

Measuring Up to Metrics: How I Became a Missourian

By

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The state of Missouri is often referred to as the “show me state”. Its epithet is traced back to Missouri Congressman Willard Duncan Vandiver, who in an 1899 speech, said: “Frothy eloquence neither convinces nor satisfies me. I am from Missouri. You have got to show me.” Vandiver may have unwittingly been the father of metrics.

Early in my long software development career I learned to say, like the Missourians, “show me”. I have often been told that the quality of our software is improving and customer satisfaction is rising. I have been assured countless times, and with inane confidence, that our projects are on track and I have nothing to worry about. But all these statements are nothing more than frothy eloquence unless they are backed by measurable data (metrics).

The use of metrics in software project management, often referred to as *management by data*, was the subject of a survey we conducted with the Cutter Consortium. Some of the findings were most interesting. For instance, we were very surprised to learn that most organizations actually collect metrics. But we also discovered that many of them don't use it very effectively. It appears that some organizations simply do not know what to do with the data they collect. It is rather like driving in the dark and not knowing how to turn the headlights on.

The goal of the survey was to learn how software development organizations collect, analyze, and use metrics. We reviewed some of the most common problems and their impact on the quality of metrics analysis. We then looked at how the use of software metrics is evolving, particularly in new areas such as agile development.

In this report on software project metrics survey, we will look at the software development scorecard. We will examine the problems encountered by organizations in collecting and analyzing metrics and we will review some of the most common methods and practices. Finally we will attempt to conclude whether software developers have earned the right to be called Missourians (at least in an honorary capacity).

HOW USEFUL IS METRICS?

Certainly one of the most interesting findings of the survey was that 83% of software organizations collect software metrics to varying degrees. The results appear in Figure 1, which show how the 83% are distributed: 35% occasionally collect software metrics while 48% do so consistently.

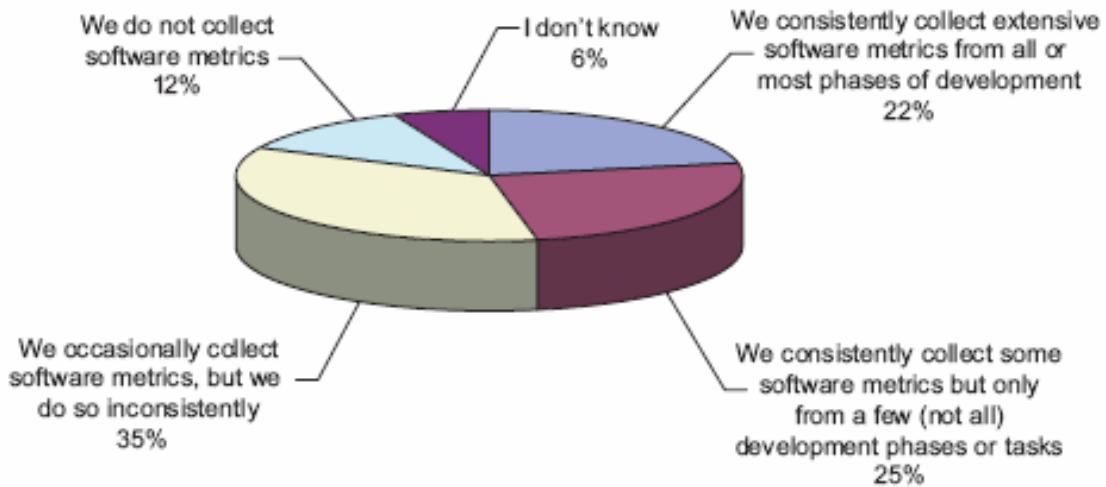


Figure 1 — Does your development organization collect metrics?

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Of the consistent group, 25% collect metrics only from the development phases or tasks that they are interested in examining, and 23% collect extensive metrics from all or most phases of software development. The rest either do not collect any software metrics (11%) or are unaware whether metrics is collected in their organization (6%).

These findings are surprising because they differ from the prevailing perception. An EDS white paper published in 2000 painted a rather bleak picture with 85% of software development organizations having no metric program [1], and similar figures were still being reported by Haddad and La Salle as recently as early 2004 [2].

For the purpose of the survey, the term *software metrics* refers to comparative data collected during the development of software and after its release, which relates to the success, failure, performance, and process of the various development and post release phases and activities. Examples are: (a) the number of defects in a particular document, software module or application, (b) the time required to perform a task, (c) the cost of a particular task or activity, or (d) the level of customer satisfaction with the software product or a specific feature.

But if we also consider the results in Figure 2, we find that the reversal in the use of software metrics is not really that significant. The data is indeed collected, but we find that the process and the analysis are poor.

Figure 2 shows that just over half of software development organizations (51%) do not effectively analyze the metrics they collect. We also find that 47% do not have any well-defined process to collect metrics and 40% collect poor quality data which is inaccurate, incomplete, or otherwise unreliable. In 40% of the organizations there is no one responsible for metrics collection and analysis, and if the data does get processed, 39% say that the results are not adequately communicated to the project teams.

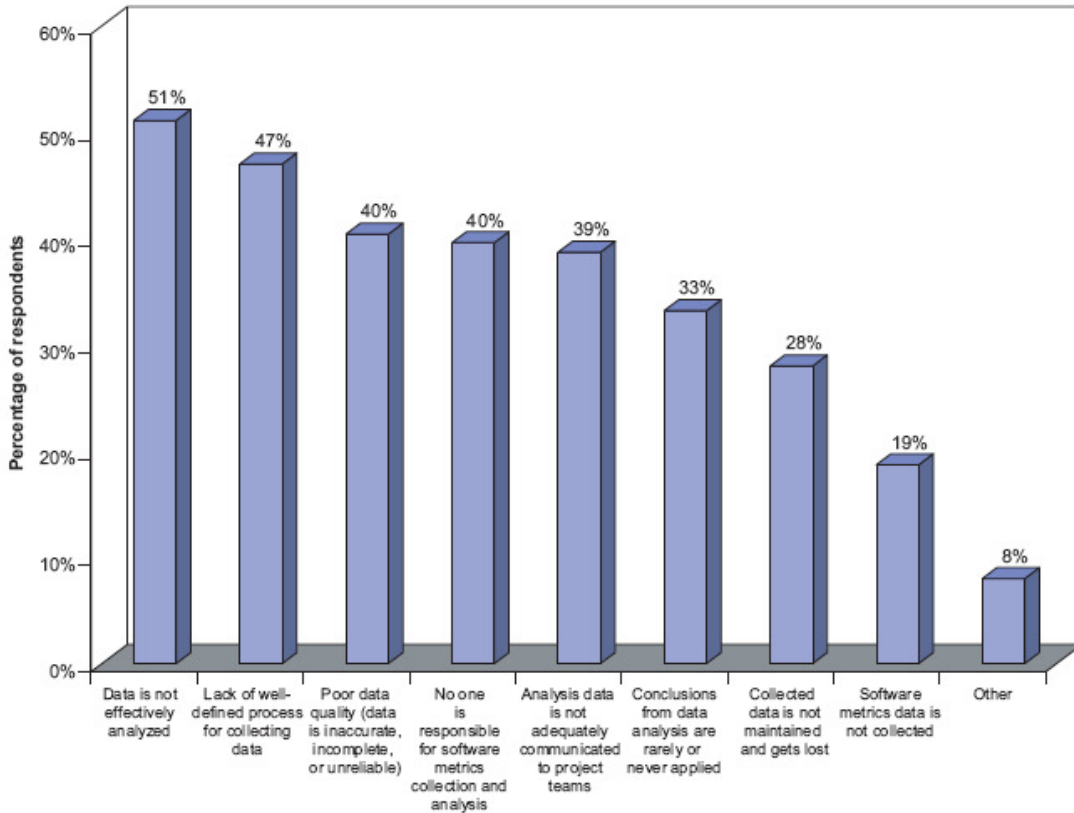


Figure 2 — What are the main software metrics problems in your organization?
(Respondents able to select more than one response.)

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Additionally, a third of the surveyed organizations report that conclusions from data analysis are rarely or never applied, and 28% say that the data is not maintained and gets lost.

These figures do not tell a flattering story about the use of metrics, but the story may not be as bad it seems if the problem-groups overlap.

An indication that there may well be significant overlap is provided in Figure 3. An impressive 88% of software organizations say that the collection and analysis of metrics data either very useful or somewhat so. Most respondents (60%) report that metrics occasionally produces useful conclusions (i.e. it is somewhat useful), and the rest (28%) say that it is very valuable and that it helps improve the way software is developed.

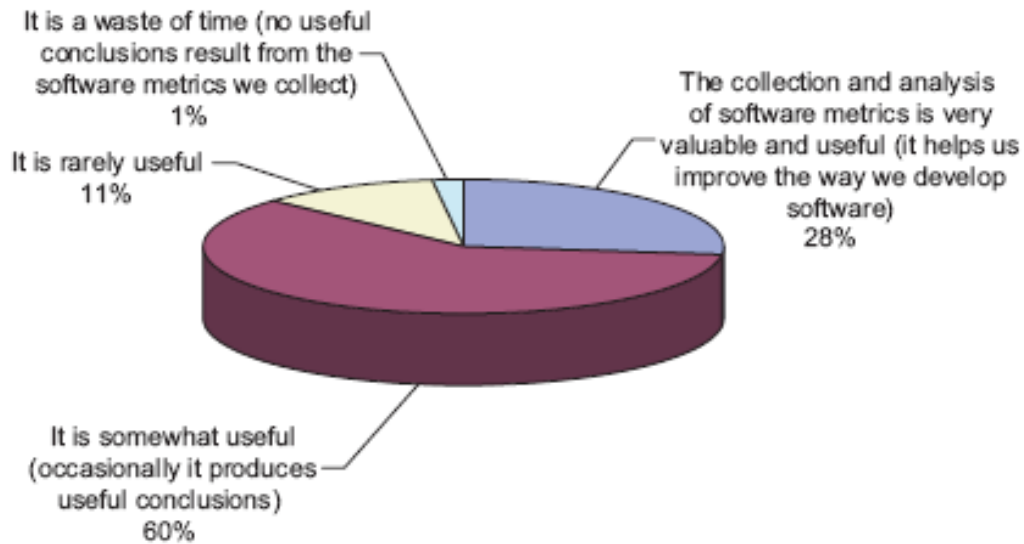


Figure 3 — How useful is collection and analysis of software metrics data in your organization?

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Of the rest, 11% said that metrics is rarely useful, and just 2% found it to be a waste of time (it leads to no useful conclusions).

COMMON PRACTICES

The survey examined the way metrics data is collected, including automatic and manual methods, and formal and informal procedures (see Figure 4). Manual data collection is most common, reported by 46% of the surveyed organizations, and is implemented by the project team members, usually according to a formal process. Automatic methods are used by 27% of development organizations by collecting the output of development and quality assurance tools. Interestingly, 23% of organizations assign specially designated staff who are responsible for all aspects of metrics collection and analysis. Other informal data collection methods are used by 44%, while another 3% said that they did not know how metrics data is collected.

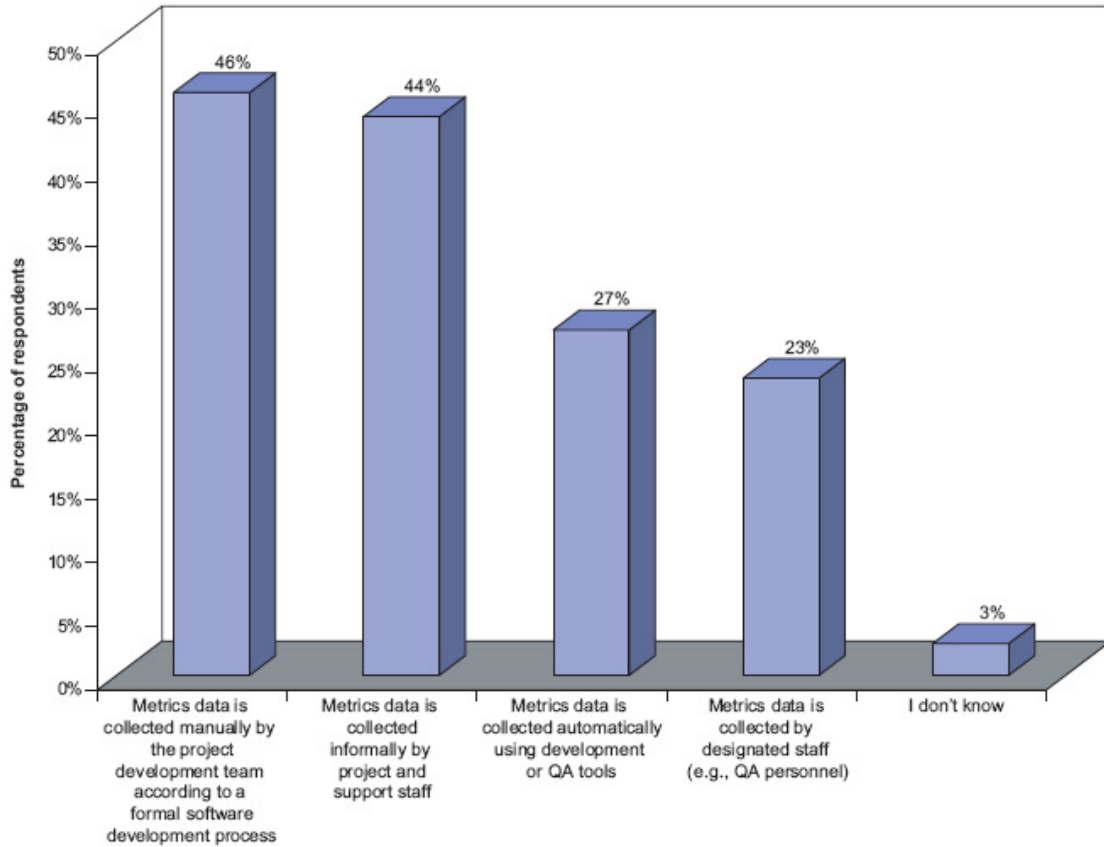


Figure 4 — How does your organization collect software metrics data?
(Respondents able to select more than one response.)

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The survey found that most software organizations use a formal metrics process or methodology. In Figure 5 we see that 48% have adopted a proprietary formal process, while 9% use an industry-wide standard such as IEEE 1061 [3] for software metrics. Another 35% report that they use an informal (largely undocumented) process and just 8% state they have no process.

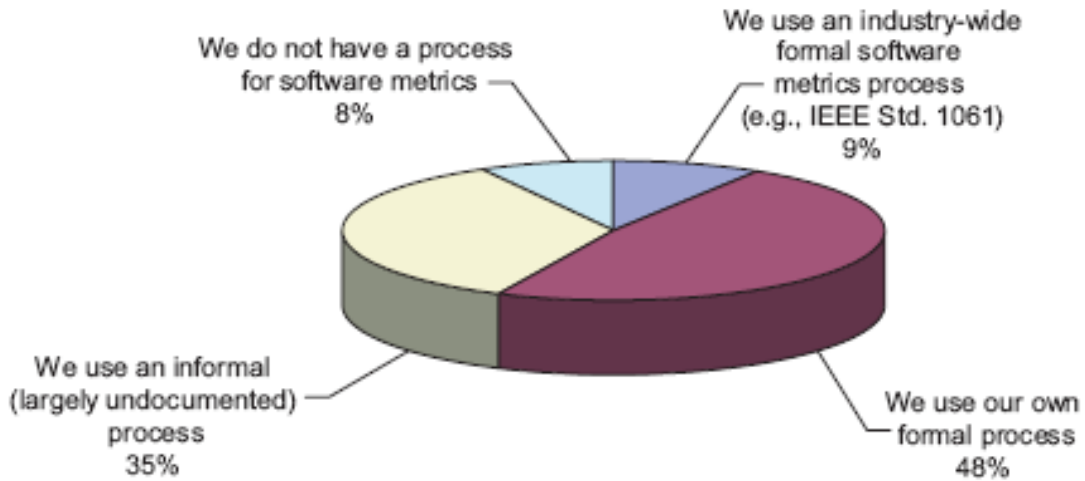


Figure 5 — What process or methodology do you use to collect and analyze software metrics?

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These findings are interesting because of the large number of software organizations that have adopted formal methods. This means that many organizations fully appreciate the high value to be derived from management by data. It will be interesting to revisit the subject again to see if this appreciation in any way gets translated into an improvement in the quality of metrics analysis (and we have seen in Figure 2 just how necessary this is).

ARE WE ALL MISSOURIANS?

So, can we say that the expression “show me” is widely used in software development? Unfortunately, the answer is no. The practice of management by data in most software development organizations appears to be fairly rudimentary. The good news is that there are companies that are leading the way (28% find metrics to be an invaluable medium), and there does appear to be a serious effort on the part of many software organizations to adopt formal metrics practices.

The overwhelming percentage of software organizations that collect metrics (to some degree), is noteworthy, even when toned down within the context of the other survey results. It further reinforces the conclusion that there is an appreciation of the benefits of measurable data but the leap from appreciation to implementation is not yet apparent. Returning to a previous analogy, it is rather like the driver at night who knows that there is something on the dashboard that will light up the road ahead, but he hasn't figured out how to use it yet.

Readers who would like to comment on this discussion or on their experience with software metrics are invited to e-mail me at: info@AdvancedPS.com.

This article was originally published by Cutter Consortium as part of its Agile Product & Project Management online resource center. For more details see <http://www.cutter.com/project.html> at www.cutter.com

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