Survey Analysis Results

Integrated Project/Program Management (IP2M)
Maturity and Environment Total Risk Rating (METRR)
using an Earned Value Management System (EVMS)

Report No. 2, Annex A

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Executive Summary

To investigate the state of practice of Earned Value Management System (EVMS), a large survey was distributed through external channels targeting participants experienced in EVMS and project controls. The survey consisted of 23 questions, was open for a three-month period (August to October 2019) and received 294 responses from both the public and private sectors. Two-hundred and one respondents identified the name of their affiliated employer, indicating that at a minimum, 68 unique organizations participated in the survey as listed in Appendix A. The survey questions included mainly evaluating the definitions for Earned Value Management (EVM) and EVMS, as well as receiving feedback on the impact of the different environment factors and maturity attributes on EVMS. This report lays out the raw results from this survey. Note that in some cases the comments and findings were modified slightly to protect the identity of the respondents. The survey findings formed a strong foundation for the development of the Integrated Project/Program Management (IP2M) Maturity and Environment Total Risk Rating (METRR). This document presents the survey questions and their results. These raw results were also the basis for developing a peer-reviewed journal article, which was published in the Journal of Management in Engineering by the American Society of Civil Engineers (ASCE) in 2021 (Aramali et al. 2021).

This document is part of the deliverables for the research project sponsored by the DOE and has been approved by the research steering committee and Arizona State University (ASU) joint team.

The IP2M METRR is a novel assessment mechanism developed as part of a DOE-sponsored Joint Research Study led by ASU and representing 19 government, industry, and academic organizations. The research team members are 41 individuals who have a diverse background including owners, contractors, consultants, academia, and so forth. The list of the research team members is provided at the end of this document. The tool assesses a spectrum of EVMS maturity and environment issues centered around the EIA-748 EVMS Guidelines, while also referencing the Project Management Institute's American National Standards Institute (ANSI) standard for EVM (2019) and International Organization for Standardization (ISO) 21508:2018 guidance. By using the IP2M METRR (pronounced "IP2M meter") to assess both the maturity and environment of an EVMS, project leaders and personnel can understand the efficacy of that EVMS to support integrated project/program management. It also helps identify opportunities for improvement. The ultimate goal of performing this assessment is to assure project/program participants are working with accurate, timely, and reliable information to manage their work, leading to successful project/program performance.

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1. Survey Background and Purpose

Drafting the survey was a milestone in the Earned Value Management System (EVMS) research project for the Department of Energy (DOE). The survey was conducted for a period of three months (August, September, and October 2019). It was distributed electronically through different channels, targeting professionals with high industry experience and knowledge in Earned Value Management (EVM), EVMS and project management related areas. In order to have a representative sample, the research team ensured to have a large number of data collected, as well as targeted different type of organizations such as governmental and non-governmental.

The survey was developed using the Qualtrics software, was titled "Assessing the Maturity and Environment of Earned Value Management Systems (EVMS)" and contained a list of 23 questions. It was initially drafted in August 2019 by the authors based on the literature review. The survey was further updated and improved based on the contribution of a research team consisting of 27 industry experts (original research team members) who provided feedback based on their experience. It was tested and shared internally among peers and industry organization representatives in the research team. Then the survey was shared externally with different organizations. A total of 363 responses were collected, and the number of responses which had quality useable data was 294. This data set was analysed using *Nvivo* software. Not all the respondents provided their organization's names, but a minimum of 68 respondent organizations were identified, listed in Appendix A.

In addition to documenting the industry's state of the practice of EVMS, the objectives of the survey included:

- Evaluation of the definitions for EVM and EVMS that were initially drafted by the research team
- Collection of feedback from experienced respondents on the impact of the different environment factors and maturity attributes on EVMS
- Validation of the major environment factors and maturity attributes that impact EVMS
- Evaluation whether the respondents' organization assess EVMS maturity and how
- Collection of feedback on research study approach and EVMS assessment
- Assistance in EVMS assessment tool development; Integrated Project/Program Management (IP2M) Maturity and Environment Total Risk Rating (METRR)

2. Respondents Demographics

This chapter presents the demographics of the survey respondents. They included the respondent's type of employer, employment role, and number of years of career experience in the industry. The demographic information proved useful later when analyzing the results.

2.1. Type of Employer

The first question in the survey asked, "Please indicate your Employer" (Question #1). The result of this question is shown in the following figure.

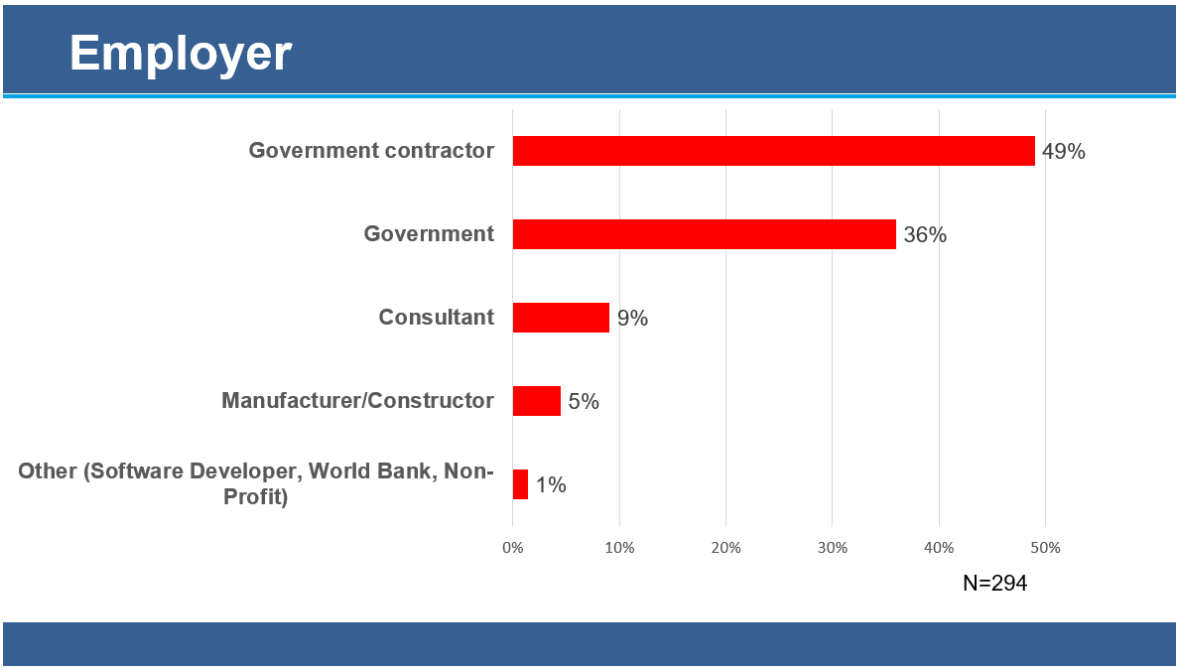

Figure 1 Type of Employer

As shown, almost half of the respondents were representatives of government contractors (49%), and the second highest group represented consisted of government agencies (36%). With widely diverse employer characteristics from both government and government contractors, the study obtained diverse perspectives from the respondents.

2.2. Employment Role

The second question in the survey asked, "Please provide your typical employment role" (Question #2). The result of this question is shown in the following figure.

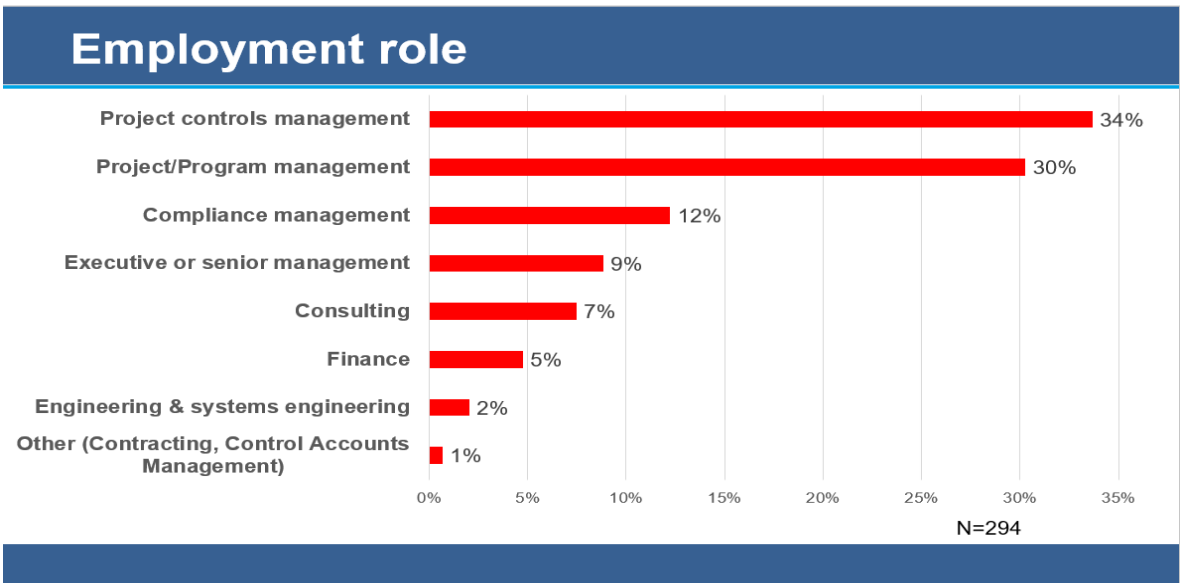

Figure 2 Employment Role

As shown, the majority of the respondents (64%) had roles in project/program management and controls. With widely diverse employment role characteristics, the study obtained diverse perspectives from the respondents.

2.3. Years of Work Experience

The third question in the survey asked, "How many years of work experience do you have in total?" (Question #3). The result of this question is shown in the following figure.

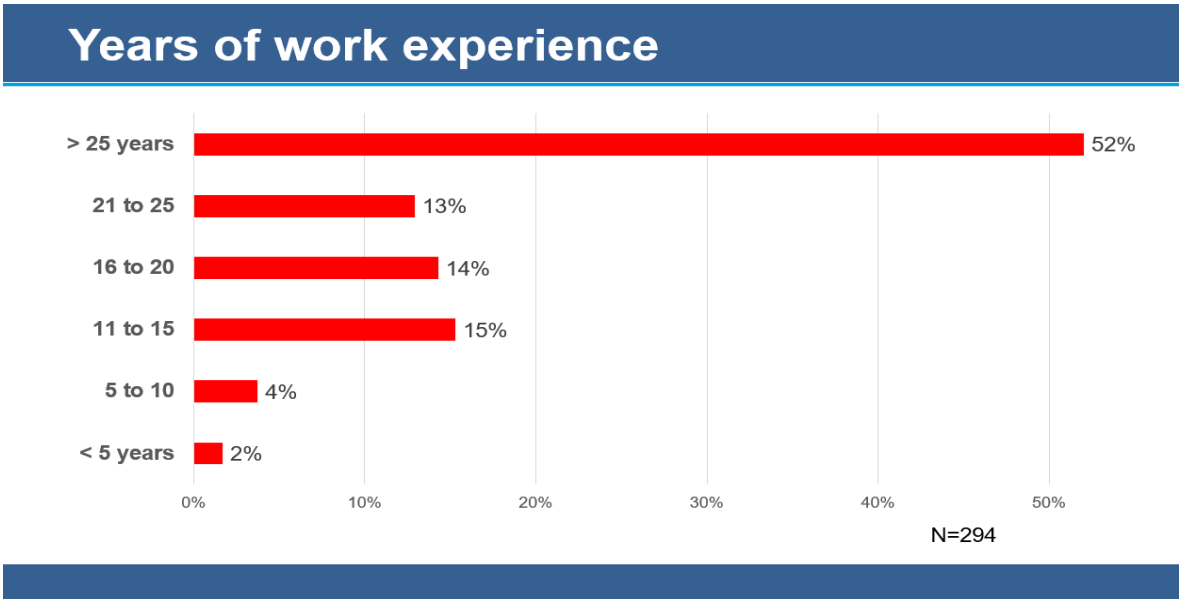

Figure 3 Years of Work Experience

As shown, more than half of the respondents had more than 25 years of experience. With widely diverse industry experience, the study obtained rich knowledge from the respondents.

3. Earned Value Management (EVM)

After the initial set of questions on respondent demographics, the survey moved forward with six questions related to defining EVM. The purpose was to develop a consensus definition for EVM. The result of each question is given in the following sub-sections.

3.1. EVM Definition from Respondents' Organizations

The fourth question in the survey asked, "Does your organization have a standardized definition of Earned Value Management (EVM)?" (Question #4). The result of this question is shown in the following table.

Table 1 Standardized Definition of EVM

Answer	Percent	Count
Yes	82%	241
No	18%	53
Total	100%	294

As shown, 82% of respondents indicated that their organizations have a standard internal definition for EVM.

In a follow-up question, those respondents were asked to provide these definitions. This follow-up question in the survey asked, "Please provide your organization's definition of Earned Value Management (EVM)" (Question #5).

The following bullet points show the answers of the individuals who provided answers to Question #5. Please note that the bold numbers that are in parentheses represent the frequency of responses arranged in a decreasing order; in fact, in many instances, many of the responses were the same.

- A project performance method that utilizes an integrated set of performance measurements (e.g., scope, cost and schedule) to assess and measure project performance and progress, and estimate cost and schedule impacts at completion. **(16)**
- An integrated management control system for assessing, understanding and quantifying what a contractor or field activity is achieving with program dollars. • Integrates technical, cost, schedule, with risk management • Allows objective assessment and quantification of current project performance • Helps predict future performance based on trends. **(11)**
- A program management technique for measuring program performance and progress in an objective manner. It integrates the technical, cost, and schedule objectives of a contract to facilitate risk identification and mitigation. **(10)**
- Earned Value Management (EVM) provides the basis for management analysis, early indication of the need for risk mitigation or course correction, and predictive

features via use of common processes for managing programs throughout the Company. **(7)**

- *Six responses to this question defined EVMS rather than EVM, as per the following*: EVMS is an integrated set of policies, procedures, and practices to support program and project management as a decision enhancing tool and a critical component of risk management. An EVMS: 1) Effectively integrates a project's work scope, cost, and schedule into a single performance measurement baseline (PMB). 2) Reliably tracks: (a) planned value (PV) of work to be performed or the budgeted cost for work scheduled (BCWS), (b) earned value (EV) of actual work performed or the budgeted cost for work performed (BCWP), and (c) actual cost (AC) of work performed (ACWP). 3) Provides performance measures against the PMB. 4) Provides means of identifying, reviewing, approving, and incorporating changes to the PMB. 5) Provides trend analysis and evaluation of estimated cost at completion. 6) Provides a sound basis for problem identification, corrective actions, and management re-planning. **(6)**
- A methodology that integrates a program's (or individual contract's) work scope, schedule, and resources with risk management, thereby providing government and contractor managers with visibility into objective progress on their programs and the ability to manage more effectively. EVM provides a standard means by which program managers can effectively plan, control, and manage programs, and EVM data provides early identification of trends and problems to enable timely corrective action and re-plan of scope, if necessary. Systematic implementation of EVM throughout the organization facilitates comparison of program performance, enabling managers to make better-informed decisions. **(4)**
- A system based on planning and performance data collected at a level of detail that, when the data are processed, allows management to make decisions regarding the project, provides a sound basis for project cost estimates and funding requirements, and helps meet the project reporting requirements for the contract cost/schedule performance measurement data. **(4)**
- A tool for measuring and assessing project performance through the integration of technical scope with schedule and cost objectives during the execution of the project. EVM provides the quantification of technical progress, enabling management to gain insight into project status and project completion costs and schedules. Two essential characteristics of successful EVM are EVM system data integrity and carefully targeted monthly EVM data analyses (e.g., identification of risky WBS elements). **(4)**
- A project management technique that contributes to successful project performance through disciplined and integrated planning, responsible management of assets, determination of true performance, and prediction of cost and schedule results to provide objective and timely information for decision making at all levels of the organization and throughout the project life cycle. **(3)**
- An integrated management system wherein the scope is integrated with the schedule and cost elements for optimum project planning and control. In EVMS, a contractor will accomplish the following tasks: • Plan scope to completion. • Integrate scope, schedule, and cost objectives into a baseline plan against which accomplishments can be measured. • Objectively assess accomplishments at the work performance level. Analyze significant variances from the plan, and forecast impacts.
- Provide data to senior management decision making and implementation of corrective action and management decisions. **(2)**

- A tool used as a performance management tool that measures actual performance of work scope and the associated cost and schedule compared to the approved baseline plan for a project or contract. **(2)**
- *Two responses to this question defined EVMS rather than EVM, as per the following*: EVMS is not a specific software system. It is a set of policies, processes, and software tools, that, when used in concert, effectively balance cost and schedule objectives, performance, and risk, and enables stakeholders to have accurate, up-to-date views of their status. **(2)**

Other answers given by the respondents and that had common themes (bolded) included:

- *Answers that referred to the EIA-748 Guidelines:* An integrated management system implementing and **compliant with** EIA-748 Guidelines **(16)**
- EVM includes **establishment of a baseline plan** for accomplishment of project objectives & use of analytic techniques that measure performance against the established baseline during execution of the work **(12)**
- EVM includes **risk management** aspects such as a tool used in identifying risks and developing risk mitigation plans, providing advanced warning to potential risks and management actions to those risks where programs/projects **(7)**
- EVM includes having **visibility** which helps prevent scope creep, into cost, schedule, and technical progress on contracts to measure and manage performance, into progress, into the magnitude of problems **(5)**
- EVM includes providing timely information for effective **decision-making (3)**
- EVM includes **integration** of project scope, schedule, and cost objective parameters **(3)**
- EVM includes **future** forecast or prediction of cost & schedule **(2)**

As shown, the definitions differed from one organization to the other, however there was some cohesion among certain terms and ideas. Having a common and standard definition supports alignment in understanding and perception to the benefit of state of the practice of EVMS. Therefore, after collecting the different definitions for EVM of the respondents' organizations, the survey showed the working definition for EVM, which was developed by the authors based on the literature and in consensus with the research team members.

The research team's working definition of EVM was:

"EVM is the use of performance management information produced from the EVM system to plan, direct, and control the execution and accomplishment of contract/project cost, schedule, and technical performance objectives." (Working definition)

After presenting the research team's working definition of EVM to the survey participants, the survey moved forward with four questions related to this working definition for EVM (Question #6 to Question #9), as presented in the following section.

3.2. EVM Definition from the Study's Research Team

The sixth question in the survey asked, "Do you agree with this EVM definition?" (Question #6). The result of this question is shown in the following figure.

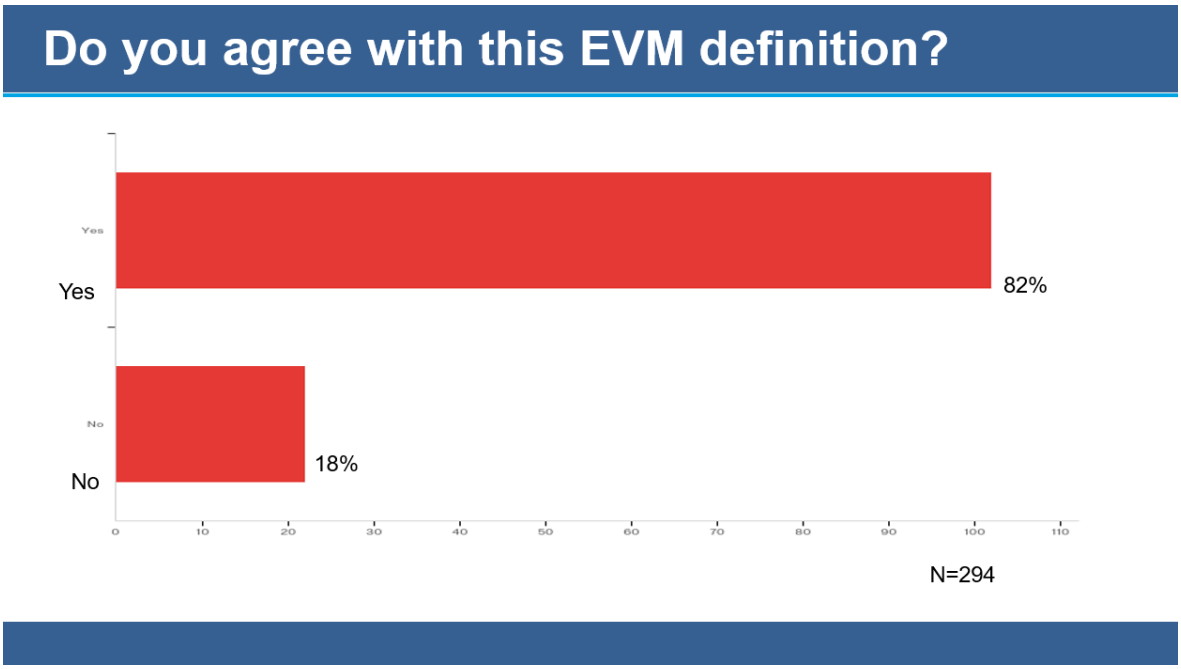

Figure 4 Definition of EVM

As shown, most respondents (82%) agreed with the definition of EVM developed as part of this study. Those who did not agree with the definition (18%), were asked to provide reasons for their disagreement through a follow-up question that asked, "Since you answered No, please provide comments below" (Question #7).

The answers to Question #7 are listed next. Please note that these answers are the feedback received on the EVM definition and are grouped in bolded themes. Under each bolded theme, the sub-bullet points represent the answers of the respondents (as is). Bold numbers in parentheses represent the frequency of responses arranged in a decreasing order.

- **The definition should address measuring of status and progress against a plan (9)**
    - "EVM is a contract/project performance method" seems clearer for the beginning of this definition. I also believe the terms 'assess and measure' are important.
    - Prefer "EVM is the use of performance management information produced from the EVM system, to plan, measure, predict, and control the execution and accomplishment of contract/project cost, schedule, and technical performance objectives."
    - The working definition makes no mention of measuring of progress against a plan.
    - EVM is a project management method used to measure and report project performance toward the objective of improving the prediction and delivery of project work.
    - I agree with what is IN this definition, but do not agree it is complete. I believe an EVM definition must include a statement regarding an understanding of current status and projected outcomes. 'Plan, direct, control' seem insufficient in this regard.

    - Performance Measurement Framework definition is - Tracks performance (work/forecast) against a requirement (baseline) - Provide the basis for communications.
    - The definition focuses too much on the performance aspect of the system and does not fully address the development of the project model to measure against. The development work on the schedule and the resource profile is one of the most important aspects of EVMS.
    - There needs to be inclusion of measuring status and progress.
    - In my opinion the performance information comes from project management planning details. The budget, cost, schedule and technical performance data elements are collected and used to compare the planned position to the current project position, in an integrated manner called EVM, and EVM is the output of project management best practices in a very formal environment.
- **Forecasting aspect is missing from the definition (8)**
    - Prefer "EVM is the use of performance management information produced from the EVM system, to plan, measure, predict, and control the execution and accomplishment of contract/project cost, schedule, and technical performance objectives."
    - The working definition makes no mention of measuring of progress against a plan.
    - EVM is a project management method used to measure and report project performance toward the objective of improving the prediction and delivery of project work.
    - EVM is simply one of several methods for assessing current performance and predicting future performance.
    - Need to address risk and forward-looking aspects, for prediction.
    - Performance Measurement Framework definition is - Tracks performance (work/forecast) against a requirement (baseline) - Provide the basis for communications.
    - Monitor, analyze and forecast are missing from the definition. The value of EV is using historical performance data to forecast the future state and provide a starting point for corrective actions to mitigate impacts to project cost and schedule.
    - I am not sure EVM controls execution, more or less monitors execution. I believe one key element was left out, forecasting. This is what sets apart EVM from tradition cost accounting: the ability to forecast "Pro-active Management".
- **Rethink use of the word “control” in the definition (5)**
    - EVM is a management tool, it does not "control" anything.
    - It does not plan, direct or control anything.
    - "Execution and accomplishment of contract/project cost, schedule and technical performance objectives" can be done by management philosophy and company processes and procedures. EVM plans but does NOT direct and control.
    - I don't believe performance information can be used to "control" the execution of objectives.

    - I am not sure EVM controls execution, more or less monitors execution. I believe one key element was left out, forecasting. This is what sets apart EVM from tradition cost accounting: the ability to forecast "Pro-active Management".
- **Risk should be included in the definition (4)**
    - Nothing in this statement discusses risk.
    - Your definition is defined at the low project controls level. However, since we say it's a management system (earned value management system), I think the [following] EVMS definition is the more accurate definition. See below. "EVMS is an integrated set of policies, procedures, and practices to support program and project management as a decision enhancing tool and a critical component of risk management."
    - Need to address risk and forward-looking aspects, for prediction.
    - I think risk should be integrated into the definition.
- **EVM is a tool, and it is not the only tool as implied in the definition (4)**
    - EVM is simply one of several methods for assessing current performance and predicting future performance. It does not plan, direct or control anything. Those things must be done but are not accomplished by EVM. Rather, EVM is just one of the tools used for project management, which is the accomplishment of those things.
    - EVM does not "direct" nor does it accomplish the objectives. EVM is one tool in the project team's toolbox to successfully execute a project. It is not the only tool and as project management is a people business, it may not even be the best tool in the toolbox.
    - This definition is overreaching. It implies the earned value is the only tool used to accomplish contract/project cost, schedule, and technical performance objectives.
    - I believe EVM is one component and only one component. This definition implies it is the "only" thing used to plan, direct and control.
- **Rethink use of the word “contract” in the definition (3)**
    - I would delete the word "contract".
    - EVM should be used to manage a project (cost, scope, schedule) NOT a contract.
    - I think the inclusion of the work "contract" creates a very specific type of context that can make many users uninterested in EVM. If anything, the removal of the words contract and project makes more sense. This is used on portfolios, programs, and projects. Not just on projects and contracts.
- **The definition defines project management rather than EVM (3)**
    - I disagree because this definition is actually "Project Management", which is the actual USE OF ... performance management information produced for the EVMS ..." Planning, directing and controlling execution is literally "Project Management USING Earned Value Management".
    - Is earned value management distinguishable from sound project management without the role of the external customer defined?
    - I think that is project management.
- **Rethink use of the word “direct” in the definition (3)**
    - "Execution and accomplishment of contract/project cost, schedule and technical performance objectives" can be done by management philosophy

and company processes and procedures. EVM plans but does NOT direct and control.
    - The word "direct" in my opinion is not appropriate, management by exception to proactively execute the program would be more appropriate.
    - EVM does not "direct" nor does it accomplish the objectives. EVM is one tool in the project team's toolbox to successfully execute a project.
- **The “proactive” notion is missing from the definition (3)**
    - The word "direct" in my opinion is not appropriate, management by exception to proactively execute the program would be more appropriate.
    - There is missing the notion of being “proactive” in the definition. If the “performance management information” is not giving early signals of deviation from an approved plan (baseline/PMB) then stakeholder decision making is more reactive then proactive. In other words, “EVM is the proactive use of performance management...”
    - I am not sure EVM controls execution, more or less monitors execution. I believe one key element was left out, forecasting. This is what sets apart EVM from tradition cost accounting: the ability to forecast "Pro-active Management".
- **Rethink use of the word “EVM” in the definition (3)**
    - "EVM is a contract/project performance method" seems clearer for the beginning of this definition. I also believe the terms 'assess and measure' are important. I also don't think it is appropriate to include the same acronym within the definition, as in 'produced by an EVM system'.
    - The definition is circular, referencing the EVM system.
    - Issue 2: Reflexive. It defines EVM using EVM in the definition. Strike "from the EVM system".
- **EVM is used for corrective actions (2)**
    - EVM should be used as a tool to execute the work. It is currently used as an evaluation tool of M&O performance. The EVM tools are intended to enable the PM to manage execution by providing early warning and the capability identify early in the process where corrective action need to be taken. However, any variance is viewed as a negative, and a lot of time is spent managing the data, not using the data to manage.
    - Monitor, analyze and forecast are missing from the definition. The value of EV is using historical performance data to forecast the future state and provide a starting point for corrective actions to mitigate impacts to project cost and schedule.
- **EVM does not take into consideration the technical performance (2)**
    - EVM in no way takes into consideration technical performance.
    - The technical performance criteria are contained in the Key Performance Parameters (KPPs) which come from the engineering specifications or science mission needs. Good EVM will help you to know if the project is deviating from the plan, but doesn't help to determine, plan, and monitor the technical performance success criteria, such as whether the jet engine the project is designing, building, assembling and testing is able to achieve the needed thrust take off from a short runway.
- **EVM is a tool to execute the work (1)**
    - EVM should be used as a tool to execute the work. It is currently used as an evaluation tool of M&O performance. The EVM tools are intended to enable

the PM to manage execution by providing early warning and the capability identify early in the process where corrective action need to be taken. However, any variance is viewed as a negative, and a lot of time is spent managing the data, not using the data to manage.

- **Compliance with EIA-748 Guidelines is missing from the definition (1)**
    - EVM is the use of performance management information produced from theEVM system, to plan, direct, and control the execution and accomplishment of contract/project cost, schedule, and technical performance objectives, in a manner which complies with the ANSI/EIA-748 Standard.
- **EVM is a decision-making tool (1)**
    - Your definition is defined at the low project controls level. However, since we say it's a management system (earned value management system), I think the [following] EVMS definition is the more accurate definition. See below. "EVMS is an integrated set of policies, procedures, and practices to support program and project management as a decision enhancing tool and a critical component of risk management."

The analysis of these results informed the authors and the research team to improve and modify slightly the working definition of EVM-specifically, to emphasize performance measurement against a plan, and to include the concept of forecasting, etc.

The definition of EVM was modified as follows:

"EVM is the use of performance management information, produced from the EVMS, to plan, direct, control, and forecast the execution and accomplishment of contract/project cost, schedule, and technical performance objectives versus the plan." (Final and improved definition)

The following question in the survey asked, "Does your organization have another term that is used in place of the term Earned Value Management (EVM)? (e.g., integrated program management)" (Question #8). The result of this question is shown in the following table.

Table 2 Do you use other term for EVM?

Answer	Percent	Count
Yes	15%	43
No	85%	248
Total	100%	291

As shown, 43 out of 291 respondents (15%) use other terms for EVM. These respondents were asked to provide these terms in a follow-up question that asked, "Please provide your organization's other term that is used in place of the term EVM (e.g., integrated program management)." (Question #9).

The following terms are the answers to Question #9. Please note that the bold numbers in parentheses represent the frequency of the responses arranged in a decreasing order.

- Integrated project/program management **(20)**
- Program performance management **(7)**
- Project/Program controls **(4)**
- Performance management system **(2)**
- Planning, Monitoring, and Controls (PM&C) **(2)**
- Earned Value Lite **(2)**
- Program management system **(1)**
- Project planning and control system **(1)**
- Integrated Baseline Reviews **(1)**
- Integrated safety management, risk informed approach and performance based **(1)**
- Enhanced project management **(1)**
- Integrated product development system **(1)**

As shown, the most common terms for EVM are integrated program management, integrated project management, program performance management, program controls, and project controls.

4. Earned Value Management System (EVMS)

After the set of questions on EVM definition and terms, the survey moved forward with six questions related to defining EVMS. The purpose was to develop a consensus definition for EVMS. The result of each question is given in the following sub-sections.

4.1. EVMS Definition from Respondents' Organizations

The tenth question in the survey asked, "Does your organization have a standardized definition of Earned Value Management System (EVMS)?" (Question #10). The result of this question is shown in the following table.

Table 3 Standardized Definition of EVMS

Answer	Percent	Count
Yes	77%	221
No	23%	66
Total	100%	287

As shown, 77% of respondents reported that they have standard internal definitions of EVMS.

In a follow-up question, those respondents were asked to provide these definitions. This follow-up question in the survey asked, "Please provide your organization's definition of Earned Value Management System (EVMS)" (Question #11).

The following bullet points show the answers of the individuals who provided answers to Question #11. Please note that the bold numbers in parentheses represent the frequency of the responses arranged in a decreasing order; in fact, in many instances, many of the responses were the same.

- EVMS is an integrated set of policies, procedures, and practices necessary to provide reliable and accurate project and program information to support project management as a decision-making tool and a critical component of risk management. An EVMS: (1) Effectively integrates a project's work scope, cost, and schedule into a single performance measurement baseline (PMB). (2) Reliably tracks: (a) planned value (PV) of work to be performed or the budgeted cost for work scheduled (BCWS), (b) earned value (EV) of actual work performed or the budgeted cost for work performed (BCWP), and (c) actual cost (AC) of work performed (ACWP). (3) Provides performance measurements against the PMB. (4) Provides means of maintaining the integrity of the PMB by identifying, reviewing, approving, and incorporating changes in a timely manner. (5) Provides reliable information necessary for trend analysis and evaluation of estimated costs based on performance used to predict future performance and arrive at an estimate to complete (EAC). (6)

Provides a sound basis for problem identification, corrective actions and management. **(22)**

- An integrated management system that integrates the work scope, schedule, and cost parameters of a program in a manner that provides objective performance measurement data. It measures progress objectively with earned value metrics; accumulates direct costs; allows for analysis of deviations from plans; facilitates forecasting the achievement of milestones and contract events; provides supporting data for forecasting of estimated costs; and fosters discipline in incorporating changes to the baseline in a timely manner. **(17)**
- An integrated set of policies, procedures and practices to objectively track true performance on a project or program. EVMS represents an integration methodology that is able to provide an early warning of performance problems while enhancing leadership decisions for successful corrective action. **(13)**
- A company's management system and related sub-systems that establishes the relationship between the cost, schedule, and technical aspects of the work; measures progress objectively with earned value metrics; accumulates actual costs; allows for analysis of deviations from plans; allows for forecasting of estimated costs; and provides discipline in incorporating changes to the baseline in a timely manner. **(9)**
- An integrated management system and its related subsystems that allow for planning all work scope to completion; assignment of authority and responsibility at the work performance level; integration of the cost, schedule, and technical aspects of the work into a detailed baseline plan; objective measurement of progress (earned value) at the work performance level; accumulation and assignment of actual costs; analysis of variances from plans; summarization and reporting of performance data to higher levels of management for action; forecast of achievement of milestones and completion of events; forecast of final costs; and disciplined baseline maintenance and incorporation of baseline revisions in a timely manner. **(8)**
- A system based on planning and performance data collected at a level of detail that, when the data are processed, allows management to make decisions regarding the project, provides a sound basis for project cost estimates and funding requirements, and helps meet the project reporting requirements for the contract cost/schedule performance measurement data. **(4)**
- EVMS refers to the development and implementation of an integrated management system wherein the scope is integrated with the schedule and cost elements for optimum project planning and control. In EVMS, a contractor will accomplish the following tasks: plan scope to completion; Integrate scope, schedule, and cost objectives into a baseline plan against which accomplishments can be measured; Objectively assess accomplishments at the work performance level; Analyze significant variances from the plan, and forecast impacts; Provide data to senior management decision making and implementation of corrective action and management decisions. **(3)**
- The EVMS addresses the seven principles of EVMS as defined by the EIA-748 standard: - Plan all work scope for the project from inception to completion. - Break down the project work scope into finite pieces that can be assigned to a responsible person or organization for control of the technical, schedule and cost objectives. - Integrate the project work scope, schedule and cost objectives into a performance measurement baseline against which accomplishments may be measured. Control changes to the baseline. - Use actual costs incurred and recorded in accomplishing the work performed. - Objectively assess accomplishments at the work performance

level. - Analyze significant variances from the plans, forecast impacts and prepare an estimate at completion based on performance to date and work to be performed. - Use EVMS information in management processes. **(3)**

- An internal management control system(s) that meets the Intent of the Earned Value Management guidelines as defined in EIA 748. **(2)**
- An EVMS is a project management technique that contributes to successful project performance through disciplined and integrated planning, responsible management of assets, determination of true performance status, and prediction of cost and schedule results to support management reporting and for monitoring corrective actions. **(2)**
- The Company Earned Value Management System (EVMS) presents vital integrated program management processes for effective program control. **(2)**
- Program management system of planning, scheduling, budgeting, work authorization, cost accumulation, performance, and reporting subsystems integrated with a Contract Work Breakdown Structure and organizational structure to meet Business Unit needs and the EVMS EIA-748 requirement. **(2)**
- The Earned Value Management System (EVMS) provides program and operations/resource management with the information, tools, and methods needed to effectively manage programs and fulfil contractual cost and schedule requirements. Supported by an enterprise resource planning system, the EVMS integrates the planning, scheduling, budgeting, work authorization, and cost accumulation systems. With this information, management is able to assess program status, evaluate performance, analyze problems, and implement corrective action in a timely manner. **(2)**

Other answers given by the respondents and that had common themes (bolded) included:

- *Answers that referred to the EIA-748 Guidelines:* EVMS is a system element identifying the processes used to ensure implementation and **compliance with** EIA-748 Guidelines **(19)**
- EVMS provides the ability to analyze schedule and cost information and determine program performance **against an established baseline** throughout the life cycle of a contract **(7)**
- EVMS includes **future** forecast or prediction of cost & schedule **(6)**

As shown, the definitions differed from one organization to the other, however there was some cohesion among certain terms and ideas. Having a common and standard definition supports alignment in understanding and perception to the benefit of state of the practice of EVMS. Therefore, after collecting the different definitions for EVMS of the respondents' organizations, the survey showed the working definition for EVMS, which was developed by the authors based on the literature and in consensus with the research team members.

The research team's working definition of EVMS was:

"EVMS is an organization's management system for project/program management that integrates a defined set of associated work scopes, schedules and budgets for effective planning, performance, and management control." (Working definition)

After presenting the research team's working definition of EVMS to the survey respondents, the survey moved forward with four questions related to this working definition for EVM (Question #12 to Question #15), as presented in the following section.

4.2. EVMS Definition from the Study's Research Team

The next question in the survey asked, "Do you agree with this EVMS definition?" (Question #12). The result of this question is shown in the following figure.

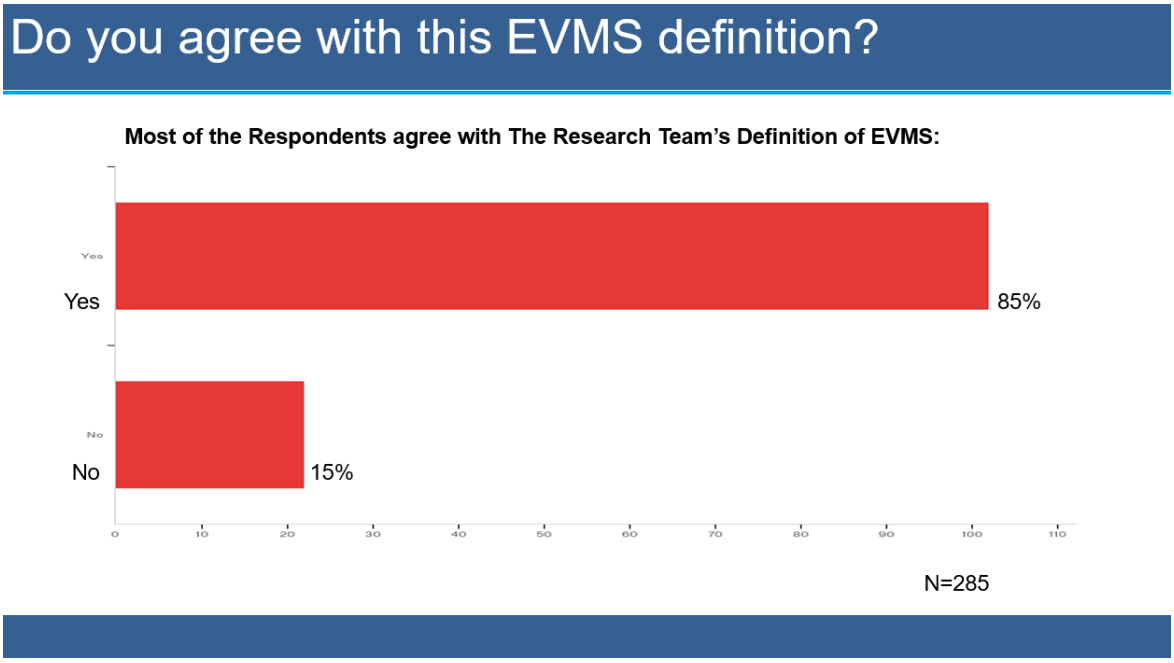

Figure 5 Definition of EVMS

As shown, most respondents (85%) agreed with the definition of EVMS developed as part of this study. Those who did not agree with the definition (15%), were asked to provide reasons for their disagreement through a follow-up question that asked, "Since you answered No, please provide comments below" (Question #13).

The answers to Question #13 are listed next. Please note that these answers are the feedback received on the EVMS definition and are grouped in bolded themes. Under each bolded theme, the sub-bullet points represent the answers of the respondents (as is). Bold numbers in parentheses represent the frequency of responses arranged in a decreasing order.

- **Missing notion of integration with other systems or processes in the definition (11)**
  - The organization's management system comprises more than work scopes, schedules, and budgets. It is a system of subsystems that integrates people in various functional disciplines, codified compliant processes, and information from various tools to produce information necessary for effective project planning and control.
  - Agree with above but I think it is missing a couple of key elements. Beyond simply integrating scope, schedule and budgets, an EVMS must also 1)

integrate actual costs and 2) produce objective data to aid in management's measurement of schedules and budgets.

- The definition appears to be missing the fact that an EVMS integrates work scope, schedule and budget for a defined project. The definition suggesting an integration of a set of work scopes (plural) is an odd statement that needs to be explained.
- It's not totally wrong at all. I just think it could be made more open. Something more like "EVMS is part of an organization's management system that integrates a defined set of associated work scopes, schedules and budgets for effective planning, performance, and management control." You can add that it is typically applied to portfolios, programs, or projects. But I wouldn't lead that it should be the only management system for that. There are a number of management systems used, this one just focuses on the integration of cost, schedule, and budget.
- The definition fails to highlight the collection of people, processes, and integrated tools which make up the underlying system. It focuses on the program data which the system would manage.
- It's more than associated work scope, schedule and budgets. EVMS integrates a number of other system information inputs (procurement, subcontracts, risk, etc.) and analysis methods and rigor to ensure both proper integration between all these inputs, but also to ensure that the basic fundamentals are in place to allow for appropriate analysis...so that informed decision making is based on good data. Things like properly setting up a WBS, OBS, good schedule health, etc. are part of what makes this system rigorous.
- Add the wording in parentheses: EVMS is an organization's management system (the combined written processes, tools, and implementation thereof) for project/program…
- EVMS is not project management tool, it's a rigorous, logical approach to project management. The output of EVMS is not metrics, it's the enablement of data driven decision making derived from a project management system that focuses on the integration of all aspect of project management in a cohesive and holistic system.
- EVMS is an integrated set of policies, procedures, and practices necessary to provide reliable and accurate project and program information to support project management as a decision-making tool and a critical component of risk management.
- Suggest including phrasing re: integration of management subsystems ... and unique identifiers (G/L 3)
- Should talk to the fact that the system should "integrate and supplement existing company systems for..."

- **The definition should include reference to EIA-748 guidelines or other standards (7)**
    - "organization's management system" EVM is the integrated set of processes, applications and practice that follow the guidelines in Electronic Industries Alliance Standard 748 (EIA-748). The statement in quotations make is seems like organization can make up their own policy and process when it's based on the 32 guidelines of EVM and ensuring you are following that in implementing a system.

    - Our EVMS Center does not use EVMS to management, our role is to assess a contractor management system's compliance to the EIA-748 32 guidelines.
    - It does not directly reference the EIA-748.
    - This definition does not actually incorporate any of the earned value standards or requirements. An accounting system that doesn't do any earned value would meet this definition. The word performance in not enough to communicate the importance of work accomplished instead of money spent.
    - I agree with the definition if it referenced a point (such as guidelines) to compare the system to.
    - No mention of the EIA-748C guidelines.
    - EVMS is an organization's management system for project/program management that integrates a defined set of associated work scopes, schedules and budgets for effective planning, performance, and management control, in a manner that complies with the ANSI/EIA-748 Standard.
- **Decision-making is missing from the definition (4)**
    - It's more than associated work scope, schedule and budgets. EVMS integrates a number of other system information inputs (procurement, subcontracts, risk, etc.) and analysis methods and rigor to ensure both proper integration between all these inputs, but also to ensure that the basic fundamentals are in place to allow for appropriate analysis...so that informed decision making is based on good data. Things like properly setting up a WBS, OBS, good schedule health, etc. are part of what makes this system rigorous.
    - EVMS is an organization's management system (the combined written processes, tools, and implementation thereof) for project/program management that integrates a defined set of associated work scopes, schedules and budgets for effective planning, performance, and management control for the purpose of providing insight for making program management decisions.
    - EVMS is not project management tool, it's a rigorous, logical approach to project management. The output of EVMS is not metrics, it's the enablement of data driven decision making derived from a project management system that focuses on the integration of all aspect of project management in a cohesive and holistic system.
    - EVMS is an integrated set of policies, procedures, and practices necessary to provide reliable and accurate project and program information to support project management as a decision-making tool and a critical component of risk management.
- **The definition should indicate that EVMS is also a tool to measure performance (4)**
    - EVMS is a system of project management methods and systems used to measure and report project performance toward the objective of improving the prediction and delivery of project work.
    - EVMS: A means to automate in whole or in part the integration of program or project performance data pertaining to scope, schedule, and cost in conformance with adopted procedures to yield trendable performance measures in a rigorous and consistent fashion so as to reveal potential program or project weaknesses and deficiencies.
    - Provides performance measurements against the PMB.

    - EVMS measures actual performance of work scope and the associated cost and schedule versus an agreed to baseline plan, while using disciplined means of baseline change control for documenting any changes to the agreed to baseline plan.
- **The word “objective” or to “objectively” measure performance is missing in the definition (4)**
    - Draft EVMS definition does not address that an EVMS provided objective performance status.
    - Should include, "Objectively measures performance" and "provides supporting data for forecasting of estimated costs".
    - Agree with above but I think it is missing a couple of key elements. Beyond simply integrating scope, schedule and budgets, an EVMS must also 1) integrate actual costs and 2) produce objective data to aid in management's measurement of schedules and budgets.
    - The definition should at a minimum include the word "objective", for example, "EVMS is an organizations management system for objective project/program management..."
- **The phrase “associated work scopes” is not clear (4)**
    - "Associated Work Scopes" is too vague.
    - The definition appears to be missing the fact that an EVMS integrates work scope, schedule and budget for a defined project. The definition suggesting an integration of a set of work scopes (plural) is an odd statement that needs to be explained.
    - It's more than associated work scope, schedule and budgets. EVMS integrates a number of other system information inputs (procurement, subcontracts, risk, etc.) and analysis methods and rigor to ensure both proper integration between all these inputs, but also to ensure that the basic fundamentals are in place to allow for appropriate analysis...so that informed decision making is based on good data. Things like properly setting up a WBS, OBS, good schedule health, etc. are part of what makes this system rigorous.
    - The phrasing "associated work scopes" is not clear.
- **Notion of risk management or risk is missing from the definition (4)**
    - The definition should also include Risk Management.
    - Missing the notion of risk management. Too often have I seen project managers, either willingly or unwillingly, not correlate the “management reserve” value from the EVMS to the risk register value.
    - A strong EVMS needs to encompass more than just scope/schedule/cost. Needs to include risks, communications, stakeholder management and procurement.
    - EVMS is an integrated set of policies, procedures, and practices necessary to provide reliable and accurate project and program information to support project management as a decision-making tool and a critical component of risk management.
- **Notion of forecasting aspect is missing from the definition (3)**
    - EVMS is a system of project management methods and systems used to measure and report project performance toward the objective of improving the prediction and delivery of project work.

    - Should include, "Objectively measures performance" and "provides supporting data for forecasting of estimated costs".
    - Provides reliable information necessary for trend analysis and evaluation of estimated costs based on performance used to predict future performance and arrive at an estimate to complete (EAC).
- **EVMS is one part of management system and it is not the only part as implied in the definition (3)**
    - EVMS is *part of an organization's management system* that integrates a defined set of associated work scopes, schedules and budgets for effective planning, performance, and management control.
    - EVMS should not be an organization's management system but rather one of the systems that an organization uses for project/program management.
    - EVMS is one part of an organizations management system.
- **Missing a statement on processes in the definition (2)**
    - This is not my specific focus area, but it seems to be missing a statement of process. I.E., a system does not necessarily fully encapsulate the associated rules and regulations governing process.
    - The definition fails to highlight the collection of people, *processes*, and integrated tools which make up the underlying system. It focuses on the program data which the system would manage.
- **Other EVMS definitions** are given in survey responses to this question **(2)**
    - EVMS is an integrated set of policies, procedures, and practices to support program and project management as a decision enhancing tool and a critical component of risk management.
    - A means to automate in whole or in part the integration of program or project performance data pertaining to scope, schedule, and cost in conformance with adopted procedures to yield trendable performance measures in a rigorous and consistent fashion so as to reveal potential program or project weaknesses and deficiencies.
- **Other answers** are listed next **(6)**
    - Include training and certification aspects as well.
    - The reason I disagree with the statement used the term budgets. Disagreed with the word Budget, I have always used the term cost.
    - Should define the system and not the output of the system.
    - It does not recognize the accounting system and a means to manage actual cost as well as committed cost.
    - The word performance in not enough to communicate the importance of work accomplished instead of money spent.
    - It includes the word "program", it should refer to "projects", not programs.

The analysis of these results informed the authors and the research team to improve and modify slightly the working definition of EVMS-specifically, to incorporate the "integration with other systems" in the definition, etc.

The definition of EVMS was modified as follows:

"An EVMS is an organization's management system for project/program management that integrates a defined set of associated work scopes, schedules and budgets for effective planning, performance, and management control; it integrates these functions with other business systems such as accounting and human resources, among others." (Final and improved definition)

The following question in the survey asked, "Does your organization have another term that is used in place of the term Earned Value Management System (EVMS)? (e.g., integrated program management system)" (Question #14). The result of this question is shown in the following table.

Table 4 Do you use other term for EVMS?

Answer	Percent	Count
Yes	7%	19
No	93%	265
Total	100%	284

As shown, 19 out of 284 respondents (7%) use other terms for EVMS. These respondents were asked to provide these terms in a follow-up question that asked, "Please provide your organization's other term that is used in place of the term EVMS (e.g., integrated program management system)." (Question #15).

The following terms are the answers to Question #15. Please note that the bold numbers in parentheses represent the frequency of the responses arranged in a decreasing order.

- Integrated program/project management system **(10)**
- Project controls system **(2)**
- Performance management system **(2)**
- Lab Performance Management System includes it **(1)**
- Project Planning & Control System **(1)**
- Integrated Program Partners **(1)**
- Integrated performance measurement system **(1)**
- Performance and monitoring system **(1)**

As shown, the most common terms for EVMS are integrated program management system, performance management system, and program controls system.

4.3. EVMS Maturity

After completing the final definitions for EVM and EVMS, the survey had a new section related to EVMS maturity. This section included three questions on EVMS maturity, (Question #16 to Question #18).

The next question in the survey asked, "Does your organization evaluate maturity of Earned Value Management System (EVMS) in addition to EVMS compliance? For example, do you have a document that provides specific criteria for giving a 1, 2, 3, 4, or 5 score (on a Likert scale) for the NDIA EIA 748-D's 32 guidelines, or other similar assessment mechanisms? "Note: Maturity does not only mean compliance. EVMS Maturity is defined as the degree to which an implemented system, associated processes, and deliverables serve as the basis for an effective and compliant EVMS." (Question #16). The result of this question is shown in the following figure.

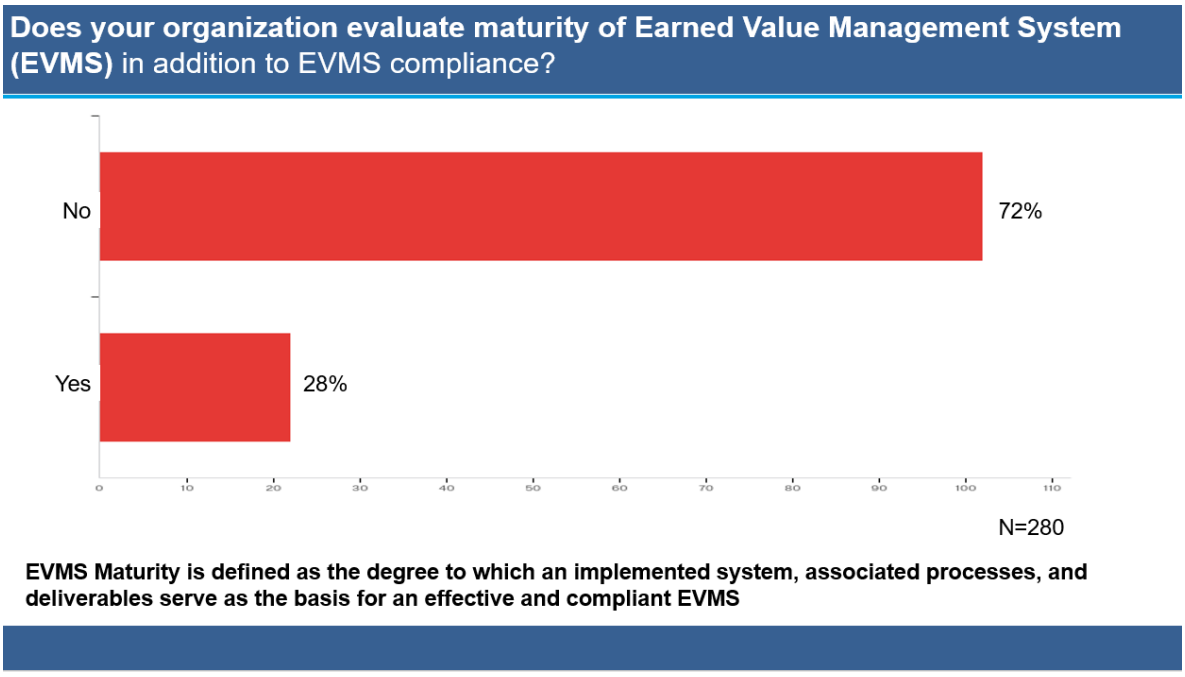

Figure 6 EVMS maturity evaluation

Out of 280 respondents to this question, the majority (72%) reported that their organizations do not evaluate EVMS maturity. Only 79 respondents (28%) reported that their organizations evaluate the maturity of EVMS. Those 79 respondents were asked to provide the ways how their organizations evaluate EVMS maturity through a follow-up question that asked, "Since you answered that EVMS maturity is evaluated in your organization, how is maturity evaluated? Check all that apply." (Question #17). The result of this question is shown in the following figure.

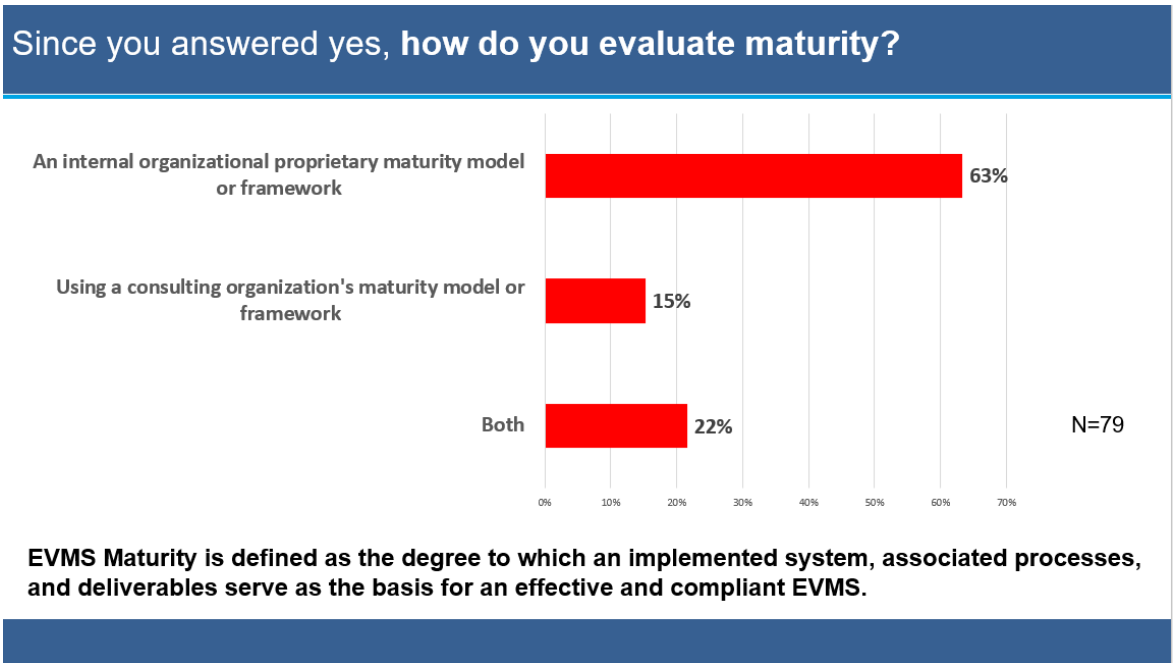

Figure 7 Means to evaluate EVMS maturity

As shown, out of the 79 respondents, 50 (63%) use (only) an internal proprietary maturity model or framework to evaluate EVMS maturity, and 12 (15%) use (only) a consulting organization's maturity model or framework. The other 17 respondents (22%) use both.

Furthermore, the respondents who reported that their organizations evaluate EVMS maturity were asked about the entity that typically conducts the evaluation, using a follow-up question that asked, "Since you answered that EVMS maturity is evaluated in your organization, who typically conducts this evaluation? Check all that apply." (Question #18). The result of this question is shown in the following table. A total of 158 responses were given by the 79 respondents.

Table 5 Entity that conducts EVMS maturity evaluation

	Percent	Count
The EVMS subject matter expert or organization's EVMS office	42%	67
Third party peer review	15%	23
By the contractor	13%	21
By the client/customer	13%	20
Consulting review	9%	15
By the owner	8%	12
Total	100%	158

As shown, the organizations that evaluate maturity rely largely on subject matter experts to perform the evaluation. This result highlights the need for an objective EVMS maturity evaluation tool for identifying issues in EVMS application and that could be used by a wide range of project stakeholders, not only subject matter experts.

After gauging the terminology for EVMS and EVMS maturity evaluation, the survey moved forward with a question on EVMS challenges.

4.4. Top three EVMS challenging aspects

The next question in the survey asked, "What are the most challenging aspects of managing a project/program using the Earned Value Management System (EVMS). Please rank the top three, with one being the most challenging aspect. (#1 is the most challenging)." (Question #19). Here, the authors provided a list of nine potential answers based on the literature review and the research team input, so the respondents could rank the top three challenges. For better visualization of the results, further data analysis, and to have higher values associated with more importance, the ranks were converted to overall importance score; the challenge that was ranked first was converted to score "3", "rank2" was converted to score "2", and "rank3" was converted to score "1". The higher the score, the more important is the challenge. The result of this question is shown in the following figure.

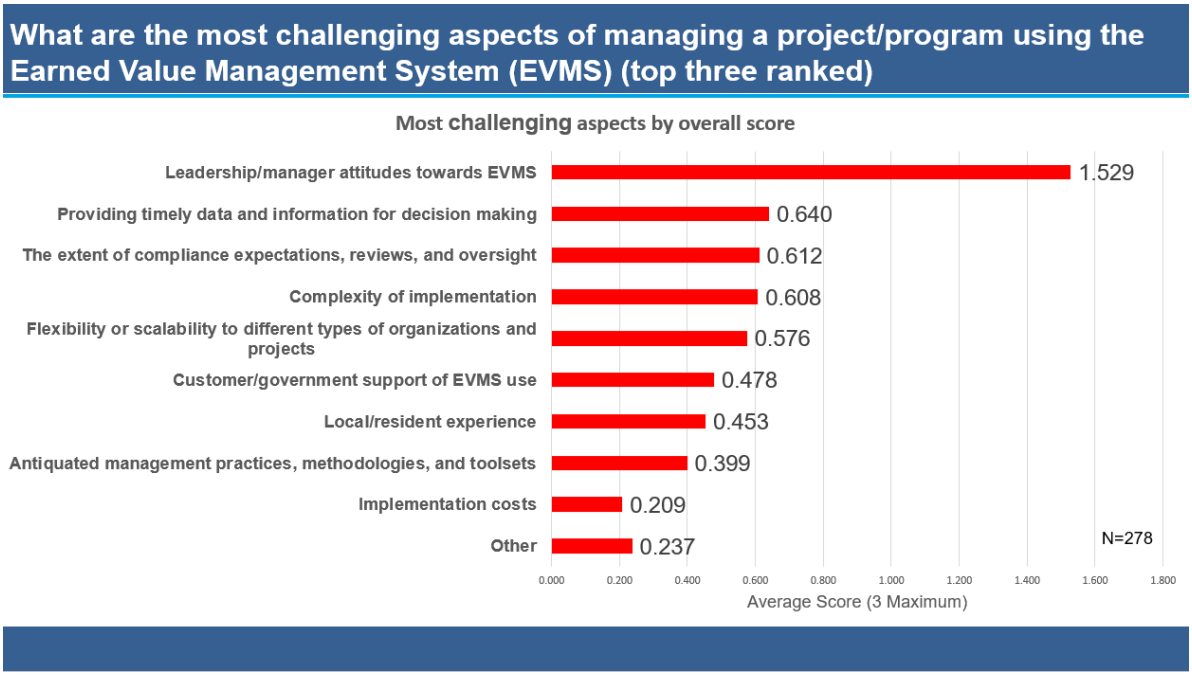

Figure 8 Top challenging aspects of managing a project/program using EVMS

As shown, overall, respondents ranked "leadership attitude toward EVMS" as the most critical challenge in EVMS application, by a wide margin. Furthermore, the survey uncovered four other challenges that each generated a similar average score around 0.6: providing timely data and information for decision-making; the extent of compliance expectations, reviews, and oversight; complexity of implementation; and flexibility or scalability to different types of organizations and projects. The respondents were also able to provide other challenges that were not listed.

The "other" challenges as specified and provided by the respondents are listed next. Please note that the answers are grouped in themes in bullet points. The sub-bullet points are responses (as is) under the corresponding theme given by those respondents who had further clarifications. The bold numbers in parentheses mean the frequency of responses covering that theme, arranged in a decreasing order.

- Lack of experience, knowledge and understanding of EVMS, its policies and procedures **(13)**
- Improper application of the EVMS tool **(12)**
    - Ineffective quality and usefulness of procedures
    - Not using it as a project/program management tool (e.g., using it as a finance function, contract management, reporting tool or performance metric)
    - Lack of Integrated Baseline Review which leads to inconsistency in application
    - Not using it to forecast
- Compliance review challenges and failure to enforce standards **(5)**
- Contractual limitation **(5)**
    - Limited applicability in certain contract types such as firm fixed price contracts
    - Management allowing out of scope work
    - Allowing applicability late in project life cycle
- Integration challenges **(4)**
    - Across software
    - With accounting system
    - In program management
    - In portfolio having different projects having different funding sources
- Changing scope and change control requirements **(4)**
- Agile environment **(4)**
- Program size and complexity **(3)**
- Perspective of EVMS as a different function **(2)**
    - As a support
    - As a finance function not program management tool
- Project requirements **(2)**
    - Complex customer requirements
    - Requirements maturity with new development & Schedule Configuration Management practices
- Maintaining the EVM system **(2)**
    - During breaks between projects
    - During absence of projects
- Discipline **(1)**
- Other responses are listed here **(7)**
    - The reliability and usability of the data submitted by the contractor.
    - Divergence in government guidance between budget and funding.
    - Engineering acceptance and ownership.
    - Treating it as a contract management system, which the [customer] does for the most part. [Customer] does not manage any of its own projects/programs with EVM.
    - Over reliance on EVMS for project management decisions.

- Obtaining accurate estimated actuals (accruals).
- Having a high quality RLS to begin with.

The survey next proceeded with a question gauging the EVMS sub-processes.

4.5. Top three EVMS sub-processes

The next question in the survey asked, "The following core processes typically make up an Earned Value Management (EVM) system. In your opinion, please rank the top three in the list below in terms of their impact on EVMS effectiveness. (#1 is the highest impact.)" (Question #20). Here, the authors provided a list of ten sub-processes based on the literature review and the research input, so the respondents could rank the top three sub-processes. For better visualization of the results, further data analysis, and to have higher values associated with more importance, the ranks were converted to overall importance score; the sub-process that was ranked first was converted to score "3", "rank2" was converted to score "2", and "rank3" was converted to score "1". The higher the score, the more important is the sub-process. The result of this question is shown in the following figure.

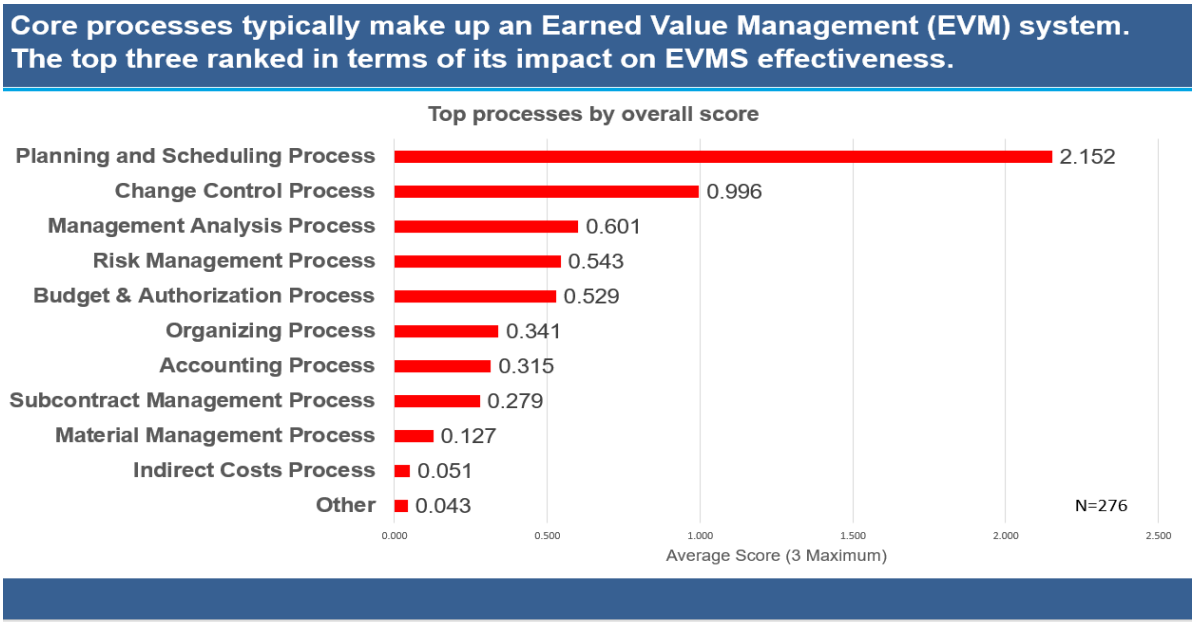

Figure 9 Top EVMS sub-processes with the highest impact on EVMS effectiveness

As shown, "Planning and scheduling" was ranked as the sub-process that had the highest impact on EVMS effectiveness, by far, versus the other EVMS sub-processes. Finally, the overall top five important sub-processes are planning and scheduling, change control, management analysis, risk management, and budgeting and work authorization. The respondents were also able to provide other sub-processes that were not listed.

The other sub-processes specified and provided by respondents are listed next:

- Forecasting
- Overall attitude about EVM
- Proper scope definition

- Lack of a well-defined Scope of Work and thereby lack or exact correlation to the Work Breakdown Structure
- Failure of [client] to collect all detailed EVM data

After gauging the EVMS sub-processes, the survey had a next question related to EVMS environment, as shown in the following section.

4.6. EVMS Environment

The next question in the survey asked, "The following factors can impact the environment of Earned Value Management (EVM) systems. Based on your experience, please rank the top 5 factors in order of importance (#1 is the most important). "Earned Value Management System (EVMS) Environment is the degree of confidence in the outputs of the EVM system, associated processes, and deliverables that serve as a basis for effective program/project management and decision making." (Question #21). Here, the authors provided a list of 18 environment factors based on the literature review and research input, so the respondents could rank the top five environment factors.

The list of the 18 environment factors included:

- Leadership team's previous experience planning, designing and executing an EVMS on a project/program of similar size, scope, and/or location
- EVMS Stakeholders are appropriately represented on the project leadership team
- Project/Program leadership is defined, effective, and accountable
- Organizational culture fosters trust, honesty, and shared values
- Technical capability and relevant training/certification of EVMS implementation team
- EVMS implementation team experience with the local regulations, with similar projects
- Internal controls team is independent of the program and has the authority to affect change
- Stakeholders are appropriately represented on the EVMS implementation team (e.g., contractor, operations and maintenance, key design leads, project manager, sponsor) and have a clear understanding of the project scope
- Communication within the EVMS implementation team is open and effective; a communication plan with stakeholders is identified
- The organization implements and follows a standard EVMS Development process, has a formal structure or process to prepare EVMS, and implements planning tools that are used effectively
- Priorities among EVMS requirements are clear
- Commitment of key EVMS personnel
- Calendar time allowed for preparing EVMS and management tools available including technology/software
- Local knowledge (e.g., institutional memory, understanding of laws and regulations, understanding of site history)
- Quality and level of data available

- Sufficient investment to implement EVMS
- Availability of standards and procedures (e.g., local EVMS requirements, standard operating procedures, and guidelines)
- Sufficient EVMS requirements definition and agreement among key stakeholders and sponsor(s)

After the participants ranked the top 5 environment factors, the ranks were converted to overall importance score for better visualization of the results, further data analysis, and to have higher values associated with more importance; the factor that was ranked first was converted to score "5", "rank2" was converted to score "4", "rank3" was converted to score "3", "rank4" was converted to score "2", and "rank5" was converted to score "1". The higher the score, the more important is the environment factor. The result of this question is shown in the following figure.

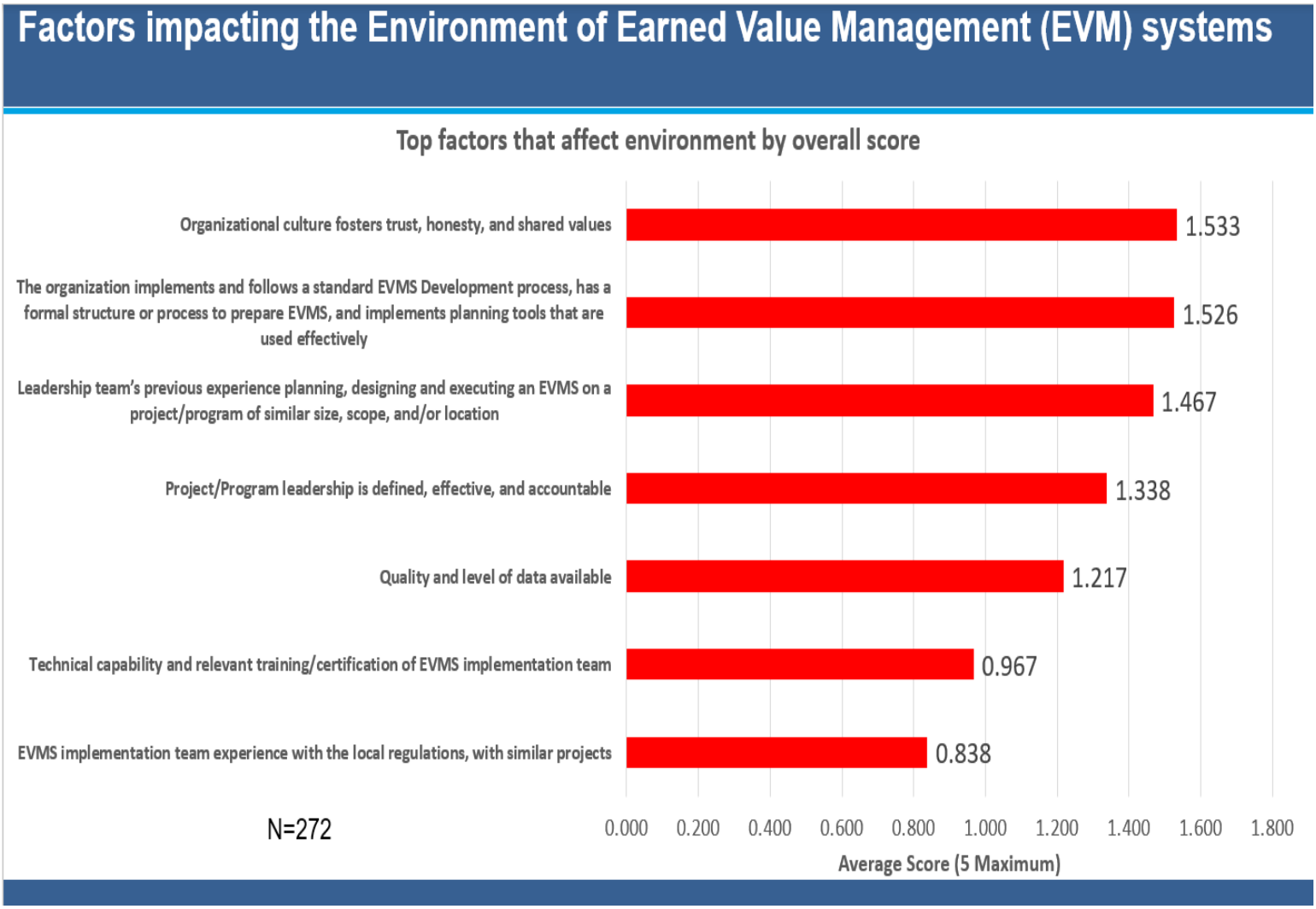

Figure 10 Top factors that can impact the EVMS environment

As shown, the top five environment factors are "Organizational culture fosters trust, honesty and shared values"; "Organization follows a standard EVMS development process"; "Leadership's previous experience"; "Defined, effective and accountable leadership,"; and

"Quality and level of data available." The analysis of these results shows that several of the top-rated EVMS environment factors are related to culture (e.g., trust, leadership, communication). The respondents were also able to provide other factors that were not listed.

Some other factors provided by the respondents are listed next. Please note that their answers are grouped in themes. Under each theme, the sub-bullet points represent the answers of the respondents (as is), in the case when they had further clarifications. The bold numbers in parentheses represent the frequency of the responses arranged in a decreasing order.

- Senior leadership support of EVMS **(5)**
  - Management ability to accept real data versus misinterpreting performance
  - Ownership and support of processes and procedures
  - Senior leadership management
  - Participation and encouragement
  - Supporting EVMS requirements
- Application of EVMS tool **(5)**
  - Treating it only as a reporting tool or as contract management rather than a management tool
  - Disregarding accountability
  - Use of data in management reviews
  - Enforcing arbitrary rules (i.e., acceptable length of a task, maximum float)
  - New technology
- Client requirements and support of EVMS **(4)**
- Poor oversight **(4)**
- Quality of scheduling and planning **(3)**
- Knowledge of EVM(S) **(3)**
  - Understanding EVMS benefits
  - Team's understanding of EVMS requirements
  - Knowing difference between budget and EVM
- Low risk visibility **(1)**
- Convenience over compliance **(1)**

4.7. Strategies to mitigate EVMS Deficiencies

The second to last question in the survey asked, "Please provide key strategies that your organization uses to identify and mitigate Earned Value Management System (EVMS) deficiencies or take advantage of opportunities for improvement." (Question #22). The analyzed summary of the responses is presented below, and the raw responses are provided in Appendix B.

Please note that the answers are grouped in themes. The bullet points are further elaborations under corresponding theme when needed. The bold numbers in parentheses represent the frequency of the responses arranged in a decreasing order.

- EVMS Surveillance **(74)**
    - Internal surveillance
    - External surveillance
    - Regular/periodic surveillance
    - Surveillance plan
    - Corrective action requirements of surveillance reviews
    - Site surveillance reviews
- EVMS reviews **(28)**
    - Monthly reviews of EVMS data
    - Analysis of EVMS reports
    - Expert reviews
    - Independent reviews (3rd party) and audits of EVMS application
    - Reviews by experienced external review teams or consultants or EVMS specialists
    - Integrate review process with the project Corrective Action Management Plan
    - Timely reviews
    - Metric based
    - Documentation review
    - Regular reviews of the project controls processes and practices
    - Schedule reviews
- Compliance **(28)**
    - Identify compliance concerns
    - Frequent oversight to ensure continuous compliance
    - Have compliance team
    - Compliance with EIA-748 EVMS guidelines and other standards
    - Reinforce compliance
    - Data driven compliance analysis
- Project team involvement **(22)**
    - EVMS compliance team/independent project team for review of EVMS
    - Experienced team to identify corrective actions
    - Receiving continuous feedback from management to effective EVMS implementation
    - EVM report availability to entire project team
    - EVMS implementation team
    - Early engagement
    - Well-trained
    - Continuous learning
    - Maintain process and documentation
- Taking corrective actions **(21)**
- Contractor's engagement **(20)**
    - Contractor to take action to mitigate EVMS deficiencies
    - Engagement with Contractor Stakeholders
    - Evaluating contractor's EVMS system/surveillance
    - Contractor self-governance
    - Analysis of contractor's EVM reporting
    - Collaboration with key stakeholders
    - Objective discussions

    - Understanding contractor's WBS vs contract WBS
    - Certification of contractor's EVMS
- Development and proper implementation of EVMS tools **(19)**
    - Use of best tools
    - Effective implementation of tools in compliance with Standards
    - Continuous improvement of tools
    - Software upgrades
    - Investment in tools
    - Assessment of tools
    - Fully integrated tools (planning, scheduling, budgeting…)
    - Tools to monitor data quality and integration
    - Use as project management tool rather than contract performance reporting tool
- Lessons Learned **(18)**
    - Continual feedback to the project team for areas of improvement
    - Submission of lessons from Integrated Baseline Reviews
    - Forum for lessons learned sharing
    - Concurrent lessons learned sessions throughout project
    - Share across organizations
    - Open communication
    - Lessons learned collection and database
- Set-up/define EVMS metrics **(17)**
- Management involvement **(16)**
    - Reporting monthly metrics to management
    - Monitoring and maintaining proactive approach to EVM
    - Management assessments
    - Good decision-making
    - Open communication and identification of deficiencies
    - Integrated project management on project portfolio
    - Awareness and management buy-in
    - Risk and opportunity management board
- EVMS assessment **(15)**
    - Independent assessments
    - Internal assessments/self-assessments
    - Worksite assessment
- EVMS Training **(15)**
    - Proper training
    - Frequent training
    - Training audits
    - Continuous training
- Continuous EVMS process improvement **(15)**
- EVMS Certification **(13)**
    - Experienced professional (EVP certification)
    - Recurring certification trainings
    - Certification of contractor
- Integrated Baseline Reviews (IBR) **(12)**
    - Use lessons learned from IBRs
    - Helping programs to prepare for IBR
    - Use IBRs to implement corrective actions

- Peer reviews **(11)**
    - External peer review
    - Invitation to peer organizations to conduct reviews
    - Peer project review or by teams from other sites
    - Periodic peer reviews
- Risk management **(10)**
    - Risk assessment
    - Risk mitigation
    - Joint risk management meetings
    - Integrated approach or tools of schedule, cost, risk and earned value
    - Control of high-risk areas
- Leadership support and commitment to EVMS **(10)**
- Change Control **(7)**
    - Proper change control includes making right changes to the baseline, reflective the most current plan
    - Understand change control process
    - Change control board meetings
    - Effective surveillance includes making necessary changes for continuous improvement
- Effective planning and scheduling **(7)**
    - Project planning
    - Planning as early as possible
    - Rolling-wave planning
- Other reviews **(6)**
    - Contractual compliance reviews/QA
    - Independent program reviews
    - individual project reviews
    - product review
    - program gate review
- Variance analysis **(5)**
    - Receiving explanation for variances
    - Monthly reviews to focus on root cause of variance

As shown, a total of 22 strategies were mentioned by the respondents. The top six strategies by frequency included the following: EVMS surveillance (74 responses); EVMS reviews (28 responses); compliance with EVMS guidelines and standards (28 responses); project team's proactive engagement and EVMS experience (22 responses); corrective actions (21 responses); and contractor's engagement in EVMS (20 responses). Using internal, external, periodic, and planned EVMS surveillance was the top strategy by far.

5. Other Thoughts about EVMS assessment

Finally, in the last survey question, the survey participants were asked "Please feel free to share any other thoughts about Earned Value Management System (EVMS) assessment with the research team." (Question #23). In total, 23 different comments were received.

The answers to Question #23 are listed next, however the raw responses are provided in Appendix C. Please note that answers are grouped in bolded themes. Under each bolded theme, the sub-bullet points represent the answers of the respondents (as is) when further elaborations were provided.

- Thirteen respondents mentioned various **areas of concern in EVMS application** that are listed next**.**
    - Improper use of EVMS, not serving as a project management tool. The responses (as is) under this sub-theme included:
        - EVMS is used as a performance metric instead of a project management tool.
        - EVMS is undervalued as a key to successful project management.
        - Earned value is seen as finance function, whereas EVMS is an exercise for scheduling and cost management only.
        - Government vendors spend a lot of time following the EVM standards and procedures, and not really using EVM as a performance management tool.
        - The use of the EVMS beyond a tool to help manage the project can lead to a lot of non-value effort.
        - EVMS is being used as a reporting tool or a check-box exercise, nothing else.
    - Improper use of Earned Value Techniques (EVT) is an area of concern, for example: improper use of % complete, when 0/100 or 50/50 is more appropriate.
    - Cost reporting should be reconciled monthly with the accounting program of record. Failure to comply jeopardizes the accuracy (i.e., environment) of EVMS.
    - Quantifiable Backup Data (QBD) may not be predetermined.
    - For small R&D type projects where the outcome is not fully understood EVMS tools have limited opportunities. However, on larger projects with fairly well-defined goals EVMS as currently used is excellent.
    - EVM language is inconsistent. For example, the ways you take EV, 50/50, LOE, etc. means something different to people who implement EVMS.
    - To be effective EVMS must take extra care to limit the amount of LOE on all projects. LOE is the bane of an effective EVMS because when it is excessive it destroys effective SV analysis. SV is half of the benefit of an EVMS.
    - The cost reporting system currently in place is so onerous and slow that project managers are often working with data that is typically 2-3 months old
    - EVMS must be flexible and scalable to adapt to various program requirements.
    - EVMS should be judiciously applied in the appropriate applications and projects. Some activities do not require rigorous EVMS programs.

    - A strong EVMS should be able to easily reconcile invoice to ACWP.
- Thirteen respondents mentioned that the biggest challenge in EVMS implementation is the **lack of experience, knowledge and understanding of EVMS**. Seven of these respondents specifically attributed these challenges to the following entities**:**
    - The customer
    - All the stakeholders
    - The senior management/leadership
    - The internal process team
    - EVM technicians who do data entry
    - The business team
    - The Control Account Managers (CAMs)
- Thirteen respondents mentioned that there should be an improved **EVMS assessment** through various ways as listed next.
    - Assessment should be a shared responsibility (government/contractor): contractual requirement for contractor, oversight by government.
    - Many times, assessment is biased by auditor: different auditors will give different results.
    - Many times, assessment is imperfect and based on personal interpretations.
    - Every organization should have internal and experienced team for EVMS assessment.
    - EVMS assessment tool will be common across all organizations.
    - Organizations struggle in self-assessment for EVMS against expectations of review authority.
    - Assessment works best when there is good communication and data sharing.
    - Any assessment of an EVMS needs to have a strong focus on schedule and schedule management.
    - Check on healthy application of EVM rules.
- Twelve respondents mentioned that the purpose of proper EVMS implementation is to have **clear, objective, quality, adequate, reliable, timely, sufficient, adequate, at the right level and accurate data**. One respondent clarified further stating that there is a need for data scientists, database administrators, coding language knowledge and better data management.
- Twelve respondents mentioned the **role of the Government in EVMS**. The following list highlights on the role of the Government based on their responses.
    - Government responsibility is to provide oversight over the compliance of the contractor to the contractual EVMS requirements.
    - Government holds great authority in EVMS assessment.
    - Currently government is too focused on looking backwards rather than using EVM to predict future project performance which would result in less variance.
    - In firm fixed priced construction contracts, the risk of EVMS is on the contractor as opposed to the government.
    - Currently government utilizes EVMS on capital project but not on operations activities.
    - Government has too many processes and guidelines that prescribe how to manage the project. Government vendors spend a lot of time following the EVM standards and procedures, and not really using EVM as a performance management tool.

    - Government to backup contractor to support compliant EVM implementation.
    - Government needs to push EVM as priority in their contracts.
    - Currently, cost is not as important as schedule is for the government. This attitude needs to change.
    - Government needs to use EVM as a powerful tool for managing projects as early as possible in project lifecycle. Implementation and reporting of EV should not be conditioned to any procurement cost threshold. If there is to be a threshold, it should be based on the Total Project Cost (TPC).
    - Government should adapt adequate cost reporting standards.
- Twelve respondents mentioned that there should be a **proper engagement of the contractor in EVMS**. The following list presents clarifications on the contractor's engagement from the given responses.
    - In assessing EVMS, there should be a shared responsibility between contractor and government: contractor has contractual requirements to remain compliant and government to provide oversight.
    - There should be incentives to contractor to produce valid, accurate, and timely information.
    - Contractor shall have internal team to run metrics to check the status of their system regularly.
    - In firm fixed priced construction contracts, the risk of EVMS is on the contractor.
    - Customer needs to follow EVMS requirements so that contractor could implement EVMS effectively.
    - Government to backup contractor to support compliant EVM implementation.
    - Contractual EVMS requirements should be well-defined.
    - It is important for the contractor to have EVMS compliance representatives as an outsider separate from the programs.
- Ten respondents mentioned that a proper, realistic, and up-front **EVMS planning** (time, cost, scope, effort) is essential**.**
- Eight respondents mentioned that improving the reliability of EVMS fosters effective **decision-making** during project execution based on clear, reliable, timely and accurate data.
- Eight respondents provided inputs specifically on the **maturity of EVMS** study. The details are listed below.
    - Maturity can stand on its own as a measure of the degree to which the implementation of the other attributes (current, accurate, complete, repeatable, auditable, and compliant) are effectively established within the EVMS.
    - Maturity could be an insightful indicator of EVMS compliance, however, it could not be considered the only indicator of EVMS compliance.
    - Compliance is not maturity and maturity may not be Compliance. A benefits analysis of the output of a mature EVM System and its direct impact to program success, is more important than ensuring 130+ metrics are checking a compliancy box.
    - An EVMS maturity model that is accepted and/or supported by government and industry should enable an improved approach to EVMS assessment.

    - “Accuracy" is only one of the attributes of "Maturity" and "Trustworthy" data and information. The data and information must also be current, complete, repeatable, auditable, in order for it to be compliant.
    - Maturity not to focus only on compliance.
    - The maturity model should not strive to make a perfect EVMS, but rather an EVMS that can produce timely, reliable, and useful information for decision making.
    - Consider other elements that can be linked to maturity such as forecast volatility and schedule execution metric.
- Seven respondents mentioned that the proper integration of both **cost and schedule aspects in EVMS application** is essential. Some of them clarified further by stating the following:
    - When improving schedule and cost data can in turn improve EVMS culture.
    - EVMS is an exercise for scheduling and cost management only and does not have any other function such as finance.
    - Effectively balance cost and schedule objectives.
    - EVMS system should be able to answer two project questions: how much is it going to cost? When will it be delivered?
- Seven respondents mentioned that an EVMS requires the right **support of management/leadership**.
- Six respondents mentioned that an EVMS should be a proper **performance reporting tool**. Clarifications from their responses included:
    - Reporting of EV should not be conditioned to any procurement cost threshold. If there is to be a threshold, it should be based on the Total Project Cost (TPC).
    - Reporting requirements of EVMS should be understood by Control Account Managers (CAMs).
    - EVM and associated reporting should follow guidelines and be tailorable to reporting to manage to level of program risk.
    - Government should adapt adequate cost reporting standards.
- Six respondents highlighted on the importance of appropriate and **well-defined EVMS contract requirements**.
- Five respondents mentioned **risk management**. Further clarifications in their responses included:
    - EVM culture needs to incorporate risk and uncertainty sciences.
    - EVM study needs to focus on program benefits of EVMS implementation rather than focusing on a compliance perspective. The benefits of integrated cost and schedule with risk and resources goes beyond just compliance.
    - Apply correct risk management to have accurate cost estimates.
    - Deficiencies in EVMS implementation could be categorized between high-risk guidelines and low-risk guidelines. An example of high-risk guideline deficiency is changing baseline dates in the Integrated Master Schedule without a baseline change request.
- Five respondents mentioned that appropriate **EVMS accountability** should be in place. Further clarifications in their responses included:
    - There is a desire from management to avoid accountability.
    - Leadership accountability is a factor in the maturity of a system.
    - The sponsors are incentivized (or at a minimum not held accountable) to hide scope growth, schedule slip, or cost growth.

- Four respondents mentioned that EVMS is an effective tool for **forecasting** project performance.
- Four respondents mentioned that an effective implementation of EVMS needs to bypass the challenge of **attitude of resistance towards new practices**. Two additional clarifications were provided in their responses:
    - Institution cultural adjustment to a new framework and approach remains a significant challenge.
    - Organizations are blinded by their traditional use of the existing EVMS.
- Four respondents mentioned that the **EVMS guidelines are interpreted** differently. The following are their responses on this.
    - Depending on the auditor.
    - They are interpreted differently at the risk of personal interpretation, preference and results in significant variation between reviewers, agencies, consultants, and industry practitioners.
    - Interpretations are difficult to manage.
    - The inflexibility & lack of scalability in those interpretations have added cost, reduced value and disenfranchised program leadership from taking advantage of all that an EVMS implementation has to offer.
- Four respondents provided inputs specifically on the **accuracy of EVMS** study (i.e., EVMS Environment). The following are their responses on this.
    - “Accuracy" only matters, is only effective if the data is both current and complete.
    - "Accuracy" by itself is not enough. The data and information must also be current, complete, repeatable, auditable, in order for it to be compliant.
    - The study’s definition of accuracy is more suitable to “credibility” rather than “accuracy”.
    - Cost reporting should be reconciled monthly with the accounting program of record. Failure to comply jeopardizes the accuracy of EVMS.
- Three respondents discussed **successful project/program outcomes** as a result of EVMS best practice. The following are their responses on this.
    - An EVMS that is judged Mature that fails to improve project delivery outcomes is a failure.
    - Reach out to organization that have project success (on time & on budget project deliverables) and find out what is working for them.
    - EVM study needs to focus on program benefits of EVMS implementation rather than focusing on a compliance perspective.
- Three respondents highlighted the lack of **EVMS surveillance** as a major concern. The following are their responses on this.
    - It leads to poor data quality
    - As multiple programs exist on site, conducting surveillance on a site level is essential
    - It needs processing/tracking metrics
- Three respondents mentioned that a proper **Work Breakdown Structure (WBS) development** is critical to successful EVMS implementation.
- Two respondents mentioned that the study needs to consider **additional attributes** to maturity and accuracy (i.e., Environment). According to one of them, compliance cannot be determined unless all these five attributes are considered: Current, Accurate, Complete, Repeatable, Auditable.
- Three other **unique thoughts** included:

- Another area for possible exposure for EVMS is to be part of a first-year engineering school curriculum.
- Dedicated individuals will lead to positive changes.
- There should be an aspect of inclusiveness (Project Management Institute knowledge area and process groups) beyond cost/schedule/scope.

Further analysis of all these results and implications are published by Aramali et al. (2021) in the peer-reviewed Journal of Management in Engineering by the American Society of Civil Engineers (ASCE) in 2021 as cited below.

Reference

Aramali, V., Gibson Jr, G. E., El Asmar, M., and Cho, N. (2021). "Earned Value Management System State of Practice: Identifying Critical Subprocesses, Challenges, and Environment Factors of a High-Performing EVMS." *Journal of Management in Engineering*, *37*(4), 04021031.

Appendix A. Respondents' Organizations

Aerojet Rocketdyne	Johns Hopkins University Applied Physics Laboratory	Raytheon Technologies
Argonne National Laboratory (ANL)	KSC IRT	Rolls-Royce Corporation
AT&T	L3Harris Corporation	Sandia National Laboratories
AzTech International	Lawrence Berkeley National Laboratory	Savannah River Nuclear Solutions (SRNS)
BAE Systems	Lawrence Livermore National Laboratory	SNA Software LLC
BDO USA	Leidos	Space Metrics Inc.
Bechtel	Lockheed Martin	Tecolote
Boeing	Los Alamos National Lab (LANL)	Textron Systems
Brookhaven National Laboratory	Management System Applications Inc.	Thomas Jefferson National Accelerator Facility
CACI International	MDSG, LLC	UCOR
CH2M HILL Plateau Remediation Company	Michigan State University (MSU)-Facility for Rare Isotope Beams (FRIB)	UT-Battelle, Oak Ridge National Laboratory
Consolidated Nuclear Security (CNS)	MTS Inc.	Washington River Protection Solutions (WRPS)
Department of National Defence (Canada)	National Aeronautics and Space Administration (NASA)	US Air Force
Econtech	National Renewable Energy Laboratory	US Army
Emerson Phoenix	National Science Foundation	US Department of Defense
Encore Analytics	New Results PM Group	US Department of Energy
Fermi National Accelerator Laboratory (FNAL)	Northrop Grumman Corporation	US Marine Corps
Fluor	Olde Stone Consulting, LLC	US Navy
General Dynamics Mission Systems	Pacific Northwest National Laboratory	
General Electric	PM Focus LLC	
Honeywell Aerospace	PM-Partners & Co LLP	
Idaho National Laboratory (INL)	Pratt & Whitney	
Infinite Solutions Inc.	Princeton Plasma Physics Laboratory	
J.G. Management Systems Inc.	Project Management Institute	
Jacobs Engineering	PT&C/Caliburn International Corp	

Note: The organization names are in alphabetical order, from left to right.

Appendix B. Raw Results of Open-ended Question #22

(Strategies to mitigate EVMS Deficiencies)

- Integrated Baseline Reviews, and Project Control System reviews, along with routine health checks on Earned Value Management Maturity and Schedule Health Maturity.
- We do not currently implement or use EVMS.
- Reviews of contractor systems.
- -internal surveillance - involvement with EV projects in phase B/facilitating EVM implementation early - communication with the business team on the past or current EV projects, collecting lessons learned.
- Established a process and policy that is scalable enough for our organization to allow for tailoring of the system as a whole, to the point that decision making is still supported by objective and timely information.
- Critiques of data assembled and presented; post-mortem analysis of failing issues. No notable proactive measures.
- Schedule/cost reporting is anchored to the schedule software data repository. Limit post-batch reporting crosswalks, when possible, to eliminate human error and delays in reporting.
- Feedback from L2 Managers on difficulties they have implementing and enforcing EVMS demands on their L3 managers. In a diverse work environment with not all L3's buying into the process, simple impediments can defeat all attempts for them to buy into the process and benefit from the output.
- Need to flow down EVMS requirements to project $20M to build core experience and good project management habits.
- Reviews, continually increasing investments in improving EVMS processes and tools, ongoing investment in retaining EVMS experts, lessons learned from previous projects
- EVMS Training
- Independent review of EVMS implementation regularly.
- Define, Measure, Analyze, Improve, Control: Improvement management occurs once a gap between current and desired performance is observed. Once such a gap has been identified, the cognizant entity initiates a project to close the gap. The DMAIC framework provides a roadmap for closing performance gaps. During the Define phase, the scope of the project is detailed and agreed upon. During the Measure phase, the current gap is studied and quantified. In the Analyze phase, the causes for current performance are identified. During the Improve phase, actual changes are implemented to close the performance gap. Once the gap is sufficiently reduced or eliminated, the control phase is used to monitor performance and ensure the gap does not re-occur.
- Tools within the Project Assessment and Reporting System (PARS) like Empowers are used.
- The answer to this "should be" effective internal surveillance conducted in the conventional manner where the program manager is the focal point for making necessary changes that drive continuous improvement and commitment.
- Standardized tools and training. Centralized earned value resource center.

- We take every opportunity to tell the [customer] why they are deficient in implementing EVMS and why they should adapt [company] practices
- We have an Integrated Program Management System (IPMS) core team responsible for maintaining processes, documentation and training to ensure effective Planning, Monitoring and Control (PM&C) and EVM implementation. This team meets weekly, discusses new processes, training, and documentation and is a forum for community members to bring forth concerns, questions, and ideas for change. We have an IPMS Change Control Board. Our organization uses a combination of internal and external surveillance to identify deficiencies, risks or other issues with our EVMS. The surveillance team provides internal evaluation of the application of our PM&C processes. We use the data-driven metrics (DECM) provided by [company]. We have a PM&C Leadership Team to improve collaboration and communication among the PM&C community, providing a forum for issues and opportunities to be addressed and elevated, if warranted.
- Conduct internal system surveillance reviews and report back to the Program; corrective actions / training to make improvements.
- Procedure oriented, disciplined and consistent application of guidelines, analysis and reporting.
- Continued training, networking and EVM conference to gain best practices
- 1) Perform integrated baseline reviews and follow-up on any best practices or management control issues that are discovered 2) Project management working group meetings to share and discuss EVM issues
- Tools to monitor data quality and integration. Oversight Training.
- We're the customer of EVMS data ([owner]). Our processes in validating data and communicating with our Contractors (data submitters) are key to mitigating EVMS deficiencies and soliciting improvement.
- Having an EVMS Compliance Team focused on Processes and Products is a key strategy for PM
- The [customer] requires certification of contractor EVMS systems and then conducts periodic surveillance reviews of those systems.
- Data driven compliance analysis and continuous process improvement
- Risk and opportunity management boards, variance analysis
- 1) Strong focus on senior management awareness and buy in. 2) Definition of organizational requirements and personnel assignments. 3) Strong focus on initial planning, scheduling and budgeting. 4) Complete understanding of change control process. 5) Complete understanding of the management analysis process. 6) Establish and delivery of process training to all stakeholders.
- Led and driven from the top as a priority.
- Project oversight Board reviews performance and shares lessons learned. We review each other and are involved in external peer reviews.
- Lessons learned database
- In my current role, I no longer evaluate EVMS. In my previous position with [company], we had clear guidance on how to evaluate contractor's EVMS. I would identify areas of concern and discuss with the contractors to determine if these were

truly deficiencies. Then, I generated a Corrective Action Report (CAR) and the contractor was required to respond to the CAR with a plan to correct the deficiency.

- Clear communication with all personnel involved.
- Enable all stakeholders to voice opinions and take corrective action for improving performance
- Our [project management oversight office] does site surveillance reviews of the [locations] who are implementing EVMS to determine if they are meeting the criteria. A [location] can lose certification if deficiencies are not corrected. One improvement in the [customer] certification process would be to have independent outsiders with expertise in EVM on the review committees; currently it is staffed with [project management oversight office] and [company] staff that are all members of the same closed community, so each [location] is reviewing each other, which causes a disincentive to be a whistle-blower on one [location], when your [location] will be visited by a partner or neighboring [company] for your review. I think this is called a reciprocation bias, or quid pro quo where I will scratch your back if you scratch mine by you giving me a good certification review if I give you a good certification review.
- EVM, in [customer] contracts, is really in the genesis phase when compared to [company] or [company]. However, EVM has recently demonstrated success on key [company] programs. The most surprising fact, which was discovered during an EVMS surveillance, was to realize that a broken EVMS has as much, if not more, value then a compliant EVMS. It enables you to understand the core deficiencies in the Contractors basics project management processes and adjust schedule and cost estimate with a greater level of confidence. In the end, EVMS deficiencies where best highlighted to senior leadership by identifying the impact to the system and data. In other words, project controls has the responsibility to enable leadership knowledge and provide them with project data to have objective discussions with the contractor and hope common sense prevails! It is imperative for leadership to understand and see value as to why they need to challenge the contractor. Also, taking time to better understand the contractors WBS vs the Contract WBS can be very beneficial. Using the contractor WBS for management and the contract WBS for reporting and invoicing was a way to get a deeper understanding of performance, but still meet the SOW requirements.
- We have subcontracted outside experts to provide us help in making our implementation on at least one major project more robust. This includes CAM training and review of our system.
- Self-governance and independent 3rd party reviews
- Knowledge sharing across programs is on-going. Best practices are communicated, issues are reviewed on a regularly recurring basis across programs and Earned Value Compliance personnel are assigned to work as an active participant and resource for all programs.
- DECMs are used to identify risk. Work with contractor to improve internal surveillance tools and processes. Write external CARs when appropriate.
- Internal surveillance and internal Corrective Action Reports (iCAR) system that are part of the closed loop business systems.

- My organization has started implementing a metrics-based approach to identify potential problem areas that shall be looked into to ensure EVMS compliance to specific guideline attributes. Many of the metrics (60 of 140+ metrics) can be automated with input from contractor cost and schedule data. These automated metrics are dispersed across the five areas and can be run monthly trend how an EVMS is performing. The remaining metrics require manual data traces through the EVMS to ensure compliance.
- The projects typically have a monthly calendar for input into the monthly reporting and review and approval.
- As a [customer] oversight organization, our Project Controls component ([customer]) provides direct oversight of EVMS via various reviews and the system certification process.
- Routine review of the [company] and regular communications with the Prime when we have questions about the cost and scheduler performance data, concerns about the quality of the data.
- Training
- We try to work with Prime(s) from Source Selection up thru IBR to identify potential areas of weakness in Management Systems with our goal of being we can have the issue corrected prior to the IBR to allow us to have the most successful IBR possible. We have SOW language for our Prime contracts establishing a weekly business rhythm to review EVM data (cost/schedule) with the [customer] to help identify areas needing help - this continues thru the life of the contract.
- The use surveillances
- We've documented our processes in a management manual, and continue to improve the participation from a broad range of stakeholders.
- This is not the only management tool and should not be considered as such. There are technical reviews, and technical discussions which provide important management inputs that are more leading indicators than EVMS is.
- Use of EVM data in monthly reviews focusing on root cause of variance and EAC as related to technical achievement.
- Start self-evaluation as early as possible and get the [customer] of PM involved in that early process.
- Variances
- Regular reviews of the project controls processes and practices to measure time, cost and quality per specs. Improvements are discussed and an implementation plan is approved by the project sponsor and the [project management oversight office].
- Perform program assessments and surveillances. - Ref. [regulation] which states in part: "It is [company]' position to encourage continuous process improvement through the adoption of new management tools or to revise processes and practices to remain current with industry trends. ... " - Also see [regulation], "Assessment and Surveillance," which documents commitments to perform periodic program assessments and surveillances to ensure compliance with standards and requirements.
- Training curriculum for project leaders (PM) - best practice to incorporate into a developmental program (catch future PMs at an early stage in their career); make

training as hands on as possible (exercises vice policy/theory). Tailoring of EVM reporting (scalable, informal "flash" reports). Highlight EVMS issues via internal rating (vice [company] surveillance).

- Internal surveillance, implementation of a EVMS system description deemed adequate by the [company], and targeted PM, CAM, WPM, scheduler, analyst training
- Transparency and robust training and reviews. Keeping things simple.
- EVMS Personnel training. Leadership involvement and coordination.
- Earned Value Management Working Groups, System CCBs,
- We utilize metrics as well as product review to assess data quality. We also require positive internal controls in high-risk areas; for example, we require a compliance monitor to review changes on several programs where poor organizational culture has led to potential compliance and data accuracy issues.
- Do not overkill or underkill when implementing an EVMS so that its use has a better opportunity to succeed.
- DECM metrics and internal dashboard
- I usually talk with the contractor about issues, and if they are not corrected, I have [company] write a corrective action request.
- Attempt to use a standard process across the organization along with standard fully integrated tools (planning/scheduling, budgeting, change control, risk, and reporting/analysis) and provide accurate data timely, within a few days of closing
- Fear.
- Training events, learning events, email, leadership engagements, embedded EVM support personnel
- Monthly document reviews, leadership direction, peer reviews by teams from other sites with corrective action requirements, surveillance reviews annually, communication among team Training Customer reviews Certification
- 1) Active participation on [organization] to be in a place where decisions are made and have a seat at the table; 2) Participation with [customer] on EVMS Review Teams to best understand the [customer] review mindset and concerns; 3) Internal Surveillances to keep the edge and focus
- Follow [company] guidelines
- [Company] has established a centers of excellence organization which has discipline chiefs from critical parts that make up our organization, [project management oversight office] , EV, Scheduling, CAM
- Management has an independent State of Business team that looks at an integrated approach on each program of schedule, cost, risk and earned value that is derived from program reporting inputs monthly. These are rolled up into an upper management independent assessment that gets compared to the PM’s assessment.
- Hold integrated baseline reviews and monthly status reviews to go over opportunities for improvement in implementation.
- Review methodology - Primarily a documentation review to verify implementation Test project EVMS Compliance, implementation & management use.
- Maintain open and transparent relationships with our contractors; Work jointly (JSRs) towards identifying system issues.

- Lessons learned, IBRs to implement corrective actions and adjustments, rolling wave planning, continuous training/feedback and process improvement exercises.
- Continuous learning - we like to stress that EVMS implementation teams wrap their EVMS team members into regular engineering events that foster learning and reflection. Processes and procedures, and tools should be regularly discussed and issues identified for improvement or enhancement. EVMS Integrated into Quality Management System - internal compliance must have teeth. The only way to properly enforce EVMS compliance is to wrap it inside (as a category or source of defect) within the company's existing quality systems and reporting processes.
- Internal Surveillance, Management Observation, Managerial involvement and buy-in.
- Independent internal surveillance teams are deployed to the programs to continuously assess EVMS implementation, using these opportunities to reinforce process compliance.
- Collaborates with other [organization] Agencies EVMS groups.
- Joint Risks Management Meetings Conducting IBRs, EACs and SRAs
- Schedule reviews, SRAs, IBRs, weekly program meeting IPT reviews, quarterly program reviews
- Key strategy is the expand stakeholder base to include program functions responsible for implementing EV. These functions include Program Management, Engineering and Program support (Finance, Planning, etc.).
- Have lessons learned meetings each month or quarter to identify issues or concerns and address a path forward to improve.
- Lessons learned flowing into improvement in our EVM handbook and processes
- EVM Readiness reviews are done during the formulation of the project. Formal Surveillance Plans are now being developed.
- Assess areas of weakness and provide support through consultant resources or software tools
- 1) Develop user-friendly EV on-line video training that focusses on concepts as opposed to jargon or policy; 2) Market EV support labor to Project Management community (focus on value-added as opposed to compliance); 3) Develop standardized EV support labor staffing model (to increase Project Management community's trust that they are not providing direct change number coverage for staff. This model should identify standard variables (# of WBS, reporting level, VAR thresholds, etc.) that can be tailored to each project in order to give Project Manager's the ability to increase or decrease the level of EV support and rigor on any given project; 4) Admit publicly that EVMS is not always perfect. Admit that there are times when an EV implementer must choose between the lesser of two evils. Admit that the value of EV increases as you move up the levels of management (EV is more valuable to a PM than to a CAM. EV is more valuable to a customer/sponsor than to a PM); 5) Rely on the EV specialists to be the translator of EV jargon to the technical staff. Do not try to make engineers into EV experts.
- Investment into standard tools and procedures, EVMS training, on-line training, holding PM accountable for EVM data.

- Follow our System description during an implementation of the EVMS and have a good internal surveillance program.
- Monthly EVM meetings to assess performance, which provide indicators of the capability of the teams and the data. Surveillance audits of the EVM implementation on various programs. Discussions and feedback from CAMs and finance members on programs.
- We have internal surveillance reviews and do checks on program EVMS data
- The organization does deploy and utilize a stakeholder EVM and planning & scheduling recurring monthly forum with Flight project management to review and strategize deployment of integrated project management on the project portfolio.
- Internal surveillance. Training of key EVMS stakeholders and the program leadership team. Sharing of EVM best practices. Use and accountability of EVM metrics in executive leadership briefings and communications. Implementation of command media.
- Assessments
- Primarily through use of compliance reviews and surveillances
- Internal surveillance, buddy reviews, training.
- Internal and External Surveillances and Lessons Learned.
- Everything, but the system does not seem conducive the rapidly changing requirements, is bottom heavy in implementation, data is weeks if not months behind when critical decisions need to be made that will affect the cost/schedule/and tech requirements. Some of our systems such as material purchasing, accrual accounting issues and timecard processing make problems worse and the data less accurate.
- Stakeholder interviews, data validation, contractual compliance reviews/QA
- Within [company] programs, deficiencies are handled internally by the contractor. Federal program office can provide input but contractors are responsible for tracking and closing out CARs.
- From a [company] standpoint, identifying a deficiency can come from a wide variety of sources. A key strategy in maximizing the breadth and depth of our identification is having near constant collaboration with all stakeholders - whether it is the contractor (prime a/o sub), [project management oversight office], or other third party interest. Likewise, mitigating a deficiency carries the same key strategy. Our goal is not to write CARs, but to achieve an EVMS that is close to perfect as possible. We have found collaboration to be key in avoiding CARs while still accomplishing improvements.
- I do not believe we do this well
- Independent program reviews
- Independent infrastructure to perform internal surveillance, training and certification
- We have multiple boards, but specifically we have an EVM Change Control Board which meets every other week. We discuss any issue related to EV on all programs. We discuss any changes to the System Description.
- We are aligned with our Policy, guidelines, leadership investment and system foundations. We use predictive indicator questioning in all EVM sessions-allowing the data to drive initial decisions.
- Annual self-assessments. Periodic peer reviews.

- Internal surveillance, program gate reviews
- Open discussions with Project Management and EVMS practitioners to identify deficiencies and strength (at least quarterly). Training of all stakeholders and key personnel, Monthly Project status reviews at both the project and [company] management levels. Open communication and sharing of lessons learned.
- This organization is in the early, early implementation stages so there are no key agreed upon strategies as yet.
- Training, Accountability, establish formal structure and procedures
- The review of and determination that an EVMS is in full compliance with EIA-748.
- surveillance; EVM assessments;
- Key strategies include early identification of areas where potential issues may reside. This is usually in the form of running a list of standard metrics followed up with CAM interviews to determine if identified discrepancies are issues.
- Internal self-assessment annually and [customer] SURVEILLANCE Review every 2 years
- Training, certifications, peer project reviews, community of practice (PM/PC) between labs, internal assessments, tailored application to [company] projects
- We provide Control Account Manager (CAM) training on EVMS methodology and EVMS Surveillance as required.
- We participate in Integrated Baseline Reviews and EVM Surveillance activities and provided feedback to programs/projects and offer training in EVM topics.
- Annual surveillance review by external peers. The surveillance review process includes an assessment of the organization's (project's) ability to respond to review recommendations. Review results and any associated corrective action requests (plans) are provided to the project sponsor ([customer]).
- Risk management
- Self-assessments, invite peer organizations to conduct reviews, we participate in other [company] reviews, maintain certifications, training, workshops, participate in community of practice with other [companies].
- Solid, well-trained team with tailored processes. Executing EVM at an appropriate level. We want to avoid over management / micro-management - you will get lost in the details.
- We use the [Company] Peer Review process for the CD gates and internal/external surveillances maintain current best practices and systems tools for our EVMS. This is done by both sitting on the review committees and being reviewed by committees.
- Besides the yearly audit performed on the EVMS and the critical decision reviews that include looking at the EVMS, there is a dedicated EVMS owner that organizes identification of process improvements and reaches out to those utilizing the information for ideas on how to improve or make corrections.
- Continuous improvement, coupled with the expectation to be very self-critical of established tools, processes, and deliverables, is fundamental in surfacing and addressing deficiencies.
- 1) Collect and share lessons learned across organizations 2) Use of standard EVM software systems and processes 3) Early engagement with project teams
- Lessons learned.

- Use of independent EVMS assessments to ensure compliance with required standards defined in the contract. Continuous evaluation of schedules to ensure critical path is maintained and adequacy of float. Monthly reporting and evaluation of metrics (monthly and cumulative) to determine if any corrections are required
- There is a central organization that supports the toolset and feedback is acted upon to correct reported deficiencies and analyze and develop ideas for improvement.
- The self-assessment and surveillance process will include the following: Review will be in accordance with Procedure [procedure number], [company] Earned Value Management System Surveillance Plan. The selected project baselines will be reviewed. The EVMS system will be reviewed against the latest EIA-748 Guidelines and [company] requirements. Recommendations to improve systems will be evaluated and implemented as appropriate.
- My organization confuses the system with the projects that use the systems. Thus, poor project management decisions translate into corrective action recommendations framed by the EIA-748D guidelines. So, I would rather not provide a response because what my organization does find deficiencies beyond the system itself.
- Continuous learning, regular internal assessments
- We conduct Requirements Analyses against the 32 Guidelines to identify the deficiencies using the sub-questions the review authority has determined to be the additional guidance for compliance assessment.
- We perform internal auditing and address minor and major deficiencies through issuance of Internal CARs managed by our Quality group. We also provide multiple training sessions focused on varying levels of experience. We assign our EVM reps to all program/projects requiring EVM to ensure assistance and guidance is available at all times.
- [Company] does not mitigate EVMS deficiencies
- [Customer]-ID and the contractor developed a Project Summary Report (PSR) template that is issued monthly, after the accounting month closes, and provides all of the EVMS data. The PSRs are used by the project manager, federal project director and other stakeholders for reporting and decision making. However, the PSR reports are based on how the contractor implements the earned value techniques, accruals, and actuals. This creates the possibility for errors based on how the project manager's take credit for the work performed.
- Surveillance plan and processes have been developed; All programs have been assessed using Metrics based quality review; training audits and advanced training availability
- Re-enlisting senior leadership frequent training and review of procedures. Internal surveillance. Socialization of the topic across the enterprise
- Ensure EVMS implementation team properly trains CAMS and Summary CAMS so that the CAMs are the SME for their assigned CAs. Communication by project Leadership supporting the EVMS implementation and subsequent care and feeding. Proper change control includes making changes to the baseline so that the baseline is what the project works and is reflective of the most current plan.
- Surveillances and assessments

- Variance analysis, graded approach to application of all elements of EVM based on size/scope/complexity of projects. After all the process only indicates issues with a project, the management team still has to assess issues/risk and develop solutions based on the risk analysis and a detailed understanding of the project. Don't overwork the financials.
- EVM focused competency and career development, EVM Stakeholder and Working groups that provide constant feedback and improvement. Relationship between [project management oversight office] and projects is one of trusted partnerships to foster transparency regarding defects so they can be solved jointly.
- Start planning as early as possible.
- Actually utilizing EVM. Internal surveillance reviews & training.
- Concurrent lessons learned sessions, not just after project completion
- 1) We have an Earned Value Management Working Group in place that serves as a forum for sharing lessons learned and implementing improvements 2) We are in the process of implementing an EVMS Governance and Surveillance Office that will be independently managed by the Corporate [project management oversight office].
- Constant communication of advances and failures to ensure we learn from mistakes and highlight areas of strength.
- Create Workgroups to collaborate with ideas for improvement
- Key strategies include 1) an integrated [customer]/Contractor auditing strategy, 2) timely review and analysis of EVMS data including flaws in the data, 3) routine monitoring of progress toward implementation of system corrective actions, and 4) clear goals and expectations.
- EVMS surveillance review
- Implemented a strong EVMS Self-Governance model that includes having an EVMS Governance Board with Key Stakeholders from each area represented i.e., Finance, Projects/Programs, Project Controls, EVMS, Quality/Issue Mgt.; a Sustainability Plan that outlines what is required each year for resources, sub-plans for Training, EVMS Tools/Software upgrades/implementations, Project and Program high level CD and 6. stage gates and how that plays into staffing plans. EVMS SharePoint site where Lessons Learned, Training Material, Procedures/Instructions are housed. Weekly User Group meetings for EVMS Software. Monthly EVMS Project/Program Surveillance, Annual Self-Assessments.
- Independent assessment of EVMS processes and implementation in accordance with the [organization's regulations].
- Project Controls oversight
- Ongoing initiatives to improve policies, processes, and tools; certification and surveillance of contractor EVM system, support for contractor self-certification, training, support for Earned Value Professional certification, build and support organizations such as [organization] and [organization].
- We perform regular internal surveillance on programs to find deficiencies anywhere in the system. Minor deficiencies are corrected on the spot, major deficiencies result in the issuance of an internal Corrective Action Request which requires the violating team to perform a Root Cause and Corrective Action analysis through our formal Quality Management System. Additionally, we provide ongoing EVMS training

classes (about 12 per quarter) that vary in topic and expertise. These are used to mitigate risk in the system as new participants enter it and regularly distribute any historical lessons learned.

- EV data is assessed on a monthly basis and reviewed for accuracy to ensure proper reporting. Management ensures PMs are trained and brings in courses as needed to help educate the process and need for EV/EVMS.
- Internal Surveillance routinely
- In depth review of applied guidelines across company by EVMS specialist.
- Periodic Performance Evaluation
- An independent internal surveillance organization within contractor organizations is required to ensure on-going compliance with the EIA-748 Guidelines. Participation by contractors through [organization] to discuss/adjudicate common EVMS shortfalls & issues enables more consistent implementation.
- Monthly analysis of contractor EVM reporting and schedules to identify deficiencies in either.
- System reviews
- Hard to answer because, although we have an EVMS system description, EVMS has never been fully implemented on internal work here. The processes that were put in place years ago have not been exercised.
- Identify Process issues or knowledge gaps through Internal Surveillance, Program start up, and helping programs prepare for IBRs, JSR, or Compliance reviews. Develop a list of actions required to help the programs become compliant with the [organization's regulations], and/or help them improve/develop processes and/or tools.
- Continuing evaluation of EVMS data with Project Management to ensure that what is being presented thru EVMS is representative of the current project status.
- Coming up with metrics
- I work for [company]. We use internal Business Practices to perform surveillance on contractors' systems. Through the surveillances, we work with the contractor on recommendations for improvements and corrections discovered.
- We have [company] Teams that review the EVMSD, the EVMS processes, and artifact templates. There is always room for improvements and the organization listens to the comments of every team member using EVMS on their programs.
- Monthly Surveillance on all applicable programs with the use of CARs/DRs/CIOs as needed. Annual Self-Surveillance on the EVMS
- It doesn't. [Organization] at this time does not have a focus on use of EVM as a management tool. It has been degraded to a contract performance reporting tool. More energy is used to get out of using EVM than to use it.
- Uses a centralized data base for external and in-house EVM reporting, this data is available for the entire project team.
- Internal primary and secondary level surveillance of programs with EVM reporting requirements; qualitative and quantitative EVM metrics trend analysis, surveillance criteria calculator with weighted factors including CV, SV, EAC v BAC, TCPI, etc. Integrated baseline reviews to ensure all levels of management and appropriate

stakeholders are confident in the program's ability to execute against the cost, schedule, and technical baselines -and that the baseline is fully integrated.

- We currently provide internal surveillance that is used to identify deficiencies and future learning opportunities.
- Typically, feedback is given during reviews. This feedback is then integrated into the EVMS to affect improvements.
- Findings are documented in a Deficiency Report (DR). The DR is a systemic or limited occurrence of an EIA-748 non-compliance or a significant impact to reporting and requires a corrective action plan (CAP). Other issues may be documented in the form of a continuous improvement opportunity.
- Quality data on time
- Surveillance, data quality indicators, reviews, and leadership commitment to EVM.
- Periodic EVM training of all people interacting with the EVM system Standard data surveillance reports run and addressed on a regular basis. Periodic surveillance of the EVM system by people outside of the Program/Project. An established EVM working group where ideas and challenges are shared.
- Key Strategy #1: Do not use the terms Earned Value Management to upper management. Key Strategy #2: Demonstrate the usefulness of the data in non-traditional ways (i.e., creating a milestone schedule with the relevant timeline and overlaying the cost data from the accounting system, usually as line graphs). Key Strategy #3: Present the data in a non-inditing way (i.e., stay away from using the color red), but getting your point across when there are issues. Key Strategy #4: Each program/project at [company] goes through its own struggles and there is a constant need to "over communicate" the meaning of the data rather than getting an explanation for the variances. This leads to generalized variance explanations.
- We use EVMS metrics internally as part of internal surveillance to identify issues. Program finance is responsible for identifying and correcting issues. We have an internal CAR process. However, it is not effective enough to mitigate continue issues or prevent recurring issues of prior deficiencies. We currently do not have strategies in place for opportunities of improvement. Due to the lack of knowledge and leadership commitment any improvements are negligible.
- Submit (into a formal office system) lessons learned from Integrated Baseline Review findings
- Standard internal surveillance review process, documentation and driving actions to closures. Actions include skill development, process improvements, tool improvements. Recurring certification training structured similar to PMP certifications.
- Project Managers oversee their work
- Early adoption. Clear structure and communication.
- [Organization] membership feedback. Corporate knowledge and experience.
- Our success in the implementation of EVM systems has been to manage the personalities of the stakeholders.
- Effectively integrate a project’s work scope, cost, and schedule into a single PMB - Reliably track PV/BCWS, EV/BCWP AC/ACWP - Provide performance measurements against the PMB - Provide means of maintaining the integrity of the

PMB by identifying, reviewing, approving, and incorporating changes in a timely manner - Provide reliable information necessary for trend analysis and evaluation of estimated costs based on performance used to predict future performance and arrive at an EAC - Provide a sound basis for problem identification, corrective actions and management

- Internal tools development which helps Program Management and EVMS analysts to pro-actively manage programs.
- System surveillance reporting with documented results, best practice identification, and corrective action processing and tracking
- Defined metrics Data traces CAM Interviews EVM Staff Interviews Program Management Interviews
- EVM Classes
- As a consulting organization, we interview those in various levels of an organization looking for consistent responses that provide a smooth flowing story of how the organization uses their EVMS.
- Usually provide training to staff.
- Since we are a [customer] agency, our agency does not have an EVMS.
- Monthly scorecard. Participation by compliance organization.
- Investment in resources (program analysts, budget analysts, and schedulers) to perform adequate analysis.
- Integration with the Site Surveillance Officer and the Project Control Functional Manager throughout the business rhythm. Continual feedback to the project team for areas of improvement, data quality and other lessons learned to effectively implement the EVM system.
- Well defined guidelines and standards. EVMS certification (compliance with standard) requirement. Contractor self-governance supported by [customer] organization and contractor work group.
- Include incentives in contracts for timely accurate data input so that EVMS output is an accurate reflection of the project's scope, cost and schedule.
- Meetings with the client to help them understand the impacts of their guidance from an EVM perspective.
- Scope definition has been a challenge for the [X life extension] project. Also, a change in the Architect-Engineer during the project has also been a challenge. The opportunity for improvement is resetting the baseline, lock in scope, and work towards a performance and cost baseline and schedule to keep the project on schedule and under cost.
- Surveillance will be based on metric results run with the contractor’s data. The data is an output that should demonstrate effective implementation of the processes and tools identified within their System Description (SD) and in compliance with the EIA-748 guidelines and the EVMSIG. SD evaluation is detailed in Business Practice 2, “System Description Review”, however metric trips and follow-up may identify the process as described as ineffective or deficient in meeting the intent of the guidelines and requiring corrective actions to remediate the issue.
- Conduct worksite assessments or management assessments.
- Training

- Experienced professionals (EVP certification) -experience implementing a system, not coming on a program or project in the middle. Implementing from the start of a program is creating the process, documentation etc. -experienced schedulers that are [familiar with] the GAO 14-point assessments and the project scope -reviewing programs through integrated baseline reviews and surveillance reviews to ensure the program is following policy.
- We conduct EVM System internal and external surveillances with outside EVMS SMEs and conduct individual project reviews with PM SMEs.
- We are currently in the self-certification phase-We report EVMS metrics monthly. We do not have CD2 approval currently, but working towards it.
- [Company] EVMS center runs metric on programs to cover 32 guidelines. During the surveillance events we discussed the shortcoming of the EVMS system and our observations. [Company] plays a vital role ensuring the contractor's EVMS system is validated and constantly have data integrity. [Company] Earned Value Management Center issue corrective action request (CARs) and Continuous Improvement Opportunities (CIOs) for the defense contractors to make sure EVMS provide accurate data and predictive analysis for project controls.
- A key strategy of [customer] is to conduct EVMS surveillances on an annual basis to identify deficiencies and opportunities for improvement.
- Hiring experts in EVM, assigning appropriate priority to EVM
- Formal EVMS surveillance for larger projects; IPT review and oversight for smaller ones.
- The ho-ho test is used and administered often regarding system output against tangible performance.
- Constant monitoring and an EVM manager that maintains a proactive approach to EVM innovation.
- Audit
- Routine surveillances
- Communication, training and repeat training.
- Integrate review process with the project Corrective Action Management Plan. Establish a Surveillance Plan
- Self-identification and corrective Action Plans
- We provide Control Account Manager EVMS training each year and sometimes multiple times/year, which allows not only CAM's, but also project personnel that contribute to the project planning and execution. Processes and procedures are always challenged and/or updated based on customer/contractor engagement and or efficiencies realized that maintain EVMS standards in conjunction with 413.3B and contractor required documents. There is also a yearly EVMS surveillance conducted for procedural compliance.
- Firm deadlines for CAM input. This applies to IMS updates, BCRs, VARs etc.
- Use of experienced external review teams or consultants to periodically identify gaps in knowledge, practice or application and to identify corrective actions.
- [Company] has incorporated into their Code of Ethics and Project Controls System Description the concept of Current, Accurate, Complete, Repeatable, Auditable, and Compliant (CACRAC) data and information, allowing all stakeholders to make

informed execution decisions. Current As agreed to or directed, such as time now, end of reporting period, or a predetermined specific period of time. Unless the data is current, any use of the data to reflect, project, or trend will be yesterday's news. Current is the lynch pin of each of the other characteristics. If your data and information is not current, there is no need to worry about accurate, complete, repeatable, or auditable. It would be better to start over. Accurate Without error, mistake, miscalculations, or anomalies. If the data is not accurate, there is no need to be concerned about current, complete, repeatable, or auditable. It would be better to start over. Complete Comprehensive, all inclusive, total, or entire. If the data is not complete, then current, accurate, repeatable, and auditable do not provide the intended value because you are not seeing the entire picture. Repeatable The ability to reproduce current, accurate, complete, and auditable results. If the process is not repeatable, it cannot be demonstrated, or validated, nor can deficiencies be pinpointed and resolved. Auditable The ability to trace the source through the entire system/process to validate the results. The inability to audit data or information places both the process and results in an indeterminate status with respect to data/information credibility/trustworthiness. Compliant Demonstrated as meeting the Current, Accurate, Complete, Repeatable, and Auditable characteristics (above), and meets specific requirements of applicable governing policies, requirements, procedures, guides or practices.

- Self-assessments, independent reviews and audits.
- Hire effective consultants
- Review of EVMS data month by an independent project team to validate accuracy, performance of annual self-assessment of the continued compliance of EVSM with EIA-738 32 guidelines, implementation of central EVM technical authorities that overview project EVM related efforts to support their continued compliance.
- EVMS compliance team, surveillances, management questioning
- Our organization has an independent office that programs/projects can rely on to help with contract set-up, formulation, planning, scheduling, EVM implementation, analysis, and independent assessments. In addition, our organization is implementing surveillance and running data quality indicators and will begin these new responsibilities in FY2020.
- 1. Compliance and Surveillance Reviews 2. Engagement with Contractor Stakeholders – [organization] 3. Engagement with Programs in [organization] as an external [project management oversight office] to focus 4. Providing SOP on how contractor will be evaluated 5. Provide several guides 6. Engage with [organization] on what is reported - impacts Congressional Language 7. Member of NDIA to update and improve EIA-748 8. Sponsor this study to gain better understanding of what is and is not effective.
- To identify EVMS deficiencies, expert review is a common strategy. However, expert review can and often results in differing opinions of compliance and sufficiency of intent. Given an EVMS is simply a set of accepted practices based on a set of guidelines, differing opinions should be expected. However, to be effective in mitigating EVMS deficiencies, strategy must include robust communications of issues, concerns, and challenges between those having responsibility for

implementing/taking advantage of opportunities for improving an EVMS and those charged with identifying deficiencies.

- Certain divisions have EVMS Maturity Assessments, however these are not widely utilized, although they may in the near future. Internal Surveillance (to include EVMS) is conducted on program that have formal [customer] regulations requiring EVMS and/or those that meet certain thresholds associate with the companies Life Cycle Management Processes. Program Performance Reviews are held that contain certain data points that can be used to assess maturity levels. Discussions are ongoing to determine a best practice as it relates to areas of maturity that may not be picked up by EVAS yet reflect a particular level of maturity within a site.
- Root cause analysis
- Cold and hard independent eyes external peer review opportunities for internal assessment and encouragement of the sometimes difficult but always helpful conversations fraught with creative tension on both sides. Most of all, a strong institutional sense of integrity and respect for stewardship of the overall [company] mission.
- 1. EVMS surveillance 2. Monthly data review and analysis of the EVM reports and IMS 3. Monthly metrics reported to senior management forums which drives more questions which leads to more action by the project and EVM analysts.
- Our continual EVMS Self-Governance and Surveillance approach is used to identify deficiencies, and our EVMS Governance Board is used to establish the assignment of mitigation actions.
- Independent assessments; guidance and assistance; frequent communication with all stakeholders
- We do internal audits as least yearly of program data and implementation of the 32 guidelines. We also review policies and procedures yearly for any necessary updates. We review all contracts with EVM requirements to make sure they are a good fit for EVM implementation and execution. We also make sure the Customers are engaged and understand their role in EVM compliance and reporting.
- Consistent & frequent oversight activities to ensure rigor and continuous EVMS compliance
- A key strategy is to ensure the EVM System remains compliant to the EIA-748 standard. In [organization], metrics are available monthly to identify areas of concern so the contractor can take action to mitigate deficiencies by review and continuous improvement strategies.
- Internal Surveillance, Management Observation and documentation, Research and financial investment in best-in-class tools and processes, employee development and retention.
- [Company] uses self-governance to identify compliance concerns with the CACRAC Concept...Current, Accurate, Complete, Repeatable, Auditable, and Compliant in assessing its processes, to identify Opportunities for Improvement (OFI's). OFI’s represent areas that could become compliance concerns if left unattended. Conversely, when OFI’s are resolved the overall health of the [company] EVMS is strengthened.
- Certification, compliance and surveillance reviews conducted at regular intervals.

- Monthly reviews of the EVMS data are performed. Annual reviews of the EVMS are performed with anomalies reported and tracked to closure. A cadre of checks are performed monthly during the data processing within change control, the schedule and the cost data, these checks are automated with a manual review performed if necessary.
- Regular surveillances with both internal/external staff that are empowered to identify strengths and improvement areas. We also focus on what the Project Manager needs to help manage his program, not what the program needs to enhance compliance.
- Frequent data driven testing; peer-peer communications.

Appendix C. Raw Results of Open-ended Question #23
(Other Thoughts about EVMS assessment)

- Leadership accountability is a factor in the maturity of a system.
- Without senior leadership buy in, formal endorsement, and promotion of the EVM System/Process the full benefits of the system are unattainable.
- The Current Execution Index (CEI) has proven its effectiveness across multiple sites where I have worked. I have worked to build out a template that captures the concept, happy to share. I believe there are other outputs that should be linked to this metric, like forecast volatility. EVMS maturity by organization/project is a very interesting factor to me. EVMS Certification is the sought-after badge of approval for an organization/project. I'd like know if there are any initiatives that introduce a similar badge offered by a Learning Management System (LMS), software specific. Different from EVP Certificates, a comprehensive, agile, and ongoing Earned Value LMS would allow 'sponsors' and users the ability to connect closest. Future implementation would be able to identify appropriate software and build off successful use cases or eliminate the high cost of a system that is destined for disaster. In hopes of feedback on these comments, please feel free to reach out anytime.
- Ensure proper training/certification programs. Ensure that programs are set up correctly at the beginning (right level of management control points). Collaborate with the customers re: CDRL content (tailoring, etc.) Current environment internal surveillance resources are tied up with processing/tracking metrics to support customer process compromising ability to provide independent critical advice/follow-thru to programs.
- [Organization] faces a fundamental problem that most of its budget is tied to 050 dollars. Until it begins to effectively adapt common standards with [organization] to include adequate cost reporting standards, it will continue to be judged deficient and never be adequate.
- With having an approved EVMS by [company], I would be curious to see how mature our EVMS is by your toolset
- People keep saying EVMS is a standalone beast. It is a best practice to obtaining good data for decision making and is part of a well-executed project where you plan the work, execute the work, measure the work, report the work and then make tweaks as necessary...standard business!
- EVM and associated reporting should follow guidelines and be tailorable to reporting to manage to level of program risk (more or less information, depending on contract risk)
- Unfortunately, EVMS is used as a performance metric instead of a project management tool which can lead to contractors "gaming" the EV data. EVM is a management tool, and not a grading system
- Current Execution Index (CEI) has proven its effectiveness across multiple sites
- Ensure proper certification/training programs
- Include adequate cost reporting standards
- It is under-valued as a key to successful project management

- Realistic planning is the key for EVMS
- EV is a useful and powerful tool for managing projects and should be used earlier at [organization] in the project lifecycle.
- Any assessment of an EVMS needs to have a strong focus on schedule and schedule management
- Sometimes a graded approach is more appropriate than full implementation; however, standardizing this graded approach ($ level etc.) is sometimes difficult. Documentation for % complete earned value technique can be difficult leading to the use of more 50/50 techniques which sometimes make real progress determination difficult and produces false variances.
- With the new [company] data driven process (DECMs), there is a need for data scientists, database administrators, coding language knowledge. This is a skill that is lacking in the [customer]. We need to do better at data management, data processing etc. Making sense of lots of data and being able to draw conclusions is the way of the future.
- The EVMS Compliance evaluations work best when there is good communication and data sharing. It is also beneficial for the Contractor EVMS Compliance representatives to be separate from the programs as if they are an outside entity performing their own business system compliance.
- The one we have here is far too cumbersome to be of much use. Even simple change control consumes dozens of hours of time. Most EVM technicians are simply data entry people, with little to no understanding of the actual work they are scheduling. Consequently, PMs spend massive amounts of time to feed information to the analysts.
- The use of the EVMS beyond a tool to help manage the project can lead to a lot of non-value effort.
- We use the basic project earned value concepts for management of a large, complex program encompassing several organizations and contractors. The IMS we've developed is used to plan, track and get early warning for elements of the program that may be falling short of the planned progress/cost.
- The use on an EVMS at the program and portfolio levels by defining, measuring and utilizing earned benefits.
- Planning, planning, planning. EVMS requirements should be conveyed to IPT personnel early in project. Control Account Managers are not always well versed in EVMS review and reporting requirements.
- It can be quite useful to manage a program, but the numbers are just numbers. You need to dig into them to really understand what is going on.
- EVMS should be a byproduct of good Program Management process.
- It's a question of attitude, but also an issue of introducing new ideas into an area that is happy to keep time stuck in 1997. Regarding EVM systems, there is a resistance to new technologies, which exacerbates systems deficiencies (such as timeliness of data), and which provides grist for mill for critics of EVM. Regarding EVM in general, there is a desire among management to avoid accountability. There is this dangerous attitude-oftentimes now repeated among [organization] PMs-that cost is not so much as important as schedule, since the impression is that their programs are

so important that Congress will fund anything they need as long as they deliver (though they tend not to deliver on time either). EVM and EVMS standards have evolved and been adapted to business processes. Yet, we still find critics using arguments from the 1980s. Finally, the paradox of the EVM community is that it is moving toward greater degree of insularity in a circle-the-wagons type of reaction. Some of this is encouraged by those, such as consultants and subcontractors, who financially benefit from that condition. But this also cuts the community off from the larger trends of affecting PM, especially in the areas of big(ger) data, which subsume EVM, and so provide senior business management with greater opportunities to obtain necessary information faster, cheaper, and more effectively than EVMS stovepipes.

- Difficulty getting project managers to embrace the philosophy without taking license or shortcuts Improved management of change. by better up-front planning, reduce the number of 'regular' correcting BCPs to fix plan deficiencies Be event driven not schedule driven, get the facts straight, then execute
- EVM Has been weakened significantly by industry, the [organization] needs to push EVM back to a priority on their contracts
- All of the concerns with EVM implementation were very relevant. EVM is not the sharpest tool in the shed for R&D programs. Culture and implementation improvements are very important to creating a more effective tool.
- EVMS assessment - as read means to me the current state of audit which is not value-added and has largely led to the erosion of trust in the value of EVMS. A future state model for quality within EVMS must fight to resolve the challenges that emerged around the current climate of compliance which does not well-focus on value-added processes that enable projects and program team members to effectively meet their missions or make decisions. A thinner, intent oriented view of compliance, as well as a 'bare minimum' view of the value proposition around EVMS needs to be considered. EVMS is otherwise doomed to winnow in its current form - and rightly so. The domain is not able to effectively meet the need for responsive and cost-effective managerial decision support
- Without senior leadership buy in, formal endorsement, and promotion of the EVM System/Process the full benefits of the system are unattainable.
- There are too many regulations, guides, and documents that need to be adhered to and keep up with. Combining some of these would make it easier for everyone to keep up and understand what is required.
- You should reach out to those institutions that have been having project success (on time & on budget project deliverables) and find out what is working for them.
- Experience of Internal process team is very important in order to provide guidance to program teams.
- The SOWs are written poorly. The sponsors are incentivized (or at a minimum not held accountable) to hide scope growth, schedule slip, or cost growth. CAMs are incentivized to perform research as a part of the project, which leads to new processes being developed (cost growth and schedule slip) instead of using the known processes that were proposed. CAMs fail to limit their scope to just the proposed parameters, but instead execute the scope with higher analysis and testing,

such as loads, limits, variation resistance, confidence levels, and every other parameter you could identify.

- Deployment of EVM on projects is just as complex as projects themselves but the practice is necessary to ensure clear and accurate goals are understood by all of the stakeholders. Simply tracking a project cost against an expected budget without an understanding of accomplishment to determine what work is left and how much it will cost is and has proven to be disastrous for projects not in tune with its requirements.
- Implementing EVMS on a program is a proven best practice for managing and reporting program performance. However, the burdensome compliance requirements driven by the lower-level interpretation of the EIA 748 guidelines (EVMSIG – [company] EVAS/oversight) has shifted the focus of the EVMS from providing management value to a focus on compliance. The inflexibility & lack of scalability in those interpretations have added cost, reduced value and disenfranchised program leadership from taking advantage of all that an EVMS implementation has to offer.
- EVMS should be judiciously applied in the appropriate applications and projects. Some activities do not require rigorous EVMS programs.
- [Company] is unique that they consider a certified EVMS at the program level (for non-construction programs). Because multiple programs exist on a site, we should be conducting surveillance and compliance at the site level. The argument from [company] is that they want to maintain flexibility and scalability. However, this may result in EVMS implementation inefficiencies.
- I always say: "there's no such thing as a perfect EVMS." The maturity model should not strive to make a perfect EVMS, but rather an EVMS that can produce timely, reliable, and useful information for decision making. At some point, the strive for perfection can cause diminishing returns on investment. We need to be smart about how hard we press for that highest level of maturity. Thanks for your efforts on this project! I'm excited to see the outcome.
- It is too complex. Relevancy to new methodologies is a challenge (we try to apply the same old way of doing EV to newer methodologies like DevOps and negate the efficiencies that could exist)
- Must be flexible and scalable to adapt to various program requirements.
- A properly setup EVMS in any organization with the right support from management (and key stakeholders) with buy-in from all the project team members will ensure the successful implementation and outcome of any project.
- EVM is ONLY one method for managing a project...and in cases with a lot of changes it is NOT the best method as it takes more to maintain the system than management gets out of the system. More data does not make a system better!! It is the right data at the right level, and this varies by project.
- Please don't take out the human element out of assessing the health and maturity of a site's EVMS. While I understand the need for using software and system's generated data for quickly evaluating the health and maturity of an EVMS, having a committee of experts come on site and review the system is invaluable for so many reasons. Most of all, the human element allows for being able to communicate and

understand the reasoning behind usage and implementations of EVMS that may not appear conventional by just assessing an EVMS data dump.

- Maturity of the EVMS will be new to many. It's an interesting approach to looking at the system instead of just focusing on compliance and audit.
- The lack of surveillance leads to inferior data quality
- EVMS is overly prescribed and may be required by Federal [organization]when it is of lesser value than less complex system. EVMS should be tailored to the type of work and length of contract rather than as part of terms and conditions in a contract.
- The survey provides a definition for EVMS accuracy (i.e., EVMS environment). After reading the definition, it occurred to me that it reflects the dictionary definition of "credibility" better.
- The cost reporting system currently in place is so onerous and slow that project managers are often working with data that is typically 2-3 months old, and sometimes even older than that
- EVMS is a tool, not a way of life. If the team is forced to focus too much on this tool to avoid "findings" and not enough on the day-to-day execution of the project the plane will still crash but you will be able to document exactly the path it took to the ground.
- Most companies struggle with self-assessment of their EV management systems against the expectations of the review authority. Independent assessments should be performed to preclude those "tradition biases" from giving a false sense of compliance with requirements.
- In my experience, one challenge is to implement the correct Earned Value techniques during the development of the Performance Baseline. How do you implement a process to measure performance (i.e., level of effort, percent complete) that will provide you with accurate information during execution for decision making?
- A Properly implemented EVMS is the only way to ensure valid trusted data which is required for efficient and profitable program execution.
- To be effective EVMS must take extra care to limit the amount of LOE on all projects. LOE is the bane of an effective EVMS because when it is excessive it destroys effective SV analysis. SV is half of the benefit of an EVMS. Should never under any circumstance exceed 25% of the total cost of a project.
- Cost versus benefit is key to application on a project. WBS development is critical to success of adequately measuring progress.
- EVM is essential. Occasionally too much time is spent on 'absolute' reading of guidelines, intent and striving for perfect-imperfect data. The EVM community needs evolve scalability and be okay with adequate data
- In federal workspace, cost reporting should be reconciled monthly with the accounting program of record. Failure to comply jeopardizes the accuracy of all At Completion calculations
- EVM language is inconsistent. If you ask 5 people the same question about EVM you will receive 5 different answers. The language means different things depending on where you are using EVM. Therefore, this makes the output unreliable and difficult to sell to management. Very confusing topic. For example, the ways you take EV, 50/50. LOE, etc. means something different to people who implement

EVMS. So how can you rely on this to tell you how well a project is performing. Garbage in garbage out has been my experience in trying to get programs/projects to effectively use EVM. My experience has been Projects see EVM merely as a reporting tool, not anything else. It is merely a check the box exercise, not used for anything else.

- My one concern is application of the Monte Carlo simulation to determine risk-based contingency/MR on commercial engineered products. To date the approach has resulted in higher estimates than actual awards. Yes, the simulation is dependent on the quality of risk inputs and their associated cost and schedule impacts. While our EVMS is in its infancy, working out these details is critical to accurate cost estimates.
- I have participated in so many EVMS reviews for [customer] EM contractors. I had also participated in developing similar thing for project, not just the EVMS. Based on my personal experience, I think the tool you are developing can only be an "assist" tool for contractors and review teams at certain point/stage of their projects.
- It is critical that the contractors have strong backup with the [organization] entity they are supporting for implementing EVM in a compliant manner. Contractors need well defined requirements in their contracts regarding the implementation of EVMS. Local [organization] that interfaces with the Contractor needs to also believe in the importance and value of EVM.
- It can be junk in and junk out. It almost always seems to me it’s an issue of not planning something properly (time, scope, cost, effort). This can be hide for quite some time and eventually is too late to do anything about it. Yeah, you know what your metrics are but the impact may have already happen.
- The promise of an effective EVM system is that performance can be measured and assessed; adverse trends can be identified and corrected, etc. Tools are improving. However, in my opinion too much time is spent working to get good data into the system. It requires a lot of discipline at all levels. Data can be manipulated. Actual analysis of performance is often minimal. It would be great if someday the paradigm shifts to where we routinely see high quality data, allowing for more robust analysis, management, and control.
- Institution cultural adjustment to a new framework and approach remains a significant challenge due to the inability to properly integrate operational pause within the mission space to properly implement and validate systems in a complex enterprise.
- The advent of automated testing protocols for assessing EVMS compliance has created a common "test" that all EVM systems are assessed against, and has streamlined the assessment process. All contractor EVM systems are evaluated using a comprehensive, common set of attributes (and tests) that enable a more rapid and complete evaluation than was previously available. The key to effective implementation, maintenance, and use of EVMS remains management support, from the top down, through all levels of the organization
- It sounds great. I don't think my workplace would rate highly however.
- Customers need to also abide by DID requirements and the 32 Guidelines in order for the Contractor to implement EVMS properly. If the Customer does not follow standard EVMS requirements or DID requirements, it makes it more difficult for the Contractor to implement EVMS compliantly.

- This Survey is really geared towards contractors. It may be helpful to create a version geared towards how the [organization] EV Center performs its duties and policies.
- This is my personal thought is that Agile is the new buzzword to the costumers that seem to think that some of the EVM processes can be circumvented.
- [Organization] needs to watch having too much process and guidelines that are really prescription on how to manage the project. I've done work with [organization] vendors that spend a lot of time having a EVM SD and Procedures, but they are not really using EVM as a performance management tool.
- To better sell EVM, a stronger emphasis needs to be placed on the programmatic benefits rather than a compliance perspective. The appearance of complexity of EVM deters many, while the benefits of integrated cost and schedule with risk and resources goes beyond just compliance. Simply put, too much gets lost in translation and it hurts EVM implementation.
- My dissertation integrated systems engineering principles with the capability maturity model to create a framework for assessment of performance management systems. The technique may be useful to the one you are following for EVMS maturity.
- EVM is a truly powerful tool for managing programs/projects. The biggest hurdles that effective use of EVM faces is a lack of management support (usually based on not really knowing/understanding what EVM is) and not being set up correctly to give the level of analysis wanted by management (often driven by being setup late in the project).
- There should be an in-depth understanding of the unique funding, funding sources and accounting practices at [organization]. These will help guide the team in their understanding of some of the challenges implementing Earned Value Management at [organization].
- Earned value is seen as finance function. EVAS is an exercise for scheduling and cost management only. EVAS does not help identify program issues and continue changes to metrics and interpretation are difficult to manage. Leadership lacks any recent program experience continually makes poor decisions related to EVM and tools. We do have the right toolset but have setup the toolset up incorrectly due to lack of knowledge. Lack of knowledge on WBS development creating more data than necessary to execute the program. Large data sets are difficult to maintain and create more compliance issues. Culture does not believe earned value is necessary to manage a program. Due to the fact that leadership has not owned it and they do not have experience in it. Many program managers and CAMs lack any earned value management experience but are still able to obtain high level roles without this knowledge. We do not have participation from other functions like supply chain or contracts
- Companies need to support and enforce accountability, staffed adequately.
- EVMS has always been less than fully embraced by contractors as this is a management by exception system (using thresholds for reporting purposes) which tells them what they are doing wrong (breaching thresholds).
- On larger projects with fairly well-defined goals EVMS as currently used is excellent. However, for small R&D type projects where the outcome is not fully

understood EVMS tools have limited opportunities to be used. Another area for possible exposure for EVMS is to be part of a first-year engineering school curriculum.

- Properly using EVMS data is more nuanced than most people think.
- EVM assessment teams are like a box of chocolates, you never know what you are going to get. In my experience, there is a tremendous difference between an assessment team with individuals that have actual work experience, and those that do not.
- As a Federal Project Director, I would be interested in learning how to operate the software that is utilized to EVMS. I do see the value in Earned Value Management. It is a useful tool to show the customer how well the project is being performed.
- All of the EIA-748 32 guidelines are important, but it has been my experience that cost and schedule integration, scheduling, and accurate updated EACs is where most deficiencies seem to occur. Other areas of concern include QBDs that may not be predetermined, and improper use of EVTs (improper use of % complete, when 0/100 or 50/50 is more appropriate).
- EVMS is helpful if you are building a wall where you know the height and length of the wall and the speed of the bricklayers. However, EVMS in the [organization] is frequently applied (or required) on complex projects where it isn't warranted or helpful. As a result, some Top Executive gets to check a box that states that "we manage well, because we use EVMS", when in reality, the numbers are largely meaningless and don't give an accurate picture of what is going on. If Management doesn't like the numbers, they bicker and complain, and if they do, they may have a false sense of security. Either way, very few projects I have managed are helped by EVMS, because of their level of complexity - and don't tell me it’s just a matter of not breaking down packages into small enough units to track, because that is not always possible to easily do, and still doesn't do it. Also, some methodologies count the packages as done when you open them, and others when you complete it, management doesn't always account for that.
- The [organization] utilizes EVMS on their capital project but are very limited on their operations activities
- If done right it's very helpful, but a lot of people don't see the value
- One of the BIGGEST problems with EVMS and one of the BIGGEST reasons it gets such a bad rap is because of customers, stakeholders, senior managers who beat up project folks because they are "red" or "Yellow". This should NOT happen UNLESS the PM or respective project team does not understand WHAT the problem is and HOW they will attempt to recover. EVMSs simply provide customers of the systems OBJECTIVE data on how the project is doing and if they continue performing as they have been, where the project will end up.
- Curious if EVMS is beneficial on a project that has Firm Fixed Priced (FFP) construction contracts. In this case, the risk is on the contractor as opposed to the [organization]. Does it help to track earned value on this case?
- I feel that every contractor shall have internal control team runs [organization] metrics monthly to check the status of their system.

- EVMS is intended to be a tool that fosters good decision making based on clear and accurate data by PMs. Implementing EVMS in a dogmatic fashion can hinder its effectiveness and make it a hurdle rather than a tool. Every organization is different and EVMS needs to be somewhat fluid to be adapted to the specific organization's needs.
- Technology can be its worst enemy
- Current EVM culture throughout the [organization] complex is too focused on looking backward at what has occurred, versus using EV data to better predict project performance which would result in less variance. Additionally, current EVM culture includes no human factors in the prediction and reporting of project work, such as using known judgment and decision-making sciences, forecasting and prediction sciences, and risk and uncertainty sciences, which could be addressing issues such as optimism bias, deliberate ignorance, etc. The human brain is an information processor, and the systems and processes have not been designed to account for and correct the common human information processing errors.
- Periodically bring in 3rd party consultants Collaborate with industry
- EVM, Agile development, and [organization] Contracting practices are out of sync with each other. If Agile software development is the preferred method, updates are needed to the EVM standards and the Contracting expectations of the [organization].
- Again, "Accuracy" is only one of the attributes of "Maturity" and "Trustworthy" data and information. "Accuracy" by itself is not enough...the data and information must also be Current, Complete, Repeatable, Auditable, in order for it to be compliant. Compliance cannot be determined unless you have all five of the attributes Current, Accurate, Complete, Repeatable, Auditable...only then can you evaluate for compliance.
- You need to have and to utilize the process, system, and tools consistently and as a normal part of the project (each day).
- The biggest challenge with effective implementation is the customer's knowledge and attitude towards EVMS requirements and the lack of incentives for contractors to produce valid, accurate, and timely information.
- To be mature, EVM has to be used by Project Managers and Senior Management as it is intended, a tool to help manage projects to success and thought of as one part of their job responsibilities versus a nuisance that takes them away from "their real work" and that we only due because our client says we have to.
- The goal in our organization is to improve the reliability of the EVM data, so that our project managers can utilize this data to make critical decisions during project execution. I feel if we can improve the usability of schedule and cost data that we can in turn change the culture within our organization.
- As a tool, EVMS leading to performance reporting, earned schedule, and forecasting is an effective tool when used by management and leadership through the workers on a project or program.
- EVMS assessment is an imperfect activity. Responsibility for assessing written procedures that make up an EVMS and compliance to a set of guidelines that are interpreted differently is done at the risk of personal interpretation, preference and results in significant variation between reviewers, agencies, consultants, and industry

practitioners. The challenges of EVMS assessment are enhanced by individuals and activities ([organization] and industry) who hold great authority and power to make an EVMS assessment. This power, along with a lack of industry-wide/[organization]-wide agreement and/or consensus on the interpretation of EVM Guidelines, often results in grave disagreements that can cost time, money and are resolved only by satisfying one reviewer's opinion; overtaking the value intended from having a set of guidelines for the planning and control of projects. While a maturity model is unlikely to solve the issues identified above, an EVMS maturity model that is accepted and/or supported by [organization] and industry should enable an improved approach to EVMS assessment.

- EVMS and Project Control are often used interchangeably yet they are not synonymous. EVMS should be about how it can be used as an effective integrated performance measurement tool in support of effective real time program execution instead of a purely audit based tool combing through a program's history to determine compliance. Compliance is not Maturity and Maturity may not be Compliance. A benefits analysis of the output of a mature EVM System and its direct impact to program success, is more important than ensuring 130+ metrics are checking a compliancy box for an independent assessor, when it's possible to be as successful if not more when less than 100% compliant.
- Any EVMS is only as good as the people using it to do EVM. I worry about this being a process thing, instead of a process clearly in service of outcomes. An EVMS that is judged Mature that fails to improve project delivery outcomes is a failure. An EVMS that supports a mature EVM approach that in turn enables better project outcomes is mature.
- The two questions that Senior management, PMs, analysts etc. want to answer are: 1) how much is it going to cost, and 2) when will it be finished/delivered? A well-functioning management system will provide data to answer both of those questions. EVMS is the [organization]'s method for trying to force suppliers to develop and maintain management systems that can answer those two questions and protect the taxpayers' dollars.
- Would be excited to see how a graded approach could be implemented using a single EVM System, given the [organization] Acquisition strategy of IDIQ contracting, and how EVMS can continue to provide the best value in supporting project management to be successful.
- Too often the assessment is based on one auditor's opinion on if you meet the intent of the guideline. And depending on the auditor you get a different result.
- Maturity could be an insightful indicator of EVMS compliance; however, it could not be considered the only indicator of EVMS compliance.
- Assessment of the EVMS should be a shared responsibility, in that the contractor has a contractual requirement to remain compliant, and the [organization] has a responsibility to provide oversight.
- Maturity and Accuracy. Are we singling out "accuracy" for a specific reason? As part of FEED MATRS? "Accuracy" only matters is only effective if the data is both current and complete. "Maturity", however can stand on its own as a measure of the degree to which the implementation of the other attributes (current, accurate,

complete, repeatable, auditable, and compliant) are effectively established within the EVMS

- Survey is good but seems a bit superficial. Consider questions that target EVMS best practices, implementation efficiency, and possibly improved project delivery outcomes as a result of EVMS.
- Important to success: Having the appropriate requirements on contract, having stakeholder advocacy with a well-defined and documented system with the fewest touch points to avoid data and information handling errors. Having the appropriate authorities and accountability.
- Behavior is a function of the individual, and the environment. If an individual (person, team, dept. project, or system) is in an environment where they are being measured, they will behave accordingly. SPI and CPI are systemic measures designed to induce a particular behavior. A poorly thought through assessment looks at the outputs, and whether they convert into appropriate decisions. However, the SPI and CPI are just the 'effect'. It is more important to measure the cause. So, a system that is being measured by HOW well it applies the rules of EVM, will also respond accordingly. It is better to routinely do health checks on application of EVM principles, or better yet, measure the system by whether it is doing its own health checks on a routine basis - focus on application, not on the result. (i.e., Cause, not Effect).
- Planning is the most important part of implementing EV project. It requires EVMS understanding by the business team as well as the CAMs. PM team's commitment to maintaining the project plan's integrity and using the monthly EV data to manage the project ensures that the EVMS produces well-controlled projects.
- I believe the term EVM is a "threatening" term in our environment. Resource loaded schedules could be seen as a less "threatening" to [company] (very linear, low risk, utility construction. No R&D, very few unknowns; outside of [organization] type risk events).
- Graded approaches to EVMS are important.

Appendix D. IP2M METRR Research Team
(2019-2022)

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