



# Process In Execution Review (PIER) and the SCAMPI B Method

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# Problems and Challenges



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## **DoD Weapon Systems Acquisition Continues To Be High Risk Area**

While DOD's acquisition process has produced the best weapons in the world, it also yields undesirable consequences in weapon system programs – cost increases, schedule delays, and performance shortfalls

Problems occur because weapon programs do not capture early on the requisite knowledge that is needed to effectively manage risks

Programs move forward with unrealistic cost and schedules estimates, lack clearly defined and stable requirements, use immature technologies, and fail to solidify design and manufacturing processes at appropriate junctures in development

As a result, programs require more resources than planned, the buying power of the defense dollar is reduced, and funds are not available for other competing needs

*Paul Francis, Director  
Acquisition and Sourcing Management  
U.S. Government Accountability Office  
May 18, 2004*





## **Problem Statement**

**A statement of organizational process maturity or capability level does not guarantee performance to that same level of proficiency on an individual project**

**Most DoD contractors claim high maturity/capability levels, yet from the perspective of the acquirer, systems engineering and program management practices are severely lacking**

**Teaming arrangements further cloud the issue of process execution and proficiency**

**Associated problems may not be evident until significant cost, schedule, or performance objectives have been missed at a late point in the program where corrective actions are very costly**

**How can the acquirer gain the necessary insight into process execution and proficiency as well as reinforce desired behaviors?**



# **Development Challenges**

**Huge system/software engineering endeavors in aircraft, space vehicles, ground systems, C2, C4ISR, battle mgt, etc**

**Significant risks for acquisition programs**

- **Multi-million SLOC programs; “hybrid” systems combining legacy re-use, COTS, new development**
- **Multi-contractor teams using different processes; Dispersed engineering & development locations**
- **New technologies create opportunities/challenges; products change/evolve**
- **Business/operational needs change - often faster than full system capability can be implemented**
- **Contractor and Acquirer skills shortfalls; Cost and schedule constraints**



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## **Acquirers' Concerns**

**Appraisals are conducted just for the “ratings”**

**Appraisal team/lead objectivity and expertise is questionable, especially with high maturity appraisals**

**Appraisals are conducted on dissimilar projects and/or in unrelated organizations/sites**

**The effect of teaming arrangements on project process performance is not accounted for**

**There is a lack of insight into contractor process execution on specific projects**

**The effect of process immaturity in acquiring organizations**



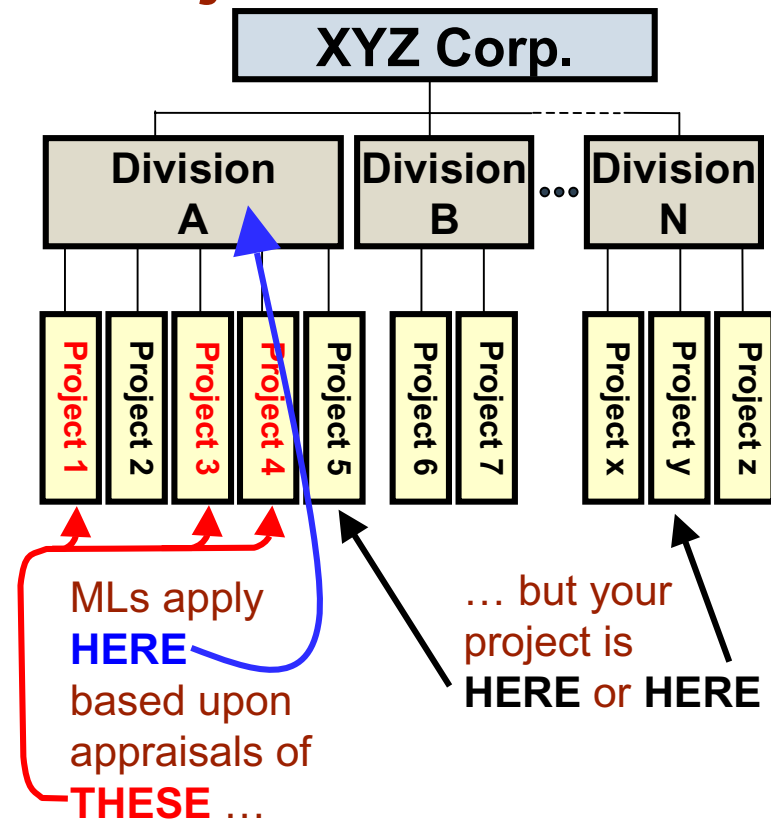
## High Maturity Organizations

Maturity Levels are indicators of organizational *potential performance*.

They describe how the next project may *perform* based on a sampling of existing projects.

Maturity Levels reside at the organizational level and are not an indication of how an individual project *is performing*.

## High Maturity Projects





## **Acquirer Needs**

**A means to assess developer process execution on their project**

- **Process performance**
- **Process capability**
- **Process adherence**

**A means to assess project process execution across large, distanced, and diverse teams**

**A means to assess all technical and project management process areas**

- **Engineering**
- **Project Management**
- **Financial Management**
- **Support Processes**

**A means to assess project risks driven by developer process execution**

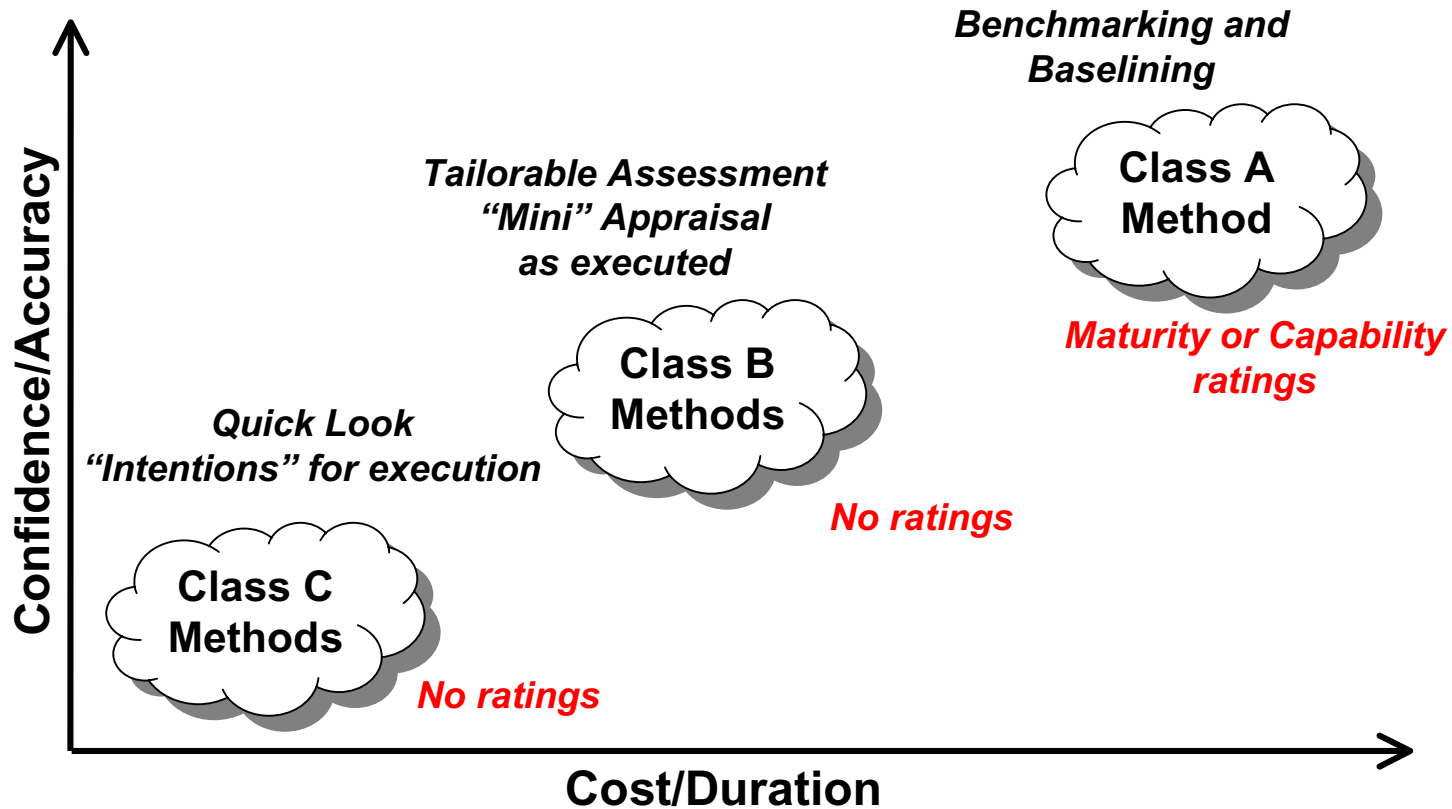
**A means to assess the potential process execution risks in source selection**



# Assessment Alternatives



# Standard CMMI Appraisal Method for Process Improvement (SCAMPI)

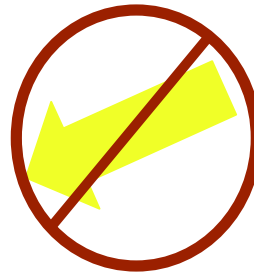




# Assessment Alternatives Mapped to Acquirer Needs

## SCAMPI Method A

Institutionalization  
Organizational focus  
Rigorous, expensive  
Ratings

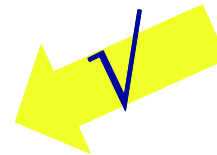


*Resource Intensive*  
*Limited utility for source selection*

*Contract Monitoring*  
*Competitive Downselect*

## SCAMPI Method B

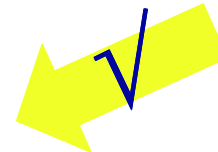
Deployment and execution  
Evidence of implementation  
What they are doing



*Contract Monitoring*  
*Source Selection*

## SCAMPI Method C

Approach  
Plan for execution  
What they will do





# Process In-Execution Reviews



## PIER Ground Rules

Use the process model – CMMI

- Interview questions based on model

Appraisal of process performance and adherence

Focus on risk assessment – risks associated with process performance, adherence, and capability

Observe strict confidentiality

- Results not attributable to individuals or interview groups

Approach SCAMPI collaboratively

Results in actionable findings by Program Office and/or Contractor



## What a PIER Is and Is Not

***Is*** an appraisal (SCAMPI-B) of the execution of and the risks associated with process implementation of the entire project team, including sub-contractors

***Is*** a mechanism to provide insight into the operations of a specific program with respect to the organization's published maturity level

***Is not*** a formal appraisal (SCAMPI-A)

No rating

No multiple projects within the organization; focus on specific project

No coverage of entire life cycle; focus on phase or near-term milestones



## **Phase 1: Plan and Prepare for the Appraisal**

### **Appraisal Team/Lead**

- Lead assists Sponsor in matching appraisal w/business objectives
- Lead and sponsor agree on details of appraisal plan
- Lead prepares team members
- Prepares in-briefs for contractor
- Lead performs readiness review

### **SEI/MITRE/ESC**

- Templates and guidance on plan preparation & PIER execution
- Assist PMO
- Model scope guidance
- Role definition guidance for customer & contractor
- Security procedures

### **Contractor**

- Coordinates with the PMO
- Identify site coordinator, process lead, and non-voting team member (as appropriate)
- Schedule facilities & resources to support the plan
- Collect relevant objective evidence
- Prepare project to support PIER (schedule interviews, briefings, demos)

### **PMO**

- Establishes contractual arrangement
- Sponsors appraisal
- Establishes business goals
- Coordinates with Contractor
- Coordinates & approves appraisal plan



## **Phase 2: Conduct Appraisal**

### **Appraisal Team/Lead**

- Examines objective evidence
- Verifies the implementation of the organization's practices
- Validates findings
- Generate appraisal results
- Lead collects lessons learned
- Data & artifacts are appropriately archived or destroyed

### **SEI/MITRE/ESC**

- Evidence collection tool
- Findings briefing template and guidance
- On-site scheduling guidance
- Guidance for preparation and delivery of preliminary findings
- Further definition of customer & contractor roles

### **Contractor**

- Provide Project context briefing
- Ensure contractor responsibilities are met to support PIER (briefings, interviewees, demos)
- Support additional evidence requests in a timely manner
- Provide PIER team facilities in accordance with plan requirements

### **PMO**

- Coordinate as necessary with Team Lead & Contractor
- Resolve any appraisal execution issues



## Phase 3: Report Results

### Appraisal Team/Lead

- Delivers final findings to customer & to contractor
- Reports results to PIER steward as authorized by PMO

### SEI/MITRE/ESC

- Findings template
- Final findings delivery guidance
- Disclosure statement guidance
- ESC PIER Custodian who retains information as observations & trends without project or Contractor attribution

### Contractor

- Attend outbrief
- Analyze results & incorporate into next cycle of process improvements

### PMO

- Attends outbrief
- Owns final findings & authorizes release of information to ESC PIER Custodian
- Analyzes results & integrates into project data for future use in award fee, program reviews, improvement initiatives, etc.



## Example Integrated Supplier Management

### Description:

The purpose of Integrated Supplier Management is to proactively identify sources of products that may be used to satisfy the project's requirements and to manage selected suppliers while maintaining a cooperative project-supplier relationship.

### Strengths:

- Proactive engagement with suppliers on early Time and Materials subcontracts expedited the creation of supplier requirements documents and SOWs for the program.

### Weaknesses:

- The lack of monitoring of supplier processes may cause execution of supplier agreements to be compromised. (SG 2)
- The Subcontract Management Plan is still in draft form. (GG 2)



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## **Example Integrated Supplier Management**

**Notes:**

- Issues with critical subcontractors exist and continue to be worked

**Example Only**



# Example Project Management Specific Practices

PA	1.1	1.2	1.3	1.4	1.5	1.6	1.7	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.3	3.5	4.1	4.2	4.3
PP	G	G	G	G				G	G	G	G	G		G	G	G					
PMC	G	G	G	G	G	G	G	G	G	G											
SAM	G	G	G					G	G	G	B										
IPM	G	G	G	G				G	G	G					G	G			G	G	G
RSK	G		G					Y	Y						G	G					
IT	G	Y	G					G	G	G	G	G									
ISM	G	G						Y	G	G											
<b>KEY</b>																					
<span style="display: inline-block; width: 15px; height: 15px; background-color: green; border: 1px solid black;"></span> Green <span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black; margin-left: 10px;"></span> Yellow <span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black; margin-left: 10px;"></span> Red <span style="display: inline-block; width: 15px; height: 15px; background-color: blue; border: 1px solid black; margin-left: 10px;"></span> Blue <span style="display: inline-block; width: 15px; height: 15px; background-color: pink; border: 1px solid black; margin-left: 10px;"></span> Not Yet <span style="display: inline-block; width: 15px; height: 15px; background-color: black; border: 1px solid black; margin-left: 10px;"></span> Not Appraised <span style="display: inline-block; width: 15px; height: 15px; background-color: gray; border: 1px solid black; margin-left: 10px;"></span> Not Applicable																					



# PIER Commitment

## Appraisal Team/Lead

- Ensure team composition is high-caliber
- Everyone shares work load based on team expectations
- Collect lessons learned to improve the PIER (SCAMPI-B) process

## SEI/MITRE/ESC

- Support and refine PIER (SCAMPI-B) method
- ESC PIER Custodian
- Work with PMO to ensure appropriate interpretation & use of findings
- Ensure confidentiality of results
- Provide updated templates and materials

## Contractor

- Participation
- Evidence prepared with adequate time to review prior to on-site
- Resolution of access to information issues in advance of on-site
- Relevant personnel provided for interviews
- Act on findings

## PMO

- Contractual obligation
- Resources
- Act on findings



# PIER Lessons Learned

## Appraisal Team/Lead

- Have consistent approach among team leads across program PIERs
- Train team on appraisal tools and templates prior to the appraisal
- Complete document review prior to start of the on-site
- Site coordinator needs to know the CMMI model
- Team building activities critical

## SEI/MITRE/ESC

- Need guidance and templates to ensure consistency of PIERs
- Capture observations and trends to isolate potential systemic problems
- Plan PIERs to avoid impacting peak or critical activities
- Contractor non-voting team member proved very valuable
- Credibility counts!

## Contractor

- Provides feedback on process implementation
- Non-trivial amount of effort to support the PIER activity
- Demonstration of organization's commitment to CMMI

## PMO

- Provides confidence in contractor through insight
- Process proficiency and execution varies substantially
- Basis for assessing contractor responsiveness
- PMOs must work internal processes to complement Contractor



# ESC Case Studies



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## **ESC Case Studies**

### **Joint Environmental Tool Kit (JET)**

- **Contract monitoring**
- **Risk identification**
- **Competitive downselect**

### **KG-3X Crypto Modernization Program**

- **Contract monitoring**
- **Risk identification**
- **Competitive downselect**

### **Joint Mission Planning System (JMPS)**

- **Contract monitoring**
- **Risk identification**



# Summary



## **Next Steps for PIER**

### **Expand the scope of PIERs**

#### **Financial Management**

**Assess execution of Earned Value Management System (EVMS) practices especially in correlating product maturity and performance to earned value – Technical Performance Measures (TPMs)**

#### **Product Quality**

**Product quality in terms of technical maturity and product performance using models, simulations, prototypes, and early functional assessments**

**May integrate with the Integrated Baseline Review (IBR) process**



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## **Summary**

**SCAMPI-A appraisals and advertised CMMI ratings do not guarantee that individual projects will perform to those levels of proficiency**

**PIERs have validated the SCAMPI-B Method in a contract monitoring context**

**PIERS provide insight into project process execution, both for Program Office and for Contractor**

**PIERS demonstrate program office commitment to process**

**PIERs can be complementary components to other reviews and technical interchanges**

**PIERs can be used to support award fee evaluations**



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