Guidelines for Creating and Using Abbreviations and Acronyms

Diane F. Miller

April 1995

NASA

National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Guidelines for Creating and Using Abbreviations and Acronyms

Diane F. Miller
Administrative Group Leader
Operations Systems Training Group
Mission Operations Section

April 1995

Contents

1.　Why We Abbreviate

*The FPSO SATR/ORR Review of DRS 90.1 was
held on 23 March.*

DMS C3.0 (DRS 90.1) UAT is progressing.

*DMT met with GLL GDS representatives to
discuss new DSN OP-G software implementation
scheduled for delivery in the next few months.*

* * * * *

Many of us work in a complex scientific and technological milieu,
surrounded by people working in narrow, specialized fields. We
invent new terms almost daily to describe new hardware and
software systems and all their parts, newly discovered phenomena,
new programs and organizations, new facilities, new job positions,
new documents, and so on. Often the terms we create are long,
combining several modifiers in front of a noun (such as "radio
science data assembly stability analyzer"). We soon tire of saying
the whole, long name over and over, so we shorten it, somehow.
Thus, an acronym is born.

We may also abbreviate for reasons other than mere expediency.
At some level, we may feel as if our new hardware or software
system, or our new committee or organization, or our new building
or laboratory, will be legitimized only after it is christened with
alphabet soup. Until then, the new thing is like an unnamed infant,
with no rightful place in the world until it can be called by words
that start with capital letters. The acronym or abbreviation of those

words then makes its name unique, we think. The "baby" becomes an interesting new creation, different from and better than the meaning of the words we string together to describe it. Our new data system is more than a space flight operations center-- it is a **SFOC**!

Psychological factors also come into play. For example, if I persist in talking to you in language you do not understand, whether it is my intention or not, my communication may affect you in one of the following ways:

> You may feel intimidated--
>> "Gee, she knows so much about this subject and I don't even understand the words she is using. She must really be smart."

> You may feel turned off--
>> "This woman is an insensitive, pretentious boor. She just goes on and on, whether or not I understand or show any interest in her subject."

> You may feel frustrated--
>> "Shucks! I know I need to understand this stuff, but I can't figure out what she's talking about!"

In any case, you'll feel uncomfortable and unclear on what I am saying, and no smarter for having heard or read my words.

Our rapidly changing terminology, combined with our job and career specialization, complicates all our work-related communication. Clear communication within a creative scientific and technological environment is crucial. The subjects are complex, subtle, and unfamiliar. In writing reports or giving presentations to our bosses and customers, or in writing a document describing our plan or design, or in writing a user's manual or training guide, we are still so focussed on our special subject, we naturally keep on trying to talk to the world at large in the same language we use with our immediate colleagues and team mates. However, in addition to managers (who may be generalists), many of our readers or audience members may, like us, also be specialists, but

in other fields. Therefore, our initially carefully contrived terminology may sound like random noise to these others.

So, despite finding writing a difficult and tedious chore, most of us recognize the need to report and document our work effectively. Since we must spend the time anyway, our efforts will be much more effective if we write with a sympathetic attitude toward our likely audience. When we create and use new words and terms arbitrarily, we compromise our effectiveness. And with our technology evolving so rapidly, communicating about it is only going to get exponentially more difficult, unless we begin to put a higher priority on clarity than on conciseness.

The point is, as is true for any words we choose, we should use abbreviations only when they contribute to communication. Most of the time, they distract and confound. Only a handful of abbreviations are so well known at any one place of business that their use in internal documentation can be safely assumed to communicate. The rest are risky.

Sometimes it may serve our purposes to be obscure. But if we are, let us be so knowingly.

2. The Difference Between an Abbreviation, an Acronym, and an Initialism

An abbreviation is a shortened form of a word, created by any of several different means. Abbreviations include (among other forms) acronyms and initialisms.

An acronym is a word (not just a string of initials) that has been coined from initial letters of a name (such as NASA for National Aeronautics and Space Administration) or by combining initial letters or parts of a string of words (such as OPSCON, for OPerationS CONtroller). An acronym is pronounceable as a word. Further examples from the environment at the Jet Propulsion Laboratory are:

SORCE	SOftware Resource CEnter
SPOOL	Simultaneous Peripheral Operations On-Line
ASCII	(AS-KEE) American Standard Code for Information Interchange
TOPEX	TOPological EXperiment (project)
VAX	Virtual Address eXtender

An initialism, on the other hand, is a combination of the first letters of a string of words (such as JPL for Jet Propulsion Laboratory, or DSN for Deep Space Network). Initialisms are not pronounceable as words. If they are, and if the pronounced form is used commonly, they cross the line into the acronym category. For example, the initialism for the Space Flight Operation Center data system at JPL is SFOC. Some people pronounce each letter. Some people say "es'-fawk," and still others say "sfawk." When

some critical mass of "sfawk" sayers is reached, SFOC officially graduates from initialism to acronym.

So what?

Whether a form is officially an acronym or an initialism is usually irrelevant, except for one matter. If SFOC is pronounced as a single syllable (that is, if it is an acronym), you would say and write "*a* SFOC subsystem;" however, if each letter is pronounced (that is, if SFOC is just another initialism), you would say and write "*an* SFOC subsystem," because the sound "s" begins with a vowel sound (that is, "ess").

Most of the abbreviations we hear and see are actually initialisms, rather than acronyms. However, we usually call them acronyms anyway, so that is what they will be called in the remainder of this booklet.

3. Assess Your Audience

In speaking or writing about our daily work, we tend to focus on our subject matter, rather than on our audience. For example, Sam is responsible for reporting the weekly activities of his 4-person team to his group supervisor. He assumes his boss is the only one who will read it, so writes as if he's just having another daily conversation with his boss. However, what happens is that Sam's activity items get combined (unedited) into a weekly report from his section manager to his division management and staff, which gets distributed to all the section employees, project management and staff, and who knows who else. With such a distribution list, somebody just might read and want to understand Sam's items.

(1)   Who might this person be?

(2)   Will he or she be able to understand what Sam wrote?

(3)   Will he or she be able to trace the authorship to Sam?

If the answers to these three questions are

(1)   Sam's project manager will read it

(2)   no, he won't be able to understand what Sam wrote, and

(3)   no, he won't know who wrote it until he wastes a lot of time asking around, because he really wants to find out what is going on . . .

old Sam could be in TDH (The Dog House).

Have you read any technical documents that had notably few acronyms? Without doubt, a few have been published. However, when the acronyms are *missing*, you seldom notice.

The documents that have fewest acronyms are usually written for the broadest or highest management level readerships. Remember, acronyms *limit your audience*. If you limit your audience intentionally, because you know, for example, that only other theoretical astrophysicists studying the weak forces of polynomial quarks in quasars farther than 3×10^8 AU from the sun will be reading your writing, fine. But most of the time, you are not this certain of your audience.

Acronyms are like cancer; they tend to multiply out of control and take over in place of real words. But they don't work as well as real words, just as cancer cells don't work as well as normal cells.

So the first step is to think about your audience. How important is it to you for your audience to understand your document or presentation? Few hard and fast rules can be made on how to use abbreviations and acronyms. Judgment and common sense are essential. So, the rest of this document gives some guidelines (not rules) for using abbreviations and acronyms where they efficiently advance your communication, and avoiding them where they will only detract from your effectiveness.

4. What to Abbreviate?

Be Selective

Save the use of acronyms for terms repeated many times in the document. If a term is likely to be new to your readers, spell it out more than once. We must hear or see an abbreviated term several times before it becomes meaningful in itself without the necessity of an extra mental step to *translate* the initials to familiar words. Moreover, we may have to be reminded again later if time has passed or other acronyms have been introduced. Even if we tell readers the first time we use the term that, for example, an MCD is a maximum likelihood convolutional decoder, after introducing sixteen more acronyms on the next two pages, when we again on page 3 refer to an MCD, who will remember?

Can you remember the first time you ever heard the term NASA or ACLU or NATO? Didn't you say to yourself the first few times, especially if the context was not particularly telling, something like "Hmmm. ACLU? ACLU? Oh yes. American Civil Liberties Union." It may take several repetitions, in context, before "ACLU" carries as much semantic content as "American Civil Liberties Union." Indeed, "ACLU" may *never* carry that much meaning for some people, no matter how many times they hear and read it.

So, for a term likely to be new to most of your audience, a *rough rule of thumb* is avoid using an acronym if the term is used fewer than six or eight times in ten pages of text. Especially if uses of a term are separated by a couple of pages, your readers are likely to forget that the acronym was even defined already, much less

where, when, and what it means. Of course, if the whole subject of the document or paper is a long term for which you have created an acronym, you can probably define it initially and use the acronym throughout, provided you avoid using too many other acronyms.

Consider the Breadth of the Finished Document

If you are writing a detailed portion of a large document, or a few paragraphs or "bullet" items that will become part of a compiled report (such as your section's project management report), then, in addition to considering in how much detail to cover your subject in order to fit into the context, consider also the purpose and scope of the whole document or report. If many technical subjects will be briefly covered, you can expect most readers will be unfamiliar with at least some of them. Therefore, you would be doing the reader a service by using meaningful words, rather than acronyms.

If, on the other hand, the document is an in-depth treatise on a narrow subject, you can expect your audience to be more homogeneous. You are in a better position to assume which terms might be familiar to your audience. If the document is addressed to both specialists in the subject area and generalists or specialists in other areas, then it is wise to use both the abbreviation *and* the spelled-out version the first time you use a special term in the document.

5. Offer Help

Define at Least First Time Used

In a document or widely distributed memo, define all acronyms after their first use. Spell out the term, then immediately follow it with the acronym in parentheses. Exceptions might be very common acronyms that have become a part of the corporate culture. At the Jet Propulsion Laboratory, for example, some such terms could be JPL, NASA, and DSN. Other exceptions might be the jargon common to the industry (such as ASCII, DOS, CPU), depending on the audience.

In addition, consider defining the acronym again at the beginning of a new section (realizing that your readers may not be reading the document cover to cover), or if two or three pages separate uses of the term. Ideally, if your reader wants to double-check the meaning of an acronym, he or she should be able to find it spelled out not farther than one or two pages back--unless the term denotes the focus of the whole document.

Conversely, do not give an acronym for a term you are not going to use again. When readers see an acronym in parentheses following a term, they naturally assume the acronym is going to pop up again; thus, they are distracted from the subject matter while making a mental note of the acronym for later.

Include a Glossary

Every formal document that uses acronyms at all should include an alphabetical list of these, with their translations, either as part of the front matter or as an appendix. Moreover, in addition to spelling out the acronym, actually defining the term is often very helpful. For example, just knowing that RCD stands for "radar composite data" is not nearly as useful as knowing, in addition, that radar composite data is a Magellan spacecraft-specific data format containing engineering, radar, and altimeter data.

Spell Out Terms on Figures

Figures should be the pages of a document that communicate the most. We include them to clarify and elaborate on points in the text. In many documents, the figure captions are the only text read, or, at least, the text that is read first. Thus, the definitions spelled out in the text may fail to do double duty for the figure captions too. As much as possible, spell out the terms in the captions. Make the captions informative and helpful in orienting the reader to the figure.

As for the callouts (labels on the different parts of the figure), some figures (such as block diagrams) look like a maze built out of children's alphabet blocks. Sometimes the full callout terms are too long to fit on the figure. Nonetheless, it's a good idea to try to spell them out in the callouts, or, second best, include a legend box on the figure itself defining any necessary acronyms. On the next page is an example of a figure that spells out as many of the labels as comfortably fit, and then gives a legend for the necessary acronyms.
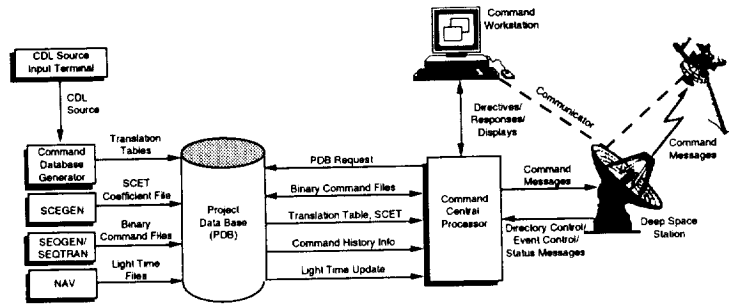
Example of a figure that spells out as many of the callouts as possible, and includes a key to translate acronyms.

Spell out Terms in Titles and Headings

As with figure captions and callouts, titles and headings should be spelled out. People glance at headings quickly to see the organization of the document and to find sections of interest. They may have missed the definition of a heading acronym that was given on the previous page. Also, headings are usually gathered, as is, into a table of contents; these headings should clearly describe the contents of each section.

Spell Out Terms in Abstracts

Abstracts are often required to stand alone in a computerized bibliography somewhere as the only clue to your paper or document. In any case, an abstract is read first and often is the *only* part read. Avoid using abbreviations or acronyms in an abstract. The reader will probably not have access to your glossary or first use of

the term in the text, so cannot be expected to know its definition. Even including acronyms in parentheses after introducing the full term in the abstract is a distraction and a waste of the few-word-limit generally imposed on abstracts.

6.   As You Say It

It is good to remember that language was spoken long before it was written. The spoken language usually evolves (for better or worse) ahead of the written language. In technical and business writing, we generally try to be more precise and formal than we often are when we speak. However, writing is still a symbolic representation of the spoken language, and we hear the language in our minds when we read. Therefore, some of the guidelines for abbreviating are based on sounds.

Spell Out Single Words and Common Expressions

Use of acronyms such as the following in narrative text distracts from readability (not to mention clarity):

FW	Firmware
I/F	Interface
H/W	Hardware
M/M	Multimission
PB	Playback
R/T	Real time
S/C	Spacecraft
S/W	Software
U/L	Uplink

A good policy is to *spell it the way you pronounce it*. We say "hardware," not "H-W;" "spacecraft," not "S-C;" If it seems too

time consuming to keep typing out these oft-used words, create macros with your word processor or do a search and replace operation when you are done.

Spell out Special Project Names

Another application of the "write it the way you pronounce it" idea is in identifying special project names. For example, at the Jet Propulsion Laboratory, our spacecraft missions are generally named after mythological or historical figures. But these beautiful, evocative names are often abbreviated. Why write GLL for Galileo? Nobody actually utters "G-L-L." Nobody says "M-G-N" for Magellan or "U-L-S" for Ulysses. It's nice to try to foster and encourage whatever poetry and vision we can bring to our daily work.

When Acronyms are Longer Than Words

From the standpoint of sound, some acronyms are longer than the terms they abbreviate. For example, why use WBS for wide-band switch, when WBS has five syllables and wide-band switch has only three? As with two letter abbreviations such as S/C and I/F, if we don't *say* the abbreviation, we shouldn't write it that way. Other examples of abbreviations with as many or more syllables than what they abbreviate are:

WR	Waiver Request
SCT	Spacecraft Team
EOF	End of file
BW	Bandwidth
HR	High rate
WS	Workstation

A or An?

We use the article "a" before words beginning with a consonant sound and "an" before words beginning with a vowel sound, acronyms and initialisms included. We would say, for example, "an SFDU" (standard formatted data unit) even though "S" is a consonant, because "S" begins with a vowel *sound--"ess."*

7. Watch for Ambiguity

Familiar Sounds Carry Baggage

Quite a few acronyms and abbreviations have become a part of our common language, describing aspects of our common culture. These are used so often in writing, in the news media, and on the street that almost everyone understands their meaning, even if they may not know how the initials translate. Some examples are

AKA	Also known as
ATM	Automated Teller Machine
COD	Cash on delivery
CPA	Certified Public Accountant
DOA	Dead on arrival
DNA	Deoxyribonucleic acid
IRS	Internal Revenue Service
VIP	Very important person
VP	Vice-president
UPS	United Parcel Service

Some of these, however, may be rather arbitrarily adopted for more specific meanings within the context of a particular company or industry. For example, at the Jet Propulsion Laboratory, another meaning for UPS is "uninterruptable power supply"; CPA can also be "Command Processor Assembly"; DNA can be "digital network architecture"; in some circles, a UFO--I am not making this up, but obviously someone else did--is "unframed synced data." The way abbreviations are capriciously spawned, it would not be surprising to hear of a hardware development project called the Thermometric Geostrophic Interface, or TGIF.

Furthermore, some abbreviations sound like familiar words, whose meaning may distract. A few examples are PAP (Product Assurance Plan), RAT (Resource Analysis Team), SIS (software [or system or subsystem] interface specification). More on this subject in Chapter 8, "Matters of Style."

Be Consistent

In some large documents, especially if composed of the contributions of several authors, the same abbreviation may stand for more than one term or phrase. Even if the context provides differentiation, this practice is likely to cause confusion for some readers.

And beware of acronyms commonly used in a single environment (that is, company or discipline or industry) to mean different things in different contexts. For example, at the Jet Propulsion Laboratory, WBS can mean wide-band switch or work breakdown structure; DED can mean delayed engineering data or data element dictionary; EOM can mean end of mission, end of media, or end of message; MO can stand for Mars Observer or mission operations; DSN can stand for Deep Space Network or data set name. Although the context may contain many clues that preclude confusion most of the time, the fact that readers may have other associations with the abbreviation distracts them from the meaning *you* are trying to convey.

In attempting to find a definition for EDR, I heard one person tell me it means "engineering data record," another swear it means "experiment data record," and a third say it stands for "expedited data record." One problem here is that this entity (whatever it is) had been called an "EDR" for so long that its original meaning has become lost, even to those who use the term daily.

Shun Redundancy

If you define "MCT" as "Mission Control Team," and later call it the "MCT Team," by your own definition you are saying "Mission Control Team Team." If "DOS" stands for "Disk Operating System," don't say "DOS system." Don't write "SFDU data," if "SFDU" means "Standard Formatted Data Unit." Also, look for synonyms. If "FOP" stands for "Facility and Operations Plan," you don't need to say "FOP document." A plan is understood to be a document.

Making Acronyms Plural

As with most nouns, add a lower-case "s" or "es" to an acronym to make it plural. An apostrophe is needed only if you are making a possessive, which, by the way, is stylistically weak if the acronym stands for an inanimate object (as opposed to a person or group of people). For example,

Plural:

> SFDUs are the "outer envelopes" on all SFOC-generated data sets.

Possessive:

> The SFDU's length is given in bytes.

or, for better style,

> The length of the SFDU is given in bytes.

This one is OK:

> This document needs the COE's signature.

(where COE stands for cognizant operations engineer).

8. Matters of Style

What Has Style to Do with Acronyms?

Style in writing goes beyond personality or a flair for words. It is, above all, clarity. Good style is made of whatever contributes to clarity, including conciseness, precision, and perhaps color and variety. (But clarity should never suffer at the hands of conciseness, color, and variety.) Introducing an acronym and then using the same three or four capital letters over and over in every other sentence does nothing to advance the cause of style, nor, in some cases, even conciseness. There may be a better way. Compare these sample paragraphs:

With acronym only:

> Test Workstation: The Test Workstation (TWS) subsystem hosts newly developed and purchased vendor software in the form of utilities that support SFOC system- and subsystem-level testing. TWS distributes test data throughout the SFOC system and captures and retrieves data from any of the SFOC subsystems. TWS can be used to do bit-level editing and manipulation of data.

With variations on the acronym:

> Test Workstation: The Test Workstation subsystem hosts newly developed and purchased vendor software in the form of utilities that support SFOC system- and subsystem-level testing. This subsystem

distributes test data throughout the system and captures and retrieves data from any of the data processing subsystems. It can also be used to do bit-level editing and manipulation of data.

The second paragraph has only one more word than the first, and uses considerably fewer acronyms. Sometimes even the word "it," used judiciously, carries more meaning within the structure of a paragraph than does a new acronym, no matter how much more specific the acronym might be in a literal sense. (Incidentally, I've seen IT used as an acronym for Information Technology. Oh, no!)

Spelling out the complete term (provided it is of reasonable length), even several times on a page (but not several times in a paragraph), often adds clarity, interest, and elegance of style, even without any variation. This practice seldom takes anything away from clarity. If you get tired of typing the term over and over, use the acronym to write the draft, then use your word processor's search and replace function to substitute the complete term.

Please Don't Verb the Acronyms!

Acronyms (even though they stand for strings of modifiers and nouns) are most often treated as simple nouns, or occasionally adjectives, in sentences. However, once in a while an acronym sprouts feet and starts running. Here are some true-life examples:

JPL <u>GFEs</u> the information system.

> Translation: JPL <u>supplies</u> the information system <u>as government furnished equipment</u>.

When a new map is created, the SCT <u>FTPs</u> the file onto the SFOC system where it is safed into the CDB by the DSOT.

> Translation--[I think]: When a new
> [decommutation] map is created, the Spacecraft
> Team transfers [using the File Transfer Protocol]
> the file to the Space Flight Operations Center
> system; the Data System Operations Team then
> stores it safely in the Central Data Base.

Any problems should be DARed to the FASO.

> Translation: Any problems should be reported
> on a Development Anomaly Report form and
> sent to the Failure Accountability System Office.

Verbs are the vigor and muscle of language. What we do to them in the normal course of speech and writing is bad enough—making passive verbal constructions (it has been determined that . . .), using nouns and adjectives as verbs (to prioritize, to multimissionalize, to optimize), burying perfectly good verbs under sterile fertilizer ("is cognizant of" instead of "knows," "hold discussions concerning" instead of "discuss," "is illustrative of" instead of "shows"). But to use acronyms as verbs, especially in writing, truly confounds things.

Verbs are often our only clear signposts in complicated, highly technical material. Make the most of their communication value by using real verbs that people understand.

Controlling Our Nesting Instincts

A nested acronym is an acronym within an acronym (sometimes within yet another acronym, ad infinitum). For example, at the Jet Propulsion Laboratory, an MM is a MOSO (Multimission Operations systems Office) Manager; GIF is the GCF (Ground Communication Facilities) Interface subsystem. C/C was the "official" acronym for the CRAF/Cassini Project, where CRAF was already the acronym for Comet Rendezvous/Asteroid Flyby. (I say *was*, because "CRAF," unfortunately, was cancelled.)

Although not exactly an acronym, one of the directives (commands) used on the Telemetry Input Subsystem of the ground data system here at the Lab is an example of how far afield we can go. The directive is **she**, which ultimately translates to "synthetic aperture radiotelegraphy detecting and ranging altitude burst header extraction," as diagrammed here:
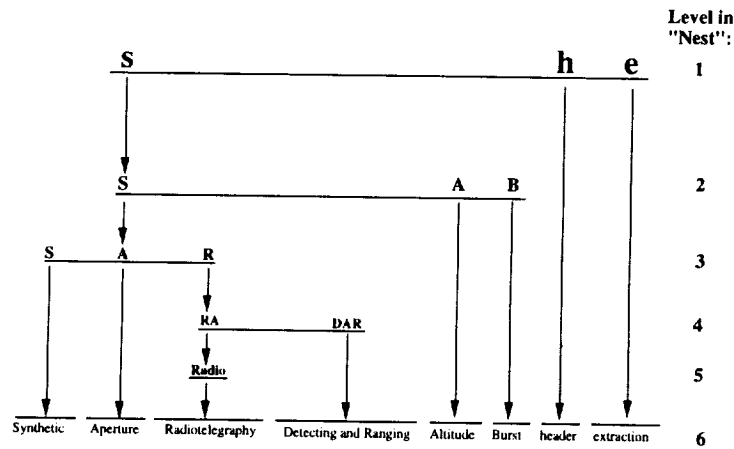
Example of a nested acronym carried to six levels of nesting.
(Don't try this at home.)

With nested acronyms, the imperviousness of ordinary acronyms is doubled (or maybe squared or cubed). When in a position to influence the creative process, remember the "keep it simple" principle.

Avoid &, @, and

The use of such symbols as the ampersand (&), at sign (@), and the number or pound sign (#) in the narrative of technical documents is too casual. These marks seem to be the author's way of saying "I am too busy (or lazy) to spell even these small words for you." Shorthand symbols such as these are better used in hand-

written notes you quickly scrawl at a meeting, when no one but you will need to read them later.

Matters of Aesthetics

Elegance, no doubt, is in the eye of the beholder. A job title such as Configuration Management Manager, even abbreviated CM Manager, is not elegant--or even logical. Alternatives? An obvious one is to toss in a little grammatical structure and at least make it "Manager *of* the Configuration Management Office." Another possibility might be just "Configuration Manager."

Or, how about a seminar called "I.D.E.A.S.," for "Integrity of Data and Environment for Archiving Seminar." What is being archived, the seminar? It makes a catchy (albeit irrelevant) acronym, but does it make sense grammatically?

A few years ago we had a small task called the SFOC Pilot Hands-on User Demonstration for Galileo Experiments (SFOC PHUDGE). That one almost gets stuck in the back of the throat. Evoking a similar response is DSN (Deep Space Network) Operations Team, DSNOT.

The wisdom of avoiding the ugly seems obvious (once we agree what is ugly). However, avoiding the cute and catchy may also be desirable. Such attempts have given us SFOC (Space Flight Operations Center) Operations Pilot Hands-On Investigation Environment (dubbed SOPHIE), and Mars Observer Pilot SOPC (Science Operations Planning Computer) Implementation Effort (MOPSIE), both SOPHIE and MOPSIE cleverly combining catchiness with nesting. A "SANTA" project (Science Analysis Near-Term Activity) was introduced around the holidays. Or, how about Orbital Operations Planning System, dubbed OOPS, making the orbit (or the planning) sound suspiciously wobbly. Some folks developing a resource center for secretaries came up with the name Support Personnel Resource Management, or SPRM, Bank. Fortunately, they thought better of it.

The "cutesie effect" is something to consider in deciding whether your ultimate goal will be advanced by the nomenclature you select.

9. Conclusion

Acronyms and abbreviations are a common topic of coffee-pot and lunchtime conversation in most technical workplace environments. It is apparent from the laughter and the tears that, deep down, everyone suffers from them . . . yet everyone uses them, and most people get to create one at some time or another. What we need are a few risk-takers, brave souls who will dare to be clearly understood--trendsetters who recognize that brevity is not necessarily the soul of wit in every case--that taking an extra breath every now and then to connect with their reader or listener is the valorous thing to do.

Bibliography

Bowden, D.D., 1987. Abregrams or Deleweds: A Forty-Year
    View of Acronyms. In proceedings of the conference of
    the Institute of Electrical and Electronic Engineers
    Professional Communication Society, Winnipeg,
    Manitoba, Canada.

Buehler, M.F., 1986. Rules That Shape the Technical Message:
    Fidelity, Completeness, Conciseness. Technical Commu-
    nication (Journal of the Society for Technical Communi-
    cation), V. 33, No. 3, pp. 130-132.

Burr, W., 1989. An Acronym Must Be a Word--A Pronounceable
    Word, He Pointed Out. Technical Communication
    (Journal of the Society for Technical Communication), V.
    36, No. 3, pp. 228-229.

Dukes, E., 1986. Rules: To Bend or Not to Bend Them. Techni-
    cal Communication (Journal of the Society for Technical
    Communication), V.33, No. 3, pp. 130-132.

Ibrahim, A.M., 1989. Acronyms Observed. IEEE Transactions on
    Professional Communication, V. 32, No. 1, pp. 27-28.

Logsdon, D., and T. Logsdon, 1986. The Curse of the Acronym.
    Conference Record of IEEE Professional Communication
    Society, "Linking Technology and Users," pp. 145-152.

Nolan, J., 1987. Effects of Cuing of Familiar and Unfamiliar
    Acronyms and Need for Cognition on Recognition: An

Experiment to Suggest Newspaper Style Guidelines. Paper presented at the 70th annual meeting of the Association for Education in Journalism and Mass Communication, San Antonio, TX.

Smith, F.R., 1983. Six Principles for Using Technical Shorthand. Proceedings of the 30th International Technical Communication Conference, pp. W&E32-34.