1995

Reviewers and workplace writing: a study of comments intended to guide revision using a reviewer profile scale and a comment categorization matrix

Christianna Irene Connell White

Iowa State University

Follow this and additional works at: https://lib.dr.iastate.edu/rtd

Part of the Business and Corporate Communications Commons, and the English Language and Literature Commons

Recommended Citation

White, Christianna Irene Connell, "Reviewers and workplace writing: a study of comments intended to guide revision using a reviewer profile scale and a comment categorization matrix" (1995). Retrospective Theses and Dissertations. 16129.

https://lib.dr.iastate.edu/rtd/16129

This Thesis is brought to you for free and open access by the Iowa State University Capstones, Theses and Dissertations at Iowa State University Digital Repository. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
Reviewers and workplace writing:
A study of comments intended to guide revision using a reviewer profile scale
and a comment categorization matrix

by

Christianna Irene Connell White

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF ARTS

Department: English
Major: English (Business and Technical Communication)

Approved:

Copyright © Christianna I. White, 1995. All rights reserved.
# TABLE OF CONTENTS

LIST OF TABLES .......................................................... vi

LIST OF FIGURES .......................................................... vii

ACKNOWLEDGMENTS ....................................................... viii

ABSTRACT .................................................................. x

CHAPTER 1. INTRODUCTION AND LITERATURE REVIEW .......... 1
  Research question ......................................................... 4
  Literature review .......................................................... 5
    Research into the nature of expertise ............................... 5
    Evolutionary influence of writing process theory on document review .......... 9
    The influence of collaboration on workplace review .............. 13
  Thesis overview ......................................................... 15

CHAPTER 2. CHARACTERIZATION OF THE ORGANIZATION ...... 17
  The position of the organization ....................................... 19
    Association with other institutions ................................... 20
    People employed in the organization ................................. 22
    Funding and budget .................................................... 23
  Writing expertise within the organization ............................ 25
  Subject matter expertise ................................................ 27
  Responsibility for texts .................................................. 28
  Responsibility for consequences of text .............................. 30
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Study participants</td>
<td>38</td>
</tr>
<tr>
<td>Table 2</td>
<td>Comparative reviewer profile narratives</td>
<td>46</td>
</tr>
<tr>
<td>Table 3</td>
<td>Perfect agreement distribution</td>
<td>76</td>
</tr>
<tr>
<td>Table 4</td>
<td>Total comment chunks</td>
<td>76</td>
</tr>
<tr>
<td>Table 5</td>
<td>Overall comment distribution</td>
<td>77</td>
</tr>
<tr>
<td>Table 6</td>
<td>Query comment distribution</td>
<td>78</td>
</tr>
<tr>
<td>Table 7</td>
<td>Statement comments distribution</td>
<td>79</td>
</tr>
<tr>
<td>Table 8</td>
<td>Corrections comments distribution</td>
<td>80</td>
</tr>
<tr>
<td>Table 9</td>
<td>Signal comments distribution</td>
<td>81</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1. Blank reviewer profile radar chart ........................................ 45
Figure 2. Comparative reviewer profile radar chart .............................. 47
Figure 3. Sample comments .......................................................... 50
Figure 4. Comment categorization matrix ........................................ 54
Figure 5. Reviewer profile of Dan Sanders ........................................ 63
Figure 6. Reviewer profile of Paul Beardshear .................................... 65
Figure 7. Reviewer profile of Jim Perkins .......................................... 68
Figure 8. Reviewer profile of Kevin Taylor ........................................ 70
Figure 9. Reviewer profile of Stewart Byers ....................................... 72
Figure 10. Reviewer profile of Derek Gebhardt .................................... 74
Figure 11. Reviewer profile of Derek Gebhardt .................................... 86
Figure 12. Derek Gebhardt’s comment distribution .............................. 86
Figure 13. Reviewer profiles of Stewart Byers and Jim Perkins ............... 89
Figure 14. Byers and Perkins’ comment distributions ........................... 90
Figure 15. Reviewer profile of Dan Sanders ........................................ 93
Figure 16. Sanders’ comment distribution .......................................... 93
Figure 17. Reviewer profile of Paul Beardshear .................................... 97
Figure 18. Beardshear’s comment distribution .................................... 97
Figure 19. Reviewer profile of Kevin Taylor ....................................... 99
Figure 20. Taylor’s comment distribution .......................................... 99
Figure 21. Reviewer profiles of Sanders, Perkins, and Taylor ................. 104
Figure 22. Sanders, Perkins, and Taylor’s comment distributions .......... 105
A wise man once told me: “Three things matter in life—faith, family, and friends.” The process of conducting the research for and writing this thesis affirmed for me the truth in this statement. My faith was tested by what seemed at times insurmountable problems associated with this project, yet I was sustained by people who expressed their faith in me and encouraged me to press on. The members of my committee, Rebecca Burnett, David Russell, Gary Phye, and Pat Patterson, managed to respond in ways that helped me to see where I needed to do more work while at the same time they showed that they had faith in me. I am indebted to them for their willingness to share their expertise, talk with me about my ideas, review multiple versions of this work in progress, and suggest ways to improve it.

I have been graced by my church family, especially Frank and Sarai Beck, who encouraged me and showed me how this project fits in with my faith journey.

I am also grateful for the continued support of my family. My husband Jeff provided balance, encouragement, enthusiasm, and insight in full measure; I treasure our special love and friendship. His unwavering confidence, backrubs, and good cheer made this possible. Sarah and Thomas are the best children ever and I thank them for their patience and understanding (I’ll stop hogging the computer and quit talking about this at the table). I can never repay my parents, Jean and Doug Ames for their continuing support, especially the three years of Camp Grandparent. I appreciated the space and time and I am grateful that Sarah and Thomas had the chance to spend time with such generous, caring people. Jim and Jackie White seem to say and do just the right thing at just the right time—always affirming and supporting.

Over the time I worked on this project, I came to understand that I am blessed by some of the best friends in the world. My friends shared their experiences with review and revision and listened patiently as I worked through my ideas. I am grateful to the IDMM
team and TIP staff members for allowing me to interview them, collect all of their drafts, and force them to think and talk about their writing processes.

Many, many people helped me in ways too numerous to mention. I must, however, mention several special people. Karen and Carl Thompson provided cars, computers, and company in times of great need. Mary Jo and Leonard Larsen were willing to talk about this project when we were supposed to be having fun and they turned emergencies into adventures. Dr. Robert Patterson encouraged me to follow my dreams. Marv Anderson and Tay Kennedy helped refine my research tools. Betsy Birmingham and Paul Sisler made useful comments on an early draft and listened patiently. Thank you all for your unique contributions.

No amount of thanks can ever repay the many kindnesses shown me by my thesis support group: Janet Renze, Kate Molitor, and Susan Booker. We have laughed and cried together; talked about ideas and hashed out problems; read and commented on drafts; prodded each other and called for times of rest. My life is richer for these friendships—I’m truly proud to know you.

Rebecca Burnett made me be coherent, challenged me to take intellectual risks, and consistently modeled excellence. For invaluable comments, stimulating conversation, treasured friendship, and more—thank you.
ABSTRACT

In order to investigate the question *What, if any, is the relationship between characteristics of reviewers and the comments those reviewers make?*, I studied comments that were intended to guide revisions. My investigation of workplace review—specifically the relationship between characteristics of reviewers and the comments those reviewers make—involves three issues.

First, a broad array of characteristics of reviewers should be considered rather than identifying one characteristic as preeminent, such as privileging subject matter expertise over rhetorical expertise. I address this issue by examining the role and function of expertise.

Second, characteristics of reviewers must be considered within an organizational context in order to account for complex social factors that influence workplace writing and review processes. I address this second issue in two ways, first, looking at the influence of writing process theory on workplace review, then examining the role of collaboration on workplace review.

The third issue has to do with taxonomies of reviewer comments. A review comment taxonomy should be complex enough to reflect the full range of the different kinds of comments as well as the ways those comments are made. At the same time, the taxonomy of comments should be simple enough to use without depleting computer, time, or human resources.

I address all three of these issues with the two tools I developed in order to conduct this study, a reviewer profile scale and a comment categorization matrix. Reviewers in the study made three kinds of comments—content, mechanical, and rhetorical—in four ways—query, statement, correction, and signal.

Based on the analysis of the reviewer profile and comment categorization data, I conclude that there are, indeed, complex relationships between profiles of reviewers and the comments those reviewers make. I observed the following patterns that involve the
three primary factors in the reviewer profile scale—organizational position, subject matter expertise, and writing expertise.

- Organizational position seems to influence the kinds of comments reviewers make (as distinguished from the ways reviewers comment).
- Subject matter expertise tends to influence the kinds of comments reviewers make (again, distinguished from the ways reviewers comment).
- Organizational position tends to influence the frequency of comments.
- Writing expertise seems to influence the prevalence of rhetorical comments.

The patterns described in these conclusions are tempered by the two other factors in the reviewer profile scale—responsibility for producing the text and responsibility for consequences of the text.
CHAPTER 1. INTRODUCTION AND LITERATURE REVIEW

Many researchers and scholars have documented not only the prevalence but also the importance of review in workplace writing and revising. As an important, common practice, the continuum of workplace review ranges from formal, institutionalized arrangements to informal, interpersonal favors. Whether the relationship between writer and reviewer is at either end of this continuum or somewhere in the middle, two elements of that review process can be identified in order to investigate the relationship: characteristics of the reviewers and characteristics of the comments the reviewers make.

My investigation of workplace review—specifically the relationship between characteristics of reviewers and the comments those reviewers make—involves three issues. First, a broad array of characteristics of reviewers should be considered rather than identifying one characteristic as preeminent, such as privileging subject matter expertise over rhetorical expertise. I address this issue by examining the role and function of expertise. Second, characteristics of reviewers must be considered within an organizational context in order to account for the complex social factors that influence the workplace writing and review processes. I address this second issue in two ways. First, I look at the influence of writing process theory on workplace review. Second, I look at the role of collaboration on workplace review.

The third issue has to do with taxonomies of reviewer comments. A review comment taxonomy should be complex enough to reflect the full range of the different kinds of comments as well as the ways those comments are made. At the same time, the taxonomy of comments should be simple enough to use without depleting computer, time, or human resources.

I address all three of these issues with the two tools I developed in order to conduct this study, a reviewer profile scale and a comment categorization matrix. I argue that these complementary tools can be used by writers who need to make informed choices about reviewers for their work as well as by students who need to learn about review.
While both tools I designed and present in this thesis contribute useful information, neither alone specifically and adequately addresses the complex interactions between reviewers, authors, and texts. Therefore, I argue that both tools must be considered together in order to form a systematic framework that begins to explain the complexity of workplace review.

What is important about these two tools is their interaction that gives writers a way to help make decisions and a way to understand both the characteristics of the reviewers and the comments these reviewers make. First, the two tools allow a writer to be deliberate when seeking a reviewer for a work in progress. If a writer can decide what kind of comments might be most productive and then determine who a likely reviewer might be (one who might provide those productive comments), then the writer has a basis for seeking review. The reviewer profile and a characterization of desired comments can help a writer decide not only what kind of comments to ask for, but also what to expect from a reviewer. These two tools help decisions become less intuitive and more systematic.

In this study I begin by discussing the common practice of characterizing reviewers by using narrative descriptions of them. Writing process research seldom characterizes reviewers beyond generic narrative descriptions and seldom articulates the criteria for choices (such as the criteria for why one reviewer was selected over others or why certain editors or reviewers are sought).

Reports of reviewers’ characteristics generally follow a pattern of narrative descriptions of relatively obvious “institutional and generic norms. . . [and] cultural and personal factors” (Broadhead and Freed 1986, 65). For example, in their 1985 study of workplace revising, Glenn Broadhead and Richard Freed first discuss in some detail the kinds of writing and the general process of writing in the organization they studied. Then, as seems customary in reporting about writers and reviewers, they provide a narrative description of the study participants using phrases and sentences such as
a sixty-one-year-old white male . . . with the Firm for sixteen years
. . . a vice-president . . . his competence in linguistic matters such as
cohesion and usage is a product of general cultural experience. . . . written
several articles and a book. . . . area of expertise is manufacturing strategy.
. . . His formal training in composition consisted of two semesters of
freshman English in college. (65–66)

This narrative pattern of describing participants in a document review process is
used by other researchers as well. For example, Carol Gerich, in a study about technical
editors and revision, describes the participants in this way.

My final choice was two Ph.D.-level geophysicists, frequent contributors
to noted journals in their field, averaging two publications per year. . . .
Editor A, who was team leader of the five editors assigned to the
department, had been editing for 6 years. (1994, 63)

Like Broadhead and Freed, Gerich situates her participant description narrative within a
broader context by briefly describing the culture of the organization where the research
was conducted.

This conventional pattern of presenting descriptive narratives of individuals or
organizations obscures the assumptions, decisions, and rationales that support the
information used to characterize individuals or organizations. I suggest that it is important
to articulate these assumptions, decisions, and rationales as a systematic approach to
characterizing reviewers and their organizations (an approach used in chapter 2 to
categorize the organization where this study is situated).

Even though I suggest a systematic approach to characterization, I acknowledge the
impossibility of establishing universal criteria for characterizing reviewers. However,
articulating the assumptions and examining the de facto criteria that are embedded in
present conventions provide a fresh perspective about the literature and a new way to study
the process of workplace review.
Research question

While the literature abounds with descriptive narratives of workplace reviewers and lists of facts that situate those reviewers within their own organizational contexts, none of these studies discusses a systematic approach to characterizing reviewers. Furthermore, these studies seldom provide tools for helping writers characterize reviewers in order to enhance their review process. This study seeks to fill this void by presenting a profile tool that can be used to look systematically at reviewer characteristics.

But knowing about reviewer characteristics alone is insufficient. Indeed, the value for writers of being able to characterize reviewers rests in being able to make the most appropriate choice among available reviewers to ensure that their comments provide fruitful, appropriate feedback to guide subsequent revision. Therefore, this study also offers a second tool, a matrix for characterizing reviewer comments. The analysis of the data collected with the reviewer profile tool and the matrix for characterizing reviewer comments enables me to investigate the following question:

What, if any, is the relationship between characteristics of reviewers and the comments those reviewers make?

I consider three dimensions of reviewer comments in this question:

- the kinds of comments reviewers make
- the ways reviewers make those comments
- the frequency and distribution of reviewers' comments

In addition to characterizing reviewer comments using these three dimensions, I compare the comments with the profiles of the reviewers in order to suggest ways in which writers can approach the document review process and negotiate review. Also, I suggest that these two tools suggest ways in which to understand comments reviewers make.

Throughout this work, I examine both the social context of document review as well as reviewer characteristics. This examination is based on the assumption that reviewer characteristics are situationally and contextually sensitive, a complexity—the interdependent, symbiotic relationships among writer, reviewer, context, and
comments—that focuses attention on the nature of expertise, the evolutionary influence of writing process theory, and the influence of collaboration on workplace review.

**Literature review**

Workplace document review is informed by research from several domains including composition studies, document cycling, cognitive science, and collaboration. While each of these domains contributes important knowledge about the nature of workplace writing, in this review, I focus on the three areas that most clearly form boundaries for my research: the nature of expertise, the evolutionary influence of writing process theory on workplace review, and the influence of collaboration on workplace review. This literature review explores these three research areas and identifies some of the ways each addresses the three elements of the research question:

- characteristics of reviewers (what I call reviewer profiles)
- characteristics of reviewer comments (including the kinds of comments reviewers make, the way they make comments, and the distribution of those comments)
- relationships between reviewer profiles and the comments the reviewers make

This literature review specifically highlights research that suggests taxonomies for reviewers or comments, or research that calls for such tools. Because of the assumption that workplace writing takes place in social contexts, this review also discusses studies that look at the social dynamics of review, particularly those that even briefly consider both the profile of the reviewers as well as the kinds of comments the reviewers make.

**Research into the nature of expertise**

Examining the nature of expertise is important to my work because I consider two kinds of expertise—subject matter expertise and writing expertise—in the reviewer profile tool. Researchers such as K. Anders Ericsson and Jacqui Smith study both kinds of expertise in order to “understand and account for what distinguishes outstanding individuals in a domain from less outstanding individuals in that domain, as well as from people in general” (Ericsson and Smith 1991, 2). Ericsson and Smith assert that
an attempt to encompass phenomena normally labeled as perceptual (e.g., chicken sexing), motoric (e.g., typing), or knowledge-based (e.g., physics) within the same overall approach will allow us to identify common methodological and theoretical issues . . . in accounting for achievement of superior performance in any of these different domains. (1991, 13)

Ericsson and Smith then describe how different kinds of expertise can be accounted for. Their findings focus on aspects of subject matter expertise, which can be viewed as expertise in a domain. Marlene Scardamalia and Carl Bereiter distinguish between expertise in a domain and “tools skills . . . [which] are useful, but . . . one is not required to be expert at them” (1991, 174). Scardamalia and Bereiter link reading and writing expertise with subject matter expertise. They say, “[w]riting is more intimately involved with expertise in learned domains than it would seem on the surface . . . . Both reading and writing . . . can interact significantly with other kinds of expertise, but they do not necessarily do so” (175).

Indeed, subject matter expertise is acknowledged as a crucial aspect for workplace writers. For instance, Thomas Duffy, Theodore Post, and Gregory Smith discuss “how subject matter, rhetorical, and design expertise are coordinated and applied” in a workplace writing process (1987, 373). However, they conclude that “rhetorical skill was not even a consideration. Writers frequently are hired on the basis of their technological expertise” (1987, 382).

Duffy, Post, and Smith call for a clear distinction between subject matter experts and writing experts and assert the need to privilege rhetorical expertise in addition to subject matter expertise. This call for writers to assume active roles as experts on workplace teams (such as software design and documentation teams) is echoed and elaborated repeatedly in professional communication literature. For instance, Charles Stratton writes,

More and more, technical experts are teaming up to produce technical documents. . . . Stratifying the project vertically, with a project team leader, a data gatherer, a writer, an editor, and a graphics person, is a more efficient and more effective way of collaborative writing. (1989, 178)
Richard Chisolm also advocates “the modern team-based [documentation] cycle [that] gets writers and product designers together from the beginning of the design process” [bold in original] (1988, 300), an approach that acknowledges the value of both subject matter expertise and writing expertise. Similarly, Ellen McDaniel, Robert E. Young, and Johan Vesterager argue for integrated teams of experts that “create system documentation and use it to drive and manage technical development in technology-transfer project” (1992, 71).

Despite these calls for full participation by writers, research into the nature of writing expertise has not been directly explored in professional and technical communication literature. Rather, research into the nature of writing expertise comes from composition researchers. Michael Carter (1990); Allan Collins, John Seely Brown, and Susan E. Newman (1989); Linda Flower and John R. Hayes (1981; Flower, Hayes, and Swarts 1983; Hayes et al. 1987); and Bereiter and Scardamalia (1991, 1993) are among those who conduct inquiries that span the boundaries of research about writing and research about expertise. As these researchers challenge critical assumptions and raise important questions, they suggest ways we can understand both expert writers and the processes by which writers attain and maintain expertise.

For example, Scardamalia and Bereiter write

Expert writers generally are found to work harder at the same assigned tasks than nonexperts, engaging in more planning and problem solving, more revision of goals and methods, and in general more agonizing over the task. . . . expert writers have been found to take more time than novices just to start writing . . . and far longer to complete [a writing task] . . . . It is the novice, not the expert, whose rate of text production is fast . . . more . . . advanced writers have less ready access to the contents of texts they have written . . . so, more wrong turns, more revisions, more time, more effort, and more recall problems as one gets "better." (1991, 172)

In addition to these findings about expertise in general and writing expertise in particular, four additional ideas about expertise are especially relevant to my work. The first idea is the notion of expert-like behavior. Bereiter and Scardamalia frame a definition of expertise in terms of careers and state
The career of the expert is one of progressively advancing on the problems constituting a field of work, whereas the career of the nonexpert is one of gradually constricting the field of work so that it more closely conforms to the routines the nonexpert is prepared to execute. [italic in original] (1993, 11)

This means that experts regularly challenge themselves to consider complex, atypical problems so that their level of expertise expands.

The second idea has to do with the possibility of expert-like processes and approaches to problems in non-experts. Scardamalia and Bereiter assert the possibility for such expert-like processes and advance the claim that non-experts can exhibit expert-like learning that closely resembles the experts' approaches to solving problems. They argue that "there are experts who are not highly talented and people who, although too inexperienced to earn recognition as experts, nevertheless go about things in a distinctly expert-like way" (1993, 5). They would suggest that an expert-like novice would contradict the notion that Robert Glaser and Michelene T. H. Chi advance in a discussion of the characteristics of "highly competent expert performance. . . . Experts see and represent a problem in their domain at a deeper (more principled) level than novices; novices tend to represent a problem at a superficial level" (1988, xviii).

The third idea about expertise that influences my analysis is the notion of expert subcultures. Bereiter and Scardamalia describe expert subcultures where expertise is an essential component of the environment and where expertise flourishes because of the community expectation that individuals "participate in the pursuit of ideal goals of the group, and this necessitates continued progressive problems solving" (1993, 105). They give as an external measure of this progressive problem solving the subculture's expectation for advances on cutting edge problems in the discipline to be made continually and reported regularly to the community of experts at annual conventions and through professional and academic publications. These public manifestations of advances contribute to the perception by others of an individual's participation in the process of expertise.
The fourth idea about expertise that figures into my work is the idea of recognition of expertise. Bereiter and Scardamalia suggest that “[e]ngaging in the process of expertise by no means guarantees expertise that will be recognized in the world at large” (1993, 112). Domain expertise is recognized in different ways from writing expertise; in workplace review, both kinds of expertise influence comments yet recognizing the influence of either domain expertise or writing expertise is a subtle, yet important distinction.

A further concept that bears on my work is the idea of intuition. Herbert Simon suggests that intuition is “unarticulated expertise” (Burnett 1995). This concept is important to my argument because I believe that much workplace document review is conducted intuitively rather than according to articulated criteria. I believe that breaking the intuitive cycle by articulating both the reviewer profile and the taxonomy of comments contributes to successful reviews intended to guide revision as part of the workplace writing process.

Evolutionary influence of writing process theory on document review

Writing process research is the second area that is critical to my analysis of reviewer profiles and comments. Document review literature generally is based in writing process theory and has evolved from seminal works in the 1970s and early 1980s (e.g., Emig 1971; Sommers 1980). In 1981, Linda Flower and John R. Hayes presented their cognitive process theory and model of writing. In 1986, Flower, Hayes, Linda Carey, Karen Schriver, and James Stratman elaborated the revision portion of the original Flower and Hayes model by describing three “key intellectual actions” that underlie the process of revising: detection, diagnosis, and devising strategies for making revisions (17). Two of these actions, detection and diagnosis, form the core of the document review process that has been studied using a variety of methods.

Among the methodologies people use to identify important variables specifically related to review or revision include complex syntactic analyses of multiple drafts of
single-author documents (e.g., Broadhead and Freed 1986), ethnographic methods (e.g., Cross 1990), and questionnaires distributed to workplace practitioners about different review tasks (e.g., Duffy 1995). Regardless of the methodology employed, discussions of review that rely on Flower and Hayes' original model tend to display two characteristics: (1) they discuss review as a facet of the relationships among and expectations of professional editors, reviewers (whether blind or known reviewers), and writers (e.g., Buehler 1977; Gerich 1994; Reinsch 1994), and (2) they study the writing process as it relates to organizations (e.g., Paradis, Dobrin, and Miller 1985; Killingsworth and Jones 1989; Kleimann 1991).

When writers and reviewers (and in many cases, editors) aren't in direct contact, their relationships are sometimes institutionalized. This institutionalization may take the form of guidelines and guidelines for a particular journal's review practices. For example, Lamar Reinsch joins four other editors of the publications of the Association for Business Communication in presenting information that "distill[s] their experiences with articles, reviewers, and authors" (1994, 59). Reinsch says that the review process "requires hard, intellectual work ... [and] an excellent paper almost always results from an intricate collaboration among authors, reviewers, and editors" (60). Reinsch names the review process but doesn't address specifics of the interaction.

Most others, however, specifically attend to the interactions between editors and writers. In landmark work published in 1977, Mary Fran Buehler described the levels of edit that she developed at Jet Propulsion Laboratory in Santa Barbara. These levels of edit have shaped the practice of editorial review and continue to serve as touchstones for talking about the kinds of comments editors make when they work with texts.

Perhaps due to the influence of Buehler's levels of edit, researchers and scholars continue to examine the review process with an eye toward accurately describing current practices and research in order to assist reviewers and writers. For instance, David E. Nadziejka (1995) calls for a reexamination of the lowest level of editing (as presented by Buehler) and suggests specific tasks that ought to be included in a revision of this level of
editing. Nadziejka further suggests the specific kinds of comments that editors ought to give to authors when they perform a low-level editorial task. In a discussion of factors that contribute to a shift in understanding of low-level editing, Nadziejka writes:

The primacy of technical content certainly makes sense in terms of the organization's and the author's interests. . . every document should be edited first with attention to as many of the author's interests as possible; then, if there is time, with attention to the details that an editor is traditionally meticulous about. (1995, 280)

Nadziejka highlights the shifts away from formal editorial relationships (due, in part, to budgetary constraints as well as advances in technology that allow writers to perform some of the tasks traditionally associated with editors). In light of this move toward writer autonomy, document review (both the comments and the profiles of the individuals who review the text) takes on added importance.

Even with the added importance of document review, writers increasingly rely on informal, self-initiated review and technologically sophisticated tools to augment the review process. Indeed, in the May 1995 issue of Technical Communication where Nadziejka discusses levels of edit, Thomas Duffy presents the results of a study of the technical editing process. Although Duffy's specific focus is "to provide the contextual and task information essential to guiding the development of computer tools" for editors, he frames his report with an examination of the kinds of tasks that editors were performing (1995, 263). In other words, Duffy reports the kinds of comments editors make on drafts. Rather than discussing the specific comments editors make, Duffy suggests that editors' responses fall within four categories of error types that are consistent with other taxonomies of errors:

- grammar and mechanics
- accuracy of text and graphics
- coherence and organization of the chapter or whole document
- comprehensibility and readability

Each of these four categories is elaborated with examples of the error type (271). Duffy's taxonomy of errors reflects a common thread in document review literature where writers
carefully define both the boundaries and constituents of errors, episodes, or examples of the object of study. This sort of careful definition is "[t]he most crucial task of a case study is the identification of important variables in the data" (Lauer and Asher 1988, 26).

Gerich takes a different approach to measuring the detection and diagnosis processes of reviewers but accomplishes the same crucial task of identifying the variables in the data and providing a taxonomy for discussing detection and diagnosis. Gerich examines the ways editors "communicate the reasons for the changes: what's wrong, missing, or unclear; what's going to fix it; and how" (1994, 63). Gerich presents two categories of revision that are "based on significance of the change to the document: minor surface revisions to the microstructure; [and] major substantive revisions to the macrostructure" (64).

Duffy and Gerich's taxonomies are representative of the kinds of approaches researchers use to sort out the similarities and differences among review comments. Taxonomies such as these, with their focus on error detection, are interesting and productive, but they fail to fully account for characteristics of the reviewers. Although I drew on taxonomies like those presented by Duffy, Gerich, and others as I developed my comment categorization matrix, I structure my analysis around the interaction of the two tools (reviewer profile scale and comment categorization matrix) in order to account for the complex interactions of tasks, individuals, and situations.

Regardless of the research methodology employed or the type of taxonomy devised, nearly all of these recent examples of document review literature can be traced back to the early writing process work of Flower and Hayes and their colleagues (1981; 1986) because they all focus on detection and diagnosis of error, central aspects of the revising process that Flower and Hayes articulated. This focus would seem to be essential in the design of a tool for characterizing comments made by reviewers.
The influence of collaboration on workplace review

Workplace document review can be viewed in many different ways. Some review processes involve detailed feedback and many revisions before a document is deemed finished. Some review processes involve an individual simply signing off that a document that seems to fit the bill has passed her desk. Some document review is based in shared document collaboration while other review involves a single author seeking feedback from a reviewer who has no stake in the text. Some review processes serve as a highly political battleground for different approaches to a problem. Some review processes serve the needs of management by keeping tabs on progress in a particular area. Some review processes strengthen a community by encouraging a high level of participation and engagement in written products. Despite these differences, nearly all forms of workplace document review can be understood in terms of what we know about collaboration.

In 1981 study of workplace writing, Lester Faigley and Stephen Witte give only passing mention to the influence and prevalence of collaborative writing in the workplace: "on-the-job writing tasks are frequently written by more than one person" (561). Paul Anderson confirms this finding in his 1985 report on survey research. Anderson writes, "[m]any workers collaborate when they write" (1985, 50). This collaboration specifically "involves critiquing drafts" (1985, 51). Following Anderson's generalizations, research into workplace collaboration and document review have blossomed.

Andrea Lunsford and Lisa Ede, in their landmark book, Singular Texts/Plural Authors, define collaboration broadly as "any of the activities that lead to a completed written document. . . . [including] organizational planning, drafting, revision, and editing" (1990, 14). Later, in a discussion of the modes of collaboration, Lunsford and Ede describe hierarchical collaboration as carefully, and often rigidly, structured, driven by highly specific goals, and carried out by people playing clearly defined and delimiting roles. These goals are most often designated by someone outside of and hierarchically superior to the immediate collaborative group or by a senior member or
leader of the group . . . productivity and efficiency are of the essence in this mode of collaboration. (133)

The activity that Lunsford and Ede define and describe is the process used to accomplish document review in many workplaces. This description seems consistent with the patterns of collaboration that Paradis, Dobrin, and Miller (1985) studied at Exxon ITD. At Exxon, the hierarchical collaboration model functioned as a management tool. Other researchers, including Susan Kleimann (1989; 1991), have confirmed and extended Lunsford and Ede's work.

Susan Kleimann conducted ground-breaking research into the different modes and practices of workplace collaboration. In 1989, Kleimann investigated hierarchical collaboration by examining "the nature and purpose of vertical collaboration at the U.S. General Accounting Office" (57). The focused research questions that guided Kleimann's work are

How many and what types of comments are made during vertical collaboration?

What is the link between the number of comments and the reviewer's hierarchical position?

In what ways do reviewers reflect the organization culture in the style and content of their comments?

How do the organizational and Divisional cultures affect the nature of the comments? (1989, 57)

Kleimann began the thread of research that I continue as I develop and apply the reviewer profile scale and the comment categorization matrix.

My departure with Kleimann's approach has to do with the ways we characterize reviewers. Kleimann's exhaustive, in-depth study of the agency suggests that such detail is required if researchers are to fully contextualize or adequately understand the organization or the relative positions (and the characteristics that contribute to those positions) of reviewers within the organization. I suggest that not only is this level of detail overwhelming, it is beyond the scope and purposes of many researchers and workplace
writers. Further, while I advocate that writers use my five-point reviewer profile scale in order to develop criteria for negotiating review, Kleimann's model of in-depth characterization is overly ambitious for writers who need simple tools to facilitate their efforts.

Despite our differences in approach, I agree with Kleimann's discussion about the complexity of workplace review in which she calls for "achieving clarity about roles, clarity about the goals of review, and clarity about the functions of review" (1991, 526). She points out three factors that influence review, the potential impact of a document, the intensity of review (measured by the extent and frequency of document cycling), and the presence of internal and external reviewers. As part of her discussion, Kleimann says "[s]ome of these [internal and external] readers may comment on a draft and request changes; others may insist on changes and usually the changes are many" [italic in original] (1991, 521).

Kleimann's research was conducted in an organization with a complex hierarchy (her complexity chart reveals eleven levels) and a fully articulated review process with mandatory participation at many levels. However, despite the articulated structure, the General Policy Manual, the document that is "the written 'glue' of the organization" (1989, 186), and the Project Manual, a second guidance document for the agency, fail to provide "specific guidance about internal Report Review processes" (194). Hence, relying exclusively on organizational structure and designations like hierarchical position may not provide the kinds of information writers and reviewers need as they try to understand the characteristics of reviewers and the characteristics of the comments that constitute their review processes.

**Thesis overview**

The overall goal of this thesis is to address the following question: What, if any, is the relationship between the characteristics of reviewers and the comments those reviewers
In order to address this question I studied a technology transfer team using two tools I developed.

The rest of this thesis situates this study, reports on the development of the tools, and reports and analyzes the data I gathered. In the next chapter, I present a detailed characterization of the workplace where I conducted my study, a situation where document review played a central role. This discussion of the workplace is critical because the characteristics of the individuals who participated in my study are less meaningful when they are removed from their organizational context. Then, in the third chapter, I outline the methods used to study this situation and present the two tools I developed to build reviewer profiles and characterize reviewer comments. In chapter 4, I present the two types of data I gathered, data about reviewers, and data about comments. In chapter 5, using the three broad research areas—research into the nature of expertise, writing process research, and research into collaboration—I analyze the data using the reviewer profile and the comment categorization tools. Also in chapter 5, I suggest possible applications for the tools and suggest directions for future research.
CHAPTER 2. CHARACTERIZATION OF THE ORGANIZATION

A systematic approach to characterization is appropriate not only to give information about an individual or organization but also to make transparent some of the decisions that support the choices behind that information. In chapter 1, I introduced the idea of a systematic approach to characterizing people and organizations; in this chapter, I first discuss the current prevailing approach to organizational characterization. Then, using the five factors I have isolated and use in the reviewer profile tool (discussed in some detail in subsequent chapters), I characterize the organization where my study is situated.

Like characterizations of participants in research studies, organizations are usually characterized according to a discernable pattern that constitutes disciplinary expectations for form and content. Researchers weave a narrative with threads such as the size of the organization, the kind of product or process that defines the organization, the way leadership is manifested, the kinds of writing done, and the relative importance of that writing. As with characterizations of individuals, the narrative description of an organization moves from the broad strokes of general categories to the more specific details that ultimately contribute to readers’ ability to mentally reconstruct the organization. These narratives are generally useful to readers because they outline important characteristics even though they apparently lack (or at least do not articulate) a systematic approach to organizing the information.

In addition to the characterizations of individuals noted in chapter 1, each of the studies referred to characterizes the organizations where the research was situated. For example, Broadhead and Freed include these phrases and sentences as they describe the Firm.

an international management-consulting company whose clients include business and industrial concerns, colleges and universities, hospitals . . . government agencies . . . the company works in manufacturing, logistics, strategy . . . the professional staff has a wide variety of academic
backgrounds. . . . approximately ten percent have doctorates. . . . job titles [include] associate, manager, principal, and partner. . . . average salary . . . [the Firm] has completed more than five thousand assignments, most of which required a written proposal. . . . Thus, proposal writing is an extremely important activity . . . much of the organization's business depends upon the quality of the proposals it writes (1986, 46-47)

In much the same manner, Gerich characterizes Lawrence Livermore National Laboratory (LLNL), the organization where her study was situated.

a major R&D organization operated by the University of California for the U.S. Department of Energy. More than 10,000 employees. . . . pursue solutions to large-scale scientific problems. . . . Although revision of journal articles is not standardized . . . LLNL has institutionalized a collaborative, step-by-step process involving scientific authors, colleagues, supervisors, and technical editors. . . . A mission unites the team. . . . The printed results will disseminate the work of the individual author and the organization and extend the boundaries of science. (1994, 63)

Even though both of these examples show how writers organize information about an organization, they display some differences. For instance, with regard to identifying the organization, Broadhead and Freed mask the identity of the organization while Gerich names the organization. Also, Gerich characterizes LLNL’s employees by saying how many people do what, while Broadhead and Freed characterize the Firm’s employees by describing educational and academic backgrounds. The differences in approach to characterizing an organization may be related to genre, organizational exigence, or focus of the study. For example, Broadhead and Freed’s characterization is in a 20-page book chapter titled “The Writing Environment” that provides in-depth details about the organization (particularly proposals, the writing process, and writing problems). On the other hand, Gerich’s characterization is a two-paragraph overview of the organization in a 12-page article in Technical Communication.

As with individuals, pseudonyms are conventionally assigned to mask the identity of organizations. Perhaps because LLNL is a government agency and because the Firm is a private concern, each organizational identity is presented and protected differently. Interestingly, in LLNL, the named organization, the participating individuals are referred
to by job title (a mark of organizational position), such as Author A and Editor B, while the Firm’s study participants are referred to by pseudonym after their organizational position had been meticulously defined in a narrative.

Researchers use different strategies to establish the focus of their studies and to describe the organization. For example, Broadhead and Freed say “much of the organization’s business depends upon the quality of proposals it [emphasis added] writes” (46), an assertion that gives the organization authority and responsibility for the writing and revising processes completed by two individuals within the organization. These individuals, Baker and Franklin, are protected by individual pseudonyms and again by the organizational designator, the Firm. On the other hand, Gerich shields the individuals by referring to them simply by job title, which is a way of emphasizing the organizational relationships rather than the individual personifying the organization.

Both Broadhead and Freed and Gerich’s characterizations fall well within disciplinary expectations for both content and format. Each characterization situates the subsequent research results and each provides sufficient information to establish the writers’ ethos. These characterizations generally include the following factors:

- the position of the organization within its industry or discipline
- the writing expertise of the people within the organization
- the range of subject matter expertise of the people in the organization
- designations of responsibility for producing written texts
- discussions of responsibility for consequences of written texts

I use these five factors as a systematic approach to characterizing the organization where my work is situated; similarly, I use parallel factors in the reviewer profile tool discussed in the next chapter.

The position of the organization

Generally the position of the organization has to do with its rank or status within an industry or discipline. Like many characteristics, rank and status are relative and subjective. However, some of these relative, subjective characteristics provide details that
contribute to a systematic characterization. Among the features that contribute to the characterization of an organization's position are association with other institutions, the number of people employed in the organization (as well as the professional affiliation and educational level of those employees), and sources of funding and the budget.

**Association with other institutions**

I gathered my data during the time I was employed as a research assistant by Ames Laboratory (Ames Lab). Ames Lab is the smallest (measured by both number of employees and budget) of 10 national research laboratories funded by the Department of Energy (DOE). Ames Laboratory, which was started in 1947 "with the successful development of the most efficient process to produce uranium for the Manhattan Project" (Karsjen 1995, 1), now supports basic research programs (in areas like metallurgy and ceramics, high-energy physics, and materials chemistry) as well as applied research efforts like environmental technology development.

One of the main DOE mandates is the rapid transfer of technologies (from basic research labs to the marketplace) that can expedite environmental restoration of contaminated soil and groundwater that resulted from the research and development efforts initiated and carried out by the national labs since their inception. Ames Lab research laboratories and research applications programs work on these environmental challenges and draw on the resources of Iowa State University (ISU), the contractor that operates the lab¹.

ISU faculty members conduct research under grants administered by Ames Lab, and ISU graduate students are commonly assigned research positions within the Lab. In addition to its affiliation with Ames Lab, ISU independently operates technology transfer programs. ISU's technology transfer efforts are coordinated and administered through the Institute for Physical Research and Technology, which houses programs like the Iowa

¹ Iowa State University and Ames Laboratory have a government owned-contractor operated —GOCO—relationship.
Center for Emerging Manufacturing Technology and the Center for Advanced Technology Development (CATD).

The Technology Integration Program (TIP), the specific Ames Lab program where my study was done, sponsored and funded the Integrated Design for Marketing and Manufacturing (IDMM) team as part of the technology transfer of a sophisticated environmental screening technology\(^2\). TIP is affiliated with CATD and several ISU departments as well as several of the research groups at Ames Lab. These affiliations were formalized throughout the inception and duration of the IDMM team.

Most of the programs of Ames Lab are housed in a complex of buildings on the ISU campus but some are housed off-campus. For example, TIP is housed in an office building and a shop building near downtown Ames, and the CATD facility is located in an off-campus research park. Sometimes ISU and Ames Lab personnel maintain work areas in more than one place. For example, two ISU faculty members (one from electrical and computer engineering and the other from civil and construction engineering) with part of their research appointment with TIP had office space available at the TIP office but also maintained offices in their departments as their primary work areas.

\(^2\) The Mobile Demonstration Laboratory for Environmental Screening Technologies (MDLEST) is a 44-foot long trailer that can be moved to a hazardous waste site in order to perform near real-time *in situ* analysis of suspected heavy metals and radionuclides. The process employed in the MDLEST is laser ablation-inductively coupled plasma-atomic emission spectrometry (LA-ICP-AES).

The LA-ICP-AES design in the MDLEST has two distinctive features: (1) The near real-time *in situ* capability means that the lab performs the analysis onsite virtually as the sample is obtained. (2) The samples are obtained by laser ablation (which generates a sample that is wholly consumed in the analysis process) as opposed to samples that are obtained by traditional scoop-and-jar techniques (which generate excess sample material that must be assumed to be contaminated). Although these two distinctive features of the MDLEST address real DOE site characterization needs, the prototype was not ready for commercialization. The IDMM team was charged with performing an engineering design study and a marketability study in order to improve the design of the prototype and to determine whether a market for the technology existed that would warrant further development.

Throughout this thesis, I refer to the MDLEST as the core technology.
People employed in the organization

During the fiscal year (FY-1993) when the data for this study was obtained, Ames Lab employed 490 full-time equivalent workers and approximately 240 part-time equivalent workers; during this same period, Iowa State University employed 5,746 people (in faculty, professional and scientific and classified positions; an additional 6,834 people filled part-time positions) with an enrollment of 25,113 students. During the summer of 1993, TIP employed 10 full-time and 18 part-time employees. The IDMM team members are among the part-time workers at TIP; Ron Paulson\(^3\), the team leader had an 83% research appointment with TIP during the summer term and a 25% research appointment during the rest of the academic year. One other member of the IDMM advisory board had a similar arrangement.

As might be expected at a large land-grant university and a national research laboratory, workers have a broad range of education and experience, from entry-level support positions that require only minimal education and training to high-level academic, technical, scientific, and professional positions that require advanced education and many years of specialized experience. As in any large organization, high-level managers and administrators frequently bring advanced degrees and extensive experience in technical fields to complement their management and administrative capabilities.

Among the professional staff at TIP, educational backgrounds range from an assistant scientist with recent bachelor’s degree in mechanical engineering from MIT to a career scientist with a masters degree in physics, from a career scientist with a PhD in solid state physics to an administrator with a master of business administration degree obtained after an undergraduate degree in mathematics. The educational profiles of all of the study participants, who are affiliated with the IDMM team that was sponsored by TIP, are given in chapter 4 as part of the individual reviewer profiles.

\(^3\) While the names of the organization and the project haven’t been changed, the names of all of the individuals in this study have been replace by pseudonyms that reflect each individual’s gender.
Job titles run the gamut from research assistant to senior scientist, from principal investigator (PI) to director. The numerous job titles and levels in the hierarchy of the organization reflect the combinations of educational background and experience of the individuals who make up the organization.

**Funding and budget**

Because Ames Lab is a DOE-sponsored research laboratory, funding for programs like TIP is attained through DOE budgeting and project support processes. This section discusses the budget processes in terms of actual budget figures as well as in terms of the role of writing in the funding and budgeting process.

The FY-1993 DOE budget for Ames Lab was $29.9 million. In FY-1992 the budget for TIP was $1.2 million; the prototype of the core technology was developed under this budget. During FY-1993, the TIP budget was $426,000; IDMM expenses totaled approximately $70,000, a 16.4% commitment of the TIP budget. Support to the team members in the form of research assistantships and hourly wages comprises the bulk of this budget amount.

The IDMM team was intentionally and explicitly a temporary team; funding was made available only for the summer of 1993 for all of the students; research assistantship funding for some of the graduate students was extended through the 1993–94 academic year. This closed-ended funding is typical of Ames Lab and TIP. A common way to talk about closed-ended funding at TIP is the phrase *soft money*, which means that funding is not permanent or ensured but rather must be constantly renewed. Continued funding through the renewal process, however, is never assured. This lack of certainty about funding raises the stakes for the staff because of the constant pressure to document progress toward goals of the project as originally conceived and funded in order to justify future funding.

These funding pressures make a difference in the both individual and the organizational approaches to writing. Within the organization, individuals write proposals,
technical task plans and technical task plan updates, monthly reports, and presentations to
the review boards that decide on continued financial support. All of these documents
played some role in the funding of projects at TIP. Consequently, the writers at TIP were,
for the most part, invested in their writing tasks.

One of the goals of the IDMM team was to produce a report about the results of the
team’s study of the engineering design and the market potential for the core technology
(IDMM, 1994). TIP had already invested $921,000 in producing and demonstrating the
prototype, but continued funding was tenuous. The IDMM report could have influenced
upper-level DOE managers to continue funding for the core technology project.

On the other hand, the technology transfer organizations, like CATD and IPRT,
that supported the IDMM team (and had a stake in TIP’s further development of the core
technology) were not specifically funded by TIP or DOE nor did they receive additional
funding because of the IDMM team. Neither did cooperating departments like English and
business receive funding support beyond the research assistantships for the students on
appointment at TIP.

**Patents and records of invention.** While the communication model of technology
transfer privileges written documents, measuring outcomes of the technology transfer
process simply by assessing these documents is difficult. One way of measuring these
outcomes is through patents and records of invention, two of the formal ways scientists and
engineers declare that a particular theoretical construct has undergone sufficient laboratory
research and has reached a development stage where a specific application is discernable.
Generally definable processes and/or tangible artifacts are associated with the theoretical
constructs articulated in patent applications and records of invention (ROI), but both are
written artifacts.

During FY-1993, Ames Laboratory scientists filed 13 patent applications, were
granted 10 patents, and disclosed 29 records of invention. The technology transfer effort
that TIP and the IDMM team focused on generated discussions with patent attorneys. As
the result of these discussions, no patent applications or ROIs were filed although Paulson indicated, “several ROIs were considered” (1995). While TIP had a stake in the progress of the transfer of the environmental screening technology, Tim Nelson, the TIP director, as well as other TIP staff indicated that the IDMM team’s investigation was not likely to produce new ROI or patentable developments, but rather was intended to further develop the patentable components of the process with an eventual eye toward the marketplace. The final written report of the IDMM team was intended to speed this move toward the marketplace as well as contribute toward future funding for the project and the organization.

**Writing expertise within the organization**

Writing plays a critical role at Ames Lab and TIP for two reasons. First, continued funding is contingent on a variety of documents, including technical task plans, monthly reports, fact sheets, and documents that describe and promote projects, articles published in academic and scientific journals, and oral presentations. Second, in addition to patents and ROIs, good writing is the one of the factors in successful technology transfer. In studies of successful technology transfers, researchers report different models of technology transfer.

Some models of technology transfer are more artifact-based (e.g., Leonard-Barton 1990) while others focus on an approach to technology transfer that privileges writing. Frederick Williams and David V. Gibson write that technology transfer is “the application of knowledge . . . it is information that is put to use. . . . [Technology transfer is] the iterative movement of this applied knowledge via one or more communication channels” (1990, 13). Ellen McDaniel, Robert Young, and Johan Vesterager (1992) and David V. Gibson and Raymond W. Smilor (1993) also discuss the centrality of communication and writing in technology transfer.

Even with writing featured prominently as a central and critical activity, writing at Ames Lab and at TIP is practiced in different ways by individuals who fall somewhere on
the continuum of expertise. Some professionals invest enormous amounts of time and energy in writing and achieve a high level of expertise. These writers exemplify what Scardamalia and Bereiter would describe as "an expert reader and writer within some domain [which means] reading and writing to maximize the productive interaction between these activities and others going on at the growing edge of expertise" (1991, 175). At the other end of the continuum, some writers attain a satisfactory level of proficiency and, over the span of their careers, churn out cloned reports and proposals in the same formats using the same language year after year. These writers exhibit what Scardamalia and Bereiter call tools skills, and their writing expertise does not necessarily increase in proportion with or even in relationship to their subject matter or domain expertise.

Both of these levels of writing expertise can be found on the continuum of writing expertise within Ames Lab and TIP where writing plays a crucial role in the success of individuals and the organization. In part because Ames Lab is a government agency, reporting information and completing forms are ubiquitous (and writers with tools-skills proficiency can be quite adept at filling them out appropriately). Because Ames Lab scientists are affiliated with the Iowa State University and the larger scientific community, publishing results in academic and scientific journals is essential for not only projects but also career survival and advancement. The bottom line is that no amount of good science or engineering can produce these documents—they must be written. And, because of this essential role of writing, writing expertise, while variable, is valued and rewarded, particularly when good writing perpetuates funding.

Like educational levels within a large organization such as DOE, writing expertise varies considerably, and, as you might expect, the writing demands place on individuals differ among individuals in different positions in the organizational hierarchy. For example, principal investigators (PIs)—generally experienced professionals with advanced education and administrative responsibilities for a project—are not only required to plan and conduct field or laboratory investigations but are also responsible for documenting every step of a project through the vast reporting and accounting systems of DOE and the
university. In order to meet these reporting and accounting requirements, PIs spend considerable time writing on the job. In contrast, lower-level employees spend proportionately less time writing although everyone is required to file monthly activity reports and maintain research notebooks and is ultimately accountable for individually written artifacts.

**Subject matter expertise**

Like writing expertise, subject matter expertise is related to amount of time spent working within the subject matter domain, particularly when the time spent is increasingly filled with new challenges in the domain and increasingly difficult problems to solve. Unlike writing expertise, perceptions of subject matter expertise are related not only to hands-on experience with the subject but also to the depth and breadth of education or research efforts into the subject. As people become more specialized, their focus tends to narrow and their knowledge about specific, specialized components increases while their knowledge about global, generalized components of the project may not increase at the same rate or with the same intensity. For example, the chemist who initially researched the core process of the TIP/IDMM technology has a high degree of subject matter expertise about that process. This chemist, however, does not have as much expertise about the mechanical aspects of the application of the technology as does the mechanical engineer who designed, developed specifications for, and supervised the construction of the field-deployable artifact that is based on the chemist’s research. Both the chemist and the mechanical engineer are subject matter experts, but neither has equivalent subject matter expertise.

In other words, subject matter expertise is domain-specific and varies from individual to individual. Ames Lab as well as TIP are both organized into teams that are often multidisciplinary in order to capitalize on this breadth of subject matter expertise. This intentional effort to build in breadth of subject matter expertise is one of the strengths of the TIP approach to technology transfer. TIP’s use of this team structure in conjunction
with the communication model of technology transfer ensures that subject matter experts contribute their specialized knowledge as part of a multi-disciplinary effort that is facilitated by written communication. The IDMM team—a multidisciplinary team of students from six engineering domains plus business and English that was charged with conducting a sophisticated design and marketing investigation and producing a written account of those investigations—embodied this conjunction of technology transfer as a process that privileges written documents.

**Responsibility for texts**

One of the ways we can characterize an organization is by examining who is responsible for producing what kinds of texts. As discussed earlier, the technology transfer efforts of Ames Lab and TIP depend to a large extent on written work, which includes routine reports, field demonstration reports, and articles in academic and professional journals. PIs and administrators routinely write reports and updates and complete various forms. In some cases, these individually prepared documents are compilations and summaries of documents written by subordinates. For example, the TIP director files a monthly activity report that is based on the monthly activity reports filed by the PIs for each TIP project. Each PI, in turn, has prepared his project report based in the individual monthly activity reports filed by all the people associated with the project.

In contrast, field demonstration reports are written collaboratively. Generally a PI holds most of the responsibility for approving technical content and drafting report, while individual project members may contribute sections of the text and provide review comments. Multiple authorship of these reports is common, and while contributions of team members are acknowledged, degree of responsibility for the text is reflected by authorial credit.

In some cases, particularly in conjunction with a technical development or successful field demonstration, subject matter experts publish articles in academic or scientific journals. Typically, the subject matter experts carry most of the responsibility
(and get most of the credit) for these texts; both courtesy and substantive reviews and joint authorship are negotiated on a case-by-case basis.

Joint authorship was built into the structure of the IDMM team, which was responsible for producing a final report that was based on market analysis and engineering design investigation. Rather than discussing the details of the team’s division of writing responsibilities here, I discuss various individual’s responsibilities for the text in the individual reviewer profiles in chapter 4. The joint authorship was imposed by Paulson, the team leader and Nelson, the TIP director. Paulson and Nelson also assembled the panels of advisers and reviewers who would review and would eventually be readers of the IDMM report.

The IDMM team had access to Ames Lab’s central technical information office that employs technical writers, editors, and artists. In addition to pre-production and production facilities, this office maintains the official Ames Lab style guide that outlines requirements (like archival numbers that must be assigned to each published work at the lab and policies for disclosing proprietary information) as well as matters of organizational style and consistency. About the same time as the IDMM team’s work, the central technical information office scaled back their involvement in the review process of documents produced by Ames Lab personnel. Instead of requiring a certain level of review, the review process shifted to a more informal, writer- and supervisor-controlled process, a shift that is consistent with Nadziejka’s findings about workplace review (1995) that I discussed in chapter 1.

Review at Ames Lab and at TIP ranges from formal, required review to informal, voluntary review. Sometimes coauthors review one another’s work as part of their mutual commitment to producing the text. Sometimes supervisors or PIs review texts as part of their job and provide suggestions for revision as part of a management function, similar to the management by document cycling model discussed by Paradis, Dobrin and Miller (1985). As in the Exxon study, Ames Lab professional writers and editors occasionally review documents based on their understanding of writing and editing principles, but
typically colleagues who have a “good eye” are asked to read a draft and give feedback, even though they might have no commitment to or stake in the text.

**Responsibility for consequences of text**

Organizational responsibility for consequences of text has to do with who benefits from the eventual success of the text or who suffers if the text is somehow insufficient. In some cases, funding for the organization (which may take the form of an accepted proposal that generates income or continued support of a project by a funding agency) may be contingent on the text, as is the case at Ames Lab and at TIP. In some cases, the consequences may be less tangible and take the form of public notice—mention in the media or attention from industry analysts. Each of these consequences must be accounted for in sorting out the various stakeholders in any given text.

Ames Lab and TIP are primary stakeholders in the success of the numerous documents produced as part of the day-to-day functioning of the organization. In turn, continued support for DOE rests on the productivity of the labs and their programs. Because of the emphasis on the communication model of technology transfer, writing and text are important in the life of the organizations.

In the following chapter, I detail the individual responsibility for consequences of the text as part of the discussion of the methodology. I gathered data to profile reviewers and their comments within the setting just described, a workplace in which writing is a critical aspect of the technology transfer process.
CHAPTER 3. METHODS

In order to answer my research question—what, if any, is the relationship between characteristics of reviewers and the comments those reviewers make?—I have analyzed comments six reviewers made during a review of the preliminary draft of the IDMM report. This study of reviewer comments is situated in the organizational context of the IDMM team and TIP, as described in the previous chapter. Although all 32 reviewers completed the task, I analyzed the comments of only six representative reviewers. I used the reviewer profile scale to create reviewer profiles in order to characterize the reviewers and a 12-cell matrix to characterize their comments.

In subsequent sections of this chapter, I discuss the evolution of the reviewer profile scale and the comment categorization matrix. Then I outline the task and describe the study participants. Next I present the reviewer profile scale and the comment categorization matrix. In the final section of this chapter, I describe the data I collected using these two tools.

The evolution of the research tools

As I formulated and began to investigate my research question, I realized the complexity of the data. Both kinds of data—data about reviewers and data about comments—had been studied by other researchers (e.g., Kleimann 1991; Cross 1990; Kleimann 1989; Broadhead and Freed 1986), but the methods those researchers reported seemed either overly complex or inappropriate for my situation. Therefore, I developed two tools, a reviewer profile scale and a comment categorization matrix, especially for this study. These tools were based on preliminary examinations of the raw data and were subsequently pilot tested, refined, tested again, and then used to analyze the data. First I repeatedly examined and then grouped the comments in the data set by similar features (such as questions, lines or marks, or different aspects of the text such as content or mechanics) in order to establish the categories in the matrix. Then I consulted other
accounts of studies, such as those I discussed in chapter 1 by researchers including Susan Kleimann, Carol Gerich, and Thomas Duffy, that looked at errors and review comments and confirmed that my criteria for categorizing the comments were consistent with other taxonomies.

As I prepared the data set for analysis by placing the comments in the categories of the matrix, I noticed patterns of comments made by certain reviewers, which led me to examine characteristics of the reviewers. As I sought to identify common characteristics of reviewers, I realized that I needed a systematic way of organizing the characteristics of reviewers in order to be able to compare the reviewers with the comments they made and also with other reviewers.

In order to find a systematic, consistent way to characterize reviewers, I considered relying only on measures that could be substantiated in some independent fashion like age, number of years on a certain job, years of school completed, or job title. These measures were tempting, but preliminary efforts use one or another of them proved frustrating. For instance, according to Kevin Taylor's education and workplace experience, a nearly completed master's program and nine years of experience in environmental consulting, he had considerable subject matter expertise that he augmented through reading and studying about the technical aspects of the project. However, of the six study participants, Jim Perkins was an undisputed subject matter expert, particularly with regard to the mechanical aspects of the project. Perkins was the engineer who had the most hands-on design experience with the technology (he drafted and supervised the assembly of the prototype) even though he had only recently completed a four-year undergraduate degree and was in the first two years of his first job. Despite Perkins' lack of a graduate degree and his near entry-level status, he was held in high esteem because of his role as the mechanical engineer on the prototype development project.

I accumulated details such as these about the individuals in order to get a general sense of each individual. The resultant rich mix of composite portrait, while interesting, still lacked a framework that would facilitate the sort of analysis I hoped to perform.
Finding a framework that generally accounted for many of the details about the individuals remained a difficulty.

This difficulty was compounded when I examined the comments made by the participants. For example, both Taylor and Perkins commented on nearly every page of the preliminary draft, which indicates that each reviewer read the entire document. However, Taylor and Perkins commented about different issues and commented in different ways. Taylor made 201 of the data set's 520 comments (38.6%) and concentrated on local level mechanical issues and local level content issues. On the other hand, Perkins made only 52 total comments, two fewer than Taylor's total (54) for mechanical corrections alone.

To further complicate analysis of the comments by considering reviewer characteristics, both Perkins (who was an entry-level engineer) and another reviewer, Derek Gebhardt (who was a high-level administrator) made special efforts to have either a face-to-face (Perkins) or telephone (Gebhardt) conversation with me to ensure that I, as the technical writer on the team, completely understood their concerns and could accurately convey them to the rest of the team. Through these conversations both Gebhardt and Perkins made their particular representation of the review task quite clear: Gebhardt evidenced concern for rhetorical issues, like audience, genre, and organization, while Perkins expressed concerns with the technical accuracy of the content. Perkins placed signals and queries throughout the text that served as guides for our conversation while Gebhardt wrote a three-page memo that he used as an outline for the telephone conversation.

In these two instances, both Perkins and Gebhardt literally took their comments off of the pages of their copies of the preliminary draft by insisting on conversation that focused on their particular concerns. How could I account for this departure from the text? Did the fact that two reviewers chose to accompany written comments with conversations represent a pattern that other reviewers follow? One way to try to answer these questions would have been to deny that a pattern might exist, to presume that the
reviewer responses were idiosyncratic and isolated. Another way would have been to try to pair specific kinds of comments with specific characteristics of reviewers. For example, did older reviewers make more comments about rhetorical issues than did younger reviewers? Did physicists make more squiggly lines and Xs in the margins than did chemists? Each of these ways of looking for patterns in the relationships between the two kinds of data, while the information they might yield might prove interesting, seemed like blind alleys between tall buildings with all the windows open and occupants leaning out and shouting things like, "What about who wins more funding? . . . Did you think about who is really the best writer of the bunch? . . . Best writer? Oh, yeah? Says who?"

One of the ways I avoided this cacophony was to limit the amount of data I considered. I had worked hard to ensure that the data set was representative, that the data set was at once large enough to yield sufficient information to analyze and small enough to be manageable. Once I was satisfied with the boundaries of the data set, I used the comment coding matrix that had emerged from the patterns I observed in the data. Then I addressed the issues of characteristics of the individuals by creating a five-factor reviewer profile scale.

One of the problems I encountered in analyzing the two kinds of data using the matrix and the reviewer profile scale was the razor-sharp line between speculation and representation. I could speculate about the relationships between the reviewers and the comments they made, but I found it difficult to represent those relationships. I needed a picture. I needed a way to distill and illustrate the data.

Specifically I wanted to see how Perkins and Gebhardt—their profiles as reviewers and the frequency and distribution of their comments—looked alike and how they looked different. And I wanted to know how I could represent these similarities and differences. I decided to develop two illustrations, one for each tool. The first, a series of five intersecting five-point scale axes on a radar chart, represents the reviewer profile. The second illustration is a bar chart that shows the frequency and distribution of each reviewer's comments in the cells of the comment categorization matrix. Both kinds of
illustrations are discussed in more detail later in this chapter and accompany the analyses in chapter 5.

The task

This is an observational study of comments that are intended to guide revision of the preliminary draft of the report produced by the IDMM team. As part of their commitment to the team, everyone affiliated with the IDMM team—the 19 external reviewers and all 13 of the IDMM team members—reviewed and commented on a preliminary draft of the final report. The draft that was reviewed (referred to in this document as the preliminary report) was produced by the team between July and October, 1993.

In my capacity as the technical writer on the IDMM team, I sent a memo to each of the external reviewers on October 18, 1993, that detailed the team’s plans to circulate the preliminary draft for review, including an outline of the time frame for the review and a brief explanation of the review procedure we planned (see appendix B, Memo and coversheet). In the meantime, the team members were generating text for the report.

I gathered all of the drafts of sections and chapters that had been written by the team members and put them together as a working draft of the report. I reviewed this working draft for consistency and mechanical correctness and arranged the text according to the organization for the report that the team had agreed on earlier. Then Ron Paulson, the team leader, and I each read through the document looking for content, mechanical, and rhetorical problems. We both recognized shortcomings in the preliminary draft and anticipated the opportunity to receive feedback from the reviewers to guide subsequent revision. I incorporated our comments into the final version of the preliminary draft that we would distribute to the reviewers.

I formatted the preliminary draft with a two-inch right margin to allow space for the reviewers to write comments. Also, I prepared a questionnaire that served as a data gathering instrument for my research and provided a structured way for each reviewer to
address specific concerns of the team (see appendix A). Paulson and I used red Post-It Note™ flags to guide reviewer attention to specific sections of the preliminary draft where we thought the individual reviewer had particular subject matter expertise; most, though not all, of the external reviewers received at least one flag on their copy of the draft.

The preliminary report consisted of a cover sheet, 36 pages of text and supplemental graphics produced by IDMM teams members, and 23 pages of appendices. Because the report was 60 pages long, Paulson and I decided to only prepare nineteen copies of the preliminary report for initial distribution to the external reviewers; we planned to circulate these same 19 copies to the IDMM team for review.

The external reviewers were members of one of three groups.

- **ISU advisers**—four Iowa State University professors, one each from business administration and construction engineering and two from the department of English. None of these advisers was paid by TIP or Ames Lab for the review of the IDMM report.

- **independent project group**—three mid- to high-level administrators, one in state government, one in a related technology transfer organization, and the director of a separate TIP project. Although the government regulator and the technology transfer administrator may have viewed the IDMM report review as a responsibility associated with his position, neither was paid by TIP or Ames Lab for the review of the IDMM report. The third member of this review category was paid by Ames Lab through TIP and the review was considered part of his day-to-day responsibility.

- **project reviewers and resource group**—eleven reviewers from various hierarchical levels in three organizations: two faculty with administrative responsibilities, one a dean in the Iowa State University College of Engineering and the other a professor in materials science /engineering, neither of whom were paid for the review of the IDMM report. The three Ames Laboratory scientists who did the original basic research on the core technology reviewed the draft; these reviewers are paid by Ames Lab and probably considered the review of the IDMM report as an extension of their day-to-day responsibilities. Six TIP staff members including the TIP director, the principal investigator of the core technology project, and four staff scientists, all of whom were paid by Ames Lab through TIP, probably considered the reviewing IDMM report to be part of their job.
When the 19 drafts were returned, the IDMM team members “read behind” the external reviewers. The IDMM team members were instructed to read to comment as reviewers and also to read the comments of the first-round reviewers, which could be used to guide subsequent revision. Paulson and I arranged for IDMM team members to “read behind” an external reviewer in their area of expertise. For example, David Allen, the team member who had most thoroughly researched the government regulations, reviewed the draft that had first been reviewed by Jovinder Gupta, the independent reviewer who is a high-level administrator in one of the state governmental agencies that would regulate the kind of technology that the team was developing. Similarly, Jay Sears, the business student, read the comments of the ISU business faculty member. I read all of the reviewer comments and brought pertinent comments to the attention of team members who were working on a particular area of the project.

**Participants**

In this section, I briefly discuss the criteria for selecting the study participants and introduce the study participants using a matrix that shows each participant’s organizational affiliation, organizational position, and professional affiliation. In chapter 4, I present detailed reviewer profiles of the six reviewers using the reviewer profile scale.

The criteria for selecting representative participants were

- at least one reviewer from the independent project reviewer group and at least one reviewer from the project reviewer and resource group
- at least one student from each of the levels (undergraduate through Ph.D.) represented on the team
- differing amounts of workplace experience
- different professional affiliations (i.e., electrical, mechanical, civil, and chemical engineering)

---

4 The Iowa State University Human Subjects Committee approved this research; human subjects documentation is included as appendix B.
• people who volunteered their time for the review as well as people who reviewed as part of their job

Six reviewers served as participants in this study, Dan Sanders, Kevin Taylor, Paul Beardshear, Jim Perkins, Stewart Byers, and Derek Gebhardt. Table 1 gives information about these participants.

Table 1. Study participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Organizational affiliation</th>
<th>Organizational position</th>
<th>Professional affiliation</th>
<th>Relationship to IDMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dan Sanders</td>
<td>Iowa State University</td>
<td>undergraduate student</td>
<td>electrical engineering</td>
<td>IDMM team member</td>
</tr>
<tr>
<td>Paul Beardshear</td>
<td>Iowa State University</td>
<td>PhD student</td>
<td>industrial engineering</td>
<td>IDMM team member</td>
</tr>
<tr>
<td>Kevin Taylor</td>
<td>Iowa State University</td>
<td>master’s student</td>
<td>civil engineering</td>
<td>IDMM team member</td>
</tr>
<tr>
<td>Jim Perkins</td>
<td>Technology Integration Program</td>
<td>staff engineer</td>
<td>mechanical engineering</td>
<td>project resource</td>
</tr>
<tr>
<td>Stewart Byers</td>
<td>Technology Integration Program</td>
<td>staff engineer</td>
<td>chemical engineering</td>
<td>project resource</td>
</tr>
<tr>
<td>Derek Gebhardt</td>
<td>Center for Advanced Technology Development</td>
<td>director</td>
<td>technology transfer administration</td>
<td>project reviewer</td>
</tr>
</tbody>
</table>

Data collection tools

As I discuss earlier in this chapter, I developed two tools for collecting data, a reviewer profile scale and a comment categorization matrix. The reviewer profile scale is designed to characterize individual reviewers while the comment categorization matrix is designed to characterize reviewer comments.
Reviewer profile scale

In late October 1993, when Paulson and I decided which sections of the text to mark for the external reviewers, our decisions were largely intuitive. We primarily considered each external reviewer’s professional and organizational affiliation and prior experience with the subject matter of the report. Paulson and I neither created nor applied any criteria beyond our perceptions of the reviewer’s affiliations and experience in order to direct reviewer attention and solicit comments to guide our subsequent revision.

For example, we guided Jim Perkins to the sections having to do with the overall engineering design, while we guided Stewart Byers to sections having to do with the technical process. Several external reviewers were not guided to specific sections. For example, we didn’t direct Mark Allen (the PI for the core technology project) to any specific section because we thought he had a broad grasp of the entire scope of the report even though his experience with marketing and marketing research is limited.

The external reviewers tended to comment on the sections of the text that had been flagged for them, but some read and commented on the entire report. As I mentioned earlier, some of the external reviewers confined their comments to marginal notations, but some of the reviewers insisted on face-to-face interaction (either with the entire team or with me). One reviewer, Derek Gebhardt, did not return his copy of the preliminary report; rather, after he sent me a three-page memo by fax, he and I had a 45-minute telephone conversation about rhetorical issues like organization, audience, and purpose.

Generally the comments from the external reviewers were interesting (and ultimately proved to be useful guides to subsequent revision), but they raised some provocative questions. Why did some reviewers comment extensively on mechanical issues? Why did some reviewers correct what they perceived to be technical inaccuracies while other reviewers simply indicated that the text was inaccurate? Why did some reviewers write many detailed comments while some reviewers wrote only a few general remarks? What did we expect from a reviewer when we flagged sections of the text based on our perceptions of subject matter expertise? How did we account for writing expertise
as we directed reviewer attention? How did we account for the difference in how much responsibility each reviewer felt for the team’s goal, which was to produce the report? How did we account for the differences in the reviewers’ stake in what happened as a result of the IDMM report?

The fundamental question that underlies each of these (and other) questions is, what, if any, is the relationship between the characteristics of reviewers and the comments they make? In order to begin to answer this broad question, I designed a reviewer profile tool with five factors: organizational position, writing expertise, subject matter expertise, responsibility for the text, and responsibility for consequences of the text. I discuss the tool I designed in order to look at the second part of this question—reviewer comments—later in this chapter and in more detail in chapter 4. As with the categories I defined for the comment categorization matrix, I started with my examinations of the data and confirmed that my taxonomy was within the bounds of conventional descriptions of reviewers found in the literature. These five factors seemed to account for many of the distinctions among the participants.

All of these five factors are interrelated and highly context specific. In order to rank an individual within a specific context, individual judgement is imperative. Subjectivity cannot be avoided even with the definitions and contributing characteristics because of the contextual nature of workplace writing. However, even though no contributing characteristics are universal, static, absolute, or objective, agreement about rankings is possible.

Generally, when researchers determine interrater reliability or percentage of agreement, the determination is made with the goal of maximum agreement. For research purposes, this goal is essential. However, one of my goals in designing this reviewer profile tool is to provide a systematic means for workplace writers to articulate their decisions when selecting reviewers for their work and to perhaps better understand comments they receive from reviewers. To accomplish this goal, I created a set of definitions and contributing characteristics that further explains my rationale for the
factors, helps users of the tool create profiles of reviewers, and minimizes the effects of subjectivity.

The resulting profiles are based in perceptions rather than absolutes and are necessarily task specific. In fact, I demonstrate the possible differences in one person's profiles for two tasks later in this chapter.

**Definitions and characteristics of the reviewer profile scale**

Each factor in the ranking scale has a set of definitions and contributing characteristics that must be considered when using the scale to describe an individual. The contributing characteristics are representative rather than exhaustive in that each characteristic may not apply to every individual. Because this profile scale is context-specific, each individual's rank for each of the five factors must be identified for a particular situation (as opposed to identifying one profile that never changes and always accurately characterizes an individual).

Workplaces are dynamic and in order to account for that when making a reviewer profile, each of the five factors—organizational position, writing expertise, subject matter expertise, responsibility for the text, and responsibility for the consequences of the text—specifically addresses aspects of workplace writing that shift as tasks, problems, and contexts shift.

**Organizational position.** Generally this factor has to do with the rank or status an individual has within an organization or group of people. Sometimes this position is official so that an individual's status can be understood by looking at things like titles and positions on organizational charts. Sometimes, though, relative position may be the result of things like years of experience on the job.

Some of the characteristics that contribute to placement of an individual on the organizational position scale are
• job title or rank
• length of time with the organization or practical experience in the field
• supervisory responsibilities

Writing expertise. Research about expertise shows that practicing an activity (like dancing, chess, or writing) along with increasing the difficulty of problems to be solved or challenges associated with the activity, correlates with expertise—people who practice a lot tend to be more expert (e.g., Simon and Chase 1979; Glaser and Chi 1988). Sometimes people take specialized writing courses to learn more expert-like writing techniques. Regardless of how expertise is developed, expertise is recognized or marked in different ways. For example, social markers of expertise can be associated with training and with recognition by others (which might take the form of publications or commendation).

Some of the characteristics that contribute to placement of an individual on the writing expertise scale are

• amount of time usually spent writing (not necessarily how long a person spends on a writing task but rather how much of a person’s time is spent writing)
• specialized training in disciplinary writing
• publications related to the topic or in the individual’s field
• special recognition for writing

Subject matter expertise. Generally this category has to do with the reviewer’s knowledge about the discipline or the topic of the text—in other words, the reviewer knows about what the text is about. Discipline can mean profession, highly specialized technical or scientific area, or avocation. It is common to ask a subject matter expert to review a text to ensure technical accuracy. People develop subject matter expertise by means such as formal study within the discipline or long term hands-on experience working with the subject. Expertise is maintained by continued practice and increasing the difficulty of problems to be solved or challenges to be met.

Some of the characteristics that contribute to placement of an individual on the subject matter expertise scale are
• knowledge about the topic of the text
• amount of academic experience related to the discipline
• amount of time the reviewer has been associated with the discipline

Responsibility for producing the text. Generally this category has to do who is supposed to get the writing job done. Sometimes coauthors review one another’s work as part of their mutual commitment to producing the text; sometimes editors review texts as part of their job and provide suggestions for revision based on their understanding of writing and editing principles; sometimes more informal, voluntary review arrangements prevail where friends or colleagues read a draft and give feedback even though they have no commitment to the text.

Some of the characteristics that contribute to placement of an individual on the responsibility for the text scale are

• reviewing as a favor (low responsibility) → designated author (high responsibility)
• stakeholder in the process of producing the text (such as editor or peer reviewer)

Responsibility for consequences of the text. Generally this category has to do with who benefits from the eventual success of the text or who suffers if the text is somehow insufficient. Different reviewers have differing degrees of engagement with texts based on their stake in the end results of the text. A manager may have a greater stake in review of a text that will go out over her signature, even though the writing has been delegated to a subordinate. In some cases, funding for an individual or an organization (which may take the form of an accepted proposal that generates income or continued support of a project by a funding agency) may be contingent on the text. In some cases, the consequences may be less tangible and take the form of public notice or private commendation—from a by-line in a company newsletter or a plaque citing exemplary performance to a handwritten “great job” note from a co-worker or supervisor.
Some of the characteristics that contribute to placement of an individual on the responsibility for consequences of the text scale are

- managerial responsibility
- stakeholder in the further development of the technology or topic
- organization's success
- reviewer's personal success

**Using the reviewer profile scale**

This section has two parts. First I discuss the steps for using the reviewer profile scale. Then I present a side-by-side comparison of two profiles drawn of the same reviewer in the contexts of two different reviews.

The first step in constructing a reviewer profile using the five factors is to decide how to rank the individual. The starting place for these decisions is the set of definitions and contributing characteristics outlined in the previous section. In addition, the context or task should be considered. Part of the systematic approach to this part of the task involves recording the characteristics that contribute to the individual's rank on each scale. Once the characteristics have been recorded (either by a more formal narrative such as the ones I present for Paulson and later for the six reviewers or by an informal notation of how the reviewer relates to each factor's contributing characteristics), the next step is to record the ranks for each scale on a radar chart. Microsoft's Excel documentation states that a radar chart

> shows changes or frequencies of data series relative to a center point and to one another. Each category has its own value axis radiating from the center point. Lines connect all the data markers in the same series. The radar chart is widely used in the Far East. (1994, 293)

A radar chart with five axes, each representing one of the five factors described above is shown in figure 1.

Once a person—a writer seeking review or a researcher seeking a participant profile—has decided on a rank for an individual on each factor in the five-point scale, she can plot a representation of the reviewer profile using a blank radar chart like the one in
figure 1 to record the ranks. Once the points on each scale have been identified, she can connect the points as described to yield a representation of that reviewer's profile that illustrates the decisions that are based on the definitions and characteristics described above. That is, when the ranking points on each scale have been marked and connected, she can see a five-sided shape that represents the reviewer’s profile.

![Blank reviewer profile radar chart](image)

Figure 1. Blank reviewer profile radar chart

The following table (Table 2) shows a side-by-side comparison of two profiles of the same reviewer, Ron Paulson, in the contexts of two different reviews, the review of the IDMM preliminary draft and a review of this thesis. This table is organized around the five factors of the reviewer profile scale. Each cell in the table contains Paulson's rank and a narrative that describes the rationale for the rank for Paulson as a reviewer in each context. I include this comparison to emphasize the striking changes in a reviewer’s profile when the context for review changes and to reinforce that reviewer profiles are dynamic.
Table 2. Comparative reviewer profile narratives

<table>
<thead>
<tr>
<th>Factor</th>
<th>IDMM Preliminary Report Review</th>
<th>White Thesis Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Position</td>
<td>rank 4. Paulson’s rank for organization position reflects his status as nominal leader of the IDMM team, his Ames Lab title (associate scientist), his ISU title (assistant professor), and his relative position within the TIP organization.</td>
<td>rank 2. As a reviewer for White’s thesis, Paulson’s organizational position rank is markedly different. On the IDMM team, Paulson was a team leader; in the department of English, he is an outside reviewer. He retains his status as assistant professor.</td>
</tr>
<tr>
<td>Writing Expertise</td>
<td>rank 4. Paulson, an engineering professor, spends a relatively small percentage of time writing on the job and has authored or co-authored 11 classified technical publications, several proposals and brochures, and approximately 15 professional and academic articles.</td>
<td>rank 3. Paulson’s rank on writing expertise shifts slightly due to the shift in discipline. While Paulson is familiar with conventions for theses in engineering, he has no previous experience with theses in English.</td>
</tr>
<tr>
<td>Subject Matter Expertise</td>
<td>rank 5. With regard to the core technology that the team studied, Paulson is unquestionably a subject matter expert. While Paulson is not an expert in the environmental marketplace, he has a good grasp of the economic factors involved in the continued design, production, and marketing of the technology.</td>
<td>rank 2. Paulson is definitely not an expert in the fields of writing or revision. He does, however, have specialized knowledge about the IDMM team, which is a sub-topic of this document. Therefore, he retains a slightly higher subject matter expertise rank than if the research for this study were not in an area where he is an undisputed subject matter expert.</td>
</tr>
<tr>
<td>Text Responsibility</td>
<td>rank 5. Paulson, by virtue of his position as IDMM team leader, was ultimately responsible for the production of the final report. This level of responsibility was attributed to Paulson by all 13 of the IDMM team members and all 7 of the other reviewers in interviews conducted as part of this research.</td>
<td>rank 1. Paulson has almost no stake in my producing a thesis; his review of the document might be viewed as a fulfillment of an administrative responsibility.</td>
</tr>
<tr>
<td>Text Consequences</td>
<td>rank 5. Paulson’s involvement with TIP hinged on the core technology project; should funding for this project be jeopardized, Paulson’s appointment with TIP was also jeopardized. Paulson’s great stake in the success of the team was measured by timely completion of a report that promoted the transfer of the core technology.</td>
<td>rank 1. Paulson has almost no stake in the consequences of White’s thesis. His professional or academic standing is in no way jeopardized by the success or failure of this document.</td>
</tr>
</tbody>
</table>
Figure 2 shows a radar chart that illustrates the comparative reviewer profiles presented in Table 2. Two characteristics illustrated by radar charts—the area contained in the pentagon and the shape of the pentagon—can be distinguished in the comparative profiles shown in figure 2. The profile for the IDMM report review has a relatively large area because Paulson’s ranks for that review were higher (5s and a 4) and therefore further away from the baseline of the chart. Comparatively, for the thesis review, Paulson’s lower ranks yield a much smaller area enclosed by the lines of the pentagon.

Because Paulson’s ranks for the IDMM report review were clustered at the high end of the scale, the pentagon formed by connecting the ranks is reasonably well-balanced and regular. On the other hand, the pentagon formed by connecting the ranks for the thesis review is an irregular pentagon (one whose sides are not the same length).
Both features, area and shape of the reviewer profile pentagon, have possible implications for understanding reviewers and their comments. For example, a large area may reflect more robust levels of expertise and engagement while an irregular shape may indicate an imbalance between expertise and engagement. However, neither area nor shape can be isolated as predominant in predicting the outcome of a review, particularly large area or regular shape as predictors of useful review comments. It is conceivable that a reviewer whose profile is relatively small and skewed (say four 1 ranks and one 5 rank) might provide useful comments in a timely fashion.

Paulson’s comparative reviewer profile shows two very different pentagons—one relatively large and regular and one that is smaller and more skewed—but in both contexts, Paulson gave useful review comments. This example shows the importance of understanding reviewers’ profiles as dynamic and as context-specific.

Pilot test of reviewer profile scale

Once I completed the reviewer profile scale, I conducted a pilot test by having an expert rater who is familiar with Ames Lab, TIP, and the IDMM team rank each of the 32 individuals who were associated with the IDMM project. This rater used a set of instructions that included a description of the tool, definitions of the factors, and list of contributing characteristics for each factor (see appendix C). The pilot tester was able to perform the task and, because he explained his choices, his ranks were valuable in refining the instructions and characterization categories prior to administering the reliability test. The scores for the pilot test are as follows.

- perfect agreement where both raters assign the same rank: 13 of 30 (43.3%)
- near agreement where, for example, one rater assigns a rank of 3 while the other rater assigns a rank of 4: 10 of 30 (33.3%)
- disagreement of two ranks where, for example, one rater assigns a rank of 2 while the other rater assigns a rank of 4: 7 of 30 (23.3%)
- disagreements of three ranks: 0 (0%)
Because the pilot test's expert rater had perfect or near agreement 77.6% of the time, I made only one superficial change to the reviewer profile scale. Specifically, I corrected a grammatical error in the instructions.

Comment matrix

The second analysis tool I developed for this study is a comment categorization matrix. The matrix evolved from my decision to look at reviewer comments. At first looking at comments ought to be reasonably straightforward and based in common sense. After all, we generally recognize comments when we see them (even though we don't always know for sure what the comments might mean). However, after examining the comments in the data set (comments from five reviewers on preliminary review drafts and a memo from the sixth reviewer), I saw the need to define exactly what I mean by comment.

I agree with Susan Kleimann's definition of a comment: "every pen or pencil mark is considered a comment:" (1989, 324). And, in order to define comment as a unit of measure for my analysis, I further defined the constituents and boundaries of comments. By constituent, I mean the various marks, whether words, number, or symbols, that make up a comment. By boundaries, I mean the places where a particular comment or constituent begins and ends. Constituents and whole comments both have boundaries. The purpose of dividing a whole comment into boundaries and constituents is to create chunks that facilitate analysis of the comments and account for the complexity of the comments. I marked boundaries by circling or marking a line around the constituents.

In addition, I define two kinds of comments, discrete and complex. Discrete comments are those that have only one constituent and, therefore, only one boundary. Complex comments are those that have two or more constituents and, because each constituent has its own boundary, a complex comment must have at least three boundaries.

The sample in Figure 3 shows both discrete and complex comments. I circled the boundaries that define the constituents and the comments. In the sample, the circled
comment labeled 49 is a discrete comment because it consists of only one mark. The
circled comment labeled 50 is a boundary of a complex comment, one that contains
constituents; the constituents are labeled 50a, 50b, and 50c.

In her more exhaustive study, Susan Kleimann "placed [comments] in one of the
following categories: question, statement, change, response to another comment, or
miscellaneous mark in the margin" (1989, 324). She extends the work of Lester Faigley
and Stephen Witte (1981) and Glenn Broadhead and Richard Freed (1986) when she
further defines subcategories within her change category as addition, deletion, punctuation,
typographical change, replacement, split, movement, and join (1989, 324). However,
based on my preliminary examination of all of the comments returned by the reviewers, I
defined different categories to account for both the kinds of comments reviewers made as
well as the ways they made those comments.

Specifically, I designed a twelve-cell matrix in order to provide a systematic way of
characterizing reviewer comments. The columns in the matrix characterize the kinds of
comments reviewers make:

- **content**—concerned with technical accuracy
- **mechanical writing**—concerned with issues like grammar, punctuation, or diction
• **rhetorical writing**—concerned with issues like reader reaction, organization, or style

The split between content and writing argued in the enlightenment (c 1700) emerged as I began to form the comment categories. I decided to divide writing concerns into those that might be described as more rule-bound (the mechanical writing issues) and those that might be more aptly described as more hermeneutic (the rhetorical writing issues). While both content and mechanical writing concerns can be considered rhetorical (and, indeed, both do contribute to the overall rhetorical stance of a document), for my purposes a guiding principle is that rhetorical concerns tend to be more global while mechanical and content concerns tend to be more local.

As I explored the implications of splitting writing issues into mechanical and rhetorical concerns using this guiding principle, I recognized that rhetorical concerns tend to be readily identifiable as rhetorical. I also recognized that while individual mechanical concerns might reflect direct concern with local-level issues, the cumulative effect of a number of mechanical concerns would likely contribute to the rhetorical stance of a text. However, regardless of the kind of comments reviewers make—content, mechanical, or rhetorical—the comments are made in some way. The twelve-cell matrix uses four categories for the ways reviewers comment. These four ways of commenting are the rows in the matrix. The row labels and their definitions are

- **query**—poses a question; may or may not be punctuated as a question
- **statement**—asserts something; may or may not be punctuated as a declarative sentence
- **correction**—suggests a change; may or may not be punctuated as a declarative sentence; may be a deletion, a replacement, an insertion, or a combination
- **signal**—a symbol, mark, or other non-word device that focuses attention; points to something in the document

I decided on these categories for the ways reviewers comment because these four ways of commenting accounted for the comments in the data set. Reviewers can use each of the four ways of commenting in any of the three columns (content, mechanical writing,
and rhetorical writing); these twelve combinations represent the cells in the comment categorization matrix.

Comment category definitions

In this section I present the cell labels and definitions for each of the twelve cells. This information is also included in figure 4, an elaborated matrix that contains the cell labels, definitions, and examples of the kinds of comments defined by each cell. The content column includes these cells:

- **content query**—poses a question about the content or meaning of the text; may be a question about why text included at all; may request elaboration or clarification
- **content statement**—asserts something about the accuracy of the content; may state agreement with or praise the text
- **content correction**—a specific suggestion of a replacement or an addition to the text to maintain technical accuracy or clarify the meaning of the text or diagram
- **content signal**—a symbol, mark, or other non-word device that identifies a content issue.

The mechanical writing column includes these cells:

- **mechanical writing query**—poses a question about the way the text is written, with emphasis on a grammatical feature such as sentence structure or punctuation
- **mechanical writing statement**—asserts that a mechanical problem exists
- **mechanical writing correction**—a specific suggestion to improve the grammar or mechanical correctness (like punctuation or word order)
- **mechanical writing signal**—a symbol, mark, or other non-word device that identifies a mechanical issue

The rhetorical writing column includes these cells:

- **rhetorical writing query**—poses a question about a rhetorical concern such as audience or organization (could be paragraph level or more global)
- **rhetorical writing statement**—points out a problem or asserts agreement with the way the text is written
- **rhetorical writing correction**—a specific suggestion to improve the organization or respond to a rhetorical choice (e.g., to emphasize or diminish the importance of certain information or to address readers’ needs)
- **rhetorical writing signal**—a symbol, mark, or other non-word device that identifies a rhetorical issue
Figure 4 is the comment categorization matrix I used in the study. Each of the twelve comment cells has two parts, a shaded part with the name of the comment and a definition of the type of comment described in the cell and an unshaded part with examples of the comment.

The example comments are actual comments that reviewers made on the preliminary draft. The examples in the matrix ought to be viewed as representative rather than prescriptive; the examples represent the comments described in the cell but are not necessarily prototype comments for that type. For example, one reviewer wrote “Why is this placed here?” (an example of a rhetorical writing query). Several other reviewers made a similar comment, including, “Is this the right place for this information” or “does this go here?” Each of these comments is substantively the same yet each is slightly different.

One of the features of the definition for query, statement, and correction is a caution that each may not be punctuated in a conventional manner. For example, one reviewer wrote, “oh? what about accumulating non-constant rate generated particles and feeding them at a constant rate.” While the first part of this comment is clearly punctuated as a question, the second, more substantive part is punctuated as a declarative statement with a terminal period. Even though this comment is written as a statement, the reviewer is clearly challenging the content and asking the writers to consider an alternative technical possibility rather than challenging the content and demanding that a correction be made.

In addition to the caution about punctuation of comments, some of the comment types are exemplified by comments that were made once by only one reviewer. Some comments, such as “Shouldn’t the section on market come before the section on design since it is the market that actually dictates the product design?”, are not likely to be duplicated by other reviewers. Some comment types, however, are exemplified by comments that were made by more than one reviewer and were made many times. Signals are the most obvious sort of comment made by multiple reviewers, as many reviewers use the same general symbol, mark, or other non-word device to point attention to something.
Figure 4. Comment categorization matrix
Using the comment categorization matrix

After I identified the boundaries and constituents of comments—the chunks—I used the preceding definitions to decide where in the matrix each chunk fit (what I refer to in the sections on tests of the matrix as coding). My use of the matrix in this study is naturalistic, retrospective, and qualitative. In other words, the comments that I analyzed were made as part of a workplace review; my analysis imposes order on the comments well after they were written. Rather than focusing attention on the number or distribution of comments, this matrix focuses attention on the kinds of comments and the ways comments are articulated; the distribution and frequency of comments data for this study follow in chapter 4.

However, I think this matrix might also have value as a heuristic device for negotiating comments between writers and reviewers. I agree with Kleimann, who points out “the significance of a single comment was not marked by where it was located in the text, but more often by how the comment was phrased” (1989, 81). This matrix provides a way for writers and reviewers to talk about the most appropriate, helpful kinds of comments for a particular situation. For example, a writer might ask a reviewer to focus on content matters and, if the reviewer perceives an error, to go ahead and insert a correction. Similarly, a writer might ask a reviewer to look particularly attend to the organization of the text and respond with statements about how the order of sections or paragraphs fulfill the writer’s rhetorical purposes.

Pilot tests of the comment categorization matrix

In order to refine the matrix, I conducted two pilot tests of the comment categorization matrix. Both pilot tests used of three pages from report drafts reviewed by the study participants but not included in the data set for the study. These three pages contained comments representative of those found in the data set. After the first pilot test, I realized that I needed to test the matrix on all of the kinds of comments in the data set.
Thus, the second pilot test also contained a page from the memo written by Gebhardt that is also in the data set but that had not been included in the first pilot test.

Two test participants completed the pilot test. These two pilot test participants were selected using the intuitive process I discuss earlier. For example, I chose Mark Allen as a pilot test subject because he is an undisputed subject matter expert with regard to the core technology in the test text; Allen is also knowledgeable about the organization. On the other hand, I chose the other pilot test subject, Tia Kelly, because she had indicated that she is familiar with technical and scientific writing (Kelly is a PhD student in an unrelated technical field); she knows nothing about the organization or the core technology beyond the brief introductory information I included as I oriented her to the test.

The pilot test included two tasks: chunking and coding. Each participant chunked the comments in the test text according to the definitions presented earlier in this chapter for boundaries, constituents, and discrete and complex chunks. On the chunking task, Kelly scored 95% agreement while Allen scored 71% agreement. The coding task asked each participant to code comments that I had previously chunked and numbered.

I scored the coding task of the pilot tests by counting agreements, or hits. For each chunk, the rater could score one of three possible hits:

- a total hit (complete agreement about the cell placement for each chunk)
- a hit for coding the chunk in the correct column—content, mechanical, or rhetorical—but disagreeing with me about the row placement
- a hit for coding the chunk in the correct row—query, statement, correction, and signal—but disagreeing with me about the column placement

Kelly scored 62% agreement (44/71) in the total hit category. Her percentage of agreement for coding comments in the correct column was 73% (52/71), and her percentage of agreement for coding comments in the correct row was 85% (60/71), yielding an overall agreement percentage of 79% (112/142).

Allen scored 36% agreement (31/86) in the total hit category. Allen’s percentage of agreement for coding comments in the correct column was 59% (51/86), and his percentage of agreement for coding comments in the correct row was 63% (54/86) yielding
an overall agreement percentage of 61% (105/172). Allen, an acknowledged subject matter expert, tended to code rhetorical comments as content or mechanical comments. Despite training, Allen lacked confidence in identifying rhetorical comments and was unable to consistently distinguish between mechanical and content comments. He also had difficulty distinguishing between statements and corrections, particularly in the content column.

Because of the different results of these pilot testers, I modified the matrix by adding labels for the constituents, changing the wording in one definition, and clarifying some of the instructions (see appendix C).

**Descriptions of the data collected**

The data collected for this study fall into two general categories, reviewer profile data and data about the comments. The data for the reviewer profiles were obtained through a variety of methods. During the time that I worked at TIP, I archived all drafts of work toward the final report (both paper copies and backups of computer files). I kept notebooks that contained notes I took during meetings and after interactions with participants; I also archived all correspondence and e-mail in the notebook. I conducted questionnaire-based interviews with all of the IDMM team members and most of the other individuals associated with the project. I took notes at meetings and made notes about what I observed of the day-to-day interactions of the team and other members of the organizations. At the end of the project, I arranged for a complete backup tape archive of all computer files, including team member’s folders.

**Reviewer profile data**

After the pilot test of the reviewer profile scale, I ranked each of the 32 IDMM report reviewers. I used the same instructions as I gave to the pilot and reliability test participants. At the time I ranked the reviewers, I had not yet used the radar chart. Instead, I examined the data in tabular form and extracted the ranks for the six study
participants to use as the data for analysis. Reviewer profile data for the six study participants are presented and discussed in chapter 4.

**Comment data**

This study includes analysis of comments made by six reviewers about the original reviewed draft—pages five through seven, an unnumbered page with a diagram, and pages eight through twelve for a total of nine pages. The 30 pages used for analysis include the nine pages from each of three copies of the preliminary draft (used by five of the reviewers) plus the three-page memo from Derek Gebhardt. Thirty pages represents slightly more than 4% of the total number of pages of the 19 copies of the draft that were circulated for review to the 32 reviewers.

These 30 pages are representative of the comments made on all of the drafts of the preliminary report that were returned. The reviewers whose comments are examined in this study include a representative cross-section: one undergraduate student, a master’s student, a PhD student, two TIP staff members (who had different amounts of involvement with the team as well as different ranks within the organization), and one upper-level administrator.

All of the reviewers in this study generally fall into what Barbara Couture and Jone Rymer describe as professionals who write (1991, 5). Although it could be argued that the students are not professionals in the strictest sense of the word, in this case, the members of the IDMM team were paid for the research that they conducted and were paid to produce the report. In writing about the IDMM team, Rebecca Burnett writes, “from its beginning, the IDMM team was identified as part of TIP. . . . Along with other TIP projects, the IDMM team was considered central in TIP’s plans. Thus, in many ways, the IDMM team was a workplace team, dealing with an actual technology transfer problem” (1995, 126).

Even though each member of the team brought a different level of professional expertise to the task, I am the only team member who might be considered a career writer.
according to Couture and Rymer's definition of this rhetorical community (1991, 5).
However, because I did not specifically comment on this draft of the report as a whole,
none of my comments are included in the data set.
CHAPTER 4. DATA COLLECTED

In this chapter, I present the two general classes of data that I gathered: reviewer profile data and data about the comments that the six study participants made within the context of the task described in chapter 3.

**Reviewer profile data**

Even with the reviewer profile scale to help structure the task, collecting descriptive, observation-based data in order to construct reviewer profiles is a messy job. The data presented in this section are based on retrospective recall of individuals within the context of the team and the organization: thus, they are necessarily subjective and context-specific. When I constructed the profiles that follow, I relied on information gathered as I worked with the IDMM team. As discussed in chapter 3, I collected this data in various ways including taped interviews with each participant and observational notes taken at meetings and after informal, small group or one-on-one interactions or conferences.

Regardless of the data collection method, three definitions influence the scope the reviewer profile data:

- the definition for ranks
- the definition of the organization
- the definition of responsibility for the production of the text

First, all of the ranks are based on the characteristics of individuals at the time they were involved with IDMM and TIP (generally from early 1993 to early 1994, with the October 1993 review falling about in the middle of that time). Second, while the IDMM team constituted the immediate organizational context for this task, the influence of other social factors cannot be ignored. For example, even though Ron Paulson was the leader of the IDMM team, his rank for organizational position is lower than Derek Gebhardt’s because, in the larger context of Ames Lab and the constellation of ISU technology transfer organizations, Gebhardt had higher status. And third, the ranks for responsibility for
producing the text were assigned in the context of the entire process of actually writing, reviewing, revising, and producing the final report of the IDMM team. The ranks for responsibility for consequences of the text were assigned in the context of TIP and in the context of the entire IDMM project.

I used these three definitions for rank, organization, and responsibility when I ranked each individual according to the five factors of the reviewer profile scale. However, the numbers in the scale are only a useful shorthand for looking at an individual. In other words, the numbers in isolation do not provide a complete picture of an individual reviewer’s profile. The reviewer profile tool needs to be considered as a whole: numerical ranks, a rationale for the rank, and a visual impression of the profile.

In the rest of this section, I present the six reviewer profiles in each of three ways:

• numerical rank for each factor
• narratives based on the factor definition and contributing characteristics (previously discussed in detail in chapter 3)
• radar charts of each reviewer’s profile

Each of these parts of the reviewer profile figures in my discussion of the relationship between reviewer profiles and the comments these reviewers made.

The reviewers’ ranks are based on a five-point scale, with 1 at the baseline or low end of the scale and 5 at the high end. The following reviewer profiles of the six participants are ordered according to organizational position rank, from low to high; the three reviewers who I ranked 3 on this factor are presented in alphabetical order.

Reviewer profile of Dan Sanders

Organizational position: rank 2. Dan Sanders, a member of the IDMM team, was a senior in electrical engineering at Iowa State University. Unlike most of the other students on the team, Sanders did not work at TIP during the summer of 1993 because he had a paid internship with a public utility company. Sanders was active in team meetings from August through October but did not actively assume leadership of the team.
Writing expertise: rank 4. Sanders completed the two required first-year composition courses as well as the required junior-level technical communication course at ISU. He reported no further formal writing training but did report valuable informal, on-the-job experience during his internship. On the IDMM project, Sanders consistently met writing deadlines and submitted interim drafts of his own work with his own comments, showing that he actively revised his own work. He asked for feedback on not only content and mechanical issues but also on rhetorical matters.

Subject matter expertise: rank 4. Sanders demonstrated a thorough understanding of his area of expertise, the power and distribution system. He participated in discussions with other IDMM team members about the overall design of the project as well as design elements of components of the project (such as the computer system, the sampling system, and the layout of the vehicle).

Text responsibility: rank 4. In the final report, Sanders was the sole author of the power generation and distribution system chapter. He participated in collaborative writing sessions and actively reviewed work in progress (including the overall design). He reviewed the preliminary draft and made comments on nearly every page of the text and about half of the pages in the appendices.

Text consequences: rank 1. Sanders participated in the IDMM team as part of his senior design project, a required element for his degree. His low rank on this factor reflects the fact that Sanders had almost no investment in the future development of the core technology beyond satisfying academic requirements.

Figure 5 shows the radar chart of Dan Sander’s reviewer profile.
Reviewer profile of Paul Beardshear

Organizational position: rank 3. Beardshear was a PhD student in industrial and manufacturing systems engineering. He was an active member of the team from May, 1993 until early July, 1993. However, during the fall of 1993, when the team was making final design decisions and working on the report, Beardshear had a teaching assistantship; therefore, he stopped attending team meetings in July and did not participate in e-mail exchanges among team members.

Beardshear was the highest-ranking student on the team. He was recruited for the team because of his knowledge of concurrent engineering, a key engineering design method that was supposed to guide the entire work of the team. He introduced the method to the team and, to some extent, it was employed by the team in conducting the design research but was not used in writing the report and certainly was not used as a manufacturing method by the team.
Writing expertise: rank 3. In an interview, Beardshear reported that he completed “undergraduate courses in technical writing” (1993). He also reported writing “several reports for people in industry—on the job—technical manuals and things like that” (1993). Beardshear expressed definite opinions about both satisfactory elements and deficiencies in both the preliminary draft and in the final report.

Subject matter expertise: rank 4. Beardshear was among the last students recruited for the IDMM team. His field, industrial engineering and manufacturing systems engineering, requires that an individual have an accurate overall grasp of the technology in order to project manufacturing processes and make production decisions. During his two months on the team, Beardshear researched the commercial availability of components of the core technology, but the manufacturability chapter in the final report also relied heavily on similar research conducted by other team members. Beardshear had prior workplace and academic experience with complex designs like the one the team was studying. Beardshear appeared to have a comprehensive grasp of the core technology as well as the manufacturing and marketing requirements.

Text responsibility: rank 1. Beardshear did not contribute any text to the preliminary draft. He was first author on the manufacturability chapter in the final report, a chapter he submitted well after the established deadlines. Despite his assertions in the interview about the importance of revision, he seemed reluctant to revise text he contributed to the final report.

Beardshear commented extensively on nearly every page of the preliminary draft. Because, at the time of the preliminary draft review, he was not an active team member, he was the only team member who was a first reviewer; all of the other students “read behind” another reviewer. Beardshear appeared to use the review of the preliminary draft to challenge other team members’ assertions and to ensure that his opinions about the design were represented.
Text consequences: rank 1. Even though Beardshear could probably have reaped academic and professional benefits from a successful IDMM report, he consistently behaved as though the team and the report were inconsequential to him. Because his teaching assistantship was assured, he risked no direct consequences of a less than satisfactory performance.

Figure 6 shows a radar chart of Paul Beardshear’s reviewer profile.

![Radar Chart](image)

**Figure 6. Reviewer profile of Paul Beardshear**

**Reviewer profile of Jim Perkins**

Organizational position: rank 3. Perkins was a member of the TIP professional staff; officially he was an assistant scientist II, but he referred to himself as a “design engineer” (1994). He had recently earned his bachelor’s degree in mechanical engineering from MIT.
Perkins' prior workplace experience consisted of summer jobs and internships. Perkins was the system administrator for the TIP computer system. He also supervised an undergraduate mechanical engineering student who was hired to relieve some of his workload as his responsibilities increased.

**Writing expertise: rank 2.** Perkins brought writing experience and training from his recently completed education. His internships and summer jobs required written reports, but his positions were generally oriented to engineering design rather than administration or communication. He reported no specialized training in technical writing beyond his undergraduate coursework, but he did regularly write as part of his job. For example, he was eighth author (of ten authors) of the first field report published about the core technology. Perkins also wrote routine workplace correspondence and monthly reports, worked collaboratively in preparing presentations, and communicated with TIP staff about the computer system.

**Subject matter expertise: rank 5.** Perkins completely understood the scientific and theoretical principles behind the core technology as well as the physical design requirements. Perkins determined the specifications for and then produced the computer-assisted drafting (CAD) drawings of the prototype. Perkins was actively involved in constructing the prototype and shared that experience with the team as the engineers sought to further develop the design.

**Text responsibility: rank 4.** As the computer system administrator, Perkins played a key role in the production of the report. The report was by far the most complex and sophisticated (measured by file size, incorporated figures and tables, and document design and format) document produced to date on the word processing software (UNIX-based, WordPerfect 5.0 for NeXT). Perkins repeatedly solved computer problems that got
in the way of document production and helped me set up and maintain the e-mail protocol for submitting drafts for editing.

As the mechanical engineer for the core technology project, Perkins frequently interacted with the team members as they worked out design details. Perkins taught the undergraduate mechanical engineering student who was on the team how to use the CAD program and worked with him to produce the drawings that are in the final report; Perkins is credited with producing the scanned CAD images in chapter 2 of the final report. Perkins spent considerable time working with the computer files of the final report; the day the final report was printed, he and I went page by page through the 110-page report to ensure visual consistency and to solve last-minute production problems.

Text consequences: rank 2. Perkins’ career success did not ride on the success or failure of the IDMM report or even the success or failure of the core technology. He recognized that, while prestigious, his work with TIP would likely be considered a career entry. Around the time the preliminary report was circulated for review, Perkins decided to change jobs (he was planning to marry and fiancee was interviewing for jobs out of state).

Figure 7 shows the radar chart of Perkins’ reviewer profile.

Reviewer profile of Kevin Taylor

Organizational position: rank 3. Taylor, a master’s student in civil and construction engineering, was one of the first students on the IDMM team. Taylor had returned to school after nine years working as a geologist and environmental consultant. Taylor was one of the students who, at times, assumed leadership of the team by facilitating team meetings and expressing opinions about various decisions about aspects of the design. While some of the students, particularly the undergraduates, were assigned a file cabinet in a common work area, Taylor had a desk in a cubicle in an office he shared
with four other graduate students. TIP professionals sought Taylor’s opinions on standard practices in industry.

**Writing expertise: rank 3.** Taylor’s workplace experience involved a considerable amount of writing in several different genres, particularly proposals and reports. Taylor coauthored (with one of the members of the ISU advisers to the team) a paper on the core technology that was presented at a professional conference and published in an academic journal. Taylor willingly reviewed written work by other team members and collaborated on text for the report as well as the marketing materials. When asked if he had specialized training in technical writing, Taylor replied, “None other than the workplace. Just practice.” In response to a question about workplace writing, Taylor said, “You always underestimate, so you end up doing more work than you planned on, but you do it, and you do by the time that that report is due. It just gets done” (1993). On other occasions, Taylor remarked, “done is good.”
Subject matter expertise: rank 6. Other TIP professionals (with the exception of Gebhardt and the TIP director, Tim Nelson) and advisers to the IDMM team were from academic or DOE-sponsored research backgrounds, with little or no first-hand field experience in environmental assessment or restoration. Thus, with his nine-year work history, Taylor brought the most experience in the environmental industry to the team and to TIP. Taylor consistently demonstrated an excellent grasp of the technical and theoretical issues that the team (and the TIP professionals) were grappling with. He worked closely with Jay Sears, the student from the business college, to conduct and report on the marketing research; his knowledge of the industry guided that research.

Text responsibility: rank 5. Taylor was treated by the team as having a high degree of responsibility for producing the text. In the final report, Taylor was first author of the chapter on operating protocols, dynamic sampling, and data integration and was second author of the marketing research chapter. Taylor reviewed the preliminary draft as well as other works in progress. Taylor generally met deadlines for text submission and almost always incorporated reviewer comments into his sections in a timely manner.

Text consequences: rank 2. Taylor was in the last year of his master's program. He clearly viewed his participation on the project as an opportunity to make contacts for future employment, and, indeed, he negotiated a contract with the Mexican national petroleum company to conduct a large-scale characterization project based on work he did with another TIP project. At one time, Taylor and Sears were considering forming a company to further develop the core technology; they jointly wrote a business plan, but stopped short of pursuing the venture.

Figure 8 shows the radar chart of Kevin Taylor's reviewer profile.
Reviewer profile of Stewart Byers

Organizational position: rank 4. Byers was an assistant scientist II and the "analytical instrumentation engineer" on the TIP professional staff (1994). He brought experience in chemical engineering and materials science both to TIP and to the IDMM team. He was pursuing a master's degree in materials science, specializing in micro-miniature chemical analysis technology. Byers came to TIP from another technology transfer (R&D) organization at ISU.

Writing expertise: rank 2. Byers was second author (of ten) of the report on the second field demonstration of the core technology; he was ninth author (of ten) of the report on the first field demonstration of the core technology. Byers wrote extensively in his research notebook to "document things like data collection and instrumentation setup" (1994). Like all TIP staff, he routinely wrote monthly reports and procedural
communications. Byers completed the “writing for engineers” course at Iowa State University and reports having had “a lot of help and advice career-wise” but no formal training in technical writing. Byers reported relying on his supervisors, Mark Allen and Tim Nelson, and Jim Perkins, for review of texts he has written.

**Subject matter expertise: rank 5.** Byers was involved in the original development of the prototype of the core technology. Byers was one of the operators of the prototype and was actively engaged in working to solve the technical problems that had been encountered in the laboratory and in field demonstrations. He consistently demonstrated an excellent grasp of the technical and scientific principles that undergirded the project and was willing to discuss them with the IDMM team members.

**Text responsibility: rank 1.** Byers reported no personal responsibility for producing the IDMM report beyond consulting with team members to help them better understand the scientific and engineering principles involved and reviewing interim drafts.

**Text consequences: rank 3.** Byers is a life-long resident of Ames, Iowa, and indicated that he was not interested in making a career move that would require relocation. In the face of funding cutbacks and economic uncertainties, Byers had a stake in the continued funding of the core technology project.

Figure 9 shows the radar chart of Byers’ reviewer profile.

**Reviewer profile of Derek Gebhardt**

**Organizational position: rank 5.** After a 27-year career in industry, Gebhardt started the Center for Advanced Technology Development (CATD), a technology transfer organization under the auspices of Iowa State University that supports market-driven research; during the IDMM project, Gebhardt was the CATD director. In that capacity,
Gebhardt related directly with the director of Ames Laboratory, the director of the Iowa Center for Physical Research and Technology, and the president of Iowa State University. I believe Gebhardt participated in the IDMM team in order to further explore the possibility that the core technology (or one of the suite of technologies) would be a candidate for CATD development and licensure. The team valued his specialized knowledge of the political and administrative aspects of technology transfer.

**Writing expertise: rank 6.** Gebhardt had more than 28 years of experience writing technical and managerial documents at an executive level. He reported experience with two Fortune 500 companies producing many different types of writing (such as technical reports, proposals, promotional materials, and routine business correspondence). He reported that he worked in all areas of business (including research, marketing, management, manufacturing engineering) except personnel and accounting. Gebhardt reported no specific training in writing beyond an undergraduate-level (junior-level)
required course for engineering students called "report writing," which Gebhardt said was a technical writing course. He remarked that the course was "probably the best and most influential course I've ever had" (1994). He described a rigorous course that included daily spelling tests and in-class papers; the teacher focused on the paper's structure and readability when in grading the papers. When he talked about the text for this class he said, "I kept it on my bookshelf with me constantly . . . . I have many, many times referred to that book, more so probably than any technical book I ever had" (1994). Gebhardt said, "No matter how good one is technically, one still has to communicate" (1994).

Subject matter expertise: rank 3. Gebhardt's rank for this factor is based on his background in research and development and a generally good grasp of highly specialized technical concepts. In addition, Gebhardt has a familiarity with the technical processes in the core technology that he attained by reviewing the reports of the field demonstrations and participating in meetings and briefings about the project.

Text responsibility: rank 1. Gebhardt had no direct responsibility for producing the text beyond his obligations as an external reviewer.

Text consequences: rank 3. Gebhardt's direct responsibility for the consequences of the text had to do with CATD's possible interest in the future development of the core technology. Gebhardt had a keen interest in whether or not the IDMM team's engineering design indicated that further technical development (in terms of scaling down the size and facilitating field performance) was warranted, particularly in the context of the marketing and manufacturability study that the team conducted.

Figure 10 shows the radar chart of Derek Gebhardt's reviewer profile.
Figure 10. Reviewer profile of Derek Gebhardt

Interrater reliability test of the reviewer profile scale

The reviewer profile scale was tested for interrater reliability by comparing the ranking of the five factors for all six participants, for a total of 30 factors on which the two raters could agree. The two raters are knowledgeable about all 32 reviewers including the six study participants; the raters were trained in the criteria and procedures for the reviewer profile ranking scale. The training materials for and data resulting from this test are included as appendix C. The two raters achieved the following percentages of perfect agreement, near agreement, and disagreement.

- perfect agreement where both raters assign the same rank: 7 perfect agreements of 30 possible agreements (23.3% perfect agreement)
- near agreement where, for example, one rater assigns a rank of 3 while the other rater assigns a rank of 4: 12 near agreements of 30 possible agreements (40% near agreement)
disagreement of two ranks (where, for example, one rater assigns a rank of 2 while the other rater assigns a rank of 4): 11 disagreements of two ranks of 30 possible agreements (36.6% disagreements of two ranks)

- disagreements of three ranks: 0 (0%)

These figures suggest that, while the raters achieved perfect agreement only 23.3% of the time, they were in perfect agreement or in near agreement 19 of 30 instances (63.3%) which approaches acceptable interrater reliability for composition studies. These agreement percentages show that perceptions differ and judgements are necessarily subjective, but that people who work closely with a team generally have similar impressions about the characteristics of the team members.

The two raters scored perfect agreement most on ranks for responsibility for consequences of the text (50%), organizational position (33.3%), and subject matter expertise (33.3%). The two raters agreed about the organizational position ranks for both Gebhardt and Perkins and they agreed on one other factor for these two reviewers, but not the same factor (for Perkins they agreed on his subject matter expertise, and for Gebhardt, they agreed on his text consequences rank). The perfect agreements tended to fall at both ends and in the middle of the scale. Both raters agreed on the text consequences rank (1 for both reviewers) for Sanders and Beardshear. The perfect agreement ranks were distributed as shown in Table 3.

The two raters disagreed most on the rankings for writing expertise and ranks for responsibilities for producing the text factor (which accounted for 5 disagreements of 6 possible agreements); these five disagreements account for 45% of the disagreements of two ranks.

Even though the reviewer profile scale provides a rank, narrative about each individual based on the factor, and an illustration of the profile for reviewers, the scale only address characteristics of reviewers.
Table 3. Perfect agreement distribution

<table>
<thead>
<tr>
<th>Reviewer's name</th>
<th>Reviewer profile factor</th>
<th>Score agreed on by both raters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derek Gebhardt</td>
<td>Organizational position</td>
<td>5</td>
</tr>
<tr>
<td>Stewart Byers</td>
<td>Subject matter expertise</td>
<td>5</td>
</tr>
<tr>
<td>Jim Perkins</td>
<td>Subject matter expertise</td>
<td>5</td>
</tr>
<tr>
<td>Jim Perkins</td>
<td>Organizational position</td>
<td>3</td>
</tr>
<tr>
<td>Derek Gebhardt</td>
<td>Text consequences</td>
<td>3</td>
</tr>
<tr>
<td>Dan Sanders</td>
<td>Text consequences</td>
<td>1</td>
</tr>
<tr>
<td>Paul Beardshear</td>
<td>Text consequences</td>
<td>1</td>
</tr>
</tbody>
</table>

A second tool, the comment categorization matrix is needed to complete the analysis of the relationship between reviewers and the comments they make. In the next section, I present the data I gathered using the comment categorization matrix.

**Comment data**

A total of 520 comment chunks on the 30 pages comprise the data set. Table 4 shows the characteristics of the 520 comment chunks: discrete chunks, complex chunks, and constituents (as defined and discussed in chapter 3).

Table 4. Total comment chunks

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete comment chunks</td>
<td>35</td>
</tr>
<tr>
<td>Complex comment chunks</td>
<td>129</td>
</tr>
<tr>
<td>Constituents of complex comment chunks</td>
<td>356</td>
</tr>
<tr>
<td>Total comment chunks</td>
<td>520</td>
</tr>
</tbody>
</table>

As I chunked, counted, and placed the reviewers’ comments in the comment categorization matrix, I observed and recorded two additional kinds of data: frequency
data and distribution data. Frequency data shows the number of comments reviewers made. Distribution data shows where the reviewers' comments were distributed over the entire matrix. First I present the frequency data for all comments by all reviewers collectively, and then I present the frequency and distribution data for each of the reviewers separately.

While the comments were distributed in every cell of the matrix, they were unevenly distributed across the three columns (representing the kinds of comments reviewers make) with a total of 179 content comments, 238 mechanical writing comments, and 103 rhetorical writing comments. The comments were also unevenly distributed throughout the rows (representing the ways the reviewers make comments) with 60 queries, 88 statements, 108 corrections, and 264 signals. Table 5 shows the overall distribution for each cell in the matrix.

<table>
<thead>
<tr>
<th>Table 5. Overall comment distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content comments</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Content query</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Content statement</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Content correction</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Content signal</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Content total</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The following sections discuss the distribution of comments among the cells, first with a narrative describing the distribution then with a table that shows the distribution by cell and by reviewer. The tables (tables 6, 7, 8, and 9) use the rows of the comment categorization matrix to show the intersections of the kinds of comments reviewers made but only one way they made those comments, such as content, mechanical or rhetorical query. Therefore, each table has three columns that correspond to the categorization
matrix but only one way of making that kind of comment. I include the cell definition in
the shaded, top part of each cell and then give the total number of comments for that cell
followed by a breakdown of comments by reviewer. The four ways of making a
comment—query, statement, correction and signal—are presented here in the order in
which they appear on the comment categorization matrix.

Queries

Of the four ways of making comments, queries were used the least by the reviewers
in this study; only 60 (11.5%) of the total number of comments were queries. Three
reviewers, Dan Sanders, Paul Beardshear, and Kevin Taylor used a query to make each of
the three kinds of comments. Jim Perkins and Derek Gebhardt made query comments in
only one column, Perkins in the content column (14, 23.3% of the queries) and Gebhardt
in the rhetorical writing column (3, 5% of the queries). One reviewer, Stewart Byers,
made no queries. Table 6 shows the distribution of comments made by query.

<table>
<thead>
<tr>
<th>Cell total: 43 queries</th>
<th>Cell total: 7 queries</th>
<th>Cell total: 10 queries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanders: 16</td>
<td>Sanders: 2</td>
<td>Sanders: 2</td>
</tr>
<tr>
<td>Beardshear: 8</td>
<td>Beardshear: 3</td>
<td>Beardshear: 4</td>
</tr>
<tr>
<td>Perkins: 14</td>
<td>Perkins: 0</td>
<td>Perkins: 0</td>
</tr>
<tr>
<td>Taylor: 5</td>
<td>Taylor: 2</td>
<td>Taylor: 1</td>
</tr>
<tr>
<td>Byers: 0</td>
<td>Byers: 0</td>
<td>Byers: 0</td>
</tr>
<tr>
<td>Gebhardt: 0</td>
<td>Gebhardt: 0</td>
<td>Gebhardt: 3</td>
</tr>
</tbody>
</table>

Statements

Of the four ways of making comments, statements were used next to least
frequently; 88 (16.9%) of the comments were statements. Derek Gebhardt made the most
statements, 29 (32.9% of the statements); 28 were rhetorical writing statements and one mechanical writing statement. Statements made by three reviewers, Sanders, Beardshear, and Taylor, account for most of the rest of the statements (57, 64.7% of the statements); Sanders and Beardshear made statements in all three columns, and Taylor made content and mechanical statements. Byers made only two mechanical statements (2.2% of the queries). Table 7 shows the distribution of comments made by statements.

Table 7. Statement comments distribution

<table>
<thead>
<tr>
<th></th>
<th>Content statement Asserts that the content is not accurate.</th>
<th>Mechanical writing statement Asserts that a mechanical problem exists.</th>
<th>Rhetorical writing statement Points out a problem with the way text is written.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell total: 25 statements</td>
<td>Cell total: 13 statements</td>
<td>Cell total: 50 statements</td>
<td></td>
</tr>
<tr>
<td>Sanders: 10</td>
<td>Sanders: 2</td>
<td>Sanders: 6</td>
<td></td>
</tr>
<tr>
<td>Beardshear: 13</td>
<td>Beardshear: 6</td>
<td>Beardshear: 16</td>
<td></td>
</tr>
<tr>
<td>Perkins: 0</td>
<td>Perkins: 0</td>
<td>Perkins: 0</td>
<td></td>
</tr>
<tr>
<td>Taylor: 2</td>
<td>Taylor: 2</td>
<td>Taylor: 0</td>
<td></td>
</tr>
<tr>
<td>Byers: 0</td>
<td>Byers: 2</td>
<td>Byers: 0</td>
<td></td>
</tr>
<tr>
<td>Gebhardt: 0</td>
<td>Gebhardt: 1</td>
<td>Gebhardt: 28</td>
<td></td>
</tr>
</tbody>
</table>

Corrections

Of the four ways of making comments, corrections were made second most frequently; 108 (20.7%) of the comments were corrections. Taylor made most of the correction comments, 68 (62.9% of all queries); most of those, 54 (50% of the total corrections made by any reviewer), were mechanical corrections. Table 8 shows the distribution of comments made by corrections.

Signals

Nearly all of the complex comments consisted of words, numbers or symbols and an equal or greater number of signals to draw attention or to more closely link the words, numbers, or symbols with the specific source of the comment. Thus, the signal was the
Table 8. Corrections comments distribution

<table>
<thead>
<tr>
<th>Content correction</th>
<th>Mechanical writing correction</th>
<th>Rhetorical writing correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>A specific suggestion of a replacement or an addition to the text to maintain technical accuracy or clarify the meaning of the text or diagram.</td>
<td>A specific suggestion to improve the grammar or mechanical correctness (like punctuation or word order).</td>
<td>A specific suggestion to improve the organization or respond to a rhetorical choice (e.g., to emphasize or diminish the importance of certain information or to address readers' needs).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cell total: 24 corrections</th>
<th>Cell total: 75 corrections</th>
<th>Cell total: 9 corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanders: 2</td>
<td>Sanders: 2</td>
<td>Sanders: 0</td>
</tr>
<tr>
<td>Beardshear: 3</td>
<td>Beardshear: 13</td>
<td>Beardshear: 0</td>
</tr>
<tr>
<td>Perkins: 0</td>
<td>Perkins: 4</td>
<td>Perkins: 0</td>
</tr>
<tr>
<td>Taylor: 12</td>
<td>Taylor: 54</td>
<td>Taylor: 2</td>
</tr>
<tr>
<td>Byers: 7</td>
<td>Byers: 2</td>
<td>Byers: 0</td>
</tr>
<tr>
<td>Gebhardt: 0</td>
<td>Gebhardt: 0</td>
<td>Gebhardt: 7</td>
</tr>
</tbody>
</table>

most frequent way of making comments (264, 50.7% of the total number of comments).

One reviewer, Taylor, made 93 mechanical signal comments (35% of the total number of signal comments) and 26 content signal comments (9.8% of the total number of signal comments). Gebhardt, made only seven rhetorical signal comments (2.6% of the signal comments) and no signal comments in either of the two other columns. Another reviewer, Perkins, made 20 content signal comments (7.5% of the total number of signal comments). Further specific data about the distribution of the signal comments follows in conjunction with the analysis of the reviewer profiles and the comment data. Table 9 shows the distribution of comments made by signal.
Interrater reliability test of the comment categorization matrix

I determined interrater reliability for the comment categorization matrix by conducting an interrater reliability test with two raters. One rater, Sarah Bishop, is a PhD student in rhetoric and professional communication and the other rater, Ron Paulson, was the leader of the IDMM team. The reliability test consisted of 33.3% of the data set counted by pages (10 of 30 pages) or 23.5% of the data set counted by numbers of chunks (122 total chunks with 41 discrete or complex chunks and 81 constituents). The test had two tasks, chunking and coding.

On the chunking task, Bishop scored 71% agreement, while Paulson scored 88% agreement, both well within acceptable interrater reliability for composition studies. Bishop apparently ignored mechanical signals made by one participant; her agreement on mechanical signal chunking was only 51% (14 of 27), while for the same category of comments, Paulson's agreement was 88.8%.

I scored the coding task of the reliability tests by counting what I called agreements or hits. For each chunk, the rater could score three possible hits:

- a total hit (complete agreement about the cell placement for each chunk)
- a hit for coding the chunk in the correct column—content, mechanical, or rhetorical—but disagreeing with me about the row placement
- a hit for coding the chunk in the correct row—query, statement, correction, and signal—but disagreeing with me about the column placement

<table>
<thead>
<tr>
<th>Content signal</th>
<th>Mechanical writing signal</th>
<th>Rhetorical writing signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A symbol, mark, or other non-word device that identifies a content issue.</td>
<td>A symbol, mark, or other non-word device that identifies a mechanical issue.</td>
<td>A symbol, mark, or other non-word device that identifies a rhetorical issue.</td>
</tr>
<tr>
<td>Cell total: 87</td>
<td>Cell total: 143</td>
<td>Cell total: 34</td>
</tr>
<tr>
<td>Sanders: 20</td>
<td>Sanders: 6</td>
<td>Sanders: 6</td>
</tr>
<tr>
<td>Beardshear: 17</td>
<td>Beardshear: 27</td>
<td>Beardshear: 19</td>
</tr>
<tr>
<td>Perkins: 20</td>
<td>Perkins: 14</td>
<td>Perkins: 0</td>
</tr>
<tr>
<td>Taylor: 26</td>
<td>Taylor: 93</td>
<td>Taylor: 2</td>
</tr>
<tr>
<td>Byers: 4</td>
<td>Byers: 3</td>
<td>Byers: 0</td>
</tr>
<tr>
<td>Gebhardt: 0</td>
<td>Gebhardt: 0</td>
<td>Gebhardt: 7</td>
</tr>
</tbody>
</table>
Bishop scored 48% agreement (59/122) in the total hit category. Her percentage of agreement for coding comments in the correct column was 60% (73/122) and her percentage of agreement for coding comments in the correct row was 78% (95/122), yielding an overall agreement percentage of 69% (168/244). Despite the pre-test training, Bishop’s familiarity with rhetorical principles combined with her lack of experience with the technical content of the sample text to partially account for this relatively low agreement score. Bishop’s perfect hits tended to cluster in the rhetorical column, and she tended to code mechanical comments as content comments.

Paulson scored 61% agreement (74/122) in the total hit category. Paulson’s percentage of agreement for coding comments in the correct column was 75% (91/122) and his percentage of agreement for coding comments in the correct row was 80% (97/122), yielding an overall agreement percentage of 77% (188/244). Paulson, a subject matter expert, tended to code mechanical and rhetorical comments as content comments. Despite pre-test training, Paulson, like Bishop, relied on prior knowledge and experience to make coding decisions.

In the following chapter, I analyze the data I presented in this chapter, present observations and conclusions based on the analyses, and suggest possible applications and directions for future research.
CHAPTER 5. ANALYZING THE DATA

What, if any, is the relationship between reviewer profiles and reviewer comments? In order to establish a foundation for answering this question I first situated my work within three research domains: 1) cognitive science and expertise studies, 2) writing process studies, and 3) research into the nature and practice of workplace collaboration. Now, I use the theories from these three research domains in order to analyze the data presented in chapter 4. I offer several stories that illustrate the key points emerging from my study of document review. The first group of stories centers on the role of expertise, while the second group of stories focus on the nature of the workplace writing process. The final group of stories illustrates the points about the practice of workplace collaborations. In these stories, I discuss all of the factors in the scale as well as all six reviewers. However, each story focuses on selected reviewer profile factors as they relate to a particular reviewer or a pair or trio of reviewers.

Each story focuses attention on one or two of the research participants, not because their stories are the only ones but because these stories effectively describe the relationships between these reviewers and the comments they made. Even though one or more of the reviewer profile factors is featured in a story, the other factors also play a role in the analyses. And, even though I emphasize one or two factors in the analysis, that emphasis was made possible by first gathering all of the reviewer profile data for each reviewer in order to assess which reviewer profile factors are important. In order to demonstrate this complexity, radar charts (with all five factor axes) and graphs of comment distribution illustrate each story.

At the end of this chapter, after concluding remarks about the data, I suggest applications for this work and directions for future research.
The role of expertise

The reviewer profile scale features two kinds of expertise, subject matter expertise and writing expertise; the three stories in this section are about both kinds of expertise as they interact with other reviewer profile factors to influence comments. The key player in the first story, which has to do with expertise and organizational position, is Derek Gebhardt. The second story, which is about subject matter expertise and responsibility for the text, features Stewart Byers and Jim Perkins. Dan Sanders is the subject of the story about a novice who demonstrates expert-like behavior.

Expertise and organizational position

The first story is about Derek Gebhardt, the technology transfer administrator at CATD. Gebhardt’s expertise, both writing expertise and subject matter expertise, and his organizational position seem to explain why he made global rhetorical comments. Gebhardt’s writing expertise rank is 5, based on his breadth of experience with workplace writing, and his understanding of the potential audiences for the report. Gebhardt’s rank for subject matter expertise is 3, based on his knowledge of and participation in the technology transfer process and his engineering background. Given Gebhardt’s understanding of the technology transfer process, his rank for subject matter expertise is relatively high despite his lack of familiarity with the technical content of the report. Gebhardt’s organizational position rank is also 5; as the director of CATD, an organization that was in some ways hierarchically superior to TIP, he was the highest-ranking person among the reviewers. The radar chart representation of his reviewer profile is shown in figure 11.

Gebhardt’s 46 total comments were almost exclusively in the rhetorical column, with 28 rhetorical statements, seven rhetorical corrections, seven rhetorical signals, and three rhetorical queries. He only made one other comment, a mechanical statement. A graph of Gebhardt’s comment distribution is shown in figure 12.
Gebhardt commented differently from other reviewers not only in terms of the kinds of comments but also in the way he commented on the preliminary draft. Rather than writing on the pages of his copy of the draft (as did nearly all of the other 31 reviewers), Gebhardt drafted a three-page memo that he faxed to me and used as an outline for a 45-minute telephone conversation. During that conversation, he elaborated and provided rationale for the rhetorical comments he made in the memo. For example, Gebhardt wrote

Many of the sentences are very long and complex. Long cumbersome sentences might be okay for internal technical reports but they are not appropriate for external consumption. Keep in mind who the audience is. (Gebhardt 1993, 3)

Gebhardt's focus on rhetorical matters is consistent with both his writing expertise and his organizational position. Gebhardt is a busy executive who, although he agreed to serve on the IDMM team advisory group, could not be expected to provide a close reading that focused on local-level mechanical comments, such as grammar or spelling. Rather, Gebhardt made use of his expertise, both his writing expertise and his subject matter expertise in the larger technology transfer sphere, and focused his attention on global rhetorical concerns. Even the one mechanical comment Gebhardt made reflects a more global concern: “Make sure the titles are properly syntaxed, i.e. the section title, ‘Blank Samples’ followed by ‘Transport samples to a laboratory’” [punctuation as in original] (thesis data set, page G-2).

**Subject matter expertise and responsibility for the text**

The second story focuses on subject matter expertise and responsibility for the text. The two TIP staff members who are study participants, Stewart Byers and Jim Perkins, were both assigned the highest rank, 5, for subject matter expertise. Byers demonstrated expert knowledge about the technical process and consistently worked to solve technical problems on the cutting edge of the research in his field. Perkins demonstrated expert
Figure 11. Reviewer profile of Derek Gebhardt

Figure 12. Gebhardt's comment distribution (46 total)
performance in the domain of the mechanical aspects of the core technology. He set
specifications, drafted plans for, and participated in the construction of the prototype.

Byers' rank for responsibility for producing the text was 1, based on the fact that he
had virtually no responsibility for producing the text. His rank for responsibility for
consequences of the text was 2. Although he could have had more stake in the
consequences of the text, Byers behaved as though he had minimal stake in the
consequences of the text.

In contrast, Perkins' rank for responsibility for producing the text was 3, based on
the amount of time he spent with IDMM team members working on illustrations, the time
he invested in managing the computer files necessary to produce the report, and the
commitment he showed to cleaning up and printing the report. His rank for responsibility
for consequences of the text was 2, based on the fact that this was his first professional
position and the IDMM report was unlikely to dramatically influence his future career.
Both Byers and Perkins are shown on one radar chart, which follows as figure 13.

Even though Byers and Perkins had the same subject matter expertise rank (5), they
commented differently; these differences can be accounted for by the combination of their
subject matter expertise and their responsibilities for the text. Byers focused his attention
on details of the technical process and corrected errors while Perkins, who had a greater
stake in the text, focused his attention on content matters but asked questions and marked
the text for a face-to-face discussion rather than simply inserting corrections. A graph of
Byers and Perkins' comment distribution is shown in figure 14.

Byers, a chemical engineer, knew all about the technical processes involved in the
core technology while Perkins, a mechanical engineer, knew all about the physical design
and operating parameters for the core technology. At the time of the preliminary review,
both Byers and Perkins were actively engaged in preparing the prototype for an out-of-state
field demonstration, yet their comments differed dramatically. Byers made a total of 18
comments, 11 in the content categories and seven in the mechanical categories. He made
no queries and only two mechanical statements; the largest number of his comments was
content corrections (7), which were accompanied by four content signals. Byers generally confined himself to the parts of the draft that addressed the technical process. Even though Byers stood to lose if the funding were cut to the core technology project, he made no comments that might have increased the persuasive nature of the text.

Byers was busy. He focused on the parts of the text where he knew his comments as a subject matter expert were expected, but neglected to comment in other areas. Beyond talking with the students on the IDMM team and reviewing the preliminary draft of the report, Byers had little stake in whether or how the final report would be produced.

Jim Perkins was busy, too. At the time of the preliminary draft review, Perkins was working long hours to prepare the prototype for the field demonstration, but his level of engagement with the preliminary draft was different than Byers’. Like Gebhardt, Perkins shifted his attention away from the pages of the copy of the draft that he reviewed. Perkins’ 52 comments are mostly signals (20 content signals and 14 mechanical signals), and he used these comments (generally arrows in the margins and parentheses to enclose sentences or phrases) as guides for a conversation that he had with me.

Rather than making content statements or content corrections, Perkins asked questions about the content of the draft. For example, both Perkins and Byers commented on the sentence that read, “The operator who positions the surface sample remains with it, providing support and observing operations during sampling” (IDMM team 1993, 10). Byers simply inserted the word “technical” before “support” (thesis data set, page KS-10); however, Perkins placed parentheses around the phrase “providing support” and wrote an arrow in the margin that seemed to cue him to talk about this place in the document (thesis data set, page J-10). During the conversation I had with Perkins, he asked what kind of support the writer meant. Also during that conversation, Perkins asked numerous other questions about the technical content of the draft. In some cases his written comments challenged the text by asking questions like, “oh? what about accumulating non-constant rate generated particles and feeding them at a constant rate” (thesis data set, page J-8) and “what about winter? overnight?” (thesis data set, page J-7).
Figure 13. Reviewer profiles of Stewart Byers and Jim Perkins
Figure 14. Byers and Perkins' comment distributions
Perkins had a higher level of engagement with the IDMM team than did Byers for two probable reasons. The first reason has to do with his organizational position as the mechanical engineer on the core technology project and as system administrator for the office computer system. These roles give him greater involvement and investment than Byers who was more concerned with the day-to-day workings of the core technology project. The second reason for Perkins’ higher level of engagement has to do with his stake in producing the text; specifically, he had agreed to work with the students on the team in drafting the design illustrations and had agreed to work with me to help manage the computer aspects of the IDMM report. Byers, on the other hand, was more focused on the prototype and the core technology development project as was befitting his slightly higher organizational position and his lower stake in producing the text of the IDMM report.

A novice who displays expert-like behavior

Dan Sanders, who is the main character in this third story about expertise, is a novice who displayed expert-like behavior. Indeed, Sanders, who was the lowest ranking of the six participants as far as organizational position and text consequences were concerned, demonstrated some of the most expert-like writing behaviors of all of the participants such as asking for feedback about rhetorical issues in addition to content and mechanical writing issues. Sanders also sought review comments from other, more expert writers, which he subsequently incorporated into his text.

Even though, by the characteristics I outlined in the discussion of writing expertise in chapter 3, Sanders doesn’t precisely fit the bill as a writing expert, I nonetheless ranked him as a 4 on that scale because I recognized those behaviors as expert-like rather than behaviors displayed by novices. The radar chart representation of Sanders’ reviewer profile follows as figure 15.

Sanders demonstrated a sensitivity to rhetorical matters (evidenced by his 14 comments in the rhetorical categories) that was very much like the rhetorical concerns
Gebhardt expressed. For example, Sanders voiced rhetorical concerns like, “Confusing. Will people understand this?” (thesis data set, page PD-5). Sanders also voiced content concerns, usually by query (16 of his 48 content comments were content queries) such as, “Is it really vaporized?”, a query that challenges the technical content expressed in the draft (thesis data set, page PD-8). A chart showing Sanders' comment distribution is shown in figure 16.

Even though Sanders is not an acknowledged technical expert (he was a young, undergraduate student with no professional experience in the technical domain), I ranked him at 4 on subject matter expertise because of the way he approached the technical and engineering problems that the team was working to solve. Sanders consistently framed questions in ways that were characteristic of experts’ approaches to problems. In other words, Sanders, even though he was not an expert, exhibited expert-like behavior. This distinction is consistent with Bereiter and Scardamalia's findings that, “expertlike students resemble the experts not so much in what they are able to accomplish but in what they are trying to do and in how they approach challenging problems” (1993, 155).
Figure 15. Reviewer profile of Dan Sanders

Figure 16. Sanders' comment distribution (74 total)
As discussed earlier, the costs associated with analyzing hazardous waste samples can be substantial. However, analytical sampling costs are only one component associated with the overall cost of sample analysis. The costs of actually collecting the sample,
The workplace writing process

The two stories in this section are about the ways that framing writing problems and attitudes toward the writing process influence the workplace writing process. Both stories feature the reviewer profile factors of organizational position, responsibility for the text, and writing expertise. The key players in these stories are Paul Beardshear and Kevin Taylor.

Distance and framing writing problems

Paul Beardshear was distant from the team; that distance influenced his approach to the review process as well as his approach to the writing problems the team had to solve. His organizational position, responsibility for the text, and writing expertise all contributed to his distance from the team and influenced both his comments and his writing.

Beardshear was the only PhD student on a team that was otherwise evenly divided between master’s and undergraduate students. All along, the team thought that he would write the manufacturability section of the report, but he contributed no text to the preliminary draft. He eventually drafted and revise the manufacturability chapter in the final report, but his primary interaction with the team after he left (he was only active with the team from March through July, 1993) was the review of the preliminary draft. Beardshear was one of only a few IDMM team members to bring professional workplace writing experience and the only team member who had experience writing the kind of report that the team was expected to produce. These factors are reflected in Beardshear’s reviewer profile, where he had ranks of 3 for both organizational position and writing expertise, a rank of 2 for text responsibility, and a rank of 1 for text consequences. The radar chart representation of Beardshear’s reviewer profile that reflects these ranks follows as figure 17.

Beardshear left the team long before any serious writing began and long before any serious design decisions were finally made. When it was time to review the preliminary draft, Ron Paulson attached this handwritten note to Beardshear’s draft copy. (Note: The
FRs refers to functional requirements, a central concept to the concurrent engineering methodology that Beardshear taught to the IDMM team members that was supposed to have guided the engineering design.

This note shows two things. First, Paulson holds the concurrent engineering methodology in high regard. Second, the note shows how Beardshear was treated differently, both because of his low level of engagement with the team and because of his organizational position. None of the other reviewers except a dean in the college of engineering had personal notes such as this to accompany their copy of the draft (the kind of political relationship that motivated the other note is discussed later). However, in spite of Paulson’s specific assignment for the review task, Beardshear’s review comments reflect his own two-part representation of the preliminary draft review task.

First, despite Paulson’s request that he concentrate on what is in the report rather than what is missing, Beardshear consistently makes both content comments that express his ideas about what is missing in the technical content. Beardshear, who made a total of 129 comments, made only three content corrections but made 13 content statements. For example, he wrote “off road too” near a description of the capabilities of the mobile lab (thesis data set, page PD-6). By making the “off road too” comment, Beardshear asserts that the content is not accurate, but he doesn’t offer a response that might fix the problem.

Beardshear’s second representation of the review task emerges from his writing expertise. Beardshear made numerous comments about both mechanical and rhetorical writing issues based on what his prior workplace experience. Interestingly, Beardshear
made relatively few corrections (three content corrections and no rhetorical corrections) that would have corrected the deficiencies he identified. Specifically, Beardshear commented extensively about mechanical writing issues; 37.9% (49 of 129) of his comments were mechanical comments; he made more mechanical signal comments than any other category (27 or 20.9%). His second most frequent comment category was rhetorical signals (19 or 14.9%). However, most of his rhetorical comments had to do with local-level organization: Beardshear repeatedly marked that all lists should be numbered rather than bulleted and asserted that organizers (like a reference to a diagram) should be included. In a conversation about these markings, Beardshear indicated that bulleted lists were not acceptable in a technical report of this nature and that numbered lists should be used instead. He cited readability as the reason for this structural difference but didn’t acknowledge the different rhetorical purposes between bulleted and numbered lists. A chart showing Beardshear’s comment distribution is shown in figure 18.

In a move that is consistent with Beardshear’s experience with this genre, in response to the question “What other suggestions do you have to improve the report?,” Beardshear wrote, “Reads more like an initial proposal than a technical report of results” (1993). This comment shows that Beardshear viewed his role as one of detachment and criticism rather than engagement and contribution and illustrates Beardshear’s relatively low ranks for text responsibility and text consequences factors.

The “done is good” attitude

The second story about workplace writing process features Kevin Taylor and has to do with the “done is good” attitude that influenced Taylor’s review process. Taylor typically wrote quickly and well. He was a leader on the team, and he brought relevant environmental workplace experience to not only the IDMM team but also to TIP. Taylor demonstrated a firm grasp of the technical intricacies of the core technology. Because of these (and other characteristics I detail in chapter 3), I assigned Taylor ranks of 3 for organizational position and writing expertise, ranks of 5 for subject matter expertise and
Figure 17. Reviewer profile of Paul Beardshear

Figure 18. Beardshear's comment distribution (129 total)
responsibility for producing the text, and a rank of 2 for responsibility for consequences of
the text. The radar chart representation of Taylor's reviewer profile that reflects these
ranks follows as figure 19.

Taylor made the most comments of any of the study participants, with a total of 201
comments; 46.3% (93) of those comments were mechanical signals. These mechanical
signals accompanied 54 mechanical correction comments (26.9%). Taylor also made a
high proportion of content signals and corrections—26 content signals (12.9%) and 12
content corrections (5.9%). Taylor made a total of five comments in the rhetorical
categories (2.5%). This comment distribution pattern reveals a reviewer who is attending
to local content and mechanical matters, and is consistent with Taylor's attitude toward
workplace writing: "done is good." A chart showing Taylor's comment distribution is
shown in figure 20.

Taylor worked hard on the preliminary draft of the report. He wrote and reviewed
major portions of the text and was eager to meet what he (and others on the team)
understood to be a January 1, 1994 deadline for the project. Taylor recognized that the
engineering design was incomplete and that, therefore, the text was flawed. However,
despite this awareness, he primarily made comments designed to clean up the existing text
and put the best face on the existing engineering design rather than challenge the text and
the design at more global levels. For example, his single rhetorical query, "Results of this
survey is [sic] presented where?," focuses attention on an organizational matter that could
be considered relatively local rather than a query intended to meet global-level concerns
with audience, organization, or style. Taylor's other complex comment (counted as two
rhetorical corrections and two rhetorical signals) was a word-level change that showed
sensitivity to both potential reader response and style. He corrected "The potential to use
the laboratory in conjunction with remediation efforts will bring a much-needed ability to a
conventional laboratory burdened industry." by striking out as indicated and substituting
Figure 19. Reviewer profile of Kevin Taylor

Figure 20. Taylor's comment distribution (201 total)
One of the characteristics of Taylor's comments is his extensive use of signals to mark the places where he commented. In some ways, he mimics the conventions for proofreading galley texts by marking corrections in the text and marking an x in the margin next to the line where a correction had been made (when actually proofreaders mark the corrections in the margins and the signals in the text). Taylor knew that the preliminary draft would undergo significant revisions—revisions that would likely range from substantive, content-based engineering design decisions to global organizational and structural changes to the text to local-level mechanical polishing as the final draft neared production. However, even with the knowledge that this document was far from finished, Taylor approached this review as if he were proofreading as a final step before publication.

In the interview, Taylor remarked,

It got to the point where the number of revisions seemed to get out of hand, and basically I just, I guess at the end, you'd say I cut it as short and sweet as possible. And also that I quit being a perfectionist and I just lived with what I had written. . . . You had too many reviewers. You should have kept it to five technical reviewers. But I recognize the political aspect of the situation spreading it as thin as possible. But it just, the review process, didn't help at all. I mean other that what we globally already knew. . . . I think it needed more structure, it needed to flow, it needed transitions. Shoot we could read that thing, if we put it down for three days and not looked at it and then picked it up. We'd a had the same comments. (Taylor 1993)

Taylor carried out what he thought he was supposed to do: get the job done. In this passage he acknowledges the need for global revisions, yet he focused his attention on local, mechanical matters. In the workplace, Taylor was accustomed to producing reports under deadlines using incomplete or inconclusive data. He transferred his prior experience to the IDMM report and, in this case, perhaps because the team was a student team, Taylor decided that the content and global rhetorical issues might be overlooked if the report were correct at the local, mechanical level.

Taylor addressed the political nature of the preliminary review process but failed to acknowledge the ultimate contributions of comments made by subject matter experts,
writing experts, and reviewers with different organizational positions. In a move that is consistent with his “done is good” attitude, Taylor jumped to the end of the process by attending to mechanical issues rather than attending to the more serious content and rhetorical problems of the text.

The role of collaboration

The two stories in this section are about two features of collaborative interactions—distance and authority—that influence the workplace writing process. Both stories feature the responsibility for producing the text and responsibility for consequences of the text factors as well as the writing expertise and organizational position factors. The key player in the first story is Derek Gebhardt and the key players in the second story are Kevin Taylor, Dan Sanders, and Jim Perkins.

Collaboration and distance

The collaborative process of workplace teams is sometimes viewed as a process where writers work together to produce a common text. However, Gebhardt’s contributions to the IDMM team’s collaboration demonstrate the criticality of broadening that view of collaboration to value contributions made by members who apparently have little stake in producing the text.

As an independent project reviewer, Gebhardt filled two roles that influenced the nature of the team’s collaboration on the final report. First, as a reader, he represented an influential audience—upper-level decision-makers in whose hands the continued funding for the core technology project rested. Gebhardt was well aware of the layers of audience that the report had to reach, and he understood the technical report genre, both as a writer and as a reader of those reports. As a prospective reader and a knowledgeable reviewer, he was also aware of the political and practical implications of the report.

Gebhardt also filled a political role. In fact, Gebhardt’s participation on the team can be viewed as a political move. When Gebhardt was recruited by Tim Nelson and Ron
Paulson (the TIP director and IDMM team leader) to serve as an independent project reviewer for the IDMM team, TIP had only been in existence for about a year; forging alliances with other influential organizations was a logical step in building TIP. Gebhardt participated in early meetings where team members presented the marketing and engineering approaches. At one of these early meetings, Gebhardt suggested that the team consult with a patent attorney for discussions of possible ROIs based on the team’s engineering design, but he did not participate in that consultation. He also sat in on the IDMM team’s formal progress report meeting and a lengthy meeting about a month before the preliminary draft where the project reviewers gave oral feedback on aspects of the design and market analysis.

These two roles—expert reader and writer, and politically astute adviser—combine to influence the nature of the collaborative effort by which the IDMM report was written, reviewed, revised, produced, and distributed.

Gebhardt was not a designated author of the report. In fact, he had almost no stake in the process of producing the text. He held a moderate stake in the consequences of the text (he ranked 3 on this factor), but he was not likely to be personally affected by the report’s outcome (see page 85 for illustrations of Gebhardt’s reviewer profile and comment distribution). Nonetheless, Gebhardt played a central role in the team’s collaboration: his comments, which focused almost exclusively on rhetorical matters, influenced the final report as much as subject matter experts’ comments on the technical accuracy of the content.

Even though Gebhardt’s participation on the team could be viewed as a gratuitous political gesture, Gebhardt contributed important feedback that shaped the final report. In part because he made the comments about rhetorical issues (as opposed to someone with low ranks for organizational position and writing expertise who might make similar comments), the comments were seriously considered as the team rewrote the report.

As Kleimann points out, “workplace staff and reviewers look for a delicate balance among audience, task, document use, politics, and conflicting values” (1993, 68). That
delicate balance reflects the process of creating a common goal, which for the IDMM team was a coherent, effective final report of the marketing and manufacturability of the core technology. Despite Gebhardt’s distance from the team in terms of the organizational hierarchy and in terms of day-to-day participation, Gebhardt collaborated with the team members in a vital, productive way.

Collaboration and authority

This second story about collaborative interaction features Kevin Taylor, Dan Sanders, and Jim Perkins and focuses on the profile factors that influence how reviewers assert authority. Taylor had nine years of professional workplace experience before he returned to ISU to work on a master’s degree in civil engineering. Taylor made the most comments overall (38.7% of the total comments made by all reviewers); nearly all (97.5%) were mechanical and content comments. Perkins’ position at TIP was his first job after finishing his undergraduate degree in mechanical engineering. Perkins’ 52 comments were primarily content comments (65%), with mechanical comments comprising the other 35%. Sanders, on the other hand, brought experience from his summer internship and was a traditional student who was finishing his undergraduate degree in electrical engineering. Sanders made a total of 74 comments, with 48 content comments, 12 mechanical comments, and 14 rhetorical comments.

These three reviewers ranked high for subject matter expertise (Perkins and Taylor ranked 5; Sanders, 4). For responsibility for producing the text, Perkins ranked 3, Sanders 4, and Taylor 5. Perkins could have ranked much lower on this scale, but because of his computer system administrator responsibilities and his drafting expertise, he extended his commitment to the team. Figure 21 shows the reviewer profiles for Sanders, Perkins, and Taylor; figure 22 shows comment distributions for these three reviewers.

Because of his workplace experience, Taylor worked on the marketing study that was reported in the first component of the report. He also worked on the engineering design component of the report where he wrote major parts of the operating protocols
Figure 21. Reviewer profiles of Sanders, Perkins, and Taylor.
Figure 22. Sanders, Perkins, and Taylor's comment distributions
chapter and helped with the overall design chapter. Taylor's involvement in the two major components of the report, combined with the fact that he typically wrote quickly and well, meant that he assumed responsibility for either drafting or reviewing sizeable portions of the report.

Taylor's comments focused on getting the job done, getting the report out the door whether or not it was ready. Even though Paulson and I acknowledged the rhetorical problems the report had as well as technical areas that were not fully explored, Taylor apparently didn't share our views about the flaws in the report. His rhetorical comments focused on local-level concerns rather than on global rhetorical matters.

Sanders, who was the sole author of the power chapter, had the lowest organizational position rank of the six reviewers. As an undergraduate with no professional workplace experience, Sanders could have commented only in the areas where he had classroom experience. Instead, Sanders commented throughout the report and made all three kinds of comments. His comments about the technical content are particularly interesting because they show that Sanders viewed the power chapter as part of a whole. Indeed, Sanders assumed authority and challenged the technical content in ways that belie his organizational position.

As I described in the story about subject matter expertise and responsibility for the text, Perkins served as a subject matter resource and helped team members draft the illustrations of the engineering design for the final report, but he wrote nothing. His review and assistance with the computer aspects of producing the final report were his primary contributions to the report.

The factors that contribute to the reviewer profiles and comment distributions of these three reviewers combine to highlight a fundamental, yet critical observation about the nature of workplace collaboration: effective, productive teams benefit from the spectrum of contributions of the team members. The trick, however, is to weigh those contributions against some standard in order to ensure optimum process and product. For example, if only Taylor's comments had guided the revision of the IDMM report, it is conceivable that
the team simply would have filled in the parts that were obviously missing, clarified some of the content issues, and cleaned up the mechanical errors so the report could be distributed right away. If Gebhardt hadn't collaborated as he did with the sophisticated rhetorical comments, the team might have been persuaded by the authority of Taylor's workplace experience and the sheer volume of his comments.

Sanders' comments illustrate a further aspect of workplace collaboration, the negotiation of authority and responsibility within a team. His politeness strategies reflected his organizational position and served to cushion his comments. Tia Kelly, one of the pilot testers, spontaneously remarked on the politeness features she observed in Sanders' comments.

Even when Sanders challenged the technical content, he was not only expressing his concerns but he also was negotiating his authority by asserting his point of view. For example, Sanders made queries and statements such as “Is this really the criteria?” (thesis data set, page PD-8A) and “Redundant. Would this fall under the time cost” (thesis data set, page PD-6). Both of these comments challenge the text and assert that a problem exists, but both are phrased in ways that give the writer a face-saving out rather than in ways that force the writer to defend the positions.

Perkins advocated for his point of view, too. His “oh? what about accumulating non-constant rate generated particles and feeding them at a constant.” (thesis data set, page J-8) comment shows that he disagreed with the text. Rather than assume a subordinate position marked by politeness, Perkins asserted his authority as a subject matter expert. Even though queries may be viewed as less challenging than corrections or statements, Perkins is nonetheless asserting that a problem existed and that he expected the team to consider this aspect of the technical content.
Concluding remarks

What, if any, is the relationship between profiles of reviewers and the comments they make? I seriously considered the possibility that, indeed, no such relationship could be identified or explored. In keeping with observational, qualitative methodology, I charted a course through a data set that provided numerous clues to relationships that defied simplistic explication. I observed that characteristics of reviewers and characteristics of their comments tended to follow discernable patterns. Of course, as with all descriptive analysis, the patterns that I observed are context-specific. However, even though the patterns can not be generalized, I believe that the tools used to characterize the reviewers and their comments may prove useful in other contexts; I address possible applications for the tools in the following section. Finally, I summarize my answers to my question: what is the relationship between profiles of reviewers and the comments they make?

General observations

Through repeated explorations of various features I identified in the data, I suggest that there is no single relationship between reviewer profiles and reviewer comments; no single characteristic of a reviewer can be isolated and correlated with a single characteristic of that reviewer’s comments in order to provide a robust answer to the question about the relationship between reviewers and the comments they make. Rather, I suggest that relationships between reviewers and the comments they make are inherently complex and any attempt to tease out those relationships must at once account for the complexity and at the same time simplify the process in order to facilitate the analysis. Thus, the stories in the first three sections of this chapter offer snapshots of the relationships among reviewers and the comments they make.

Based on these snapshots, I suggest the following as some of the broadly drawn patterns that emerged from this study. While these patterns confirm basic, commonly held views about the nature of workplace writing and workplace review, the elaborations
suggest ways our understanding of the processes can be enriched. While the broad patterns may seem self-evident, my observations explain why these confirmations of the common sense are important.

**Teams of reviewers maximize the breadth of review comments.** Individuals on teams, especially teams with document review as a central defining feature, produce a broad spectrum of comments. These comments range from ambiguous marks to sophisticated written accounts of complex rhetorical and technical exigencies. Indeed, in my data set, signals—a symbol, mark, or other non-word device—constitute 53.8% of the total number of comments, while the remaining 46.2% of the comments were distributed among the other nine cells of the comment categorization matrix representing the rest of the range of possible comments. Even though each story focuses on a different aspect of the comments and the evidence that supports my analyses, nearly all of the comments were useful in some respect. For example, Gebhardt’s comments about organization and audience shaped the eventual report. Byers’ word-level corrections about the technical process influenced the way that information was presented. Taylor’s mechanical corrections and Beardshear’s insistence on numbered lists drew attention to the need for the team to follow the style sheet for the report. Perkins influenced the way the content was presented by challenging assertions and by offering options that the team had apparently not considered. Sanders identified both local- and global-level content and rhetorical concerns that were addressed in the subsequent revisions.

**Reviewer profiles are dynamic.** In order to accurately assess reviewer profiles, we have to be able to account not only for characteristics of individuals that are relatively stable but also for shifts in situations and tasks. In chapter 3, the comparison of reviewer profiles for Ron Paulson for two different review tasks, the IDMM report and this thesis, illustrates this point. A further indication of the dynamic nature of reviewer profiles is revealed in Paulson’s comment as he ranked one of the participants: “What I expected [as
he pointed to the 4 on the scale] and what I actually got [as he pointed to the 1 on the scale]” (Paulson 1995).

**Information changes how we talk about review.** We can devise vocabularies and taxonomies for talking about characteristics of reviewers as well as characteristics of comments. These vocabularies and taxonomies enhance the document review process by finding meaningful ways to negotiate reviews. Instead of handing a document to a colleague and asking, “Can you take a look at this for me?,” we can say, “Because you know a lot about subject X, I'd like you to read through this draft and correct the places where you think I’ve made technical mis-statements and tell me where you don’t fully understand what I wrote.” I suggest that the first option might tend to generate more of the “it’s pretty good” type of comment with sprinkled comma corrections while the latter negotiation might yield more substantive comments that focus on the technical content. People can probably be trained to use specific vocabularies and taxonomies to help them detect differences among reviewers and comments in order to enhance and understand the review process.

An example of this observation in the study is the story about Byers and Perkins. Because Perkins and Byers were both subject matter experts, we naturally expected their comments to focus on the technical aspects of the report. However, with the additional information about the each reviewer's stake in producing the text, it is easier to understand the different ways each chose to comment.

**Comments fall into patterns.** Even though we can’t predict how reviewers will comment, we can determine patterns of comments. This is, of course, consistent with what we know about the predictability of any human behavior. But, as research tools, the reviewer profile scale and the comment categorization matrix provide ways to examine and describe the document review process. Without the reviewer profile scale, the comment categorization matrix simply illustrates a catalog of comments or suggests ways reviewers
can comment. Without the comment categorization matrix, the reviewer profile scale is simply an illustration of characteristics of workplace writers. While each kind of information is useful, the patterns emerge only when the information from each tool is considered together.

**Exceptions to patterns provide useful information.** Even though we can gain valuable insights into the review and revision processes by using the reviewer profile scale, we still need to assess the dynamic interaction of all the factors instead of relying on apparent patterns. We ought to resist the temptation to assume that an individual will comment in predictable ways. Instead, we can learn from studying reviewers like Dan Sanders who exhibited expert-like behavior even though his ranks suggested that he might have commented differently.

**Conclusions**

The preceding general observations point the way for four more focused conclusions. Even though these conclusions suggest that certain factors are influential, no single factor can account for any kind of comment or way of making a comment. The three reviewer profile scale factors I focus on in these conclusions—organizational position, subject matter expertise, and writing expertise—seem to be primary factors, each influencing the others to some degree. The other two factors—responsibility for producing the text and responsibility for the consequences of the text—seem to be secondary factors that influence each other as well as the primary factors. Given the interrelated nature of the factors on the scale, I suggest the following four conclusions.

**Organizational position seems to influence the kinds of comments reviewers make (as distinguished from the ways reviewers comment).** Derek Gebhardt exemplifies the influence of organizational position. Gebhardt offered sophisticated rhetorical comments that grew out of his 27 years of experience in upper-level management and the rhetorical
strategies the team needed to employ in order to be successful with the audience of upper-level managers that he represented. However, stake in the text—both producing the text and stake in the consequences of the text—tempers the influence of organizational position, both in terms of the number and the distribution of comments reviewers make and in terms of the ways writers use the comments. For example, Dan Sanders, who had a low organizational status, had a high stake in the consequences of the text and consequently exhibited expert-like behaviors in that a relatively high percentage of his comments were rhetorical comments.

Subject matter expertise tends to influence the kinds of comments reviewers make (again, distinguished from the ways reviewers comment). Jim Perkins and Stewart Byers provide examples of this trend. Both Perkins and Byers, who were subject matter experts, commented extensively on the technical content of the report, which seems congruent with the broader pattern about the nature of individuals and teams. Perkins and Byers participated on this team because they were subject matter experts; the team sought their comments in order to ensure that the technical content of the report was accurate. However, Perkins and Byers brought different domain expertise (Perkins in mechanical engineering and Byers in chemical engineering) to the review process. As was expected, Perkins and Byers focused attention on the parts of the report having to do with his area of expertise.

Even though both reviewers focused their attention on the technical content of the report, they commented in different ways; responsibility for the text seems to be the distinguishing factor that influenced the ways each reviewer commented. For example, Perkins, who had a high level of involvement with the production of the text as well as a high level of commitment to the individual team members, carefully marked his copy of the preliminary draft in order to remember to comment extensively on all of the aspects of the content that he felt were not accurate. Byers, on the other hand, had little stake in the
Nearly half of Byers’ comments were content corrections, and most of those corrections were word-level corrections rather than concept-level comments.

**Organizational position influences the frequency of comments.** Byers and Perkins also illustrate the influence of organizational position on the frequency of reviewer comments. This influence, however, also is mediated by the influence of reviewers' level of responsibility for the text. For example, Byers had a relatively high organizational position, with little to “prove.” He was interested in continued funding for his position in an industry where funding is exceptionally uncertain, but he seems to have weighed the relative influence of the IDMM report against the possible outcomes of the up-coming field demonstration. Byers evidently chose to focus his attention on preparing for the demonstration rather than expending a great deal of time or energy reviewing the IDMM's preliminary draft. Consequently, like Taylor, Byers quickly provided a “done is good” review of the draft before he left for the demonstration.

Perkins, who also invested a great deal of time and energy in the field demonstration but also had a high degree of responsibility for producing the text, made a special point of arranging for a face-to-face conversation that focused on technical aspects covered in the report. This conversation took place after he returned from the field demonstration, even though it meant an extension of the stated deadline for returning review comments.

**Writing expertise seems to influence rhetorical comments.** In this study, reviewers with higher rankings (Gebhardt 5; Sanders 4) on writing expertise tended make more rhetorical comments. In some cases, these comments were specific inquiries about reader responses or suggestions for more effective organization. Generally, the reviewers with lower writing expertise (Perkins, Taylor and Beardshear 3; Byers 2) made markedly fewer rhetorical comments. Of course, people who display expert writing behavior may also
comment on mechanical writing issues just as content experts also comment on mechanical writing issues that intrude on their focus on the technical accuracy of the text.

**Applications and directions for future research**

At the beginning of this thesis, I analyzed the different ways writers characterize research participants and organizations where research is conducted. By extending the characterization process from research reports to the workplace review process, I argue for a systematic approach to characterization that can assist writers and enhance the review process. The two tools I developed, tested, and used to analyze the data in this study, the reviewer profile scale and the comment categorization matrix, constitute one way to systematically approach the review process.

In this final section I explore two further aspects of my work, possible applications of the two tools and directions for future research.

**Applications for the tools**

- My research was situated in the workplace where I view practitioners of workplace writing as people who are concerned with increasing their writing expertise. I believe that the two tools, the reviewer profile scale and the comment categorization matrix, can help workplace writers increase their writing expertise while at the same time improving workplace writing by enhancing the workplace review process. Using the two tools can accomplish these objectives:
  - empower writers and reviewers by helping them understand more about the review process
  - provide writers with a vocabulary for talking about comments
  - help writers understand characteristics of reviewers
  - give reviewers guidelines and models for commenting
  - help writers and reviewers negotiate useful reviews

Each of these objectives also can be used in writing classrooms, where the focus is on promoting expert-like writing skills and nurturing developing writing expertise. In
order to enhance the value of the comment categorization matrix as a pedagogical tool, the comment categorization matrix might need to be refined to include examples of the various comments that are drawn from less technical sources (the examples on the matrix I used for my research are comments taken from the 19 drafts of the preliminary review). While students are not as likely to reflect as broad a range of reviewer profiles as the range found in many workplaces, the reviewer profile scale can help students begin to discern differences among reviewers. The responsibility for producing the text and responsibility for consequences of the text factors would probably assume more influence in a classroom, while the organizational position factor might tend to be somewhat less influential.

**Directions for future research**

I see three distinct areas where future research could build on the work presented in this thesis. First, I would like to explore varying levels of expertise (both subject matter expertise and writing expertise) as they influence the review processes of teams. Do teams of experts approach the review process differently than teams of non-experts? Do teams with both non-experts and experts comment in different ways than teams with only non-experts?

Second, I would like to incorporate some way of accounting for time on task as an influence in the review process. How much time do people spend when they review a text? Does the amount of time depend on the individual’s profile? Is the amount of time spent on the review task related to the number of comments a reviewer makes? For example, Byers made 18 comments on the same document where Taylor made 201 comments. Even though the number of comments varies dramatically, I wonder if the time spent reviewing the document varied proportionately. I think it would be interesting to measure time on task in order to add another dimension to the relationships between the reviewer profiles and the kinds of comments each of these reviewers made.

Third, I would like to investigate the interplay of reading and writing in document review. Written comments are the artifacts that remain after the writing part of the review
process, but no measurable artifacts remain that allow us to investigate the reading part of the review process. For instance, it would be interesting to find out if reviewers report that they skim a text or read word-for-word; read the parts in order or out of order; or depend on what readability research suggests are important cues (such as headings, font changes, bulleted lists, or tables of contents).

Summary

There are, indeed, complex relationships between profiles of reviewers and the comments those reviewers make. I characterized the reviewers in the study as well as the comments they made using the reviewer profile scale and the comment categorization matrix. All three kinds of comments—content, mechanical, and rhetorical—were made by the reviewers in all four ways—query, statement, correction, and signal.

Based on the analysis of this data, I observed the following patterns that involve the three primary factors in the reviewer profile scale—organizational position, subject matter expertise, and writing expertise.

- Organizational position seems to influence the kinds of comments reviewers make (as distinguished from the ways reviewers comment).
- Subject matter expertise tends to influence the kinds of comments reviewers make (again, distinguished from the ways reviewers comment).
- Organizational position influences the frequency of comments.
- Writing expertise seems to influence rhetorical comments.

The relationships described in these conclusions are tempered by the two other factors in the reviewer profile scale—responsibility for producing the text and responsibility for consequences of the text.
WORKS CITED


Beardshear, Paul [pseud.]. 1994. Interview with the author. 13 May.


Byers; Stewart [pseud.]. 1994. Interview with the author. 8 August.


Gebhardt, Derek [pseud.]. 1993. Memo to author, 15 November.

Gebhardt, Derek [pseud.]. 1994. Interview with author, 2 November.


Paulson, Ron [pseud.]. 1995. Reliability test interview with the author. 5 June.

Paulson, Ron [pseud.]. 1993. Note to Paul Beardshear that accompanied the preliminary IDMM report.


Taylor, Kevin [pseud.]. 1993. Interview with author. 16 December.

APPENDIX A. QUESTIONNAIRE
Preliminary draft questionnaire

Reviewer ________________________________

Do you have specific concerns with the content of this report? If so, what are your concerns and how might the IDMM team address them?

Has anything critical been omitted? If so, what? Why should it be included?

Do you think this report meets the IDMM team report’s goal? The IDMM report’s goal is to report the results of the IDMM team and recommend a suite of technologies that continues the transfer process of LA-ICP-AES/MS from the laboratory to the marketplace. If not, how could we better meet the goal?

Please rank the effectiveness of the following characteristics of the report:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Effective</th>
<th>Ineffective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Accessibility of information</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Readability</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Style</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Technical content accuracy</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Technical content completeness</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

*Please explain any items that you rank 2 or 1.*

What other suggestions do you have to improve the report?

Please return this form and the draft with your comments to:
Chris White at TIP, Sherman Place, 125 S. 3rd. (294-8542)
By October 29
APPENDIX B. HUMAN SUBJECTS APPROVAL FORM
1. Title of Project: Structuring Ambiguity: Writing in Technology Transfer

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

Christianna L. White
Typed Name of Principal Investigator
14 Oct 93
Date

3. Signatures of other investigators:

Rebecca E. Burnett--
Helen R. Ewald--
Ralph E. Patterson, III--

4. Principal Investigator(s) (check all that apply)

[ ] Faculty [ ] Staff [x] Graduate Student [ ] Undergraduate Student

5. Project (check all that apply)

[ ] Research [x] Thesis or dissertation [ ] Class project [ ] Independent Study (490, 590, Honors project)

6. Number of subjects (complete all that apply)

13 # Adults, non-students 13 # ISU student 8 # minors under 14 8 # minors 14 - 17

7. Brief description of proposed research involving human subjects: (See instructions, Item 7. Use an additional page if needed.)

My research question is: How is writing variously defined in technology transfer teams and what are the key problems associated with writing in technology transfer? In addition to an overview of relevant literature, I will investigate this question by examining a multidisciplinary team of students and staff working on technology transfer through the Integrated Design for Marketing and Manufacturing (IDMM), which is sponsored by the Technology Integration Program of Ames Laboratory. I will obtain data by observing interactions and recording observations, transcribing tape recordings of meetings, and examining multiple drafts of documents and incidental e-mail and text-based messages. I will conduct a questionnaire based interview of each subject. No incentives or follow-up techniques will be used to collect data.

(Please do not send research, thesis, or dissertation proposals.)

8. Informed Consent:

[ ] Signed informed consent will be obtained. (Attach a copy of your form.)
[ ] Modified informed consent will be obtained. (See instructions, item 8.)
[ ] Not applicable to this project.
Checklist for Attachments and Time Schedule

The following are attached (please check):

12. [X] Letter or written statement to subjects indicating clearly:
   a) purpose of the research
   b) the use of any identifier codes (names, #'s), how they will be used, and when they will be removed (see Item 17)
   c) an estimate of time needed for participation in the research and the place
   d) if applicable, location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, note when and how you will contact subjects later
   g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. [X] Consent form (if applicable)

14. [X] Letter of approval for research from cooperating organizations or institutions (if applicable)

15. [X] Data-gathering instruments

16. Anticipated dates for contact with subjects:
   First Contact: ___________ Last Contact: ___________
   Month / Day / Year       Month / Day / Year
   8 Jul '93                13 May '94

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:
   ___________ Month / Day / Year

18. Signature of Departmental Executive Officer: __________________________ Date: ____________

19. Decision of the University Human Subjects Review Committee:
   [X] Project Approved     [ ] Project Not Approved     [ ] No Action Required

   Patricia M. Keith          10/29/93
   Name of Committee Chairperson     Date     Signature of Committee Chairperson

GC: 1/90
Cover memo to inform subjects and request consent

October 14, 1993

To: IDMM Team Members and TIP Staff
From: Christianna I. White
Subject: Consent to participate in research

I would like you to participate in research toward my master's thesis. My research question is: How is the role of writing variously defined in technology transfer teams, and what are some key problems associated with writing in technology transfer? Here is some information about my research methods and how you might participate in my study.

In addition to an overview of relevant literature, I will investigate this question by examining a multidisciplinary team of students and staff working on technology transfer through the Integrated Design for Marketing and Manufacturing (IDMM), which is sponsored by the Technology Integration Program of Ames Laboratory. I will obtain data by observing interactions and recording observations, transcribing tape recordings of meetings, and examining multiple drafts of documents and incidental e-mail and text based messages. I will conduct a questionnaire-based interview of each subject. No incentives, compensations or follow-up techniques will be used to collect data.

Time needed In addition to your normal involvement with the IDMM team, a questionnaire-based interview will take about two hours.

Location of the research activity The interviews will take place at the Ames Laboratory Technology Integration Program office.

Confidentiality I will ensure confidentiality by using pseudonyms when interpreting this research. All identifying information will be removed from the texts or artifacts.

Identifier codes No identifier codes will be assigned to subjects; pseudonyms will be assigned to protect subjects' identities.

Future contact Future contact beyond normal involvement with the IDMM team and the interview is not expected.

Voluntary participation Participation in this research project is voluntary; nonparticipation will not effect evaluations.

Giving consent If you are willing to participate in this research, please read, sign and return the enclosed consent form. Thank you for your help.
APPENDIX C. TEST INSTRUCTIONS

Reviewer profile: Information and instructions
Reviewer profile worksheet
Instructions for chunking and coding comments intended to guide revision
Reviewer profile: Information and instructions

Several factors must be considered in order to form a profile of a reviewer. All of these factors are interrelated and highly context-specific. Among the general categories of factors are: organizational position, writing expertise, subject matter expertise, responsibility for producing the text, and responsibility for the consequences that result from the text. Each of these general categories of factors has contributing factors that ought to be considered when describing an individual on the general factor scale. The following list shows contributing factors for each of the general categories of factors.

Organizational position

Generally this category has to do with the rank or status an individual has within an organization or group of people. Sometimes this position is official and an individual's status can be understood by looking at things like titles and positions on organizational charts. Sometimes, though, relative position may be the result of things like years of experience on the job.

Some of the contributing factors of organizational position are

- job title
- supervisory responsibilities

Writing expertise.

Generally this category has to do with a reviewer's writing expertise. Because research in the area of expertise shows that practice of an activity like dancing, chess or writing correlates with expertise—people who practice a lot tend to be more expert. Expertise can also be associated with training and with recognition by others (which might take the form of publications or commendation).

Some of the contributing factors of writing expertise are

- amount of time usually spent writing (not necessarily how long a person spends on a writing task but rather how much of a person's time is spent writing)
- specialized training in disciplinary writing
- publications in the discipline or related to the topic
- special recognition for writing
Subject matter expertise.

Generally this category has to do with the reviewer's knowledge about the discipline or the topic of the text—in other words, the reviewer knows about what the text is about. It is common to ask a subject matter expert to review a text to ensure technical accuracy. Discipline can mean profession, highly specialized technical or scientific area, or avocation.

Some of the contributing factors of subject matter expertise are

- knowledge about the topic of the text
- amount of time the reviewer has been associated with the discipline
- amount of academic experience related to the discipline

Responsibility for the text

Generally this category has to do with who is supposed to get the writing job done. Sometimes coauthors review one another's work as part of their mutual commitment to producing the text; sometimes editors review texts as part of their job and provide suggestions for revision based on their understanding of writing and editing principles; sometimes friends or colleagues who have a "good eye" are asked to read over a draft and give feedback even though they have no commitment to the text.

Some of the contributing factors of responsibility for the text are

- reviewing as a favor (low) – designated author (high)
- stakeholder in the process of the text

Responsibility for consequences of the text

Generally this category has to do with who benefits from the eventual success of the text or who suffers if the text is somehow insufficient. Different reviewers have differing degrees of engagement with texts based on their stake in the end results of the text. A manager may have a greater stake in review of a text she has delegated to a subordinate that will go out over her signature. In some cases, funding for an individual or an organization (which may take the form of an accepted proposal that generates income or continued support of a project by a funding agency) may be contingent on the text. In some cases, the consequences may be less tangible and take the form of public notice or private commendation—from a by-line in a company newsletter or a plaque citing exemplary performance to a handwritten "great job" note from a co-worker or supervisor.

Some of the contributing factors of responsibility for consequences of the text are

- managerial responsibility
- stakeholder in the further development of the technology or topic
• organization's success
• reviewer's personal success

Instructions for filling out reviewer profiles

One of the assumptions of this profile tool is that profiles are not static but rather shift with the particular task, role, situation, context, or organization where each individual makes review comments on text that are intended to guide revision.

Your job is to use the factors and guidelines presented above along with your knowledge of the individuals and the specific context (the preliminary draft of the IDMM report) to help create a profile of the people affiliated with the IDMM team.

Please rank every reviewer on every factor. Even if you don't have first-hand knowledge about one or more of the factors of each of the reviewers included in the sample, complete the form using your impressions and what knowledge you do have.
Reviewer Profile Worksheet

Reviewer ________________________

<table>
<thead>
<tr>
<th>Factor</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational position</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Writing expertise</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Subject matter expertise</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Responsibility for the text</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Responsibility for consequences</td>
<td>Low</td>
</tr>
<tr>
<td>of the text</td>
<td>1</td>
</tr>
</tbody>
</table>
Instructions for chunking and coding comments intended to guide revision

The purpose of this task is to classify comments that reviewers make. Our goal is to try to classify these comments according to what the reviewer intended to say to the author of the text (as opposed to classifying the comments according to what we might mean if we wrote the same comment). In order to classify these comments we have to first decide what the units of comment are; I'm calling these units chunks. After the comments have been chunked, they will be coded—placed in a classification matrix.

In order to chunk and code the comments you will probably not need to read and understand the entire text. However, when you are both chunking and coding the comments, you should read the text adjacent to the comments in order to try to get the gist of what the reviewer is telling the author.

Before you begin chunking the comments, you should familiarize yourself with the coding matrix. You need to understand the matrix because you will eventually decide where chunked comments fit in the matrix.

About the matrix

The Category Matrix for Comments Intended to Guide Revision consists of three classes of comments across the top that match with four ways of making comments to form a twelve-cell matrix. Each cell of the matrix has two parts. The top, shaded part contains a definition for that cell and the bottom part shows some examples of the kinds of comments you might place in that cell. The text that was commented on is in CG Times 12pt (as is this text) and the sample comments are handwritten. Elaborations look like this: \[ written in the margin. \]

Chunking the comments

To chunk the comments you will use the following items.

- the originals of text with comments in sheet protectors (please do not mark on the originals)
- photocopies of the text with comments for you to mark on
- a copy of the matrix with definitions and examples
- three pens—red and green for chunking and black for coding

After you have examined the coding matrix, you will look at some pages of text that have reviewer comments on them. You will look at each page carefully and decide how you think the comments should be chunked.

Some chunks will be discrete; in other words, one mark or word will be the entire comment. You will circle these discrete chunks with the red pen.
Some comments will be more complex because they consist of more than one element from
the coding matrix. When this is the case, you will circle both the individual elements as
well as what you think the whole chunk is. Circle the whole complex chunk with the red
pen and circle the individual elements of the chunk with the green pen.

Generally it is better to make too many chunks than not to break each chunk down into
enough components. When you are chunking, you may find it helpful to think about
where the comments you are chunking will fit in the matrix.

Here is a sample page of text with comments. Because this page has several chunks and in
order to clarify the boundaries between the chunks, this one page of text with comments is
chunked and coded on two photocopies of the page. As you can see, the comments have
been both chunked and numbered.
Direction of travel

Larger particles in the aerosol have a greater mass and therefore greater inertia than the smaller particles and the argon gas itself. When argon passes around a bend in the tube, the larger particles resist the change in momentum and strike the tube wall, consequently falling out of the gas stream. Particles that impact the wall may stick or escape. The percentage of particles that remain stuck to the wall is a function of all the factors discussed above.

Particle excitation

The inductively coupled plasma (ICP) torch acts as a transducer in the analytical system by converting the sample mass stream into a characteristic light signal that can be sensed and analyzed. Therefore, the plasma torch is a pivotal component in the LA-ICP-AES sampling system. As the particles from the ablation cell pass through the ICP torch, they are vaporized, atomized, ionized, and then excited to a higher excitation state. In this higher state, the valence electrons of the elemental particles are excited to higher energy shells. When the particles desorb, the excited electron will move from their excited state to a natural ground state releasing a photon of light energy. This release of energy creates the visible (and invisible) flame, or plasma, whose light can be analyzed by an atomic emission spectrometer.

The stream of argon and sample particles from the transport tube is directed through a radio frequency (RF) coil which generates a large amount of electromagnetic energy. The coil is composed of spiral-wound copper tubing which allows water to flow through for cooling purposes. The electromagnetic energy is produced in an RF generator which is connected to the coil with a coaxial cable. The RF energy creates an electromagnetic flux in the coil which transfers the energy to the passing gas stream. RF generators can operate at 27.12 MHz and 40.68 MHz and dissipate approximately 1.1 kW of power to the argon and sample gas streams.

There are three distinct gas flows that pass through the coil to create the plasma. Each flow is composed of argon gas, and the three flows are arranged in concentric rings. Auxiliary or shielding gas flows through the outer most ring with a flow rate of approximately 0.8 L/min. Its purpose is to prevent air from interacting with the plasma, thus preventing the surrounding air from being excited and introducing error into the sample reading.

The flow from the middle ring is referred to as the plasma gas flow. Its flow rate is typically 16 L/min. This flow forms the plasma flame used for ionization of the mass particles. The plasma, which is composed entirely of excited argon atoms, can reach temperatures from 3,000° to 40,000° C. An important distinction to remember is that the heat is generated by the excitation of
Coding the chunks

As with the chunking activity, you don't have to read (or understand) all of the text, but it is important for you to consider the text that is adjacent to the comment in order to make the best decision about how to code that chunk. Each chunk is numbered and your task is to write the number of each chunk in the matrix position that most closely corresponds with what you think the reviewer is telling the author.

Remember that chunks are not only discrete and relatively simple but also combined and somewhat complex. In some cases, a signal, which is defined as a symbol, mark, or other non-word device, combines with a word, phrase, or another signal to make up a chunk. Corrections frequently consist of a signal paired with a suggestion for a change or replacement. Code the signal and the actual suggestion for the change separately.

Note that complex chunks have both a number and letters. For example, in the example on the previous page, the whole chunk 12 as well as the components need to be included in the matrix (e.g., 12, 12a, 12b and 12c). If you place the whole chunk (12) in two cells in the matrix, you also have to decide where the component chunks go.

Some information to help you make decisions

1. A signal is a symbol, mark, or other non-word device. In some cases, signals are paired with words and together convey the reviewers meaning.

2. Sometimes reviewers consistently use symbols that have a very specific meaning for them, but are not commonly used. For example, in the texts you will be chunking and coding, one of the reviewers uses a symbol that looks like this \( \uparrow \) to indicate that the letter should be changed to be uppercase rather than lowercase. The meaning of this symbol can be inferred from the context of the comment—this comment is generally adjacent to other marks that indicate how the reviewer would change the sentence structure of the text.

3. Sometimes reviewers make lines or use question marks that don't seem to be associated with other comments that help make meaning. Here is an example of this sort of comment:

   - sensors and controllers to regulate environmental conditions and support systems behavior within the mobile laboratory
   - Global \( \text{Positioning system} \) and other system add-ons

4. When the only marks in a paragraph are parentheses, consider the pair one chunk. If there is a signal (like an arrow or a question mark) in the margin, the parentheses and the signal will probably be one red chunk, with the signal and the pair of parentheses each being a green chunk. Here is an example.
As discussed earlier, the costs associated with analyzing hazardous waste samples can be substantial. However, analytical sampling costs are only one component associated with the overall cost of sample analysis. The costs of actually collecting the sample,