



Fielding New Ground Systems and Capabilities

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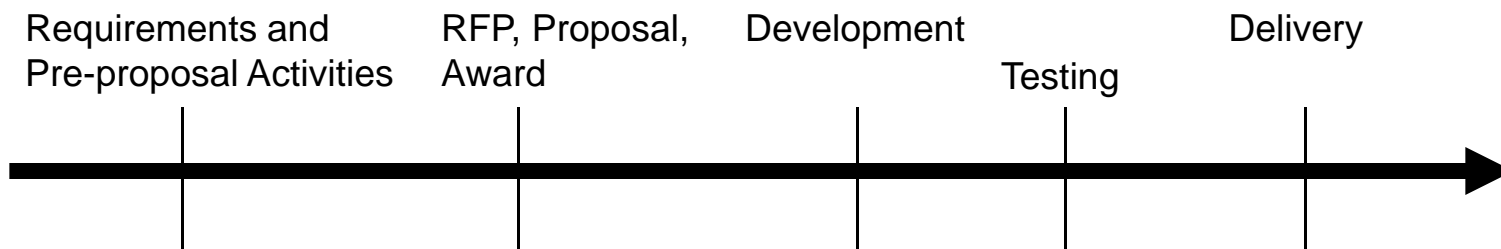
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Fielding New Systems/Capabilities


How do commercial ground systems and new capabilities get fielded so much quicker than Government and DoD?

- **Presentation Approach**
 - Compare commercial vs Gov/DoD acquisition process
 - New ground systems
 - Ground system capability upgrades
 - Satellite T&C systems only – bus control
 - Not sensor control or sensor processing systems

New System/Capability Timeline



Pre-Proposal Activities - New Ground System



Commercial

Informal Discussions with Industry

- See what satellite mfr is offering
- See what industry has to offer
- Consider long term plans for their ground operations
 - Multiple system types vs one system type
- May develop high level functional requirements
- Rarely develops detailed requirements document
- Sometimes no requirements document is developed
 - Proposal is often incorporated into the contract and becomes the SOW and requirements doc

Government/DoD

Process Driven Approach

- RFI
- Industry Days
- Detailed requirements document developed
- Draft RFPs issued
- Feedback from industry solicited
- Study contracts sometimes issued
- Process takes a year or several years

Pre-Proposal Activities - New Capabilities



Commercial

Discussions with GND provider

- May develop high level functional requirements
- Rarely develops detailed requirements document
- Gnd provider usually provides a description of the implementation and capabilities
- Operator usually pushes to have the capability put into the product plans and delivered via support subscription upgrade
- Otherwise a quote is provided with a written description of the new capability

Government/DoD

Process Driven Approach

- Issues RFP to gnd provider if gnd provider is under currently under contract
 - May go competitive otherwise
- Detailed requirements document developed
- Process can take months or over a year

The RFP and Proposal - New Ground System

Commercial

Adapts to what industry has to offer

- Driven by cost and schedule
- RFP is often a request for quote
- RFP comes from operations group
- No rigid procurement and RFP process
- Alternate proposals easily discussed
- Sometimes no requirements specified
 - Proposal is often incorporated into the contract and becomes the SOW and requirements doc
 - Requirements are functional only, and try not to dictate design
 - Requirements encourage the use of existing COTS products
- Commercial product solution is preferred approach
 - Proven capability if used by many other satellite operators
 - Desire an upgrade path through a software support subscription model

Government/DoD

Specifies requirements for system

- Driven by procurement process
 - Requirements, SOW, Phase A contracts, etc.
- RFP comes from procurement group
- Interaction with operations group during procurement is often minimal
- Requirements may need custom software development
- RFP process does not allow for negotiating requirements/functionality/cost tradeoffs
 - Submitting an alternate proposal is considered risky and costly by contractors due to procurement rules

The RFP and Proposal

- New Ground System Cont'd

Commercial

Adapts to what industry has to offer

- For a bundled procurement (satellite and gnd)
 - May specify gnd system vendor to maintain homogenous, integrated ground system
- Willing to adapt CONOPS to adapt to existing product implementations
 - To meet cost and schedule
- Encourage vendors to offer alternatives that don't meet RFP requirements but meet mission needs and get fielded quicker
- Reasonable cost/function tradeoffs made frequently and quickly
- Proposals developed in 2-10 days
- Award is usually in 1-3 months
- Always a fixed price contract

Government/DoD

Specifies requirements for system

- Sometimes requirements for the system architecture are also specified
- Architecture requirements may require changes in available software products
- Large proposal development effort
- Cost Plus contract usually issued
- Award is 3-12 months or longer after proposal submittal

The RFP and Proposal - Capability Upgrade



Commercial

S/W Version Upgrade Preferred

- Often our customers wait for the new capability to be provided as part of software support subscription update
- Otherwise, usually a verbal request worked with the vendor based on customer evolving needs and vendor product evolution
 - Customers provide regular feedback to vendor to ensure product evolutions meets future needs
- Proposal takes the form of a quote with technical details
- Quote becomes the SOW and requirements document

Government/DoD

Process driven

- Need identified by users
- Procurement group takes control of process
- Requirements developed
- Formal RFP generated
- Formal proposal provided
- Lengthy process

System Development - New Ground System



Commercial

Cost/Schedule Drive Development

- Cost/schedule/functional tradeoffs can be made quickly by buyer
- No design/development oversight
 - Typically little to no design or development work allowed
 - Want low risk, proven solutions
 - Focus is on capabilities and performance, not architecture and design
- Customer accepts vendor internal commercial practices
- One program review conducted more closely resembles a training session than a design review
- Custom software development discouraged and minimized

Government/DoD

Requirements Drive Development

- Not much flexibility for cost/schedule/functionality tradeoffs
 - Must meet requirements
- Extensive design/development oversight
 - Design reviews
 - Software development processes
 - QA processes
- Certain processes required or require approval
 - CMMI
 - Software development, QA
- Custom software often needed to meet requirements
 - More process, more oversight
 - More documentation, more time

System Development Cont'd

- New Ground System

Commercial

Cost/Schedule Drive Development

- Customers often develop the spacecraft procedures
 - Often request vendors to provide the set of most commonly used procedures
 - Customers then have operations staff develop/automate remaining procedures
 - Productive use of ops staff down time
 - Forces learning by the operators and hence greater knowledge of satellite operations and procedures, and the ground system itself

Government/DoD

Requirements Drive Development

- Procedures developed by contractor for checklist operations
 - Requires more detailed procedures and documentation
 - Results in lengthy process with extensive testing

System Development - Capability Upgrade



Commercial

Software Version Upgrade Preferred

- Customer usually waits for most new capabilities to come in a software version upgrade
- If new capability is contracted, usually no development oversight
- Usually no design reviews except for major upgrades
 - Such as development for a new spacecraft bus type
- Software version upgrades performed yearly or more frequently
 - Gets new capabilities out quicker

Government/DoD

Requirements Drive Process

- Reviews and process oversight are performed
- Software version upgrades are performed by contractor under a tech refresh
 - May be several years between upgrades
 - Extensive test plans, procedures, testing, etc.

Testing and Delivery - New Ground System

Commercial

Cost/Schedule Driven

- Product test plan adapted for program
- Formal sell-off testing typically takes 1 week
- Customer will run additional operations scenarios before taking system operational
- Minimal custom documentation
 - Mostly product documentation
- Many training classes use standard training material
- Some training material is adapted for the new system
- Total system training is 1-2 weeks
- Experience level of the students is fairly high. 7+ years ops*

Government/DoD

Requirements Driven

- Extensive testing
 - Unique test plan developed to address rqmts
 - Extensive oversight
 - Testing dry runs conducted with customer
 - Formal testing takes weeks
- Significant documentation requirements, much of it custom
- Significant training requirements, much of it custom. Standard training material used as starting point
- Experience level of DoD students is less than commercial due to rotation*

Testing and Delivery - Capability Upgrade



Commercial

Less Process than New System

- Usually no formal Factory Acceptance Test, unless extensive new capability
- Acceptance testing of the new capability is done on site
- Regression testing done by provider, not witnessed by customer
- Customer will run new software on a test system for 1-4 weeks to verify new capability and no regression issues
- Customer often takes new software releases and installs and tests the software themselves
- Often no training done, or an informal hour or two of new capability demonstration is done

Government/DoD

Process Similar to New System

- Test Plans are developed, reviewed, and accepted
- Testing Dry runs are performed
- Formal testing performed
- Formal regression testing performed
- Training material is developed or updated
- Multiple training classes of each type are usually given

Summary



Commercial

Cost and Schedule Driven

- Procurement focuses on selecting what is available to meet the need
- Procurement group are the satellite operators and engineers
 - Procurement decisions can be made quickly by those who will use system
- Use commercially available software and systems – Architecture is less important
- Avoid custom software development to reduce cost, schedule, risk
- Fixed price contracts
 - Drives cost and schedule performance
- Very little development oversight
- Upgrades - Take software updates from supplier

Government/DoD

Process Driven

- Procurement process focuses developing requirements to meet the need
- Procurement group is separate from operations group
 - Formal and lengthy process followed for procurement
- Specify system requirements and often system architecture
- Perform custom software development when needed to meet requirements
- Cost plus contracts
 - Drives process performance
- Extensive oversight throughout program
- Upgrades – Follow procurement processes