

Paper 067-30

# Journeyman's Tools: The Writing for Reading and Reuse Program Header or Everything You Ever Wanted To Know About A Program But Were Afraid To Ask

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## ABSTRACT

Information is the difference that makes a difference. The difference between a program with documentation and one without is the cost of development. A program with documentation is more likely to be easily understood and therefore more likely to be reused thus saving the effort and expense of reinvention. This paper proposes a model program header which, like this paper, contains a title, abstract, and introduction that are designed to communicate clearly program intent and usefulness. Expected audience is intermediate to advanced users and programmers.

**Keywords:** comments documentation quality theory.

## INTRODUCTION

What would you pay for a program with 100 SAS statements? As little as \$1000? As much as \$10,000? Having paid that bill, with that program working, would you delete it and pay another programmer to write the same functionality a second time? Would you be willing to spend another \$100 on a dozen lines of program documentation so that you wouldn't be tempted to have someone do the same work a second time?

On the last page are those dozen lines of documentation to be filled in in order to convert a program from disposable to a keeper: a reusable program.

## THE MYTHICAL MAN-MONTH

Brooks [Bro95] offers some memorable thoughts which I will use below to offer for consideration an approximate dollar value for a thousand lines of code (1K lines of code: KLOC). Let us assume at the beginning that a line of code is roughly equivalent to a SAS statement.

Brooks cites several studies done in the 1960s on the number of lines of code produced per man-year while developing code for compilers and operating systems. The various studies show values from 0.5 to 10 KLOC/man-year. There are a number of factors which skew a SAS KLOC from what was measured in the midst of the previous century, most notably this quote: "Programming productivity may be increased as much as five times when a suitable high-level language is used."

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## BACK OF THE ENVELOPE CALCULATIONS

A typical man-year might consist of as many as 50 40-hour weeks (2000 man-hours). If we pick the middle of the range of productivity — 2–30 KLOC/year — we might guesstimate that one SAS programmer might be able to fluctuate between one and fifteen lines of code per hour. He also notes that: "Very good professional programmers are *ten times* as productive as poor ones, at same training and two-year experience level." So an order-of-magnitude productivity difference between any two programmers is not unexpected.

Just how much goes on in that hour, besides typing? Brooks divides effort into two halves: Design and Testing.

			minutes/hr	days/week	days/month
Design: 1/2	1/3	understand problem	20	1.66	7.0
		education and research			
	1/6	coding	10	0.83	3.0
Testing: 1/2	1/4	component or unit test	15	1.25	5.0
	1/4	systems or integration test	15	1.25	5.0

What are contemporary rates for SAS programmers? Let us start at dirt-cheap: \$15/hr or \$30,000/yr and go on up to experienced at \$75–\$100/hr.

You may pay from \$15 per line of inexpensive code down to less than \$6 per line of expensive code. One hundred SAS statements might cost anywhere from \$500 on up to \$2000.

Of course, these figures are ball-park figures, but they are meant to make the point that a program that is a few pages long is a significant investment, one worth an effort to preserve.

## INFORMATION: THE DIFFERENCE THAT MAKES A DIFFERENCE

This example program header suggest there are two important groups of information to communicate: tell what *the user requires*: purpose, and description, and tell about *the program specifications*: program group, program type, SAS type, input, process, and output. By addressing the two distinct groups of readers program quality — conformance to requirements — may be assured.

The meta-program information is designed to communicate to the two main groups of readers of a program: users and programmers. Providing this overview creates expectations, relevance, and anchors to the reader's past experiences. In addition this facilitates a key-word search of the files in a directory.

The information about expectations is expected to convey to readers — either users or programmers — in three distinct styles, what to expect.

## NOTES:

Examples of program headers of the author's subroutines are available in the current SUGI Proceedings, see [macro-Array], and [J-Tools]. This material is derived from [Rhetoric], a work in progress.

## CONCLUSION

Program documentation is an over-looked and under-appreciated aspect of programming effort. Effective documentation contributes to program reuse. The costs associated with documentation are miniscule in comparison to those associated with redevelopment.

## REFERENCES

- [Bro95] Brooks, Frederick P., Jr. (1995), *The Mythical Man-Month: Essays on Software Engineering, Anniversary Edition, 2/E*, Addison-Wesley.  
[http://www.aw-bc.com/catalog/academic/product/0,,0201835959,00%2ben-USS\\_01DBC.html](http://www.aw-bc.com/catalog/academic/product/0,,0201835959,00%2ben-USS_01DBC.html)  
<http://www.amazon.com/exec/obidos/tg/detail/-/0201835959/002-4796015-3029601?v=glance>
- [macro-Array] Fehd, Ronald (2004), Proceedings of the 29th Annual SAS<sup>®</sup> Users Group International Conference, 2004. <http://www2.sas.com/proceedings/sugi29/070-29.pdf>  
 Proceedings of the 12th Annual Conference of the SouthEast SAS Users Group, 2004.
- [J-Tools] Fehd, Ronald (2004), *Journeyman's Tools: Two Macros to Show Calling Sequence and Parameters of Routines*,  
 Proceedings of the 12th Annual Conference of the SouthEast SAS Users Group, 2004.  
 Proceedings of the 30th Annual SAS<sup>®</sup> Users Group International Conference, 2005.
- [Rhetoric] Fehd, Ronald (2005), *A SAS<sup>®</sup> Companion: A Journeyman's Rhetoric of Writing for Reading and Reuse or Testing*, a Work in Progress.

## SUGGESTED READING

For an overview of quality I recommend the following authors:

Philip Crosby, designer of the Zero Defects attitude of quality management:

<http://www.philipcrosby.com/>

<http://www.philipcrosby.com/qualitystore/books.html>

W. Edwards Deming, author of *14 Points for Management*: <http://www.deming.org/>.

Joseph Juran, pioneer of Quality Management, author of Pareto Chart: <http://www.juran.com/>.

Walter Shewhart, father of Statistical Process Control:

<http://www.asq.org/join/about/history/shewhart.html>.

Philip Crosby, *Reflections on Quality*, McGraw-Hill, 1996.

<http://www.amazon.com/exec/obidos/ASIN/0070145253/104-9767883-6219904>

Philip Crosby, *Quality & Me, Lessons from an Evolving Life*, Jossey-Bass Publishers, San Francisco, 1999.

<http://www.amazon.com/exec/obidos/ASIN/0787947024/104-9767883-6219904>

W. Edwards Deming, *Out of the Crisis*, The MIT Press, Cambridge, Massachusetts, 1982, 1986, 2000.

<http://www.amazon.com/exec/obidos/ISBN%3D0911379010/104-9767883-6219904>

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## The Writing for Reading and Reuse Style Sheet: a Program Header

	<i>item</i>	<i>expected value</i>	<i>commentary</i>
	<code>/* name:</code>	<code>what FileName.ext</code>	
	<code>-----:</code>	User Requirements:	create expectation: Zero Defects
	<code>description:</code>	<code>what</code> product expectation	informal: natural language prose
	<code>purpose:</code>	<code>how</code> usage context	how will this be used?
	<code>-----:</code>	Program Specifications:	very technical from here on
	<code>program group:</code>	<code>when</code> development, testing review data fix data change normal form find information summary reports	a set of related tasks
	<code>program type:</code>	<code>which</code> job: implements task routine: calls subroutines subroutine	to submit or execute specific purpose general purpose
	<code>SAS type:</code>	<code>which</code> %include without parameters %include with parameters macro procedure macro function	
	<code>input:</code>	<code>what</code> parameters	
	<code>process:</code>	<code>how</code> algorithm steps	semi-formal: pseudo-code or program design language
	<code>output:</code>	<code>where</code> data, log, list, ODS	
	<code>notes:</code>	side effects? uses routines or subroutines?	
	<code>usage:</code>	<code>how</code> submit job or typical example of use of routine or subroutine	
	<code>author:</code>	<code>who</code> Ronald Fehd	
	<code>change notes:</code>	<code>who,</code> when, what changed	