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Introduction

- Many government customers, including NASA, NRO, and the Missile Defense Agency, are expressing increasing interest in Mission Assurance (MA)
- The presentation will:
 - Review customer MA requirements
 - Identify the critical MA activities
 - Explain how CMMI relates to MA
 - Present examples from Northrop Grumman Mission Systems

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What is Mission Assurance?

- An engineering level assurance process performed over the lifecycle of a program to identify and mitigate design, production and test deficiencies that could effect mission success
 - The outcome is an effective, reliable, and safe capability
- Includes the disciplined application of general system engineering, risk management, quality, and management principles to achieve mission success
- Mission and safety critical items are those items where failure would directly affect system or personnel safety, mission success, or operational readiness

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Our Customers Recognize the Need



THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON WASHINGTON DC 20001 JOHO

PEB 20 2000

MEMORANDUM FOR: SEE DISTRIBUTION.

SUBJUCT: Policy for Systems Engineering in Dol)

Application of rigorous systems engineering disciplate is paramous, to the Department's ability to meet the challenge of developing and maintaining seeded warfighting capability. This is superially true as we strive to integrate interestingly complex systems in a family-of systems, systems of systems in a family-of systems, systems of systems or system and balance system engineering provides the integrating technical processes to define and balance system performance, was schedule, and not. It must be embedded in program planning and performed across the emire ocquisition life cycle.

Toward that each I am establishing the following policy, effective immediates to be included in the next revision of the DeD 5000 series acquisition documents:

Systems Engineering (SE). All programs responding to a capcle little or frequencies character, regardless of acquisition category, shall apply a solous. SE approach that realizes test system performance and could contribility on which the family of systems, systems-of-systems contest. Programs shall develop a Sentent Engineering Plan (SEP) for Milestone Engineering (Miles) approach is conjunction with each Milestone review, and integrated with the Acquisition Strategy. This plan shall devertee the program's contest accounts, had adding programs a mounter, exercise, and applicable performance incentions. It shall also detail the turning conduct, and success criteria of networks of sections.

In support of the shove policy, the Diocetor, Defence Systems shall

- a. Identify the requirement for a SEP in DOOR 5000.2, and provide specific content guidance tailorable by the MDA in the Defense Acquisition Guidabook.
- Assess the adequacy of current Department-level S E related policies, processes, practices, guidance, tools, and education and training and recommend some necessary changes.



"All programs..., regardless of acquisition category, shall apply a robust SE approach that balances total system performance and total ownership costs within the family-of-systems, systems-of systems context."

- Directive issued in December 2003
- Charged the Director, Defense Systems, to identify requirements in DODI 5000.2 and provide guidance in the Defense Acquisition Guidebook
- Charged each Component Acquisition Executive and defense agency to provide its approach and recommendations

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MDA Assurance Provisions

Almost 3000 separate process requirements for MDA programs

- Management
- Design & Development
- Software & Firmware
- Technical & Mission Assurance Reviews
- Reliability, Maintainability, & Availability
- Parts & Materials Control Program
- Configuration Management

- Control of Nonconforming Items
 & Materials
- Fabrication & Quality
- Supplier Management
- Safety
- Integrated Test & Evaluation Program
- Test, Measuring , & Diagnostic Equipment and Standards
- Interface Management

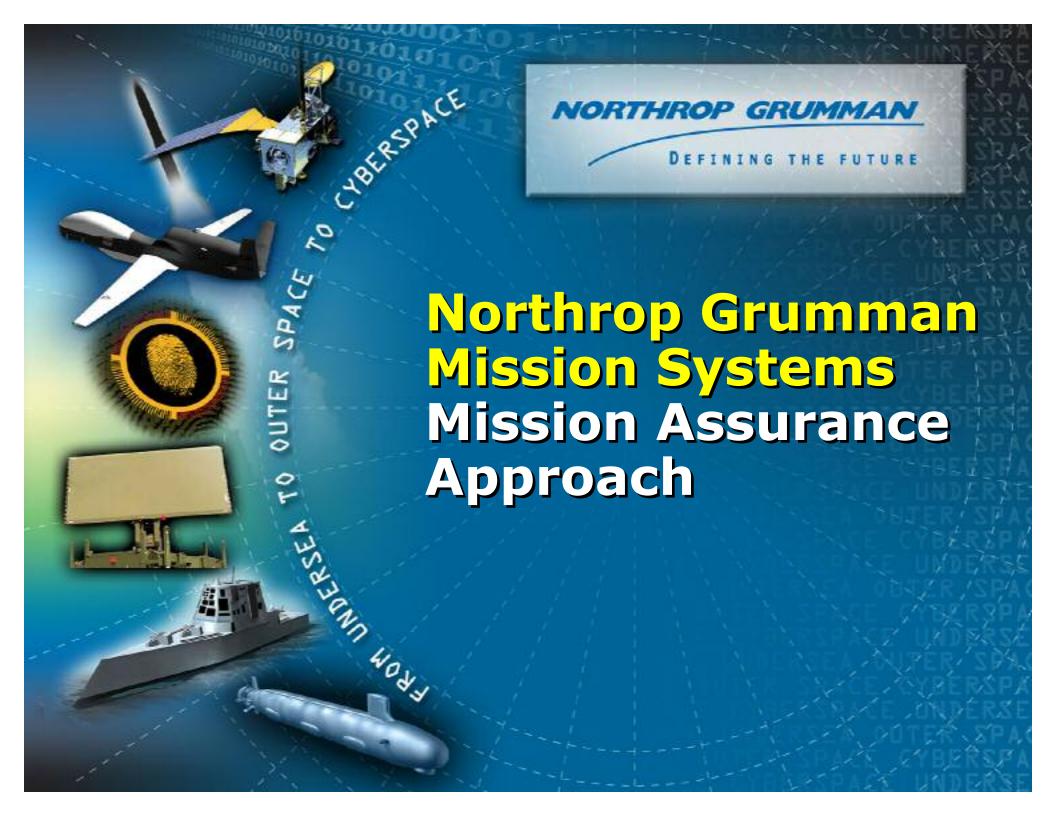
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How Does This Relate to CMMI?

MDA requirements addressed by CMMI

- Management
- ✓ Design & Development
- ✓ Software & Firmware
- Technical & Mission Assurance Reviews
- Reliability, Maintainability, & Availability
- Parts & Materials Control Program
- ✓ Configuration Management
- Control of Nonconforming Items & Materials
- Fabrication & Quality
- ✓ Supplier Management
- Safety
- Integrated Test & Evaluation Program
- Test, Measuring, & Diagnostic Equipment and Standards
- ✓ Interface Management

	Process Areas
5	Causal Analysis and Resolution Organizational Innovation and Deployment
4	Quantitative Project Management Organizational Process Performance
3	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Risk Management Integrated Project Management (for IPPD) Integrated Teaming Integrated Supplier Management Decision Analysis and Resolution Organizational Environment for Integration
2	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
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Mission Success Requires Multiple Approaches

Risk Management Dashboards for Enterprise-Wide Measurement Program **Systems Engineering** Effectiveness Communications & **Independent Reviews Best-Practice Sharing Mission Training, Tools, & Robust Governance Model Templates** (Policies, Processes, **Assurance Procedures**) Operations **Process** Effectiveness Effectiveness

> CMMI Level 5 for Software, Systems, and Services

ISO 9001 and AS-9100 Certification

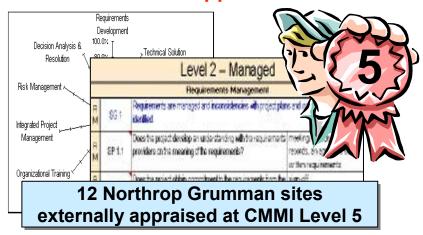
Six Sigma

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Process Effectiveness

Audits & Appraisals

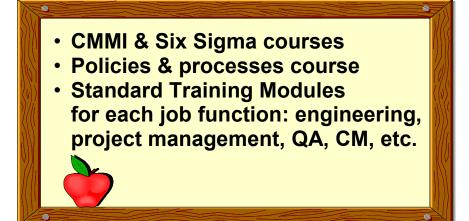


Process Asset Library



is integrated for

Staff Competence & Training



Communications & Collaboration



Assuring mission success by making the people and processes more informed and effective

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Program Effectiveness

Six Sigma connects process improvement and business value

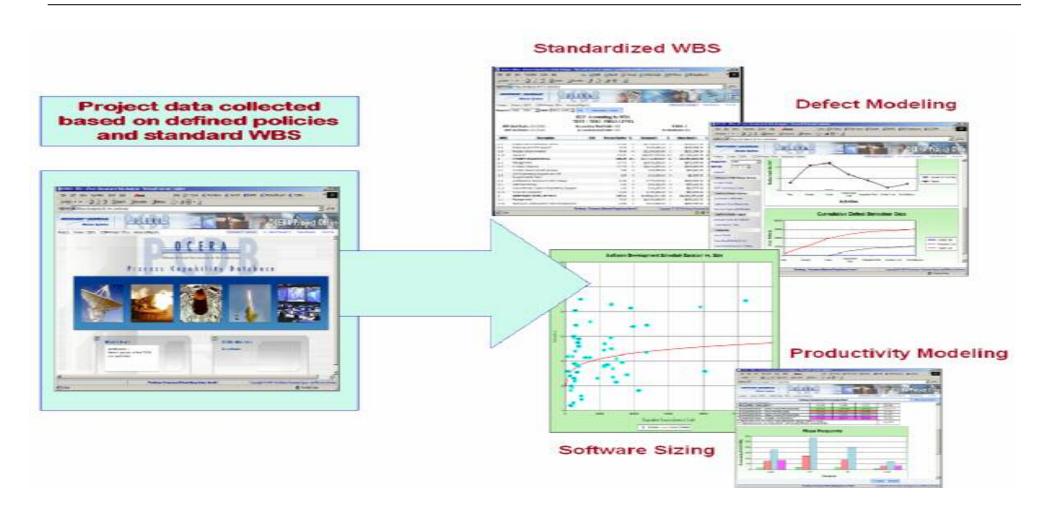


- Six Sigma projects can help focus and measure CMMI-driven process improvements
 - Identify the customer's needs, maximize the value/cost
 - Tools for management by variation (CMMI Levels 4 and 5)
- Results to date
 - 3500 Green Belts, 170 Black Belts, 10 Master Black Belts
 - 400 completed Six Sigma projects, 270 in progress
 - Significant benefit to our customer lower costs, better performance

Assuring mission success by identifying the customer's needs and reducing defects

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Operational Effectiveness



Assuring mission success by providing independent cost, schedule and risk realism

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Lessons Learned

- Mature processes are only a necessary condition for mission success
 - Goal should be successful missions, not process for process sake
- Mission success requires a holistic culture shift
 - Focus improvements on program success in the larger mission context
 - Requires corporate leadership and vision, backed by experience, dedication and resources



Must reduce variation and risk, to ensure predictable program performance and maximize chances of mission success