



# ***Small Business Innovative Research Process Review***

***SMC Industry Day***

***17 April 2008***

***Col Kenneth Allison  
SMC/XR***



# Overview

- **Responsibilities**
- **Selection Process**
- **2008 results**
- **Path Forward**
- **Summary**



# ***SBIR Responsibilities***

- **SMC Responsibilities**
  - Identify and score each topic and forward the most relevant
  - Evaluate particular Phase I topics for Phase II implementation
  - Transition and mature technologies once Phase II complete (EA, XR, System Wings collaboration)
- **AFRL Responsibilities**
  - Determine allocations for each AF organization
  - Collect and act on each topic to award Phase I and II contracts
  - Execute/Manage program



# ***2008 SBIR Topic Selection Process***

- **48 Topics allocated to SMC for 2008 from AFRL/XPS**
  - **27 set aside based on SMC Wing Commander's input**
  - **21 topics (plus 4 back-up) selected through scoring process by Chief Engineers**
- **Scoring Criteria developed to identify most probable return on investment**
  - **Criteria included traceability to tech need, criticality, pervasiveness, transition ability, feasible scope**
- **Topics provided spectrum of technology areas**



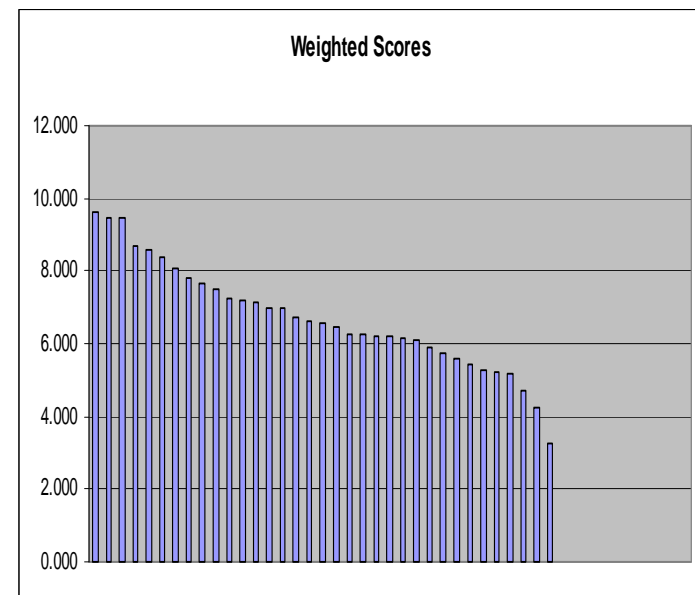
# Scoring Criteria-Recap

- **Traceability To Tech needs**
  - Speaks to relative Alignment with SMC Tech Needs based on PEO TEO Reviews (H/M/L)
- **Criticality**
  - Based on criticality as reflected in AF Mission or capability matrices to your best understanding (H/M/L)
- **Pervasive**
  - Is Technology of Cross cutting impacts as it relates to SMC Wings (Y/N)
- **Transitionability**
  - Is Technology (1) Ready to transition or not (2) Worthy of Transition or not
- **Feasible Scope**
  - Wants your opinion on the relative feasibility of the Topic in terms Small Business ability to execute this Topic within Phase I timeframe and potentially Phase II timeframe



# 2008 Participation

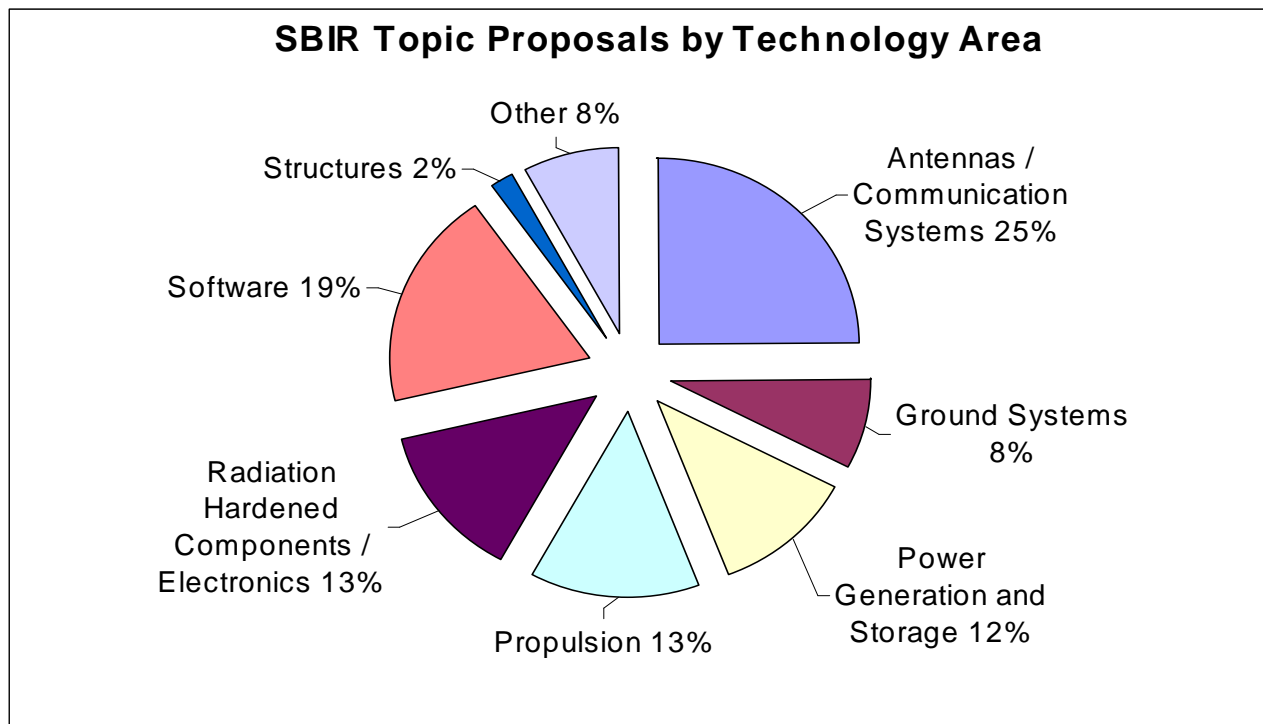
- **CEC input very successful**
- **Wings representing more than 85% of the Topics participated in Scoring (65% orgs participated)**
- **Statistical score distribution showed no unusual clustering and a smooth curve**
- **Small Wings/SPOs did not score in some cases**
  - May reflect their stakes vis-à-vis those of large Wings/SPOs
- **Better communication by outlying (non-co-located in LA) Wings/SPOs with SMC**
  - Revise and incorporate changes to the process to correct this





# FY08 SBIR Funding and Topic Overview

- Overall SBIR Funding between \$75M - \$85 M per year
  - This year Space Related funding: \$86.8M
  - Phase I: \$4.8M+ with potentially \$57M ROI to SMC through Phase II





# ***XR SBIR Path Forward***

## **SHORTFALLS**

## **GOALS**

## **RECOMMENDATIONS**

- | SHORTFALLS   | GOALS  | RECOMMENDATIONS  |
|--|--|--|
| <ul style="list-style-type: none"><li>• Topic calls have not been open for discussion</li></ul>  | <ul style="list-style-type: none"><li>• Better prepare topics earlier and provide more insight to the program teams to ensure adequacy</li></ul>       | <ul style="list-style-type: none"><li>• Initiate rigor in topic development and start a topic parade for interested program offices</li></ul>            |
| <ul style="list-style-type: none"><li>• Certain elements of scoring criteria not clear, may exclude some variability in the topics</li></ul> | <ul style="list-style-type: none"><li>• Develop a refined scoring process that is flexible and repeatable accommodating a spectrum of topics</li></ul> | <ul style="list-style-type: none"><li>• Refine the scoring criteria to mature definitions thereby reducing subjectivity in the scoring process</li></ul> |
| <ul style="list-style-type: none"><li>• SBIR Process not monitored to effectively transition technology</li></ul>                            | <ul style="list-style-type: none"><li>• Develop information process to inform programs/industry of tech progress</li></ul>                             | <ul style="list-style-type: none"><li>• Initiate in system wings/groups transition teams that monitor/transition tech programs</li></ul>                 |

**Desired End State: Coordinated topic selection and transition process**



# Summary

- **All SMC topic allocations filled (~\$48M)**
  - 48 Topics forwarded for inclusion into AFRL's 2008 SBIR process
- **Need to ensure SBIR Phase I and II efforts continuously monitored for potential meeting of program tech needs**
  - FY07 Phase 2 awarded (44 items)
  - Begin Monitoring and Transitioning process for FY07 Phase 2
  - Selectively review prior Phase 2 for transition opportunities (400-500 items)
- **Work toward more efficient transition from Phase II to commercialization**
  - Institutionalize tech transition process among stakeholders
  - Identification of Wing/Tech transition POCs
  - Industry involvement early and often to support successful transition

**CONTINUITY**



# ***SMC SBIR Point of Contact***

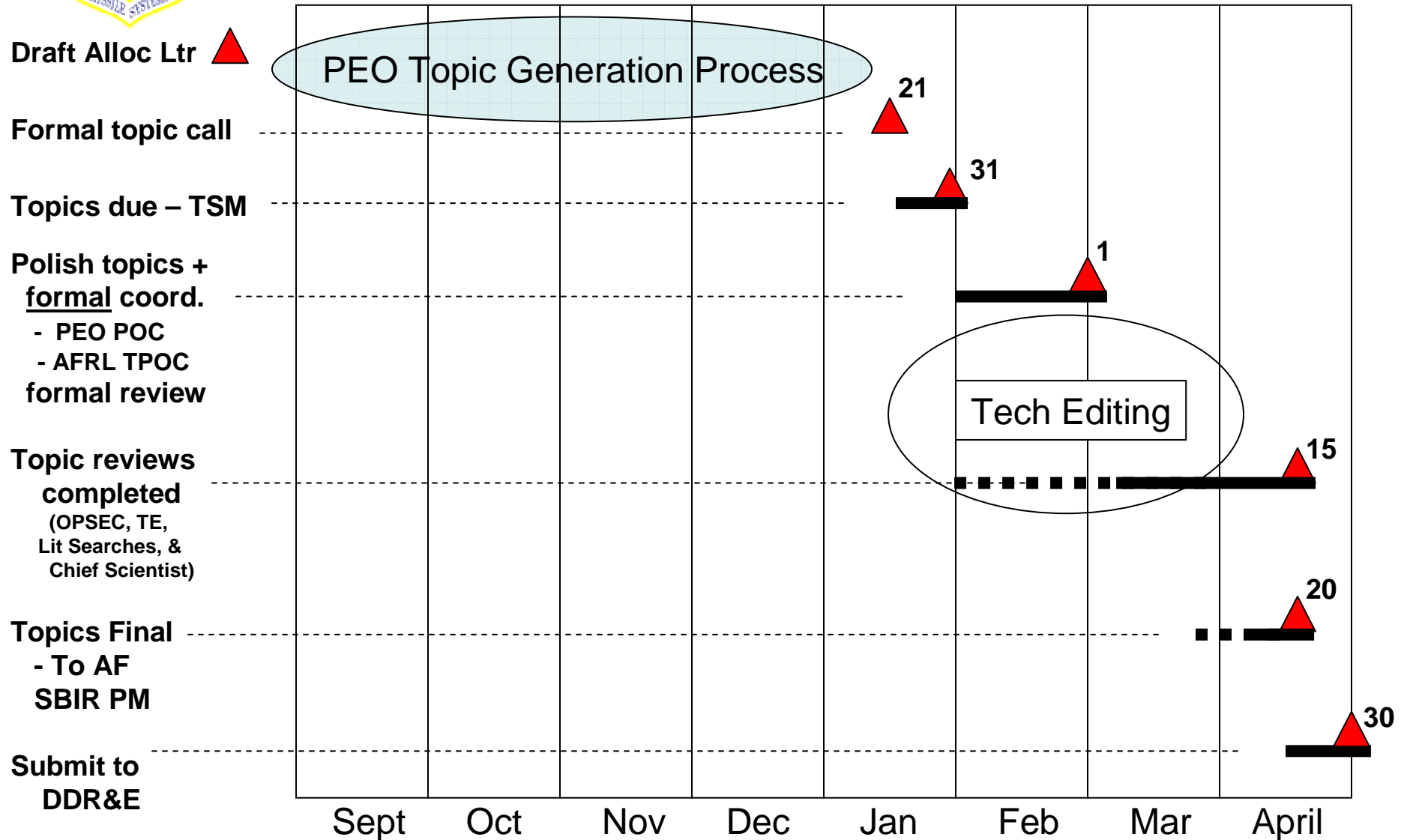
- **Mr. Karim Chaudhry, (310) 653-9175  
Karim.Chaudhry@losangeles.af.mil**



***Backups***



# SBIR Topic Development Timeline





## ***SBIR Process***

- **SMC received 48 Topics this year as allocation from AFRL/XPS, Mr. Steve Guilfoos's Office**
- **27 topics have already been set aside based on SMC Wing Commanders' Official allocations per decision of SBIR Management at SMC**
- **21 Topics plus 4 as back-up will be selected for forwarding to AFRL/XPS**



## ***Background (Contd.)***

- **4 topics will be kept as Management Reserve**
  - Mgt Reserve takes care of contingencies such as unfeasible topics at the last minute rejected or overridden for many reasons
  - On rare occasions we may be directed to include a topic or two by SMC Management that are Critical topics
    - We have to keep some few uncommitted slots
  - At the discretion of SMC Managers of S&T Oversight we may offer one or two Topics for certain Wings if they earned none, if we have not already offered them any
  - Or some wing has a compelling reason and higher level (CC down) support for some augmenting technology
  - Also, keeps some discretion for Managers' better judgments over those of SBIR worker-bees during Mgt-Review



# CEC Scored Topics Selection

| <b>Priority #</b> | <b>Topic Serial No.</b> | <b>SPO Topic No.</b> | <b>Topic Title</b>   | <b>Weighted Total</b> |
|-------------------|-------------------------|----------------------|--|-----------------------|
| 1                 | 2                       | FY09MCC57            | Advanced Lithium Ion Batteries for Space Based applications    | 9.645                 |
| 2                 | 1                       | FY09MC29             | Integrated Blanket/Interconnect System for Thin MJ solar cells | 9.455                 |
| 3                 | 26                      | FY08SY07             | Operational Algorithms for Disturbance Storm Time (DST) Index  | 9.445                 |
| 4                 | 12                      | FY09MC33             | Light-wt solar array structure for Thin MJ solar cells         | 8.715                 |
| 5                 | 14                      | FY09MC14             | 65-nm radiation hardened logic                                 | 8.565                 |
| 6                 | 18                      | GP09                 | Precision Oscillator Developments                              | 8.385                 |
| 7                 | 27                      | SC02                 | Automated Resource Management and Beam scheduling              | 8.050                 |
| 8                 | 22                      | SMC383SY             | Space System Threat Mission Impact Assessment                  | 7.815                 |
| 9                 | 17                      | GP08                 | Low Power Software defined GPS                                 | 7.640                 |
| 10                | 35                      | XR10                 | Mobile Ground Systems  | 7.515                 |



# CEC Scored Topics Selection

| <b>Priority #</b> | <b>Topic Serial No.</b> | <b>SPO Topic No.</b> | <b>Topic Title</b>  | <b>Weighted Total</b> |
|-------------------|-------------------------|----------------------|---|-----------------------|
| 11                | 9                       | FY09MC36             | Digital Optoelectronic logic for highly interconnected Systems          | 7.220                 |
| 12                | 16                      | GP07                 | Tropospheric & Ionospheric corrections for GPS                          | 7.195                 |
| 13                | 11                      | FY09MC11             | 3-D Space qualifiable FPGA  | 7.145                 |
| 14                | 10                      | FY09MC13             | Optical switching fabric  | 7.000                 |
| 15                | 30                      | AF08.3-ICBM04        | Variation-minimized casting Techniques for Solid Rocket Motors (SRMs)   | 6.985                 |
| 16                | 23                      | SMC343SY             | Collaboration for Space Situational Awareness                           | 6.700                 |
| 17                | 19                      | GP10                 | Reliable and rad-hard Micro-electronics                                 | 6.595                 |
| 18                | 24                      | FY08-SY02            | High Propellant throughput micro-thrusters for Next Gen Nano-satellites | 6.570                 |
| 19                | 31                      | XR15                 | Payload Integrated Health Management Systems (IHMS)                     | 6.45                  |
| 20                | 25                      | FY08-SY05            | Resident Space Object ID using natural Illumination                     | 6.25                  |



# CEC Scored Topics Selection

| Priority # | Topic Serial No. | SPO Topic No. | Topic Title   | Weighted Total |
|------------|------------------|---------------|---|----------------|
| 21         | 29               | AF08.3-ICBM03 | Aging & Surveillance Technology for Solid Rocket Motors                       | 6.24           |
| 22         | 4                | FY09MC05      | Wide Band Direct Digital Synthesizer  | 6.190          |
| 23         | 32               | XR19          | Carbon Nano-Tube (materials & structure)                                      | 6.190          |
| 24         | 5                | FY09MC49      | Space-Based carbon Nano-tube Ultra-capacitor                                  | 6.135          |
| 25         | 6                | FY09MC15      | High Efficiency Green Propellant Thruster for Attitude Control of Spacecrafts | 6.120          |
| 26         | 15               | GP06          | Distributed Sensor Networks   | 5.900          |
| 27         | 7                | FY09MC52      | Innovative Low cost Encrypted Mobile Ground Systems                           | 5.750          |
| 28         | 8                | FY09MC58      | Dev of Tensioned Phased Array Structural technologies                         | 5.580          |
| 29         | 3                | FY09MC43      | Compact Multi-band Antenna for Ground Integrated Satellite Terminals          | 5.435          |
| 30         | 33               | XR04          | Responsive multi-parametric methods for remote-target ID and characterization | 5.295          |



# CEC Scored Topics Selection

| <b>Priority #</b> | <b>Topic Serial No.</b> | <b>SPO Topic No.</b> | <b>Topic Title</b>  | <b>Weighted Total</b> |
|-------------------|-------------------------|----------------------|---|-----------------------|
| 31                | 21                      | GP12                 | Enhanced GPS Using Signals of Opportunity for handhelds   | 5.210                 |
| 32                | 28                      | AF08.3-ICBM02        | Solid Rocket Motor fast Cook-off Modeling & Design  | 5.150                 |
| 33                | 34                      | XR02                 | Laser Beam Wave-front methods for remote target   | 4.720                 |
| 34                | 13                      | FY09MC47             | Quantum repeater technology development   | 4.230                 |
| 35                | 20                      | GP11                 | Miniaturized military GPS receiver w/ ultra high accuracy/timing capabilities for intra and inter platform sensor synch | 3.255                 |



## 2008.3 Topics (CC Priority Lists)

| Priority # | SPO | SPO Topic No. | Topic Title  |
|------------|-----|---------------|--|
| 1          | MC  | FY09MC30      | High Efficiency Thin Multi-junction Solar Cells                                      |
| 2          | MC  | FY09MC21      | Next Generation Reconfigurable FPGA  |
| 3          | MC  | FY09MC32      | Advanced Li-ion battery cathodes   |
| 4          | MC  | FY09MC16      | Next Generation Ultra-linear SHF/EHF Solid State Power Amplifiers                    |
| 5          | MC  | FY09MC07      | Radiation hardened Deep submicron microelectronics development                       |
| 6          | MC  | FY09MC24      | COTM Antenna Pointing and Stabilization System                                       |
| 7          | MC  | FY09MC01      | Next Generation Integrated Laser Diode   |
| 8          | MC  | FY09MC25      | Terabit per second Optical router for Space Based Satellite Network                  |
| 9          | MC  | FY09MC09      | UAV-to-satellite communication Link using adaptive optics                            |
| 10         | MC  | FY09MC48      | Captured Data damage assessment and mitigation in the era of Quantum Crypto-analysis |



## 2008.3 Topics (CC Priority Lists)

| Priority # | SPO | SPO Topic No. | Topic Title  |
|------------|-----|---------------|--|
| 11         | MC  | FY09MC31      | Mono-Propellant Warm gas Pressurization with dual use for Attitude Control System  |
| 12         | MC  | FY09MC17      | Bandwidth-efficient SATCOM Waveform Techniques                                     |
| 13         | GP  | GP01          | Anti-jam Improvements by Combining Remotely Located GPS Antennas on a UAV Platform |
| 14         | GP  | GP02          | Novel Device Processes for Anti-tamper Applications                                |
| 15         | GP  | GP03          | Coaxial cable bandwidth Exploitation   |
| 16         | GP  | GP04          | Cognitive Radio technology   |
| 17         | GP  | GP05          | Commercial Micro-electronics for Space Applications                                |
| 18         | SY  | FY08-SY30     | Autonomous Vehicle awareness sensor  |
| 19         | SY  | FY08-SY31     | Foveated Wide-Field- of-View Imaging Sensor System for SSA                         |
| 20         | SY  | SMC-382-SY    | Autonomous Mission Manager for Space Superiority and Responsive Space              |



# 2008.3 Topics (CC Priority Lists)

| Priority # | SPO  | SPO Topic No.   | Topic Title   |
|------------|------|-----------------|---|
| 21         | SCNG | FY8.3-SC01      | Virtual Space Operations-Universal Services for Control and Use of Space Systems                        |
| 22         | LR   | PRO354          | Design Tools for Combustion stability   |
| 23         | SR   | AFRL-VSSE-07-03 | Reliability and radiation Hardness Assurance  |
| 24         | SD   | FY08.3-SD01     | Low-cost De-orbiting System   |
| 25         | ICBM | AF08.3ICB M-01  | Weapon system Intermittent Fault Detection  |
| 26         | XR   | XR03            | Lucky imaging-Enhanced imagery for Space Situation Awareness  |
| 27         | XR   | XR01            | Multifunction X-Band Phased Array Antenna for Air/Space Surveillance and Operationally Responsive Space |

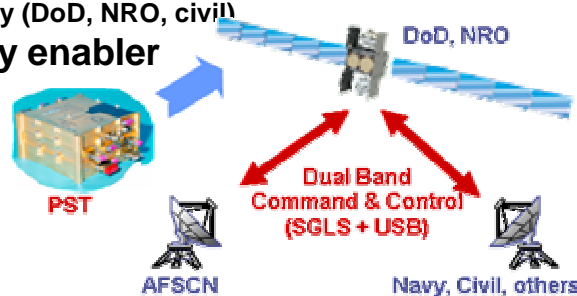


# Interoperable Satellite Operations

Sponsor: SMC/EAB, XR, AFRL

## Objective

- Create a more robust architecture to address potential vulnerabilities in DoD sat. operations
  - Global coverage (foreign landing rights, spectrum policies, etc)
  - Reduced cost & manning
  - Interoperability (DoD, NRO, civil)
- Dev. technology enabler



## Cost

(STE, travel, etc)

- SBIRS Phase I \$700K (RTLogic)
- SBIRS Phase II \$2.5 M (RTLogic)
- Aerospace JO 8583-46
  - 10 hours per week

## Approach

- Synchronize with SATOPS community on architecture, interoperable interfaces, spectrum use
- Partner with AFRL, XR, etc. to develop enabling technology
  - Programmable Sat Transceiver (PST)
- Technology insertion into SMC/NRO programs

### Investigators:

- Charles Tang (Aerospace)
- Bonnie Slaten (Aerospace)

## Schedule

(include milestones & deliverables)

- PST requirements definition (Aerospace)
  - Aug 15, 2005 (completed)
- SBIR Phase I factory demo (AFRL/contractor)
  - June 8, 2006 (completed)
- Engineering model (AFRL/contractor)
  - April 20, 2008
- Flight unit (AFRL/contractor)
  - TBD



# SST (Standardized Space Trainer)

(SMC Sponsor: SCNG/ST)

## Objective

- Capable of training all aspects of space system's mission tasks -- realistically replicating space mission to include modeling the interface to the satellite constellation, ground antennas, and control segments
- Sufficient fidelity to satisfy operations training objectives for each task from the Master Training Task
- List and replicate 100% of the known stimuli for each task simulated and be fully SIMCERT compliant

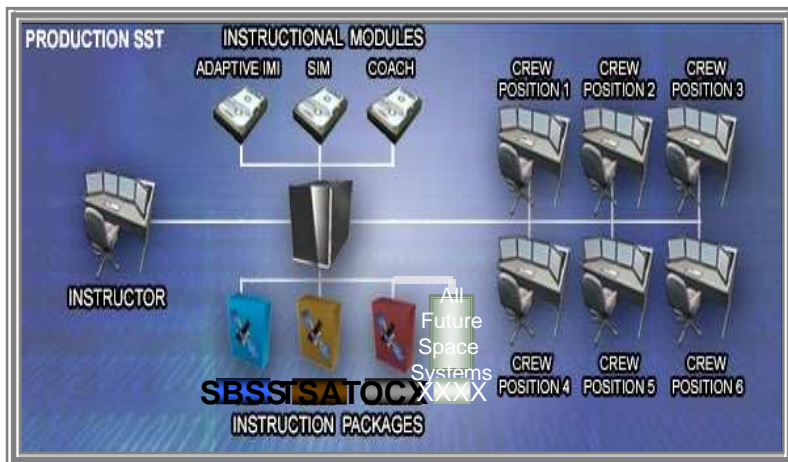
■ = SST Development (3600)   ■ = SST Sustainment (3400)   ■ = Total SBIR Phase III Requirement FY08 to FY13

| Standard Space Trainer   | FY08                        | FY09                        | FY10                        | FY11                    | FY12                    | FY13                    | FY14                    | FY15                    |
|--|-----------------------------|-----------------------------|-----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>Risk Reduction</b> - (via SBIR Phase II Ext)<br><small>(1) Capabilities Document<br/>(2) Software Requirements Spec</small> | UFR<br>\$1.1M               |                             |                             |                         |                         |                         |                         |                         |
| SST Architecture   | UFR<br>\$300K               | UFR<br>\$2.6M               | POM<br>\$2.2M               |                         |                         |                         |                         |                         |
| "1st" SST Training Application   | UFR<br>\$200K               | UFR<br>\$2.0M               | POM<br>\$1.8M               |                         |                         |                         |                         |                         |
| Management Reserve   |                             | UFR<br>\$500K               | POM<br>\$700K               |                         |                         |                         |                         |                         |
| <b>Total 3600 Need for Development<br/>FY08 to FY13 = \$11.4M</b>  | <b>Total UFR<br/>\$1.6M</b> | <b>Total UFR<br/>\$5.1M</b> | <b>Total POM<br/>\$4.7M</b> |                         |                         |                         |                         |                         |
| <b>Total 3400 Need for Sustainment<br/>FY08 to FY13 = \$2.2M</b>   |                             |                             | POM<br>\$500K               | POM<br>\$500K           | POM<br>\$600K           | POM<br>\$600K           | POM<br>\$600K           | POM<br>\$600K           |
| <b>Total SBIR Phase III Requirement<br/>FY08 to FY13 = \$13.6M</b>   | <b>Total<br/>\$1.6M</b>     | <b>Total<br/>\$5.1M</b>     | <b>Total<br/>\$5.2M</b>     | <b>Total<br/>\$500K</b> | <b>Total<br/>\$600K</b> | <b>Total<br/>\$600K</b> | <b>Total<br/>\$600K</b> | <b>Total<br/>\$600K</b> |

The Standard Space Trainer was ranked #91 on AFPSC FY10 POM Unfunded List

## Approach

### SBIR Phase III Contract - (FY08 to FY13)



SMC SBIR Overview Brief

## Schedule

(include milestones & deliverables)

