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Integrating Risk Management with Earned Value Management

A paper summarizing a study of the current status of the integration of risk management with earned value management and recommendations for further actions. This study was conducted by the National Defense Industrial Association Program Management Systems Committee's Risk Management Working Group

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Introduction

In the mid-1990s, process ownership for Earned Value Management Systems (EVMS) began a transition from Government to Industry. The movement gathered steam in 1998 when industry developed and published a standard, ANSI/EIA 748-98, Guidelines for Earned Value Management Systems. Leading companies began using EVMS to manage their programs in accordance with this standard, both when company policies indicated EVMS must be used as well as when contract requirements mandated it. In many cases, suppliers use EVMS to manage all work, including their commercial business, scaling the application as appropriate given contract type, contract size, and duration.

Subsequently, the Department of Defense (DoD) adopted the industry standard in lieu of longstanding regulations to determine the acceptability of a supplier's EVMS process for use in managing Government programs and for ensuring continued acceptability via ongoing process surveillance. Other agencies soon followed suit. Recently, the Office of Management and Budget (OMB) imposed the use of EVMS for all major Federal Government acquisitions. OMB defines an acceptable EVMS as one that meets the guidelines in the ANSI Standard 748, current revision.

Earned Value Management is a proven process that has become widely recognized and accepted for managing programs. It provides early insight into developing trends, indicative of both problems and opportunities, that allow a program manager to focus attention where it is needed and to develop and execute corrective action to enable the fulfillment of technical and contractual requirements by objectively measuring the program's cost, schedule and technical progress.

Cost and schedule growth have been persistent problems in DoD for decades, and many would argue, have always been. Cost growth has been variously cited as being in the area of 20-30%[1] when adjusted to correct for quantity growth and inflation. Schedule growth has been cited as being in the neighborhood of 30%.[2] Both of these outcomes are clearly undesirable, as they show an insufficiency of forecasting, determining and mitigating risks, be it in cost or schedule.

The disciplines of EVM and RM emerged to address the problems of cost and schedule growth. Each has strengths and each has weaknesses.

- EVM is the most widely accepted discipline for the measurement of cost and schedule variances. A weakness of EVM is that it is unable to forecast the size of cost and schedule variances until their emergence, and it makes no pretense at determining a course of action; instead it simply isolates the cause of the problem. EVM can predict the estimate of cost at completion (EAC) reasonably well after

[1] *NAVAIR Cost Growth Study*, ISPA/SCEA 2001, 34th DoDCAS, R.L. Coleman, M.E. Dameron, C.L. Pullen, J.R. Summerville, D.M. Snead

[2] *The Relationship Between Cost Growth and Schedule Growth*, Acquisition Review Quarterly, Spring 2003, 35th DoDCAS, SCEA 2002, IPMC 2002, R. L. Coleman, J. R. Summerville, M. E. Dameron

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project commencement (EAC is widely believed to stabilize and be fairly accurate after about the 20% point.) To use the vernacular of RM, EVM can only help with "problems," defined in RM as undesirable events that *have* come to pass, not with risks, which are defined in RM as possible events that *have not* come to pass.

- RM is the most widely accepted discipline for the identification, tracking and handling of risks. The strength of RM is in enumerating risks and focusing the acquisition team on the handling of risk. A weakness of RM, unless Monte Carlo simulations are effectively used, is that it in practice, users often just quantify the consequence and likelihood of risk. Once these are quantified, the risk is prioritized, typically in a 5 by 5 matrix, which is then divided into bands of high, medium, and low, but beyond this prioritization, the likelihood and consequence are typically not used. Additionally, risk management is not always applied across the entire program, is not "rolled up" thereby not providing an estimate of the overall programmatic impact of the risks on the baseline program.

What is clearly needed, then, is a linking of EVM and RM methodologies. The ideal situation would be a unification that drew upon these disciplines and was able to forecast the size of cost and schedule growth, in order to allow informed budgeting and scheduling, was able to either operate in conjunction with RM or effect a turnover to RM for identification of risks and the formulation of mitigation plans, and to rely upon EVM to ascertain the emergence of the risks (both "known unknowns" and the unavoidable "unknown unknowns"). Recognizing this, the National Defense Industrial Association's (NDIA) Program Management Systems Committee (PMSC) decided to address EVM in the broader context of integrated program management and identified several other management processes that, if properly integrated, could ensure that programs are managed more efficiently and that they ultimately achieve success in terms of their cost, schedule and technical objectives. One of these processes was Risk Management.

In May 2002, the NDIA PMSC chartered a joint Government/Industry working group to explore the integration of RM with EVM. The Risk Management Working Group's mission statement was: Engage the customer and supplier communities in the identification, collection, and sharing of requirements and processes necessary to integrate RM with EVM. During its first year, the working group developed its objectives that included the collection and sharing of best practices, lessons learned, benchmarks, guidelines and the identification of centers of knowledge and excellence. In addition, it hoped to identify the skill set necessary to successfully integrate EVM with RM.

In order to meet these objectives, the working group developed a survey to find out what program managers were doing and thinking about both EVM and RM, whether they were integrating these two processes and, if so, how they were integrating them, and what they perceived as barriers to process integration. The survey was hosted by the Defense Acquisition University (DAU) and was conducted on-line during the period October 2003 through June of 2004. The survey results, which are summarized in this paper, were subsequently compiled and analyzed and have resulted in a number of recommendations for further work necessary to improve the integration of RM with

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EVM. The working group's recommendations are presented later in this paper. The survey results will also be posted on the NDIA site and on the Acquisition Community Connection's (ACC); PM and RISK Community of Practice (CoP) sites, hosted by DAU at www.acc.dau.mil. In addition, links to the survey results will likely be posted at other appropriate sites.

Summary of Survey Results: *Survey results are summarized below by category. Detailed results, along with the results of their analysis, are available in the appendix to this document.*

Demographics of Survey Respondents

78% of respondents were from Industry, 18% were consultants, and 4% were Government employees. 87% of respondents indicated that their primary marketplace was Government rather than commercial; this response was anticipated since the survey was distributed among the membership of NDIA, the PMI-College of Performance Management, the PMI-Risk Management Specific Interest Group, and the Society of Cost Estimating and Analysis. EVM is well known and well established among these communities. Nevertheless, 41% of respondents indicated ten years or more of RM experience while only 16% said they had two years or less experience with RM. The range of experience with EVM was very similar to the range of experience with RM. More than 50% indicated their experience was with non-Department of Defense customers. Program/project experience was broad, with 45% of respondents indicating they had experience with multiple size programs. The spread was equal on the high and low ends, with 16% each indicating experience on programs greater than $1 billion and programs less than $80 million, the approximate traditional threshold for mandatory EVMS application. Respondents spanned a range of job functions including EV Specialist, System Engineering/Quality and Risk specialist, program manager, business manager, and senior/executive manager.

Results by Category

Process Ownership – Formal ownership of the RM and EVM processes resides in different functional communities. Furthermore, process champions or sponsors are usually aligned with process ownership. In the majority of responses, RM is both championed and operated by either systems engineering or the program manager. EVM, on the other hand, is typically championed and operated by the finance or program controls community. In most companies, these organizations operate as silos, with little cross-organizational communication or training. As a result, it isn't surprising that in many cases, the PM isn't using RM and EVM in an integrated manner to manage the program.

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Risk Management Process –There is wide variation among our respondents' RM processes, including the primary areas of risk addressed, the methods used to quantify risk, and the methods used to manage/track risks. The majority address technical, schedule and cost estimating risk in their RM processes. A smaller majority addresses budget and funding risk. Most qualify rather than quantify their risks using subjective assessments, with a slight majority employing probabilistic cost or schedule techniques.

A wider variety of techniques exist for managing/tracking risks. Most respondents use a Risk Management Plan, along with a schedule and regular meetings to discuss them. 61% use risk tracking software while 59% set aside management reserve for risks and develop risk-based estimates at completion (EACs). About half use variance analysis to manage risk. This means that 59% or fewer of our survey's respondents integrate their RM and EVM processes via the links of MR, EAC, and variance analysis. Far fewer, 37%, can trace their risks to their contract work breakdown structure and fewer still to their budgets, indicating that responsibility for execution of risk mitigation plans is often not assigned, at least as part of the overall plan for program execution.

When asked about the effectiveness of the risk management process, only 30% of respondents said their process predicted 50% or more of the issues/problems that occurred on the program. However, 68% agreed that there is integrity in the information that is derived from their RM processes.

Earned Value Management Process – 65% of respondents said that there was integrity in the information derived from their EVM processes.

Process Integration – Survey questions addressing process integration fell into two categories. The first set of questions addressed the Integrated Baseline Review (IBR), which is a risk-based assessment of the program baseline intended to ensure that the program plan is complete and that the program is executable within contractual cost and schedule constraints. Only 35% of respondents agree that the IBR process has improved the integration of risk management with EVM. 38% said that the IBR resulted in the identification of additional program risk and 38% said that the program's risk management plan was updated for the newly identified risk. This would seem to indicate that, initially; the two processes are used together to assess the program plan. If however, as in the majority of cases, the RM plans are not updated to incorporate IBR findings, one could infer that the two processes are not well integrated following IBR.

The second set of questions addressed how well the processes are integrated. When asked which risks are selected for integration with EVM, only 26% indicated "none." The remainder varied among all risks, high risks only, and high/medium risks. 62% of respondents indicated they routinely review their cost and schedule variances to identify risk for inclusion in the RM process. However, while 70% indicated they believed there was value in integrating RM and EVM, only 34% said they were effectively integrating these processes and 43% said their process integration was poor.

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Barriers – The survey asked about a number of perceived barriers to process integration that were identified by the NDIA PMSC working group during a series of discussions and facilitated brainstorming sessions. Respondents were asked to indicate, for each, whether they agreed or disagreed that it was indeed a barrier. The most significant barriers to process integration, as identified in this survey, are lack of RM or EVM process maturity, organizational barriers, lack of knowledge/skills, internal or external (customer) management culture, lack of management commitment, and emotional barriers, e.g., fear of failure or delivering bad news. Removal of these barriers will be required in order to improve the integration of RM with EVM.

Conclusions

The NDIA PMSC's Risk Management Working Group reached three major conclusions based on the results of its survey. First, programs will benefit from the integration of RM with EVM. 70% of respondents agreed or strongly agreed that there is value is integrating RM with EVM; only 10% of respondents disagreed and the rest remained neutral indicating they had no opinion. Second, while some PMs are already integrating these two processes, there are opportunities to improve the integration of RM and EVM because only 34% of respondents indicated their process integration is effective while 43% indicated it is poor or very poor. Third, there are many barriers to the effective integration of RM with EVM, which must be overcome to improve process integration.

Preliminary survey results were presented and discussed at two workshops during the 2003 Integrated Program Management Conference, jointly sponsored by NDIA, PMI-CPM, and SCEA, and at the PMI-CPM Spring Conference in 2004. It was evident from audience participation that most participants attended these workshops looking for guidance or solutions for integrating RM with EVM. Based on this demand and the improvement opportunities evident from the survey results, the working group has developed a number of recommendations for further work toward improving integrated program management, which are summarized, along with potential implementation steps, in subsequent sections of this paper.

Business Case for Change

As discussed in the two previous sections of this paper, there is a perceived need for improving the integration of RM and EVM among both the Risk Management Working Group's members as well as the survey's respondents. Fundamental to the business case for integrating RM and EVM is the belief that spending a little extra on integrating processes and tools will save a lot in replanning and rework as well as basic product cost and schedule. The integration of RM and EVM will likely involve increased costs to operate and manage both processes, and additional costs associated with the program team taking an integrated view. However, the anticipated savings to the program, the customer and/or the supplier and subcontractors, comes from a better understanding of not only the risk/uncertainty but also from identifying opportunities in the program in ways that contribute directly to deliberate management actions. If those actions are taken, the management team can reduce the consequences of risks being realized and take advantage of identified opportunities, thus avoiding adverse cost impacts and late deliveries. The Risk Management Working Group believes that a project team that

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invests appropriate effort on both Risk Management and Earned Value Management can realize benefits well beyond the investments when these processes are integrated.

No studies or cases have been found that specifically document cost or schedule benefits obtained from the integration of Risk Management and Earned Value Management. The degree of integration of these processes should be driven by the potential paybacks. Therefore, the extent of integration of these two processes, and thus the cost of integration, should be tailored to the program's risk and complexity. Programs with more risk and uncertainty will clearly benefit from a more robust risk management process. Large, complex development programs clearly benefit from a more robust earned value management process. As a rule, complexity and risk tend to rise together; so one would expect the robustness of both the EVM and RM process to rise as programs increase in size and scope and, in addition, that the integration of these processes would also increase with the size and complexity of the program's requirements. However, programs should receive return on their investments regardless of the level of integration of risk management and EVM.

At a minimum the Risk Management Working Group believes that the program that integrates will realize customer goodwill from the increased understanding of the program's characteristics and be in a much better position to defend, and thus implement, risk mitigation plans that have clear paybacks. In terms of goodwill, programs that better characterize the risk in projects through the earned value baseline (beyond point solutions that have a risk reserve) will provide all involved a better understanding of the nature of the project. Understanding the range of possibilities and the distribution of that range around the selected baseline will provide the customer and the program management teams a better understanding and thus will improve communications about the management decisions being made. The program management community has a reputation problem with staying within baselines. A program that has integrated risk handling into the program baseline, based on a robust risk management process, will greatly improve credibility and the likelihood of success.

To more fully appreciate the upside of integration, one must understand the downside of non-integration. Failure to integrate EVM and RM will result in problems that are, sadly, all too common. Even if management reserves are arrived at correctly through a healthy RM program, budget and responsibility for risk handling are not built into the baseline during program planning or following the IBR. Even if the baseline (before risk is considered) is correctly arrived at through a proper application of EVM, the risks may be missed or incorrectly addressed. Furthermore, if the variance analysis process within EVM is not linked to the RM process, risks newly identified through variance analysis may not be addressed in the RM plan. When risks and the core work are not integrated, risk reserves may be allocated, in the worst case, for scope creep, or in the best case, without consideration for the severity of risk being addressed, in terms of probability and impact, resulting in a poor return on the investment. Understanding the downside of non-integration makes the case for process integration even stronger.

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Recommendations

The working group's recommendations were developed to address both the demand for solutions, i.e., guidance for integrating RM and EVM, as identified during the conference workshops it facilitated, as well as the removal of the major barriers to integration that were identified via the survey.

Training

The survey identified lack of RM and EVM process maturity and lack of knowledge/skills as major barriers to the effective integration of RM with EVM. Thus, improvement of training is a primary recommendation of this working group.

Throughout this team's discussions, it has been apparent that proper training for Program Managers (PMs) and their staff is a need that must be addressed in order to improve the integration of these two processes. The faulty perception that EVM is primarily a financial tool, rather than a PM tool, must be corrected. EVM is a process that, when properly used, provides more realistic information for management decision-making purposes. In addition, the PM community needs to have a better understanding of both EVM and RM and the benefits that can be obtained through their integration. We strongly recommend that both the customer and the supplier communities address both EVMS and RM training as core program management processes and further that the Defense Acquisition University (DAU) move its EVMS courses from the Business, Cost Estimating and Financial Management (BCF) curriculum to the Program Management curriculum, where its RM courses currently reside. We applaud DAU's Program Managers Tools course (PMT-250), which includes IPT, WBS, Scheduling, Risk, Cost, Contracts and Earned Value topics. DAU should continue to pursue integration of these topics in the tools course and others. In addition, we recommend that both customer and supplier organizations develop courses oriented to the understanding of the benefits of RM and EVM integration and include techniques for achieving process integration. Middle and advanced level courses in EVM should include extensive modules on risk management. Lastly, we recommend that DAU develop a scheduling course that incorporates schedule risk management and that the supplier community do the same.

Policy

The survey identified a number of other barriers to effective integration of RM with EVM that included internal/external management culture, lack of management commitment, and emotional barriers. The working group believes that these barriers, while difficult, will be easier to overcome if customer policy and industry standards are revised. Further, implementing guidance is needed to ensure that the processes are integrated effectively and the desired benefits are obtained. Realizing the benefits of integration and improving program outcomes, through improved program management process integration, will reinforce cultural change, instill management commitment, and remove emotional barriers associated with the identification and reporting of risks.

The working group believes it is imperative that the customer and supplier communities be advised of changes needed to policies, regulations, standards and guidelines that would improve program management and help more programs reach their cost, schedule

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and technical performance goals. The working group identified potential needs and included them in the following list of items for consideration and possible change in accordance with this recommendation. Once these needs are verified, appropriate language should be developed and coordinated with applicable document owners for incorporation and publication.

- The need for additional language addressing risk management integration in the ANSI Standard 748, the EVM Implementation Guide (EVMIG), the IBR Guide, and/or the EVMS Guidelines Intent Document.
- The need for language to address the importance of integrating RM with EVM within EVMS Policy documents
- The need to consider risk in the development of a WBS, for incorporation into the pending update of Military Handbook 881
- The need to recommend changes to the Government's acquisition process, e.g., to address the concept of risk identification and disclosure, prior to contract award, and its effect on competitive procurements, as well as the idea of a pre-award IBR, currently being contemplated for OMB's new FAR clause for EVMS.
- The need for OSD to consider adding a risk assessment requirement for establishing program baselines and tracking such risk assessments in program and contract documentation, to include the CPAR. It is essential that programs not be punished for risk identification and reporting. Until all programs are required to transparently make such identification and reporting, pressure to underreport, and thus not appropriately manage risks, will persist.
- The need for an industry guideline document, oriented to RM, similar to the criteria based standard for EVMS. For Risk Management to be a disciplined process an agreed to set of criteria should be established by which RM efforts can be assessed and tracked.

Process

The final major barrier to process integration identified by our survey was organizational. The survey showed that RM and EVM usually have different process owners as well as different process champions. Furthermore, considering a program over its entire life cycle, there are other functional disciplines involved, e.g., cost estimating, that should also address risk at each and every stage of the acquisition life cycle with which they're involved. Thus, to successfully achieve integration of RM and EVM, it is necessary to cross all of these organizational boundaries. Without appropriate senior-level management commitment and encouragement, the functional communities within an organization are typically not motivated to work together. However, if both RM and EVM were considered core program management processes, with ownership vested in the program manager, some of the organizational barriers would be diminished. The working group recommends that the EVM community reach out to other communities and partner with them on this initiative to create the demand for integrating RM and EVM. The following actions are recommended for action:

- Reach out to the RM community, the Cost Estimating community, the Systems Engineering community, and others through their member organizations such as PMI's Risk SIG, SCEA and INCOSE. .

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- Identify an OSD office responsible for risk management with whom appropriate representatives of industry, representing the EVM community, can work to further the cause of integrated program management from a policy perspective.
- Work with OMB to ensure it's on the same path, e.g., with regard to risk management guidance and process integration, as it develops its program management policy and guidance through its CAO Council.
- Work with other professional associations, e.g., PMI-CPM, PMI's Risk Management SIG and College of Scheduling, and SCEA, to promote RM as a process that must be included/addressed as part of an integrated program management discipline.
- Work with the software suppliers to encourage them to incorporate RM capabilities or interfaces with RM tools into their tools that support EVM, scheduling, cost estimating, etc., e.g., C/S Solution's wInsight, Dekker LTD's iPursuit, Primavera's scheduling products, Business Engine's MPM, and others.

Integrated Program Management

Integrated program management is key to program success. Survey results support the Risk Management Working Group's belief in the value of integrated program management. The integration of risk management with earned value management, as outlined in this paper, is an important next step toward this goal. The survey showed that most survey respondents believe there is value in integrating these processes and, when these processes are integrated, there is significant opportunity for improvement. Better integration should provide greater benefits to programs and ensure better program outcomes.

The Risk Management Working Group believes the business case has been made (albeit not quantified) and that the integration of EVM and RM will pay off. Recent OMB initiatives support this premise. The annual Business Case (OMB Exhibit 300) required in support of federal budgeting for major acquisitions, addresses programs from an IPM perspective. Both EVMS and RM, along with other management processes, are addressed in each Business Case. OMB's initiative supports performance management legislation and the President's Management Agenda to improve the use and management of Government resources through appropriate Capital Planning and execution to ensure that programs remain within 10% of their cost, schedule and performance goals. OMB requires that every major acquisition be managed using EVM and have an acceptable risk management plan.

The project management profession is urged to embrace integrated program management, beginning with EVM and RM. As the PM community proceeds to build an integrated program management model, working with other functional communities, as appropriate, other program management processes will be identified that should be integrated. As in evolutionary or spiral development, each step towards integration will both make the next step more achievable, and will make the next step clearer.

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Appendix: Analysis of Survey Results

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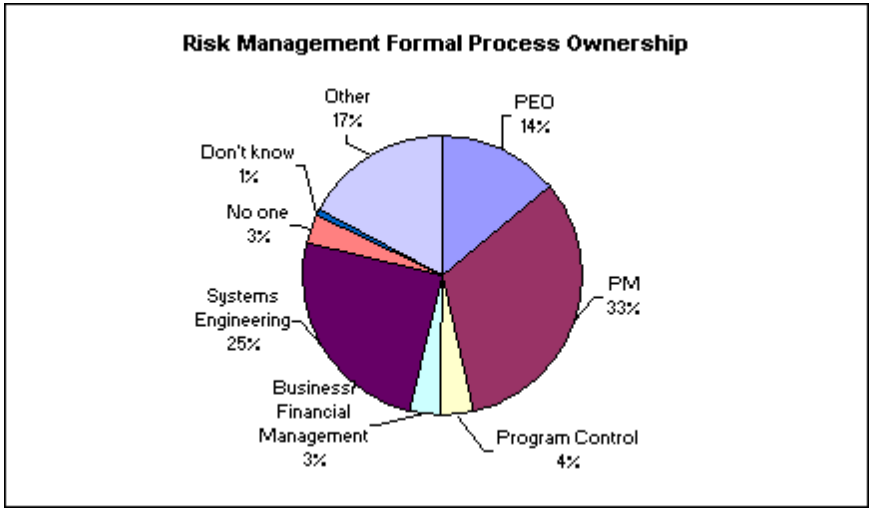
EVM/RM Process Ownership

1 Within your organization, which unit or individual is the "formal" process owner for your Risk Management?

			Count	Relative Frequency
a	PEO		17	14%
b	PM	1	39	32%
c	Program Control		5	4%
d	Business/Financial Management		4	3%
e	Systems Engineering	2	30	25%
f	No one		4	3%
g	Don't know		1	1%
h	Other	3	21	17%
			121	100%



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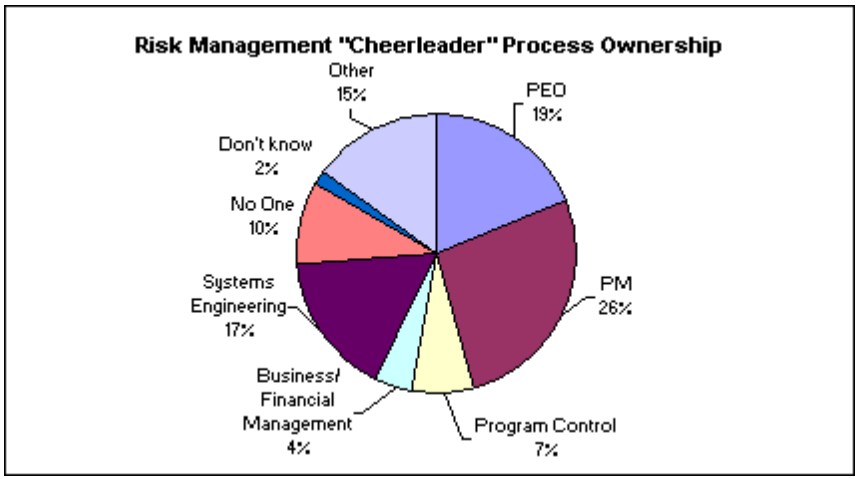
2. Within your organization, which unit or individual acts as the champion or "cheerleader" of your Risk Management process?

			Count	Relative Frequency
a	PEO	2	23	19%
b	PM	1	32	26%
c	Program Control		9	7%
d	Business/Financial Management		5	4%
e	Systems Engineering	3	20	17%
f	No one		12	10%
g	Don't know		2	2%
h	Other		18	15%
			121	100%



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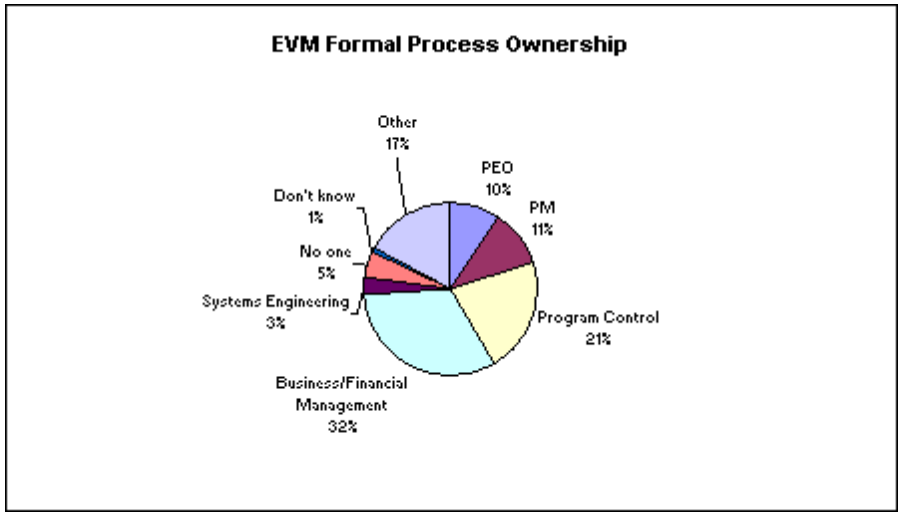
EVM/RM Process Ownership (con't)

3. Within your organization, which unit or individual is the "formal" process owner for your Earned Value Management process?

			Count	Relative Frequency
a	PEO		12	10%
b	PM		13	11%
c	Program Control	2	25	21%
d	Business/Financial Management	1	39	32%
e	Systems Engineering		4	3%
f	No one		6	5%
g	Don't know		1	1%
h	Other	3	21	17%
			121	100%



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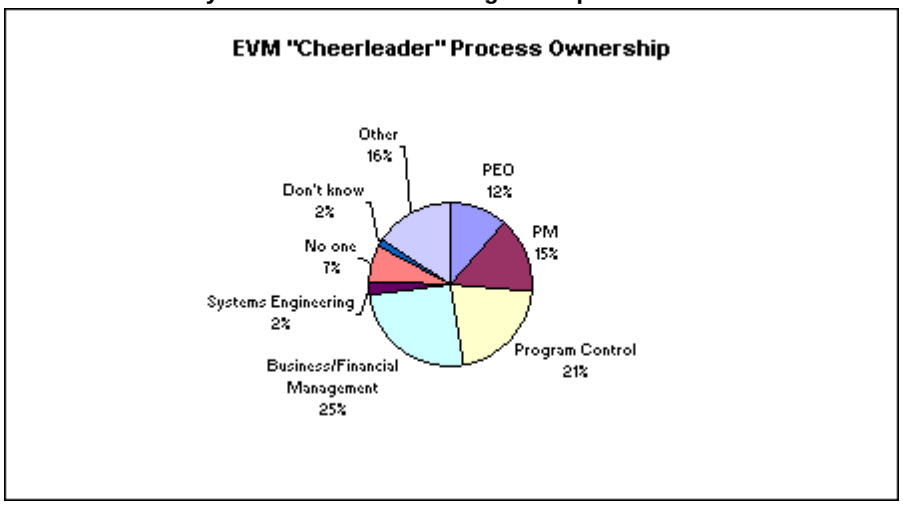
4. Within your organization, which unit or individual acts as the champion or "cheerleader" of your Earned Value Management process?

			Count	Relative Frequency
a	PEO		14	12%
b	PM		18	15%
c	Program Control	2	25	21%
d	Business/Financial Management	1	31	26%
e	Systems Engineering		3	2%
f	No one		9	7%
g	Don't know		2	2%
h	Other (please list)	3	19	16%
			121	100%



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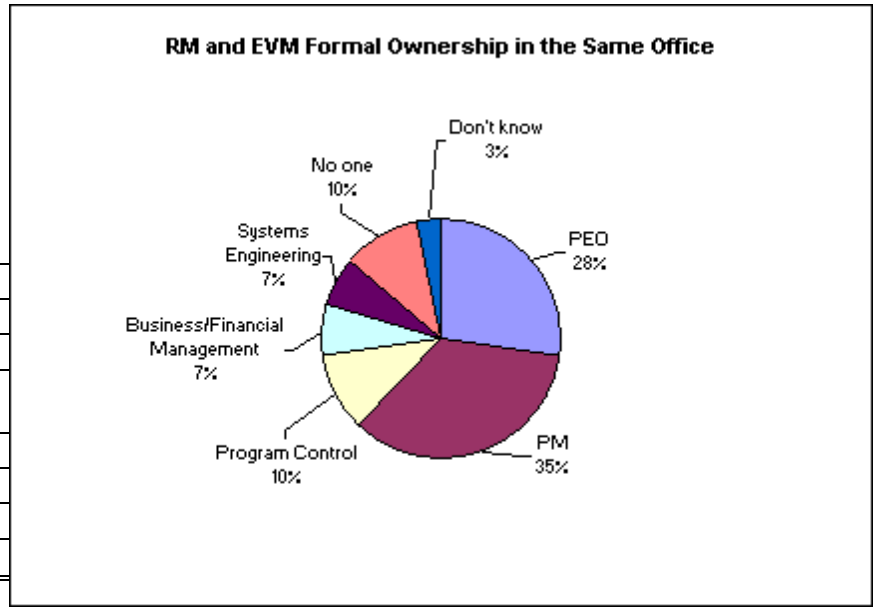
EVM/RM Process Ownership (con't)

EVM and RM Formal Ownership in the Same Program Office

Percent in Same Office	**24%**
Percent in Different Offices	**76%**

		Count	Relative Frequency	Percent of total
1	PEO	8	28%	7%
2	PM	10	34%	8%
3	Program Control	3	10%	2%
4	Business/Financial Management	2	7%	2%
5	Systems Engineering	2	7%	2%
6	No one	3	10%	2%
7	Don't know	1	3%	1%
8	Other	n/a	n/a	n/a
	Total	29	100%	24%



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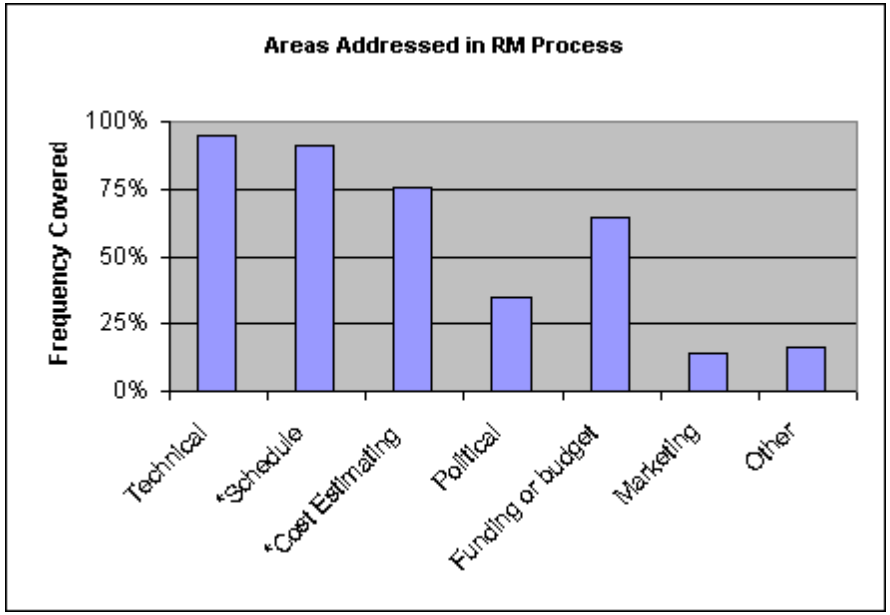
Risk Management Process

5. What areas are addressed in your Risk Management process?

			Count	Frequency
a	Technical	1	114	95%
b	***Schedule**	2	110	91%
c	***Cost Estimating**	3	91	75%
d	Political		42	35%
e	Funding or budget		78	64%
f	Marketing		17	14%
g	Other		20	17%

* Respondents who addressed these areas were more successful integrators



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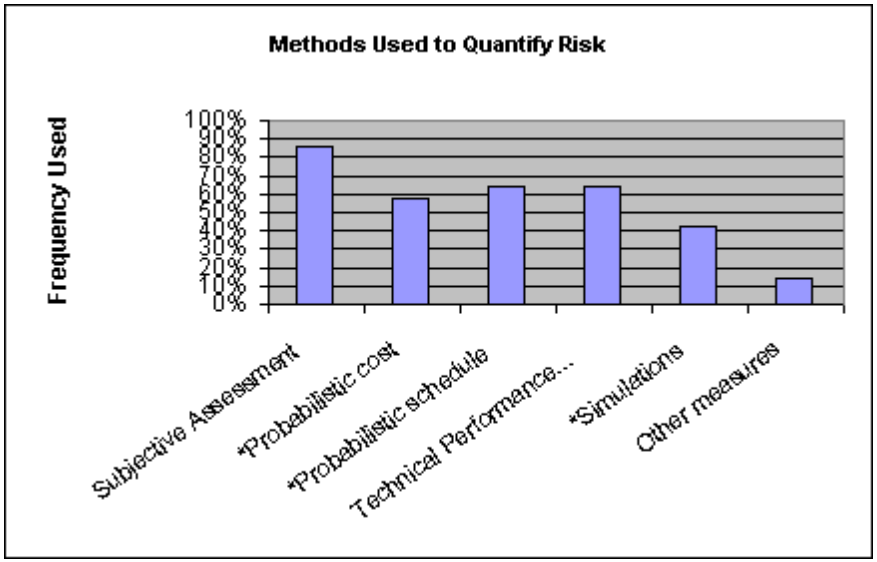
6 What methods do you use to quantify risk?

			Count	Frequency
a	Subjective Assessment	**1**	104	86%
b	***Probabilistic cost**		70	58%
c	***Probabilistic schedule**	**2**	78	64%
d	Technical Performance Measures	**3**	77	64%
e	***Simulations**		51	42%
f	Other measures		17	14%

* Respondents who addressed these areas were more successful integrators



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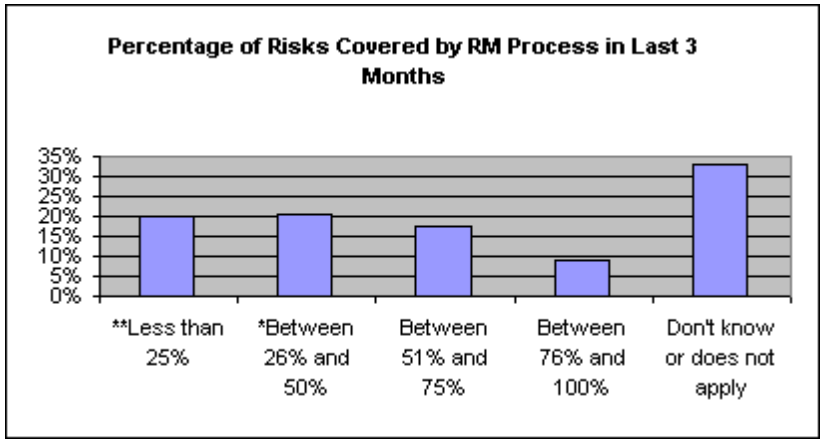
Risk Management Process (con't)

7 **In the last 3 months, for the items that you control, what percentage of your issues, problems, or concerns were predicted or covered by your risk process?**

			Count	Frequency
a	****Less than 25%**	**3**	24	20%
b	***Between 26% and 50%**	**2**	25	21%
c	Between 51% and 75%		21	17%
d	Between 76% and 100%		11	9%
e	Don't know or does not apply	**1**	40	33%



* These respondents were more successful integrators

** These respondents were less successful integrators

.

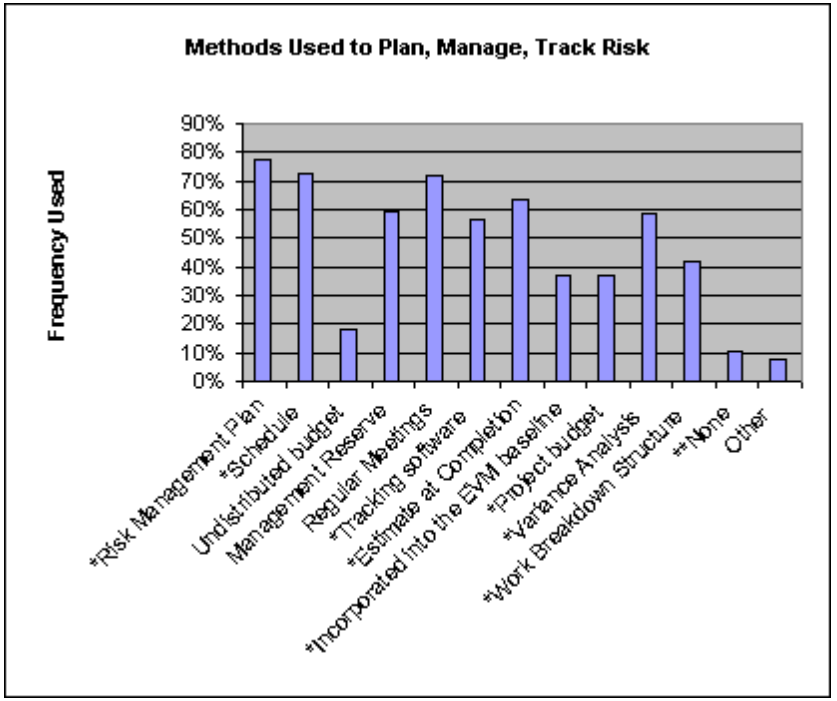
Integration of EVM and RM

8 How do you plan, manage, and track your risks?

			Count	Frequency
a	***Risk Management Plan**	**1**	94	78%
b	***Schedule**	**2**	88	73%
c	Undistributed budget		22	18%
d	Management Reserve		72	60%
e	Regular Meetings	**3**	87	72%
f	***Tracking software**		68	56%
g	***Estimate at Completion**		77	64%
h	***Incorporated into the EVM baseline**		45	37%
i	***Project budget**		45	37%
j	***Variance Analysis**		71	59%
k	***Work Breakdown Structure**		51	42%
l	****None**		13	11%
m	Other		9	7%

* These respondents were more successful integrators

** These respondents were less successful integrators



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9. Are "Cum-to-Date" and "At -Completion" EV cost and schedule variances routinely reviewed for inclusion in the Risk Management process?

Yes **71%**

Respondents who answered yes were more successful integrators

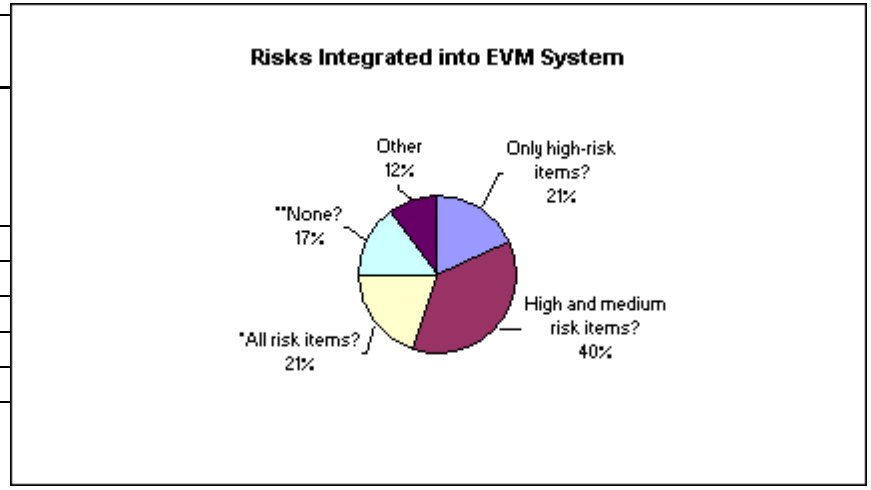
Integration of EVM and RM (con't)

10. When selecting risks to integrate into your EVM system, do you choose:

			Count	Frequency
a	Only high-risk items?	**3**	25	21%
b	High and medium risk items?	**1**	49	40%
c	***All risk items?**	**2**	26	21%
d	****None?**		21	17%
e	Other		14	12%

* These respondents were more successful integrators

** These respondents were less successful integrators



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11. When the Integrated Baseline Review (IBR) was initiated by DoD, one objective was to improve the integration of EVM and Risk Management. Do you agree that this has been successful?

Average Score **3.1**

5=Strongly agree
4=Agree
3=Neutral
2=Disagree
1=Strongly disagree

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12. Did your IBR lead to updating the project's identified risks?

Average Score **3.3**

5=Strongly agree
4=Agree
3=Neutral
2=Disagree
1=Strongly disagree

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EVM and RM Process Integration Success

13. How effectively are your EVM and RM processes integrated?

	Total	*Small Projects	Large Projects
Average Score	**3.0**	**2.62**	**3.3**

*Small projects have significantly smaller average response than large projects (references question # 36)

5=Highly Effective

4=Effective

3=Neutral

2=Poor

1=Very Poor

Successful integration is significantly correlated with the following areas:

Process Integrity

Belief that there is integrity with the information derived from the Earned Value Management process

(Question 26)

Belief that there is integrity with the information derived from the Risk Management process

(Question 28)

Tools and Processes

Addressing the following areas in the Risk Management process:

(Question 5)

Technical
Schedule
Cost Estimating
Political
Funding or budget
Marketing

Using the following Methods in the Risk Management process:

(Question 6)

Probabilistic cost
Probabilistic schedule
Simulations

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EVM and RM Process Integration Success (con't)

Successful integration is significantly correlated with the following areas:

Having the following percentage of issues, problems, or concerns predicted or covered by the risk management process. (Question 7)

- ***Less than 25%*** (These respondents were more successful integrators)
- ***Between 26% and 50%*** (These respondents were less successful integrators)

Planning, managing, and tracking risks using: (Question 8)

- ***Risk Management Plan***
- ***Schedule***
- ***Management Reserve***
- ***Tracking software***
- ***Estimate at Completion***
- ***Incorporated into the EVM baseline***
- ***Project budget***
- ***Variance Analysis***
- ***Work Breakdown Structure***
- ***None*** (these respondents were less successful integrators)

Having "Cum-to-Date" and "At -Completion" EV cost and schedule variances routinely reviewed for inclusion in the Risk Management process (Question 9)

The percentage of risks integrated into the EVM system: (Question 10)

- ***All risk items*** (These respondents were more successful integrators)
- ***None*** (These respondents were less successful integrators)

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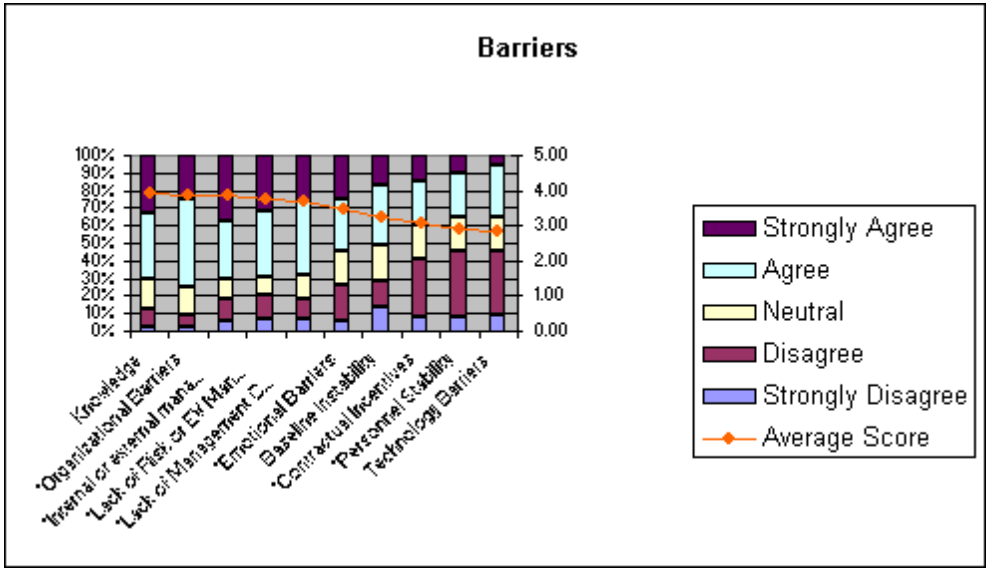
EVM and RM Process Integration Success (con't)

Successful integration is significantly correlated with the following areas:

Barriers: (Questions 15-24)

Contractual Incentives
Internal or external management culture
Emotional Barriers
Organizational Barriers
Personnel Stability
Lack of Risk or EV Management process maturity
Lack of Management Commitment

* Indicates significant negative correlation to successful integration (as indicated by question #13). Barriers were rated lower by successful integrators



14. Please comment on why you selected your answer to question 13 above.
(see survey results)

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Barriers to Integrating Risk and EV Management in the Acquisition Process

For questions 15-25 please indicate the strength of your agreement that the area is a barrier to integration:

Correlation Between Barriers

			Average	Gov't Average	15	16	17	18	19	20	21	22	23	24
15. Contractual Incentives	Contractual Incentives		3.0											
16. Internal or external management culture	**Internal or external management culture**	**3**	**3.8**											
17. Emotional Barriers	**Emotional Barriers**		**3.5**											
18. Technology Barriers	Technology Barriers		2.9											
19. Organizational Barriers	**Organizational Barriers**	**2**	**3.8**	**4.3**										
20. Personnel Stability	Personnel Stability		3.0	**3.6**										
21. Knowledge	**Knowledge**	**1**	**3.9**											
22. Lack of Risk or EV Management process maturity	***Lack of Risk or EV Management process maturity**		**3.7**											
23. Lack of Management Commitment	**Lack of Management Commitment**		**3.7**	**4.2**										
24. Baseline instability	**Baseline instability**		**3.3**											
25. Other barriers	Other barriers		(see survey)											

These scores indicate statistically significant barriers

These scores are significantly different from the non-government average

*** Small projects have an average response of 4.16, which is significantly larger than the average of larger projects of 3.25.**

Small projects are defined as being smaller than $500M (Q. 36)

5=Strongly agree

4=Agree

3=Neutral

2=Disagree

1=Strongly disagree

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Process Integrity

26. Do you agree that there is integrity with the information derived from the Earned Value Management process?

Average Score **3.9**

5=Strongly agree
4=Agree
3=Neutral
2=Disagree
1=Strongly disagree

27. Please comment on why you selected your answer to question 26 above.
(see survey results)

28. Do you agree that there is integrity with the information derived from the Risk Management process?

	Total	*Gov't	Non-Gov't	P-Value
Average Score	**3.7**	**3.3**	**3.8**	0.026

5=Strongly agree
4=Agree
3=Neutral
2=Disagree
1=Strongly disagree

* Government and non-government responses are significantly different (references question #33)

28. Please comment on why you selected your answer to question 27 above.
(see survey results)

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Best Practices

30. Do you have Best Practices or Techniques that you would like to share?

(see survey results)

Other questions

31. In your opinion, how much value is there in integrating the Risk Management and EVM process?

Average Score **4.0**

5=Very Strong
4=Strong
3=Medium
2=Lesser
1=Negligible

32. Please comment on why you selected your answer to question 31 above.

(see survey results)

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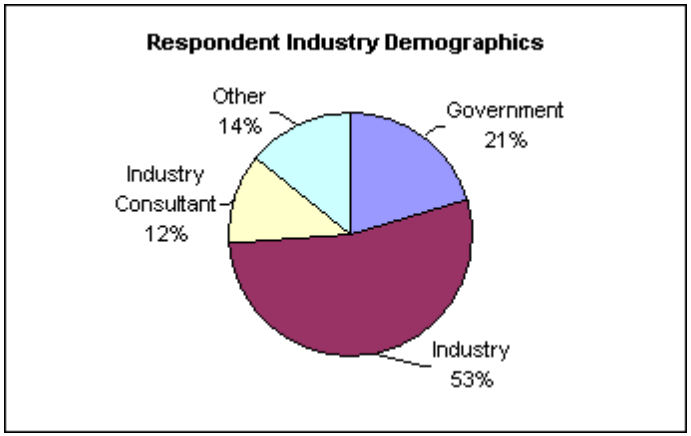
Demographics

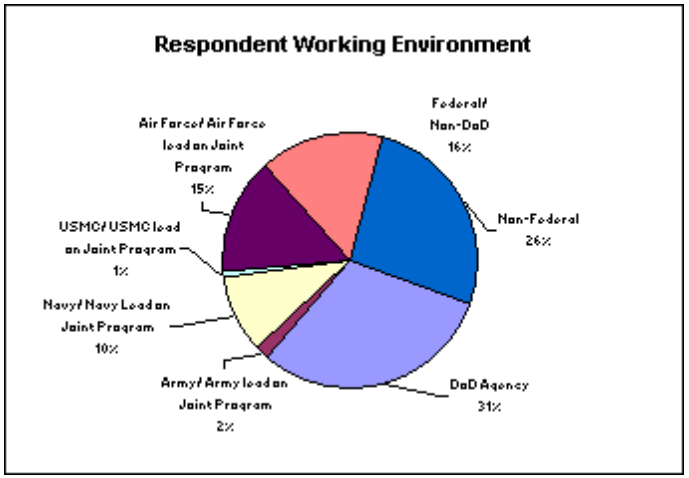
33. Are you:

			Count	Frequency
a	Government	2	25	21%
b	Industry	1	64	53%
c	Industry Consultant		15	12%
d	Other	3	17	14%
			121	100%



34. What best describes your environment?

			Count	Frequency
a	DoD Agency	1	37	31%
b	Army/ Army lead on Joint Program		2	2%
c	Navy/ Navy Lead on Joint Program		12	10%
d	USMC/ USMC lead on Joint Program		1	1%
e	Air Force/ Air Force lead on Joint Program		18	15%
f	Federal/ Non-DoD	3	19	16%
g	Non-Federal	2	32	26%
			121	100%



35. If you are an industry employee, which area is your company's primary marketplace?

		Count	Frequency
	Government	78	64%
	Commercial	8	7%

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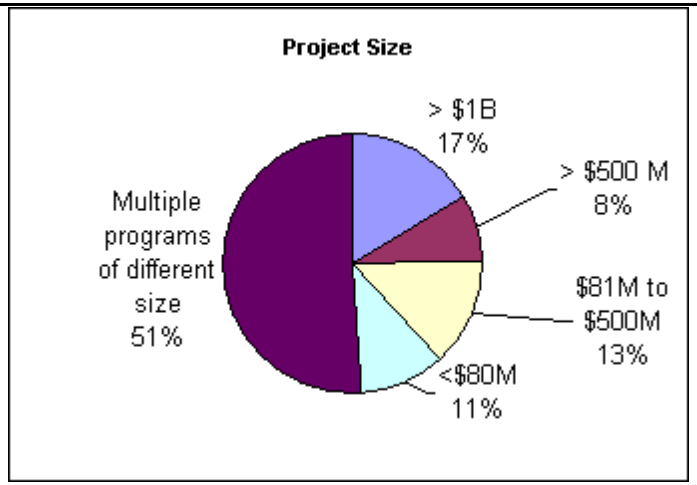
Demographics (con't)

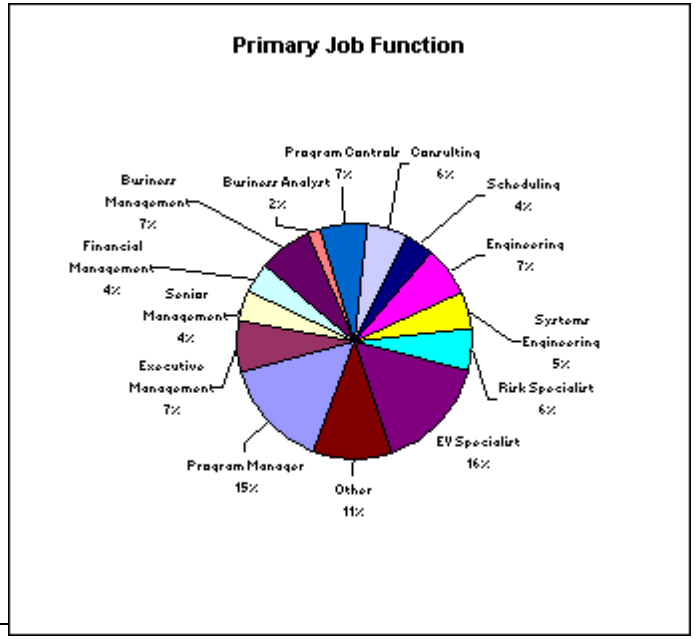
36. What size projects do you work on?

			Count	Frequency
a	> $1B	2	20	17%
b	> $500 M		10	8%
c	$81M to $500M	3	16	13%
d	<$80M		13	11%
e	Multiple programs of different size	1	62	51%



37. What is your primary job function?

			Count	Frequency
a	Program Manager	2	18	15%
b	Executive Management		9	7%
c	Senior Management		5	4%
d	Financial Management		5	4%
e	Business Management		9	7%
f	Business Analyst		2	2%
g	Program Controls		8	7%
h	Consulting		7	6%
i	Scheduling		5	4%
j	Engineering		8	7%
k	Systems Engineering		6	5%
l	Risk Specialist		7	6%
m	EV Specialist	1	19	16%
n	Other	3	13	11%



Demographics (con't)

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38. How many years experience do you have with EVMS?

			Count	Frequency
a	0 to 2		17	14%
b	3 to 5	2	22	18%
c	6 to 10	3	19	16%
d	More than 10	1	63	52%

39. How many years experience do you have with Risk Management?

			Count	Frequency
a	0 to 2	3	24	20%
b	3 to 5	2	29	24%
c	6 to 10		19	16%
d	More than 10	1	49	40%