Acquisition of a COTS-based Command and Control System for Legacy and New Satellites

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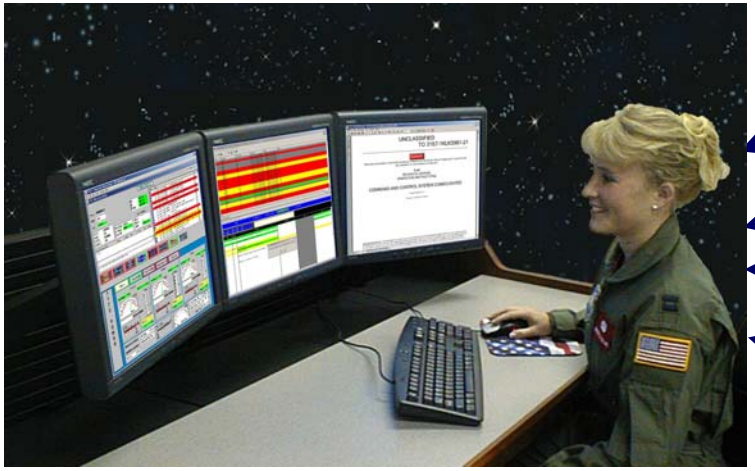
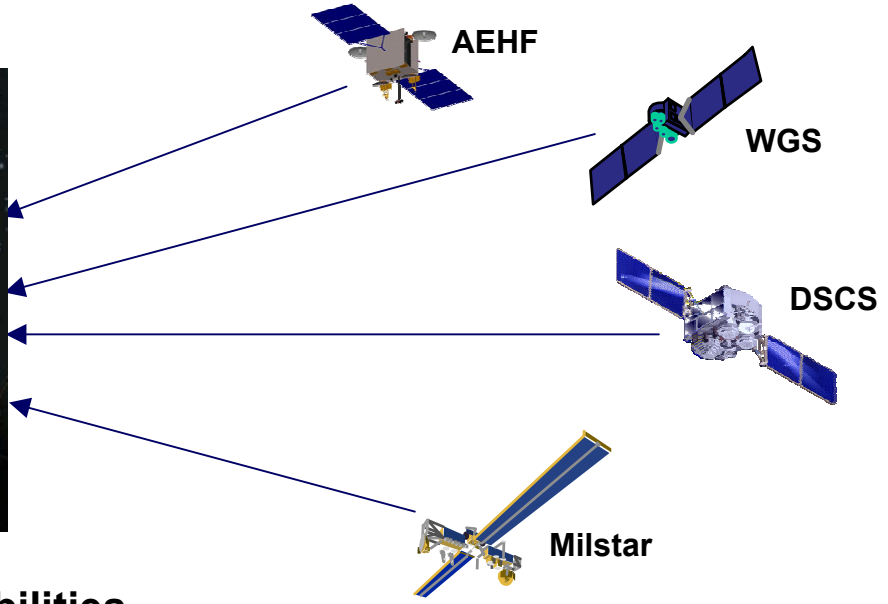
Command & Control System-Consolidated (CCS-C)

Mission

Develop, deploy and sustain an integrated MILSATCOM Satellite Control System

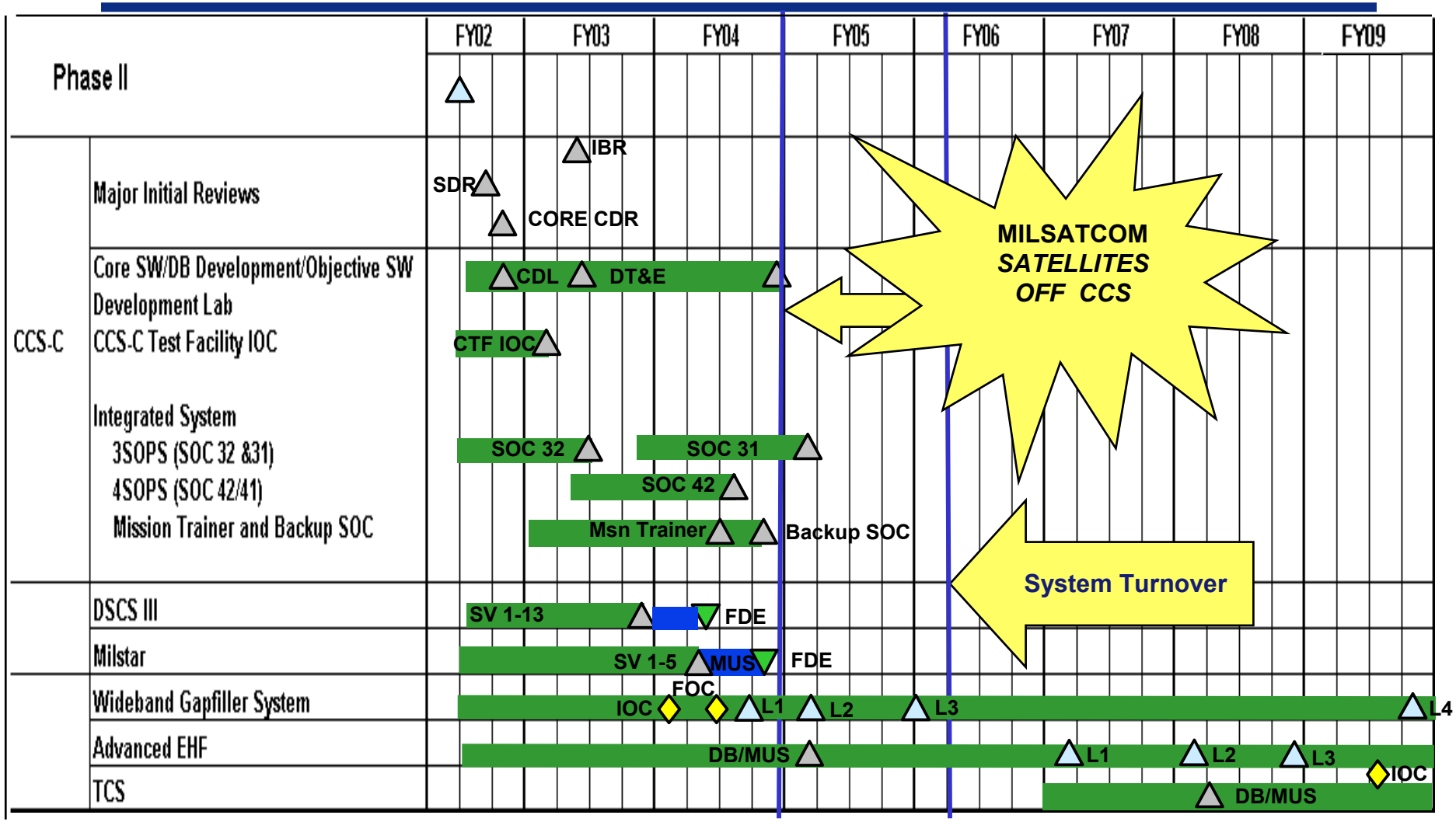




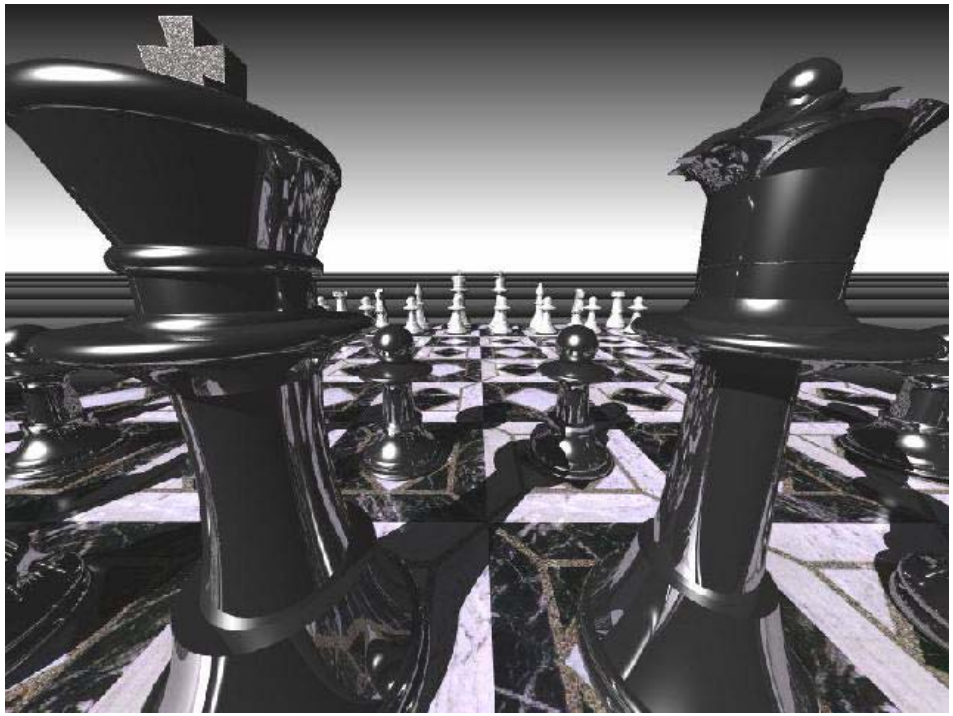
Capabilities

- Launch and S-band on-orbit command and control of MILSATCOM satellites
- Integrated satellite operations center
  - DSCS III, Milstar, WGS, AEHF
- Training systems same as operational systems
- Non-collocated backup

Program Schedule



Acquisition Strategy Development



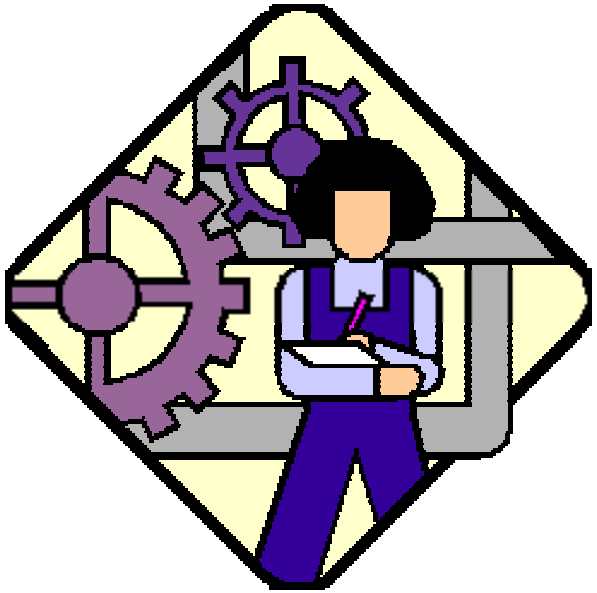
First things first

Drivers

- Limited lifetime of legacy ground system
- Schedule for Wideband Gapfiller on-orbit support capability
- Advanced EHF (AEHF) launch support capability
- Development cost and schedule control

Market Survey – Early Industry Involvement

- Extensive research
  - Discussions with industry
  - Independent product surveys
  - Ground system marketplace analyses
- Determined the availability and capability of:
  - Current satellite ground system products
  - Typical commercial practices for:
    - Contract type/terms and conditions
    - Testing/Maintenance/Warranties
- Impacts
  - Identified a robust commercial market for Satellite Command and Control Systems



Multi-Phase Strategy

- **Initial Competition**
  - **Multiple offerors**
  - **Analysis of system objectives and requirements**
  - **System design descriptions**
  - **Technical approach to mitigating government-identified technical, cost, and schedule risks.**
  - **Cost proposals:**
    - **Demonstration Phase**
    - **Four-year Development Phase**
      - FFP for COTS hardware/software/installation
      - CPAF for development
    - **Five years of sustainment**

Multi-Phase Strategy (cont'd)

- Demonstration Phase
  - Two contractors
  - Draft System/Subsystem Specifications, engineering studies, & system design documents
  - Prototype of initial CCS-C capabilities
    - Demonstration conducted at CERES, Schriever AFB, approximately 7 months after contract award (Oct 01)
- Downselect
  - CFI/downselect NOT full/open competition
  - Call For Improvement (CFI) to Demo Phase contractors
    - Release Nov 01
  - Downselect to one contractor
  - Development/Sustainment Options award Mar 02

“Fly Before You Buy”

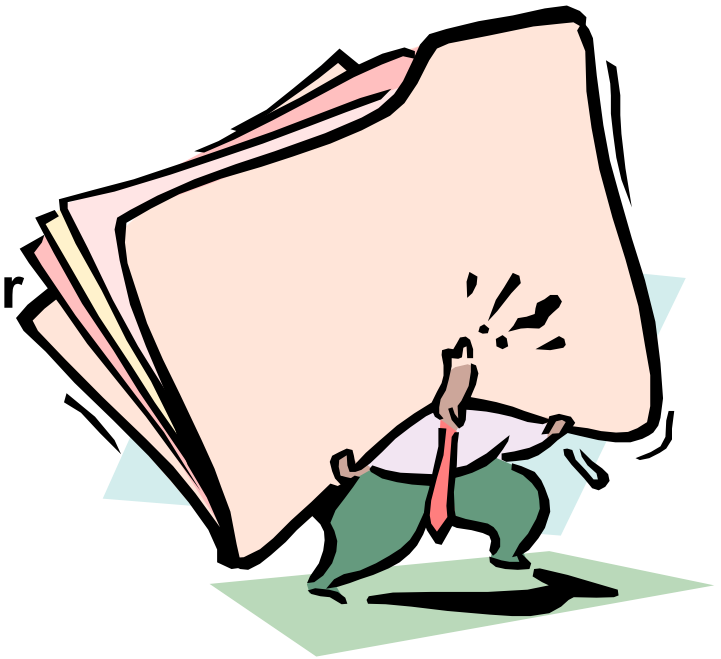
What really happened in the Demonstration Phase

Objectives

- Downselect between two contractors to award development/sustainment options
- Reduce development risk and uncertainty
  - Overcome history of COTS integration development overruns
  - Assess impact of program-unique requirements on COTS-based system architectures
  - Validate contractors' system and proposal claims
    - Demonstrated ability to interface with MILSATCOM-unique vehicles
- Hands-on operator feedback in a "real world" environment
  - "Fly Before You Buy" - Software Engineering Institute (SEI) and Industry Best Practice
  - Forum for interaction and technical interchange among operators and contractors

Programmatic Challenges

- Personnel constraints
  - Shortages and Transitions
  - Involving other program stakeholders
- Fiscal Constraints due to budget reductions
- Managing two (competing) contractor teams
  - Information Separation
  - Workload and division of labor
  - GFP delivery



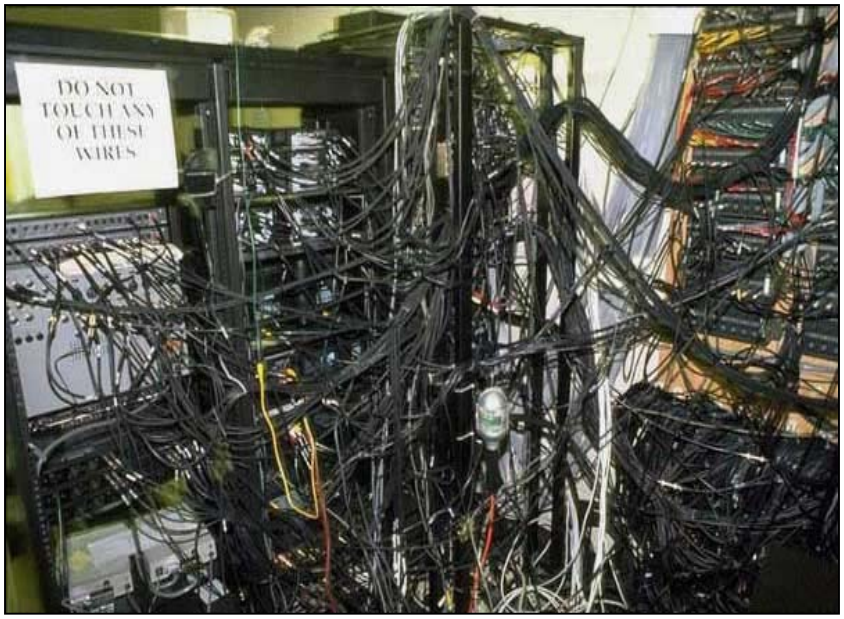
Maintaining Fair Competition

- Managed two unique contractor approaches and organizational structures
- Prevented technical transfer
  - Ideas from KTR A getting to KTR B, vice versa

- Prevented unfair competitive advantage
  - Contractor with access to useful information and resources
- Briefed Rules of Engagement to government stakeholders and contractors early

Minimizing Requirements Creep

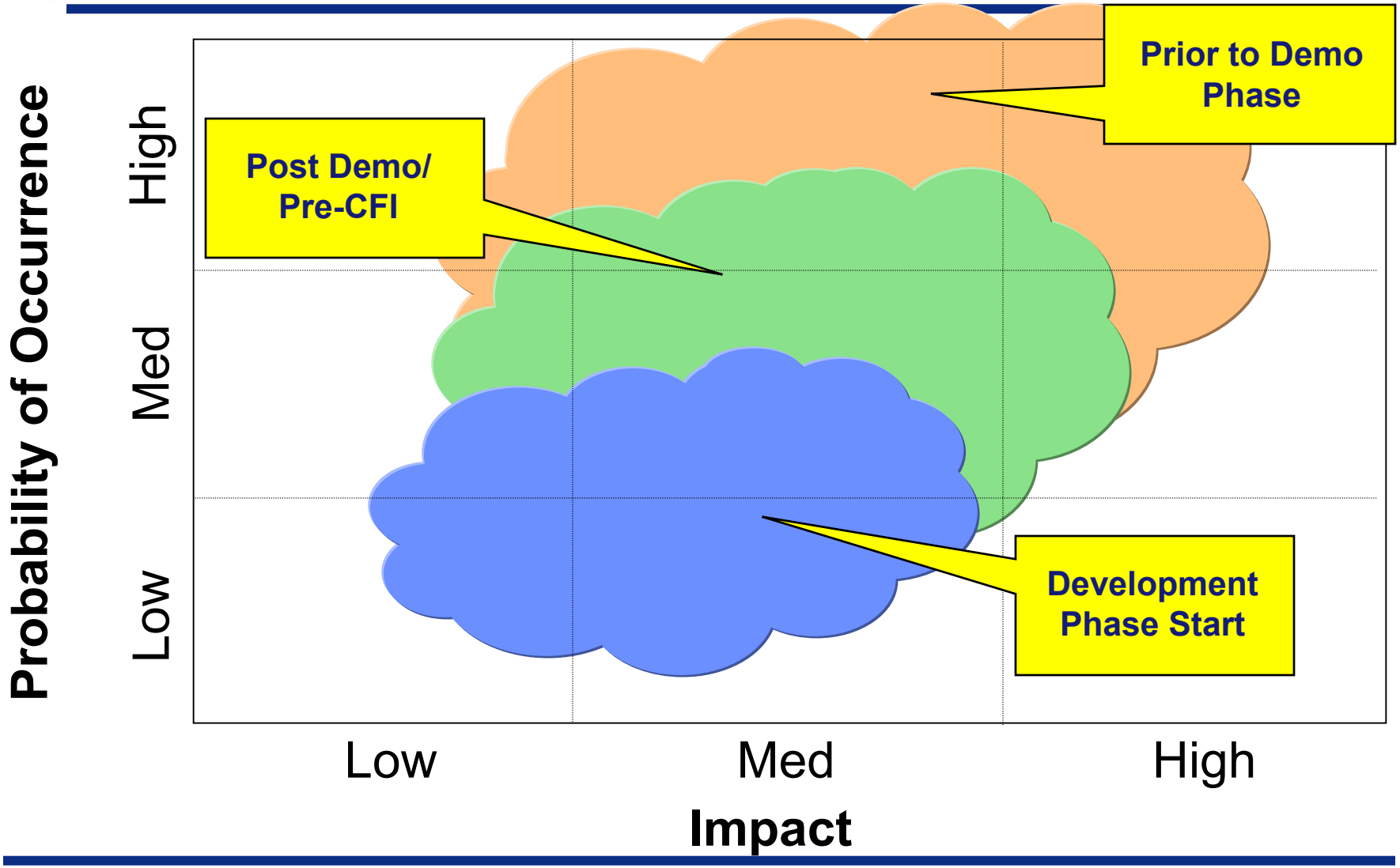
- Demo actually provided a mechanism for managing requirements creep
  - Contract structured to allowed for some, but not significant, changes to requirements
  - Became a powerful control on new requirements
- Still had numerous stakeholders who wanted to add "new" requirements
- Strong leadership at AFSPC significantly contributed to minimized requirements creep
- A handful of critical new requirements and fact-of-life changes were incorporated, but "creep" was controlled



Demonstration Phase Results

- Competition provided increased capability at lower cost
- Government input (both user and acquirer) improved Contractor's:
  - Understanding of requirements
  - Final design
  - Operations and sustainment concepts
- Legacy transition schedule refined
- Key system capabilities validated
  - Technical risk baseline updated
- Strong government/contractor IPT involvement
  - AFSPC users/staff were integrated into all aspects of program development
  - Foundation for continued participation in Development Phase

Program Risk Mitigation



Lessons Learned

- Ensure balance of competition & fairness in downselect process
- Extend competitive phase timeline
  - Requirements refinement
  - Development of preliminary designs
- Increase support from legacy satellite and ground system contractors
  - Explanation of operations plans and satellite constraints
  - Analysis of satellite databases

Integrated Product Development Organization

Program Management

System Engineering

- Requirements Analysis
- Test
- Risk Mitigation

System Development

- Telemetry & Commanding
- Orbit & Attitude
- Mission Planning
- Simulation
- Security

Operations/ Logistics

- Operations Concepts
- Facility Activation
- Transition
- Training
- Support & Sustainment

Satellite-Specific Development

- Functional & Interface Requirements
- Memory Management
- Maneuver Planning
- HMI displays
- Support Plans
- Technical Orders

Development Approach

- **High degree of operator involvement**
  - **Guaranteed availability of key personnel throughout transition period**
  - **Operators integrated into IPTs**
    - **Explain current operational procedures and satellite constraints**
    - **Refine development requirements**
      - Satellite operations
      - HMI design
      - Documentation of procedures

Development Approach (Cont'd)

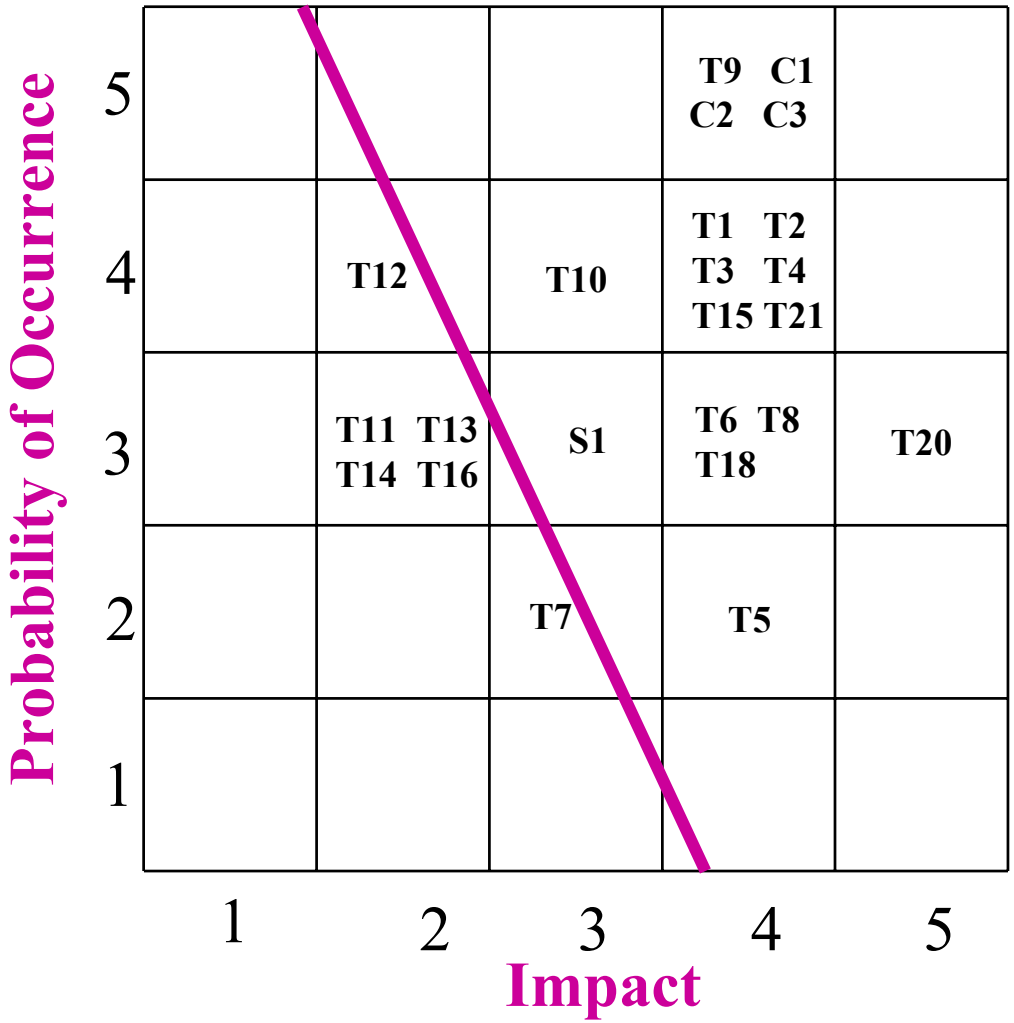
- Positive control of requirements change
  - Approval hierarchy: Squadron-Wing-Headquarters
  - Program Configuration Control Board
    - Review/approval of DOORS change proposals
- Extensive IPT Coordination
  - Issues worked at lowest level IPT
  - Integration of issues at higher-level IPTs

Conclusions

- CCS-C acquisition strategy was a success
  - Competition resulted in greater capability at lower cost
- Operator involvement at all steps is an essential factor for system buy-in
  - Understanding how acquisition process affects outcome
  - Being flexible in requirements definition and change
  - Actively supporting system development and transition

Backup Charts

Risk Baseline



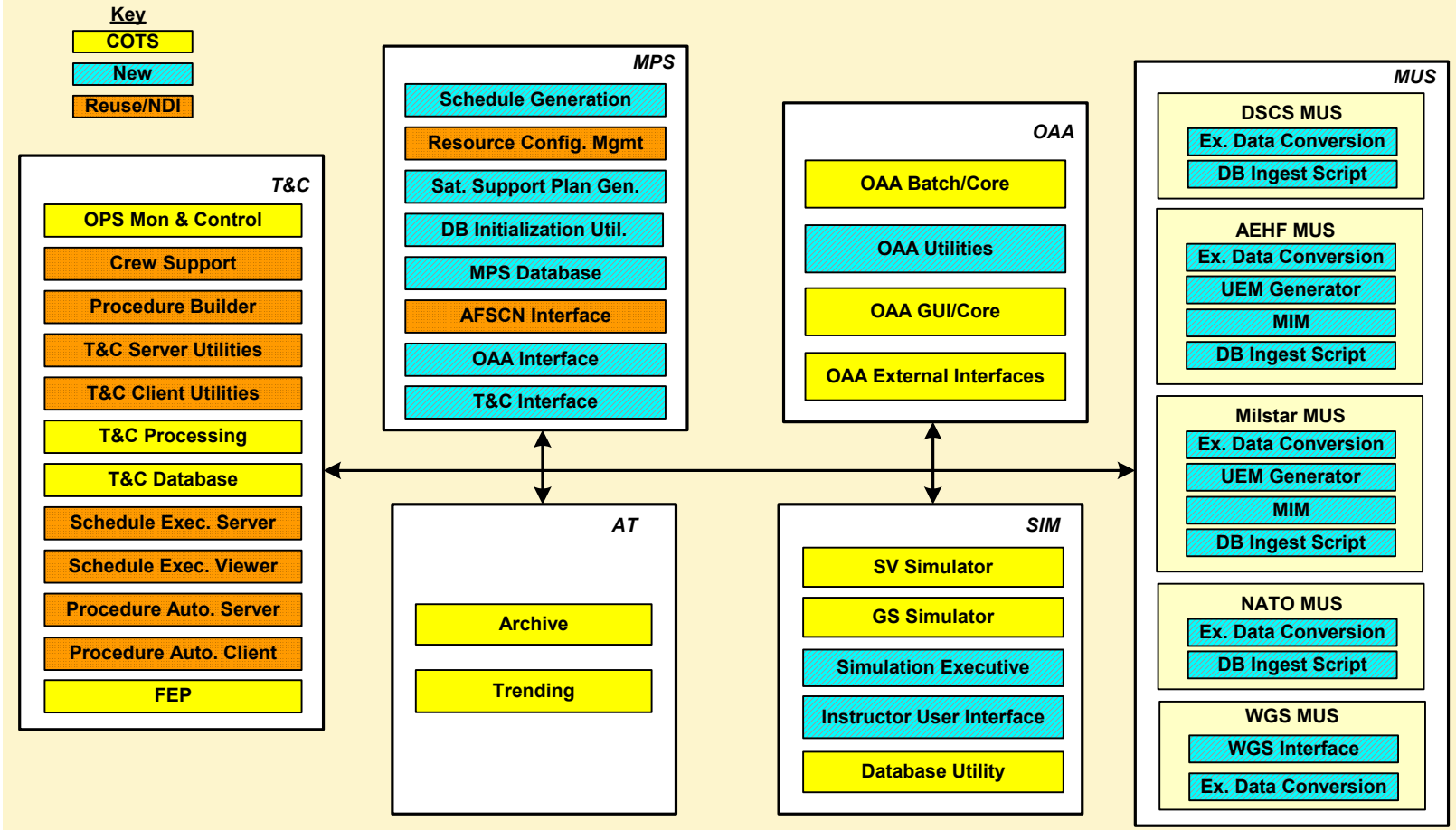
- T1 - Milstar MUS Functions/Core Interfaces
- T2 - Correct Vehicle Modeling
- T3 - Legacy SV Telemetry Databases
- T4 - Incorrect SV Command Data
- T5 - Orbit Accuracy
- T6 - Attitude Sensors
- T7 - SV Simulation
- T8 - Expandable System Architecture
- T9 - COTS Management
- T10 - DII/COE Compliance
- T11 - Scheduler Modifications
- T12 - Engineering Analysis Capability
- T13 - AFSCN Ground Simulation
- T14 - Integrated System Monitoring
- T15 - Satellite Support Plans
- T16 - External Interfaces with MUE
- T18 - AFSCN RGF Interface
- T20 - Operational Validation
- T21 - Interfacing with SV Developers/ Legacy System Contractors

- S1 - Meeting Test Objectives

- C1 – New Satellite Requirements
- C2 - Core Cost Overrun
- C3 - Budget Cut Impacts

System Architecture

CCS-C



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