

CMM and *TODS*

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The *Capability Maturity Model* [4] is an orderly way for organizations to determine the capabilities of their current processes for developing software and to establish priorities for improvement [2]. It defines five levels of progressively more mature process capability [3].

Level 1: Initial The software process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort.

Level 2: Repeatable Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.

Level 3: Defined The software process for both management and engineering activities is documented, standardized, and integrated into an organization-wide software process. All projects use a documented and approved version of the organization's process for developing and maintaining software. This level includes all the characteristics defined for level 2.

Level 4: Managed Detailed measures of the software process and product quality are collected. Both the software process and products are quantitatively understood and controlled using detailed measures. This level includes all the characteristics defined for level 3.

Level 5: Optimizing Continuous process improvement is enabled by quantitative feedback from the process and from testing innovative ideas and technologies. This level includes all the characteristics defined for level 4.

You may be asking, what does a maturity model for software development have to do with databases generally and with *TODS* in particular? Well, CMM has been applied to personnel management, quality management, and even weapons system development. And it can be used as a framework for evaluating the journal review process, as we will do here.

Manuscript review at *TODS* started, logically, at Level 1. In 2001, the ACM Publications Board approved a broad policy [1, 5, 6] that raised publishing of ACM journals and transactions to Level 2. In 2003 ACM adopted the Manuscript Central¹ web-based manuscript tracking system [7], raising its manuscript reviewing process to Level 3.

In parallel with these efforts at the ACM Publications Board level, I have been refining the reviewing process for *TODS*. In October 2003 I released the first edition of the *ACM TODS Associate Editor Manual*, with revisions in April 2004 and October 2004. This manual, at 22 pages, is quite detailed.

I have also been collecting detailed statistics since July 2001. Some of these statistics are reported on the *TODS* web site²: turnaround time, article length, number of articles, and end-to-end time [6]. I have also kept records on the turnaround time of individual Associate Editors, and have closely monitored the progress of individual papers.

¹<http://acm.manuscriptcentral.com>

²<http://www.acm.org/tods/TurnaroundTime.html>

Through these efforts, and through a series of internal policies regarding the reviewing process that has been adopted by the *TODS* Editorial Board, all of the statistics has improved, some considerably [8]. Average turnaround time is now down to 13 weeks, average article length has been brought down to levels last seen in the mid-1990s (under 40 pages), the number of articles per volume is back up to that last experienced in the early 1990's (21 articles per year), and average end-to-end time is down to 17 months, last experienced in the 1970's.

The result is that *TODS* is now operating at CMM Level 5.

Why should you, dear reader, care about internal processes at *TODS*? The short answer is that by being at Level 5, *TODS* can provide assurances as to how *your* submission will be handled.

Average turnaround and end-to-end times are nice, but what authors really care about is how long *their* submission will take to be reviewed. Addressing this concern involves both average and *maximum* times. A low average turnaround time is of little reassurance to someone experiencing an abnormally long turnaround time. As an example, while the average turnaround time for papers submitted in January 2002 to *TODS* was a quite reasonable 5.5 months, one paper submitted that month had to wait almost nine (!) months for a decision.

By virtue of being at CMM Level 5, the variance of the turnaround time could be monitored and improved, as shown in Figure 1.

The turnaround time has been slowly decreasing over the past four years. This figure shows four sets of data. The bottom line is the *average turnaround time*, a moving average of the turnaround time for papers submitted in the indicated month. To smooth monthly variations, the moving average includes all of the submissions for the previous year. Each data point represents dozens of papers. The value for January 2005, 12.5 weeks, is the average turnaround time for all of the papers submitted between (inclusive) February 2004 and January 2005.

The next line up is the average turnaround time for external reviews only, a moving average of the turnaround time for papers submitted in the indicated month. This includes only submissions that went out to external reviewers and specifically excludes desk rejects. The value for January 2005, 15.6 weeks, is the average turnaround time for external reviews of all the papers submitted during the year up through January 2005.

The points, one per month, denote the maximum or peak turnaround time for submissions in the indicated month. Each point represents a single, unusually slow paper submitted during the indicated month. For all the papers submitted in January 2005, the longest turnaround time was 4.9 months (21 weeks).

In terms of turnaround time, *TODS* at 12.5 weeks is now equivalent to conferences (as exemplified by SIGMOD and PODS at 12 weeks), while being more flexible in not imposing a submission deadline.

The straight line is the *committed maximum turnaround time*, the boundary that the Editorial Board has committed to not exceed, for any submission. Several years ago the Editorial Board established a formal policy stating its commitment to providing an editorial decision within 6 months [8]. *TODS* thus joined conferences in guaranteeing a stated turnaround time.

Due to the rigorous application of CMM Level 5, of continuous process improvement as exemplified by the steady lowering of average turnaround time and the compression of the variance in turnaround time by a factor of two, I can announce that the Editorial Board is now committed to providing an editorial decision within *five* months, starting with submissions in 2004. As depicted in the figure., we have met this stated commitment for the past thirteen months. As of the writing of this column (June 29, 2005), all manuscripts submitted before February 1 of this year have been processed and editorial decisions rendered.

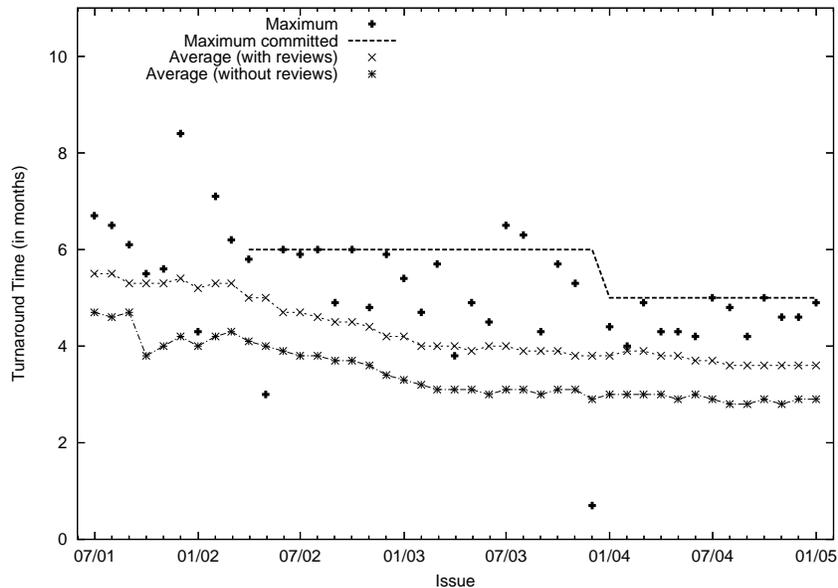


Figure 1: ACM *TODS* Turnaround Time

That *TODS* now matches conferences in terms of turnaround time is a testament to the hard work of two groups of people: reviewers and the editorial board. I will recognize the reviewers in a future column, but here I wish to thank the following people, who comprise the *TODS* Editorial Board, for their dedicated effort work in achieving very fast decisions while upholding very high standards.

Surajit Chaudhuri, Microsoft Research
 Jan Chomicki, SUNY Buffalo
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 Betty Salzberg, Northeastern University
 Sunita Sarawagi, IIT Bombay
 Dan Suciu, University of Washington
 Jennifer Widom, Stanford University

These 18 people are providing a truly valuable service to readers, to authors, and to reviewers. When you see these people, please thank them personally for their role in achieving quick reviews of submitted papers.

References

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