

## ***CPM Series on Earned Value and Agile<sup>1</sup>***

### **Connecting EVM with Agile**

**Glen B. Alleman**  
**Niwot Ridge, LLC**

#### **Introduction**

Several concepts needed to be established before proceeding:

The connection of agile development practices starts with the principle of Earned Value Management, not Agile development.

When the Agile community says VALUE, it means Business VALUE, not EARNED VALUE.

The details of ANSI-748-C are shown here. In the current Earned Value Management Practice guide, ANSI-748-C is only references. The content of ANSI-748-B is not mentioned or used in the suggested practices of Earned Value Management. In order to incorporate agile development practices with Earned Value Management, it is critical to understand the intent of ANSI-748-B.

A second document not referenced in the current Practice Guide, is the National Defense Industry Association Earned Value Management Intent Guide. The NDIA EVMIG is the second document needed when incorporating Agile practices with Earned Value.

#### **Principles of This Appendix**

Before any of the current “agile” development methods, Earned Value Management provided information for planning and controlling complex projects by measuring how much “value” was produced for a given cost in a period of time. One shortcoming of an agile development method is its inability to forecast the future cost and schedule of the project beyond the use of “yesterday’s weather” metrics.

Earned Value Analysis provides a means of predicting future schedule and cost variances through three measurements – budgeted cost for work scheduled, actual cost for work performed, and budgeted cost for work performed (earned value).

Before proceeding let’s look at some top level similarities between Earned Value Management and Agile Development.

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<sup>1</sup>The College of Performance Management (CPM) published a Compendium of articles on Earned Value and Agile based program management in *The Measureable News* in late 2014. The articles are now being republished in the *PM World Journal*, as agreed with CPM and the authors. An introduction by Ray Stratton launched the series in the April 2015 edition of the *PMWJ*. This is the 5<sup>th</sup> article in the series. For information about CPM, visit their website at <https://www.mycpm.org/>

Earned Value	Agile Development
<b>A Big Picture View of the Project's performance.</b>	Continuous production of useable software.
<b>Accurate Estimate at Completion built from the bottom up performance.</b>	Prediction of the next iteration's effort using performance from the last iteration.
<b>End-to-end value tracking for deliverables measured as Physical Percent Complete.</b>	Iteration to iteration tracking of planned deliverables to the customer.

**Figure 1** – Top level concepts of connecting agile development with Earned Value Management starts with simple principles of successful project management. These connections establish the basis of this appendix, showing how compatibility between these seemingly conflicting concepts are in fact supportive of each other.

## The Agile Paradigm

The project management and product development method used by Agile depend on incremental development and iterative work processes in ways not normally found in standard approaches project management and product development. This is not to say standard approaches are not iterative or incremental. Just that agile prescribe special approaches to the iterations and increments that will be described below.

The first important method for Agile is to provide on short intervals the opportunity to assess a project's progress. Typically these boundaries are measured in weeks rather than months. As well all aspects of agile projects participate in these short intervals, requirements, development, testing, and deployment.

With these short intervals, the participants in the project have recurring opportunities to assess the progress of the project in terms of deliverables. These deliverables are complete, working instances of the product or service. They may be partially complete in terms of the entire project, but they are 100% complete in terms of their individual capabilities.

## Attributes of Agile Projects <sup>[2]</sup>

- The Period of Performance of the Work Effort is relatively fixed – iteration.
- Work is distributed evenly over time – the development has a fixed staff level.
- Work produces linear output – the product of the work effort remains relatively constant.
- Actual costs are not broken down by task – they are accumulated for the iteration.

## Agile Business Rhythm

All successful project management processes has a well-defined rhythm. Earned Value processes on government programs follow a monthly rhythm for producing the Contract Performance Report (DID 81664A). Similar rhythms are used for construction and other Earned Value centric projects. These business rhythms focus on measuring performance against plan. In Earned Value, this performance is the Budget Cost for Work Performance (BCWP) or Earned Value (EV).

For agile projects measures of performance take place through periodic releases of working products. The intervals of these releases are measured in weeks, usually not more than 4 to 6 weeks.

<sup>2</sup> "Earned Value for Agile Development," John Rusk, SoftwareTECH News, April 2009, Vol. 12, Number 1.

To address the challenges of planning and scheduling, the agile enterprise must create a fixed set of rules that are imposed upon all the teams, and then leave the teams to figure out how to accomplish the mission. For the agile release train, these principles include: <sup>[3]</sup>

Frequent, periodic release dates for the system, platform, or solution are fixed and inviolate and known to all team members.

*Similar to planned durations of Work Packages.*

*Most Earned Value systems limit the duration of work before measures of completion.*

Certain intermediate, global integration milestones are established and enforced.

*Milestones and measures of physical percent complete are part of all Earned Value implementations.*

*Work Packages or Tasks have defined outcomes that can be measures of progress*

Continuous system integration is practiced at the top system level as well as at the component level.

*Most Earned Value based programs rely on systems engineering processes.*

*Measures of progress are usually 0% or 100% at the Task level*

Constraining teams to the dates means that functionality for the components must be flexible.

*Many programs using Earned Value have fixed delivery dates.*

*Many have fixed budgets are “not to exceed” budget*

## A Quick Survey of Some Agile Paradigms

There are many sets of principles for agile development and agile project management. In this appendix, there are 3 sets of principles that will be the basis for connecting the 32 guidelines of Earned Value Management as it is described in ANSI-748-B.

### Agile Paradigms

These two approaches (Agile Manifesto and 12 Agile Principles) focus on a smaller set of principles than will be found in the application of Earned Value – the focus on identifying and measuring the creation of “value” for the customer.

While these three are representative of the agile they are not the complete list of agile processes. For now though they will be used to develop the connections to Earned Value Management.

12 Principles of Agile	EVO principles
<b>Our highest priority is to satisfy the customer through early and continuous delivery of value</b>	Select design with the best value impacts for the costs and do them first.
<b>Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.</b>	<i>Control projects by quantified critical few results.</i> Change design base on quantified value and cost experience of implementation. Change design requirements based on quantified value and cost experience.
<b>Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.</b>	Decompose workflow into weekly time boxes or 2% of the total budgeted time.
<b>Business people and developers must work</b>	Involve stakeholder, every week, in setting

<sup>3</sup> *Scaling Software Agility*, “Systems of Systems and the Agile Release Train: An Agile White Paper,” Dean Leffingwell, 2007.

## 12 Principles of Agile

together daily throughout the project.

**Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.**

**The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.**

**Working software is the primary measure of progress.**

**Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.**

**Continuous attention to technical excellence and good design enhances agility.**

**Simplicity – the art of maximizing the amount of work not done – is essential.**

**The best architectures, requirements, and designs emerge from self-organizing teams.**

**At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.**

## EVO principles

quantified value goals.

Given developer freedom to find out how to deliver those results.

Involve stakeholder every week in actually using value in increments.

Make sure those results are business results. Involve stakeholder every week in actually using value in increments.

Decompose workflow into weekly time boxes or 2% of the total budgeted time.

Select design with the best value impacts for the costs and do them first.

Estimate the impacts of designs on the quantified goals.

## A Quick Look at Connecting Earned Value with Agile

An earned value management system is not a reporting system, contract administration, cost analysis, accounting, or a contractor's task management system. It is a measure of the value of physical progress in a project and as such adds additional effort to the work of managing a project. Beyond the additional effort of an EVMS, care must be taken to avoid hindering the project team's ability to use its organic management systems.

With the Earned Value and Agile methods now outlined, let's look at the similarities of each as ask why can't Agile methods be used in an EVMS environment? The 32 guidelines of ANSI-748-B define a fully compliant Earned Value Management System (EVMS). There are 11 guidelines that are the basis of project success. Figure 2 describes these 11 guidelines.



**Figure 2** – 11 of the 32 guidelines for successful agile project development as defined in ANSI–748–B. These 11 guidelines define the project management processes and are connected to the principles of Agile development in this appendix.

#	EVM Guidelines	Agile Approach
1	Define WBS	Features and Stories define tasks
2	Identify Organization	Self-organizing teams
5	Integrate WBS and OBS	Self-organized teams with a customer
6	Schedule Work	Iterations and Releases
7	Identify Products & Milestones	Working software at the end of iterations
8	Set time phased budget	Fixed length iterations and releases
16	Record direct costs	Fixed staff = Level of Effort
23	Determine variances	Velocity measures missed features
25	Sum data and variance	Missed features moved to next iteration
26	Manage action plans	Replan missed features, adjust velocity
28	Incorporate changes	Replan missed features, adjust velocity

## 32 Guidelines of Earned Value Management

The PMI Earned Value Management Practice Guide does not explicitly call out the 32 guidelines of an Earned Value Management System defined in ANSI–748–B<sup>[4]</sup>. The next section provides an overview of ANSI–748–B and the National Defense Industry Association Earned Value Management Intent Guide.

ANSI–748–B’s stated purpose is:

<sup>4</sup> American National Standards Institute/Electronic Industries Alliance. (1998). Earned value management systems. Arlington, VA: Electronic Industries Alliance. (ANSIEIA- 748-98)

A GUIDE FOR ESTABLISHMENT AND APPLICATION OF AN INTEGRATED MANAGEMENT SYSTEM WITH COORDINATION OF WORK SCOPE, SCHEDULE, AND COST OBJECTIVES AND APPLICATION OF EARNED VALUE METHODS FOR PROGRAM OR ENTERPRISE PLANNING AND CONTROL

There are seven principles of Earned Value Management that will be connected with the Agile development principles. These are:

1. Plan all work scope for the program from inception to completion.
2. Break down the program work scope into finite pieces that can be assigned to a responsible person or organization for control of technical, schedule, and cost objectives.
3. Integrate program work scope, schedule, and cost objectives into a performance measurement baseline plan against which accomplishments may be measured. Control changes to the baseline.
4. Use actual costs incurred and recorded in accomplishing the work performed.
5. Objectively assess accomplishments at the work performance level.
6. Analyze significant variances from the plan, forecast impacts, and prepare an estimate at completion based on performance to date and work to be performed.
7. Use EVMS information in the organization's management processes.

Our first effort is to simplify these concepts to find connections with the Agile principles described in §2, without disrupting the integrity of Earned Value Management.

These are divided into five major categories:

748–C EMVIG	Organization	Artifacts for This Guideline
<b>Guide 1</b> <b>2.1a</b>	Define WBS	Work Breakdown Structure (WBS). WBS Dictionary
<b>Guide 2</b> <b>EVMIG 2.1b</b>	ID Organizations	Organization Breakdown Structure (OBS). OBS Identification to WBS
<b>Guide 3</b> <b>EVMIG 2.1c</b>	Integrate Subsystems	Master, intermediate, and detail level schedules. MRP/ERP operational schedules Control Account Plans. Performance reports by WBS and OBS Responsibility Assignment Matrix (RAM)
<b>Guide 4</b> <b>EVMIG 2.1d</b>	ID Overhead Control	Cost Accounting Standards (Disclosure Statement). Organizational Charts Accounting Chart of Accounts
<b>Guide 5</b> <b>EVMIG 2.1e</b>	Integrate WBS & OBS	Control Accounts. Responsibility Assignment Matrix (RAM)

Planning and Scheduling	Artifacts from Planning and Scheduling
<b>Schedule Work</b>	Integrated network schedules including master, intermediate (if any), and detailed schedules. MRP or ERP schedules, or planned order reports. Control account plans (may be separate plans or detail schedules). Work authorization documents.
<b>ID Products / Milestones</b>	Integrated schedules including master, intermediate (if any), and detailed schedules that identify contract milestones and key events. MRP or ERP production planned order reports. Control account plans (may be separate plans or detail schedules)
<b>Set Time–Phased Budget</b>	Control account plans. Summary level planning packages. Performance measurement baseline. Undistributed budget logs. Notification to the customer of an over–target baseline. Work authorization document.
<b>Significant Cost Elements</b>	Control account plans by element of cost. Work authorization documents. Performance measurement baseline. Undistributed budget logs. Bills of Materials (BOM). Responsibility assignment matrix dollarized). Schedules, if resourced. Material requirements documentation identifying when the material is expected to be used. Subcontractor schedules. Resource plan for resources not contained in the control account plans.
<b>Discrete Work Packages</b>	Control account plans divided into work packages and planning packages. Control account schedules. Control account time–phased budgets.
<b>Sum Work / Planning Packages</b>	Control account plan total budget. Work package budget. Planning package budget.
<b>ID LOE Activities</b>	Control account plans identify level of effort work packages and budgets.
<b>Set Overhead for Organizations</b>	Documented process for managing indirect costs. Organizational structure identifying ownership responsibility and authority levels. Indirect cost policies and procedures. Chart of accounts. Organizational charts. Forward pricing forecast (including sales forecast and business base projections). CAS disclosure statement, if applicable. Indirect budget and performance reports.
<b>ID Management Reserve and Undistributed Budget</b>	Project control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base). Contract Performance Reports (CPRs), if applicable.
<b>Target Costs and Budgets</b>	Project control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base) reconciled to project target cost. Contract Performance Reports (CPRs), if applicable. Internal report showing the summarization from cost account to the

Planning and Scheduling	Artifacts from Planning and Scheduling
	performance measurement baseline.

Accounting Considerations	Artifacts for Accounting Considerations
<b>Record Direct Costs</b>	Reconciliation of project costs with the accounting system. Actual costs are reported at the control account level at a minimum. Reconciliation of subcontract reported actual costs to subcontract payments. Internal and external performance reports for subcontractors. Subcontractor control account plans, when utilized.
<b>Summarize into Work Breakdown Structure (WBS)</b>	Cost collection account structure. WBS/cost collection mapping. WBS structure (roll-up scheme). Monthly performance report.
<b>Summarize into Organizational Breakdown Structure (OBS)</b>	Responsibility assignment matrix. Organization charts. OBS structure (roll-up scheme). Contract performance report (format 2 where required).
<b>Record Indirect Costs</b>	Cost collection account structure. WBS/cost collection mapping. WBS structure (roll-up scheme). Cost accounting standards disclosure statement.
<b>ID Equivalent / Lot Costs</b>	Project cost collection structure (MRP). ERP system supports the identification of unit costs, equivalent unit costs, or lot costs when needed, including differentiation of work in process.
<b>Material Accounting</b>	Performance reports. Control account plans. Material system reports.

Analysis and Management Reports	Artifacts for Analysis and Management Reports
<b>Periodic Control Account Sums</b>	Monthly performance report (cost variance, schedule variance, and variance at completion analysis). Variance analysis data (root causes, impacts at completion, and management actions).
<b>Determine Variances</b>	Variance analyses (budget based schedule variances and cost variances). Management action plans. Updated schedule task completion and cost-at-completion forecasts. Project schedules and schedule analysis outputs.
<b>Budget / Actual Indirects</b>	Indirect cost variance analyses. Indirect cost management action plans. Indirect cost updated schedule and cost forecasts.
<b>Sum Data and Variances</b>	Variance analyses. Schedule and cost performance reports. Management action plans. Updated schedule and cost forecasts.
<b>Manager Action Plans</b>	To-Complete Performance Index (TCPI). Independent completion estimates. Risk management data and similar metrics.

	<p>Management action plans and review briefings.                  Variance analyses.</p>
<b>Estimate at Complete (EAC) Revision</b>	<p>Control account plans.                  Documented process for developing EACs, including subcontractor EAC integration.                  Basis of estimates.                  Risk management plans (identification, mitigation, and opportunities).                  Operational metrics.                  Earned value metrics.                  Material and subcontractor performance data.</p>

Manage Revisions	Artifacts from Managing Revisions
<b>Incorporate Change</b>	<p>Contractual change documents.                  Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).                  Control account/work package/planning package plans.                  Master schedules, intermediate schedules (if any), and detailed schedules.                  Statement of work, WBS, and WBS dictionary.                  Work authorization documents.                  Management reports (contract performance reports or other applicable management reports).</p>
<b>Reconcile Budgets</b>	<p>Contractual change documents.                  Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).</p>
<b>Control Retroactive Change</b>	<p>Change control logs.                  Retroactive change control process including approval.</p>
<b>Only Authorized Change</b>	<p>Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).                  Control account/work package/planning package plans.                  Master schedules, intermediate schedules (if any), and detailed schedules.                  Statement of Work, WBS, and WBS dictionary.                  Work authorization documents.                  Management reports (contract performance reports or other applicable management reports).</p>
<b>Document Performance Measurement Baseline (PMB) Change</b>	<p>Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).                  Control account/work package/planning package plans.                  Master schedules, intermediate schedules (if any), and detailed schedules.                  Statement of Work, WBS, and WBS dictionary.                  Work authorization documents.                  Management reports (contract performance reports or other applicable management reports).</p>

## Connecting the Dots between Earned Value and Agile Development

With the 11 ANSI-748-C Guidelines established, this section details how Agile development practices can be used to support these guideline. Each subsection here addresses a single ANSI-748-C Guideline by restating the guidelines and the Agile practices that support the guidelines.

Again the principle of this appendix describes how Agile development practices can be “added” to Earned Value Management programs to improve the probability of success.

### 2.1.a Define Authorized Work Elements

Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.	
EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Work Breakdown Structure (WBS).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Road Map &amp; Release Plan consisting of Capabilities, Product Backlog &amp; Iteration Backlog.</li> </ul>
<ul style="list-style-type: none"> <li>▪ WBS dictionary (may or may not be used, but a method to reconcile the statement of work to the WBS structure must be demonstrated).</li> </ul>	<ul style="list-style-type: none"> <li>▪ WBS dictionary: agile user stories are deliverables that you can measure “done” for, therefore user stories satisfy wbs dictionary.</li> </ul>

### 2.1.b Identify Program Organizational Structure

Identify the program organizational structure, including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.	
EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Organization Breakdown Structure (OBS).</li> </ul>	<ul style="list-style-type: none"> <li>▪ CAM just builds a team as usual, but the team needs to be persistent, and not interchangeable parts.</li> </ul>
<ul style="list-style-type: none"> <li>▪ OBS intersections with the WBS.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Team hierarchy definition with resources associated with their sub-teams.</li> <li>▪ Done at the level of granularity to support the basis of estimate (BOE).</li> <li>▪ Persistent teams are needed to apply throughput benchmarks to product backlogs to validate plans.</li> </ul>

### 2.1.e Integrate WBS and OBS

Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.

EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Control accounts.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Evidence that the CA meets the 90% discrete work rule.</li> <li>▪ Defend schedule &amp; cost performance at the CA level?</li> <li>▪ Agile CA = one release.</li> <li>▪ Actuals captured at the story level.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Responsibility Assignment Matrix (RAM).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Done at too high a level for the SW development approach to make a difference.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Contract Performance Reports (CPRs), if applicable.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Given an objective of X stories in iteration Y, completed stories are earned; all unearned return to backlog and a new ETC is developed from the benchmarks &amp; backlog.</li> </ul>

### 2.2.a Schedule the Work

Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.

EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Control accounts.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Evidence that the CA meets the 90% discrete work rule.</li> <li>▪ Defend schedule &amp; cost performance at the CA level?</li> <li>▪ Agile CA = one release.</li> <li>▪ Actuals captured at the story level.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Responsibility Assignment Matrix (RAM).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Done at too high a level for the SW development approach to make a difference.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Contract Performance Reports (CPRs), if applicable.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Given an objective of X stories in iteration Y, completed stories are earned; all unearned return to backlog and a new ETC is developed from the benchmarks &amp; backlog.</li> </ul>

### 2.2.b: Identify Products and Milestones

Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.	
EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Integrated schedules including master, intermediate (if any), and detailed schedules that identify contract milestones and key events.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Agile dev performance reporting follows the approved program system description</li> <li>▪ Apportioned technical performance milestones to reduce risk &amp; roll up intermediate technical performance.</li> </ul>
<ul style="list-style-type: none"> <li>▪ MRP or ERP production planned order reports.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not relevant to sw development.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Control account plans (may be separate plans or detail schedules)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not relevant to sw development because we are reporting tasks as physical % complete, which will automatically roll up.</li> </ul>

### 2.2.c: Set Time Phased Budget

Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost including estimates for authorized but undefinitized work.	
EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Control account plans.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Time phased budget created for the current iteration(s) and future work.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Summary level planning packages.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Agile summary level planning documented in road map. Comprises capabilities, features and stories</li> <li>▪ Agile planning packages driven by persistent teams with proven benchmarks.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Performance Measurement baseline.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Is there a target threshold for future work as described in a PMB? Within 10% OTB?</li> </ul>
<ul style="list-style-type: none"> <li>▪ Undistributed budget logs.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Does this have anything to do with SW dev approach?</li> </ul>
<ul style="list-style-type: none"> <li>▪ Notification to the customer of an over-target baseline.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Does this have anything to do with SW dev approach?</li> </ul>
<ul style="list-style-type: none"> <li>▪ Work authorization document.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Does this have anything to do with sw dev approach?</li> </ul>

### 2.3.a: Record Direct Costs

Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.	
EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Reconciliation of project costs with the accounting system.</li> </ul>	<ul style="list-style-type: none"> <li>▪ CAM would follow program direction on these.</li> <li>▪ These are not impacted by sw dev approach</li> </ul>
<ul style="list-style-type: none"> <li>▪ Actual costs are reported at the control account level at a minimum.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not impacted by SW development approach.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Reconciliation of subcontract reported actual costs to subcontract payments.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not impacted by SW development approach.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Internal and external performance reports for subcontractors.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not impacted by SW development approach.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Subcontractor control account plans, when utilized.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not impacted by SW development approach.</li> </ul>

### 2.4.b: Determine Variances

Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.	
EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Variance analyses (budget based schedule variances and cost variances).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Can track &amp; report variances per the approved program system description</li> </ul>
<ul style="list-style-type: none"> <li>▪ Management action plans.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Actionable recovery plans per issue.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Updated schedule task completion and cost-at-completion forecasts.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Scrum Agile has a POD and Plan for Iteration.</li> <li>▪ CAM's monthly EAC reporting follows the approved program system description</li> </ul>
<ul style="list-style-type: none"> <li>▪ Project schedules and schedule analysis outputs.</li> </ul>	<ul style="list-style-type: none"> <li>▪ PM tracks the dynamic backlog, which will go up and down based on sponsor feedback</li> </ul>

#### 2.4.d: Summarize Variances

Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the project.

EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Variance analyses.</li> </ul>	<ul style="list-style-type: none"> <li>▪ There is nothing in Agile’s approach to SW development that precludes reporting variances at the WP level.</li> <li>▪ Agile is more dynamic than EVM so variances are less the issue than the evolving baseline, as approved in governance. The sponsor will want to track accumulating business value and variances to total product needs.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Schedule and cost performance reports.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Similar – but measures of performance not usually in dollars</li> </ul>
<ul style="list-style-type: none"> <li>▪ Management action plans.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Similar – but less formal. Collaborative discussion of what actions to take include the customer.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Updated schedule and cost forecasts.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Similar – but less formal. Planning processes include the customer.</li> </ul>

#### 2.4.e: Implement Management Plan

Implement managerial action taken as the result of earned value information.

EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ To–Complete Performance Index (TCPI).</li> </ul>	<ul style="list-style-type: none"> <li>▪ <math>TCPI = \text{Work Remaining} / \text{Cost Remaining} ((BAC - BCWP_{cum}) / (EAC - ACWP_{cum}))</math>. In Agile, work remaining is the product backlog. Backlog is <math>BAC - BCWP</math>.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Independent completion estimates.</li> </ul>	<ul style="list-style-type: none"> <li>▪ No longer used in 2010</li> </ul>
<ul style="list-style-type: none"> <li>▪ Risk management data and similar metrics.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Qualitative Risk Burn–down Chart (risk rating)</li> </ul>
<ul style="list-style-type: none"> <li>▪ Management action plans and review briefings.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Agile approach called Commitment Based Planning – where the SCRUM team makes and meets its time phase BCWS commitments.</li> <li>▪ Any team, when behind, gives voice to the customer when evaluating/reweighting the triple constraint.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Variance analyses.</li> </ul>	<ul style="list-style-type: none"> <li>▪ This is an issue of cost mgmt and system description would define when and where team members would bill</li> </ul>

### 2.5.a: Incorporate Changes

Incorporate authorized changes in a timely manner, recording the effects of such changes in the budgets and schedules.

EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Contractual change documents.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Bug reports, new user stories, but not necessarily cost sized.</li> <li>▪ User stories above baseline are tracked as new scope (with a valid BOE) and require BCWS</li> </ul>
<ul style="list-style-type: none"> <li>▪ Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).</li> </ul>	<ul style="list-style-type: none"> <li>▪ New or materially altered features or stories are changes.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Control account/work package/planning package plans.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Product and iteration backlogs are frozen during the development period</li> </ul>

Incorporate authorized changes in a timely manner, recording the effects of such changes in the budgets and schedules.

EVMIG Objective Evidence	Agile Objective Evidence
<ul style="list-style-type: none"> <li>▪ Master schedules, intermediate schedules (if any), and detailed schedules.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Iterations and evolutionary planning at the detailed levels merges with the end to end planning for agile.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Statement of work, WBS, and WBS dictionary.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Customer owner and Planning processes identify requires work and its description.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Work authorization documents.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Planning sessions, authorize a set of Stories to be developed during the iteration.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Management reports (contract performance reports or other applicable management reports).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Big Visible Charts, “sticky notes” display progress to plan for the agile team.</li> </ul>

## Step by Step Processes for “Connecting the Dots” [5]

With the definition of the 11 ANSI-748-C guidelines needed for the connections to Agile development, here are some steps that should be taken during the planning and execution of a project subject to Earned Value, but wanting to implement Agile development.

These steps are simply “good project management.” In the context of Earned Value, these steps are also compliant with the principles of Earned Value.

### Define DONE

Define the Accomplishments needed to reach done. And the Guidelines by which these Accomplishments will be measured. Only then define the work effort needed to fulfill the Guidelines.

### Time Boxes

These are fine for some things. But the Basis of Estimate for what can be accomplished within the time box still needs to be performed.

### Don't add slack

Slack needs to be somewhere. It's best to make it explicit in the schedule. Before the deliverable. This "buffer" is best determined using Monte Carlo knowing the probability distributions the work efforts.

### Defer Decisions

Decisions can be deferred only if there is an understanding of the consequences. Maybe Defer Commitments is a better term. Decisions must be made all the time. Waiting too long for a decision simply delays the project.

### Discipline

Discipline is the glue that holds the project together.

### Reduce Cycle Time

Ask "how long am I willing to wait to find out I'm late, over budget, or the product doesn't work as specified?" Use that time as a guide for the cycle time. The cycle time can be too short as well. This results in thrashing.

### Keep the Pipeline Short and Thin

Never confuse effort with results. Focus on deliverables.

### Limit Task Switching

Multitasking beyond two tasks has been shown to reduce effectiveness. Don't do it.

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<sup>5</sup> Adapted from Jurgen Appelo's Blog “10 Principles of Agile Time Management,”  
<http://www.noop.nl/2008/06/10-principles-of-agile-project-time-management.html>

## Prevent Sustained Overtime

If you're using overtime, you're not managing the schedule or the deliverables. "No Surprises" is the goal.

## Separate Urgent from the Important

Define the value of the deliverables. Let that drive urgent versus important.

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## About the Author



### **Glen B. Alleman**

Niwot Ridge, LLC



**Glen B. Alleman** leads the Program Planning and Controls practice for Niwot Ridge, LLC. In this position, Glen brings his 25 years' experience in program management, systems engineering, software development, and general management to bear on problems of performance based program management.

Mr. Alleman's experience ranges from real time process control systems to product development management and Program Management in a variety of firms including Logicon, TRW, CH2M Hill, SM&A, and several consulting firms before joining Niwot Ridge, LLC. Mr. Alleman's teaching experience includes university level courses in mathematics, physics, and computer science.