

The Beginnings of STOP Storyboarding and the Modular Proposal

To separate fact from fanciful folklore, we asked Walter Starkey, co-author of the 1965 *STOP Manual*, to reflect on the genesis of that legendary manual and its then-revolutionary technique.

by **WALTER S. STARKEY**

Because proposal storyboarding began at Hughes-Fullerton (a division of Hughes Aircraft Company), I have been asked a number of times whether storyboarding was imported from Hollywood to the proposal management profession under the personal auspices of Howard Hughes. That is a fetching myth, but it is not the way the STOP (Sequential Thematic Organization of Publications) storyboarding technique began. To the best of my knowledge, Howard Hughes never graced Hughes-Fullerton's hallways, and movie-making influence had nothing to do with the conception and gestation of STOP.

The STOP technique, which eventually permeated much of the defense/aerospace industry as the preferred proposal development approach, began as a simple formatting idea, which then became the nucleus for a cluster of strategizing, composition, and publication disciplines focused on managing the complex task of proposal development.

The Dilemma

For people in the business of writing, editing, and producing engineering publications in the defense/aerospace industry, the early 1960s were an era of daunting challenges. Within the first two or three years of the decade, the relatively small engineering report lost its place as the chief publication product. Such reports had usually stemmed from the activities and intellect of a single author, or at most a handful of authors, and moved through the publication process at a sedate pace. With the seeming abruptness of a seismic event as our nation's military commands became increasingly ravenous for complex computer-based systems, engineering reports were supplanted by sales proposals typically running hundreds and sometimes thousands of pages. These proposals were generated by a large, multi-discipline author corps, and were driven by Red-Alert schedules imposed by the procuring customer (Department of Defense agencies or other equally demanding customers).

Often, just getting the books off the presses in time to hustle them onto a last-chance, red-eye flight was a victory in itself.

Under these circumstances, the hope of instilling qualities such as strategic unity and overall coherence into a proposal were dim at best. Often, just getting the books off the presses in time to hustle them onto a last-chance, red-eye flight was a victory in itself. Under particularly desperate schedules, niceties such as pre-print buyoff had to be forgone, and a scramble to deliver errata sheets followed hot on the heels of proposal delivery. At the climax of one short-fused proposal effort, I remember spending a long night in the print shop at Hughes-Fullerton, eyeballing pages for glitches as they came off the press while Jim Tracey sat next to me typing errata sheets that were printed on the spot and bundled up for delivery in the same package as the proposal volumes themselves.

I will resist the temptation to regale the reader with early-60s war stories, since anyone who was in the proposal business in that era could match them or top them with stories of their own. Even those who were not can appreciate the urgent need of publications specialists for some way to cope with the overwhelming matrix of dilemmas confronting them: How could the individual contributions of dozens or scores of authors be brought into line with the strategies management had in mind for the proposal? How could the proposal manager guard against unpleasant surprises when the authors' inputs finally reached his desk—surprises that could activate management's panic button by exposing the need for agonizing, eleventh-hour revisions? How could each author be assured that he was not spinning his wheels when he knuckled down to generate his inputs (i.e., that he was writing

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what the proposal manager really wanted)? How could the strong points of the company's approach be made glaringly clear to the proposal evaluator? How could the publications specialist make any meaningful contribution to the editorial caliber of the proposal?

As it turned out, workable (but not fail-proof) answers to these dilemmas were afforded by the storyboarding, composition, critiquing, troubleshooting, and editing disciplines embodied in the STOP process. The STOP disciplines, of course, did not, like Pallas Athena, instantaneously appear in full battle array from the head of one individual or the collective heads of a group of tech-pub specialists and proposal managers—but they did germinate at a pace that seems breathtaking in retrospect once the seed of the approach was planted.

An early impetus for the origination of this new publications approach came from a tough-minded program manager named Mike Rapport. The proposal he was charged with developing represented an entree into a product area deemed by Hughes-Fullerton's management luminaries to be crucially important to the company's future. With the spotlight on him, a fiery determination to make Hughes' proposal stand out from those of the competition marked Mike's discussion of his proposal plans with Jim Tracey and Dave Rugh. Tracey headed the publications group where Rugh worked as writing supervisor and I worked as editing supervisor, and which served the proposal needs of Hughes-Fullerton's Data Processing Products Division and Systems Division.

There seems to be a natural passage length that is completely compatible with treating a specific topic within the confines of a two-page module.

In early 1963, Tracey, Rugh, and Rapport considered a number of approaches to making the proposal distinctive. At one point, I believe, Mike advocated some sort of comic-book treatment (my apologies to him if my memory is wrong), which clearly would have been too frivolous for proposal purposes. Finally, Tracey's suggestion of a modular approach won Mike's endorsement. The notion was to construct the proposal entirely of two-page modules, with text and any associated visual facing each other. Such a format, they agreed, would offer important reader advantages, and would certainly distinguish the proposal from any that had come down the pike thus far.

The Two-Page Module Evolves

Shortly after the meeting with Mike Rapport, Tracey convened our group for an after-hours brainstorming session to explore where the modular-proposal idea might take us. The response was



Figure 1. This photograph shows an early-days storyboarding session at Hughes-Fullerton.

enthusiastic. I voiced the thought that the two-page modules could be treated as self-contained themes, akin to college "blue-books." Others were quick to point out that treating them that way would help us to exploit some of the proven techniques of expository/persuasive composition that were often lost in the fog of loosely structured proposal discourse (e.g., clearly identifying the subject and its relevance, sticking to it, making a strategically persuasive point about Hughes' approach to the issues pertinent to it, and presenting an argument to prove this point via the module's text and visual). The desirable thematic character of the modules later led to the appellation Sequential Thematic Organization of Publications, and STOP was born.

It seemed probable that working at the level of two-page modules could solve a lot of problems in proposal-cadre communication. An author could jot down a paragraph outline for his module (call it a "storyboard", somebody said) and include a rough version of his visual. His storyboard, along with related storyboards from other authors, could then be pinned up and reviewed jointly by manager, editor, author, and anyone else concerned with the subject (Figure 1 shows an early-days storyboarding session at Hughes-Fullerton). The author's argument could be honed by discussing its pros and cons, and he could walk away with a marked-up storyboard like that shown in Figure 2, reflecting what input the manager really wanted. In other words, the module could be revised at the outline level before the author invested his time and energy in the difficult chore of composing it. What a boon that could be! I wish I could remember everyone who took part in that first brainstorming session, because, as things worked out, the meeting proved to be a momentous one. Writers and editors included Walt Starkey, Dave Rugh, Dave Gater, Mal Gable, Stu Jones, Aileen Lang, Carole McCorkindale, and Larry McCollum. Art supervisor Jack Hunt and production supervisor Dorothy Morico also took part. I left the meeting, as I know others did, exhilarated by the feeling that we had hold of an idea that could

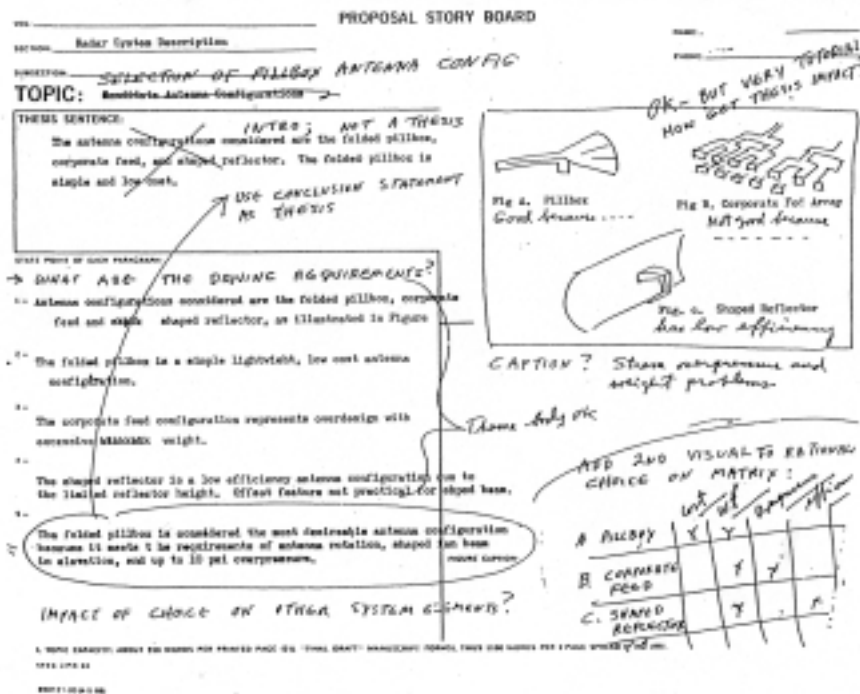


Figure 2. This is a sample of a marked-up storyboard showing the author the pros and cons of his or her argument.

reshape our professional lives in a rewarding way. We did not think of the meeting as the first shot of a revolution in proposal development at that moment, but we later became fond of thinking of it in that light.

Everyone at the meeting deserves credit for their constructive ideas about implementing the modular approach and their efforts of putting them into practice in the ensuing weeks, as we applied the approach to Mike Rapport's proposal and to two others that were active at the time.

Having acknowledged that, I want to make it clear that without Jim Tracey's influence, the STOP approach would not have taken root and flourished as it did. Jim passed away shortly after his retirement in 1989, but those of us who worked with him share indelible memories of his stubborn dedication to improving the quality of the proposal product.

The Challenge of Establishing a "Standard"

As we launched our campaign to establish the modular approach as the standard for Hughes-Fullerton proposals, the motto of our publications group was "sell STOP." Two aspects of the approach raised objections in some parts of the engineering community. First, limiting the discussion of a subject to the word count accommodated by a two-page spread appeared to some authors to infringe on their freedom to thoroughly develop their subject. Second, other authors objected that mandatory visualization was an artificial requirement on the grounds that some subjects simply did not call for or support a figure.

The notion was to construct the proposal entirely of two-page modules, with text and any associated visual facing each other.

Relative to the first objection, Dave Gater and others did yeoman work in local libraries checking word counts of passages in various genres. Happily for the practicality of the two-page module, they discovered that many authors tend to change the subject on themselves after every 400 to 1,000 words. The clues are easy to spot: subheadings, phrases such as "On the other hand," "Another problem is" "Having determined that, the next step is," etc. There seems to be a natural passage length that is completely compatible with treating a specific topic within the confines of a two-page module.

(Incidentally, we began referring to the modules as topics early on, and I will call them that for the rest of this article.)

The objection to mandatory visualization was overcome by inventiveness at the storyboard wall. A visual does not have to be a figure. Building on the line of argument in the text (or theme body, as we began calling it), we learned to develop several kinds of verbal visuals, all of which could illuminate and support a given argument. Examples are the dot and indented-dash list, which amounts to an X-ray view of the entire argument, and the dialectic verbal visual (problem vs. proposed solution, trade-off candidate vs. advantages and disadvantages, key requirements vs. Hughes' approach, etc.). These turned out to be valuable browsing aids for the evaluator.

Implementation Brought Improvements

Figure 3 shows several of the features that distinguish STOP topics. These features were incorporated one after another in the course of developing a fair number of proposals. A phrase-structured topic title that suggests the author's intention or attitude about a subject replaced the conventional, simple noun title of the subject almost immediately. Topic tie-back references under the title, which lead the evaluator from the topic back to his own requirements documentation, also appeared almost immediately. The two-part figure caption (a Tracey invention), which adds a strategic commentary about

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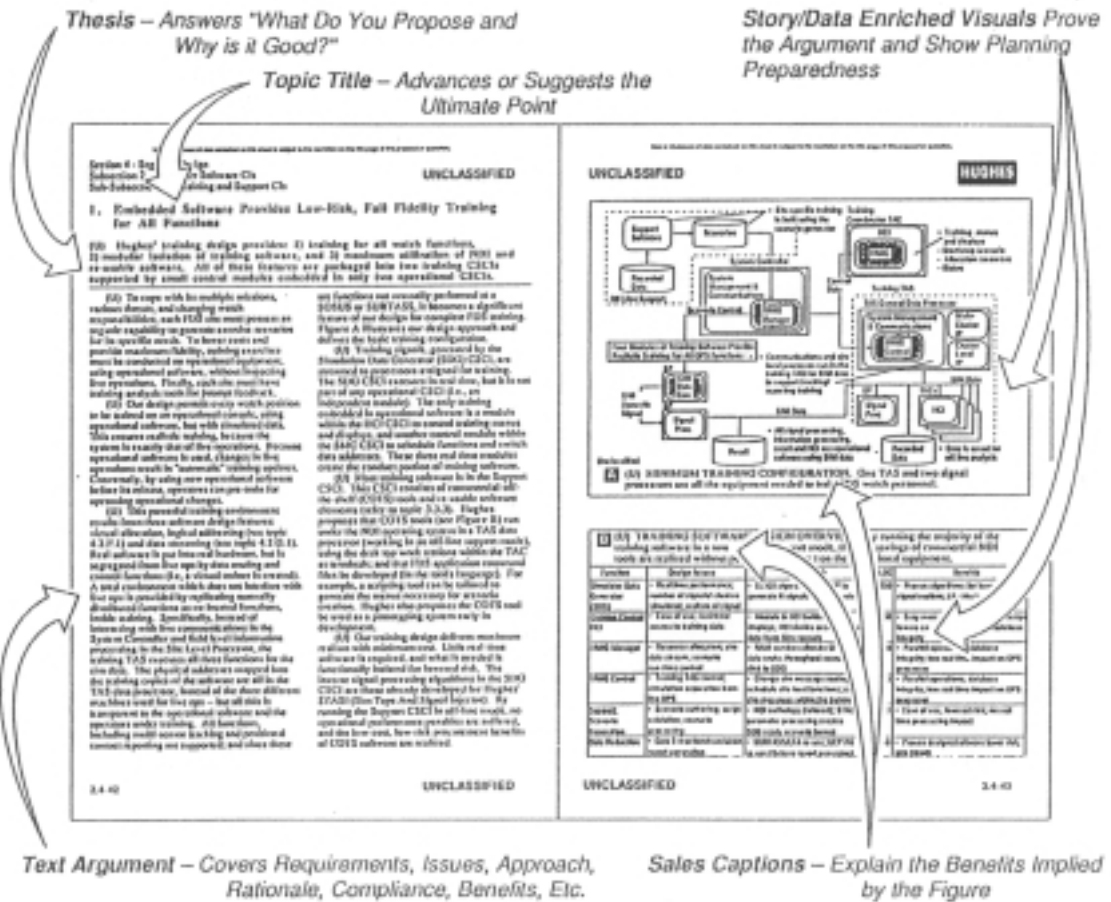


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the figure to its noun title, came a little later. Shortly after that, Mal Gable invented the “balloon rubric,” which uses a comic-strip type of balloon to draw the evaluator’s attention to some significant feature of the figure. Although we had all appreciated the thesis-driven nature of STOP topics for some time, several months went by before I wrote the first thesis sentences ever published in a proposal. The thesis sentence (displayed via bold type, underlining, or some such device) summarizes the main strategic point of each topic, hopefully leading the evaluator to mentally challenge the author to prove it, which, again hopefully, the theme body and visual proceed to do. (After I had written thesis sentences for the 50 or so topics in that first proposal, I copied them out in order, added some connective tissue, and found myself with a concise two-page summary of the proposal. This convinced us that if we displayed thesis sentences in all topics, an evaluator could gain a fair grasp of the thrust of a proposal just by reading them before delving into the details.)

These focusing features — phrase-structured title, verbal visual, figure, two-part caption, thesis sentence — found high favor among proposal evaluators.

Early Reviews Now Focused Our Message

As we implemented storyboard reviews, there was grumbling in some quarters that they imposed too much front-loading of

the proposal effort — that too much time would be spent in the reviews before the actual composition task could begin. This objection faded away as it became clear that because each topic was a self-contained theme, authors could launch their writing chore as soon as the agreed-upon writing plan came down from the wall (i.e., writing could begin within an hour or two of beginning storyboard reviews). The self-contained nature of the topics also permitted lock-step scheduling, in which the phases of the development effort overlap (storyboarding, writing, technical/management approval, critiquing, troubleshooting, editing, production, preprint buyoff, and printing). In other words, no phase of the effort had to be completed before the next phase began. Suddenly, short-fuse proposals were easier to cope with than they ever had been. (The modular approach also eliminated the domino effect in which, under the conventional approach, late changes in one part of the proposal threatened the schedule by impacting other parts of the proposal.)

The author who came to the review with a skimpy storyboard left the review with a fleshed-out, agreed-upon writing plan.

As we put storyboard reviews into practice, we were struck by the creative force that group dynamics brought to bear on the proposal development process. The shared goal of making each topic and topic string as telling as possible on the proposal's chances of winning energized the review cadre to debate and improve upon the strategic point of each topic and the theme body/visual supporting it. The author who came to the review with a skimpy storyboard left the review with a fleshed-out, agreed-upon writing plan. At times the review process went far beyond topic-level critique once the review cadre's creative juices began to flow. I have seen systems redesigned and management plans retailored at the storyboard wall.

To ensure consistent steering of proposal strategy, we determined that, as a minimum, the review cadre should include the proposal manager and technical director or their representatives, section or topic-string honchos, the topic authors, and a STOP specialist to conduct the review.

*See excerpts
from the
Hughes
Aircraft STOP
Report on the
following
pages*

In the mid 1960s, I served as managing editor for a consortium-generated proposal to implement the air-defense ground environment for the North Atlantic Treaty Organization. The proposal ran into thousands of pages and involved, on a limited schedule, teaching STOP and conducting storyboard reviews at companies in Italy, France, The Netherlands, West Germany, England, and Canada.¹ The coherence and strategic unity of the finished proposal were not perfect, of course, but they were good enough to beat the competition. Considering the diversity of contributors to the proposal, I believe they could have been achieved in no other way than by the application of STOP principles. As had been the case a number of times in the past and would be the case many times in the future, this effort demonstrated the effectiveness of the proposal storyboarding approach.

The promise we sensed at our initial brainstorming session was fulfilled. The challenges of the proposal adventure were still there and still real, but the STOP disciplines gave us the tools we needed to cope with them.

STOP Became a Way of Life

The STOP specialist was a new breed of technical editor, one equipped through mastery of STOP disciplines to be instrumental in developing and presenting sound proposal strategy. Our most senior STOP specialists were dubbed Managing Editors. They were supported by topic critiquers, troubleshooters, and copy editors.

Once the STOP storyboarding technique was adopted, it didn't take long for Hughes-Fullerton's win-percentage to mushroom. And it did not take long for the technique to be widely adopted in our industry, spread at first by our proposal-teaming efforts with other companies, and then by its own momentum as word got around.

¹As luck would have it, a general *greve* struck Paris at the beginning of the storyboard review schedule there, shutting down electricity among other things. Because the schedule, which could not be slipped, called for review sessions extending late into the night, these were the only storyboard reviews ever conducted by candlelight.

References

- Tracey, J.R., Rugh, D.E., and Starkey, W.S., 1965, *STOP, How to Achieve Coherence in Proposals and Reports*, Fullerton, CA, Hughes Aircraft Company
- Special Interest Group for Documentation, 1999, *The Journal of Computer Documentation*, Vol. 23, No. 3, New York, NY, Association for Computing Machinery

Except for four years at the University of Chicago, where he investigated infrared and cosmic-ray detection techniques as a research physicist, Walt Starkey's career has been spent in engineering publications. During his 29 years at Hughes Aircraft Company, he was one of the developers of the STOP storyboarding technique. Since he retired as head of Hughes-Fullerton's Proposal Development Section in 1989, his free-lance articles, short stories, humor, and poetry have appeared in numerous periodicals. He can be reached at Starkeys@worldnet.att.net.

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Excerpts from the Original STOP Report

Titled "Sequential Thematic Organization of Publications (STOP): How to Achieve Coherence in Proposals and Reports," the 65-page Hughes Aircraft Company manual published by J.R. Tracey, D.E. Rugh and W.S. Starkey in January 1965 was revolutionary in concept and in the affect it had on a burgeoning industry.

The STOP Technique at a Glance

STOP: A better method of organizing and writing reports and proposals

STOP is a systematic method of organizing and writing the technical report and proposal which significantly improves outlining control and editorial caliber of the content. Essentially, the method spoon-feeds the reader in "bite-size," 2-page topics.

STOP stands for Sequential Thematic Organization of Publications. It is a new and unorthodox method that is surprisingly effective for outlining and writing technical reports, and proposals, particularly the lengthy, detailed and technically complex publica-

tions prepared by teams under time stress. In a STOP report or proposal the subject matter is organized into a series of relatively brief themes, each presented in a "module" of two facing pages, complete with associated figure, if any. Thus, you change the subject whenever you turn the page and your attention is occupied with only one message at a time. This framing of message "modules" in a STOP book increases the impact of each and makes it easier to comprehend. What makes STOP work as a practical method for all thematic types of technical writing is that it makes use of the more-or-less uniform topical structure that exists naturally in ordinary expository discourse, but which is hidden by conventional outlining practices. It can be shown statistically that this natural topical structure exists and that the topics, once you recognize them, fit the 2-page

spread in an overwhelming majority of the cases. Therefore, recasting or boiling down is not required in the STOP technique.

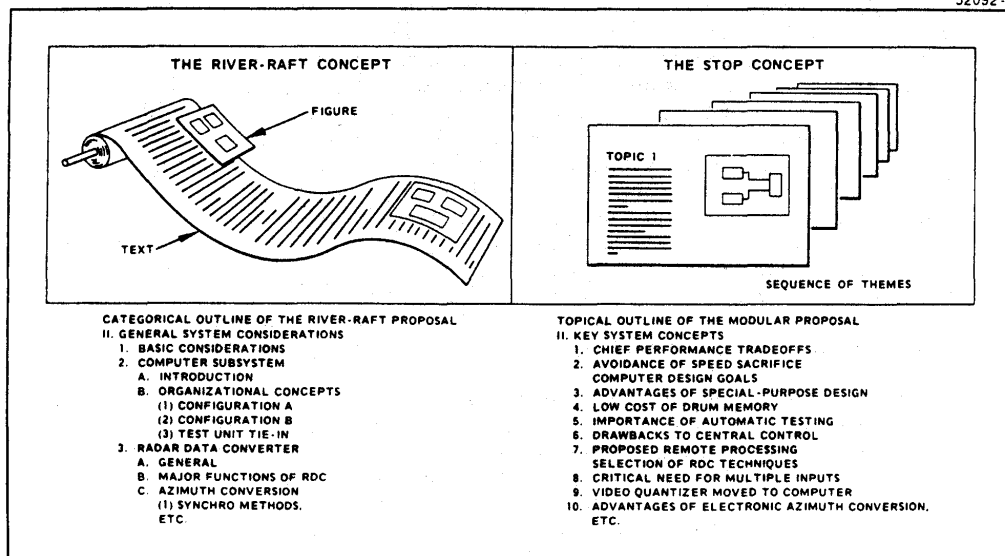
Conventional outlining practices not only hide the natural topics of a discourse, they allow the thesis of the topics to remain unstated, and this makes it easy for the reader to miss the most important points the author wants to make, and for the author to miss making them in the first place. The conventional outline is "categorical" rather than topical, so it is essentially a one-man tool. To supplant the categorical outline, Storyboards are used in the STOP technique to prepare a detailed, "team-visible" outline for each theme module. The traditional but neglected Thesis Sentence, which is the key to coherent outlining and writing, guides the design of each Storyboard for maximum thematic unity. The Thesis Sentence

shows the reader at a glance the essential argument of the theme body, and since the total shape of the theme body is readily apparent, the reader is relieved of the common vexation: "When will this passage end, and what point is the author driving at?"

STOP is based on the principle of Thematic Quantization, which asserts that proper recognition and treatment of topical units of discourse is the essence of "coherence," and that the best way to achieve topic recognition is the device of uniform modules.

For a given subject area, the author always has the option of spinning off additional topics, provided each is treated in a unified manner, but he never exceeds a 2-page span of attention at any one moment. The topical segmentation of natural expository structure is thus taken advantage of: it replaces the arbitrary and

Figure 1. Page-by-page printing of the conventional "run-on" proposal tends to conceal the fact that it takes the form of a scroll or a river of words. Since the usage and location of the figures are unpredictable, figures are referred to as rafts. The permissive character of the river-raft proposal is reflected in the categorical outline on the left, whose riddle-like headings may be compared to the pertinent topics of the same material treated modularly on the right.



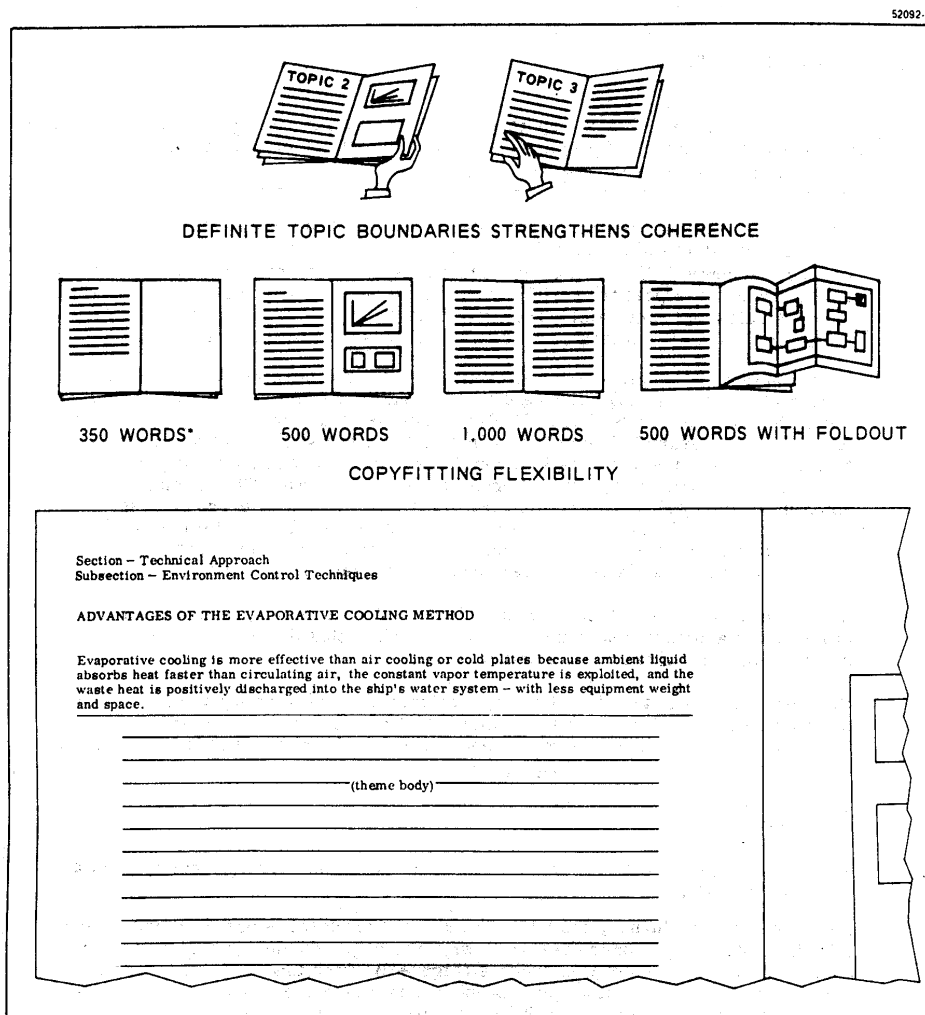


Figure 2. The modular organization with printed thesis promotes stronger coherence and continuity within the topic simply because the point is more clearly defined and the space restriction prevents the author from over-reaching it unwittingly.

artificial rules of "logical" categorizing as the issue of the "organizing" process.

Experience with STOP over a period of years has demonstrated the practicability of this seemingly brochure-like organizing method for detailed technical exposition. One hundred and twenty major STOP proposals and reports have been produced since November 1962. It is considered now to be demonstrated as a practical method for all types of subject matter, the usual mix of engineering writing talent, typical crash schedules, and conventional methods of multilith production.

As evidenced by reader

reaction, increase in comprehensibility of STOP documents as compared to their River-Raft counterparts can only be described as dramatic. This has been especially true in the proposal field, where the quantizing methodology reveals company intention more plainly, and provides a standard "processing" framework for the evaluator, who is concerned with identifying points for scoring purposes, spotting areas of disagreement, and rank-ordering items for priority analysis.

CONCEPT OF THE TOPICAL MODULE

Because it has obvious

boundaries (both physical and editorial) and an appropriate capacity, the self-contained theme of two-page proportions becomes a prescription for thematic coherence that is more objective to the author and reviewer, while being compatible with the natural behavior of the author and reader.

Application of Thematic Quantization to the printed document is illustrated in Figure 2. The reader is confronted with a self-contained and easily assimilated theme wherever he may open the document. Since all discourse within the module boundary, turning the page means starting a new topic.

The number of topics selected during initial outlining to cover a given subject category can be as few or many as desired, depending upon the emphasis intended and the overall page limit of the publication....

The only absolute requirement is that each resulting theme must be coherent, pertinent and not in excess of two pages. Violations of thematic unity are easier to spot and therefore more likely to be repaired early in the game. In the typical STOP publication, the text is placed on the left and the figures are placed arbitrarily on the right, but since the use of illustrations is not essential to the method, the text may "slop over" as desired. Conventional 8-1/2 by 11 reproduction methods allow about 500 words per page, for a maximum topic length of about 1,000 words without illustration. Multiple figures can be employed per page, to the limits of art-sizing ingenuity, as can foldouts in the customary way, which, however, must be "backed up" with the text for the subsequent module.

It will be shown that the engineer writing a report or proposal invariably starts a new topic after about 500 words on the average. This is fortunate because it means that the STOP format accommodates normal writing habits without a lot of copyfitting trouble as might be feared... The essential argument of the topic is crisply summarized for the reader by the printed out Thesis Sentence, which facilitates scanning, and the figure is always found right there, without the nuisance of page flipping to locate it.

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Excerpts from the Original STOP Report (continued)

The STOP manual concludes with this eloquent appendix, offering more insights into the gestation of a successful process.

Appendix

Background and Acknowledgements

The STOP technique was not born by invention, but through the unfolding of numerous insights and accidental discoveries by a group of people over a 2-year period.

The idea of a modular treatment for organizing the full text of a technical document, and the decision to try it on a typical proposal, was reached by Jim Tracey and Dave Rugh at the close of a proposal crash in October 1962. It was their conclusion that the brochure-like, text-and-picture organizing method that presented story elements in a spread-by-spread sequence could offer the same reader advantage in the case of the fully detailed technical exposition as it did in the case of the slide and flip-chart presentational booklet. The assumption was that difficulties in writing and editing would necessarily have to be overcome to fit the detailed technical narrative into such a pattern. The plan was that the extra work of revising and rewriting would be shouldered by the technical editor.

The significant point is that this assumption was soon proved incorrect, but at that moment it was felt (in a mood of desperation) that the existing problems of achieving comprehensibility in the conventional production were already so difficult, and being so poorly resolved, that any change could only work for the better, especially if it entailed a modular end result of proven reader benefit. For implanting this

attitude of letting the devil take the author for a change, credit must be given to Mike Rapport, who had propelled the authors into the recognition that traditional editorial elegance was incontestably beside the point when having to spoon feed hard arguments to soft customers.

The modular technique was therefore adopted on two proposals in November and December of 1962: the Small Ships Data Processor, and the Space-Ground Link Subsystem. Both of these proposals lost. Important discoveries were made, however, which justified the editorial efforts. First, it was seen that the topicizing operation inexorable shook out editorial defects (most material was being converted from River Raft) as though by formula. Second, it was observed that the text body was already naturally structured by topical segments, accommodating modular uniformity without extra work, but that the possibility was being concealed by the categorical headings. This was in January of 1963.

By February, the Storyboard concept of outlining was accepted as an essential step in planning the modular publication, and its superior role in managing proposal content was seen. A Storyboard form was printed up (on B-size vellum), though it did not include a Thesis Sentence. Instead, space was provided at the bottom of the sheet to answer this question: "What conclusions do you want the reader to draw from this write-up?"

As the number of modular proposals grew through March and April of 1963, a realization dawned concerning thematic unity which,

looking back, seems as though it should have been self evident. This odd discovery was voiced by Walt Starkey, who held up a topic in genuine surprise and said "Look, each of these is a self-contained theme."... This occurred during the edit of the first AADS-70 proposal, the eleventh modular document produced by the then Systems Publications Sections.

By the end of 1963, 44 modular publications had been produced. It was felt that a decided measure of control had been gained over the basic parameters of coherence, and enough customer favor was filtering back to verify that the improvement existed for the reader. But one dissatisfaction persisted, namely a sense of low pertinence or missing significance throughout the technical "descriptions" which make up the bulk of the average proposal. Must proposals be dull? This question led to a search for ways to insure that the author would elect and declare a propositional intent, rather than just describe. It was then found that the traditional Thesis Sentence could be applied repeatedly to the topic elements for this purpose... This was in November 1963, one year after the basic modular technique was adopted.

The first modular document employing the printed out Thesis Sentence was prepared as an experiment in December 1963. In July 1964 three modular proposals were also so prepared (an inexplicable delay, though there was as understandable reluctance to become committed to the "exposure and labor" of the technique).

Since then, the Thesis

Sentence has lost its threat, becoming a highly useful standard device and the identifying symbol of both the Storyboard and the topic. Thus the various modular ideas had matured into the full STOP technique by the Summer of 1964. By the end of 1964 about 120 documents of major proportions had been produced by the method. Several technicalities were also clarified that year, such as the identification of the operational parameters of organizing, the essential procedural defects of the categorical outline, and some of the secrets of Storyboard reviewing.

The Audio-Visual technique of handling math writeups (a Tracey-Rugh production) was developed in detail in November 1964 with the encouragement and examples of Ron Long.

As can be seen, the development of the STOP technique was a gradual process of worry, speculation, brainstorming and fumbling experience. Members of the Writing Services Section contributed valuable assistance, particularly Dick McCormack, who provided a much needed layman's description of STOP, and Dave Gater, who assisted Rugh in proselyting a generation of skeptical authors. Walt Starkey proved the efficacy of Storyboarding once and for all on the 6,000-page cross-cultural NADGE program. Jack Hunt and Dorothy Morico led the revolution in graphics that was prerequisite to smooth production of STOP books. Bob Perry furnished the Storyboard clue, discovered Parkinson's Law of the Trivial, and endorsed all with an enthusiastic managerial indulgence.