1. Introduction

The current federal acquisition environment is producing an overwhelming number of small support contracts, indefinite delivery indefinite quantity (IDIQ) task orders, and information technology (IT) support contracts that trip the threshold for the need of an Earned Value Management System (EVMS).

The contracts supporting these programs establish requirements for performance management, metrics, and reporting. To meet the demands of these efforts, contractors need a program management system that is agile, effective, and does not overburden the program. The principles of EVMS implemented with an agile methodology (as shown in Figure 1) provide the architecture and framework for the solution SM&A consistently implements in these environments.

2. What is Agile EVMS?

In a traditional EVMS environment, change is the enemy and must be controlled. In an agile environment, change is embraced, and the management system is designed and implemented to effectively manage it, as shown in Figure 2. What makes agile EVMS different from traditional implementations of EVMS are two key attributes. The first is the level at which programs are planned. Requirements for these programs are not well defined at program award, and change over time. As a result, the initial program plan is implemented at a high level and only detail planned at the event horizon of an effort (sprint). To initiate each sprint, requirements are defined in collaboration with the customer, and the effort is detail planned.

The second difference is the approach to reporting. Rather than formal monthly reporting, Agile EVMS creates transparency through weekly reporting centered on a resource load Integrated Master Schedule (IMS) incorporating “by-name” planning that ensures cost/schedule integration. The focus of this reporting is the cost/schedule/technical objectives defined for the sprint. The reporting of each sprint is in the context of the overall program to ensure each sprint, and the program, meet the defined cost/
schedule/technical objective. This methodology favors responding to change, collaboration with the customer, and forward motion through incremental accomplishment rather than rigid detailed program plans that over time become ineffective in management tools.

Although any program can benefit from an agile approach, Agile EVMS is tailored for IT projects, software projects, and service efforts. These project environments are in a constant state of change. To measure performance effectively, the implementation of the project management system must promote transparency to all stakeholders, flexibly manage changing requirements, and be simple to operate. To accomplish this, an Agile EVMS leverages short duration sprints that manage the following five elements:

- **Requirements**: cost/schedule/technical requirements must be managed to ensure the impact of changes is understood and accomplishments can be tracked. At the beginning of each sprint, requirements are defined in collaboration with the customer with mutual agreement on scope.
- **Sprints**: the user stories and requirements comprise the entry and exit criteria for each sprint. To complete a sprint, the customer must agree the requirements of the sprints are met or the user story/requirements will be move to the next sprint. However, the dollars associated with the scope of the requirement must also be moved to the next sprint.
- **Iterations**: several iterations may be required to meet the entire scope of a requirement. At the beginning of each sprint, requirements are defined in collaboration with the customer with mutual agreement on scope.
- **Daily Visibility of Accomplishments**: meeting daily the team evaluates accomplishments and identifies challenges. All stakeholders attend these meetings to promote collaboration and transparency.
- **Continuous Feedback**: the cost/schedule/technical attributes are continually evaluated to ensure quick feedback occurs as challenges arise. This feedback is managed through an integrated collaborative team that designs quality into the delivery process. Through continual evaluation, the team ensures quality expectations are met.

**Figure 2: Scope of an Agile EVMS.**
Agile EVMS employs four tools to simplify the management of the effort, ensure the program is flexible, and promote transparency. The data represented in these charts, as shown in for the basis for assessing performance eliminating the need for elaborate performance measures and EV techniques:

**Burn Down Charts** measure the burn rate of the requirements in the unit of the measure defined when the requirement is defined. The units of measure simplify the development of the Estimate to Complete (ETC) for the sprint and the team ability to predict the outcome of the project. By predicting the future velocity of the sprints based on the current run rate.

**Burn Up Charts** establish the relationship between contributing elements of the effort. The visibility this chart provides highlights the patterns in delivery in relation to the actions taken to adjust the direction of the team. As an example, the chart shows a project where development is fairly smooth and quality assurance (QA) is keeping pace, but project requirements are very volatile.

**Velocity Charts:** velocity is a major attribute of Agile EVMS. Measuring velocity provides the rate of progress of a team in a given iteration. Velocity is a reliable measure as it is based on objective tangible measures and not subjective data. The unit of measure is defined in collaboration with the customer and established by the team at the beginning of the sprint. The basis of estimation in velocity varies from team to team and therefore, velocity is not a measure used to compare teams. The velocity of the team can be compared only within itself from iteration to iteration, but only if the goal for team is consistent.

**Validation Charts:** designing quality into the delivery of a product or service is integral to Agile EVMS. Key to this is measuring the number of requirements, number of issues, and the trend across iterations. At the end of the sprint all requirements for the sprint are retired with no open issues.

The outcome of implementing Agile EVMS is:

- **Greater collaboration:** the members of an agile team work closely together, favoring direct communication over passing documentation back and forth to each other. They recognize that documentation is the least effective manner of communication between people.

- **Reduced Cycle Time:** the time between specifying a requirement in detail and validating that requirement is now measured in minutes, not months or years, due to the adoption of integrated validation approaches, greater collaboration,
and less of a reliance on temporary documentation.
- **Embrace change**: Agile teams choose to treat requirements like prioritized stacks that can change throughout the lifecycle of a sprint. A changed requirement is viewed as a competitive advantage not an obstacle.
- **Greater flexibility**: rather than submit a deliverable for validation or acceptance, agile teams adopt a “show early and show often” paradigm. Transparency and collaboration is key to success.

3. **Architecture of an Agile EVMS System**

Weekly updates of planning and status ensure transparency and promote the agility of the system. However, manual integration of data and tradition approaches to status are not practice. For the system to remain flexible, it must be responsive to change. To accomplish this routine tasks and manual data manipulation must be eliminated. Automated cost/schedule/technical integration is key to the implementation of an Agile EVMS. The schedule is the foundation of the system and provides the timeline and resource needs for the effort. The technical attributes of each task provide the scope for the effort, enable a clear definition of “done,” and provide the basis for performance measures. Cost is a critical measure and can only be effectively managed if the planning tool is integrated with the accounting system.

Implementing a weekly cycle presents several challenges the implementation of an Agile EVMS must overcome:

1. **Aggressive Business Rhythm**: the system requires that the owners of each sprint provide status weekly. The process for taking status must be focused and not require complex inputs or data manipulation.

2. **Geographically Divers Users**: many of the users of the system will not be professional planners/schedulers. This effort cannot be onerous and the system must also be available where people. In contemporary project environments, the team is not collocated and is often working on site with customer or in a remote location. The system must be available when and where they have access.

3. **CAM Status**: given the aggressive business rhythm for the system the technical leads/control account managers (CAMs) must be able to update the system quickly. However, these users are not professional planners/schedulers and do not have skills required to navigate contemporary planning tools (Microsoft Project, Primavera, OpenPlan, etc.). These users need an interface to the system that promotes quick accurate updates and status. This capability must also eliminate the potential for errors and rework.
To eliminate the challenges, and promote ease of use, SM&A leverages workflow automation to implement a push system that leverages the Microsoft Office Suite of tools, Microsoft Project, and Microsoft SharePoint. This approach ensures that end users get the information sent to them in a format or tool they use daily, which does not require intimate knowledge of complex tools, and tracks completion of required tasks. In addition, they information they are provided is interactive and allows for immediate updates to status, independent generation of required reporting, including Program Status Reports.

4. Roles and Responsibilities

- **Senior Management**: establishing the objectives and priorities for each sprint; ensuring the team has the resources required, and promoting interaction and transparency with the customer
- **Functional Managers**: providing the required resources and skills required for each task
- **Technical Leads (CAMs)**: managing the technical effort, directing the resources assigned to each effort, and providing status to the system; defining the detail planning for each spring with support from Program Planning & Control
- **Customer**: provides scope, funding, priorities, feedback, and approval for the effort. Typically, the technical counterparts from the customer are integral to the team and engaged in the process
- **Program Planning & Control**: system, business rhythm, data quality, and reporting; validation of data collected from the Technical Leads; supporting the detailed planning of each sprint

5. Concept of Operation

A clear understanding of the Agile EVMS architecture, daily management meetings, and a baseline weekly business rhythm will ensure teams are consistent on delivering updates to the system. Regular updates in the system allows near real time views of program metrics at both the team level and the macro level. In addition to the agile metrics detailed above EVMS-like metrics will also be created to ensure regular tracking of both cost and baseline execution.
The weekly business rhythm is as follows:

- Program Planning & Control team generates a status request for Integrated Master Schedule (IMS) specific updates. This status will include the sequencing and duration on all sprint activities representing the work teams will perform to achieve their deliverables agreed upon by the team.
- Team stakeholders perform an IMS specific status update in preparation for a further detailed resource estimate including the duration tasks/sprints will be performed as well as any logical dependencies within the network that need to be modified to better represent the logical sequence in which the teams tasks/sprints will be performed.
- IMS updates are performed by the stakeholders. The Program Planning & Control team will update the IMS with the updates and run a critical path and health check on the system and report status to management for approval to proceed.
- The IMS status is approved a project planning and forecast workbook is created from IMS data and sent to the team stakeholders for update.
- Team stakeholders make necessary resource allocations and modifications to the hours that teams will perform tasks/sprints based on their daily management meetings and burn down status and reports are provided back to the Program Planning & Control team for input to the IMS.
- All inputs are received, automated metrics are generated from the system, and actuals are merged with the latest revised estimates. With an all-inclusive database in place, detailed metric packages are generated and provided to program management for review.
- Program management is briefed on the material and any necessary changes are made then a finalized metrics package is created and uploaded, sent, and or briefed to the customer as necessary on a weekly or monthly basis.

Figure 6: Agile EVMS concept of operations.
6. Implementation Considerations

There are several factors that can affect the quality of an Agile EVMS implementation. The following provides our insights based on the lessons learned from the implementations we have completed to date:

- The single most challenging issue is cultural resistance to change. People resist change to the process and procedures they know. Concepts such as integrating the customer into the team, transparency, and new workflow models can be met with overt protest or passive resistance. Management must support the use of the system top down, and the team must hold itself accountable for ensuing its success.

- Ensuring the data in the planning/scheduling tool and the accounting system provide the requisite level of detail and have the integration points is critical to ensuring data integration and data quality. In addition, understanding which tools own the data and promoting changes to only the source data will ensure quality results.

- Training is critical. Every member of the team must understand their role, responsibility, and how they fit into the system. Training and mentoring will be key to minimizing cultural resistance to change.

- At first, weekly status and small time periods for planning can challenge the team. Developing a business rhythm and validation process that promotes the success of the system is key.