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Interpreting CMMI[SM] for Operational Organizations

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Operational Organizations

An operational organization is any group of individuals teamed together to carry out a mission. A mission is a specific task or set of tasks with which a person or a group is charged to carry out.

Task requirements could come from external customers or from internal sources.

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Task Defined

For the purpose of this briefing, an operational organization is considered to have mission elements or teams that carry out mission tasking or subsets of that tasking. These tasks could be either mission-essential tasks or mission-support tasks [USAF 2000].

Mission-essential tasks: A mission-essential task is any task that directly accomplishes mission requirements.

examples: flight operations, satellite control, mission management, etc.

Mission-support tasks: A mission-support task is any task that supports the accomplishment of mission requirements.

examples: spares replenishment, mission planning, new employee orientation, etc.

[USAF 2000] United States Air Force, Air Force Instruction 90-1102. Performance Management, <afpubs.hq.af.mil/pubfiles/af/90/afi90-1102/afi90-1102.pdf>, February 2000.

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Examples

Examples of Operational organizations:

- military units
- educational institutions
- health care facilities
- fire and police units
- non-profit organizations

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Motivation

Operational organizations, like engineering organizations, can benefit from a disciplined approach to improving their operational effectiveness.

This effectiveness can be measured in terms of lower operating costs and higher throughput and yields on mission outcomes as well as improved working conditions and morale of operational personnel. When considering military units or emergency response teams, disciplined planning, execution, operational risk management, and continuous improvement could be critical to winning the war or saving lives.

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CMMI For Product Development

Process Management	Organizational Process Focus Organizational Process Definition Organizational Training Organizational Process Performance Organizational Innovation and Deployment
Project Management	Project Planning Project Monitoring and Control Supplier Agreement Management Integrated Project Management Integrated Teaming Risk Management Quantitative Project Management
Engineering	Requirements Management Requirements Development Technical Solution Product Integration Verification Validation
Support	Configuration Management Process and Product Quality Assurance Measurement and Analysis Causal Analysis and Resolution Decision Analysis and Resolution Organizational Environment for Integration

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Concepts Applied to Operations

Operational organizations can use these simple process-improvement concepts to improve their practices.

Operational organizations contain mission elements or teams that do the following:

- plan their work
- carry out mission-essential and support tasks
- measure the effectiveness of their mission
- define operational procedures and processes
- control the configuration of these procedures and other work products
- identify and manage operational issues and risks
- make structured decisions
- continuously look for ways to improve mission effectiveness

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CMMI for Operational Orgs

Category	Process Areas
Mission Management	Task Planning Task Monitoring and Control Supplier Agreement Management Integrated Mission Management Operational Risk Management Quantitative Mission Management
Support	Configuration Management Process and Mission Quality Assurance Measurement and Analysis Operational Readiness Decision Analysis and Resolution Causal Analysis and Resolution
Operational Process Management	Operational Process Focus Operational Process Definition Operational Training Operational Process Performance Operational Innovation and Deployment

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Mission Management

Mission Management is a grouping of those process areas that focus on improving the management of an operational mission.

This process area category would contain the following process areas:

- Task Planning (Project Planning interpreted)
- Task Monitor and Control (Project Monitor and Control interpreted)
- Supplier Agreement Management (Supplier Agreement Management interpreted)
- Integrated Mission Management (Integrated Project Management interpreted)
- Operational Risk Management (Risk Management interpreted
- Quantitative Mission Management (Quantitative Project Management interpreted)

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Task Planning

Purpose: To establish and maintain plans that define mission-essential and support tasks.

SG 1 Establish Estimates
- SP 1.1-1 Estimate the Scope of the Task
- SP 1.2-1 Establish Estimates of Task Attributes
- SP 1.3-1 Define Task Timeline
- SP 1.4-1 Determine Estimates of Effort and Cost

SG 2 Develop a Mission Plan
- SP 2.1-1 Establish the Budget and Schedule
- SP 2.2-1 Identify Operational Risks
- SP 2.3-1 Plan for Data Management
- SP 2.4-1 Plan for Task Resources
- SP 2.5-1 Plan for Needed Knowledge and Skills
- SP 2.6-1 Plan Stakeholder Involvement
- SP 2.7-1 Establish the Task Plan

SG 3 Obtain Commitment to the Plan
- SP 3.1-1 Review Plans that Affect the Task
- SP 3.2-1 Reconcile Work and Resource Levels
- SP 3.3-1 Obtain Plan Commitment

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Task Monitor and Control

Purpose: To provide an understanding of the task's progress so that appropriate corrective actions can be taken when the task's performance deviates significantly from the plan.

SG 1 Monitor Task Against Plan

- SP 1.1-1 Monitor Task Planning Parameters
- SP 1.2-1 Monitor Commitments
- SP 1.3-1 Monitor Operational Risks
- SP 1.4-1 Monitor Data Management
- SP 1.5-1 Monitor Stakeholder Involvement
- SP 1.6-1 Conduct Progress Reviews
- SP 1.7-1 Conduct Milestone Reviews

SG 2 Manage Corrective Action to Closure

- SP 2.1-1 Analyze Issues
- SP 2.2-1 Take Corrective Action
- SP 2.3-1 Manage Corrective Action

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Integrated Mission Management

Purpose: To establish, manage, and integrate mission-essential and support tasks and the involvement of the relevant stakeholders according to an integrated and defined process that is tailored from the organization's set of standard processes.

SG 1 Use the Task's Defined Process

- SP 1.1-1 Establish the Task's Defined Process
- SP 1.2-1 Use Organizational Process Assets for Planning Task Activities
- SP 1.3-1 Integrate Mission Task Plans
- SP 1.4-1 Manage the Mission Tasks Using Integrated Plans
- SP 1.5-1 Contribute to the Organizational Process Assets

SG 2 Coordinate and Collaborate with Relevant Stakeholders

- SP 2.1-1 Manage Stakeholder Involvement
- SP 2.2-1 Manage Dependencies
- SP 2.3-1 Resolve Coordination Issues

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Operational Risk Management

Purpose: To identify potential problems before they occur, so that risk-handling activities may be planned and invoked as needed across the mission tasks to mitigate adverse impacts on achieving mission objectives.

SG 1 Prepare for Operational Risk Management

- SP 1.1-1 Determine Risk Sources and Categories
- SP 1.2-1 Define Risk Parameters
- SP 1.3-1 Establish an Operational Risk Management Strategy

SG 2 Identify and Analyze Operational Risks

- SP 2.1-1 Identify Operational Risks
- SP 2.2-1 Evaluate, Categorize, and Prioritize Risks

SG 3 Mitigate Operational Risks

- SP 3.1-1 Develop Operational Risk Mitigation Plans
- SP 3.2-1 Implement Operational Risk Mitigation Plans

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Taxonomy of Operational Risks

A. Mission

1. Tasking/Orders/Plans
   - a. Stability
   - b. Completeness
   - c. Clarity
   - d. Validity
   - e. Feasibility
   - f. Precedent
   - g. Timeliness
2. Mission Execution
   - a. Efficiency
   - b. Effectiveness
   - c. Complexity
   - d. Timeliness
3. Product
   - a. Usability
   - b. Effectiveness
   - c. Timeliness
4. Operational Systems
   - a. Capacity
   - b. Suitability
   - c. Usability
   - d. Familiarity
   - e. Reliability
   - f. System Support

B. Work Processes

1. Operational Processes
   - a. Formality
   - b. Suitability
   - c. Process Control
   - d. Familiarity
   - e. Product Control
2. Maintenance Processes
   - a. Formality
   - b. Suitability
   - c. Process Control
   - d. Familiarity
   - e. Product Control
3. Management Process
   - a. Planning
   - b. Organization
   - c. Management Experience
   - d. Program Interfaces
4. Management Methods
   - a. Monitoring
   - b. Personnel Management
   - c. Quality Assurance
   - d. Configuration Management
5. Work Environment
   - a. Quality Attitude
   - b. Cooperation
   - c. Communication
   - d. Morale

C. Constraints

1. Resources
   - a. Schedule
   - b. Staff
   - c. Budget
   - d. Facilities
2. Policies
   - a. Laws
   - b. Regulations
   - c. Restrictions
   - d. Contractual Constraints
3. Program Interfaces
   - a. Customers
   - b. Associate Agencies
   - c. Contractors
   - d. Corporate Management
   - e. Vendors
   - f. Politics

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Mission Support

Mission Support is a grouping of those process areas that focus on supporting the execution of mission-essential and support tasks.

This process area category would contain the following process areas:

- Configuration Management (Configuration Management interpreted)
- Process and Mission Quality Assurance (Process and Product Quality Assurance interpreted)
- Measurement and Analysis (Measurement and Analysis interpreted)
- Operational Readiness (new process area)
- Decision Analysis and Resolution (Decision Analysis and Resolution interpreted)
- Causal Analysis and Resolution (Causal Analysis and Resolution interpreted)

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Process and Mission Quality Assurance

Purpose: To provide operational staff and leadership with objective insight into operational processes and mission outcomes.

SG 1 Objectively Evaluate Operational Processes and Mission Outcomes

- SP 1.1-1 Objectively Evaluate Operational Processes
- SP 1.2-1 Objectively Evaluate Mission Outcomes

SG 2 Provide Objective Insight

- SP 2.1-1 Communicate and Ensure Resolution of Noncompliance Issues
- SP 2.2-1 Establish Records

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Operational Readiness

Purpose: To establish and maintain the readiness needs of operational systems and personnel.

SG 1 Establish Readiness Levels
- SP 1.1-1 Identify Critical Operational System Components and Personnel
- SP 1.2-1 Establish Readiness Levels for Critical Components and Personnel

SG 2 Establish Inventories for Critical Components
- SP 2.1-1 Establish Logistics Requirements and Sources
- SP 2.2-1 Maintain Inventories for Critical Components

SG 3 Maintain System and Personnel Readiness
- SP 3.1-1 Assess System and Personnel Readiness
- SP 3.2-1 Take Preventative and Corrective Action as Required

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Operational Process Management

Operational Process Management is a grouping of those process areas that focus on standardizing and improving operational processes.

This process area category would contain the following process areas:

- Operational Process Focus (Organizational Process Focus interpreted)
- Operational Process Definition (Organizational Process Definition interpreted)
- Operational Training (Organizational Training interpreted)
- Operational Process Performance (Organizational Process Performance interpreted)
- Operational Innovation and Deployment (Organizational Innovation and Deployment interpreted)

Example 1 – Fire Department

Operational organization: Major Metropolitan Fire Department

Purpose: Protect the life and property of city residents and visitors from fire and critical health threats by doing the following:

- fighting fires to save life and property
- providing pre-hospital emergency medical service
- investigating the causes and origins of fires
- regulating public safety
- conducting fire safety presentations and events

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Example 1 – Objectives

The objectives for this fire department would answer questions such as the following:

- How quickly must emergency vehicles and teams respond to fight a fire?
- What is the quality of the pre-hospital emergency medical service provided?
- How quickly and accurately can the cause and origin of a fire be determined?
- How often are safety codes violated?
- How effective are fire prevention activities?

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Example 1 – Tasks

Mission-essential tasks might include fighting fires, providing emergency medical service, and investigating causes and origins of fires.

Mission-support tasks might include regulating public safety and conducting fire prevention activities.

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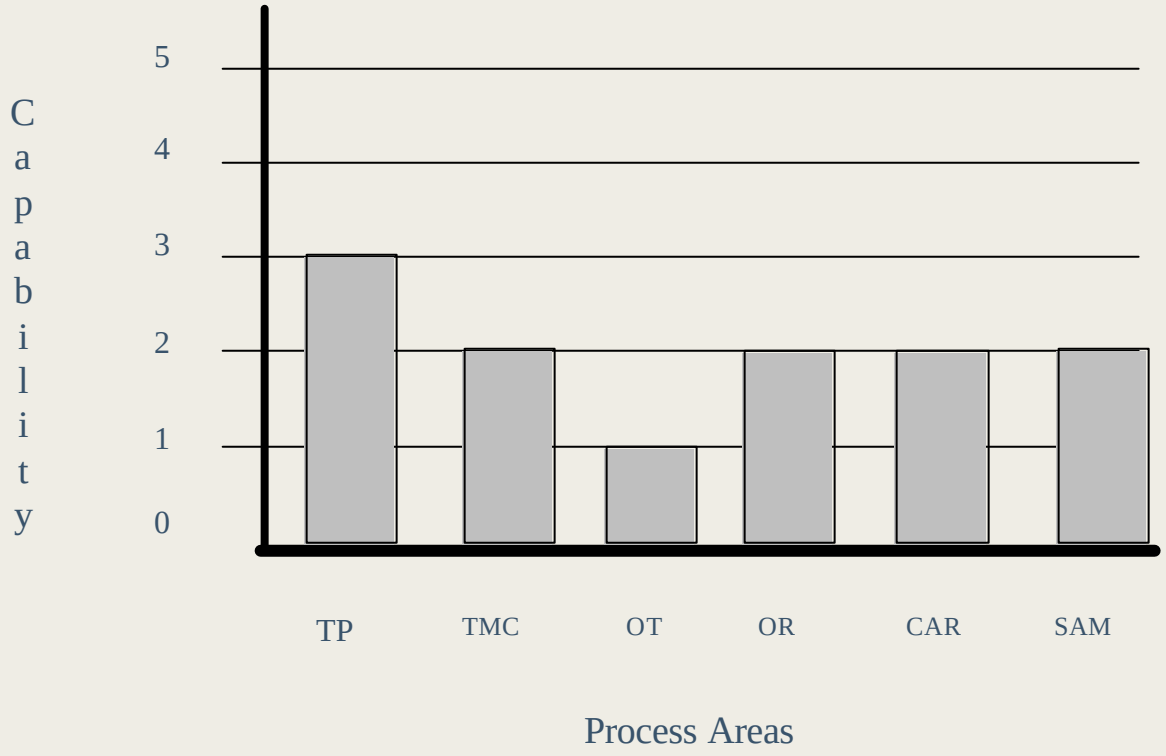
Example 1 – Selecting Improvement Areas

Using CMMI, this fire department might select the following process areas as the most important ones to improve first:

- Task Planning (TP)
- Task Monitoring and Control (TMC)
- Operational Training (OT)
- Operational Readiness (OR)
- Causal Analysis and Resolution (CAR)
- Supplier Agreement Management (SAM)

Example 1 – CMMI Target Profile



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Example 2 – Space Ops

Operational organization: US Air Force Space Operations Squadron

Purpose: Accurate and timely detection of worldwide ballistic missile launches and nuclear detonations by:

- processing satellite information
- performing satellite command and control functions
- monitoring and maintaining data processing equipment
- preparing for initial operations of a new sensor

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Example 2 – Objectives

The objectives for this squadron would answer questions such as the following:

- How timely and accurate must the system process satellite information?
- How reliable must operational systems perform control functions?
- How quickly must data processing equipment problems be identified and corrected?
- How would we know we were prepared for operating the new sensor?

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Example 2 – Tasks

Mission-essential tasks might include processing satellite information and performing satellite command and control functions.

Mission-support tasks might include monitoring and maintaining data processing equipment and preparation activities to operate the new sensor.

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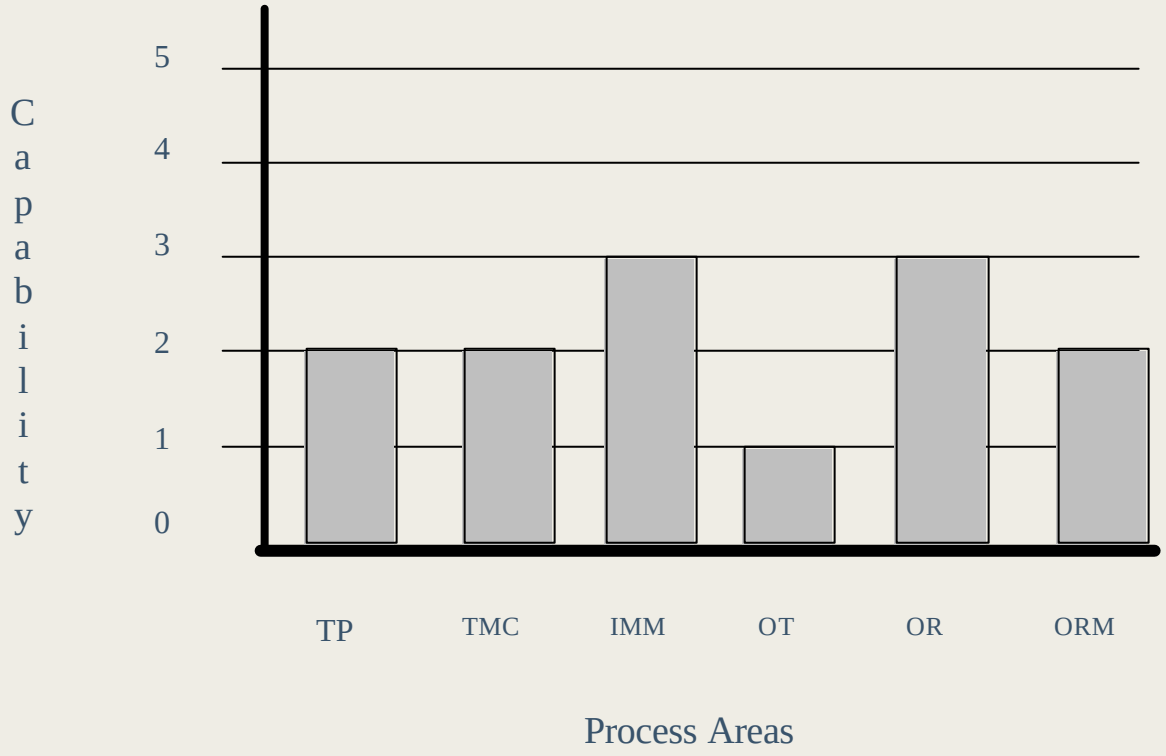
Example 2 – Selecting Improvement Areas

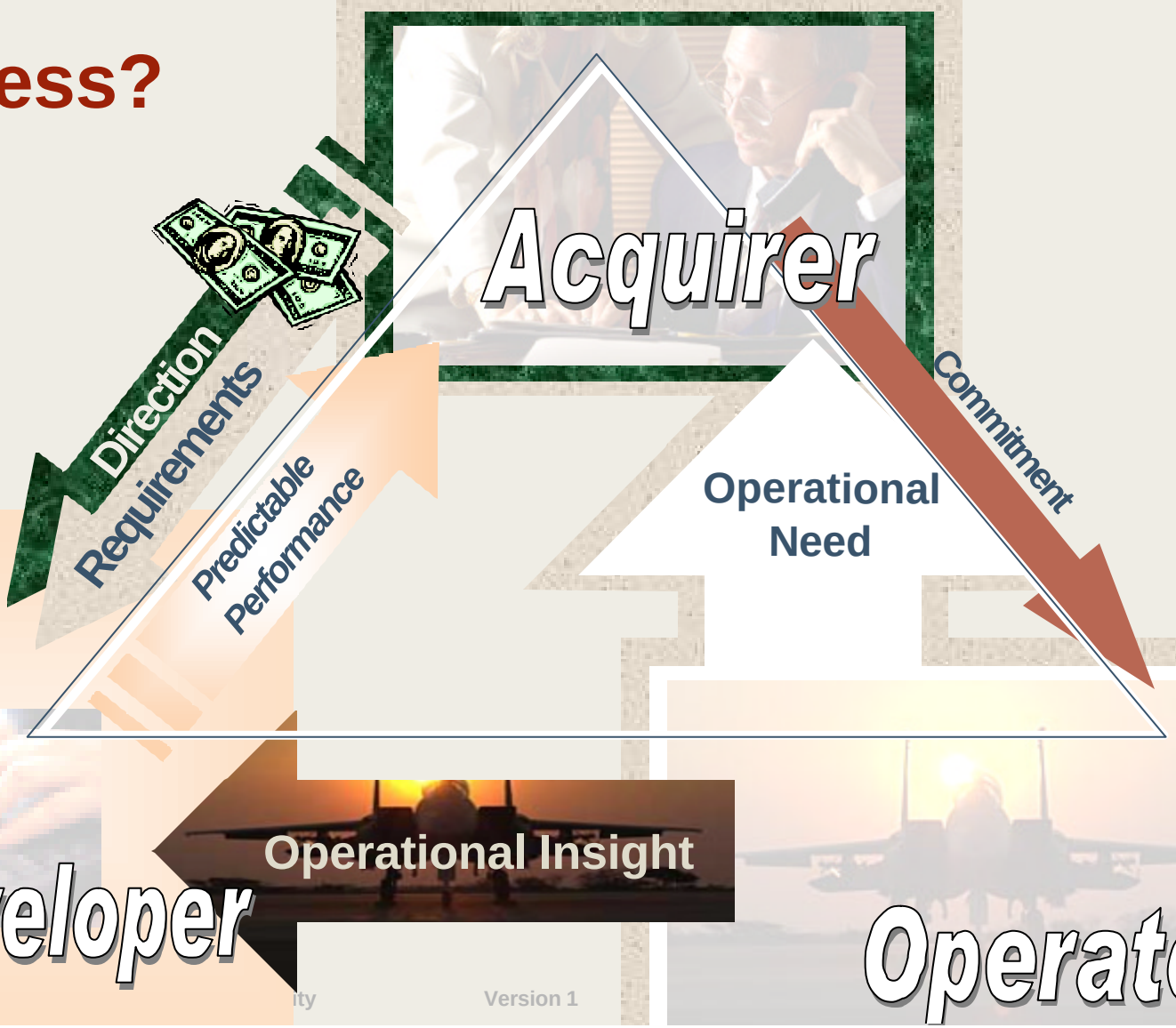
Using CMMI, this squadron might select the following process areas as the most important ones to improve first:

- Task Planning (TP)
- Task Monitor and Control (TMC)
- Integrated Mission Management (IMM)
- Operational Training (OT)
- Operational Readiness (OR)
- Operational Risk Management (ORM)

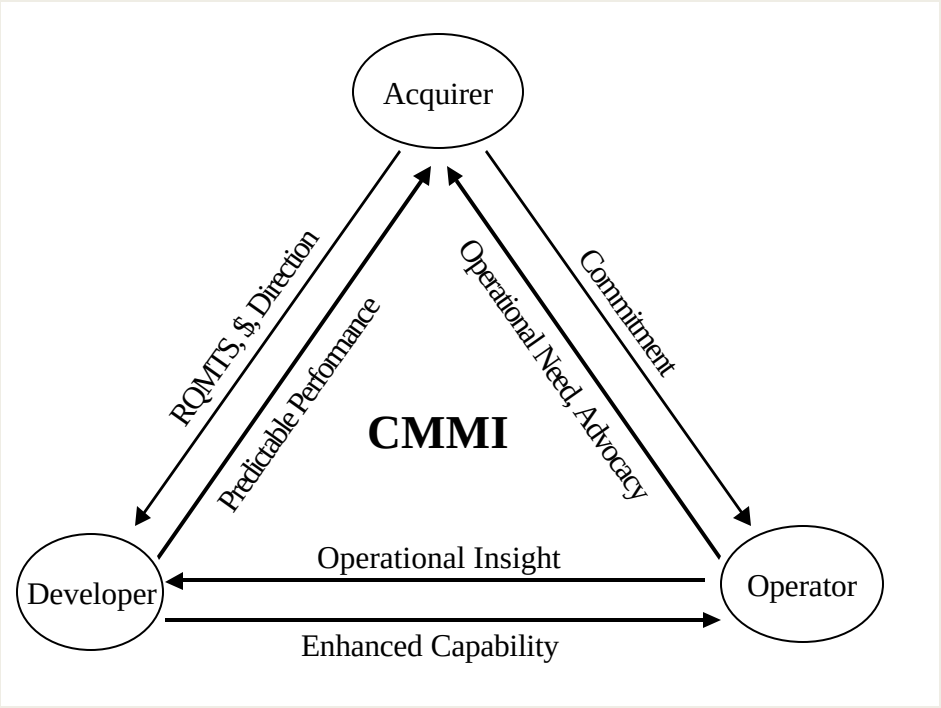
Example 2 – CMMI Target Profile



Success?


Acquirer
Direction
Requirements
Predictable
Performance
Operational
Need
Commitment
Operational Insight
Developer
Operator

Developers, Acquirers and Operators Teamed for Success



Common Framework To:
- Document Processes
- Improve Processes
- Identify Risks
- Plan and Monitor
- Manage Issues
- Make Decisions
- Build Integrated Teams

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Next Steps

This is the first attempt to show how an operational organization can interpret CMMI to help establish and maintain an operational process-improvement program.

An enlightened leader within an operational organization could start a CMMI-based improvement program today without further model definition.

Others may take these ideas and further refine them and propose an addition to the CMMI model framework that explicitly addresses operational needs.

Bottom Line – Results for the Warfighter!