

A Global and Cross-Industry Perspective on EVM Practice & Future Trend

Lingguang Song, Ph.D
Construction Management
University of Houston

Outline

1. Introduction
 - Motivation & objectives
 - Methodology & definitions
2. EVM usage in different industries & countries
3. EVM practice standards
4. EVM service market
5. EVM & project outcomes
6. Improving EVM usage
7. Discussion

1. Introduction – Motivation

- **The Stage**

- Growth of EVM usage in government & private industries
- Growth of EVM knowledge, practice standards, services
- Globalization and cross-industry project collaboration

- **Questions**

- **Owner/contractor**

- How is EVM used in my industry sector?
- What are the EVM standards used by others?
- How to improve EVM usage?

- **Consultant**

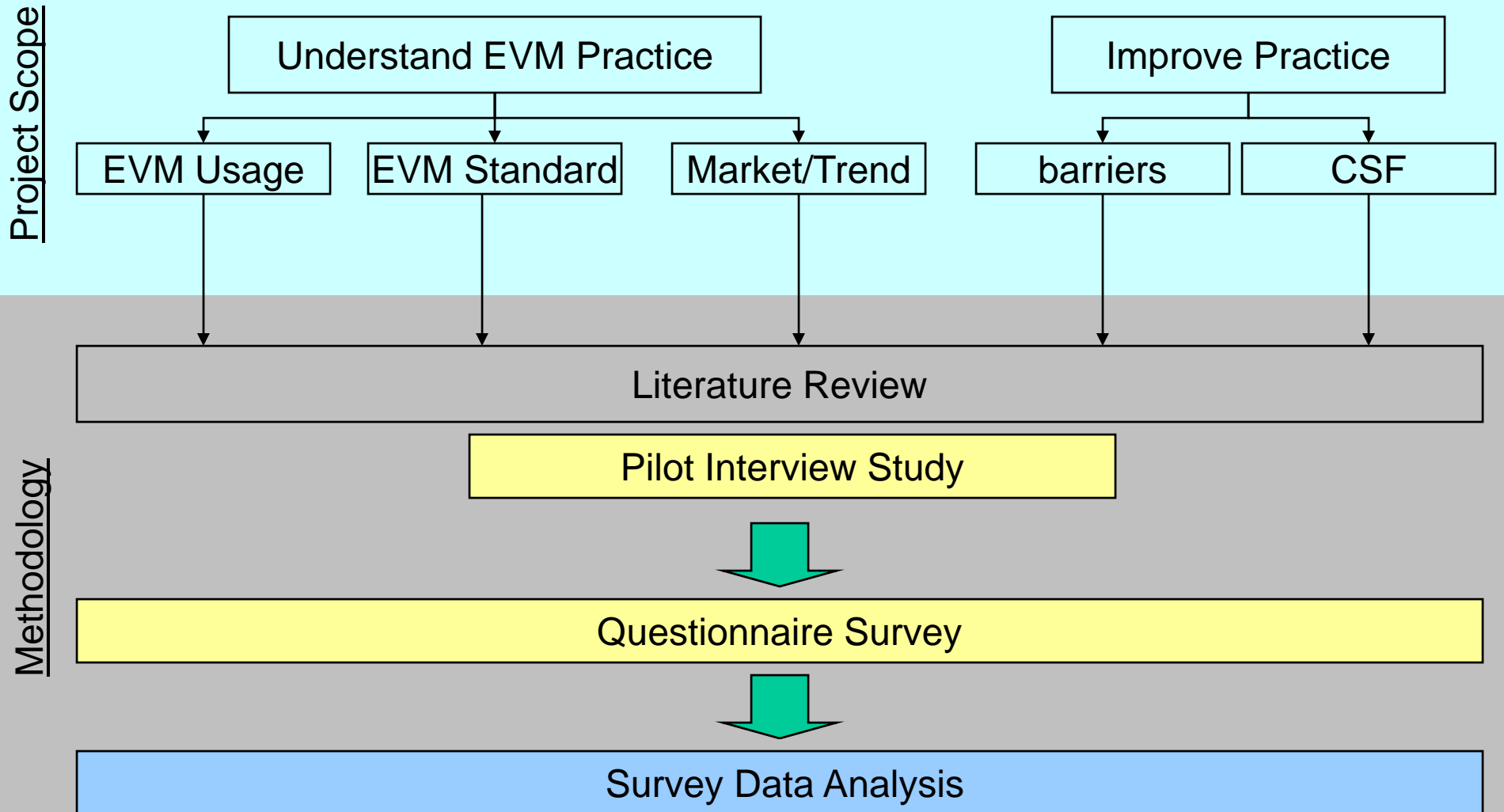
- How is EVM used by industry, by country etc. ?
- What is the size and trend of EVM market?



Objectives

- Compare current EVM practice
 - by user characteristics
 - E.g. industry, country, motivation, role ...
 - In terms of usage level, maturity, implementation ...
- Characterize EVM standards and services
- Measure EVM contribution to project outcomes
- Identify issues that hinder EVM acceptance and usage
 - Current users
 - Non-users
- Identify critical success factors to improve EVM practice

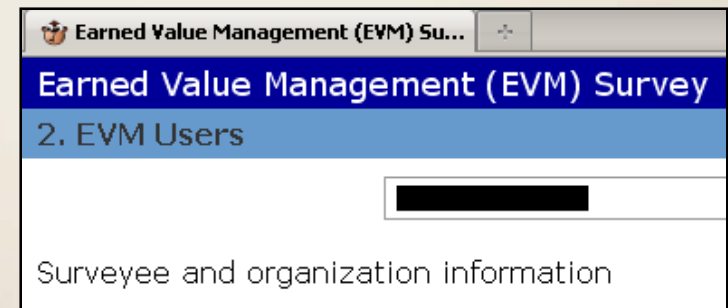
Methodology



Survey Design

- **Pilot interview study in Oct. 2008**
- **Questionnaire design**
 - 41 variables in 5 categories
 - Surveyee, EVM practice, barriers, project outcomes, and implementation.
 - 32-question online survey
- **Questionnaire Validation**
 - 57 invited EVM practitioners
 - 46 respondents - response rate 80%
 - 100+ comments

Online survey



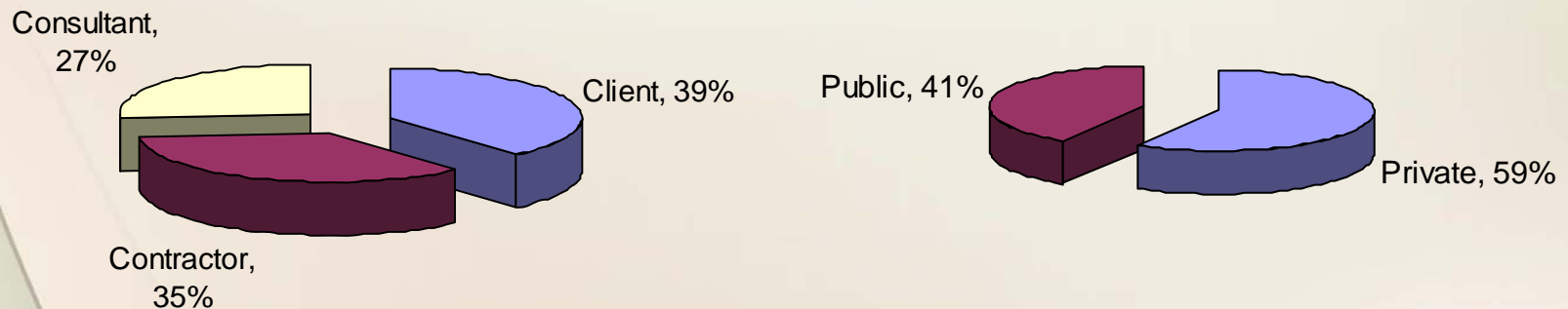
The screenshot shows a web browser window with the title "Earned Value Management (EVM) Su...". The page content includes a blue header with the text "Earned Value Management (EVM) Survey" and a sub-header "2. EVM Users". Below the sub-header is a redacted area (black box) and a text label "Surveyee and organization information".

Data Collection & Analysis

- **Data collection**
 - Solicitation
 - PMI 250 chapters, 29 SIGs; PMI-CPM 2,400 members; and other international EVM & PM associations/online communities
 - Response
 - 908 responses (Oct. 08 – Apr. 09)
 - 677 completed survey (completion rate 74.5%)
- **Data analysis**
 - Characterize user and their practice using descriptive statistics
 - Compare user and their practice using cross-tabulation and hypothesis testing

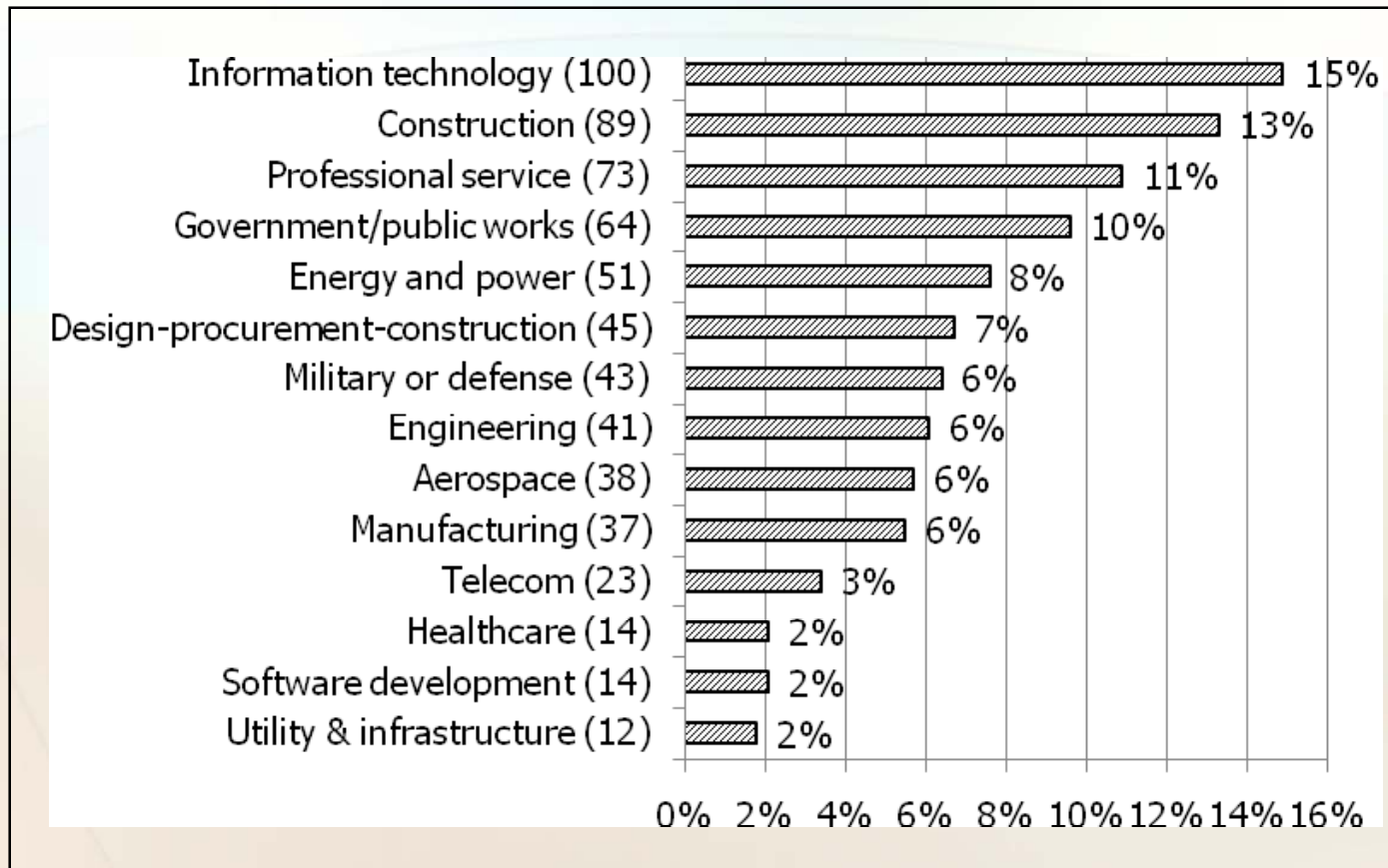
Population Characteristics

- **Respondents**
 - 92.5% respondents in EVM related management functions
 - 85% reported more than 5 years of PM experience
- **Organizations**
 - 61 countries – U.S. (33%)
 - 36 states and Washington D.C.
 - 39% clients, 35% contractors, and 27% consultants
 - 59% private sector and 41% public sector



Population by Industry Sector

By industry sector (>=10 responses)



User Classification

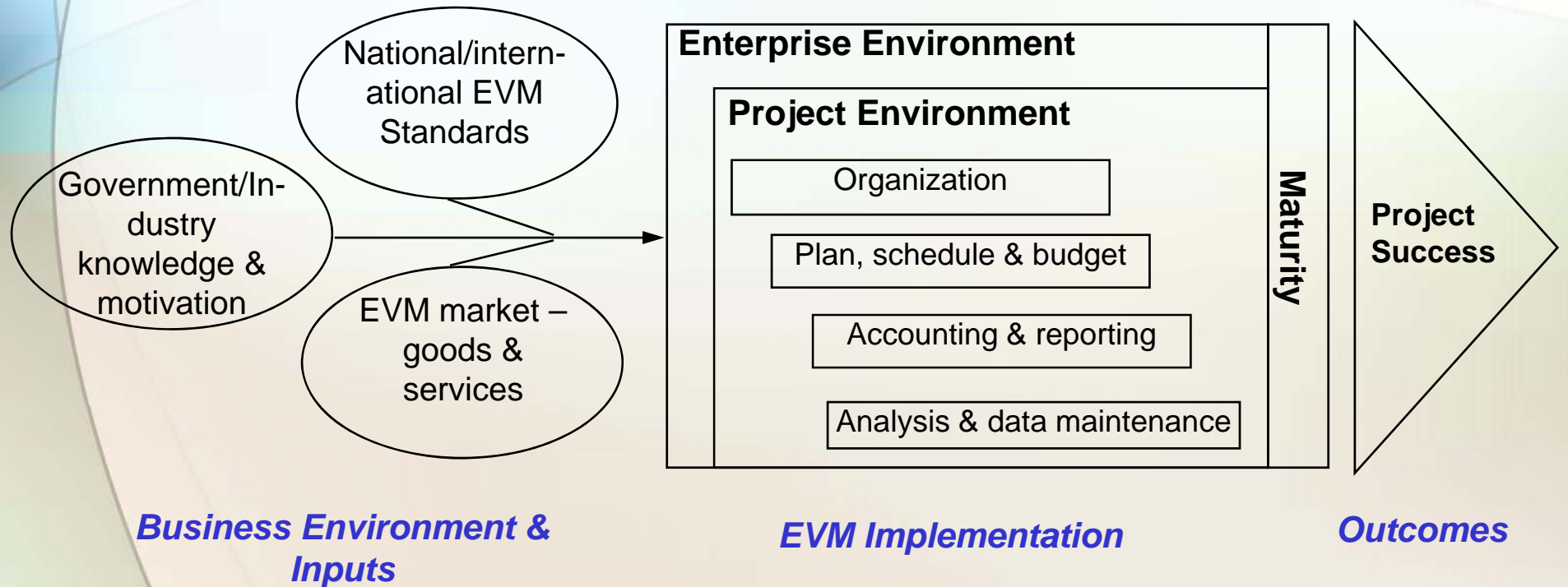
| Classification | Percentage |
|--------------------------------|------------|
| 1. By EVM adoption | |
| User | 62% |
| Non-user | 38% |
| 2. By Industry | |
| Private sector | 79% |
| Defense/government | 21% |
| 3. By Motivation | |
| Mandatory use | 31% |
| Voluntary use | 69% |
| 4. By Organization Role | |
| Client/owner | 38% |
| Contractor | 35% |
| Consultant | 27% |

| Classification | Percentage |
|---------------------------|------------|
| 5. By world region | |
| U.S. | 33% |
| Early EVM adopters* | 16% |
| Middle East | 28% |
| All other countries | 23% |
| 6. By U.S. Regions | |
| Southwest | 12% |
| Midwest | 18% |
| West | 21% |
| Northeast | 21% |
| Southeast | 28% |

* Australia, Canada, New Zealand, Sweden, and the U.K.

EVM Practice – Comparison Matrix

- **EVM Practice System Model**
 - Designed to compare all facets of EVM practice
 - Provide a structure to organize variables



Industry Sector & Motivation

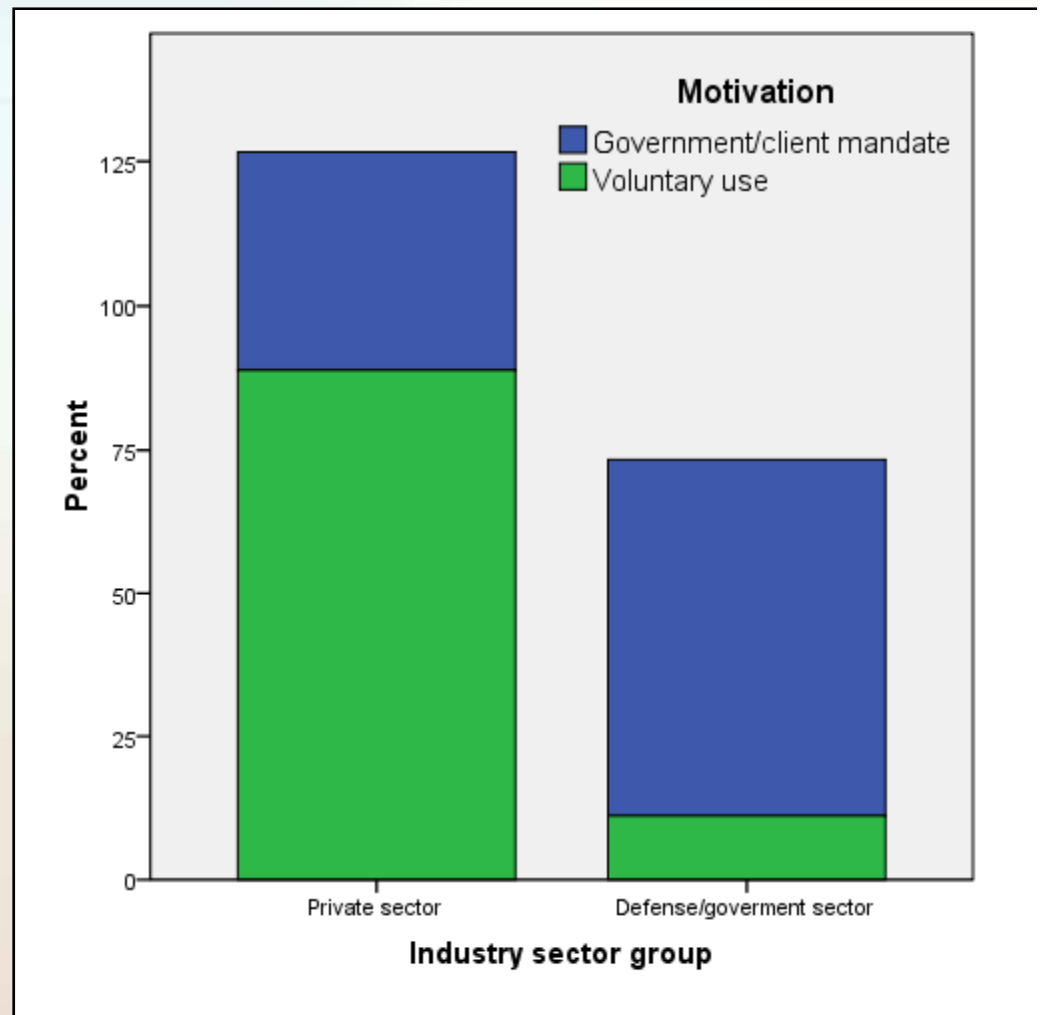
Overall

- 69% voluntary use
- 31% mandatory use

By industry

- 71% mandatory use in defense/government
- 84% voluntary use in private industry

Industry sector & motivation



2. Comparison - Level of EVM Usage

By industry sector

By industry

- EVM usage on large/risky project is higher in defense/government

By world region

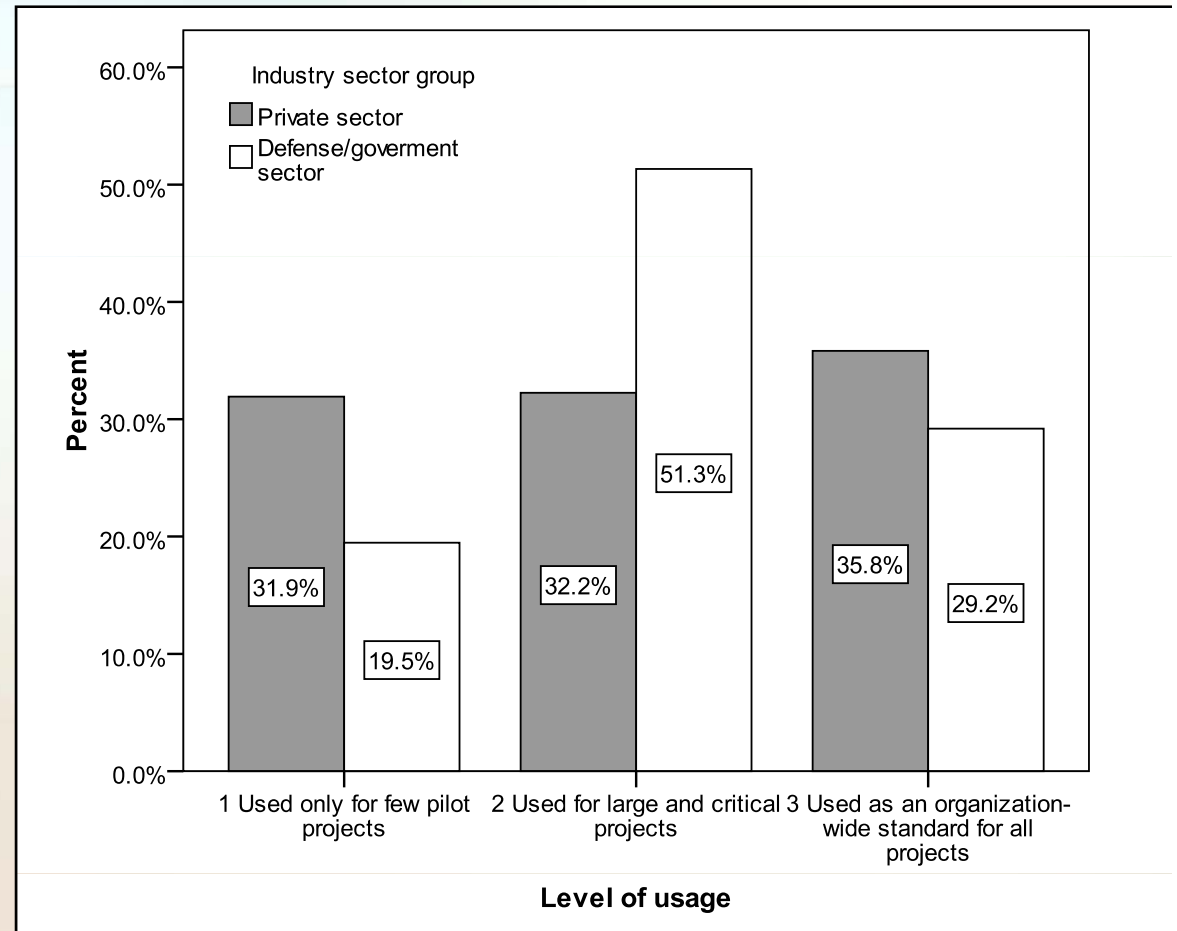
- U.S., early EVM adopters, and Middle East have relatively higher usage than other countries

By motivation

- Little/no impact on EVM usage

By organization role

- Little/no impact on EVM usage



Comparison – EVM Applicability (1/2)

When is EVM applied?

Reg.=regardless

| Category | Budget Size | | Duration | | Risk | | Contract | | |
|-------------------|-------------|------|----------|------|------|------|--------------------|----------------|------|
| | Large | Reg. | Long | Reg. | High | Reg. | Cost/ Incentive | Fixed Price | Reg. |
| Industry | | | | | | | | | |
| Defense | X | | X | | | | X | | |
| Private | | X | | X | | | | X | X |
| Motivation | | | | | | | | | |
| Mandatory | X | | X | | | | X | | |
| Voluntary | | X | | X | | | | X | X |

Comparison – Implementation Strategy

| Strategy | Defense/ Government | Private Sector | Test Sig. |
|---|------------------------|-------------------|--------------|
| 1. Develop a full-fledged EVM system to meet a specific standard | 42% | 16% | 0.000 |
| 2. EVM implementation is made flexible at different levels in a project, program, or organization | 30% | 40% | 0.069 |
| 3. Simplify EVM implementation across all projects | 25% | 35% | 0.043 |
| 4. Customize EVM applications for a given project context | 22% | 21% | 0.833 |

Comparison – Future Plan

| Future Plan | Defense/ Government | Private Sector | Test Sig. |
|---|------------------------|-------------------|--------------|
| 1. Expand EVM usage to all types of projects | 43% | 43% | 0.899 |
| 2. Establish an organization-level support team to continuously improve EVM | 34% | 29% | 0.325 |
| 3. Acquire a formal EVM certification | 22% | 8% | 0.000 |
| 4. Integrate software systems & components for EVM | 22% | 22% | 0.995 |
| 5. Establish a library of historical project EVM data for future project planning | 21% | 28% | 0.161 |

Definition - EVM Maturity Index

| Level | Primary Characteristics |
|-----------------|---|
| 1 Ad hoc | EVM used only for few pilot projects |
| 2 Repeatable | EVM used for large and critical projects |
| 3 Defined | EVM used as an organization-wide standard for project control |
| 4* Managed | Regular training and EVM data archiving for future use |
| 5* Optimized | Regular EVM system evaluation and continuous improvement |

Criteria for Levels 4 and 5**

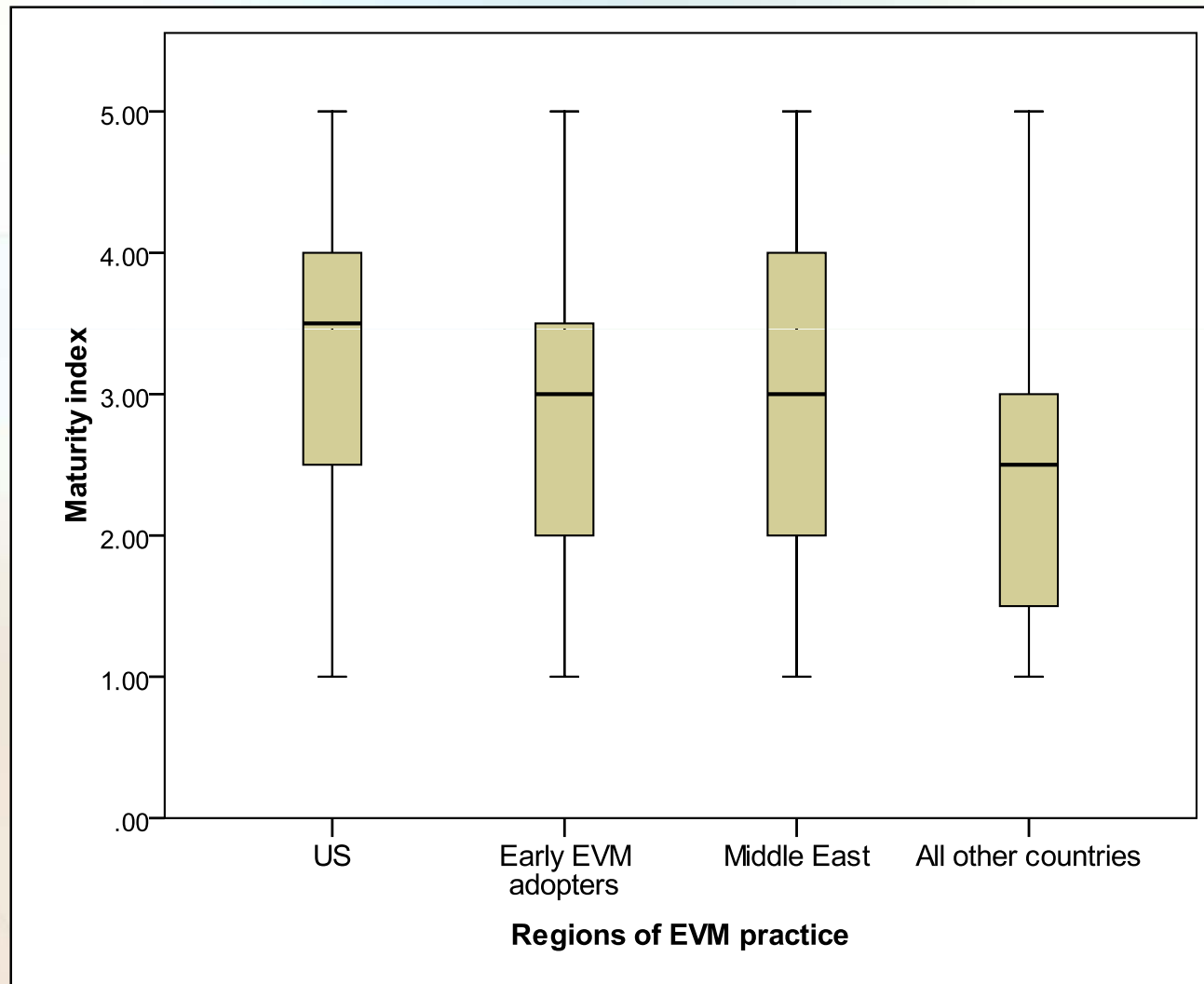
- (1) Regular training
- (2) Historical data archive and usage
- (3) System evaluation and assessment
- (4) Continuous system improvement

** Stratton, R. W. (2006). The earned value management maturity model. Plymouth, U.K.: Management Concepts.

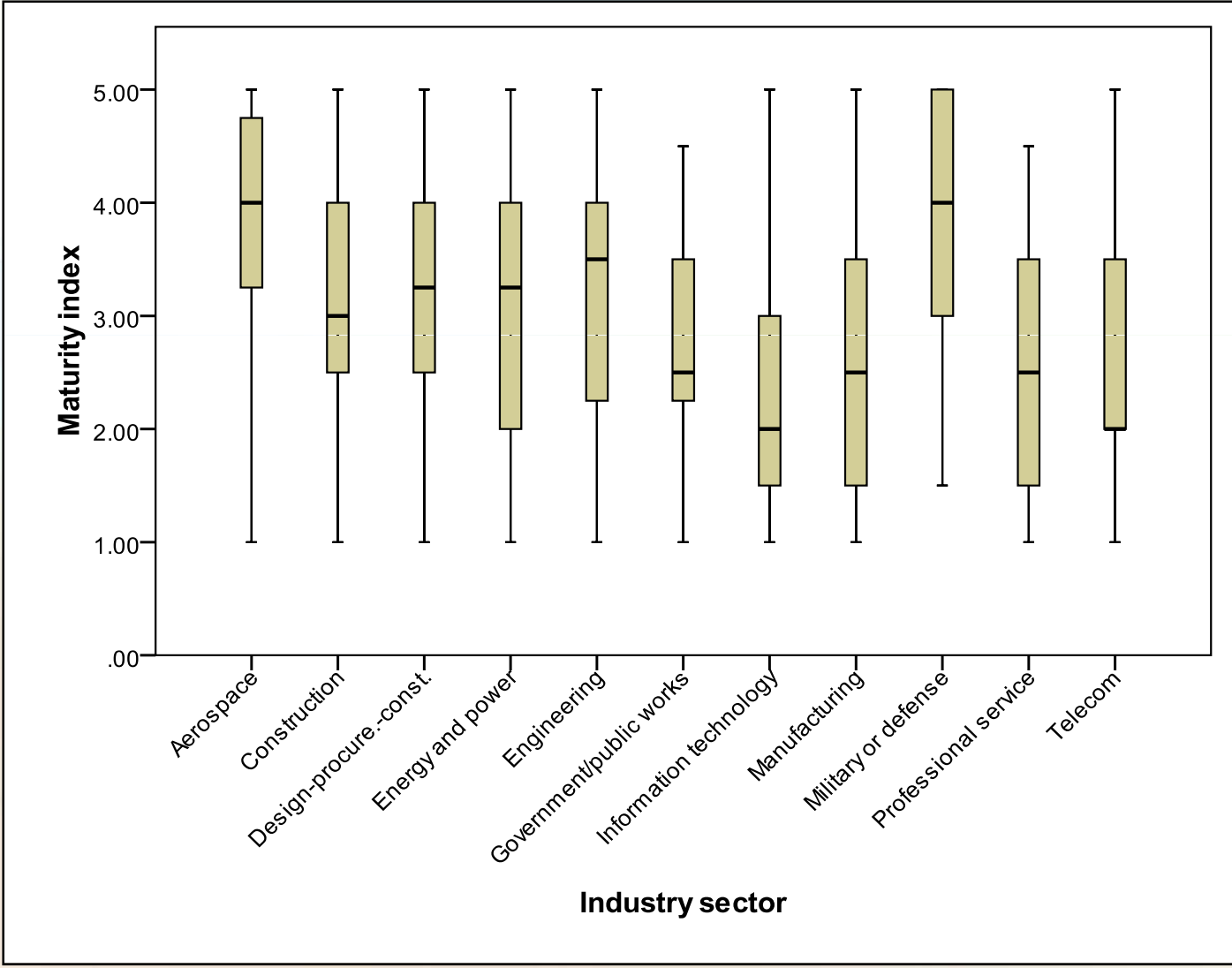
Comparison – EVM Maturity (1/3)

| Classification | Mean Maturity Index | Test Sig. |
|---------------------|---------------------|-----------|
| Industry | | |
| Defense/government | 3.24 | 0.003 |
| Private | 2.85 | |
| Motivation | | |
| Mandatory | 3.15 | 0.028 |
| Voluntary | 2.87 | |
| Role | | |
| Client | 2.67 | 0.000 |
| Contractor | 3.22 | |
| Consultant | 2.87 | |
| Country | | |
| U.S. | 3.22 | 0.000 |
| Early adopters | 2.93 | |
| Middle East | 2.95 | |
| All other countries | 2.44 | |

Comparison – EVM Maturity (2/3)



Comparison – EVM Maturity (3/3)



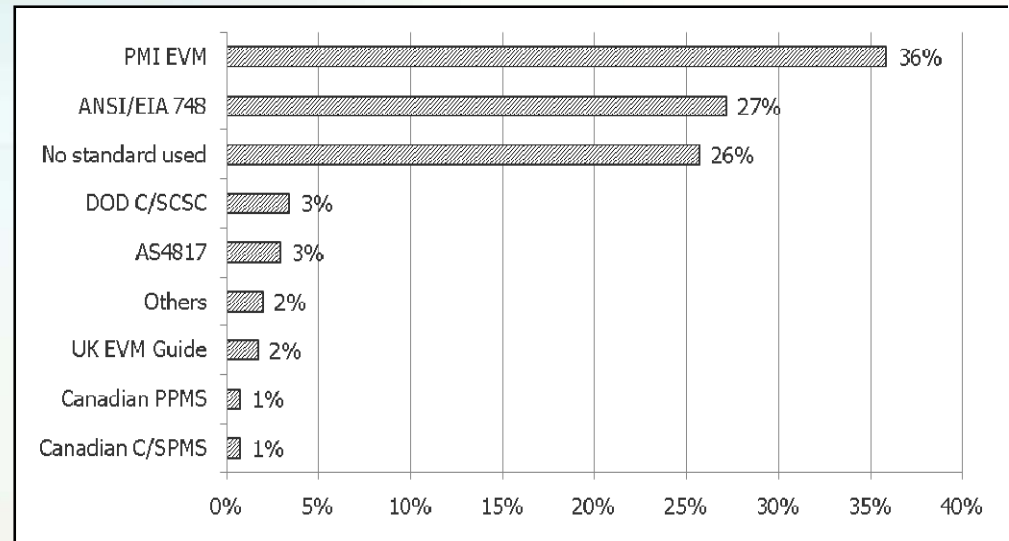
3. EVM Practice Standards (1/2)

- **Criteria-based EVM standard**

- Use a criteria-based philosophy
- Specify criteria that an EVM system must meet
- E.g. ANSI/EIA 748, AS4817, UK EVM Guide

- **Broad-based EVM guide**

- For broad-based project-management community rather than a compliance requirement document
- Focus on essentials of EVM and its integration with other project management process
- PMI's *Practice Standard for Earned Value Management*



EVM Practice Standards (2/2)

Three major approaches

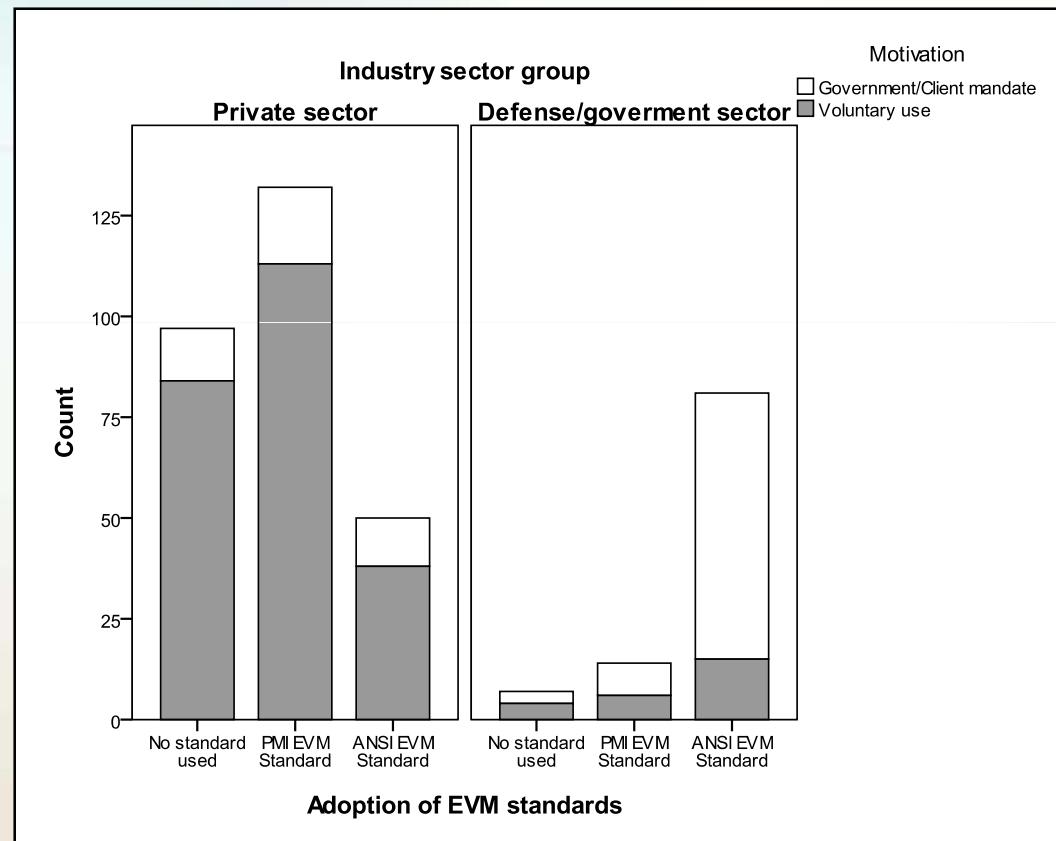
- No standard used (26%)
- Using PMI EVM (36%)
- Using ANSI/EIA 748 (27%)

By industry

- Private – 69% use PMI EVM
- Defense/government – 71% use ANSI

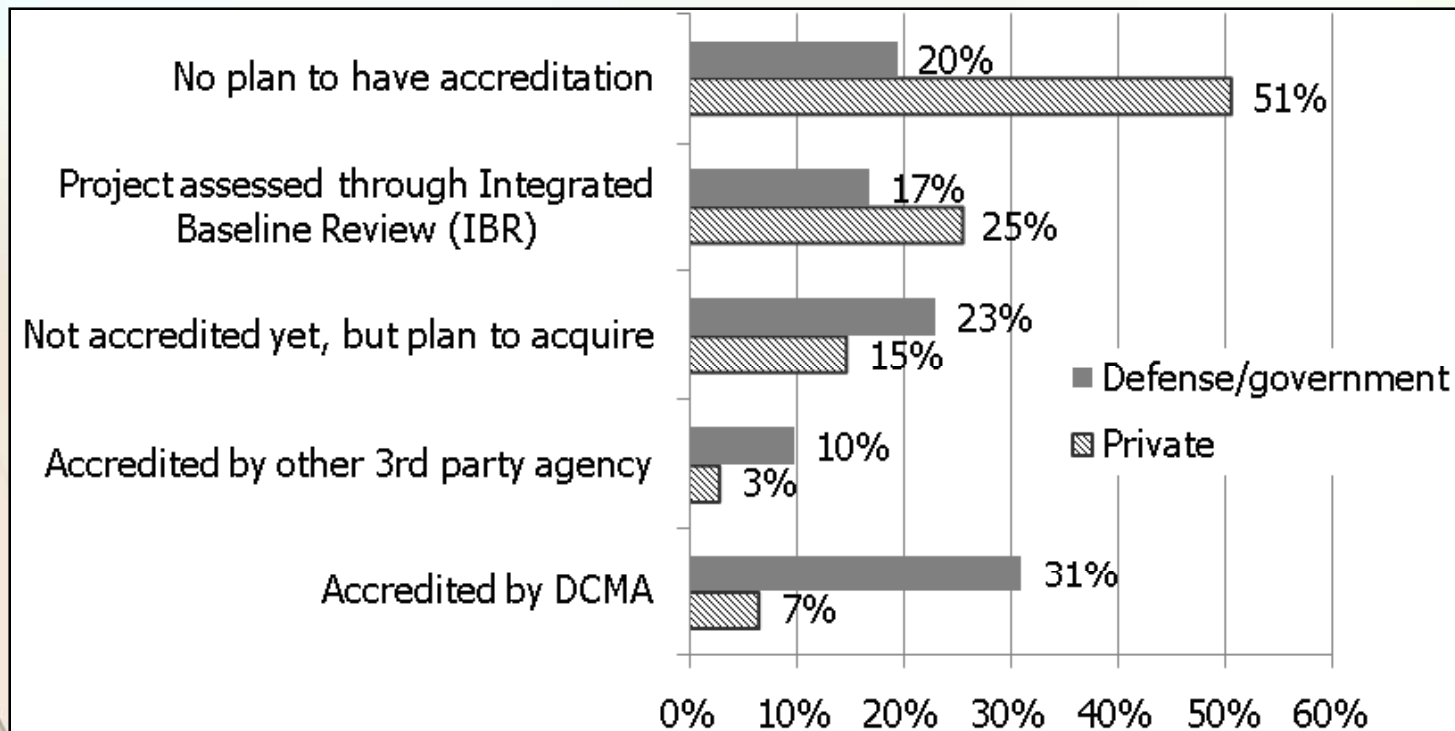
By motivation

- Mandatory use – 61% use ANSI
- Voluntary use – 64% PMI EVM



4. EVM Service Market – Certification

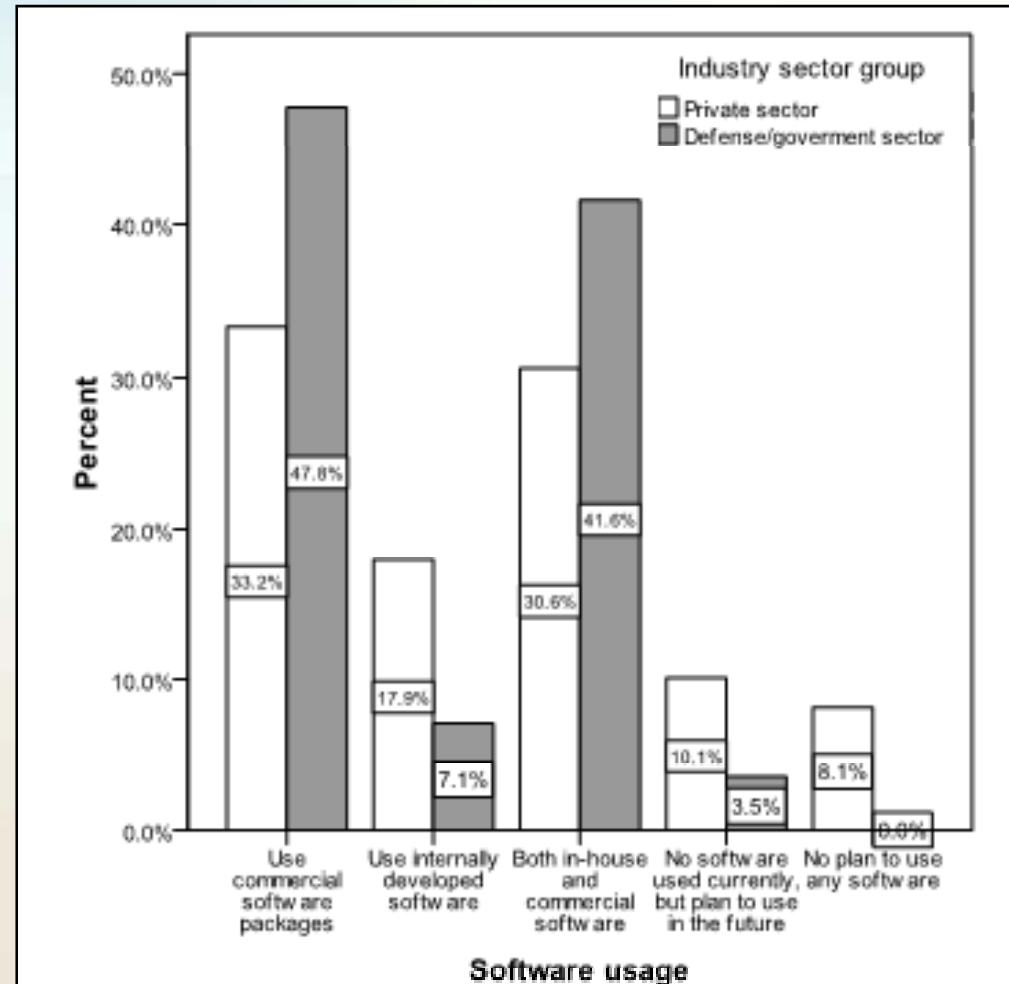
- **EVM system certification**
 - Mostly associated with defense/government and mandatory EVM use
 - Integrated Baseline Review (IBR) also used (23%)
- **Personnel certification**
 - E.g. AACE EVP



EVM Service Market – Software

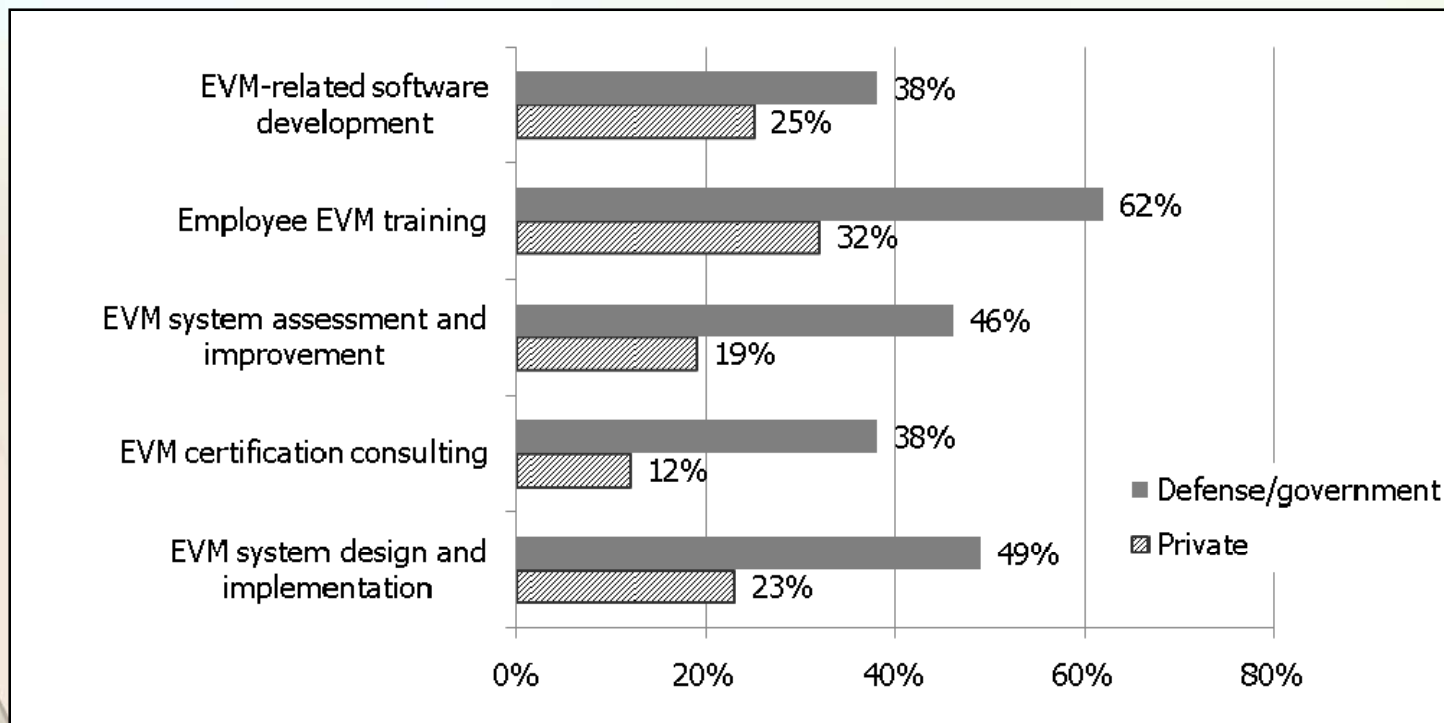
Software strategy

- Commercial off shelf software (37%)
- In-house development (15%)
- Both commercial software and in-house developed programs (34%)



EVM Service Market – Consulting/Training

- **EVM consulting**
 - Training
 - System design & implementation
 - System assessment/improvement
 - Certification
 - Software development



4. EVM & Project Outcomes

| EVM Contributions | Defense/ Government | Private Sector | Test Sig. |
|--|------------------------|-------------------|--------------|
| 1. EVM provides early warning of performance problems. | 4.51* | 4.48 | 0.665 |
| 2. EVM assists the project team to achieve cost objectives. | 4.29 | 4.27 | 0.938 |
| 3. EVM improves communication among project team members. | 4.28 | 4.11 | 0.037 |
| 4. EVM assists the project team to achieve schedule objectives. | 4.19 | 4.06 | 0.148 |
| 5. EVM improves project scope management. | 4.17 | 3.78 | 0.000 |
| 6. Overall, EVM is a cost-effective tool for performance management. | 4.25 | 4.24 | 0.941 |

* On a 1-5 scale

5. Improving EVM Usage

- **Barriers for EVM users & non-users**
 - Consistently top ranked issues regardless of user characteristics
 - Lack of EVM knowledge & experience
 - Lack of “motivation” and reasons behind it
 - Applicability issue
 - Cost-effectiveness issue

| Barriers for Non-Users | Defense/ Government | Private | Test Sig. |
|---|--------------------------------|----------------|----------------------|
| Lack of EVM expertise and experience | 50% | 58% | 0.453 |
| Not required by clients | 46% | 43% | 0.695 |
| Lack of top management support | 46% | 48% | 0.843 |
| Lack of interests of the project team | 25% | 29% | 0.628 |
| Barriers for Users | Defense/ Government | Private | Test Sig. |
| Not required by clients | 47% | 38% | 0.080 |
| Lack of motivation and top management support | 43% | 38% | 0.360 |
| Inadequate EVM knowledge and experience | 42% | 47% | 0.363 |
| EVM is not suitable for all projects | 33% | 28% | 0.345 |

6. Success Factors for EVM Implementation

- **A scene of a supportive organizational environment**
 - A visionary top management that provides authority and resources
 - Knowledge project team that is motivated and committed
- **Adequate training**
- **Support from other mature project-management functions**

| Top 5 Critical Success Factors (CSF) | Defense/ Government | Private | Category |
|--|--------------------------------|----------------|------------------|
| 1. Top management support | 4.8* | 4.6 | Culture/resource |
| 2. Buy-in of EVM by the project-management staff | 4.6 | 4.2 | Culture |
| 3. EVM training | 4.5 | 4.3 | Expertise |
| 4. Culture of the organization and top management leadership style | 4.4 | 4.2 | Culture |
| 5. Maturity of the organization's project-management system | 4.2 | 4.2 | Expertise |

* On a 1-5 scale

7. Discussion (1/2)

1. EVM has gained wide acceptance in private industry (17 sectors represented), and received worldwide attention (61 countries represented, especially U.S., Middle East, South Asia, Canada, and Europe);
2. The practice of EVM varies greatly with the highly diversified user profile;
3. Industry sector and motivation for EVM usage are the most discerning factors to differentiate among EVM practices;
4. The decision regarding whether EVM is applicable to a particular project is affected by many factors, and budget size appears to be the most important decision factor;

Discussion (2/2)

5. The ANSI/EIA 748 standard (especially in defense/government) and the PMI EVM practice standard (especially in private industry) are the most widely used international industry standards;
6. EVM's contributions and cost effectiveness are widely recognized by all users regardless of their industry sector, motivation, country, etc.;
7. Lack of motivation and lack of expertise are perceived by both EVM users and non-users as the top barriers for them to enhance their level of EVM usage;
8. A supportive and knowledgeable organizational environment is critical for successful EVM implementation.

Acknowledgement

Thank PMI and PMI-CPM for the funding and support!



Our Research Website

<http://www.tech.uh.edu/evm/>