NORTHROP GRUMMAN

DEFINING THE FUTURE

Using Six Sigma to Accelerate CMMI Adoption (and Vice Versa)

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FROM UNDERSEA TO OUTER SPACE TO CYBERSPACE

Northrop Grumman Mission Systems

- **A leading integrator of complex, mission-enabling systems**

- **2003 Sales - ~$4.1B**

- **18,000 employees in 50 states and in 23 countries**

- **1500 active contracts**

- **Deep, legacy domain expertise in priority, high-growth segments**

- **Premier provider of mission critical end-to-end solutions**

Intercontinental Ballistic Missile Program
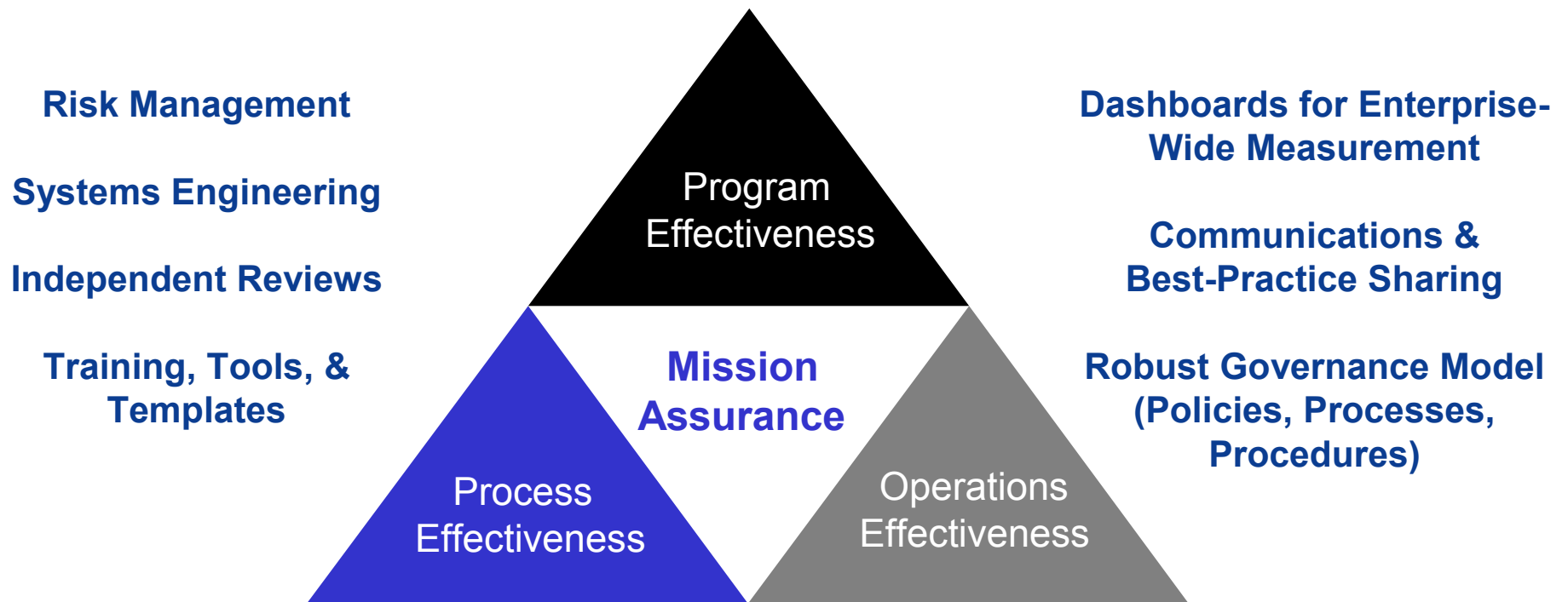
Joint National Integration Center

Satellite Command & Control

Focused on program performance

Mission Success Requires Multiple Approaches

Program Effectiveness

- **Six Sigma connects process improvement and business value**

DEFINE	MEASURE	ANALYZE	IMPROVE	CONTROL
Charter team, map process & specify CTQs	Measure process performance	Identify & quantify root causes	Select, design & implement solution	Institutionalize improvement, ongoing control
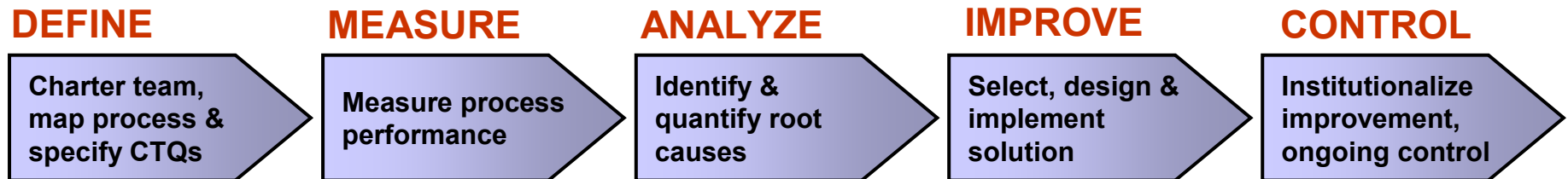
- **Six Sigma projects can help focus and measure CMMI-driven process improvements**
  - Identify the customer's needs, maximize the value/cost
  - Tools for management by variation (CMMI Levels 4 and 5)

- **Results to date**
  - Over 3500 Green Belts, 200 Black Belts, 10 Master Black Belts
  - 529 completed Six Sigma projects, 234 in progress
  - Significant benefit to our customer – lower costs, better performance

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

How CMM/CMMI Helps Six Sigma Efforts

- **CMM/CMMI focuses on organizational change**
  - Provides guidance on many dimensions of the infrastructure

Process Areas	*Generic Practices (all process areas)*
Organizational Process Focus	**GP 2.1 Establish an Organizational Policy**
Organizational Process Definition	**GP 2.2 Plan the Process**
Organizational Training	**GP 2.3 Provide Resources**
Organizational Process Performance	**GP 2.4 Assign Responsibility**
Organizational Innovation and Deployment	**GP 2.5 Train People**
	GP 3.1 Establish a Defined Process
	GP 2.6 Manage Configurations
	GP 2.7 Identify and Involve Relevant Stakeholders
	GP 2.8 Monitor and Control the Process
	GP 3.2 Collect Improvement Information
	GP 2.9 Objectively Evaluate Adherence
	GP 2.10 Review Status with Higher-Level Management

Barriers and Challenges

- **Capturing the first, "low hanging fruit" makes Six Sigma implementation look easy…**
  - Clearer problems, simpler solutions, bigger payoffs
  - Little need for coordination

  …but later projects are tougher
  - Keeping projects appraised of similar efforts, past and current
  - Focusing on "the pain", not the assumed solution

- **Engineering process measurements are often difficult to analyze**
  - Dirty (or no) data, human recording problems
  - May necessitate Define-Measure-Analyze-Measure-Analyze-etc.

- **Must demonstrate the value of quantitative data to managers**
  - Management style - reactive vs. proactive vs. quantitative
  - Less value in a chaotic environment
  - Must engage customers

Benefits

Based on 16 Northrop Grumman CMMI Level 5 organizations

- **Having multiple improvement initiatives helps encourage a change in behavior as opposed to "achieving a level"**
  - Reinforces that change (improvement) is a way of life

- **The real ROI comes in institutionalizing local improvements across the wider organization**
  - CMMI establishes the needed mechanisms

- **CMMI and Six Sigma compliment each other**
  - CMMI can yield behaviors without benefit
  - Six Sigma improvements based solely on data may miss innovative improvements (assumes a local optimum)

- **Training over half the staff has resulted in a change of language and culture**
  - Voice of Customer, data-driven decisions, causal analysis, etc.
  - Better to understand and use the tools in everyday work than to adopt the "religion"