--the conventions of table design, the conventions of graphic presentation," the technical writer needs a background in math or science and a familiarity with symbol systems. They must be in a sense bilingual. Another remarked that though one may have a background in the specialty, he can never be truly prepared since much of the time what he has to describe is state-of-the-art equipment.

It is important that a technical writer not only possess written communication skills, but also possess interpersonal
communication skills, especially since much of the technical
writer's time is spent in communicating with engineers.
Sometimes it can take a lot of time trying to probe an
engineer about what actually occurs in a certain function or
with a particular process. One interviewee summed it up:

This I am confident of. To be a good technical
writer, it is important to be as good a
communicator, interactor with people, as it is to
be either a wiz on some mechanical device, or a
terrific prose artist. You can be a wonderful
prose artist, but if you can't get those computer
people out there to tell you what it is they're
doing, you haven't got a thing. And it's the same
anywhere. It's not just computers. You've got to
be able to interact with those folks, get them to
tell you their story, want to tell it to you, want
to care about your product enough that you can give
it back to them and say, "Check this out." And
they'll take the time to say, "Oh, perfect, but
that's not really what we do in that specific step.
We do this." And not just forget about it. If you
can win their empathy, get them enthused about your
side, your contribution, then you've got it made.
And, if you can't do that, you're in trouble.

The Role of the Technical Writer

Generally, most agreed that those in the field of
technical writing were developing more awareness of themselves as professionals. Traditionally, technical writers tended to "fall into the position." It previously had not been a career which individuals chose to enter. The increasing numbers of college programs in technical writing also suggest that technical writing is developing as a field (Zook 23). "The whole technical communications field has become conscious of itself as a field," said one interviewee, adding, "There's more of a feeling of self-identity." Another said, "...the field is becoming a great deal more professionalized. It's becoming organized. People are networking. They're having seminars. They're developing a whole body of professional embroidery that establishes them as serious, dedicated, career-minded people."

The development of professional societies, who often distribute newsletters to their members, also reflects the development of technical writing as a field. Some of these societies include STC (Society for Technical Communication), ASTD (American Society for Training and Development), ATTW (Association of Teachers of Technical Writing), IEEE (Institute of Electronic and Electrical Engineers), along with companies or groups who put on seminars: AMA (American Management Association), Battelle Seminars and Studies Program, Comtech Services, Inc. An array of newsletters put out by these associations and companies include Harbor Light (STC), Intercom (STC), Folio (Sandra Pakin & Associates),
Professional Transactions (IEEE), Technical Writing and Communication (Maywood).

The role which a technical writer plays within an organization is as varied as the companies employing them. One put it this way:

You will find that the number of environments in which technical writers work is just about as diverse as the number of companies that employ them. Some companies make a strong commitment to the function, and they support the function with hardware, software, and graphic artists. Other companies are not at all prepared to support the function. They make a grudging acknowledgement of the need for it by hiring technical writer(s), but then they don't go the distance and support that person or persons.

In performing their job, technical writers must work under time constraints and budget constraints and must interact with numerous individuals in order to complete their functions. The technical writing department "ties everything together." At one company, this act may require untangling information and reconciling any differences between groups. When the engineers had one name for a process and marketing had promoted the process under a different name, the technical writing department had to reconcile the terms.

For most of those interviewed, interacting with numerous
individuals accounted for most of the technical writer's time and concerns. Succinctly put, one interviewee said,

Your concerns are time, cost, and being part of the schedule, part of the pipeline, which is a time problem I guess. It's not just the time that your part takes, but the time that the other pieces that come together take, integration. Those are your immediate concerns. Most of the time those are out of control...your time is taken up either writing what you're going to do, or getting the rest of it in line: dealing with graphic artists, dealing with printers, dealing with marketing or advertising people (depending on the type of project you are working on), dealing with the technical people who are providing material, going back and checking it with them, dealing with the customer (if you're front end). You have all of these interfaces, and seeing that those go down smoothly, and that the product which is eventually produced actually addressed the concerns of each of those constituents is what bothers you.

It is the technical writer's job to "simplify and translate," to take a vast amount of information and make it manageable for the user.

Ideas About Composing

Mina P. Shaughnessy in her book, Errors and Expectations
(1977), provides insight into why writers place a great amount of concern on surface errors in writing. She states, “So absolute is the importance of error in the minds of many writers that 'good writing' to them means 'correct writing,' nothing more.” “But,” she adds, “it may also be that grammar still symbolizes for some students one last chance to understand what is going on with written language so that they can control it rather than be controlled by it.” Though her notion is applied to basic writers, in varying degrees it also typifies the concerns of many in the business world. To a certain extent their concern is reasonable, as Shaugnessy remarks,

Errors, however, are unintentional and unprofitable intrusions upon the consciousness of the reader...That errors carry messages which writers can’t afford to send is demonstrated by the amount of energy and money individuals, business firms, publishing houses, etc., spend on error removal. (8-11)

The emphasis on removal of error (at least in terms of mechanics, grammar and spelling) is clearly evident in business, and understandably so, since for most businesses documents reflect the corporate image. If they are sloppy, both in appearance and in spelling and grammar, the company itself comes into question. Getting the interviewees to respond beyond the surface structure of language was
difficult. Possibly, this is because the act of writing is more of a reflexive act for them. They accomplish writing fairly easily without much reflection, while dealing with time concerns and people-interaction requires more conscious effort. Cooper and Odell (1976) remarked that one of the professional writers in their study concluded that the "processes become so automatic that one is scarcely aware of them" (qtd. in Cooper, Courts, and Odell 6). Nonetheless, the following responses by those interviewed provide some interesting insight on how they go about composing. Some comments about the writing phase showed how time constraints act upon the writer, not allowing much time for prewriting activities:

--How it gets produced a lot of times is on the fly. You whip it out.
--There is not that much reflective time. It's a deadline.
--Although I know you're supposed to write an outline sometimes you just have to start and stop when the deadline comes around.
--I just start to write and then I go back to edit.

Responses to the question, what influences or guides the structure of documents, ranged from the journalistic heuristic of the "wh" questions to pre-existing outline forms, to time and budget:

--If a person has answered the five "wh" questions,
he probably has a good document.

--Our group modifies existing documents. The style and format is already determined. We just follow what's there.

-----because we're doing DOD (Department of Defense) work, we know that it has to be done in accordance with this standard...if we're going to do a user's manual that it's going to follow this outline.

--The corporate office is developing a general guide for our manuals. Then we will be consistent in form and quality. [It is kind of like Bell Labs Workbench (a software program developed to aid the writer in composing. It is not intended to make great writers, but a consistent level of good writing)].

--The data is going to determine what the engineer says.

--Time and budget guide the process.

From this group of responses, there appears to be no single answer as to what exactly guides the act of writing. In fact, another major influence mentioned involves concern for the audience. The ultimate user of the document helps guide the writer in what does or does not need to be included:

--The concern for audience is one of the major controlling factors for the technical writer in
developing a manual.

--Most of our documents are for internal use, written for and by engineers... We spend more time revising any documentation that will be used in congressional reports or by the newspaper.

--In our internal documentation, we have documentation that supports the systems programmers, which is very different than the operations programmers. And then we also have documentation for our internal training and for our users.

--With internal documentation, the only thing that is important is that we can use it and it is bearable.

--The user documentation is really part of our marketing. You can have the best product in the world but if you can't use it, you can't sell it. So, that's where most of our emphasis, time, and money are going to be placed.

One individual had praise for the president of the company who "is a stickler for grammar, which is unusual nowadays, especially in this industry." Later in our discussion, she commented, regarding technicians, "They know the rules, but they don't know the exceptions." This person cited, for an example, the general rule to avoid repeating the same word within close proximity, using instead a synonym. Yet, in some instances, the synonym's slight variation in
meaning could confuse the reader. For instance, a manual for an in-flight simulator referring to the system as a simulator in one section and a trainer in another may misdirect the reader. For this individual, her concern for communicating to her audience allowed her to be flexible with one of the general rules for writing, which some of the technicians regarded as a rigid rule.

Often, during the writing process, the technical writer must get initial information from the engineer, and, after the rough draft is written, ask the engineer to critique the writing for technical merit. To some, this relationship is generally very amicable. As stated earlier, one interviewee emphasized the need for gaining the empathy of the technicians to assure their cooperation in helping the technical writer complete his task. At other times it can be frustrating, "You know they're going to mess it up." Or, there can also be the irritation of having the engineer send back your document with grades. At one company the writers had to be understanding. When reviewing manuscripts, one engineer gave grades for technical merit, grammar, and spelling.

One person interviewed had some interesting insights into the reasons why engineers write the way they do. His company generates most of its documents for internal use, and these are written by the engineers. His role as an editor can become very difficult. Most of the writing which we
looked at during my interview reeked of nominalized style, having prepositions spinning off prepositions. Another problem was that most of the engineers continually use a handful of verbs and expressions. In the role of the editor, mainly for documents intended for external use, he usually attempts to change the passive voice to active, vary the sentence length and untangle confusing syntactic structures.

Yet he questioned whether or not the passive voice was inappropriate for internal documents. The buzz words, the jargon, and the nominalized style all display the subculture of the engineers. The use of such devices identifies the group. It includes and excludes individuals. In this sense writing functions not only as a mode of communication but also as a mode for demonstrating membership to a select group. Most engineers feel more comfortable with this style. Sometimes, he suggested, it may not be so inappropriate. It is a trade-off between communication and comfort.

Along this same line, the above editor mentioned some of the difficulties which he encountered with this type of style. Even when it is his job to edit a text, to make it more readable, the changes are not always readily received. Changing passive to active voice makes some individuals involved in reviewing the text before release feel very uncomfortable. At other times, he experiences difficulty determining the author's meanings. Relationships between things and/or between ideas are sometimes unclear. The
dense style makes the task of untangling them much greater. As well, it is not very easy to determine exactly who is doing what. Also, the writing once in awhile has many unexplained assumptions. Occasionally when an engineer grudgingly agrees to a revision by saying, "Okay, but don't change my meaning," the editor humorously remarked that he feels like responding, "I'm going to have to change your meaning, because there isn't any there."

Regard for Readability

Many of the technical writing departments do consider the readability of their manuscripts. One company places great concern on not intimidating the reader, or more accurately, the user: "If you bring them a documentation and the first sentence is fifty words long, you've lost them." Accordingly, they attempt to keep a lot of white on the page, keeping sentences below twenty-five words, or four inches in length. A number of essays and books, according to this individual, elaborate on the psychological concerns of the reader. This company uses, among other books, Sandra Pakin's, *Documentation Development Methodology* (1982).

In developing documents this company also understands that readers use the documents mainly to find answers, not necessarily to read them from cover to cover. They base the design of their computer help-screens on the same assumption. There are three levels of help-screens, each increasing in
the amount of information provided. In this respect the user can retrieve the amount of information necessary to complete a given task on the computer.

Another company uses double columns, much like a newspaper, when documenting material intended for pilots and crew members of airplanes. Additionally, they try to communicate as much as possible visually, using graphs, charts, illustrations, cutaway drawings. Also they attempt to define necessary terms, including in some of their manuals glossaries and troubleshooting descriptions.

One editor mentioned a number of efforts to help individuals quickly find the information they need. For instance, they now place summaries and conclusions at the beginning of the text. If individuals want more detail, they can read through the text. If not, however, they can easily access what they are after. I find that they too are relying more on visual aids, both in conveying technical information pictorially and using them to break up the text (giving the reader a psychological breather).

A final note on readability stresses the need to get inside the mind of a potential reader:

The rhetorical essence is concern for the audience. [It is important] to get inside the head of the person on the other end. What do they know? What do they need to know? What order do they need to know it in? What are they going to
misinterpret?...if you really care about communication...you can’t communicate without caring about other people. To me the essence of communication is caring.

This is well put. Added enthusiasm about what one does, a sense of responsibility and a caring for the individual at the other end of the communication, will no doubt enhance communication. If this concept is truly to take hold, there must be a change of perspective regarding technical writing. Yes, it is impersonal. Yes, it is precise. But, there is still a human element--both in the reader and the writer. If there is to be this added dimension of concern, there must also be the added understanding of the writer’s self in writing. Technical writing is not the clear window through which we see reality. It is, as LaRoche states, a lamp controlled and steadied by the writer.

This essence of caring must go beyond an imagined sense of the reader; companies need to put more of an effort into getting feedback from the user of documentation, to close the loop in a sense. The efforts to communicate with the technical/engineering side need to occur on the user side as well.

Problems and Concerns Within the Field

The questionnaire results published in Lola Zook’s
article exhibit a range of concerns. Again, those interviewed were basically editors, but their views have general implications:

Lack of Understanding by management:
--Too many managers have no conception of what a good technical editor can do and why it is valuable to the company.
--It’s not thought of as a profession—-but a clerical function.

Time Pressures:
--This is often a high-stress field, where there is never enough time to do the job right.
--The short turnaround time is a major concern—-direct result is drop in quality.

Failure to bring editors into the system:
--Proper integration of the editing person with the project people.
--I’m too isolated.

Lack of career opportunity/poor pay:
--Language skills are not highly valued—-salaries are limited.
--Seems to be a dead-end career, at least in our company.

Lack of concern for quality:
--Schedules and deadlines often are more important than quality.

--Lack of concern for English quality and an overall level of literary quality. (22)

Those whom I interviewed generally agreed with most of these concerns, though perhaps not as strongly. Lack of understanding by management will always be a gripe in industry to some degree. The sense of technical writing being looked upon as a clerical position may be one explanation for the low-man-on-the-totem-pole position of technical writers. I suspect that C.P. Snow's two cultures partially explains management's lack of understanding. The technical writer has traditionally been considered more allied with the humanities than the physical sciences, and in a high tech world, those with humanities abilities are ranked lower. Yet, as a couple of the interviewees stated, the documentation is becoming more integral to the product. "Documentation is really part of your marketing," remarked one individual. As another person observed, in his organization, documentation for computer hardware is actually a part of the product, a part which currently plays a more important role in the consumer market. As consumers demand clearer, more concise documentation, companies are concomitantly placing more emphasis on their publication department's role.

Time pressures, along with budget constraints, are
unquestionably a major concern for the technical writer. Meeting these two constraints in turn may cause a decrease in quality. "If we spent our time putting together perfect manuals," said one technical writer, "the company would go broke." Lola Zook, quoted by one of my interviewees, sums up the writer's frustration, "The easy thing is perfection." Knowing where to loosen standards and how to reduce time is the difficulty. One of the better attempts at helping the technical editor systematically reduce the editing function is The Levels of Edit by Mary Fran Buehler and Robert Van Buran (I will describe this further in the next chapter). Zook responds to editors' concern about low quality by saying,

> We see many examples of high-quality work along with many that are less well done--and this variance may be what our real world demands. Budgets are not made of elastic. Perhaps we are being forced to accept the hard fact that some publication items are more important (or have a wider audience) than others and there must be selection in where available money is best spent. (25)

Interviewees mentioned four other concerns. First, one expressed the problem of adequately simplifying technical information. "In software, there is a real problem because it is almost impossible to get extremely technical information down to the point where users with no technical background will understand what you're talking about." Three
others commented that above the time constraints—gathering information, producing a text, and fitting into the schedule—the technical writer faces the additional difficulty of working on a manual even while the product is being developed. The problem arises when revision and modifications occur at the final stages of development. These changes must also be reflected throughout the entire existing text, a very time-consuming activity.

One editor expressed the problem which sometimes occurs when critiquing engineers' writing. Though some engineers understand the difficulties in communication, others do not. Those who do not receive comments for revision as a personal affront, both to their writing ability and their intellectual ability. This can cause a bit of friction.

Finally, two of those interviewed raised a concern with education. One was disconcerted by the separation between the classroom and practice, theory without the refinement of practical experience. The individual felt that teachers lacked a connection with the real world.

Before concluding this section, I would like to consider further some of the assumptions which underlie the view of writing as expressed by those interviewed. To be sure, some flexibility is forced by the pressures of time and money—"I know you're supposed to use an outline, but..." "I just begin writing and then I go back to edit." The pressures of time and money at times force the writer to abandon the
traditional paradigm of writing. Even so, from the comments of those interviewed, many appear to view the traditional paradigm of writing as product as the ideal. In this view, the emphasis on writing as a product outweighs that placed on writing as a process. Richard E. Young explains this concept:

Such is the case with the vitalist assumptions, inherited from the Romantics, that underlie so many of its overt features...: the emphasis on the composed product rather than the composing process; the analysis of discourse into words, sentences, and paragraphs.... (31)

A paradigm, according to Thomus Kuhn (1970), is "a system of widely shared values, beliefs, and methods that determines the nature and conduct of the discipline" (qtd. in Young 29). The traditional paradigm has a stronghold within the business community. As problems continue to develop in the technical world because of a proliferation of poorly written documents (information pollution in a sense), attention solely to surface structure, and a cursory consideration of audience, business will be forced to consider "development of new theories which are able to provide more adequate solutions" (Young 35).

Within the last fifteen years, writing has begun to be viewed as a process; consequently, more consideration has been given to parts of that process, such as invention. Young asserts, "Invention requires a process view of
rhetoric; and if the composing process is to be taught, rather than left to the student to be learned, arts associated with various stages of the process are necessary" (35). It would be worthwhile for those in technical writing to understand the three methods of invention which Young describes: Kenneth Burke’s dramatistic pentad, D. Gordon Rohman’s prewriting method, and Kenneth Pike’s tagmemic invention.

Knowledge of these types of inventions helps the writer have various strategies with which to approach composing. Burke’s dramatistic method is much like the journalist’s "wh" questions. "Any complete statement about motives," Burke (1955) says, "will offer some kind of answers to these five questions: what was done (act), when or where it was done (scene), who did it (agent), how he did it (agency), and why (purpose)." Prewriting, the second method of invention, includes what Bruner (in Rohman, 1965) refers to as the "act of discovery." This notion implies that the process of writing can actually help writers determine what they mean to say. Writers do not necessarily have to postpone writing until they explicitly know what they want to write. Writing can in fact help them elicit their meanings and intentions. Pike’s tagmemics, the third method, broadens the scope of writing (Young 37-39). One of the tenets of tagmemics is that "Language is to be studied, not as an isolated structure, but as a system set off only by indeterminate
bounds from a context that expands in time and space and complexity to include ultimately whatever forms a part of man's experience" (Algeo 96). It views invention as a problem-solving activity, both those arising as a result of one's own experience of the world and those arising out of a need to change others.

In Authentic Voice (1972), Donald Steward argues, "The fault of present-day teaching methods is that they teach students how to judge their finished work but not how to produce it" (qtd. in Young 38). This is changing in education, but has not yet been cultivated in private industry. Understanding the process of writing is one facet of written communication which will help improve technical writing. The next chapter, then, will be a discussion of the writing process, specifically analyzing composing models from a cognitive psychology framework.
The main purpose of this thesis is to suggest a composing model for technical writers, based upon existing models and upon information gained from interviews. Later in this chapter, I will discuss why I feel that technical writing is not necessarily a completely different process of writing from the writing done in composition classrooms; many premises and concerns are common to both. The differences lie in the need both to understand linguistic forms and information in specialized areas of study (specifically technical) and to understand the additional constraints placed upon the writer in the working environment.

In this chapter, I first consider a general overview of how technical writers envision their writing task. As well, I discuss a model developed by Jet Propulsions Laboratory which offers the technical writer/editor a systematic way to comply with time and money constraints. These constraints should be reflected in a composing model intended for technical writers.

Finally, I present and explain the composing models of Linda Flower and John Hayes, and Mike Rose, and drawing from these models, I develop a composing model which reflects the constraints upon the technical writer. The model does not necessarily represent the practice of technical writers in the field. Rather, because the model brings together current research and technical writing constraints, it represents a hypothetical process for the ideal technical writer. The
model has implications both for industry and education.

To accomplish the first task, I would like to present the general overview offered by Russell Hensel of Grass Valley Group, "Publication Odyssey: Assignment to Distribution." (GVG designs and develops broadcasting equipment). Hensel prefaces his article with a caveat, admitting that there are many approaches to technical manual publication. Many types of marketplaces have different needs. This process used by the GVG writing staff has proved to be effective for their purposes in a "high technology, engineering manufacturing environment" (which basically covers quite a range of technical activity). His outline of the process is idealized, and he claims that "Industry's demands and human fallibilities seldom allow a technical writer to 'go by the book.'" He recommends, for the technical writer, resourcefulness, a good sense of humor, and flexibility, especially since manuals must be produced on a short time-line and often even while the engineer is still designing the product.

After having been assigned a project, the writer first conducts basic research before contacting the engineer. Then the writer interviews the engineer to gain a functional overview of the product. Having evaluated the available data, the writer establishes a format for the publication, establishes a general schedule, and contacts support services (graphics design, publication, marketing etc.). While
composing the text, the writer continually interacts with the engineers, having question-and-answer sessions. In these sessions, they discuss specific areas, and how these areas interact.

The next step is to develop functional block diagrams. These block diagrams pictorially represent or describe how an overall mechanical or electrical system operates. Depending upon the detail required, block diagrams are also used to show the design of electrical circuits. The writer must also write text further describing the functional block diagrams. Then, the writer submits the text to a word processing operator. Both text and artwork go through a review/edit cycle. Once this is completed, the final copy is reviewed for last minute changes and placed into a production cycle (1-2).

This approach is linear in its presentation, the functions being broken down into succinct stages. J.C. Mathes and Dwight W. Stevenson (1976) have represented this overall process pictorially (Figure 1). Their graphic representation suggests an input-response-feedback-response relationship among the organizational environment, the writing task, and the writer.

Mathes' and Stevenson's design helps to clarify how technical writing fits within the system or the company. The most impressive aspect of the schema is that it addresses the rhetorical context within which the task of writing takes
place. The weakness, however, is that it presents writing as a linear task, occurring within discrete stages.

In business, the job of producing a manuscript usually involves many individuals: writers who do research and generate the text; graphic artists who design graphs, schematics, or cutaway drawings; editors who review manuscripts before production of the document. There may be numerous types of editors (technical, grammar/mechanics, layout design) and individuals who develop a text or only one individual who works with a text from conception to completion, depending on the resources and the size of a
company and the complexity of the task. Producing a perfect text influences one or more of these individuals; yet, not all documents need to be perfect. Knowing where to reduce the effort and time is difficult. *The Levels of Edit*, written by Robert Van Buren and Mary Fran Buehler (JPL), addresses this concern.

This work represents an attempt to provide guidelines for editing, from a thorough edit of a manuscript to a cursory edit. Two main purposes spurred this study: to develop a consistency among editorial terminology and to help a publication organization "achieve flexibility in meeting a range of demands for quality, while coping with time and money constraints." It establishes a framework which managers, editors and clients may use in discussing expectations, costs, and time for a given publication.

*The Levels of Edit* is based on five levels of editing, each containing two or more types of editing (a total of nine types of editing possible). Refer to Table 1 for a visual concept of how the levels are arranged. The nine types of editing include coordination, policy, integrity, screening, copy clarification, format, mechanical style, language, and substantive. The types of editing are summarized by Mary Fran Buehler as follows:

*Coordination Edit* deals with the non-copy aspects of editing: meetings, budgets, schedules, quality control, and liaison with authors and production
Policy Edit ensures that institutional policy is carried out.

Integrity Edit is essentially a numerical matching function. It ensures that all elements referred to in a publication (figures, tables, subsections, etc.) are present and appropriately identified.

Screening Edit represents the minimum acceptable language quality. It eliminates misspelled words, mismatched subjects and verbs, garbled sentences, and similar language errors, as well as some substandard graphic elements such as hand-drawn graphs.

Copy Clarification Edit ensures that all copy is legible and that instructions to the compositor or illustrator specify exactly what is wanted.

Format Edit deals with the physical arrangement of the publication, specifying how material will look on the page and where it will be placed in the publication.

Mechanical Style Edit ensures that the typographic treatment of numbers, abbreviations, and other individual elements of the publication is appropriate and consistent throughout the document.

Language Edit represents a complete language review of the publication, including usage, transitional
elements and consistency of terminology.

Substantive Edit ensures that the material is appropriately organized and is presented coherently. ("Revisited" 2)

Table 1
Types and Levels of Edit

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<th>Type</th>
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<td>Policy</td>
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<td>Integrity</td>
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<td>Screening</td>
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<td>Copy Clarification</td>
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<td>Mechanical Style</td>
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<td>Language</td>
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<tr>
<td>Substantive</td>
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Using the levels of edit offers what the author's term "controlled flexibility" (options concerning the intensity of editing a document should receive). For instance, a document written for internal use only may receive a "level five
edit,” yet one intended for the buyer or the public, say for instance an operations manual, would go through a “level one edit.” Controlled flexibility allows for decisions which respond to situational contexts and other uncontrollable variables. Buehler states, “For each publication, we consider the type of information contained, the intended audience, the purpose the publication will serve, constraints of time and money, and—especially for author-prepared publications—the quality of input” (“Revisited” 2).

Another reason for discussing The Levels of Edit is the recent proposal by Candace Soderston of a tenth type of edit, a “usability edit.” The added dimension enhances The Levels of Edit by including not only a concern for audience, but much more a concern for rhetorical context. Referring to Richard Larson, Soderston states in her article that the writer’s success depends upon how well he can internalize the intended audience. In so doing, the writer must consider four things: What information does the reader possess? What are the expectations of the reader? What types of demands does the information place upon the reader? and Are they reasonable? (16)

Though the usability edit may also be referred to as a usability test, Soderston emphasizes its usefulness as an aid to revision. This type of edit is intended not only as a way to measure quality, but also to ensure quality. Pointing out that writing is no longer viewed as a linear task with
discrete stages (planning, writing, revising), but as overlapping processes which occur cyclically, she asserts that usability should be a concern throughout the entire "writing cycle," and not merely at the end. Table 2 represents Soderston's view of how the usability edit fits in with the levels of edit.

Table 2
The Usability Edit

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<td>Coordination</td>
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<tr>
<td>Policy</td>
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<tr>
<td>Integrity</td>
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<td>Screening</td>
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<tr>
<td>Copy Clarification</td>
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<td>Format</td>
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<tr>
<td>Mechanical Style</td>
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<tr>
<td>Language</td>
<td>X X X X X X X</td>
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<tr>
<td>Substantive</td>
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<tr>
<td>Usability</td>
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Soderston, a Senior Associate Information Developer with IBM, also describes ways in which IBM (Kingston) gathers
information about typical users of their manuals. They have developed three procedures. First, they visit customers to understand the types of environments in which their product will be used. Second, before doing any writing, they conduct task analysis for new functions and products. Finally, they conduct research with volunteers who are representative of their target audience. This last approach may be a vanguard for these kinds of efforts in industry.

At IBM's Human Factors Laboratory in Kingston, volunteers are placed within a room, given a particular task to perform, and a manual. The room is equipped with one-way glass, computer terminals, video cameras and microphones. As the subjects proceed through a given task, their efforts are observed. Researchers watch their behaviors, listening to them through microphones, and seeing what is displayed on their terminal screens. The researchers also have the option of videotaping both the display screen and the subject. They ease the tension, which some of the volunteers experience when being observed with such scrutiny, by providing them with a help phone and allowing them to take breaks whenever they desire. They also emphasize the fact that the information and the system, not the volunteer, are on trial.

Soderston points to the success of such efforts. From her own experience, she tells how the subjects, while interpreting the text, revealed ambiguities and gaps. These
were completely unexpected, especially since the material had already undergone numerous technical reviews (18).

Grass Valley Group also attempts to get direct feedback from their users by including Instruction Manual Surveys at the end of their manuals. They ask questions such as the following: "What is your general reaction to this manual?" "What did you use this manual for?" "Did it meet your needs?" "Are there incomplete or missing areas of information?"

Though these types of data are not as direct as the laboratory efforts of IBM, they too represent a step in the right direction.

Technical writers interact with engineers and other scientists in order to write and revise their texts. Organizations now need to place more of an emphasis on understanding the other end of the loop, the user of the information. This type of understanding must be more than tacit. The understanding must be explicit, empirically gathered data to help the writer in producing a text.

Soderston also mentions in her article that psycholinguists have concluded, after studying cognitive processes, that syntax alone does not control when inferences will be or need to be made. In performing the reading task, each of us brings with us a framework of knowledge. In attempting to understand a piece of information, our minds search our long-term memory for an existing framework in which to resolve understanding. Consequently, what one
person's framework (the writer's) perceives as meaning, another's may infer as ambiguity. In order to resolve this ambiguity, the reader must then juggle various possible interpretations, ultimately choosing one (possibly the wrong one). Soderston concludes by stating:

In view of this process of cognition, Harris and Monaco define readability as the number of long-term memory searches plus the number of inferences required in order to comprehend the material. In other words, readability (or usability) is a function of the interaction between the text and reader, rather than being solely an attribute of the text. 18

Companies would be wise to have their technical writing departments have an understanding of reader-response criticism. Reader-response critics (e.g. Norman Holland, Jonathan Culler, Stanley Fish) posit the notion that meaning is not inherent in the text. Instead, it is the reader who brings meaning to a text. I mention this as a possible direction for new research in technical writing, applying notions of reader-response criticism to user's developing meaning from complex data. Perhaps more efforts would then be taken by business to understand their documentation users. The new directions which IBM's activities point toward are important to the field of technical writing.
Composing Models

A composing model for technical writers should address both the realities of writing in business and the findings of composition research. As mentioned earlier, the business world is tending to hold on to traditional paradigms of writing. Yet, within the past decade, composition research has resulted in a change from viewing writing as a product to viewing writing as a process. Influential investigators exploring the cognitive behaviors involved in writing include Emig (1971), Flower and Hayes (1981), Perl (1979), Pianko (1979), and Mike Rose (1984). Janet Emig, for instance, discovered that many superior writing students do not compose according to the formal outline recommended in many writing handbooks. In fact, her research revealed that "no correlation [exists] between the presence or absence of any outline and the grade a student receives evaluating how well organized that theme is" (27).

Current research on how people actually write indicates that traditional writing instruction is based on inaccurate premises. The traditional, or product-centered model of composition is being replaced by a process-centered model for composition.

According to Mike Rose, the paradigm traditionally used presents writing as a predominantly static, linear, and "algorithmic" activity. Traditional composition texts "are by nature, static and insular approaches to a dynamic and
highly context-oriented process, and thus are doomed to the realm of the Moderately Useful" ("Composition Texts" 65). Current texts which I have examined, however, are beginning to address rhetorical concerns and to consider writing as a process; however, they still do not provide extensive explanations of the writing process. The layout of the text, without giving a clear understanding of how writing works, implies to the reader that writing is a one-directional, linear process, possessing distinct stages; this linear view, presents writing as a step 1-step 2-step 3 activity. The writer proceeds in the following manner: choosing a topic, narrowing the topic, developing an outline, writing a rough draft, revising and writing a final draft.

In their research, Flower and Hayes, Rose, and others consider the process of writing as a problem-solving activity and study it from a cognitive psychology perspective. Most theorists, according to Rose, share certain assumptions as to activities involved in problem-solving behavior. In order for an individual to solve a problem, one must first be recognized. Theories generally refer to this as the introductory period. Usually "some conflict, some stress, some gap in information" triggers problem-solving behavior. Next an individual considers possible solutions during a processing period. The search for solutions ranges from stumbling on possible solutions to an elaborate, sophisticated process of considering alternatives. Theorists
basically agree that both past learning and one's approach or orientation to the problem influence the effectiveness of the solution. Finally, there is a solution period, a time when a solution is reached, "stress" and "search" are finished, and a sense of "closure" is felt ("Rigid Rules" 390).

In his article, "Rigid Rules, Inflexible Plans, and the Stifling of Language: A Cognitivist Analysis of Writer's Block," Mike Rose asserts that in solving the task of writing, we need to consider flexible strategies, rules, and plans over static structures. Rose discusses two general kinds of rules, which we use in problem-solving, set forth by Dunker, Polya, Miller, Galanter, and Pribram: algorithms and heuristics (391). Using algorithms results in exact solutions. We use these rules to solve mathematical problems. These rules utilize constant functions such as $\pi$, and direct procedures such as "square the radius." The outcomes are also predictable. For instance, the square root of twenty-five is always five.

On the other hand, heuristics or "rules of thumb" provide guidelines which allow a continuum of options for solving problems. Heuristics do not allow for the precision and certitude attained through algorithms. As Lyle E. Bourne states, "a heuristic does not guarantee the optimal solution or, indeed, any solution at all; rather, heuristics offer solutions that are good enough most of the time" (qtd. in Rose, "Rigid Rules" 392). In fact, heuristics can at times
seem to be vague; however, for solving the problem of writing, heuristics provide the most appropriate and functional approach. They allow the writer flexibility in the very imprecise activity of writing.

In his research comparing writers who block when writing with those who don’t, Rose found that these writers mainly differed in their use of plans, rules, and strategies. The blockers tended to view each of these as rigid and fixed, while the non-blockers utilized them in a more heuristic sense. If a strategy, plan, or rule didn’t work non-blockers tried another. They were not stymied by the fact that not all writing plans, strategies, and rules are applicable in all situations and contexts. (Writer’s Block).

I discuss these perspectives not so much because technical writers have a problem with blocking (though no doubt some do), but more to understand that successful writers approach writing with a repertoire of strategies; having many options from which to choose, they have a better chance of producing the most effective or efficient type of prose.

In trying to understand what guides the decisions writers make when they compose, a number of individuals have offered plausible answers. In their survey of composition research, Odell, Cooper, and Courts make the following statement:

How do writers actually go about choosing diction,
syntactic and organizational patterns, and content? Kinneavy claims that one's purpose—informing, persuading, expressing, or manipulating language for its own sake—guides these choices. Moffett and Gibson contend that these choices are determined by one's sense of the relation of speaker, subject, and audience. Is either of these two claims borne out by the actual practice of writers engaged in drafting or revising? Does either premise account adequately for the choices writers make? (6)

Flower and Hayes, attempting to answer that question, developed a process model for composing based on five years of protocol analysis. Their cognitive process theory posits four key points:

1. The process of writing is best understood as a set of distinctive thinking processes which writers orchestrate or organize during the act of composing.

2. These processes have a hierarchical, highly embedded organization in which any given process can be embedded within any other.

3. The act of composing itself is a goal-directed thinking process, guided by the writer's own growing network of goals.

4. Writers create their own goals in two key ways: by generating both high-level goals and supporting
sub-goals which embody the writer's developing sense of purpose, and then, at times, by changing major goals or even establishing entirely new ones based on what has been learned in the act of writing. ("Process Theory" 366)

The Flower and Hayes model (Figure 2) breaks the writing process into three parts: the writer's long-term memory, the task environment, the writing processes. The writing process occurs in the context of both the task environment and the writer's long-term memory. The cognitive process model differs from the traditional framework, in that the major units of elementary mental processes are observed and not the stages of the written product. In the Flower and Hayes model, these processes are hierarchical. For instance, both organizing and generating are sub-processes of planning.

Within the model, the task environment includes both the rhetorical problem, and the written text. First, writing addresses a rhetorical problem, including a specific topic, the audience, and exigency (a need arising as a result of a particular situation). To explain this, Flower and Hayes offer a simplified version of the rhetorical problem: a school assignment. This context includes the writer's topic, audience, and an implied role (student to teacher).

The rhetorical problem is complex in that it not only involves audience, topic and exigency, but also goal-setting by the writer. The writer, responding to the rhetorical
situation, makes these goals. They involve the writer's purpose and include four major goals--affecting the reader, creating a persona or voice, building a meaning, and

Fig. 2. Structure of the writing model. From Linda Flower and John R. Hayes, "A Cognitive Process Theory of Writing," College Composition and Communication 32 (Dec. 1981), 366. producing a formal text (Figure 3). The writer's understanding of the rhetorical situation is critical to effective writing: "If a writer's representation of her rhetorical problem is inaccurate or simply underdeveloped, then she is unlikely to 'solve' or attend to the missing
aspects of the problem. To sum up, defining the rhetorical problem is a major, immutable part of the writing process" ("Process Theory" 373).

<table>
<thead>
<tr>
<th>The Rhetorical Problem</th>
<th>Elements of the Problem</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THE RHETORICAL SITUATION</strong></td>
<td>Exigency or Assignment</td>
<td>&quot;Write for Seventeen magazine; this is impossible.&quot;</td>
</tr>
<tr>
<td></td>
<td>Audience</td>
<td>&quot;Someone like myself, but adjusted for twenty years.&quot;</td>
</tr>
</tbody>
</table>
| **THE WRITER'S OWN GOALS** | Reader | "I'll change their notion of English teachers..."
| | Persona or Self | "I'll look like an idiot if I say...
| | Meaning | "So if I compare those two attitudes..."
| | Text | "First we'll want an introduction." |

Fig. 3. Elements of the rhetorical problem writers represent to themselves in composing. From Linda Flower and John R. Hayes, "Defining the Rhetorical Problem," College Composition and Communication 31 (Feb. 1980), 24.

Next within the task environment is the written text, which, though external to the process of writing, influences the writer's choices. The developing text influences the writer's subsequent choices (the act of making choices, however, is under the writing process). How great an influence the text exerts may vary. If writing is incoherent, then the writer did not respond appropriately to the text, failing to incorporate new ideas clearly. At the other extreme, basic writers tend to allow the text too much
control. They struggle from sentence to sentence, unable to transcend the textual concerns to more global concerns.

Long-term memory, the second major part of the model, is relatively stable and has its own "internal organization of information." It includes knowledge about the audience, topic, writing plans and frameworks for problem-solving. Two problems are inherent with long-term memory: first, retrieving the information, and second, adapting that information to match the rhetorical situation.

The final part of the model, the writing process, has four major sub-processes: planning, translating, reviewing, and monitoring. Planning is not intended necessarily to mean a detailed plan enabling the writer to get from beginning to end. The plan may have an internal representation that is more abstract than what the prose will be eventually. A word, for instance, may represent a whole network of ideas, or the internal representation may be stored as a visual or perceptual code.

Sub-processes used in developing this internal representation include, first of all, generating ideas, or retrieving ideas from long-term memory. The retrieved ideas may be like written English, but are usually "fragmentary, unconnected, even contradictory thoughts." The next sub-process, organizing, comes into play in order to untangle the information and adapt it to the rhetorical situation. Organizing appears to be critical in thinking and developing
creatively, as it allows the writer to group ideas and form new concepts. Finally, the writer sets goals, considering both procedural and substantive concerns. "Although some well-learned plans and goals may be drawn intact from long-term memory," Flower and Hayes suggest, "most of the writer's goals are generated, developed, and revised by the same processes that generate and organize new ideas" ("Process Theory" 373).

Translating, a term used by Flower and Hayes instead of "transcribe" or "write," involves taking the ideas generated during planning and "putting them in visible language." Translating takes place because the information generated in planning is not generally represented in language but in symbol systems--imagery or kinetic sensations. "So the writer's task," according to Flower and Hayes, "is to translate a meaning, which may be embodied in key words...and organized in a complex network of relationships, into a linear piece of written English" ("Process Theory" 373).

Next, reviewing involves evaluating and revising. These two sub-processes, along with generating, are "able to interrupt any other process and occur at any time in the act of writing" ("Process Theory" 374). Reviewing may occur as a plan to systematically revise/edit the text. It may also be used as a "springboard" to further translating. New cycles of planning and translating usually result from planned reviewing.
The last element of the model is the monitor. This representation implies that writers constantly monitor their progress, shifting among processes. This function determines when the writer will move from one process to another. These choices are influenced both by the writer's goals and by writing habits or style. A writer's approach to writing may range from generating ideas and attempting completed prose as soon as possible, to painstakingly detailing the discourse before even writing.

Mike Rose offers a modification of the Flower/Hayes model. He is concerned that their model is based on a hierarchically, top-down deductive perspective. The fundamental orientation is that the writer generally works in an orderly fashion; for instance, from generating ideas to translating. Though the model allows for flexibility with the concept of "recursiveness," as well as "priority interrupts," Rose contends that the Flower/Hayes model is still too mechanical. He offers as an alternative the concept of "opportunism." He transfers this notion from the work of Barbara Hayes-Roth and Frederick Hayes-Roth with planning processes, as described in "A Cognitive Model for Planning." They explain opportunism as follows:

We assume that people's planning activity is largely opportunistic. That is, at each point in the process, the planner's current decisions and observations suggest various opportunities for plan
development. The planner's subsequent decisions follow up on selected opportunities. Sometimes, these decision-sequences follow an orderly path and produce a neat top-down expansion... However, some decisions and observations might also suggest less orderly opportunities for plan development....

This view of the planning process suggests that planners will produce many coherent decision sequences, but less coherent sequences as well. In extreme cases, the overall process might appear chaotic. The relative orderliness of particular planning processes presumably reflects individual differences among planners as well as different task demands. (qtd. in Rose Writer's Block 9)

Opportunism applied to writing allows for Rose to suggest that plans, goals, frames, etc. can influence one another in a much broader range of possibilities. Rose's model (Figure 4) contains many of the same features as the Flower/Hayes model, but with a number of reorganizations. Rose's "domain knowledge" is similar to Flower/Hayes' "long-term memory." Theirs is more defined. The task environment is the same, again, the Flower/Hayes model being more thoroughly explained.

The main difference lies in the writing processes. Whereas, Flower and Hayes place planning, translating, and revising under writing process, Rose has added another major
function, "executive operations." Under this heading he includes high-level strategies, goals, and problem solving/composing styles. These "strategies select, organize, and activate composing sub-processes." (Writer's Block 10). Under composing sub-processes, Rose makes

![Diagram of cognitive dimensions and functions]

**Fig. 4.** A schematic representation of selected cognitive dimensions and functions of the composing process. From Mike Rose, *Writer's Block: A Cognitive Dimension* (Edwardsville, IL: NCTE, 1978), 12.
explicit the rules, plans, discourse frames, and attitudes which the writer brings to the act of writing. Additionally, there are linguistic, stylistic, rhetorical, sociolinguistic, and process plans.

Rose suggests two major types of rules, plans, and discourse frames—those which are flexible and multi-optional, and those which are "one-directional, rigid, and inflexible." Generally, writers who use multi-operational, flexible rules have a better chance of producing effective prose. This group of processes shapes, selects, organizes and evaluates domain knowledge. The acts of "interpretation" and "writing" (presumably in the sense of writing language on the page; Rose does not specify) are included in this group. He refers to James Britton's notion, "composing at the point of utterance" to describe the composing activity, where domain knowledge is "shaped" or converted into written language (what Flower and Hayes refer to as "translating") (Writer's Block 11).

Rose's model lacks the detail and explanation of the Flower/Hayes model. The importance of his model, however, is the notion of opportunism and the attempt to demonstrate that writing occurs not only in a deductive, top-down, hierarchical movement, but may also occur as an inductive, down-top movement. For example, Rose suggests that as a writer is editing his work, he may see that the material could be organized a different way, or a particular phrase
may cue his long-term memory for additional information. In addition to the two-way hierarchical movement, the writer may also make "horizontal" shifts within the major groups—executive operations, composing sub-processes, frameworks of knowledge, aspects of the task environment. The notion of opportunism addresses more accurately the "fundamental reciprocity between intent and discovery, goal orientation and goal modification" (Rose, *Writer's Block* 9).

Drawing from these two composing models and from information in the interviews describing constraints upon the technical writer, I propose a modified model which specifically addresses how a technical writer writes. I have chosen to use process models, as they appear to represent more accurately the activity of writing. Stage models, such as Gordon Rohman's Pre-Write/Write/Re-Write model and Britton's Conception/Incubation/Production model, represent writing as a linear, distinct set of stages. These analogies used to describe writing provide insight for writers, helping them understand the types of phases involved in writing; even so, the distinct stages do not accurately portray what occurs in writing. Nancy Sommers' studies have shown that revision, for instance, is not something that merely occurs at the end of writing, but that it occurs throughout the process.

This modified model (Figure 5) shares many of the characteristics of the Flower/Hayes model, but by rearranging some of the processes and by using double-headed arrows, I
attempt to imply the opportunism which Rose emphasizes. Within the Flower/Hayes model, the writer operates in a top-down manner; that is, the writer oscillates among planning, reviewing, and translating. From these major operations the writer may move to a sub-process, for instance, planning to organizing or planning to generating. My model presents the types of planning (organizing, goal-setting, generating) and types of reviewing (evaluating, revising); yet, it portrays the writer's sporadic, opportunistic behavior, moving both laterally and vertically, say for instance, evaluating to organizing or evaluating to revising.

Additionally, I have shown more explicitly that writers, though setting new goals for each writing task, bring to the task a number of rules, plans, and strategies which affect their ability to write effective prose. These rules, plans, and strategies are stored in the writer's long-term memory. The model also addresses the fact that successful writers must have a repertoire of "strategies, rules, frames, and, possibly, evaluative criteria and the richer the repertoire, the richer the opportunistic activity" (Rose, Writer's Block xiv).

I have attempted to depict the very real constraints placed upon the technical writer: money (as determined by an organization); time (both to produce a text in a limited amount of time and coincidentally within a broader production
schedule); peer/executive review; and data gathering (including basic research using books, journals, etc., and information interviews). Each of these elements influences the writer’s decisions and strategies used in accomplishing the writing task.

**WRITING PROCESSES**

- **TRANSLATING**
  - PLANNING
    - GENERATING
    - ORGANIZING
    - GOAL SETTING
  - REVISIONING
    - REVIEWING
    - EVALUATING

**THE WRITER'S LONG-TERM MEMORY**

- Topic/Data Gathering
- Attitudes
- Plans, Rules, Strategies
- Discourse Frames
- Problem-solving/Composing Styles

**TASK ENVIRONMENT**

- **PEER/EXECUTIVE REVIEW**
- **THE RHETORICAL PROBLEM**
  - Audience
  - Topic
  - Urgency
- **TIME AND BUDGET CONSTRAINTS**
- **EVALUATING TEXT**

*Fig. 5. A composing model for technical writers*

Budget constraints place limits on the amount of time and effort allowed for a particular project. Peer reviews
include recommendations or demands placed upon the writer by other individuals included within the organizational structure. Such reviews range from engineers concerned with technical merit, to reviews by supervisors, and other higher-ups. Those who review the writer's work for overall content, style, and format bring to the review their own perceptions about writing, about the rhetorical context of the document, and about the function of the document. If they are higher in the organizational structure, their concerns will place upon the writer additional constraints, unless the writer is able to convince them otherwise. Finally, the information-gathering aspect influences the generating and revising of a text. And the author's understanding of the assumed audience should be based in part on some kind of feedback from the actual users of the product, or users who typify the intended target group.

Implications of the Model

The model has implications for both private industry and for pedagogy. If, as research indicates, effective writing is enhanced by the writer's repertoire of rules, plans, and strategies (which should be flexible and multi-operational), companies would be wise to increase the repertoire which their writers bring to the writing task. They should encourage formal training at special seminars or universities or develop in-house writing programs.
Additionally, there must be an adjustment in the framework which appears prevalent in business, from the traditional paradigm to the process model paradigm. There should also be an increased awareness of the rhetorical complexities and varieties which may vary from project to project.

As an example, a handbook written by Mary Fran Buehler, *Report Construction*, presents a linear approach to writing. It, in fact, offers an overall skeleton for a complete technical report. Simply by filling in the slots, the writer is able to produce a technical report. The handbook provides an excellent resource for learning how to design graphs, charts, to insert technical data (formulas, representations, etc.) correctly within a text, to write tables and graphs. The book is clear, well-written, and easy to follow. Yet, the strategies which the writer used in preparing the "how to" book are probably more flexible and multi-operational than those presented in the book.

The one-directional, linear format, however, does not adequately prepare the writer for solving the abstract, complex problem of writing. The booklet focuses on the product of writing. Writers are taught the form, rather than the process; consequently, this limits the writer's ability to address various contexts, situations, information, audiences, and purposes. Engineers and scientists spend much time learning scientific, technical information. In order to communicate more clearly their knowledge and insight, they
should be encouraged to develop their ability to write, expanding their reserve of strategies in solving the problem of writing.

In terms of pedagogy, the model would imply, assuming that a process model of writing is already being taught in the classroom, that at least a few of the assignments should in some way incorporate the constraints placed upon the technical writer. For instance, there could be an assignment which emphasizes developing schedules for a project and meeting those deadlines. Another assignment could be to have students work in groups of three, each developing a part of a document, having to confer with one another to complete the report. This exercise should help students learn to interact with others in completing a project, to coordinate their efforts, and to give and receive advice.

At least one project should be given the students where they must interview somebody with expertise in a particular field—science, computers, medicine, chemistry, biology—and try to develop from that interview a technical report which would explain a function of some apparatus, some process, or some procedure. For instance, a student might interview a computer science major or instructor to understand how information is stored on a disc and how a disc drive retrieves that information; having begun to develop a tentative draft, the student would then need to collaborate with the individual further in order to verify technical
accuracy. It could be argued that finding individuals to assist in such a project through the duration may be difficult. Those being interviewed may lose interest. That too can be part of the assignment. The technical writer must be able to gain the interest and the empathy from the expert in order to complete the task.

From conducting this research, I have no question that there should be courses for individuals interested in technical writing, courses which address the additional concerns and constraints of the field. The writer should gain an awareness of the type of style, format, and subject matters characteristic of technical writing. The ideal technical writer should be trained in the specialty—engineering, computers—as well as in writing.

The most essential training which the technical writer needs, however, is writing. The English composition class, though not usually including technical or business subject matter, teaches the writer communication skills, specifically the ability to sort, relate, and present ideas. The model which I have proposed, while including the concerns of the technical writer, mainly portrays the complex dynamic of the writing process. Because there are so many concerns placed upon the writer at one time—audience, purpose, topic, grammar, spelling, syntax—writing is one of the most difficult problem-solving activities. Flower and Hayes suggest the metaphor of a switchboard operator to understand
the writer's difficulty in juggling the many constraints and concerns during writing:

She has two important calls on hold. (Don't forget that idea).

Four lights just started flashing. (They demand immediate attention or they'll be lost.)

A party of five wants to be hooked up together. (They need to be connected somehow.)

A party of two thinks they've been incorrectly connected. (Where do they go?)

And throughout this complicated process of remembering, retrieving, and connecting, the operator's voice must project calmness, confidence, and complete control. ("Dynamics of Composing" 33)

Without plans and strategies to simplify the task ("just think about the topic for now," "I'll try to develop a general outline," "maybe I'll just begin writing"), the writer may experience "cognitive strain" and be stymied by the task (Flower and Hayes, "Dynamics of Composing" 31). The use of plans and strategies makes writing manageable; even more important, though, the writer needs to be flexible, to work with a sense of opportunism, being willing to use a strategy which is useful at a given moment.
CONCLUSION

Technical writing offers a unique challenge for researchers of composition theory. Most current research posits theories derived from studies of student writers or professional literary artists. Many of these notions apply to the technical writer, but they need to be modified. Further research needs to be done on how the pressures and concerns, peculiar to technical writers, affect their process of writing, their concern for audience and purpose, and their ability to manipulate and organize information. The field of technical writing is fertile for applying many recently derived insights about the composing process. Any research in this area must also include extensive study within the workplace of the technical writer. A number of those interviewed expressed a desire for academics to spend more time attempting to understand the work environment of the technical writer, while developing theories and recommendations for the field.

Companies and individuals generally express dissatisfaction with the quality of technical writing within business and industry. In part, poor technical writing is understandable when one realizes the diametrically opposed demands placed upon the writer. It is difficult to insure effective writing while also meeting the demands of quantity and expediency.

The fact that numerous copies of the booklet, *The Levels of Edit*, have been used by companies and individuals
indicates that the technical writer-editor's most pressing concerns are time and money. The levels-of-edit concept provides a partial solution to this problem. It provides a systematic way to adapt the editing function, complying with money and time constraints. The complete solution, however, can only result in a change of perceptions by those in business and industry. The root of the dilemma rests in the question: What is writing? More specifically, what is technical writing? Many definitions for technical writing are based on subject matter and format, a premise which reflects a product view of writing. From this perspective, it appears that the technical writer's job simply involves transferring information. The technical writer, as simply as pouring milk into a container, pours information into the form of writing.

Current research, conversely, indicates that the process of writing is a much more complex, problem-solving activity. Because the nature of the writing problem is constantly changing, the rules which one must use are more heuristic than precise. Instead of focusing on the product of writing, technical writers need to understand the processes involved in writing. Using flexible, multi-operational plans and strategies will not only help technical writers produce effective prose, but also help them contend with time and money constraints.

If they are to produce the most efficient technical
discourse, writers must operate with a sense of opportunism, as implied by the technical writing model. This does not mean that writers who feel comfortable approaching writing with a particular plan need to change. Instead, the plan should be used in a flexible and multi-operational manner.

For instance, some writers prefer to develop an outline before writing. This represents a type of plan, which can be very effective. Yet, always postponing writing until completing the outline may not be the most opportune action. The writer by doing this may still solve the problem, but not necessarily as expediently. A plan such as this becomes less effective when it is used rigidly. Used as a heuristic device, as a "rule of thumb," this plan offers the writer a rich variety of opportunities. The writer's willingness to use, in this case, variations of the outline, or, at times, no outline at all, renders the plan flexible and multi-operational. Though some writers prefer to make an outline, they should be willing to begin writing without one, recognizing that writing can help them discover their meaning. Variations of the types of outlines used may range from a formal outline, to a sketch, to jotting notes, or outlining after attempting an initial draft. Because writing is not a precise act, writers who process an assortment of strategies will be more effective in solving the problem of writing.

Companies should invest in developing their writers
repertoire of strategies used for writing. A writer's ability to adapt these strategies to various rhetorical situations, purposes and demands of individual projects will improve the quality of technical reports. I am not suggesting that all technical reports meet a certain level of quality, since time and money constraints render such efforts impractical. This suggestion is for those documents which are integral to the company's image, and the efforts to sell a product, thus the need to ensure usability.

A much greater concern for audience, and presumably the rhetorical context, as evidenced by Candace Soderston's usability edit, and IBM's Human Factors Laboratory, is a needed emphasis in the field. Companies ought to become more aware of how a reader interprets a text, even more, how readers may actually determine meaning in a text. An interesting avenue for research would be to apply reader-response criticism to users of technical manuals. Results of such research would probably cause industry to take a more empirical look into their target groups.

The role and emphasis placed upon technical writing will continue to increase as technology advances, and as the users of that technology are further removed, lacking direct knowledge of the specialty. Yet, for technical writing to assist in bridging C.P. Snow's two cultures, a change of perceptions must occur in industry, and, even more importantly, in the educational system.
Individuals from seven companies were interviewed for the purpose of this study. The interviews provided valuable insight into the field of technical writing. The names of those interviewed, their positions, and a brief description of what their companies do is provided below:

Robert V. Airhart  
Manager/Systems Management Department

Ralph Burnstein  
Manager/Hardware Engineering and Services Activity

Norman Fleming  
Section Manager/Hardware Publications

Burroughs Corporation, Pasadena: Burroughs (Pasadena) designs and builds main frames, the central processing units for computers. As well, they develop software systems for the mainframes. Peripheral systems are designed at other Burroughs locations.

Mary Fran Buehler  
Supervisor/JPL Publications Group  
Part-time Instructor, UCLA

Jet Propulsion Laboratory, Pasadena: JPL, an operating division of the California Institute of Technology, uses facilities provided by the National Aeronautics and Space Administration. JPL is engaged in exploring Earth, the solar system, and deep space with automated spacecraft; operating the Deep Space Network for spacecraft communications, data acquisition, and mission control as well as performing investigations of space through radio science; and performing basic scientific and engineering research in support of the Nation's energy and security interests.

Russell Hensel  
Senior Technical Writer

Rosemary McLeod  
Senior Technical Writer

Grass Valley Group (a subsidiary of Tektronics), Grass
Valley: Grass Valley Group designs and develops television broadcasting equipment which involves the routing of television signals and video/electronic special effects.

Anthony Mclvor
Manager/Technical Publications

Science Applications International Corporation, San Bernardino: SAI is a high technology research and development contractor, specializing in the fields of energy, national security, and environmental concerns.

Rebecca M. Morris
Assistant Documentation Specialist

Health Data Sciences Corporation, San Bernardino: HDS designs, develops and installs health care, data processing systems.

John Throp
Senior Supervisor of Technical Publications

Lockheed Aircraft Service Company, Ontario: Lockheed modifies existing airplanes for a variety of customers--commercial, government, corporate. Modifications range from installing new radio systems to developing and installing on-board hospital facilities.

Bob Wells
Word Processing Supervisor

TRW, Norton AFB, San Bernardino: TRW (Norton AFB) provides technical support to the Air Force in the research, design, development, and production of ballistic missile systems.

Though I have not included transcriptions from all of the interviews, I have included two of them--Science Applications International Corporation, Health Data Sciences Corporation--to provide a sense of what occurred during the interviews. In the interviews, RH stands for myself, while
the other individuals are represented by their initials. Their names are at the beginning of the interview.
TM: You will find that the number of environments in which technical writers work is just about as diverse as the number of companies that employ them. Some companies make a strong commitment to the function, and they support the function with hardware, software, and graphic artists. Other companies are not at all prepared to support the function. They make a grudging acknowledgement of the need for it by hiring technical writer(s), but then they don't go the distance and support that person or persons. So, you can find a very broad range of work environments for people who are making a living, some very well and some average, as technical writers.

Two things bring good news: first, the field is becoming a great deal more professionalized. It's becoming organized. People are networking. They're having seminars. They're developing a whole body of professional embroidery that establishes them as serious, dedicated, career-minded people. Second, their salaries are starting to reflect this. And so, over the last three, maybe five years, the standing in the work-place and the concomitant salaries for these people is really starting to grow, and that is encouraging for anyone entering the field.

Senior writers in some firms can expect to make up to thirty-five, forty thousand—-not too shabby. Compared to what it was several years ago, it's a real step forward.
Starting salaries for writers depend on their personal qualifications. This includes free-lance work, and education, especially combination degrees, which is to say they have communications, journalism, or English plus biotechnology, computer science, mineral engineering, or whatever the technical area is. If they are going to work for United Mines, they want to bring two things together, both the writing itself, the communication side, and some technical knowledge about the field.

Those are the ideal candidates, but not the only ones by a long shot. And those people, right at the start, are making $18,000 to $24,000. Depending on all those personal factors, and their backgrounds, they’d fall somewhere in the upper or lower end of that scale. Compared, it’s not what an M.D. makes, but it’s more than a lot of starving lawyers are making. It’s not bad.

It’s getting much, much better, and the work environment in which these people do their business is getting much better. Also, the number of companies and the extent to which the companies take the function seriously is on the upswing. These are all encouraging things. On the downside, it is still an upward battle in many of the areas. I have it pretty easy compared to some folks. But, it’s a rewarding field that is getting more rewarding, both financially and personally.

RH: What about some of the professional organizations
who put on seminars? Do you know any off hand?

TM: Yes, there are two that I am most familiar with: the Society for Technical Communication (the STC); and the ASTD (American Society for Training and Development), which works more, or specifically, in the training, human resources, development side, but which also covers communication and writing. They both have programs. They both have Inland Empire, Tri-City, or Orange County chapters. They have chapters that are local. I know ASTD does. The closest chapter for the STC (I’m not positive. I’m from San Diego) is the Orange County Chapter.

EH: Do they publish a newsletter or anything like that?

TM: Yes, that’s what I think I can give you. Once you get on the mailing list for seminars, you’ll get some of this. AMA (American Management Association) is another example of this type of organization, but their seminars are expensive. STC has a national newsletter. Here’s an old one. It’s called Intercom. Once you get into the field, there are a number of things you can pick up for leads on things. The Folio is a good example of that. And here’s a little newsletter that’s published by Pakin and her associates back in Illinois, and this is much too expensive for you to get while going to school, at least I think it is. It’s forty bucks per year, and I think you only get four of them. So it’s ten bucks a piece. That’s a lot. But, it’s worth it for companies to get them to help professionalize
their staffs. It's also good to be aware of it because every now and then you can find things in here that are absolutely priceless for a particular problem you may have.

What you're doing in terms of talking to people who are active in the field and working on writing (I don't do much writing myself anymore. I'd like to do more, but I just don't have time. I'm involved in other projects.) is really the only way to find out what is going on, and I really encourage it. You'll find that you pick up so much so fast by talking to someone who is in the environment everyday. Most people are prepared to take a few minutes out to talk.

RH: As I do more research this may change, but I am curious how technical writers view the composing process? When they actually go to write, what are their concerns? What are the questions the writer asks him or herself? These interviews will help because I want to know how much composition theory, being done by people such as Flower and Hayes or Mike Rose at UCLA, is filtering into the technical field?

TM: Zero. Again, just one person's view. I come from an academic background so I understand what you are saying, and I haven't met every tech writer in America, and I don't know how much time they spend thinking about the methodology they use, or about structured theories on how their work is carried through, and how their ideas are shaped by
preconceived notions, and all of those kinds of things. I don’t know whether those thoughts ever cross their mind or not. My guess is, and my experience has been, not at all. And the reason for that is there is not that much reflective time. It’s a deadline.

You know they’re going to mess it up. You know that the people who you are depending upon for information are not going to be available at the critical time, and on down the line. Your concerns are time, cost, and being part of the schedule, part of the pipeline, which is a time problem I guess. It’s not just the time that your part takes, but the time that the other pieces that come together take, integration. Those are your immediate concerns.

Most of the time those are out of control, except for maybe cost. You can anticipate cost; it holds out pretty steady. Because many of your concerns depend on people who are responding to other demands, the bulk of your time is taken up either writing what you’re going to do, or getting the rest of it in line: dealing with graphic artist, dealing with printers, dealing with marketing or advertising people (depending on the type of project you are working on), dealing with the technical people who are providing material, going back and checking it with them, dealing with the customer (if you’re front end). You have all of these interfaces, and seeing that those go down smoothly, and that the product which is eventually produced actually addresses
the concerns of each of those constituents is what bothers you.

How it gets produced a lot of the times is on the fly. You whip it out. It sounds excellent to you. You take it over here, and they say "What? This has nothing to do with it," and you don't have time to think, "Now how did I make that mistake?" That's a luxury that most people don't have. I'm kind of talking around your question, and the reason is that it's not part of my experience and I don't see how, by and large, it could be the part of the everyday experience of very many people. It could be that staff writers in large departments, whose interactions with the world at-large are fairly limited, have time to ponder these things and get involved in them.

But, you have people, and I think most tech writers are like this, who wear a number of different hats, and basically they are information facilitators; they take information from technical people and make it intelligible to non-technical people. In the process, they enlist the help of graphics people, and printing people, and other editors, or proof readers, or word processing operators, and they've got to assuage all their egos and make sure they all feel beholden enough to actually do the work, and to get it through the line. That's what you get uptight about. That's what you worry about.

RH: So a lot of it is people-concerns, the interfacing.
TM: By and large. This I am confident of. To be a good technical writer, it is important to be as good a communicator, interactor with people, as it is to be either a wiz on some mechanical device, or a terrific prose artist. You can be a wonderful prose artist, but if you can’t get those computer people out there to tell you what it is they’re doing, you haven’t got a thing. And it’s the same anywhere. It’s not just computers. You’ve got to be able to interact with those folks, get them to tell you their story, want to tell it to you, want to care about your product enough that you can give it back to them and say, “Check this out.” And they’ll take the time to say, “Oh, perfect, but that’s not really what we do in that specific step. We do this.” And not just forget about it. If you can win their empathy, get them enthused about your side, your contribution, then you’ve got it made. And, if you can’t do that, you’re in trouble.

RH: In this business, do you generally use word processors?

TM: Yes. Most people try to compose either on discs with a stand-alone system in their office, or they’ve got dumb computers. They use data files in the main computer and just dial in. They keep all their documents out there in the main computer, and then they get it printed either down in the computer room or in some other central printing place. Most people don’t have a stand-alone with a printer.
In a lot of places where they don't compose on computers, they may compose on typewriters or by hand. If they're really lucky, they take it into a word processing. We kind of do both here. For example, I can either write it here, print it, and take it down to have a word processing operator format it; or, I can write it out by hand, send it to word processing, and they'll put it on my discs.

RH: So I have my facts right, this company basically does subcontracting, and other companies like TRW come and ask your company to do technical writing?

TM: We are a prime contractor. We're just the same as TRW. It's just that right here locally, our role is miniscule compared to theirs. On other sites and at other areas, we are prime. The point is, we are a government contractor.

RH: This arm of the company then does the technical writing function?

TM: Yes, but because of our product. The company as a whole is a technical company, but they don't develop as many documents to support nuclear physics or environmental studies as they do for computer systems. For instance, you might have a huge multimillion dollar study, but the result is a thirty-page document and that's it. There's the result. If we have a multimillion dollar computer project, the result is that we've got all those users out there that now have to use what we've built. So they've all got to have supporting
documentation. The people that maintain it, and tweak it, and adjust it, all need to have documentation. So we dump out large amounts of printed material.

RH: The technology for the computer hardware and software isn’t done here, but it is done at a different place and then you have to access the files on it?

TM: No, we actually develop the software here. We’re not a hardware company. The guys in the bull pen are actually developing the software.

RH: So when supporting data has to come out, you simply go across the hall and get the information?

TM: In terms of what a tech writer might do?

RH: Yes.

TM: Right. But if I’m trying to write a user’s manual or a program specification, or some other kind of supporting document for the systems, I just go up the hall, or go to whomever it is that is actually writing it, writing the code. And, I’ll say, “This is what I need,” and extract it from them.

RH: The last thing then, once you as a tech writer have interfaced with engineers, and with graphic artists, how do you go about organizing the material? Once you’ve interviewed the engineer, do you make notes and then compose? Is it more of a crisis type of composing where there is a deadline and you just sit down and compose, and then you get feedback?
TM: No, it's easier and much more difficult than that. We know, that because we’re doing DOD (Department of Defense) work, it has to be done in accordance with this standard (a document request form from the DOD). So, we know, therefore, if we’re going to do a user’s manual that it’s going to follow this outline.
RH: My thesis is on technical writing and composition theory. It has been helpful for me to get out and talk with people, because the direction that I started taking, I think I am going to have to shift a little bit. Originally, I was intending to find out what types of procedures companies use. Do you have a style book? Or, how do you train your people once they come in? How do you insure the most efficient type of communication through your writing in the organization, especially since you're working in a technical field and trying to communicate to non-technical people?

RM: There are really three different types of technical writing that go on here. Let me preface that by saying because this company is brand new, we don’t have anything set in stone yet. The company is a year old. I am the first technical writer they’ve ever hired. If I stay in the technical writing field, it will eventually be my responsibility to develop the training book, the formats, etc. for our internal and external training and for internal and external documentation. Part of our work is very specific. We create hospital software, and we use a language that is unique to the hospital industry. It’s called MUMPS (Massachusetts General Hospital Utility Multi-Programming Service). It’s a language specifically for the medical profession. Most computer languages deal with numbers, but
hospitals deal really with words. The number crunching is relatively minor. It's used by a certain part of the health industry, whose concern is words, such as patients' conditions etc. MUMPS is a language that deals with words rather than with numbers. It has number crunching capability, but it's based on literals.

We have a very specific use. In our internal documentation, we have documentation that supports the application programmers, and it's a very specific type of application. Then we have documentation which supports the systems programmers, which is very different than the application programmers. We also have documentation for our internal training and for our users. So there's a lot of different types of documentation being created. We have thousands of pieces of documentation that are created every year.

RH: Is your internal documentation done on word processors?

RM: Everything. We're a hundred percent on-line. We have several Data General supermini computers.

RH: The bottom line is...well, originally I started my research in questioning how much theory is making it into the business world, especially since it seems the professional world would always be trying to figure out ways to improve communication—for instance, what's the best way to have a technical writer write to his or her highest ability?
Are you familiar with theories in composition? Mike Rose has done a study on writer's block and what people go through when writing. Linda Flower and John Hayes have done research on composing models. I had originally started out questioning how much of that type of information is making it into the real world? For instance, many times we see writing as incremental—step 1, step 2, step 3. This is what you do. Yet, Rose and a number of others are saying that writing is more recursive and opportunistic. It isn't necessarily that you start with brainstorming and then develop an outline. It is kind of a problem-solving activity. It is heuristic, rules of thumb. It is not always a linear, hierarchical procedure. What I'm interested in is from the business side. What do you look for in technical writing? What are your concerns? How do you encourage your writers to write?

RM: Very simply, in software (I don't know how much background you have in information systems) there is a real problem because it is almost impossible to get extremely technical information down to the point where users with no technical background will understand what you're talking about. Now, you can use a lot of different models, but that doesn't mean the information will be well written. I rely on Strunk and White, and I re-read it regularly because the concept is pretty much the same way that I believe, so there's got to be some hope—especially when he talks about highly technical fields.
It's too easy to use buzz words--input, output, hardcopy, etc.--and it just frightens the user away because a user doesn't have to be a computer expert. They're going to be nurses. They're going to be doctors. They're going to be people who couldn't care less about how we did it. They just want to be able to use it. So, for that purpose most of the writing here, technically speaking, is done by the person who creates the product. The programmer will write his own documents, and then my job will be editing them, taking them from his concept of English to my concept of English. And the same holds for user documentation. We're going to get it down to a simple level. It's going to go through several iterations before it is finalized, probably several hundred. And we're also going to be hiring outside firms to come in and evaluate our writing because there are firms that do that specifically for the computer industry.

There is a problem with documentation in the computer industry. There isn't a good background upon which to rely. I was reading an article about a company that at one time bragged about having twenty-four volumes of documentation on their system. Nobody wants to read twenty-four volumes. They're now bragging that they have two volumes of documentation. So, it's gone the whole spectrum from totally documenting everything to creating documentation that people can use. That's where our problems are going to be too, because we're dealing specifically with health professionals,
not with information systems professionals. It's an interesting problem.

RH: Because a lot of your software developers are specialists, the biggest challenge is to take....

RM: Yes. Systems software, applications software, and health professionals. We have doctors and nurses working here as well.

RH: So the difficulty is changing their terminology into laymen’s.

RM: We’re going to have to get all the way down to the point of an admissions clerk, so that we have to even make sure that the health data and terminology is simple enough.

RH: So there are two hurdles.

RM: Right. We are developing, or I’ve been developing a little bible. In the computer world there are certain words—they’re not even real words, so there’s no dictionary reference. For instance, how do you spell the word “disc”? There’s not a real way of spelling it. You can spell it “disc” or “disk“. So we’re just developing that kind of a little Bible. This is the way we will spell all words. If there are optional spellings, we choose one way and we always spell it the same way, like canceled, we always use one “1” rather than two. We have certain formats for user documentation like the script format. Are you familiar with that?

RH: No.
RM: A script format has the topic on the left side of the page and on the right side of the page you would have the information explaining it. We try to keep the sentences to four inches or less, and we try to keep them to twenty-five words or less.

RH: That's interesting. Like a newspaper.

RM: Right. Because a person can absorb that at one grasp. Because people, when they pick up their manual, they're just looking for the answer. They're not going to read it because it is interesting. In other words, we try to make it visually and technically easy to absorb.

RH: So that manual would be for one group, one type of user?

RM: Right. Eventually we're going to have an entire documentation department. The president of our company is a stickler for grammar, which is unusual nowadays, especially in this industry.

RH: Jet Propulsions Laboratory has a document that they put together called The Levels of Edit, where they, depending on the document, depending on the user, will go through certain levels of edit. They actually have got it broken down to time and cost. Depending on the depth of editing, as far as say the grammar or syntax...

RM: Whether it is for internal or external?

RH: Yes, and then they adjust it to cost. Is that the type of direction you see your company going?
RM: Probably, eventually. For internal documentation we try to make sure the spelling is correct and the grammar is correct, but as far as going through many iterations to get the sentences conceptualized, we’ll probably never get to that point. With internal documentation, the only thing that is important is that we can use it and it is bearable.

RH: Because you’re under time constraints?

RM: Right, and because there are thousands and thousands and thousands of pages of internal documentation that the user will never see. The user documentation is really part of our marketing. You can have the best product in the world but if you can’t use it, you can’t sell it. So, that’s where most of our emphasis, time, and money are going to be placed.

RH: That’s a good point. In a sense your documentation is becoming more user friendly as is the computer.

RM: Right. And a lot of the documentation that we are talking about is going to be on-line as well. We’ll have three levels of help screens for the user. For example, if they have a question about a certain function, and they don’t have the manual next to them, they can push a help button. The first screen level will be a very brief explanation, and a lot of times that’s all they’re going to need, “Oh, I remember. That’s the key I’ve got to hit.” If that doesn’t answer the question, the next level, accessed from an expand key, will give them an expanded explanation (several pages possibly) depending upon what the question is. And if that
doesn't answer their question, there will be a third level which will be defined by the company who bought our product. "How does this interact with our current policies and procedures?"

RH: That's good. It seems to me that with technical writing a lot of time is spent in interfacing with different people--software design and others--but once you get down to where you've gathered your information and you want to start writing, what questions do you ask or what questions would you tell your technical writers to ask? For instance, would you say, once you get to such and such a point you just need to crank it out, or what types of advice would you give them?

RM: I don't know. Ours is like a constant interaction. Well, let me give you an example of what I've been doing today. I'm working on a language book which is our systems programmer's bible. They wrote something that maybe a Ph.D. in math understood. But it is going to have to be able to be used by a brand new systems programmer trainee, who's maybe got a degree from college but no practical experience. Right now we're worlds apart, so I'm trying to bring the worlds together. If I understand it, I'll edit it. If I don't, I'll go to the source, and he'll either give me a definition I can understand or he'll make it worse. Then I'll work through it, several iterations, until I get to the point where I have a sentence that makes sense to me and also is accurate to him.
But I don't think we're ever going to get away from that because we're working with a lot of different personalities, and a lot of brilliant people. No matter how big our documentation department grows, we're going to always have to interface with people who are creating the product, whether it's our applications programmer or our systems analyst, or whomever. Sometimes, I just walk into their office and say "Hey, I have a question. I don't understand this sentence. Did you mean this or did you mean that because you can interpret it either way?" And they'll say, "Oh, I didn't realize that." Then, they'll tell me which way they meant, and I'll make whatever adjustments.

RM: Even for internal use because we're creating it so that anybody that we hire can come in and use it. Some of the people we will hire will have a background in medicine, and some in computers, but very few people have a background in both.

RM: With user documentation, we'll do that because the more you tell them, the more gets through. But for internal
documentation, basically what we will have will be a statement of the function, or a statement of the command, which will be an actual sentence in programming language. And then the parts will be broken down below that.

RH: Depending on the information the user needs?

RM: Yes. So, our internal documentation is going to be quite different from what we’re preparing for the external. It has got to be useful, but as far as great reading, that’s not an issue. I don’t know if you’re interested in the kind of final format, color, text, and graphics, but we have quite a bit of internal capabilities here. I think an eventual part of our documentation department will include a graphics department, because we want to be able to visually show in our documentation what it’s going to look like, and what the graphic capabilities of the screens are.

RH: That seems to be a very critical point in technical writing to give as many visuals as you can in order to communicate.

RM: Especially in the health industry because every transaction is a little different, and there are several different paths you can take. So, we want to have visual examples.

RH: I’ve got a few more questions. Do you have the time?

RM: Yes. If you can give me information too on the different models that you have, I’d appreciate that because
it has been a long time since I've been an English major.

RH: As far as the composing models do you mean the Jet Propulsions laboratory?

RM: No you were talking originally about...

RH: Oh, recursive and opportunistic models. Sure. I should have some more on that. Mike Rose's study of writer's block is interesting. What he did was to take students and give them an exam question, and he videotaped them. After the students took the exam, he interviewed them while viewing the videotape. He would question, "Well, what were you thinking at that point?" He concludes that general rules in English become dictums so to speak. For instance, never begin a sentence with "but."

RM: I have that problem with our technical people. For example, sometimes I will repeat words when I edit. I have to be redundant to be clearly understood. Then they'll say, "You used this word twice in a sentence, and that's wrong." It's like they know the rules, but they don't know the exceptions. If you take it out, it's not clear. That's why it needs to be redundant.

RH: The thing is you want to communicate. But as far as writer's block, it is where students rigidly hold to these rules. For instance, your introduction has to grab the reader; some students will be stuck on that first paragraph because they have to get something that will grab the reader before they move on. Writing is now being viewed more as a
process, rather than a product. You may not have everything together that you want to say, but that's okay. You can start writing. So writing becomes an act of discovery, "Oh, so that's what I mean." Or "That's close," and then you can edit. It's where you are constantly going between brain storming, initial draft...

RM: I do that all the time, but that's just the way I write. I just start to write and then I go back to edit.

RH: Exactly. Also when I write, I've gotten to the point that I like to write on a word processor. It's cleaner that way. But sometimes if I have to get started, I'll make notes. Other times I'll just have to go for it and write, and then go back and do my editing.

As far as my project, I'm asking what do tech writers consider? What are they thinking as they go through the writing process? What are the demands of business? Which seem fairly obvious—you want to communicate. A lot of times in technical writing it is taking technical material and...

RM: Making it into English. I think a lot of emphasis in our company, because we're new and because we have a product to sell, is customer satisfaction. It's a marketing function. It's not just documentation. It's going to be that way until we're on top of the heap, until we're IBM, and then we can relax a little.

RH: Do you get feedback from your customers? This was hard to understand. This was difficult.
RM: I don’t know. We’re just going live this week with our first customer.

RH: Now this is a system that you use [referring to brochure].

RM: Right. This [referring to brochure] was professionally written by our marketing company. When we get into the final draft of our user documentation, we will probably be using their services. They can’t write our documentation for us. It’s too technical, but they can help us with the layout. And we will probably go to the expense of having it professionally printed, rather than trying to do it internally because we want our image one hundred percent professional. We’re not going to spare any expense on our documentation. This is what I was talking about [brochure], the visualization of screens. There’s going to be a lot of this in our documentation and we’re going to also try to make screen images in color. Because, you see the gradations of color here?

RH: Yes.

RM: The bold versus the dim has a meaning on our screen. In some instances when you have a bold, it means that the event has already taken place. If you have a chart of patient orders, a bold one has already taken place and a dim one is to take place. It’s an order the doctor has already given that the nurse has to do. You can’t show that very well on a black and white. But you can use color gradations
so that you can see differences on the screen.

RH: This is a good layout. When you go to write...

RM: Right now I'm editing.

RH: Your major job is editing?

RM: Yes.

RH: In editing you ask yourself if the meaning is clear? And with that meaning you try to visualize your reader?

RM: Right. And sometimes I will rewrite it and ask the originator just what he originally said because this is the way I interpret it.

RH: Do you think in terms of visualization--this amount of information is too much in one swallow? How can we cut this information?

RM: For the user we do. That's why we get into even the amount of inches. There's been quite a few studies for the computer industry on documentation development. In fact, I can give you some references if you're interested. They go through different theories, but they really do believe that the number of words affects the reader. You've got to realize that most people are resistant when they first sit down to the computer. They don't want to use it. They've been doing it twenty years the way they've always done it, and they don't see why somebody is bringing in a new machine. If you bring them a documentation and the first sentence is fifty words long, you've lost them. So we try to get it into short sentences with lots of white on the page. You don't want the
sentences going all the way to the end because it is intimidating. There’s a lot of writing on the psychological aspects in our industry as well.

RH: That’s interesting. That would be an interesting approach.

RM: I do have some references I can show you for our industry, some good resources.
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