



Commercial vs. Government Satellite Cost Drivers

Discussion of Initial Findings

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Air Force Cost Analysis Agency

Duncan Thomas

Linda Snow

Meghan Connelly

Integrity - Service - Excellence



Background



- Comments from senior leadership
 - Why do government satellites cost so much more than commercial?
 - This program will be different, we are using a commercial bus
 - We won't have all those problems



Goal of Study



- Commercial vs. Government
 - Identify major cost drivers
 - Improve our estimating methodologies
 - Better understand cost and technical differences
 - Provide better information to decisions makers



Data Sources

- Analyzed historical data (Communication satellites only)
 - Commercial satellites
 - Multiple vendors
 - Government satellites
 - Air Force, NASA, NRO
- Interviewed Experts
 - Industry
 - Government



Key Cost Drivers

- Accountability
- Affordability
 - Key Performance Parameters
 - Technology
 - Technology Readiness Levels (TRL)
 - Percent New Design
- Oversight
- Contract Type and Schedule



Accountability

- Commercial Satellites
 - Build for Profit
 - Business Plan to Specific Market
 - CEO/CFO Accountable to board/shareholders
- Government Satellites
 - Build for Mission
 - Support Wide Variety of Users
 - Decision Maker
 - Not accountable in a legal sense
 - 'Problems' often inherited from previous administration / 'new' program problems often delayed to next Decision Maker
 - 'Political' accountability
 - No financial accountability
 - Lives may depend on decision (DoD)



Affordability - KPPs

- Commercial Satellites
 - Addresses most government KPPs but at a high level (e.g. coverage may be similar but commercial does not reconfigure coverage areas)
- Government Satellites
 - Unique government only KPPs
 - Not as technically mature
 - Challenging to accomplish and expensive (e.g. there is no commercial market for communications at 44 GHz, for frequency hopping, survivability, etc.)





Affordability - Technology



- Commercial Satellites
 - 5% to 20% new design with the average around 10%
 - Overall TRL level is at or near 9
 - With one or two components at TRL 6
 - Benefit from prior test experience
- Government Satellites
 - 75% to 100% new design
 - Overall TRL level historically at 6
 - With many components at TRL 4 or 5
 - Require extensive test program

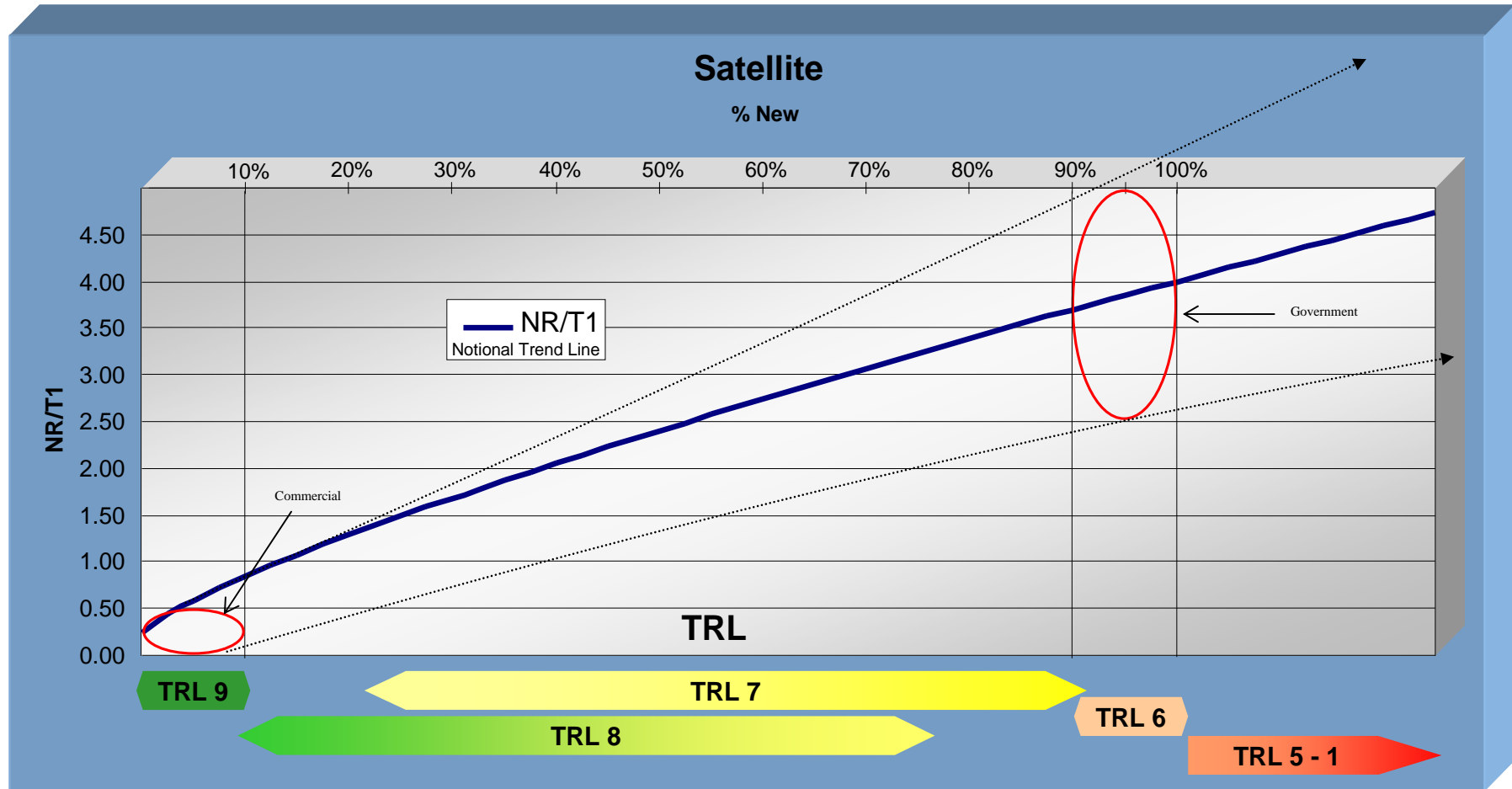


New Development and Technology Readiness Levels

| Commercial Space | Government Space |
|---|---|
|  <p>80% - 90% Existing Technology Bus and Payload</p> <p>Test as Needed Commercial Encryption Heritage Parts Supply No Survivability Rqmt No Risk Mgmt Program No Security Clearances Minimal Oversight</p> <p>Maximum Use of TRL 9 Components</p> <p>10% - 20% New Development</p> |  <p>10% - 20% Existing Technology Mostly Bus Related</p> <p>TRL 8 - 9 Components</p> <p>70% - 80% Unrefined Requirements Mostly Payload Related</p> <p>Extensive Testing Extensive Risk Mgmt Security Clearances Extensive Oversight Government Encryption Survivability</p> <p>Requires Use of Newer Technologies TRL 5 - 6 Components</p> |



Commercial vs. Government Satellite Acquisition





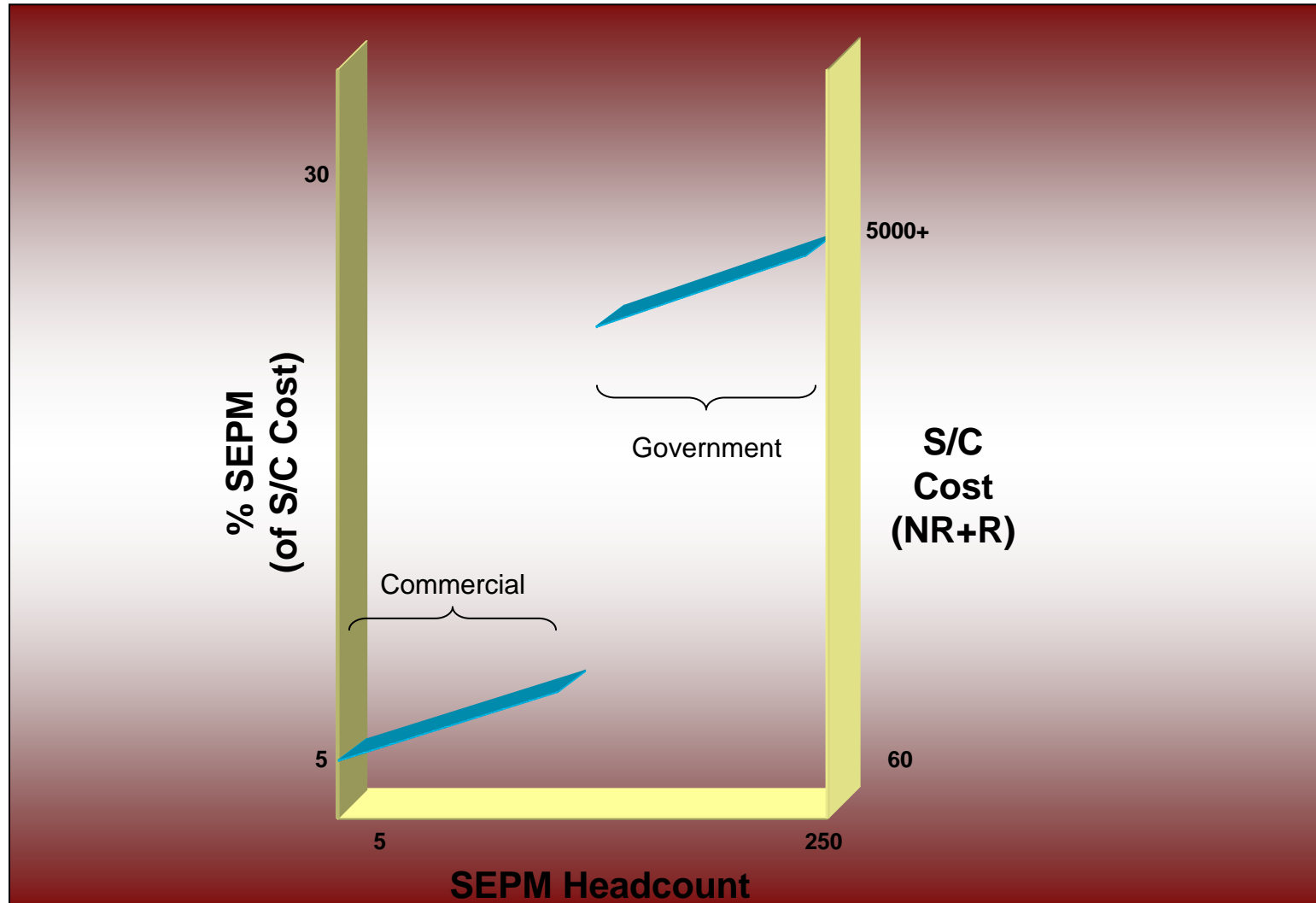
Oversight

- **Commercial Satellites**
 - Normally one or two customer engineering representatives 'on-site' (for certain customers this can be as high as 30)
 - Issues can usually be solved immediately
 - Subcontracted items are minimized – little or no need to monitor subcontractor processes
- **Government Satellites**
 - Large cadre of government representatives 'on-site'
 - Issues often require meetings, reviews, & formal approval of correction
 - Manage large number of subcontractors
 - Oversight necessary to review process validation of subcontractors
 - Contractor must functionally match government oversight staff
 - Must follow DoD acquisition guidelines
 - Write, manage and review Interface Control Documents (ICDs)



Oversight

SEPM Percent as a Function of Cost



Integrity - Service - Excellence



Contract Type and Schedule



- Commercial Satellites
 - Fixed-Price Contracts
 - Requirements 'Nailed-Down' - well understood by Customer and Contractor
 - ATP to Launch Ready ~ 24 months
 - Financial incentives for early completion
 - Funding stability *guaranteed*
- Government Satellites
 - Cost-Reimbursement Contracts
 - Requirements often unrefined
 - Schedule often assumes key component TRLs at higher level than they really are
 - **Components at TRL 6 do not translate to a subsystem at TRL 6**
 - ATP to Launch Ready ~ 5 to 10 years
 - Great deal of funding instability



Summary

- **Accountability**
 - Government needs to implement mechanism to make decision makers more accountable
- **Affordability**
 - Must recognize that government requirements often push state-of-the-art technology (e.g. hard to do)
 - Accept that this is going to cost more and take longer than commercial satellites
- **Oversight**
 - Better definition of requirements may allow government oversight to be more like commercial
- **Contract Type and Schedule**
 - Contractors unwilling to accept firm-fixed price contracts for high risk developments (e.g. TRL 6 or lower)