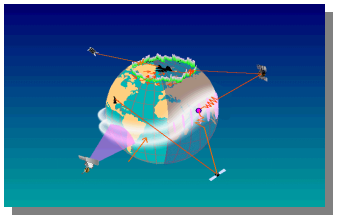
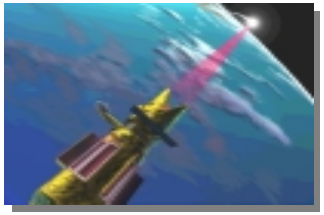
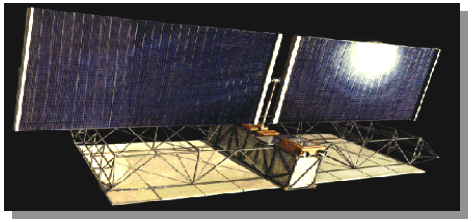
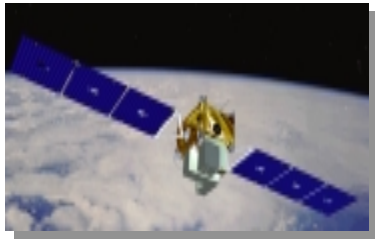
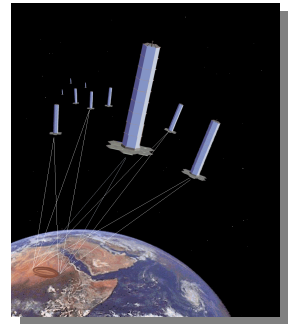
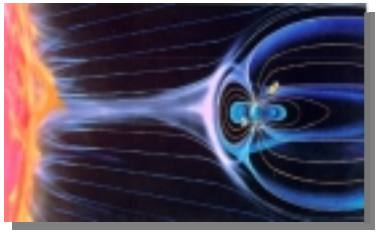
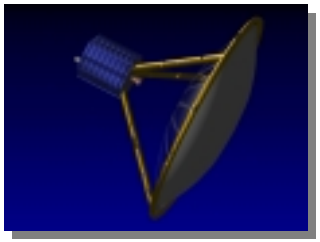






Air Force Research Laboratory

Space Vehicles Directorate





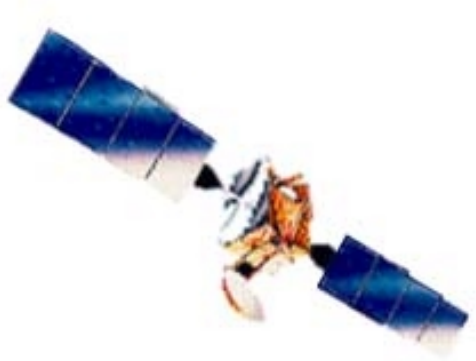
Col. Richard A. Kniseley
Deputy Director, Space Vehicles
Air Force Research Laboratory
Kirtland AFB, NM
Kniseley@plk.af.mil
(505) 846-2604

Space Vehicles Directorate
Agenda

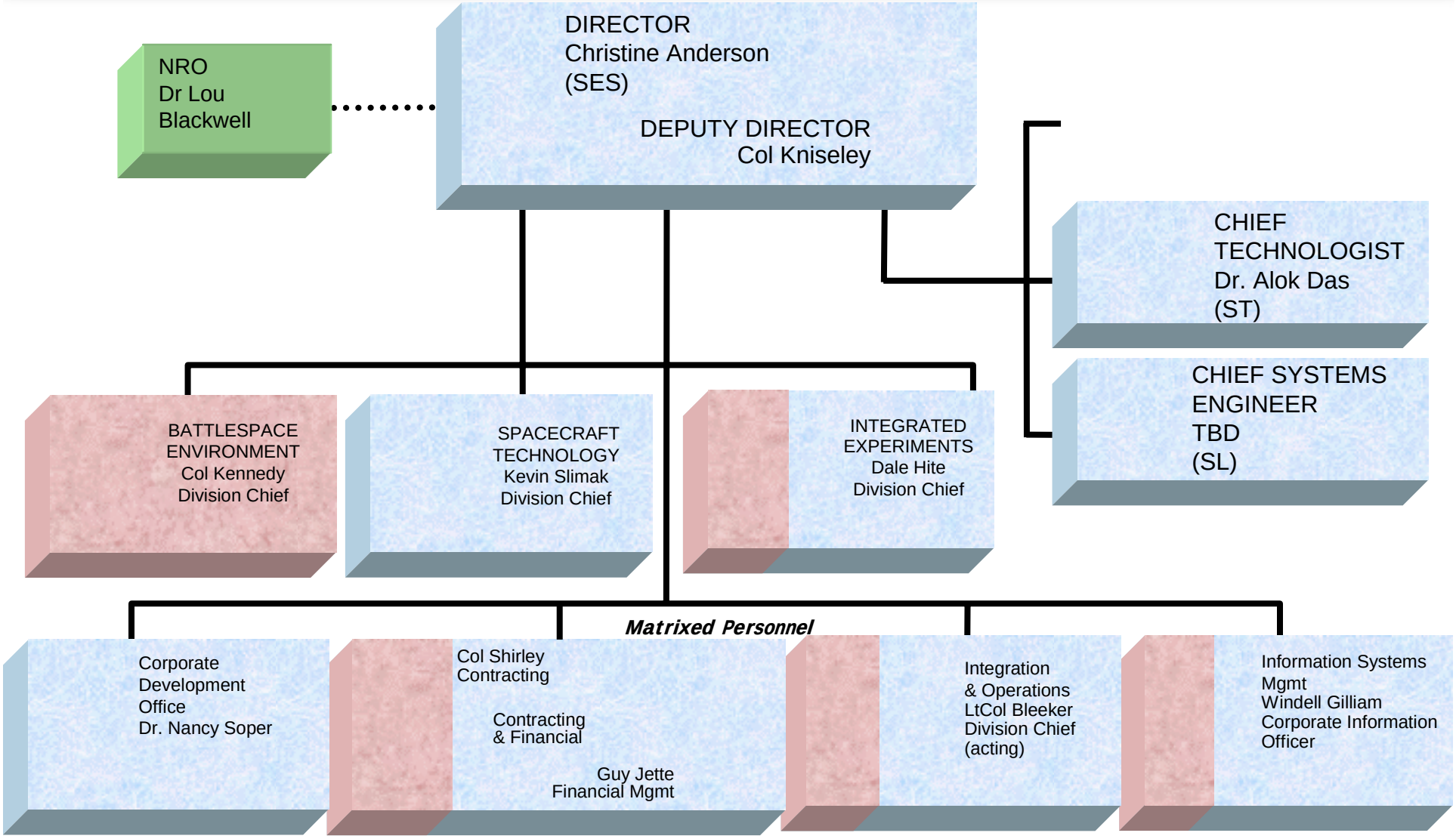
- **Directorate Highlights**
- **Partnering Opportunities**

Space Vehicles Directorate
Mission

Develop and transition
high payoff space technologies
supporting the warfighter
while leveraging commercial, civil and
other government space capabilities
to ensure America's advantage



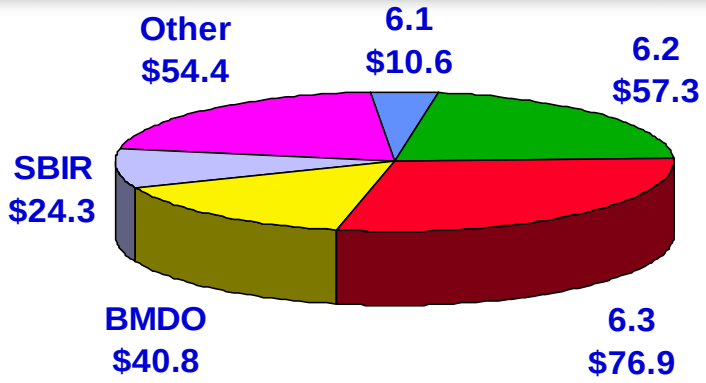
Space Vehicles Directorate
Organization



Key Hanscom | Kirtland

Space Vehicles Directorate

Funding



FY99

Science and Technology	$145M
Other Funding	$120M
Total	**$265M**

FY00

Science and Technology	$191M
Other Funding	TBD

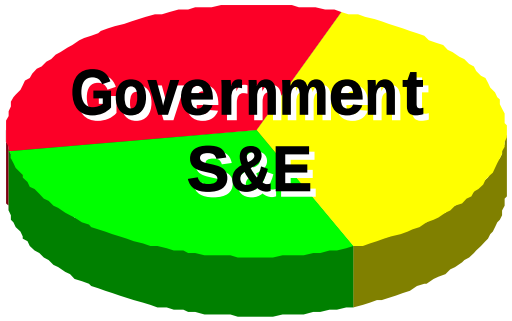
Increased collaboration with DARPA, NRO, and NASA

Space Vehicles Directorate
Personnel

Military
22%

Civilian
78%

Government	581
IPA	17
On-Site Contractors	326
Total	924



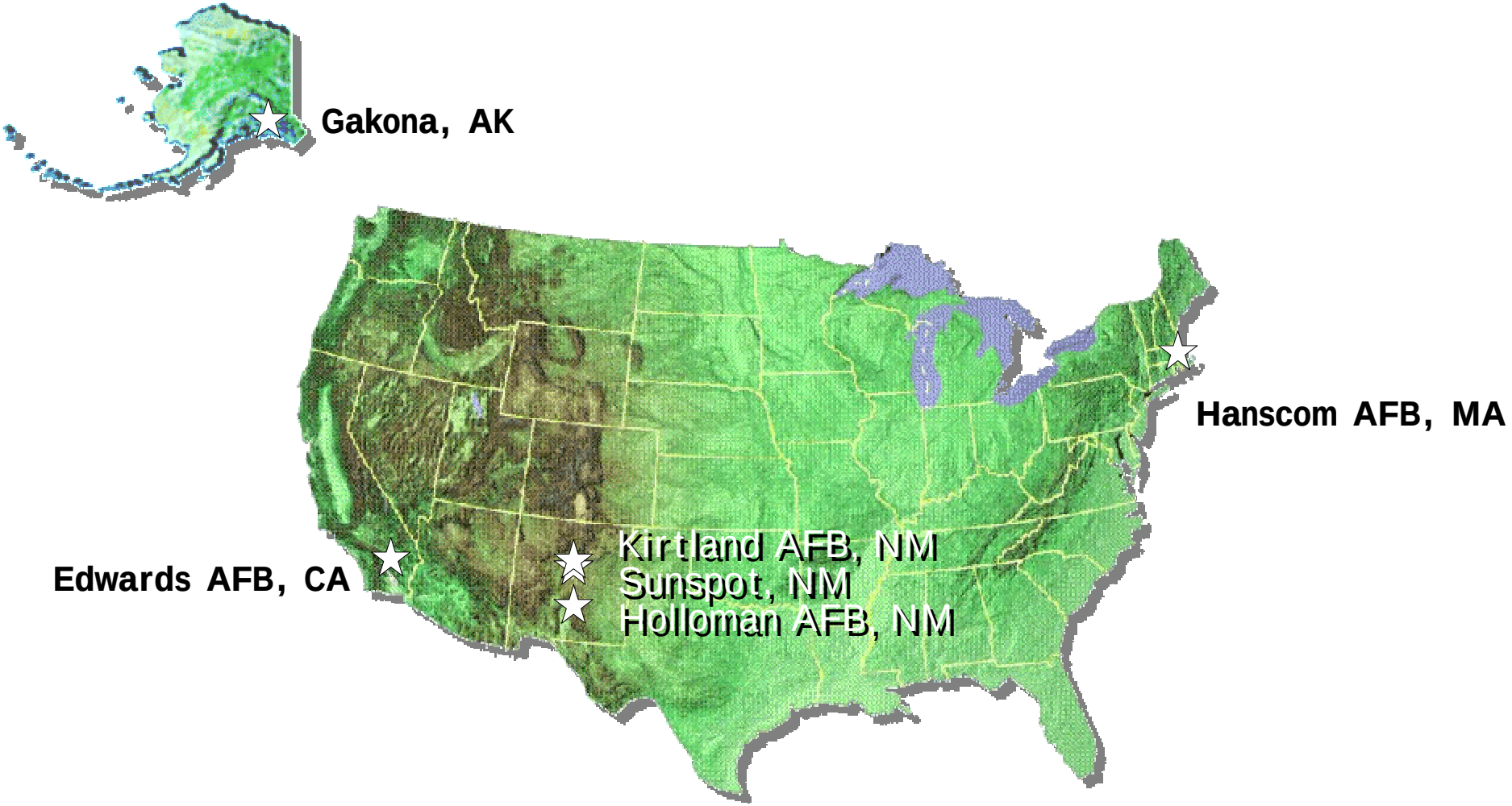
MA
33%

PhD
38%

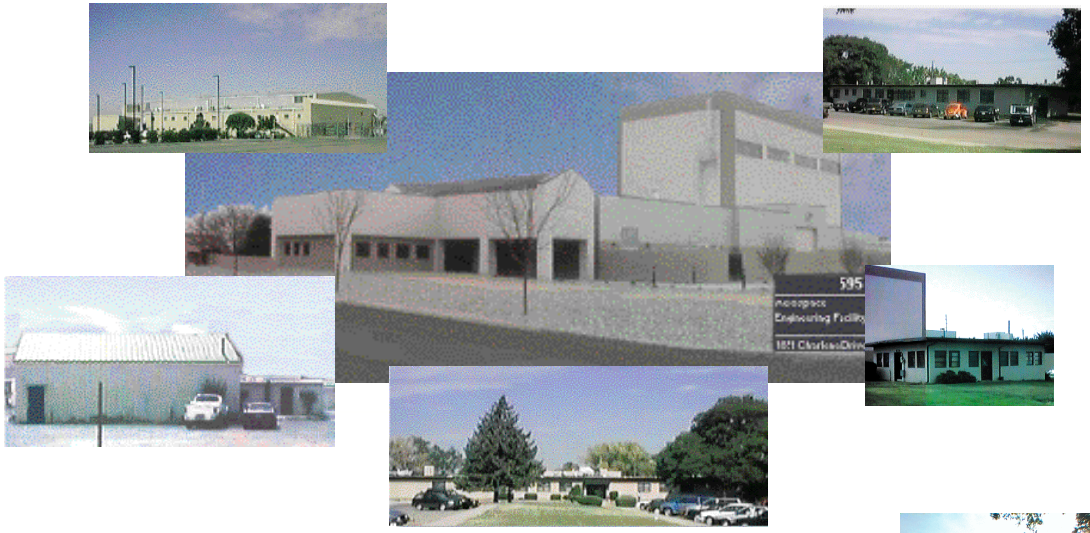
BS
29%

An Integrated Workforce of Military, Civilian, and On-Site Contractors

Space Vehicles Directorate
Operating Locations

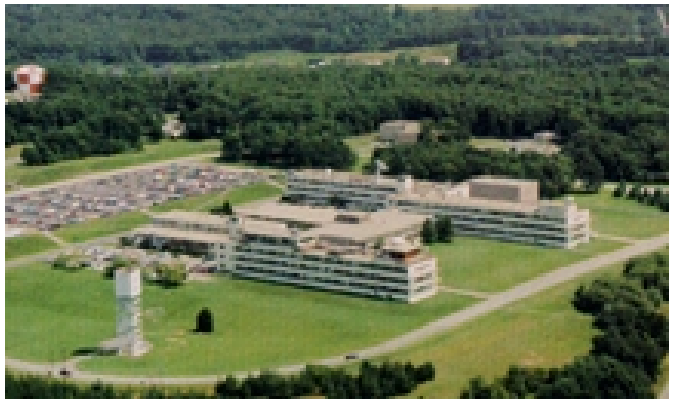


Space Vehicles Directorate
Facilities



FY98 Workspace

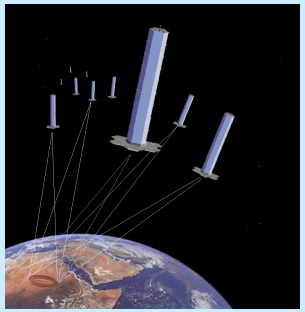
284,500 Sq Ft - Kirtland
370,000 Sq Ft - Hanscom



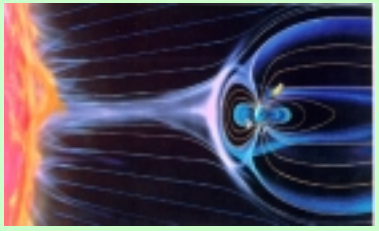
Space Vehicles Directorate
Strategic Thrusts

Current thrusts based on phased approach to achieving Space Superiority

Awareness
- Space-Based Surveillance



Defense
- Space Capability Protection
- Prevention



Offense
- Negation

Access to and Mobility in Space*

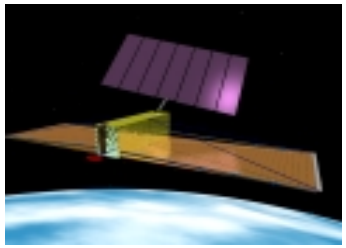
* **Covered under space capability protection thrust**

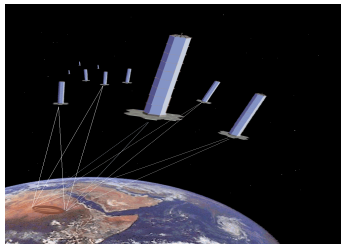
Today.....Future

Space Vehicles Directorate

Space Based Surveillance Thrust

Sense anything anywhere, anytime for perfect knowledge of the battlespace



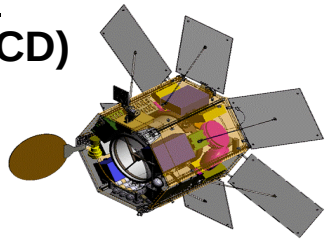


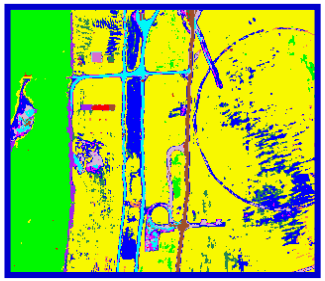
All Weather, Day/Night Surveillance

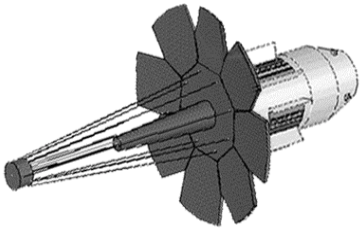
- **Undeniable, all weather surveillance**
- **Real-time operations**
- **Rapid global revisit - any point on earth**
- **Detect Low Observables (LO) targets**

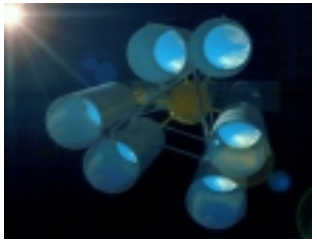
Detection and Characterization of Hard Targets

- **Counter Camouflage, Concealment and Deception (CCD)**
- **Positive ID**
- **Terrain characterization**
- **Battle Damage Assessment**
- **NBC detection**









Long Dwell, Continuous Global Coverage

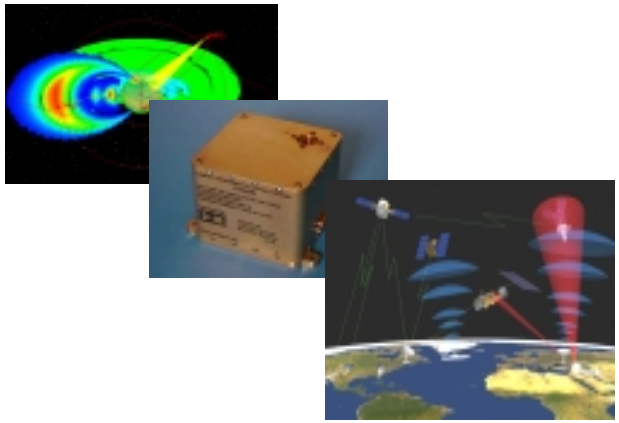
- **Continuous coverage**
- **Weak signal collection**
- **Wide area coverage**

Current Capability: Limited Theater Surveillance

Space Vehicles Directorate

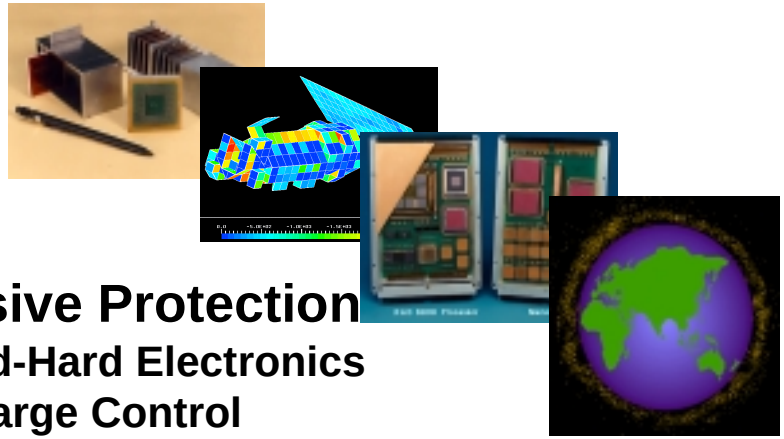
Space Capability Protection Thrust

Protect space systems from natural and man-made threats



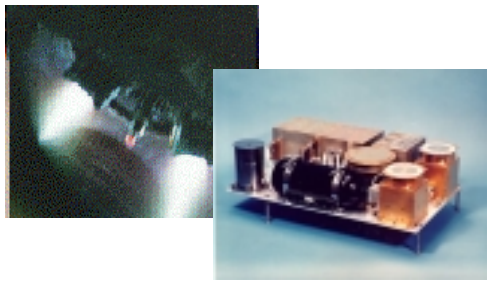
Hazard Alerts/Prediction

- Threat Environment Modelling
- Environmental and Hazard Sensors
- RF and Laser Sensors/Alerts
- Ionospheric Monitoring



Active Protection

- On-orbit Manueverability
- Active Threat Control/Negation



Passive Protection

- Rad-Hard Electronics
- Charge Control Monitoring
- Debris Modelling
- Contamination

New dimension of protection - growing reliance on commercial systems

Space Vehicles Directorate
Role in Access To and Mobility in Space
Commensurate with National Policies and Priorities

Launch Isolation

- **Expendable Launch Vehicles (USAF Lead)**
  - **EELV Support**
  - **Transition to "Buy Launch Services"**

NASA X-Vehicle

- **Reusable Launch Vehicles (NASA Lead)**
  - **Leverage NASA investment**
  - **Work Military Unique Requirements**

F15 Launch

Space Maneuver Vehicle

- **Advanced Technology Concepts (AFRL Lead)**
  - **On-Demand Launch of Nano Sats**
  - **Space Maneuver Vehicle**
  - **Solar Orbit Transfer Vehicle**

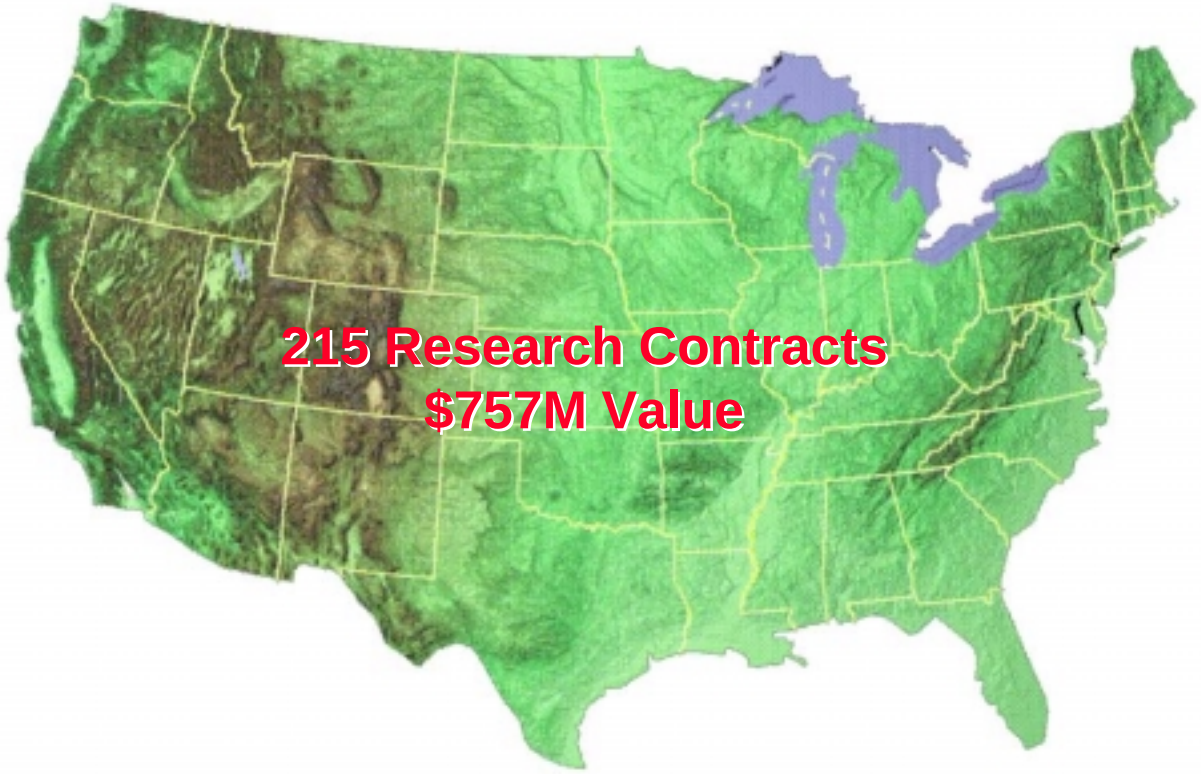
National Goal: Affordable, Reliable, Access to Space

Space Vehicles Directorate
Agenda

- **Directorate Highlights**

- **Partnering Opportunities**

Space Vehicles Directorate
Traditional Industry Partnerships



OTHER CONTRACTOR PARTNERSHIPS

- **Cooperative R&D Agreements (CRDAs)**
  - **75 Agreements (FY 1989-1999)**
  - **Total Value of Resources: $56M**

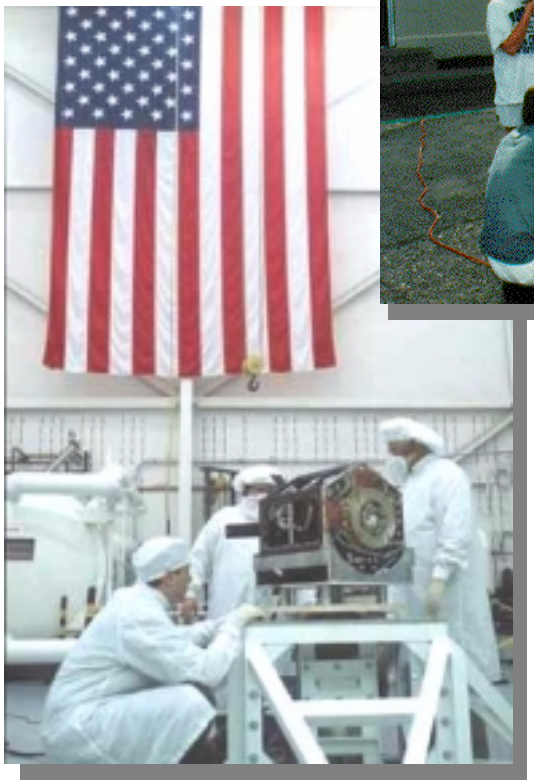
326 On-site contractors

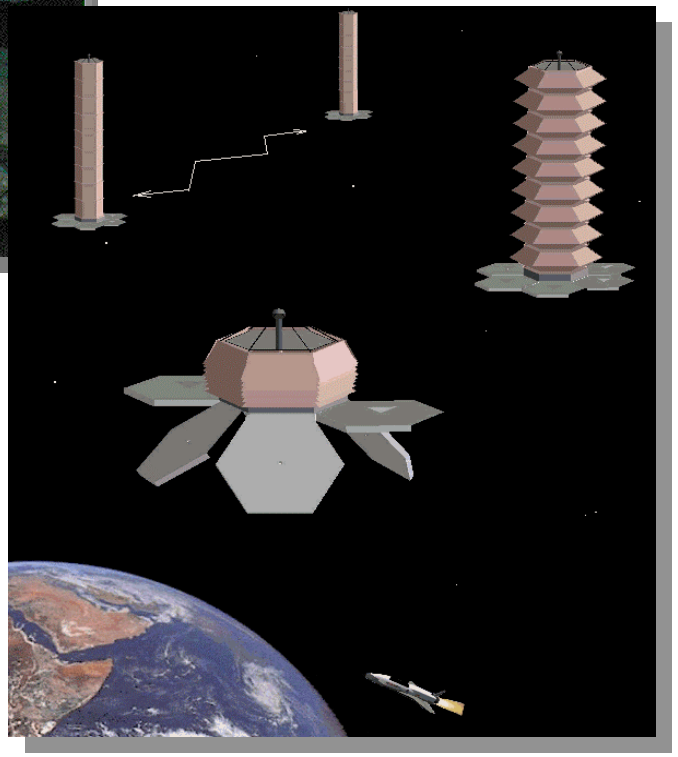
Space Vehicles Directorate
What's a "Collaborator"?

- A technology partner that brings a value-added capability or product, not possessed by the host organization:
  - Core competency
  - Experience
  - Complementary technology
  - Unique facility
- Characterized by:
  - High national reputation
  - Focus on quality
- Resulting in partnership with AFRL's government S&T workforce
  - Joint activity with each partner having a vested interest in success
  - Mutually beneficial goals
  - Co-invested resources (cost-share/in kind share)
  - May or may not be on-site

…Not traditional "fee-for-service" contract

Space Vehicles Directorate
"Collaborator" Examples

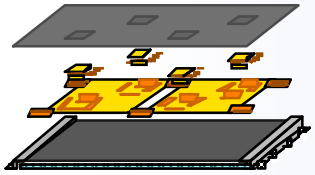




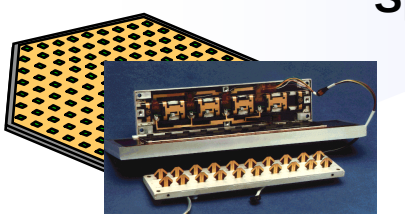
Space Vehicles Directorate
"Concept Car" Model for Integrated Experiments

LAB.....plus.....Industry.....

Lab Developed Breakthrough Technology



MFS



TRAM

Innovative Spacecraft Design

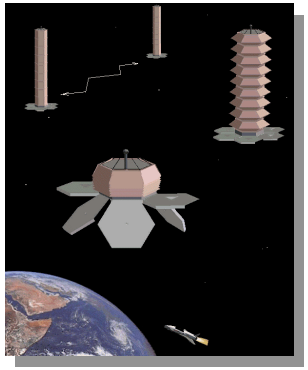
Integrated Flight Experiment

- Concept car approach
- Executed under lab revitalization authority
- Work Force 21 model - Industry collaborator
- 50% - 50% cost share
- Industry retains commercial rights for 5 years

Equals.....

Revolutionary Capability

- True multimission capability



Partnership Win-Win:
Laboratory successfully transitions technology industry partner gains winning edge

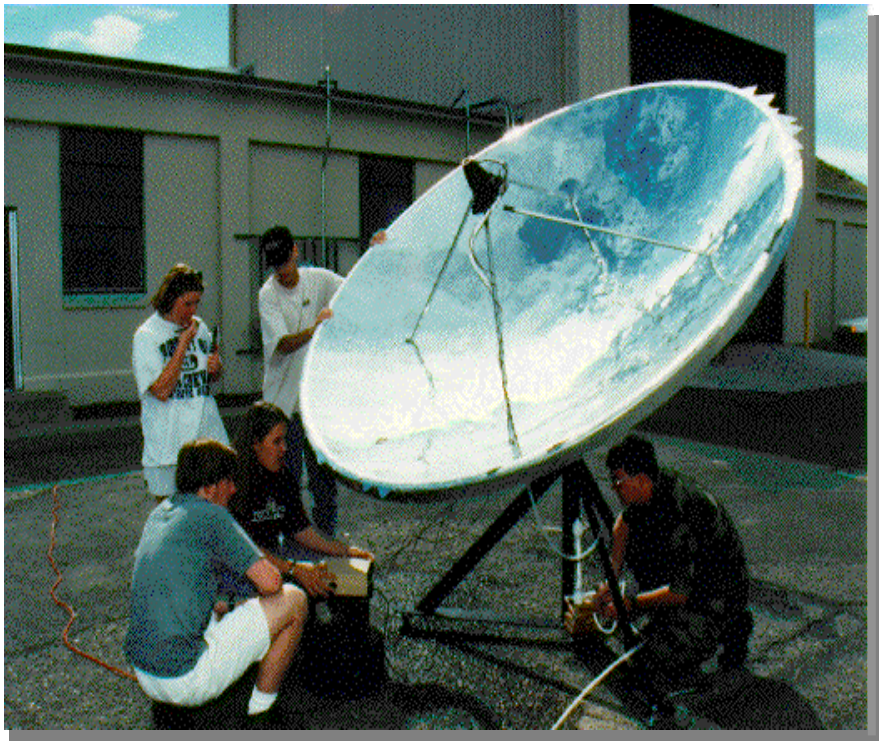
Space Vehicles Directorate
Space Industry Fellows

- Industry researchers work one year with AFRL researchers at AFRL Space Vehicles Directorate
- Includes Professional Enrichment Program
- Up to six will be chosen in 2000
- 50-50 Cost Share with industry

On-Site industry/government collaboration

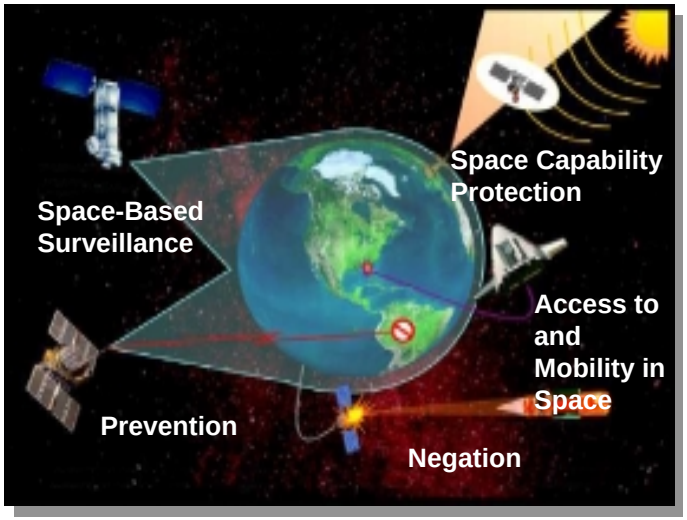
Space Vehicles Directorate
Space Scholars Program

- **Undergraduate summer work program**
- **Graduate school scholarships**
- **Mentors assigned to students**
- **Close coordination with faculty advisors**



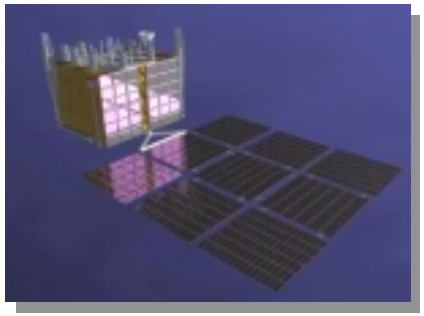
Nurture Our Future Aerospace Leaders

Space Vehicles Directorate
Potential Areas of New Collaboration

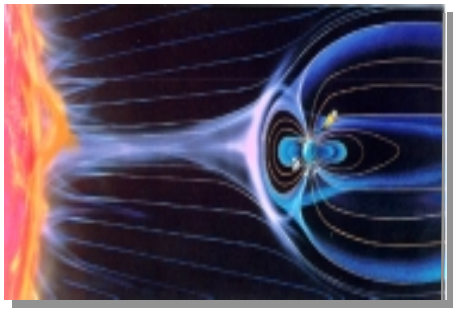


Space Control

Structures & Control



Power



Space Weather

Space Vehicles Directorate
Collaborator POCs

•Structures and Control	*Dr. Steven Huybrechts*	505-846-9371
•Space Weather	*Dr. Gregory Ginet*	781-377-3974
•Power	*Dr. Kitt Reinhardt*	505-846-2637
•Space Control	*Lt. Col. Roger Hunter*	505-846-4155
•Space Scholars	*Dr. Janet Fender*	505-846-2604
•Space Industry Fellows	*Dr. Nancy Soper*	505-846-9352
•"Concept Car"	*Dr. Alok Das*	505-846-8250

Space Vehicles Directorate
Summary

The Space Vehicles Directorate

is proactively pursuing

innovative technologies and strategic partnerships

leading to

US space superiority in the 21st Century