Wideband Global SATCOM (WGS) Operations Transition at Schriever AFB

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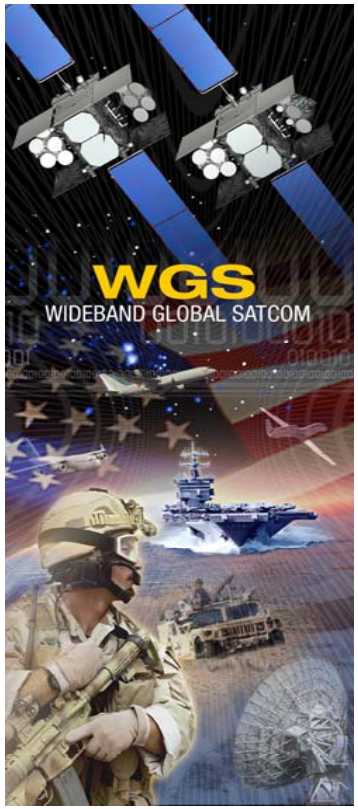
Overview

- WGS and CCS-C Background
- Operations Readiness Workload
- Major Areas of Effort
- Command Script Development in Detail
- Lessons Learned
- Questions

Background

- Wideband Global SATCOM
  - Boeing 702 bus with AF payload
  - Two spacecraft on-orbit
    - Oct 2007
    - Mar 2009
  - Four planned launches
    - 3 qtr 2009
    - 2011-2013



- Command and Control System – Consolidated (CCS-C)
  - Integral Systems C2 system
  - Controls all AF MILSATCOM sats
  - Fully operational since 2004

Operations Readiness Workload

- Road to readiness is made up of many areas:
  - *Requirements definition*
  - *Software design*
  - *Satellite database ingest and test*
  - *Commanding script development and test*
  - *Telemetry screen development and test*
  - *Mission Unique Software and Equipment development and test*
  - *Intersegment test and evaluation*
  - *Operational crew training*
  - *Initial Operations Capability*
  - *Full Operational Capability*

For WGS development, approximately 4 years from dev start to IOC!

Major Areas of Effort

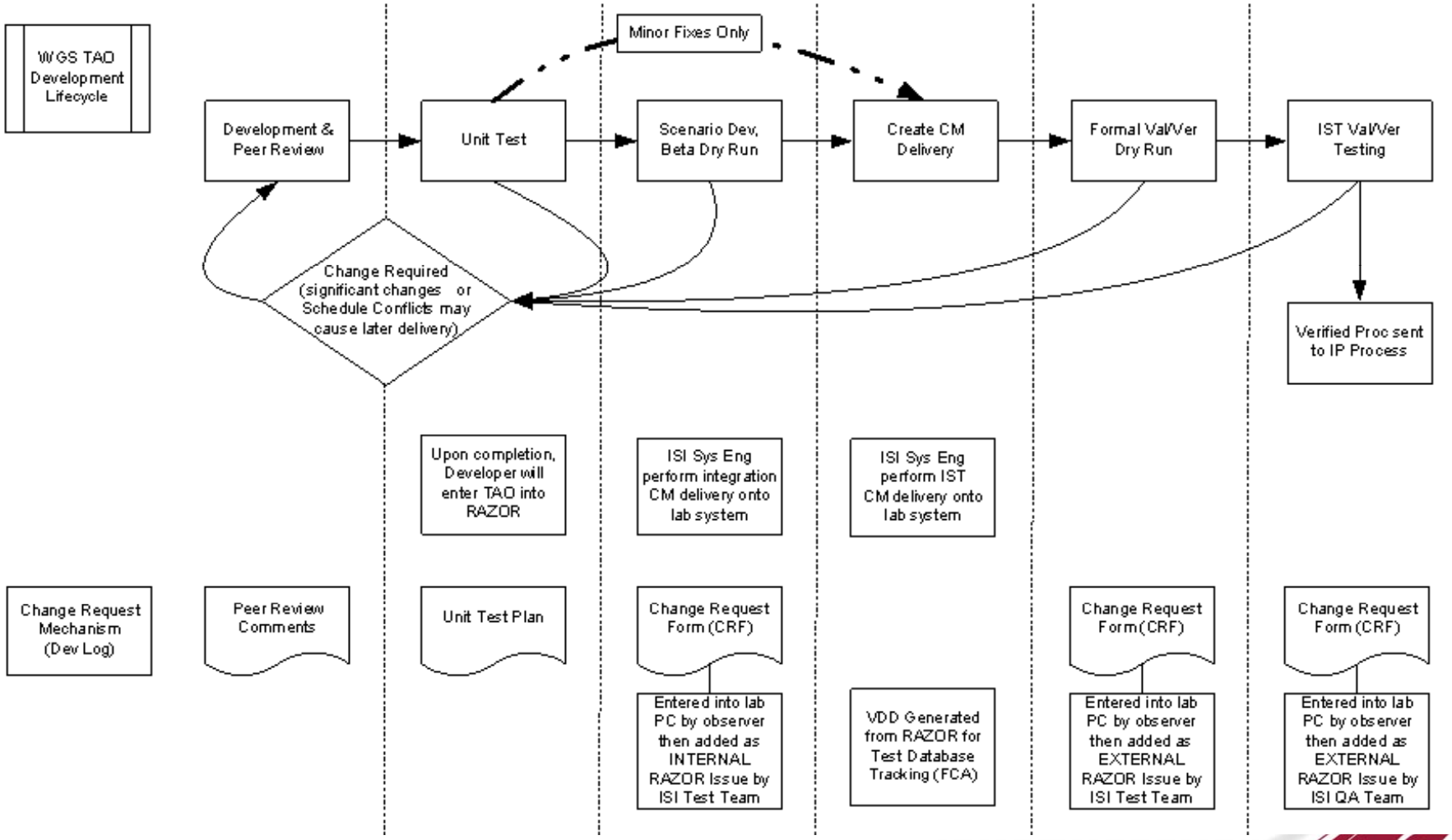
- Satellite Database Ingest and Test
  - *Multiple releases that coincide with satellite development*
- Commanding Script Development and Test
  - *Over 2,200 pages of procedures required coding and testing*
- Mission Unique Software Development and Test
  - *Significant software applications required to handle command and telemetry data processing*
- Intersegment Testing
  - *Compatibility testing with spacecraft and other ground systems*
- Crew Training
  - *Classroom, simulator, OJT, exercise, rehearsals, etc.*

Command Script Development – aka TAO

- Objective was to convert 2,200 + pages of commanding procedures (in MS Word) to CCS-C commanding language, TAO
- Full use of TAO commanding not used before in MILSATCOM
  - *Goal was 100% accurate TAO scripts which would instill confidence in leadership and operators in TAO use*
- Team players
  - *Boeing Satellite Systems ~ 6 people*
    - Technical experts on satellite procedures
  - *Integral Systems Inc ~17 people*
    - TAO development team and test team
  - *USAF – 3 SOPS ~6 people*
    - Customer and users of the ground system
  - *The Aerospace Corp ~1-3 people*
    - Program office representative, test witness and final signature

Almost three years of development, test, rework and integration!

Command Script Development – aka TAO



Lessons Learned

- Beware the “snapping turtle” requirements
  - *Statements from procedures that result in new requirements:*
    - “Compare the collected telemetry data file with the upload file and report any errors”
    - “Upload the desired value stored in the database”
- Satellite schedules and deliveries ultimately drive ground system schedules – be prepared for slips
  - *Satellite database deliveries dependent on factory tests (i.e. thermal vac) or re-releases of databases*
- Co-located team of satellite experts, ground system experts, operators and program management is *absolutely critical* to successful development
  - *TAO development, database delivery and test, MUS development and test*
- A high fidelity simulator is key to accurate products that everyone trusts

Questions

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