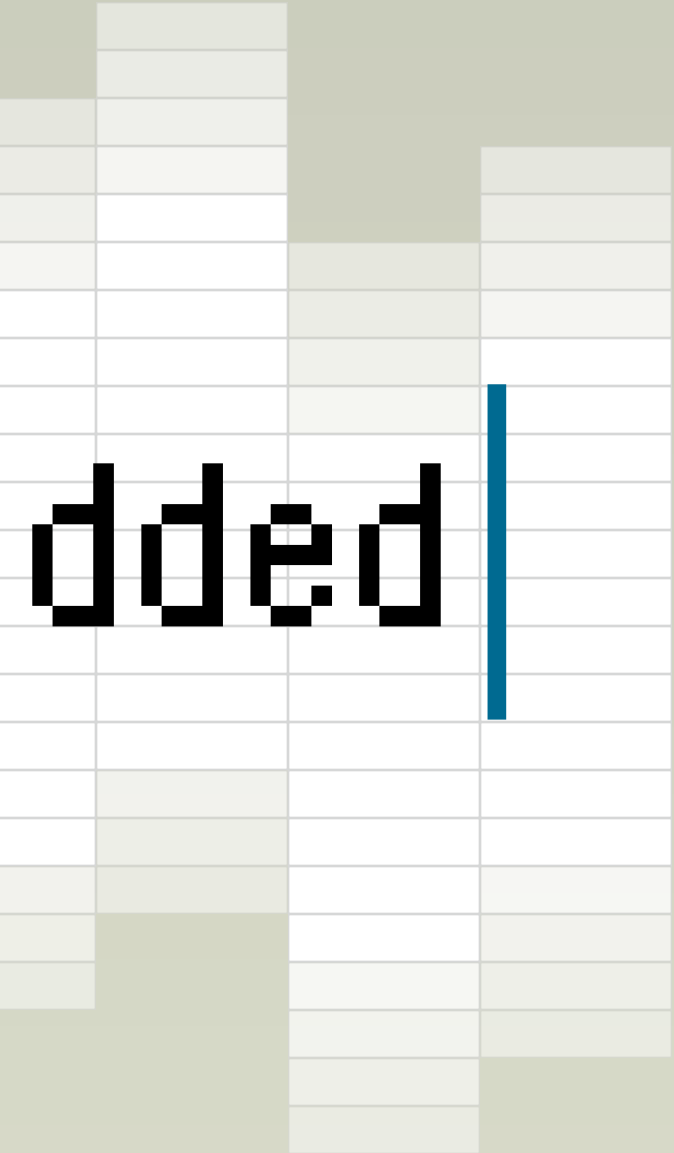
Earned Value-A

by Michael Jansen



Earned value management (EVM)...either you swear by it, or swear at it. Either way, there's no getting around the fact that EVM can be one of the most efficient and insightful methods of synthesizing cost, schedule, and technical status information into a single set of program health metrics. Is there a way of implementing EVM that allows a program to reap its early warning benefits while avoiding the pitfalls that make it infamous to its detractors? That's the question recently faced by the International Space Station (ISS) program...

In 2002, I joined the Station program's Assessments and Cost Estimation Office (ACEO), an organization established to perform the kind of early warning, "Where's-my-program-headed?" assessments that few program managers have the time or staff to do thoroughly.

By the time I joined the team, the ACEO had already established several unique tools with which to develop meaningful summaries and "What's-the-data-really-telling-you?" assessments for the ISS Program Manager. But one key program control tool remained missing: earned vlue based performance measurement. Leading the development and implementation of a program-wide EVM system became one of my early tasks, to no small extent because I volunteered that I understood EVM and believed in its utility.

But you've got to use the data

Mid-program EVM implementations, I soon discovered, are widely held by industry to be difficult endeavors at best. Although the ISS program was receiving monthly EVM data from its major contractors, nobody was tying them together to form a consolidated performance message. And even if someone had, only about half of the program's work would have been covered under this type of performance measurement.

Few seemed to be using the contractor EVM data we were getting. Most managers were collecting it because it was required, not because they saw the value inherent in EVM reporting. The common feeling was that EVM was expensive, faddish, a royal pain in the posterior, and definitely not worth the effort. This feeling was expressed even more strongly by managers of work content not already encompassed by EVM reporting: "I'm getting all

the data I need through planned vs. actual costs, plus the technical updates I receive monthly from my leads…why do I need earned value?"

That was only the beginning of the challenge. ISS was already squarely in operations, even as the last of the development effort was wrapping up. Some astute managers started asking the very good question of how meaningful EVM would be when applied to what they considered to be essentially level-of-effort work. Literature and Internet searches unearthed no examples of implementation of EVM on programs in the operations phase; nobody's corporate memory could recollect such an instance either. And it didn't help that what some veterans could remember was that a prior implementation of across-the-program EVM had been abandoned largely because the associated overhead was perceived to outweigh the benefits.

▸ The overall program status was very close to the management team's "gut feel."

Then there was the issue of timeframe. All knowledgeable sources indicated that EVM implementation was often a multi-year endeavor. Once initiated, EVM systems were said to take at least four to six months to "settle out" and produce meaningful data. My team's marching orders were to have a tested EVM system in place in time for the start of the next fiscal year (which at that time was less than five months away) and to have results capable of withstanding outside scrutiny after the first month of baseline operation.

Drumming up support

A crucial first step was to develop an implementation plan and gain the Program Manager's support. We outlined an aggressive schedule that supported conducting three dry runs of the new system. The Program Manager agreed to our plan, as well as to our request to present it to his control account managers at his next senior staff meeting. Having the Program Manager openly support our efforts in that forum was worth far more than any amount of lobbying we might have attempted to do. We had a sanctioned plan in front of everyone. Now we had to make it happen.

Dealing with PMS

Our philosophy of implementing an EVM system which maximized return on investment included minimizing the impact on managers' existing workloads. Our new Performance Measurement System (PMS—yes, we've heard all the jokes) was to be based on earned value concepts rather than to be a formal, certified EVM system. The idea was to use existing schedules, metrics, etc., rather than to reinvent the wheel. Considering that our program was largely in the operations phase, we also didn't expect to cover the high percentage of total work content under discrete earned value performance metrics that traditional EVM systems do.

We concentrated on measuring performance for those tasks that, because of their risk, high cost, or visibility, could cause potential problems for the Program Manager. In this approach, we identified and closely watched those items that could become "gotchas." Thus our PMS became closely aligned with the program's risk management system.

Another facet of making our PMS palatable to managers involved relieving them from as much of the implementation effort as possible. For example, our team shouldered the up-front work of developing a PMS process tool that would minimize the effort required for control account managers to make monthly EVM inputs and retrieve processed data for analysis. Our team drafted top-level, resource-loaded schedules for those control accounts that didn't already use one

in routine status reporting. We reiterated our "low-impact implementation" message as we presented our pre-developed schedules and formats to managers and their support folks, then worked with them to answer questions and revise the schedules.

Within ten weeks of the inaugural senior staff meeting, we had our process defined, and the first version of the PMS tool developed and validated. We also had top-level, resource-loaded schedules for all of our new control accounts, covering the three-month dry run period laid out in our PMS implementation plan. Similar schedules, covering upcoming fiscal year 2003, were in place. An innovative, more understandable way of looking at the EVM data—adapted from a DoD format—was incorporated into our tool and ready for debut with the ISS senior management. We developed methods of projecting end-of-fiscal year expenditures, as well as the split between unencumbered under-run and content-laden roll-through—taking into account such unorthodox factors as being in the operations phase. Convergence metrics were devised to track the system's "settling out" and to project when the EVM data would be mature enough to be considered meaningful for management decision making.

But will the process work?

Starting with the first dry run, we made monthly briefings of PMS results to the Program Manager and his senior staff. The initial results were interesting: Any given control account's data could be all over the map, but in aggregate the PMS estimate of overall program status was very close to the management team's "gut feel." The second month's dry run results showed more of the same behavior, and underscored what EVM experts had predicted: The data should be expected to vary widely from one month to the next until the system "settled out." By the third dry-run, however, the system already showed signs of stabilizing, particularly the ISS-level aggregate data. The Program Manager and his team were pleased with the initial results, as well as with our tool's data processing and presentation; the go-ahead was given to proceed with a baseline PMS for the new fiscal year.

Success...!

The initial baseline run, completed within six months of approval of our implementation plan, went as smoothly as anyone could have hoped for. The new resource-loaded schedules were completed just in time; the last-minute process and tool tweaks came together the same way. The financial and earned value data—once loaded into our PMS tool—resulted in a very believable ISS status that was in line with the senior managers' understanding of the program's technical, cost, and schedule situation.

Perhaps most importantly, the EVM data sparked questions that forced managers to look a bit deeper into what was going on in their respective areas of responsibility. Those healthy discussions alone made all the previous months' efforts worthwhile.

All of this was accomplished with the part-time efforts of a half-dozen people on our team, plus a couple of people from each of the ten new control accounts we created—and is being maintained with far less overhead than is commonly attributed to EVM systems. Our home-grown Excel®-based PMS tool, besides being "no-cost" compared with commercially available software, enabled us to tailor every thing at will to meet our analysis needs. Our PMS, including the unorthodox projection methods we developed, went on to predict fiscal year closing statistics to within a half percent a mere three months into baseline operations. EVM has become a valuable tool in our assessment suite indeed.

We swear by it. •

Lessons

- Rather than forcing a situation to conform to a solution that doesn't fit, flexibility and a willingness to try new things are necessary to tailor known techniques to the specific needs of a project.
- Overcoming the project team's resistance to change can be facilitated by minimizing the direct burden that results from the implementation of that change.

Question

Why is a methodology developed more than a generation ago still unpopular in many well-developed organizations, and why does it still require a dedicated introduction effort?

MICHAEL JANSEN leads the Assessments branch within the Program Planning & Control Office of the International Space Station (ISS) Program at the Johnson Space Center (JSC). He is active in NASA training, knowledge sharing, and community outreach activities.