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Enterprise Process Improvement Approach

Conference on the Acquisition of Software-Intensive Systems
Arlington, Virginia

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Vice President, Six Sigma
Agenda

- Business Drivers
- Synergies – CMMI and Six Sigma
- Mission Systems’ Enterprise Approach to Improvement
- Institutionalizing our Success
- Lessons Learned
Northrop Grumman Mission Systems

§ A leading global integrator of complex systems
- Based on information technology and systems engineering expertise
- Integrated solutions: architecture, development and sustainment

§ Many customers and markets in transformation

§ Six Sigma – a cornerstone of our transformation
Business Drivers

§ Competitive advantage through lower costs and lower risks
   § Ability to predictably deliver on time and within schedule
   § Increased customer satisfaction and associated growth
§ Better business management through management by data
   § Quantitatively understand performance and quality drivers
   § More strategic and less tactical
§ Enterprise approach to process improvement
   § Ability to capitalize on knowledge from all across the organization
   § Common infrastructure for all improvement initiatives
   § Common policies, processes, and training
Driving the Business Model

Dashboards
Used to Manage the Core Business Processes
Defined and Owned by Business Executives

Results of Six Sigma Projects are seen in improved business performance

Core Processes Drive the Key Business Measurement Criteria

Core Processes
- Program Execution
- Business Development
- Portfolio Management (Strategic Positioning)
- Employee Management
- Technology/Product Development
- Relationship Management
- Subcontractor Management

Enabling Processes
- Financial Management
- Information Management
- Governance Compliance

Business Objectives

Key Business Questions

Sub Processes

Gaps & Goals

ROI Gate
Typical Challenges During Acquisition

- Acquisition process starts very early during strategy development, where leverage is greatest
  - Teaming and other Supplier arrangements
  - Technology, “Fit”, and other competitive factors

- Gathering information relative to Suppliers and Teammates typically focuses on individual contract performance
  - Enterprise and Strategic view generally have additional metrics

- Significant inter-relationships among all teammates
  - As evidenced by the degree of subcontracting
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What is Six Sigma?

- A disciplined, data-driven methodology for improving program and business performance
  - Focuses on process performance by eliminating defects and reducing variation
  - Establishes a common language and set of tools
  - Identifies what’s critical to quality in the eyes of the customer
  - Uses metrics to measure process capability
- Links process improvement to organizational strategic objectives
  - Decomposes larger, strategic goals / gaps into a series of projects
  - Prioritized based upon expected financial benefit expected

*Six Sigma is about satisfying customer needs economically*
**Six Sigma Methodologies**

- **Define** (D): Each project must have a business case and sponsor.
- **Measure** (M): You can’t manage what you don’t measure.
- **Analyze** (A): Solve the problem, not the symptoms.
- **Improve** (I): Push for innovations, breakthrough thinking.
- **Control** (C): Who is accountable for making the fix stick?

**Dashboards:** Alignment and Linkage to Business Strategy and Transformation Objectives.

**Design New Products and Processes** that Meet Customer Needs.

**Improve Existing Processes** so that Their Outputs Meet Customer Requirements.

**Control and Manage Cross-Functional Processes** to Meet Business Goals.
### CMMI Relationship to Six Sigma

<table>
<thead>
<tr>
<th>Level</th>
<th>Focus</th>
<th>Process Areas</th>
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<tbody>
<tr>
<td>5 Optimizing</td>
<td>process improvement</td>
<td>Organizational Process Technology Innovation Causal Analysis and Resolution*</td>
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<td>4 Quantitatively Managed</td>
<td>Quantitative management</td>
<td>Organizational Process Performance Quantitative Project Management</td>
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<tr>
<td>2 Managed</td>
<td>Basic project management</td>
<td>Requirements Management * Project Planning* Project Monitoring and Control* Supplier Agreement Management Measurement and Analysis <strong>Process and Product Quality Assurance</strong> Configuration Management</td>
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<td>1 Performed</td>
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<td>*Areas of ISO Focus</td>
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* Six Sigma Define
* Six Sigma Measure
* Six Sigma Analyze
* Six Sigma Improve
* Six Sigma Control
Comparison of CMMI to Six Sigma

For an individual process:
- CMMI identifies *what* activities are expected (industry best-practice)
- Six Sigma identifies *how* activities might be improved (more efficient, more effective, ...)

Example – Project Planning in CMMI

*Could fully meet CMMI goals and practices, but still write poor plans*

*Six Sigma can be used to improve planning process and write better plans*
Comparison of CMMI to Six Sigma (Cont’d.)

For the organizational infrastructure:

- Six Sigma identifies *what* activities are used for improvement (DMAIC, DMADV)
- CMMI identifies *how* those activities might be implemented (Process Groups, Training Offices)

Example –
Organizational Process Focus in CMMI

*Six Sigma doesn’t assess overall organizational capability*

*CMMI provides an approach to setting up the infrastructure*
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Organized Enterprise-Wide for Accomplishments

- We leverage our Six Sigma efforts off our successful CMMI infrastructure
  - Common Process Management program office and reporting structure
  - Shared staff with skills in both areas
  - Information sharing from Enterprise to Division to Project

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<th>Mission Systems</th>
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<tr>
<td>• Process Management staff</td>
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<td>• Mission Systems Process Group</td>
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<tr>
<td>• Office of Cost Estimation</td>
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<tr>
<td>• Six Sigma Training Office</td>
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<td>• Dashboards</td>
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<tr>
<th>Divisions</th>
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<tr>
<td>• Division Champions</td>
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<td>• Division Process Groups</td>
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<tr>
<td>• Training Offices (engineering, management)</td>
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<th>Projects</th>
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<tr>
<td>• Self-Assessment Tool</td>
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<td>• Corrective Action System</td>
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<th>Six Sigma Projects</th>
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<td>• StartIt! Database</td>
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<td>• Best Practice Sharing</td>
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Highlights of Our Approach

Enterprise-Wide Institutionalization
- Policy & Requirements Manual
- Training

Projects

Six Sigma Teams
- DMAIC / DFSS
- Tools & methods

Quantitatively Measured
- Metrics Manual
- Measurement repository

CMII Assessments
- Self-Assessment Tool
- Internal / external formal assessments

CMII / Six Sigma Synergy
- Project Reviews / Summits
- Integrated strategies
**Six Sigma Lifecycle**

**Define**
- Six Sigma Business Goals & Metric Category Linkage

**Measure**
- High Level Priorities (Quantified Gap Analysis)

**Analyze**
- Map Projects

**Control**
- Dashboard

**Improve**
- Prioritize & Select Projects
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Institutionalizing Our Improvements

- Communications
- Sharing best-practices
- Measurement & dashboards

Industry/Government Standards

- CMMI
- ISO
- Customer Specific

Process Improvement

Organizational Policies & Processes

Metrics Database

Organizational Training & Tools

Project Plans

Project Results

Schedules & Budgets

Organizational Performance

Project Performance
Communication via On Line Resources

Six Sigma on-line resources facilitate communication, project management and sharing of best practices
Sharing of Best Practices Through Online Collaboration

- **Pursuit**
- **Decision**
- **Proposal**
- **Award**
- **Project Start-Up**
- **Project Performance**

**Project Start-Up**

**Phase Description:**
This phase begins normally when the award is announced or just prior to a strongly expected award. This is a very critical phase of a project and lays down the foundations for a smoothly run, efficient project. If the project has not yet started at the contract and contract funding are not yet approved a request for pre-contractual or non-contractual funds may be required. It is recommended that the reader review the "Wrap-Up" phase in starting the project as activities and checklists required should be added this phase as well.

**Assumptions:**
- Award has occurred (but project has not started) or Award has occurred and project starts immediately.

**Activities:**
- Call Project Management Team Meeting
  - Continue team building.
  - Analyze and understand contract requirements, specifications and acceptance criteria (if applicable).
  - Transfer Proposal team’s knowledge to the Project team (if different than commercial team).
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Lessons Learned: Keys to Success

- Executive leadership and sponsorship mandatory to achieving long-term, sustaining results or “management by data

- Integrated, enterprise-wide approach provides a cost-effective way of institutionalizing processes
  - Common policies, processes, metrics, training and assessment methodology
  - Promotes sharing of best practices and lessons learned

- Communicate plan, approach, and most importantly, results

- Understanding variation in process performance allows more insight into estimation
  - What’s likely cost of work? For ourselves? Our Teammates?
  - What’s probability we can perform work for $____?
Summary

- Mission Systems has a broad, enterprise-wide framework in place for process improvement
  - Focused on metrics to drive improvements
  - Part of overall business strategy
  - Common policies and processes

- Institutionalization re-enforced through collaborative on-line environment and common tools
  - Centralized metrics data base, lessons learned and best practices on-line
  - Synergy between Six Sigma and CMMI

- Enterprise investment strategies are long-term and broadly focused across the entire customer base
  - To influence investments, government agencies should consider long-term preferences for investment
  - “Registration” significant step in increasing consistency in evaluations