Explosion of Commercial Space and the Implications for National Security

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Background

- Space not mainstream
- Desert Storm
- Air Force Role
  - Space Service
  - Strategic Vision
  - Budget
  - Outlook
- National Defense Panel Report

An approach -
Greater reliance on commercial space

In coming years, most dramatic changes in national space program will be commercial space

Evolution of National Space Sectors

- Civil – Primary NASA
- Military
- Intelligence
  - Missile Gap
  - U2 Model – AF/CIA Cooperation
  - Corona
  - NRO
- Commercial
  - Communications Satellite Industry
  - Other Industries in 1980's
  - Reagan Space Policy

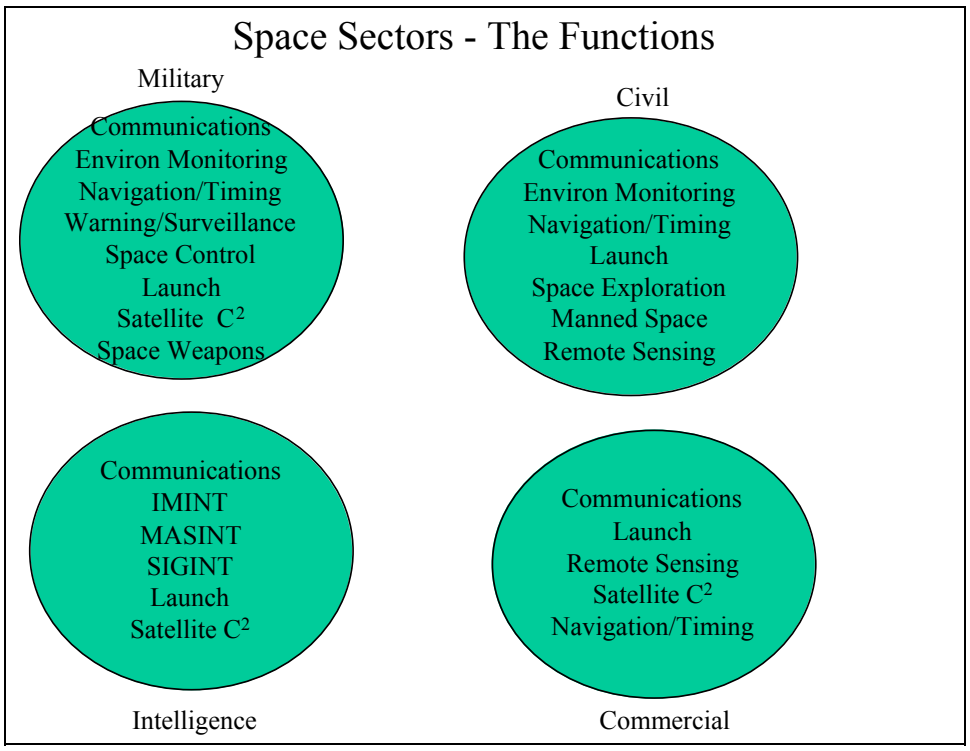
Independent → Interdependent → Commercial a far bigger actor

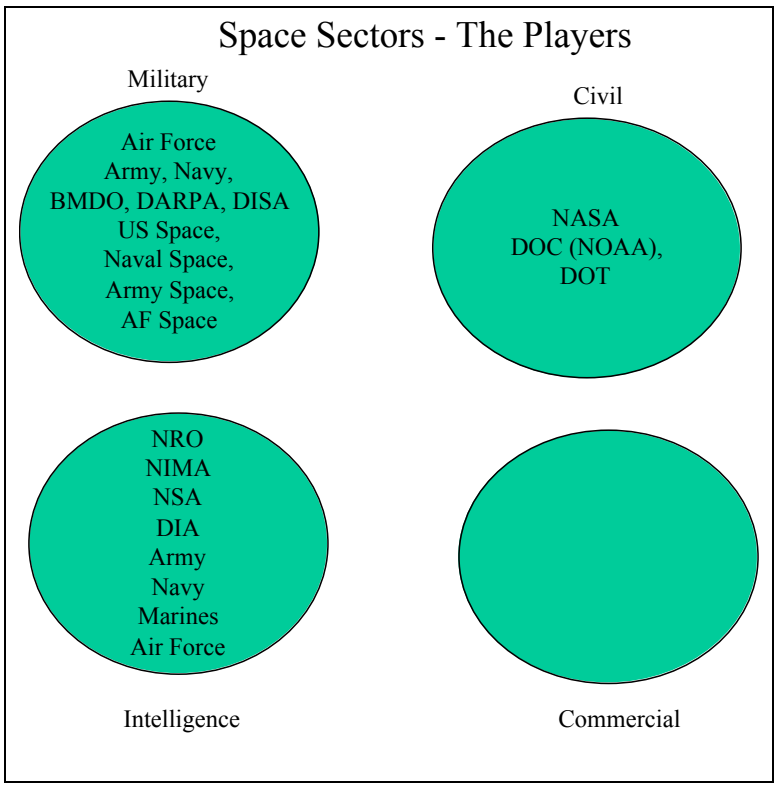
Explosion of Commercial Space

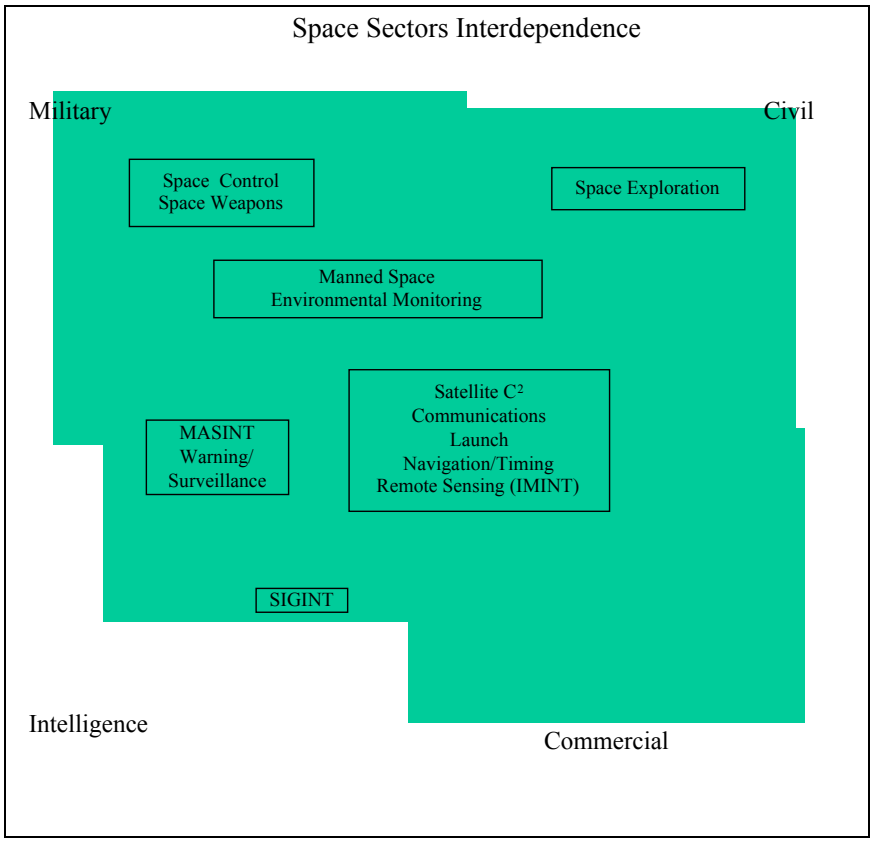
• Space Dominated by Government now changing
- Rapid evolution of info technology
- Progress in international space policy
- Changes in cost/processes of satellite manufacturing

• Current Picture
- Infusion of capital
- • $85B today - $121B by 2000
- Commercial space growing at 20%, government 2%
- 1996 commercial revenue exceeds government
- Volume
- • 1700 launches projected

In coming years, most dramatic changes in national space program will be commercial space


Space Sectors - The Functions
Military
Communications
Environ Monitoring
Navigation/Timing
Warning/Surveillance
Space Control
Launch
Satellite C2
Space Weapons
Civil
Communications
Environ Monitoring
Navigation/Timing
Launch
Space Exploration
Manned Space
Remote Sensing
Communications
IMINT
MASINT
SIGINT
Launch
Satellite C2
Intelligence
Communications
Launch
Remote Sensing
Satellite C2
Navigation/Timing
Commercial


Space Sectors - The Players
Military
Air Force
Army, Navy,
BMDO, DARPA, DISA
US Space,
Naval Space,
Army Space,
AF Space
Civil
NASA
DOC (NOAA),
DOT
NRO
NIMA
NSA
DIA
Army
Navy
Marines
Air Force
Intelligence
Commercial


Space Sectors Interdependence
Military
Civil
Space Control
Space Weapons
Space Exploration
Manned Space
Environmental Monitoring
Satellite C²
Communications
Launch
Navigation/Timing
Remote Sensing (IMINT)
MASINT
Warning/
Surveillance
SIGINT
Intelligence
Commercial

Commercial Space Communications

- Giant in the past
  - Information Revolution
  - Bandwidth is King
- Market - $50B in new development
- Programs
  - Geosynchronous (GEO)
    - 30-40 launches annually
    - Will get heavier
    - Cyberstar, Spaceway, Astrolink, Eurosky Way
  - Low Earth Orbit (LEO) Medium Earth Orbit (MEO)
    - Large constellations/Huge investments
    - Teledesic, Celestri, WEST, Skybridge

Commercial Space Communications

- LEO- Inexpensive World-wide cellular
  - US owned big LEO
    - Iridium, Globalstar, Constellation
  - Foreign big LEO
    - ICO Global (79 National Consortium), Signal (Russia),
  - Euro African
  - US little LEO
    - Orbcomm, Gemmet, FAI Sat and Starsys
  - Foreign little LEO
    - Elekon (Russia/Germany), GONET (Russia), IRIS
  - (Belgium), LEO One (Mexico)
- Outlook
  - Well capitalized
  - High risks
  - All launch within 2-3 years

Commercial Space Communications

- Implications for National Security
  - Operational
    - Capacity
    - Flexibility
    - Bosnia & Direct Broadcast System
    - Gapfiller
  - Efficiencies
    - Short acquisition cycles
    - New technology infusion
    - Satellite design
    - Simplified SAT C^2
    - Stable & flexible capital

Commercial Space Launch

- Change as dramatic as communications
- Market
  - 1975-1995-23 launches/year, 75-80% government
  - 1997-2006-45-52 launches/year, commercial exceeds government

- Space launch modernization
  - Increasing costs, decreasing
  - National Space Launch Transportation Policy (1994)
  - EELV-$2B, MLV (2001), HLV (2004)
  - NASA Reusable Launch Vehicle (RLV)
    - X-33

Commercial Space Launch

- Implications for National Security
  - More timely launch
  - Costs decreasing
  - Commercialization of launch services
    - Government a customer
    - Pay for capability on orbit
      - Reassign expensive military

Commercial Space – Remote Sensing

- Past – Sole domain of the Government
  - NRO
  - Landsat
- Policy debate in Early 1990's
  - Foreign competition
  - Resolution & dissemination
  - Two schools of thought
- Land Remote Sensing Act of 1992
  - Permitted commercialization/licensing
  - Established rules of the road
  - Landsat management
  - Sale of technology

Commercial Space – Remote Sensing

• Market
- $2.65B industry by 2000
- Innumerable uses – huge potential
- "Field of Dreams"

• Programs
- US – 7 licenses, volatile
  - • Earthwatch – Early Bird 1, Quick Bird
  - • Space Imaging EOSAT
  - • Orbimage – Orbview Series
- International
  - • France (SPOT)
  - • Japan (ALOS)
  - • Canada (RADARSAT)
  - • China/Brazil (CBERS)
  - • India (IRS)
  - • Brazil (EROS)

Commercial Space – Remote Sensing

- Implications for National Security
  - Negative – Availability to adversaries
    - Lose element of surprise
    - Targeting capability
  - Positive
    - Operational
      - Flexibility
      - Timeliness
      - Map Source
      - Complement existing systems
    - Efficiency
      - Reduce requirements for collection systems
      - Savings unknown but substantial

Commercial Space - Navigation

- Unlike communications, remote sensing & lauch model
  - Little incentive – "Free Good"
  - International view
- Presidential GPS Policy (1996)
  - DOD to acquire, operate & maintain
  - Selective availability
    - Examine yearly beginning 2000
    - Discontinue use in 2006
- Market
  - Phenomena Growth
    - $500M (1992)→$3B (1997)→$8.5B (2000)
    - Car navigation & handheld

New Military Needs

- Dilemma – How does the Air force fund the vision
  - Maintain basic services
  - Probable reductions in defense budget
- New Initiatives
  - Protecting space systems
  - AWACS/JSTARs Replacement
  - RLV/Spaceplane
  - Weapons Technologies
    - Kinetic solutions
    - Space-based laser

Conclusion

- Space an Enabler for Revolution in Military Affairs
- Must Take Advantage of Commercial Space
- Need to become More Efficient
  - Commercial space & the revolution in business affairs
  - Adopt processes/practices from this dynamic industry

The Dilemma