

# Academic Research Study - Improving the Reliability of Earned Value Management System (EVMS) Implementation: Development of an EVMS Maturity Level Rating Index

## Briefing Paper

February 2019



# **Improving the Reliability of Earned Value Management System Implementation: Development of an EVMS Maturity Level Rating Index**

February 7, 2019



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School of Sustainable Engineering and the Built Environment  
Arizona State University**



**A genuine collaborative partnership by Government and Industry is required for this research to succeed**

- **People – expert knowledge, proper attitude, communication skills**
- **Time – commitment to three year effort**
- **Data – sharing of EVMS successes/failures**

# Research Study Leadership



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**\*PI – Principle Investigator**



## Arizona State University – Proven Track Record with Similar Research Projects

### – Dr. G. Edward Gibson Jr. (Edd Gibson)

- Professor and Sunstate Chair in Construction Management and Engineering, in the School of Sustainable Engineering and the Built Environment at Arizona State University
- Proven record of similar research with Construction Industry Institute (CII)
- Twice selected as CII Researcher of the year
- Extensive experience in working with industry research teams, including the development of project definition rating indexes for industrial (large and small), building and infrastructure (large and small) projects and risk assessment for international projects. Recently, he led development of the FEED MATRS tool for CII.

### – Dr. Mounir El Asmar

- Associate Professor in the Del E. Webb School of Construction at Arizona State University, and the Co-Director of the National Center of Excellence on SMART Innovations
- 2014 CII Distinguished Professor Award, the 2015 ASCE Thomas Fitch Rowland Prize, and the 2017 DBIA Distinguished Leadership Award.
- He worked closely with Dr. Gibson on development of the FEED MATRS tool.

### – Two PhD Students



- OMB A-11, FAR 34.2/52.234, agency directives require use of EIA-748 compliant EVMS for major acquisitions
- Contractors have flexibility to do what is reasonable and makes sense in implementing an EVMS suited to management needs provided they meet EIA-748 GL intent
- Compliance assessment methods based on preference
- Finer points of EVMS compliance continually debated
- Cost of obtaining EVMS certification is significant; contractors sometimes obtain multiple EVMS certifications
- OMB has encouraged **reciprocity** between agencies in acceptance of a contractor's certified EVMS

# Why Conduct a Research Effort



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- Typically Government and Industry work independently to define EVMS compliance assessment bases/methods/tools
- Why not have common, consistent, and specific interpretation defining expected attributes/characteristics and test protocols with thresholds?
- Collaboratively developed EVMS maturity level rating index could assist in:
  - Implementing and maintaining a mature and effective EVMS
  - Assessing degree to which an EVMS is mature and effective
  - Fielding consistent EVMS across a company

- **Characteristics of the contractor's EVMS meet the intent of the 32 guidelines**
  - Embodied in the integrated processes and sub-processes of a contractor's methods of operation; define data methods and uses
- **Following data characteristics shift perspective**

from generating data  
for reporting

to producing  
trustworthy data and  
information for  
management

- **Current** - As agreed to or directed, such as time now, end of reporting period, or a predetermined specific period of time.
- **Accurate** - Without error, mistake, miscalculations, or anomalies.
- **Complete** - Comprehensive, all inclusive, total, or entire.
- **Repeatable** - Ability to reproduce current, accurate, complete, and auditable results.
- **Auditable** - Ability to trace the source through the entire system/process to validate the results.





- **Compliant EVMS should provide all users (CAM, PCE, PM, PD, AE, CO), confidence that the EVMS as implemented is an Effective EVMS**
- **Resultant schedule, cost, and technical performance data is trustworthy**
  - Accurately reflects actual operations and current status
  - Credibly predicts completion estimates
  - Correctly identifies programmatic risks or other technical issues requiring corrective action
  - Can be reliably used by management for decision-making



**This research and development activity will result in a method to assess the maturity of EVMS processes and systems and at the same time address the accuracy of the existing process by looking at its contextual factors such as resources, management support and contracting approach.**

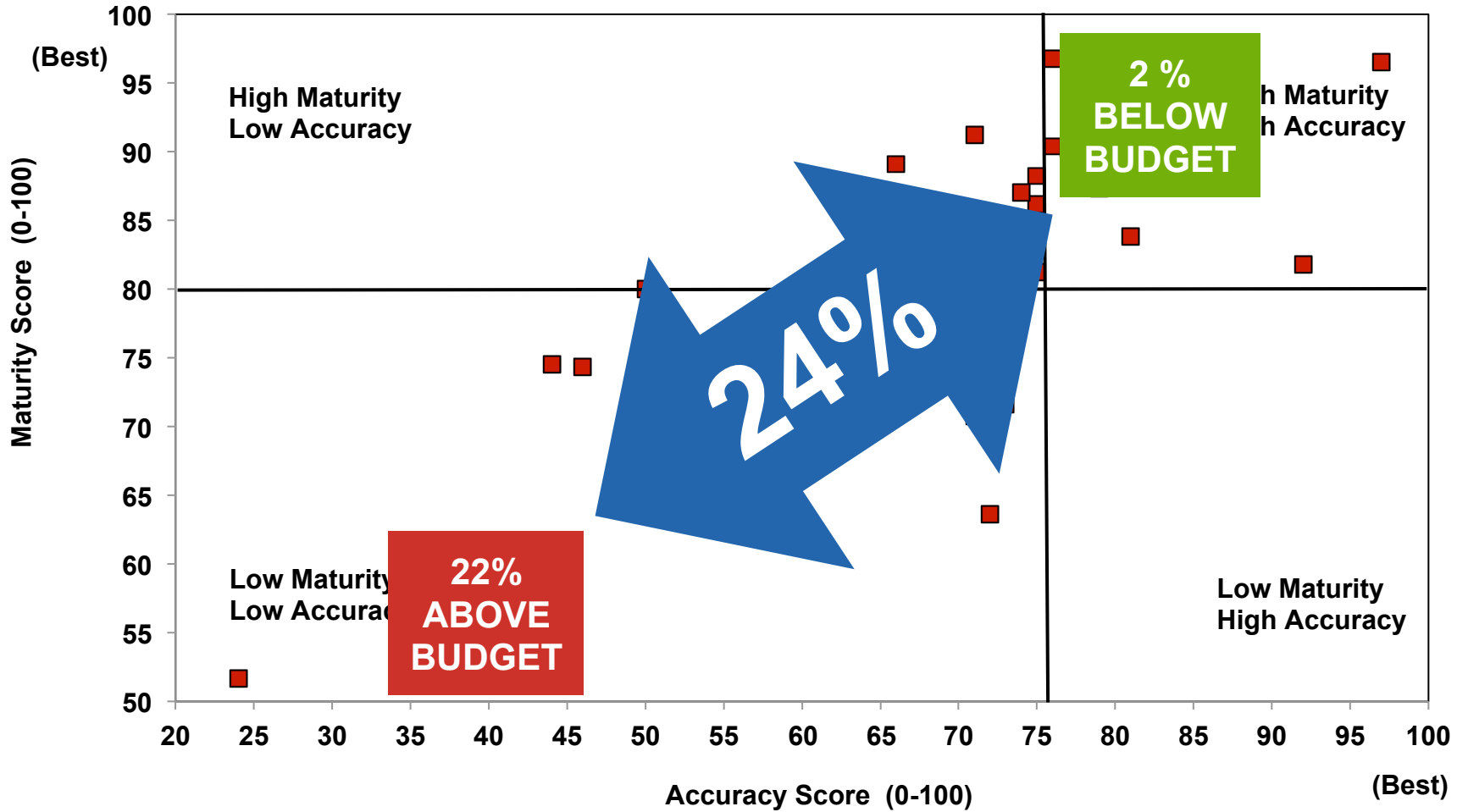
*Using CII's Front End Engineering Design (FEED) Maturity and Accuracy Total Rating System (MATRS) as a guide in its methodology*



1. **Develop a testing method/tool to weight each EIA-748 Guideline attribute** using CII PDRI model framework as a basis.
  - The resultant method/tool may present differing variants to accommodate the unique missions, program and project types of DOE, DoD, NRO, NASA, other CFAs, and other participating organizations.
2. **Evaluate the enabling factors** that drive the effective use of the EVMS
  - i.e., lack of clear contract requirements, customer advocacy, the size and experience of the project team, personnel turnover, etc.
3. **Verify and validate through rigorous testing** the reliability of EVMS using a maturity level rating index
  - through credible proven research techniques for broad applicability to research group members.
4. **Determine what typical percentage of a program/project cost must be invested to implement and maintain a mature and effective EVMS.\***
5. **Quantify the benefits**
  - By examining EVMS maturity and its ability to control/mitigate cost or schedule increases or reductions in scope.\*

\*Complementary purpose

# CII's FEED MATRS (An Example)





Create a high-value and innovative assessment and rating mechanism that specifically applies to the EVMS with high usage and impact for government and industry. Deliverables include:

- A proven EVMS implementation and assessment mechanism/process;
- Automated Toolset with associated user instruction documentation;
- Research summary giving an overview of the research and key findings;
- Research report providing a detailed discussion of all research work;
- Informs EIA-748E update;
- Training sessions; and
- EFCOG/NDIA conference presentations.

# Methodology (11 Steps)



1. Perform an extensive **literature review**, to develop a detailed basis for the effort.
2. **Recruit** experienced team members representing the various agencies/ organization benefiting from the project.
3. Develop shared and **consistent definitions** where needed.
4. Work closely with the Research Team (RT) to further **refine the scope, objectives, and tasks**
5. Conduct a **short questionnaire of EVMS practitioners** within NDIA and EFCOG concerning the RT's working definition as applicable and the expected impact of assessing the maturity and accuracy of its EVMS / controls component.
6. Coordinate with DOE/other CFA/GAO/NDIA/EFCOG and **develop the assessment mechanism** using input and feedback from the RT and questionnaire to support the development of both maturity and accuracy of EVMS development.



7. Identify the external participants and projects to include in this effort, **develop the data collection approach** and evaluation methods.
8. **Conduct a series of workshops** for invited personnel to comment on the tool and importance of identified factors. It is envisioned that these workshops will tap expertise from 20-40 owner and contractor organizations, both inside and outside of NDIA and EFCOG membership, including OGA if possible, with representation of between 40 and 60 individuals.
9. **Finalize the assessment mechanism** and test its effectiveness with both completed and ongoing projects. It is anticipated that approximately 25-35 completed projects (after the fact) and 5-15 ongoing efforts will be assessed looking specifically at the tool's effectiveness in evaluating the efficacy of the EVMS implementation.
10. Working closely with the RT, **synthesize the results** of the quantitative and qualitative data analysis into a concise guide.
11. **Develop publications and presentations.** Include results and any tools developed; provide recommendations for updates to the EVMS publications as applicable.

# Research Schedule



Research Schedule		2019												2020												2021											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
	<i>NDIA IPMD Conf.</i>		◆					◆						◆						◆						◆						◆					
	<i>Team meetings (tentative)</i>		◆			A S U		◆		A S U				A S U	◆		◆			◆		A S U				A S U	◆					◆			◆	◆	
	<i>Interim Reports</i>							◆				◆						◆					◆						◆								
	<i>Training</i>																															◆		◆			
1	Review of Literature and State of Practice	█	█																																		
2	Recruit Team	█	█	█																																	
3	Define Project	█	█	█	█																																
4	Finalize Scope and Objectives	█	█	█	█	█																															
5	Questionnaire			█	█	█	█	█																													
6	Develop Draft Assessment Tool			█	█	█	█	█	█																												
7	Identify Data Sample			█	█	█	█	█	█	█																											
8	Conduct Workshops												█	█	█	█	█	█	█	█	█	█	█														
9	Finalize and Test												█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█		
10	Synthesize Results into Guide																							█	█	█	█	█	█	█	█	█	█	█	█		
11	Develop Publications and Presentations																																				

Draft





## **Expected research participants (SMEs) and benefactors include:**

- the National Defense Industrial Association (NDIA)
- the Energy Facility Contractors Group (EFCOG)
- Cognizant Federal Agencies:
  - Department of Energy
  - Department of Defense
  - Defense Contract Management Agency (DCMA)
  - National Aeronautics and Space Administration (NASA)
  - National Reconnaissance Office (NRO)
  - Federal Aviation Administration (FAA)
  - Others
- Office of Management and Budget (OMB)
- Government Accountability Office (GAO)



- Research team members meet minimum of quarterly with more meetings up front to fully set up the research effort
- Report to Stakeholders every 6 months
- Presentation to Stakeholders at conclusion
- Assessment Tool
- Documentation
  - Research Report
  - Research Summary
  - Implementation Resource

# We need volunteers



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- Three-year effort
- Looking for 10 – 15 additional volunteers
- Serve as expert research team (RT) member working closely with the ASU research team



# Volunteers Level of Effort

- Meet face to face 12-15 times x 1.5 days over three years (half in the Phoenix area and half in conjunction with NDIA IPMD)
- Help with developing definitions, tool structure, etc. (mental input)
- Help with identifying projects for study, people for interview
- Possibly host a one day data collection workshop (at locations TBD); about four or five will be needed in total
- Help with recruiting participants in those workshops
- Help with writing (as a [website](#)) and beta testing software





- **Qualifications: >10 years project controls/EVMS on major capital projects**
- **Budget approval for travel and participation**
- **Recognized EVMS thought leaders and implementors at a more senior level**
- **Diverse representation and backgrounds across agencies and contractors**



# Benefits of team participation

- **Ability to influence the final outcome and gain early insight into findings**
- **Opportunity to gain first access for adoption of the developed tool and process/methods**
- **Recognition as a thought leader in relation to EVMS**
- **Opportunity to network with expert colleagues**
- **Satisfaction from knowing this effort will impact industry**
- **Have fun!**



- **Research effort and products are needed**
- **Commitment from Government and Industry needed to conduct research**





# Bottom Line (cont'd)

- **Subject Matter Experts from Industry and Government needed to form the research team**
  - Support with time
  - Support with travel funds
  - Support with program/project data
  - Help host meeting(s)
  - Align some meetings with NDIA locations and times
  - DOE support to CII research efforts suggests that a participant will need about 10 to 20 hours a month with many of the more detailed efforts by the ASU team.
- **Agencies/organizations desiring to participate will nominate volunteers**







# QUESTIONS