
Collaborative Government / Contractor SCAMPI Appraisal

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Agenda



- **Background**
 - Nature of Program
 - Roles & Responsibilities
 - Contractual Requirements

- **Appraisal Approach**
 - Considerations for a Joint Appraisal
 - Tailoring of Method
 - Team Selection & Training
 - On-Site Activities

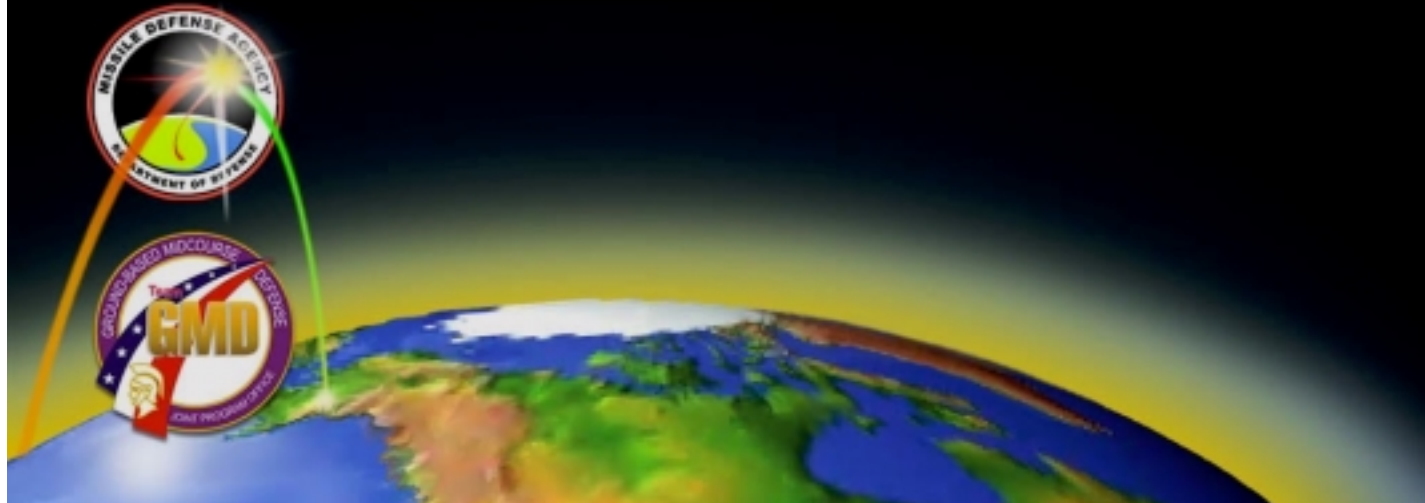
- **Lessons Learned**
 - Government
 - Boeing
 - Northrop Grumman

Background

Nature of Program
Roles & Responsibilities
Contractual Requirements

Missile Defense Agency (MDA)

Ground-Based Midcourse Defense (GMD) Fire Control & Communications (GFC/C)



Nature of Ballistic Missile Defense



- **Within the Department of Defense, the MDA is responsible for developing, testing, and deploying the Ballistic Missile Defense System (BMDS).**
- **BMDS is a collection of systems (ABL, AEGIS, GMD, THADD, Patriot) and is designed to intercept threat missiles during all phases of their flight: boost, midcourse, and terminal.**
- **The Ground-Based Midcourse Defense (GMD) system is a component of the midcourse defense, during which the Ground-Based Interceptors (GBIs) intercept and destroy long-range missiles during the ballistic (midcourse) phase of their flight, before their reentry into the Earth's atmosphere.**

Note: Material on this page taken from public website – <http://www.acq.osd.millbmdol>

Ground-Based Midcourse Defense



- **On December 17, 2002, the President directed the Department of Defense to field initial BMDS missile defense capabilities beginning Fall, 2004.**
- **The plan calls for fielding up to 10 GMD interceptors by 2004 and an additional 10 by 2005 (for a total of up to 20), in addition to other assets.**
- **GMD is the most mature missile defense element; therefore, it will form the basis for this initial defensive capability.**
- **In addition, MDA / GMD will continue to develop, test and improve GMD capabilities.**

Note: Material on this page taken from public website – <http://www.acq.osd.millbmdol>

Roles & Responsibilities for GFC/C



GMD Fire Control & Communications (GFC/C) is essential for a GMD Initial Defensive Operations (IDO) Capability, scheduled for Fall, 2004. GFC/C is the central nervous system for GMD and interfaces with all GMD components and related external MDA systems.

- Government – GMD Joint Program Office (JPO) Management**
- Boeing – Prime Contractor, GMD Systems Integrator**
- Northrop Grumman – Primary Software Development Organization (SDO) for GFC/C Software Development**

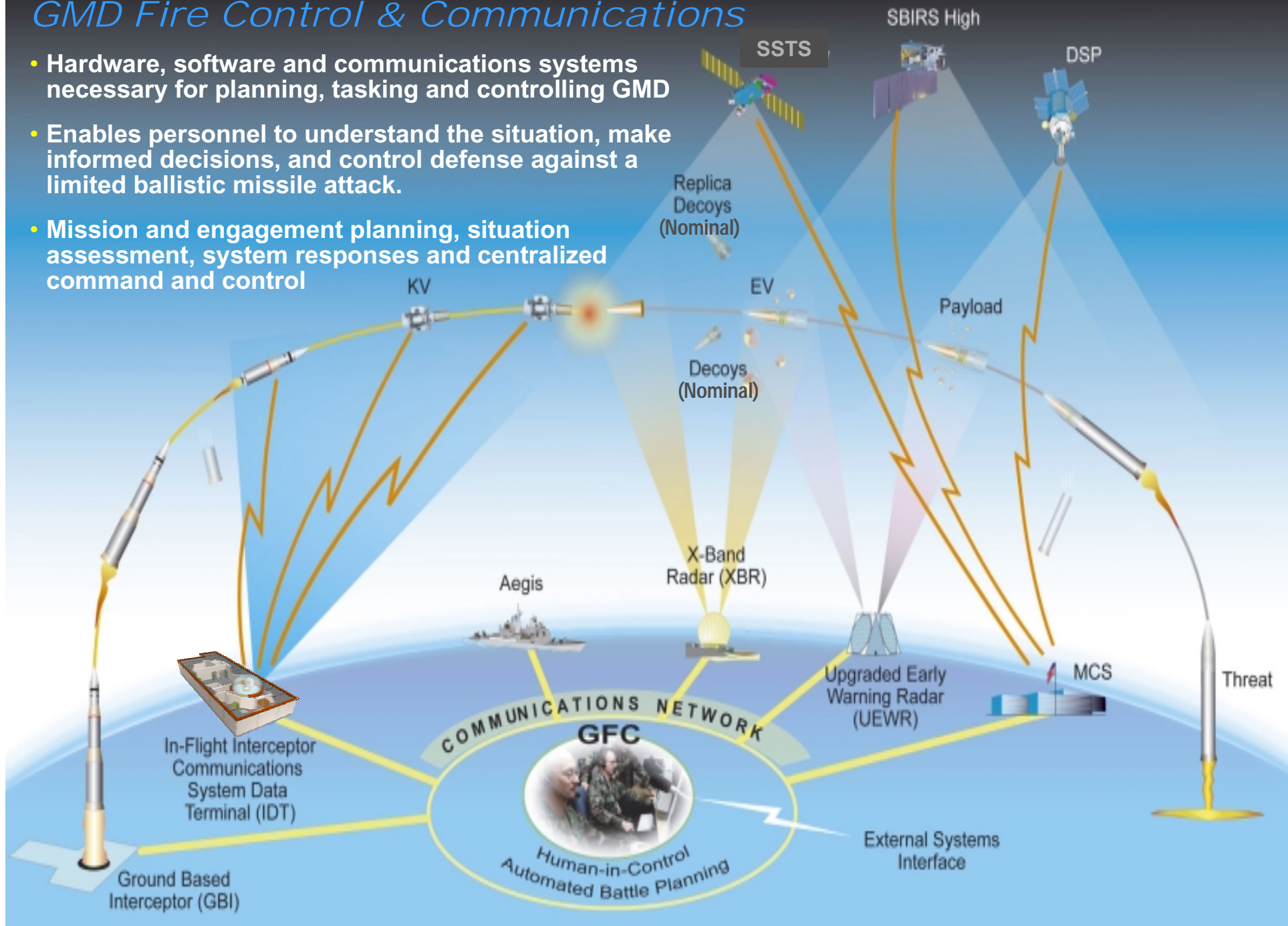
GMD Contractual Requirements



- **GMD Contract requires all Software Development Organizations (SDOs) developing mission critical software to achieve and maintain a Software Engineering Institute (SEI) Capability Maturity Model (CMM) Level 3.**
- **GMD contract requirement for all SDOs to attain at least an SEI CMM Level 3 is specified by:**
 - GMD Software Development Plan (SDP)
 - GMD Software Capability Evaluation (SCE) Assessment Plan
- **Government and Boeing Contract requires conduct of a SCE on the Northrop Grumman GFC / C program every 18-24 months to monitor the software development progress.**

GMD Fire Control & Communications

- Hardware, software and communications systems necessary for planning, tasking and controlling GMD
- Enables personnel to understand the situation, make informed decisions, and control defense against a limited ballistic missile attack.
- Mission and engagement planning, situation assessment, system responses and centralized command and control



Appraisal Approach

Considerations for a Joint Appraisal
Tailoring of Method
Team Selection & Training
On-Site Activities

Considerations for a Joint Appraisal



- **Northrop Grumman requested substitution of CMMI SCAMPI instead of the SW-CMM SCE**
- **CMMI could provide greater value to the program**
 - Bigger scope, more depth than SW-CMM
 - Northrop Grumman had transitioned to CMMI as the basis for process improvements
- **Contract Letter Submitted to Government (GMD JPO) by Boeing, accepted by the Government**
- **CMMI SCAMPI conducted at Northrop Grumman facilities in Huntsville on 29 September – 3 October 2003**
 - Joint Government-Boeing-Northrop Grumman appraisal team
 - CMMI Level 5 reached instead of SW-CMM Level 3

SW-CMM to CMMI Comparison



SW-CMM Level 3

Organization process focus
 Organization process definition
 Training program
 Integrated software mgmt

Software product engineering

Intergroup coordination
 Peer reviews

Requirements management
 Software project planning
 Software project tracking & oversight
 Software subcontract mgmt
 Software quality assurance
 Software configuration mgmt

CMMI Level 5

Causal analysis and resolution
 Organizational innovation & deployment

Organizational process performance
 Quantitative project management

Organization process focus
 Organization process definition
 Organizational training
 Integrated project management
 Risk management
 Requirements development
 Technical solution
 Product integration
 Verification
 Validation
 Decision analysis and resolution

Requirements management
 Project planning
 Project monitoring and control
 Supplier agreement management
 Product & process quality assurance
 Configuration management
 Measurement and analysis

Appraisal Objectives & Approach



Objective	Approach
Reduce cost and effort	<ul style="list-style-type: none">• Use mature Northrop Grumman appraisal process, tools, and experienced appraisers• Scheduled a six day appraisal, based on Northrop Grumman history (20+ SCAMPI appraisals)
Ensure sufficient CMMI expertise on appraisal team	<ul style="list-style-type: none">• Train a pool of Govt., Boeing and Northrop Grumman appraisal team members on CMMI and SCAMPI• Provide on-site team training
Maintain objectivity and ensure accuracy of results	<ul style="list-style-type: none">• Mix Government, Boeing, and Northrop Grumman personnel on team, sub-teams• Project prepared all evidence in advance, mapped to the CMMI

Team Selection & Training



- **An SEI-authorized external Lead Appraiser, independent of Northrop Grumman, Boeing, and the Government, was hired to lead the appraisal team**
- **The Government and Boeing nominated appraisal team members and alternates**
- **Northrop Grumman provided training to the appraiser pool**
 - **Official 3-day CMMI training - provided by Northrop Grumman SEI-authorized instructors**
 - **2-day SCAMPI training, based on SEI material - provided by experienced Northrop Grumman Lead Appraisers**
 - **Northrop Grumman provided an overview of the process and tools**
 - **The external Lead provided an overview of difficult model interpretations**

On-Site Activities



Monday	Tuesday	Wednesday	Thursday	Friday
Arrival	Evidence Review (in mini-teams)	Interviews (in mini-teams)	Review Findings (whole team)	Review New Evidence
Opening Briefing by Site		Consolidation (in mini-teams)		
Team Training		Evidence Review		Finalize Findings
Evidence Review	Interviews (in mini-teams)	Interviews (in mini-teams)	Present Draft Findings	Executive Briefing
Whole Team Interview (training)	Consolidation (in mini-teams)	Consolidation (in mini-teams)	Review New Evidence & Conduct New Interviews	Final Findings
Findings Consolidation (training)	Evidence Review	Draft Findings (in mini-teams)		Team Wrap-Up

Finished a day early, due to well-trained team and well-prepared evidence

Evidence Prepared in Advance



- **13 team members**
 - 1 Lead
 - 4 Government
 - 3 Boeing
 - 5 Northrop Grumman
- **Organized in mini-teams, with joint membership on each**
 - Project Management
 - Engineering
 - Support + Process Management
 - Level 4/5 Process Areas
- **Northrop Grumman pre-assembled the evidence**
 - At least one notebook for each Process Area
 - Each notebook had separate tabs for each practice



Lessons Learned

Government
Boeing
Northrop Grumman

Lessons Learned - Government₁



Initial Concerns	Experience
<ul style="list-style-type: none"> • Collaborative efforts among Government / Boeing / Northrop Grumman was an area of concern, as past CMM SCE activities were viewed as adversarial in nature 	<ul style="list-style-type: none"> • CMMI SCAMPI Team members worked very well together from the start <ul style="list-style-type: none"> – Mini-team composition was Boeing, Northrop Grumman, and Government on each – Teamwork was evident
<ul style="list-style-type: none"> • Ensuring sufficient CMMI knowledge and SCAMPI experience on the team <ul style="list-style-type: none"> – CMMI experience – No SCAMPI trained Government personnel 	<ul style="list-style-type: none"> • Government is now trained & experienced on SCAMPI • Northrop Grumman provided SEI-approved CMMI & SCAMPI training to Government

For SDOs that have transitioned to SEI CMMI, conducting an SEI CMMI SCAMPI is an appropriate activity

Lessons Learned - Government₂



Initial Concerns	Experience
<ul style="list-style-type: none"> • Contract requires SEI CMM SCE, and Government and Boeing had not participated in a CMMI SCAMPI • Some risks with a deviation to performance of a SEI CMMI SCAMPI 	<ul style="list-style-type: none"> • Previous Northrop Grumman CMMI SCAMPI Efforts outside GFC/C contract reduced risk to Government <ul style="list-style-type: none"> – External SCAMPI, Assessed at CMMI Level 3, December 2002 – Internal CMMI SCAMPI, Summer, 2003
<ul style="list-style-type: none"> • Would joint Government/ Boeing/ Northrop Grumman SCAMPI “Path Finder” efforts be successful? <ul style="list-style-type: none"> – Objectivity – Consensus 	<ul style="list-style-type: none"> • GFC/C SCAMPI Appraisal was very Successful – Thorough, Objective Agreements Reached <ul style="list-style-type: none"> – Mini-Teams – Entire SCAMPI Team

Path Finding, Ground-Breaking, 1st Ever Joint Government / Contractor Team for a CMMI SCAMPI – Very Positive

Lessons Learned - Boeing



Initial Concerns	Experience
<ul style="list-style-type: none"> • Objectivity in the performance of the SCAMPI <ul style="list-style-type: none"> – Contract calls for 50% Government and 50% Boeing • Having an outside team Lead that has worked with Northrop Grumman, and Northrop Grumman as a co-lead <ul style="list-style-type: none"> – Contract calls for Boeing lead and Government co-lead 	<ul style="list-style-type: none"> • Well picked team members Northrop Grumman members knowledgeable in the CMMI <ul style="list-style-type: none"> – Knowledgeable in CMMI – Good work ethic by all – Well trained • Trust gained in the team members after a day of assessing
<ul style="list-style-type: none"> • Concerns during the SCAMPI <ul style="list-style-type: none"> – Not being able to see/hear all of the evidence/assessment – Not knowing the background or experience of all team members 	<ul style="list-style-type: none"> • Good discussions among the team members during and after group meetings <ul style="list-style-type: none"> – Overall hard and time-consuming work put in by all

**Team worked professionally and maintained objectivity.
Good for trust building and team building of the involved entities.**

Lessons Learned - Northrop Grumman



Initial Concerns	Experience
<ul style="list-style-type: none">• Ensuring the appraisal was value-added to the program<ul style="list-style-type: none">– SW-CMM results are of little value to Northrop Grumman, since we have moved on to CMMI	<ul style="list-style-type: none">• Joint appraisal team fosters joint ownership of the results<ul style="list-style-type: none">– More opportunities to explore the process in depth– Joint assessment of process-related program risks
<ul style="list-style-type: none">• Ensuring sufficient CMMI knowledge and SCAMPI experience on the team<ul style="list-style-type: none">– Some past SCEs have used untrained/inexperienced assessors– Results are inaccurate and of little use to the programs	<ul style="list-style-type: none">• Training the Government and Boeing team members was straightforward<ul style="list-style-type: none">– Integrated into an existing Northrop Grumman class

The joint SCAMPI fit well with the internal process improvement program, and provided accurate and useful results

Summary Lessons Learned



- **Early planning is essential**
 - Communicate early with all parties involved
 - Involve all stakeholders in the plan, training and scheduling
- **Selection of the team members is critical**
 - Team must have a balance representation from all stakeholders
 - Team must have knowledge in CMMI SCAMPI methodology and the assessment process to be used.
- **Must build trust of all stake holders into the process**
 - Keep all parties informed from start to finish of the assessment
 - Process must be conveyed and understood by all stakeholders
 - Clear line of responsibilities and roles need to be established early
- **Training is essential**
 - All team members must be trained in the method and appraisal process
 - Group training builds understanding and camaraderie

Conclusions



- **The Government, Boeing, and Northrop Grumman agree that the joint SCAMPI approach was successful**
- **We recommend that a similar approach be used on other contracts to promote a joint understanding of process maturity program risk and trust**
- **Having a mix of Government, Boeing, and Northrop Grumman on the Mini-Teams was a major factor contributing to the success of the Collaborative Government / Contractor CMMI Appraisal**