
P R O C E D U R E S P E C I F I C A T I O N

Title:	Document Preparation
Issue Number:	1.0
Approved:	_____
Date:	_____

1. POLICY

Preparing a document is a project and is managed along the same lines as any other project. All documents, regardless of size, prepared for an internal or external customer are prepared according to this procedure specification. The requirements governing the document's content are derived from the customer's specification (including Request for Tender documents) and this procedure specification.

2. OVERVIEW

A document that is prepared for someone else, internal or external, is prepared for a customer and customers have requirements. The document preparation process seeks to satisfy those requirements. For small documents, the process can be as short as a few days and all parts of the process need to be addressed, however briefly, to prevent errors due to assumptions or missing necessary details.

As a rule of thumb, any document, irrespective of size and subject content will take a minimum of 1 hour per page to produce (from blank paper to deliverable form); forty pages will take forty hours of uninterrupted work - minimum. This is why document production has to be planned and managed in a proper manner.

The fundamental message of this procedure specification is to plan the work and work the plan.

There are three phase in the documentation production process:

- a. Planning (30%)
- b. Implementation (68%)
- c. Wrap-up (2%)

The Planning Phase produces an *information plan*, *project plan* and a detailed *content specification* for the document (down to the second header level and the number of pages in each section of the document). The Implementation Phase is an iterative write and review activity, managed according to the project plan and the content specification. The Wrap-up Phase produces a *wrap-up report* which reviews the project in terms of actual performance against the plans, what could be done better next time, what errors can be prevented from occurring next time and adding the project statistics to the relevant database.

3. PROCEDURE SPECIFICATION

The three phases in this procedure are sequential and it is essential to resist the urge to begin writing before the Content Specification is completed. If writing commences before the Content Specification is finished, it increases the risk of having to re-work the material - which is a waste of time and money.

3.1 *Planning Phase - Part 1*

INPUT: Customer requirements and briefing

Reqment: An Information Plan shall {1} be produced in accordance with the guidelines in Appendix A.

A Project Plan shall {2} be produced in accordance with the guidelines in Appendix D.

The primary purpose of the Information Plan is to describe the characteristics of the target audience and to make some initial observations concerning the design of the document itself.

Allow 10% of the total available project time for the preparation of these two plans (if the duration of the project is not known, allow one week). The Information Plan can be commenced as soon as the need for the document is known - before it becomes a formal production project. Starting early allows extra time for additional planning. The Project Plan contains the first cut of the resources, schedule and milestones.

Both plans are brief because:

- The Information Plan is expanded in the Content Specification
- The Project Plan will be updated later in the process

Allow time for the Information Plan to be approved.

OUTPUT: An approved Information Plan and a draft Project Plan.

3.2 Planning Phase - Part 2

INPUT: Information Plan, Project Plan and the customer's requirements documents

Reqment: A Content Specification shall {3} be prepared in accordance with the guidelines in Appendix B.

An Issue Tree(s) shall {4} be prepared in accordance with the guidelines in Appendix E.

The Project Plan shall {5} be updated in accordance with the approved Content Specification.

Allow 20% of the total available project time for this activity. This is an iterative activity by which the Content Specification and the Issue Trees evolve together. Depending on the purpose of the document, this phase can involve significant discussion about the requirements and methods concerning the product itself rather than about the content of the document. This is natural, but must not change the focus of this phase. The output of this activity is a specification for the content of the document, down to the second header level (the final detail of the product is a separate issue).

The Content Specification and updated Project Plan are formal documents (which means they will be subject to Configuration Management) but the Issue Tree is an informal collection of charts and diagrams that can be summarised and provided to staff as required.

Do not give in to the temptation to commence writing. No writing should commence for the document until the Content Specification has been approved. Spend the time on the Issue Tree(s) while it is easy to make changes without undoing other people's work.

OUTPUT: An approved Content Specification; updated Project Plan.

3.3 Implementation Phase

INPUT: Content Specification and Project Plan

Reqment: The production of the document shall {6} be in accordance with the Project Plan and the Content Specification.

The most important metric to be determined during this phase is the *percent completed*, not the amount remaining. The completed work is easy to identify (it is the number of requirements completed to date and or the number of pages written to date); the amount remaining can be derived, as appropriate. It is important to monitor progress precisely according to the Content Specification because with production times up to one to two days per page (depending on your approach), it is easy to slip behind and fall into a cycle of long work days (and introduce errors).

A particularly useful technique to use at the beginning of this phase is to prepare story boards for every heading level in the Content Specification. Until the material for that section can be summarised in a storyboard, there is a significant risk that the subject matter is not understood and this leads to unnecessary and expensive rework.

OUTPUT: Approved document for delivery

3.4 Wrap-up Phase

INPUT: Project Plan and Content Specification

Reqment: Project statistics shall {7} be entered into the document production database.

A Project Wrap-up Report shall {8} be provided in accordance with the guidelines in Appendix C.

The statistics are recorded to assist with estimating the next documentation project. The purpose of the Project Wrap-up Report is to review the outcome of the project against the Project Plan and Content Specifications. The reasons for deviations, under or over, should be given. Any errors that occurred during the process that can be prevented next time are to be identified and discussed. Specific, detailed recommendations should be provided for making the necessary changes to prevent the errors from re-occurring.

OUTPUT: Updated production database; Project Shutdown report.

APPENDIX A - INFORMATION PLAN TEMPLATE

The details for creating an Information Plan are contained in a Word template:
DOCINFP.DOT.

APPENDIX B - CONTENT SPECIFICATION TEMPLATE

The details for creating an Information Plan are contained in a Word template:
DOCCONSP.DOT

APPENDIX C - WRAP-UP REPORT TEMPLATE

The details for creating a Project Wrap-up Report are contained in a Word template:
DOCPROJW.DOT.

APPENDIX D - PROJECT PLAN TEMPLATE

The details for creating an Project Plan are contained in a Word templates: PROJPLAN.DOT. That template needs to be modified according to the guidelines in this appendix to create an initial Project Plan for a documentation project. The purpose of the first version of the Project Plan is to determine if the job is likely to be completed in the time available.

The initial Project Plan needs to contain the following information:

- a. Initial estimate of the scope (size and editing level) and complexity (of content) of the project.

Use a previous project for a guide; use the production database statistics. Is this project bigger or smaller? Are there any pre-conceived ideas that dictate the size of the document? Does the product require a “best we can produce, useability tested and fully verified” level of effort or a “one read, one edit” level of effort?

Will the document have more or less graphics than a previous job? Is more or less explanation required? Are there any competitor publications to give a guide?

Include a dependencies calculation for the job. This calculation takes an industry, company or personal standard hours/page estimate for the type of job and modifies it according to a number of factors that can influence productivity. Each factor is rated on a scale of 1 - 5 (where 5 is the worst) and each number in the scale is assigned a weighting number. (The intervals between the weighting numbers represent an increase or decrease in difficulty of 5 percent.). The standard hours/page estimate, multiplied by each weighted number produces the estimated hours/page for the job.

An example of the dependencies calculation is presented in Figure 1. The rows identify the factors that influence production and the middle columns shows the scales. Underneath each scale value is its weighting number (the first factor uses a different weighting scale range from the other factors in the table). The grey boxes shows the scale values selected for this example and their corresponding weighting numbers are listed in the second last column. The weighting numbers are also repeated in the last column with a multiplication sign to show that the calculation extends down the column, starting with the *Average hours/page* value.

classification

DATE

Figure 1 - The Dependencies Calculator

		Average Hours/Page:					5.50
Product Stability <i>weighting:</i>	1 0.80	2 0.90	3 1.00	4 1.10	5 1.20	➔ 1.10	x 1.10
Information Availability <i>weighting</i>	1 0.90	2 0.95	3 1.00	4 1.05	5 1.10	➔ 1.00	x 1.00
Subject Matter Experts <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 1.00	x 1.00
Review <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 1.05	x 1.05
Writing Experience <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 0.95	x 0.95
Technical Experience <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 0.95	x 0.95
Audience Awareness <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 1.00	x 1.00
Team Experience <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 1.00	x 1.00
Product Availability <i>weighting</i>	1 0.09	2 0.95	3 1.00	4 1.05	5 1.10	➔ 0.95	x 0.95
		Project hours/page:					5.45

For more details, see *Managing Your Documentation Projects*, Hackos, J.T., John Wiley & Inc, Brisbane. ISBN 0-471-59099-1

- a. Initial estimate of the time and budget required to complete the project by the deadline.

Calculate the target number of hours by multiplying the size in pages by the Project hours/page value from the Dependencies Calculation.

Calculate the calendar hours available per week or month as appropriate for the expected duration of the job. Assign enough writers to do the job.

Factor in editing time as a percentage of total writing time (if performed by the writers rather than editors).

Add time for final production if anything other than standard printing direct from the workstation.

Factor in the illustration time as a percentage of total writing time (if performed by the writers rather than illustrators).

classification

DATE

Factor in the time for Project Management as a percentage of the total time devoted to the project by all personnel on the project (can be as high as 10% - reports and all the other administrative activities).

Adjust resource time until total hours of effort matches the target number of hours and the customer's schedule.

- b. Initial estimate of the resources required (people, equipment and tools) to produce the specified editing level.

This is the process of dividing the work across as many people as necessary. For example, it may make sense to use an editor to follow the work of the writers so that the writers do not do any significant edits to their own work. Similarly, it may be more efficient to have illustrators do the drawings rather than the writers because the illustrators will be quicker and do a better job on the first pass.

- c. Schedule of Milestones

Milestones must be measurable in terms of work completed. For example the first draft will contain 20% pages completed to first copy edit level; 40% of pages with partial information and freehand drawings of all illustrations.

The schedule needs to take into account any limitations on equipment availability and other such resources. There is a lower limit to how quickly some jobs can be finished, no matter how much money is available (nine women cannot have a baby in one month).

- d. A description of the roles and responsibilities of the team members, including those who are not members of the publications organisation.
- e. A list of technical and other reviewers and their responsibilities and estimated times for the review activities.
- f. A plan for the final production of the publications, including printing or disk duplication.
- g. A plan for useability and validation testing of the publications.
- h. A Plan for ongoing maintenance of the publications.

APPENDIX E - ISSUE TREES

The following guidelines explain how to create and use Issue Trees. The material in this paper was presented in the Australian Society for Technical Communication *Seminar '94 Proceedings*.

A TOOL FOR ALL REASONS

Dr Joann Temple Dennett

School of Journalism and Mass Communication Boulder, CO 80309-0390 U.S.A.

Technical writing is about solving problems. Technical writing, and in fact any writing can, in large measure, be viewed as a form of problem-solving. The problems to be solved are compounded when we are writing in a language that is not our own or when we are writing a text destined for eventual translation.

There is a tool, devolved from linguistics and rhetorical research, that can help writers produce coherent useful text [1]. This tool is an adaptation of the decision trees of management science and artificial intelligence. Renamed an issue tree, this tool offers a structured problem-solving approach to any writing problem. I would like to explore with you the utility of issue trees and offer real-world examples of their application in four major task environments: organizing information to meet the expectations of your reader, writing in collaboration with others, explaining why a text fails, and writing for translation.

First, it is important to agree that writing is a set of complex, iterative interactions between the individual writer, the process by which the writer addresses the problem, and the actual writing problem itself. This set of interactions is usually described as a three-part process of prewriting, writing, and rewriting.

3.5 Overview of Research on the Writing Process

The following overview is excerpted from a recent publication on using issue trees to facilitate the writing of unskilled engineering students [2].

The process by which we write has been a major focus of rhetorical and educational research in the last two decades. As early as 1965, in fact, Romman [3] offered the idea that the writing process could be viewed in three stages - prewriting, writing, and rewriting. Many beleaguered composition teachers, shell-shocked from endless hours of picking nits in student writing, welcomed the pedagogical shift from critiquing only the written product to concentrating classroom effort on helping each student unveil the actual process by which he or she produced the writing. The beginnings of this philosophical shift occurred with Janet Emig's doctoral research at Harvard University [4]. She showed in her case study that the composing process involved three major efforts - prewriting, writing, and rewriting - even though her 12th grade subjects did little of the first and last.

During the following decade, more and more researchers hopped on the process band-wagon [5,6,7,8,9,10,11,12]. Many described an essentially three stage process - often in different words such as Murray's "prevision, vision, and revision," Britton's "preparation, incubation, and articulation," and the segmented sections of prewriting, writing, and postwriting described by Koch and Brazil as eight discrete steps. Experiencing, discovering, and making formal choices were seen as part of prewriting. Forming, making language choices, and

classification

DATE

“languaging” were part of writing, and the distinctly different tasks of criticizing and proofreading were grouped into postwriting.

Most of these early models were essentially linear models based on theories about the nature of somewhat static components of what was actually a dynamic process. Perl [13] addressed this failing. She observed the recursive nature of writing quite clearly noting that “composing always involves some measure of both construction and discovery ... writers know more fully what they mean only after having written it.”

Arguing that “current research on the composing process is pre-theoretical; that is, it lacks a coherent, process-oriented theory from which to generate and test hypotheses,” Matsuhashi [14] concluded:

Clearly, the goal of much writing process research must be towards model-building: towards the construction of an abstract system which characterizes the writing process and which directs us to regularities or patterns in observational data.

Models have come a long way in a steady evolution from the simple linear version to a complex recursive one. In 1981, for example, the Document Design Center codified the strategies inherent in technical writing into a process model modified to lead the writer through the process [15].

The first researchers to begin to successfully capture the basic dynamic recessiveness of the writing process in a necessarily static model were Flower and Hayes [16]. They used the protocol technique - recording detailed transcripts of writers thinking aloud while they wrote - and observed writers commenting on problem-solving and strategy. Emig's study of eight 12th-graders had pioneered the protocol technique; then years later, Flower and Hayes described the process as capturing:

a detailed record of what is going on in the writer's mind during the act of composing itself... We ask [the writers] to work on the act as they normally would - thinking, jotting notes, and writing - except that they must think out loud. They are asked to verbalize everything that goes through their minds as they write, including stray notions, false starts, and incomplete or fragmentary thought [16, p. 368].

Flower and Hayes developed their model to reflect what they saw as a complex interaction among the writing process, the writer's self, and the rhetorical problem being addressed. They found that writers set goals about both content and process. This goal setting is both recursive and constant and, as such, it directly affects the entire composing process.

In short, Flower and Hayes reported evolving goals that “grow into an increasingly elaborate network of goals and sub-goals as the writer composes.” They described the writing process as “a goal-directed thinking process, guided by the writer's own growing network of goals” - a network that is hierarchal “in the sense that new goals operate as a functional part of the more inclusive goals above them.” This hierarchical network of goals can be recast as an issue tree.

Not everyone has agreed with this cognitivist approach. Michael Carter, for example, noted that the process movement of the seventies “was founded on information-processing theory, which ... offers a view of human performance as based on domain-general processes.” Carter argues for a “pluralistic theory of expertise, one that reflects the value of both general and local knowledge” [17]. Joseph Harris also criticized the Flower and Hayes focus on the logic shared by writer and reader; the focus variously called reader-based prose, writing for your

classification

DATE

reader, and meeting reader expectations. However, his concluding argument that “Flower's reader-based prose is really another name for a privileged form of discourse” [it] can be seen to support the role of issue trees in facilitating “privileged” discourses, which he defines as “hierarchal in structure, issue-centered, organized around concepts rather than events, and [containing] transitions and conclusions (but not always assumptions) ... made strongly explicit” [18].

That is exactly what issue trees accomplish. They are hierarchal in structure, focused on issues and organized to show the relationships and transitions between events that lead to a logical conclusion. As such, they expedite the transition from prewriting to writing. In fact, a carefully crafted issue tree can remove much of the difficulty of getting started, arguably the hardest part of writing.

At about this point, someone usually asks, how are issue trees different from outlines. Substituting hierarchical issue trees for outlines has many advantages. Whereas a standard outline helps organize the material you already have, an issue tree helps you identify both the information you need to gather and the logical structure you need to tie it together for your reader. A good issue tree always shows the relationship between various pieces of information, and most importantly, shows which information is central and which is supportive or incidental.

Let's take an example. Say, I ask you to write a short paper to convince a sedentary audience that exercise is a good use of time. Could you do that? Could you do that right now? And have a credible first draft done in the next five minutes?

Would it be any easier if I gave you this issue tree? (Figure 1)

What have we accomplished here? We've done the prewriting. Given this issue tree, it would be a straightforward process for any of us to write - immediately, right now - a credible first draft addressing the target audience with a logical argument about the utility of exercise.

This issue tree was developed by a process of asking questions and answering them. There are, of course, many other ways to organize an issue tree. In their text, *Writing Science*, M.A.K. Halliday and Jim Martin introduce key concepts of systemic linguistics and “move on to explore the historical relationships between science, language and literacy.” [19, p. xii] Indeed, issue trees may help decode the “Secret English” they identify as they view science as discourse performance - “ [19, p. xiii] and explore the question of genre - global patterns of text organization. For writing about science, they say the two most relevant genres are *report* (how the world is organized) and *explanation* (why it is organized that way.) [19, p. 206] The main function of a report is “to organize information about things typically by classifying them or decomposing them” [19, p.187]. Such classification or decomposition is hierarchal and therefore easily displayed in issue tree format. As for explanation, as we have just seen, issue trees readily conform to a question and answer format.

But, however you decide to organize your tree, the first questions to ask about any writing are, of course, why am I writing and who cares? Flower [20] suggests that the pre-writer provide the gist and goal to appropriately complete the following thought:

What I am writing about is (gist) because what I want to do is (goal).

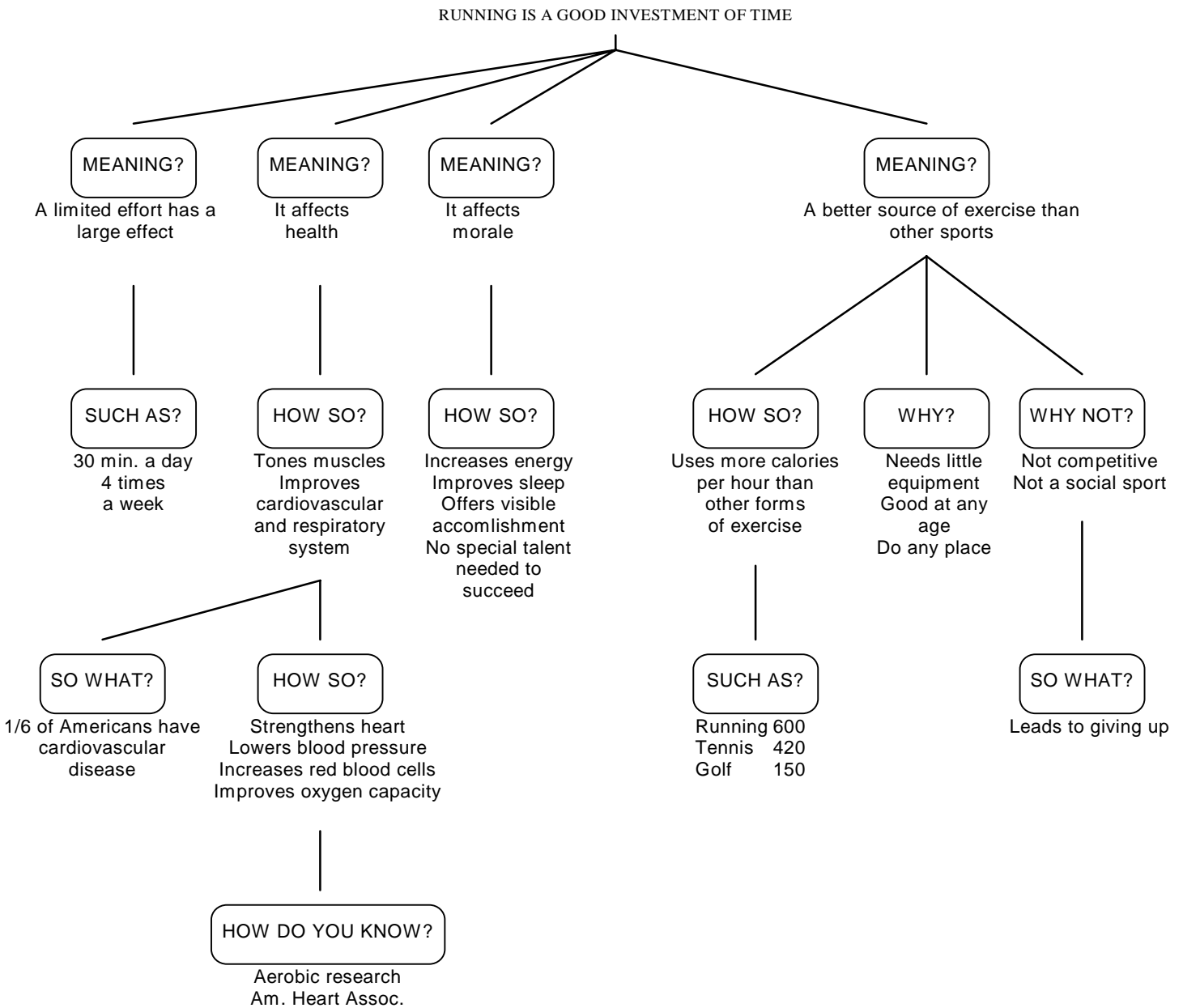
It actually is very helpful to start prewriting by explicitly stating the gist and goal of the proposed writing. This is a direct extension of western rhetorical work from Aristotle to Bitzer [21,22]. It argues that the task of a technical writer is to provide information about a

classification

DATE

specific topic that logically addresses the specific goal and audience defined by the project. It further incorporates the purpose of the project.

A tree generated through the questioning method



(From Flower [20])

Figure 1

Issue Trees in Rewriting

Those of us who are writers are frequently challenged to explain why one version of writing is better than another. “It just sounds better” won't often do - but often that, in fact, is the case. What we know intuitively has a reason. And that reason usually centers on the expectations of the reader.

Readers have some fundamental expectations. As articulated by Gopen and Swan [23], native English-speaking readers have six basic expectations, They are as follows.

1. The action will be articulated by the verb.
2. Usually only verbs will express action.
3. When appropriate the agents of the action will be the subject of the verb.
4. The emphasis of the content will coincide with the emphasis of the structure,
5. Old information will come before new information.
6. The important new information will be at the end of the sentence.

If these expectations are met, native English-speaking readers will find a text readable. But, what, in fact does make one piece of writing better than another? If you cannot point to a violation of one of the above six rules,” how can you argue that one text is better than another?

Issue trees can help answer this question. An issue tree sketched from a piece of text can tell us if the text is well constructed. It can also help pinpoint gaps in logic or leaps in understanding. Reading theory tells us that readers use context, make predictions, create “gists,” and organize ideas as they read [24,25,26]. Much of this activity involves inferencing - tying the written word to previous information introduced in the text or to their own knowledge. The ease with which the reader can use this information to make the inferences the writer intended is a major factor in determining clarity and comprehension of a piece of writing.

Consider the following three short excerpts. Each of these excerpts describes a celestial phenomenon known as a white dwarf. Each addresses a lay audience. Yet they are not equally successful.

1. “The terms 'giant' and 'dwarf' were originally assigned simply to denote luminosity, without implying that the stars were actually large or small in size. However, it is true that the giants are of giant dimensions and the dwarfs are relatively small.” [27]

In summary, it is proposed that sub-subdwarf stars are numerous, at least in parts of the Milky Way, this proposition holding whether planets originated in a contracting primeval dust-and-gas cloud or as the product of violent eruptions and collisions of stars.

2. “The radiation from these Lilliputians must lie largely in the radio section of the electromagnetic spectrum. A great field opens for researchers in tracking down the

classification

DATE

radio sources that are as yet unidentified. They must abundantly exist in the size-and-brightness intervals between big planets and subdwarf stars.”[28]

3. “Nearly all stars reach the stage in which their helium fuel has been used up. Exhaustion of the helium is followed by the inevitable collapse under the pressure of the star's own weight. From this point onward, the history of the star varies according to its size. In the case of small stars, the collapse continues until all the manner of the star is squeezed into a space the size of the earth. The density of the collapsed star is so great that a volume the size of a matchbox weights ten tons. The collapse makes the surface of the star white-hot. These shrunken white-hot stars are called white dwarfs. Slowly the white dwarf radiates into space the last of its heat. In the end, its temperature drops, and it fades into a blackened corpse.” [29]

The inferences that readers must make to understand the material presented differ significantly among these three articles. If we arrange the content of each article into issue tree format, we can see these significant differences.

The first excerpt appears to be essentially a definition. So, let's just call it “terms.” The issue tree then is a simple bi-nodal statement supporting the original bi-nodal statement (Figure 2).

The second example at least offers us a topic at the top of the tree - sub-subdwarf stars. But, after that, we again encounter a list-like structure that offers few clues about the hierarchy or connectedness of the information. (Figure 3)

Only for this last excerpt can we draw an issue tree that clearly illustrates the hierarchy of information, that leads us along logical paths, that is easy to read - and to understand. (Figure 4)

3.6 Issue Trees in Collaborative Writing

When a group of people try to write something together, they must first agree on the task. Thus, helping a collaborative team pose the right problem is essential. Issue trees can be a powerful tool in casting the writing task as a problem to be solved. Also, since issue trees serve as a non-rhetorical solution to the rhetorical problems of organizing material, they are a powerful tool that can help a team of writers visualize the transitional steps of the writing process and produce useful text that is coherent with that produced by their colleagues.

So, the first step of any collaborative effort should be to identify the problem, that is, to agree on a gist and goal. Only when their the gist and goal are firmly in mind will the writers be ready to begin prewriting organization - an organization process that typically begins with construction of an outline. This was the case when a structural engineering team was sent from the United States to evaluate building damage after the major earthquake in Armenia in 1988. The team surveyed the damage, took photo-graphs, made notes, and met in Moscow to plan their report. They drew up an outline with major headings of:

classification

DATE

Terms

- Originally there was a size difference
- Now there is another difference

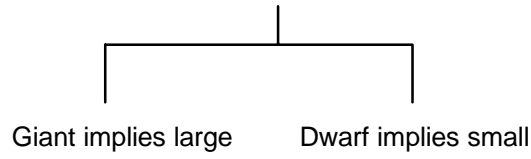


Figure 2

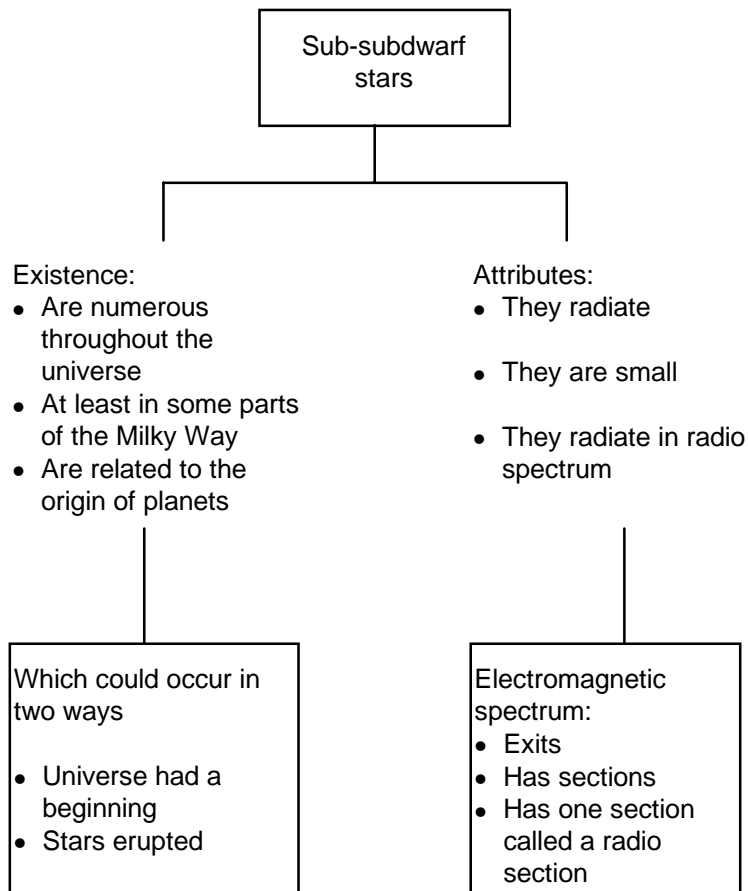


Figure 3

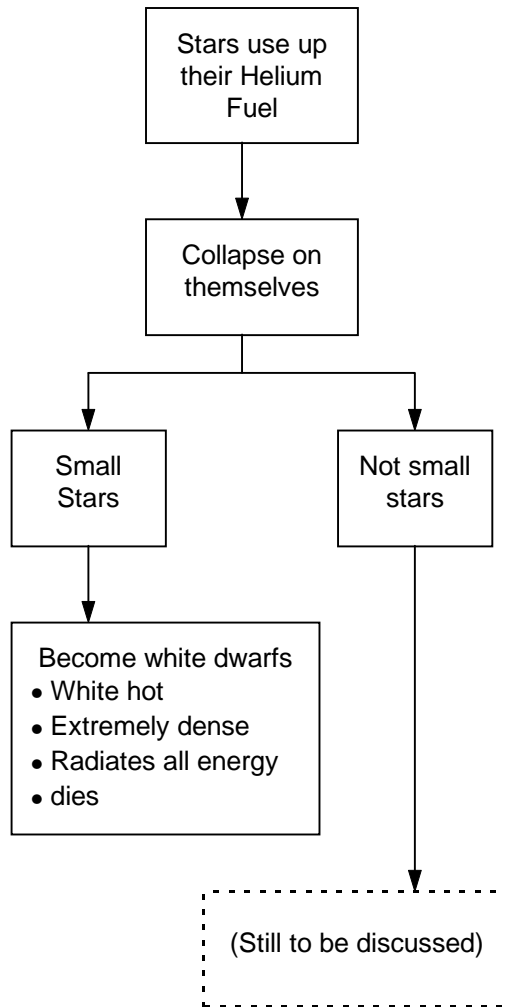


Figure 4

Introduction

Background

Observations of Construction

Observations of Performance and Damage

Discussion and Analysis

Recommendations

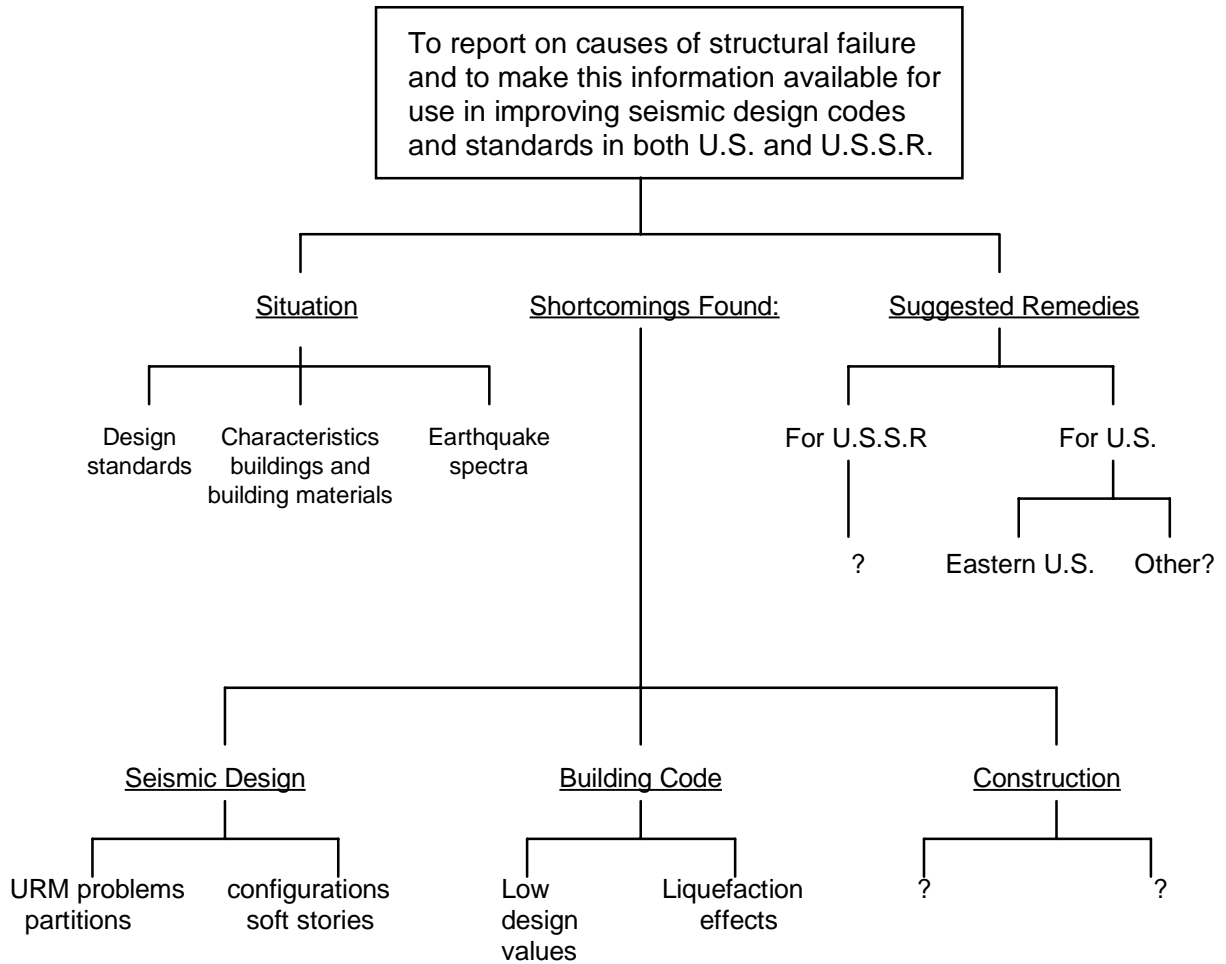
The details of the outline got down to four significant figures. For example section 3.3.4.2 was to cover rectangular (as opposed to square) large panels in buildings with precast framing. Each numbered section was assigned to an author and the team headed home to their respective institutions to begin writing.

The problem with this approach was that the outline gave equal weight to all building types and all locations. No one had had the time to examine the data, to zero in on the facts and see that this equal weighting of building types and locations was not necessary. There were really only two categories of buildings that required major analysis: composite frame buildings and load bearing (URM) masonry. And, in the four locations surveyed, the damage was noticeably different in Spitak (as compared to Kirovakan, Leninakan, and Stepanavan).

Two years later, when the report still was not completed, the team began working with an issue tree format. The initial tree is shown in Figure 5. Notice that the major headings of the original outline are now relegated to Appendices. Writing from a tree like this, the collaborators could discuss the data, draw some conclusions, and make some suggestions - something that was virtually impossible to do with the original outline treatment.

Flagship Report on Structural Investigations *

Gist/Goal:



* All detailed observations located in three Appendices - one for each location visited. Division within Appendices done by building type.

Figure 5

3.7 Issue Trees in ESL Writing and Writing for Translation

Beginning with a clear articulation of gist and goal is particularly important for the ESL (English as a Second Language) writer who is trying to conform to rhetorical expectations of scientific argument as developed by Isaac Newton. This reasoning is a step-by-step process with each step related in some explicit fashion to the preceding steps. Such a rhetorical model is by no means universal. From the purpose and intent of writing, to casting the first sentence and eventually wrapping up the argument, ESL writers may have to force their efforts into unfamiliar, often uncomfortable, patterns.

Rhetorical expectations can be very different from one culture to another. Japanese technologists, for example, sometimes cite the usual goal of clarity as desirable in their technical writing. However, they also often add other attributes such as beauty and surprise as desirable measures of good writing [30]. Similarly, Chinese scientists have explained to me that it would be too egotistical to explain their findings. Rather, they may want to present their data and have the reader discover both the problem and the suggested solution for themselves.

Melding this eastern focus on consensus between writer and reader with the western expectations of brevity, explicit clarity, and step-by-step logic can often produce results that meet neither rhetorical need. In working with nonnative English-speaking scientists, I frequently encounter texts that fall in the middle somewhere: they offer no western logic and they lack eastern consensus-building.

A good example of this is the “text” produced by a Japanese about to finish his Ph.D in physics. I had given my ESL technical writing class an illustration from an encyclopedia that showed the Roman empire with icons for goods traded or delivered to Rome. We had been discussing description and I instructed the class to use this illustration as source information to describe the trade of ancient Rome. They had the entire hour to respond to this request for a basic description. The physics student was finished in minutes. His text:

“The Romans were trading long, long ago. See the map,”

As he handed in this 10-word composition, he grinned, and said. “English is very nice, very quick!”

Well English can be “very nice” only for those ESL writers who clearly understand the differences between the rhetorical patterns and expectations of their native language and those of English. Thus, nonnative English speaking writers may benefit most from instruction that compares how English rhetoric differs from that of their native language and a focus on hierarchical issue trees is one way to do this.

In Chapter 7 of *Writing Science*, titled “The Analysis of Scientific Texts in English and Chinese,” Halliday describes the text structure of a scientific paper - a text structure that “established the highly-valued form of scientific argumentation: what constitutes an acceptable canon of evidence, reasoning and proof.” He then illustrates some of the similarities and differences between English and Chinese in the way their lexicogrammar constructs scientific reality [19, p. 126].

So the grammar of both Chinese and English, using similar resources (noun compounding, the nominal group, nominalization and grammatical metaphor), creates a form of discourse for codifying, extending and transmitting scientific knowledge. With this discourse, the

classification

DATE

argument - the rhetorical movement - is made very clear and explicit; while the content - the conceptual structure and internal relationship - may be left highly implicit, in one way or another (each language in its own way). We are not saying that for the meaning to be implicit in this way is something undesirable; but this kind of grammar does make demands on both writer and reader: demands on the writer to ensure that the text provides the semantic information that the reader needs in order to construct the taxonomies, decode the metaphors, and follow the argument; and demands on the reader to be alert enough to receive and make use of this information. [19,p. 132].

I would argue that this also makes demands - extraordinary demands - on translators and people writing for subsequent translation. If we assume that translators will not alter the discourse structure of the text they are translating, then we must be sure that the structure of our text does its rhetorical work properly. And, creating and following a hierarchical issue tree is one sure way to achieve this.

3.8 Conclusion

Issue trees are useful in all phases of the writing process. In addition to helping writers prewrite, issue trees provide writers a visual picture of their text structure. Overlaying a familiar problem-solving process on the less familiar writing task often eases the "writer's block" or "white paper shock" of the novice or unwilling writer.

Once an issue tree is devised in the prewriting phase, it becomes a template for the writing phase. The writer can easily produce coherent, useful text. Issue trees are particularly helpful in collaborative writing because individual writers can see exactly how their text relates to the entire text. Once crafted, an issue tree offers the writing team a visual view of their writing plan - a view that illustrates the logical links of the proposed writing.

Issue trees are important in the rewriting phase when they are used in a diagnostic sense to examine a written text for logical structure. If structure is lacking, the issue tree pinpoints where correction is needed. This sort of diagnostic analysis turns the rewriting process into a joint problem-solving effort of editor and writer or writer and rewriter.

Issue trees can also play a major role in guiding the writing of nonnative English-speakers. The hierarchical nature of the trees provides a firm guide to the rhetorical expectations of writing about science and technology in English. And, lastly, issue trees are useful when producing text for subsequent translation. Since the translator will likely be a native speaker of the target language rather than a native speaker of English, it is important that relationships are clear in the writing. Issue trees will help accomplish this.

REFERENCES

- [1] D. Wojcik, "Planning for Discourse," 1975. *Water Spectrum*, Winter 1975-76: 25-29.
- [2] J.T. Dennett and M. Hsieh, "Issue Trees: A Tool to Aid the Engineering Writer," *IEEE Transactions on Professional Communication*, June 1994, 37 (2), pp. 88-96.
- [3] D.B. Rohman, "Pre-writing: The stage of discovery in the writing process." *College*
- [3] D.B. Rohman, "Pre-writing: The stage of discovery in the writing process." *College Composition and Communication*, May 1965, 16(2), 106-112.
- [4] J. Emig, "The composing processes of twelfth graders," Urbana, IL: National Council of Teachers of English, 1971, Research Report No. 13.
- [5] P. Elbow, *Writing Without Teachers*. New York: Oxford University Press, 1973.

classification

DATE

- [6] W.R. Winterowd, "Topics' and levels in the composing process," *College English*, February 1973,34(5), 701-709.
- [7] D. H. Graves, "An examination of the writing processes of seven-year-old chil-dren." *Research in the Teaching of English*. 1975, 2, 227-241.
- [8] E.W. Nold, "Alternatives to mad-hatterism." In McQuade, D., *Linguistics@ stylistics*,
- [8] E.W. Nold, "Alternatives to mad-hatterism." In McQuade, D., *Linguistics, stylistics, and rhe teaching of composition*, Akron, Ohio: University of Akron,1979, 103- 117.
- [9] A.N. Applebee, "Trends in written composition." Paper presented at the Midwest School for Lrnprovement Forum, Milwaukee, WI: October 1979.
- [10] D.M. Murray, "Internal revision: A process of discovery." In C.R. Cooper and Odell, L. *Research on composing: Points of departure*. Urbana, II: National Council of Teachers of English, 1978.
- [11] C. Koch andJ.M. Brazil. *Strategiesforteaching the composihon process*. Urbana, II: National Council of Teachers of English, 1978.
- [12] J. Britton. "The composing processes and the functions of writing." In C.R. Coo-per and L. Odell (Eds.), *Research on composing: Points of departure*. U}bana, @: National Council of Teachers o f English,1978, 13-28.
- [13] S. Perl, "The composing processes of unskilled college writers ' *Research in the Teaching of English*, 1979,13.317-336.
- [14] A. Matsuhashi, *Producing written discourse: A theory-based description of the temporal characteristics of three discourse types from four competent grade 12 writ-ers*. Unpublished doctoral dissertation, State University of New York at Buffalo, 1979.
- [15] L.S. Flower and J.R. Hayes, *A Process Model of Composition*. TechDical Report No.3, Document Design Project, Pittsburgh, PA: Carnegie Mellon University, 1979.
- [16] L.S. Flower and J.R. Hayes, "A cognitive process theory of writing," *College Composition and Communication*, pp. 365-387.
- [17] M. Carter, "The idea of expertise: An exploration of cognitive and social dimen-sions of writing," *College Composition and Communication*, vol.41, no.2, 1990, pp. 265-286.
- [18] J. Harris, "Rethinking the pedagogy of problem-solving," *Journal of Teaching Writing*, 7 (2), 1988, pp. 157-165.
- [19] M@A K Halliday and J R Martin@ *Writing Science: Literacy and Discursive Power*. Burgess Science Press, Basingstoke,1993.
- [20] L. Flower, *Problem-Solving Strategies for Writing..* 1984, Harcourt, Brace, Jovanovich, San Diego, CA.
- [21] Aristotle, *The Rhetoric*, trans. Lane Cooper (New York Appleton-Century Crofts, 1932).
- [22] L. Bitzer, "The rhetorical situation," *Philosophy and Rhetoric*, 1968, 1, 1-14.
- [23] G.D. Gopen and J A Swan, The Science of Science Writing. *American Scientist*, vol. 78, November-December 1990, pp.S50-558.
- [24] P.W. Thorndyke, "The role of inferences in discourse comprehension," *Journal of Verbal Learning and Verbal Behavior*, 1976, 15, pp. 437446.
- [25] H.H. Clark and E.V. Clark, *Psychology of Language*, New York: Harcourt Brace Jovanovich, Inc., 1977, pp. 43-173.
- [26] H.H. Clark amd S.E. Haviland. "Comprehension and the given-new contract," in *Discourse Production and Comprehension*, R. Freedle, Editor. Norwood, N.J., Ablex, 1977, pp. 7-9.
- [27] H. Shapley, *Beyond the Observatory*, Charles Scribner's, 1967, pp. 66-67.
- [28] D. McLaughlin, *Introduction to Astronomy*, 1961, p. 272.
- [29] R. Jastrow, *Red Giants and White Dwarfs*, Harper and Row, 1967, pp. 41-42.
- [30] J.T. Dennett, *Writing Technical English: A Comparison of the Process of Native English and Native Japanese Speakers*, doctoral dissertation, University of Colora Boulder, CO, 1985.