Operationally Responsive Space

Now Is The Time to Step-Out Smartly

Mr. Joseph D. Rouge
National Security Space Office
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The Convergence of Many Forces

- Growing US Need for Responsiveness
- TACSAT Programs
- Back-to-Basics Acquisition Approach
- High Rate of Change of Technology
- Responsive Space Operations Architecture
- Congressional Interest
- Emerging threats (e.g. Chinese ASAT Testing)
Operationally Responsive Space: Four Ideas with the Same Name*

“Operational Level of War vs. Strategic Mission”
- (OPERATIONALLY responsive space (Ors))
- Put combatant commanders in charge

“Change the economics of space”
- (operationally RESPONSIVE space (oRs))
- Smaller and simpler satellites in shorter timeframes

“Surge and Replenish”
- (operationally responsive spaceLIFT (ors-L))
- Requires responsive launch and spacecraft

“Technology Push”
- (operationally responsive SPACE (orS))
- Use small satellites to drive technology insertion

* From Dr. S. Huybrechts, OASD(NII), “Thoughts on Space Power in the 21st Century”
Operationally Responsive Space Goals

CONNECT SPACE TO THE USER:

– Make space capabilities more relevant to joint force commanders and more adaptable to future joint force needs

RESPOND TO THE URGENT NEED:

– Deliver effects to joint warfare in response to an urgent or previously unanticipated need

REDUCE DEVELOPMENT/DEPLOYMENT TIME AND COST:

– Complement NSS architecture with an element focused on increased value and timely delivery

CAPITALIZE UPON EMERGING/INNOVATIVE CAPABILITIES:

– Motivate and adopt new capabilities from advanced technologies, innovative operational concepts, and benefits from data integration, information sharing, and net-centricity
Potential Responsive Space Applications

**Missions**
- Battlefield ISR (hyperspectral imaging, etc.)
- Communications
- Blue Force Tracking
- Position Navigation & Timing (PNT)
- Weather
- Space Superiority

**Payload Capabilities**
- Imagery
  - Synthetic aperture radar
  - Panchromatic, Multi-spectral, Hyper-spectral, Infrared
- Communications
  - Standard, Covert, Store and Forward
  - RF transmit, broadcast, relay, UAV support
- Radio Frequency
  - ELINT, battlefield geolocation
  - SIGINT, real-time detect radars
  - RF scan, detect new targets
- Weapon Support
  - PNT / GPS augmentation
  - Non-imaging infrared

Feasible Applications Exist
Operational Experimentation

- **UK TopSat**
  - Conducting operational experiments with UK’s low cost imaging spacecraft already on orbit

- **TacSat-1 (Lead: NRL for OSD/OFT)**
  - Dual-mode target identification using Specific Emitter Intelligence (SEI)
  - Estimated launch April 07 Space-X Falcon-I

- **TacSat-2 (Lead: AFRL/VS)**
  - Provides enhanced SEI & Automatic Identification Systems and ~1m resolution imagery, tactical tasking & data dissemination
  - Proposed launch 16 Dec 2006

- **TacSat-3 (Lead: AFRL/VS)**
  - Hyper-spectral and panchromatic imagery directly to tactical user or to CONUS data center, On-board data processing
  - Estimated launch Fall 2007

- **TacSat-4 (Lead: NRL)**
  - “Comm on the Move”, Data Exfiltration and Blue Force tracking
  - Launch ready 2008
Tactical Satellite (TacSat)-2 Experiment

**Capability:**
- Field tasking/data downlink in same pass
- One meter tactical imagery
- Specific emitter ID & geolocation
- Dynamic retasking, cooperative with EP-3
- Autonomous tasking/checkout/on-orbit maintenance, on-board data processing
- Total mission cost w/ launch ~$63M

**Status:**
- First of TACSAT series on-orbit
- 18 month development to launch cycle
- Utilized the Minotaur launch vehicle
- Launched from Wallops Island Facility 16 Dec 2006
- Successfully commanded spacecraft from China Lake ground station

Successful Launch, 16 Dec 06, Orbital Minotaur

Ground Terminal – China Lake
Responsive Satellite Enabling Technology

- Tactical Operations and Data Dissemination:
  - Integrated with existing ISR C2
  - Must fit into existing warfighting architecture
  - Decision quality data to the warfighter

- Advanced Small / Microsat Technologies:
  - Lightweight, low cost apertures
  - Advanced power
  - Efficient propulsion
  - Low cost rad-tolerant components

- Modular Design:
  - Plug ‘n play architecture
  - Standard, open architecture interfaces

- Responsive
- Affordable
- Employable
- Integrated

- Rapid Deployment & Ops:
  - Mission planning tools / tailored orbits
  - Fast assembly and test
  - Rapid autonomous deployment and operations

Investments Being Made Across ORS Enterprise
Surrey Satellite Technology Limited (SSTL)

<table>
<thead>
<tr>
<th>Mission</th>
<th>Year</th>
<th>Launch</th>
<th>Platform</th>
<th>Programme</th>
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<tbody>
<tr>
<td>BEIJING-1</td>
<td>2005</td>
<td>Cosmos</td>
<td>Bespoke</td>
<td>Turnkey</td>
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<td>TopSat</td>
<td>2005</td>
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<td>SNAP nanosat</td>
<td>R&amp;D</td>
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<td>Dnepr</td>
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SSTL Leads the World in Small Satellite Mission Development
Acquisition Stages--Block Approach
ORS and the “Block” Acquisition Strategy

Operational Programs

ORS Capabilities

System Production

Build Approval

System Concept Demonstration

Technology Development

Dev Planning & Labs

Science & Technology

System Production

Build Approval

System Concept Demonstration

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Build Approval

System Concept Demonstration
Responsive Space Operations Architecture
Responsive Reserves against Uncertainty

“It is thus an essential condition of strategic leadership that forces should be held in reserve according to the degree of strategic uncertainty.”
- Clausewitz, *On War*

<table>
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<tr>
<th>Customer Reserves</th>
<th>Responsive Space Capabilities</th>
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<tbody>
<tr>
<td>Forward Deployed</td>
<td>First Response</td>
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<tr>
<td>30 days</td>
<td>On-Call</td>
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<tr>
<td>90 days</td>
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<tr>
<td>Maintenance and Construction</td>
<td>Fundamental</td>
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COCOMs (Foundation)

- COCOMs: Drivers, but need “interpreters” between each organization
- “Don’t wait for the perfect requirement” “Don’t overload projects with S&T”
- Near Term Focus: S&T; Tens of $Ms, doled out by the “ORS HQ”
- AQ Office: Near Term – 10 people; setting up processes – IDIQs…
- Expects ’07 to be OFT; ’08 to have significant AF budget for ORS
Congressionally-Directed ORS Plan

• **Who:** SECDEF shall submit to the defense committees

• **When:** Due NLT 120 days after enactment: February 14th

• **What:** A plan for the acquisition by the DoD of capabilities for operationally responsive space to support military users and military operations
Congressionally-Directed ORS Plan

- Elements of the plan specified for inclusion:
  - Roles and missions
  - Identification of required capabilities
  - ORS Program Office* chain of command and reporting structure
  - Classification of ORS-related information
  - Description of the acquisition policies and procedures applicable to ORS... and any legislative or administrative action necessary to provide any additional acquisition authority to carry out ORS responsibilities
  - Schedule to implement the Plan and...establishment of the ORS Program Office
  - Funding/personnel required to implement the plan within the FYDP
  - Additional authorities and programmatic, organizational, or other changes to ensure success
“The space threat posed by China is multifaceted. The painting in September of a U.S. satellite by a ground-based laser shows that the Chinese program includes a broad range of capabilities, from kinetic kill to directed energy. The January 11th test also show China’s ability to hit targets in low Earth orbit where most of American reconnaissance assets are deployed. But reports also suggest that they are seeking the ability to attack satellites in the medium and higher Earth orbit, such as GPS.”
Conclusions

- Congressional support sound
- Threat to US Space capabilities emerging
- DOD heavily investing
- Community-wide team charting way ahead

ORS will transform future space operations
The Time is NOW