National

Security

Space

Office

Turning Architectures into Capabilities

National Security Space Policy and Architecture Symposium

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National Security Space Office (NSSO)
Background

- **NSSO primary roles:**
  - Staff Support to DoD Executive Agent for Space
  - NSS Architect (NSSA)

- **NSSA established by 1998 MOU for NSS Management between SecDef (Cohen) and DCI (Tenet)**
  - "Ensure activities are closely coordinated and architectures are integrated to maximum…"

- **Support Decision-making**
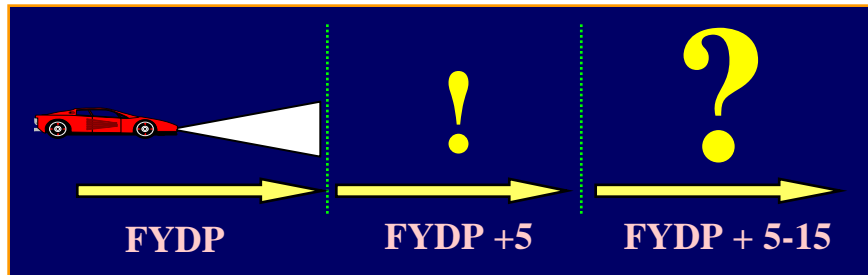
Architectures: What they are and aren't

- **Provide framework and context**

  - Much like city planning

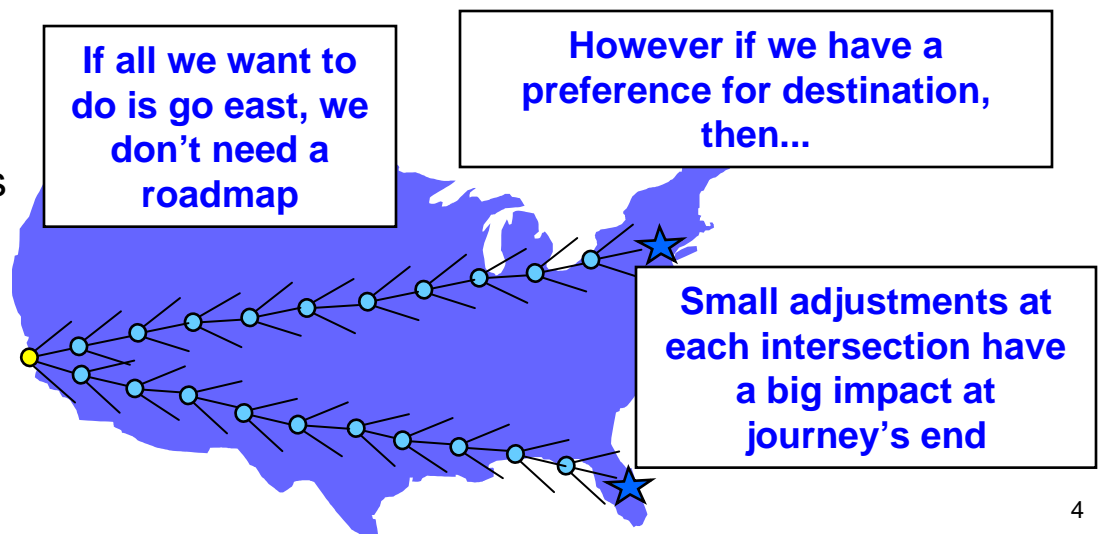 - Versus designing a specific building

- **Recommendations that guide long term actions**

  - Focus on ultimate destination

  - Versus the next exit & meal stops or what's within range of the headlights

- **Characteristics or objectives that influence decisions**

  - Allows flexibility in moving towards objective

  - Versus specific system implementations

!

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FYDP   **FYDP +5**   **FYDP + 5-15**

If all we want to do is go east, we don't need a roadmap

However if we have a preference for destination, then...

Small adjustments at each intersection have a big impact at journey's end
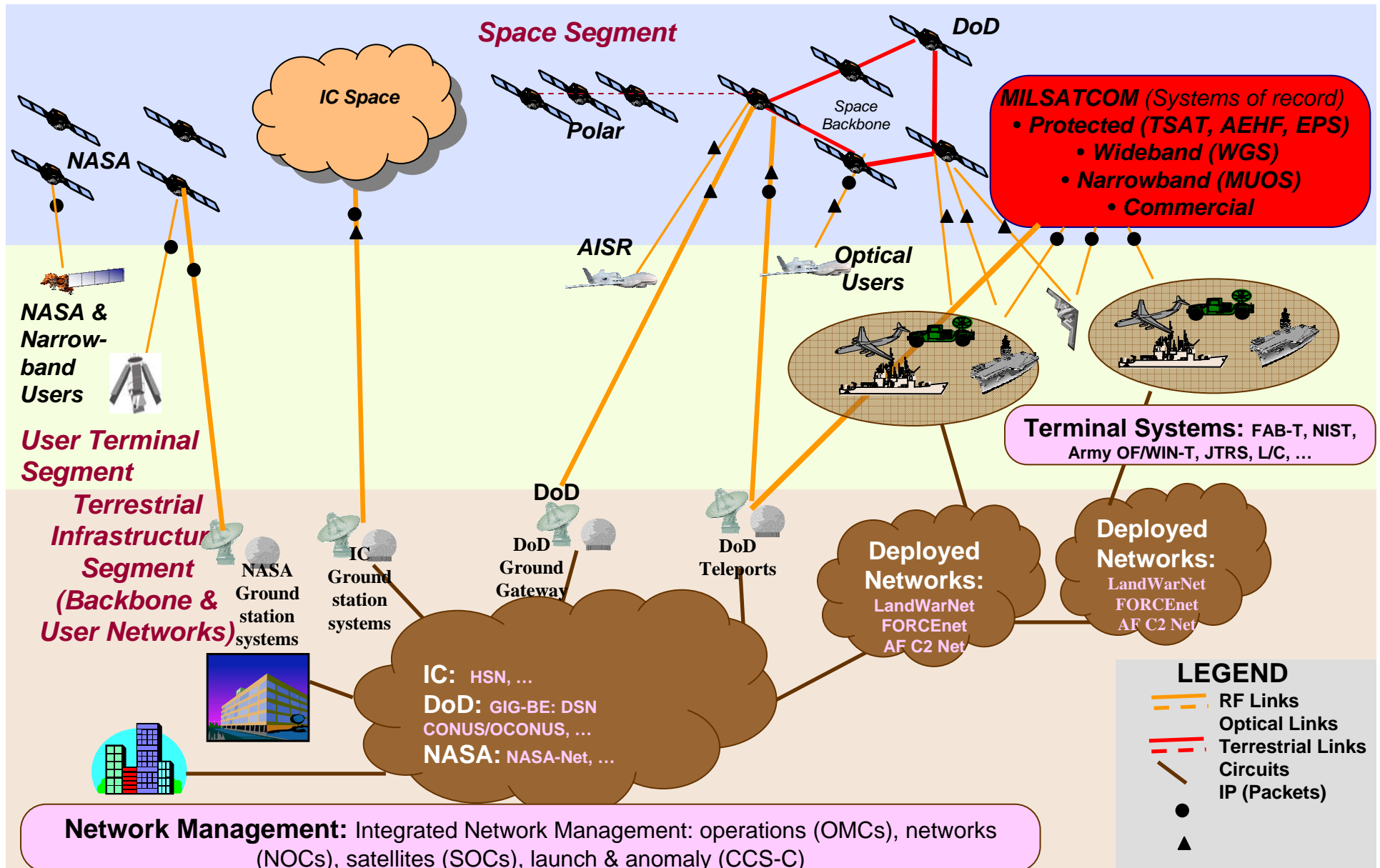
Architectures:
What makes them successful
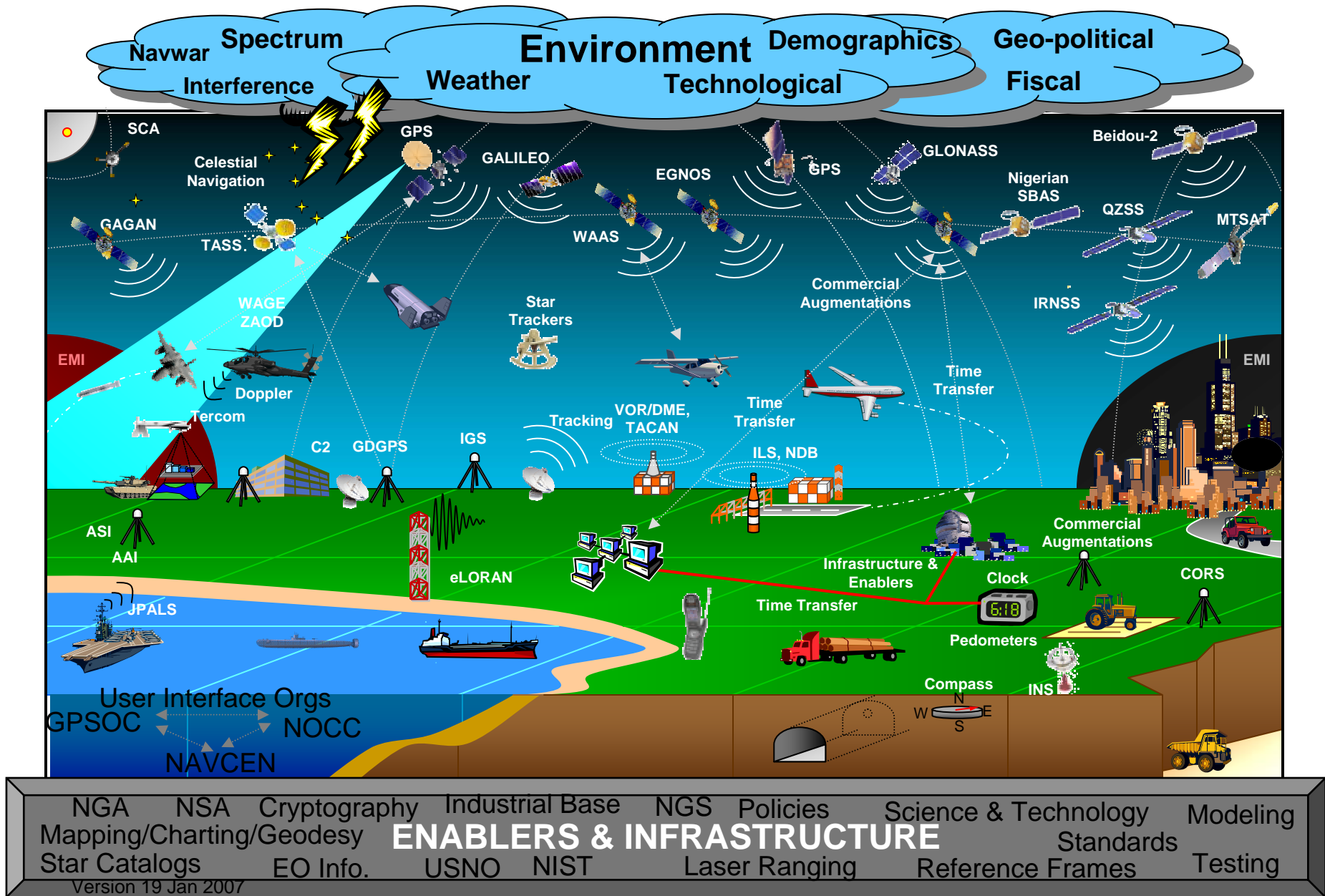
- Context
  - End to end mission, all platforms
  - Interfaces with other missions and mediums

- Dynamic
  - Continuous assessment to address "facts of life"

- "Enforceable"
  - Enough detail to support implementable decisions

- Transparent
  - Impartial build of "should be" architecture

- Senior leadership participation
  - Agreed evaluation criteria
  - Organizational data sharing

SATCOM Architecture
TCA Version 2.0

Space Segment

DoD

IC Space

NASA

Polar

Space Backbone

MILSATCOM (Systems of record)
- **Protected (TSAT, AEHF, EPS)**
- **Wideband (WGS)**
- **Narrowband (MUOS)**
- **Commercial**

AISR

Optical Users

NASA & Narrow-band Users

User Terminal Segment

Terrestrial Infrastructure Segment (Backbone & User Networks)

DoD

Terminal Systems: FAB-T, NIST, Army OF/WIN-T, JTRS, L/C, …

NASA Ground station systems

IC Ground station systems

DoD Ground Gateway

DoD Teleports

Deployed Networks: LandWarNet FORCEnet AF C2 Net

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IC: HSN, …
DoD: GIG-BE: DSN CONUS/OCONUS, …
NASA: NASA-Net, …

LEGEND

RF Links

Optical Links

Terrestrial Links

Circuits

IP (Packets)

Network Management: Integrated Network Management: operations (OMCs), networks (NOCs), satellites (SOCs), launch & anomaly (CCS-C)

Position, Navigation, and Timing (PNT)
Evolved Baseline (2025) - Operational View

Navwar Spectrum

Interference

Environment

Weather

Demographics

Technological

Geo-political

Fiscal

SCA

Celestial Navigation

GPS

GALILEO

EGNOS

GPS

GLONASS

Beidou-2

Nigerian SBAS

QZSS

MTSAT

GAGAN

TASS

WAGE ZAOD

WAAS

Star Trackers

Commercial Augmentations

IRNSS

EMI

Doppler

Tercom

C2 GDGPS IGS

Tracking

VOR/DME, TACAN

Time Transfer

ILS, NDB

Time Transfer

EMI

ASI

AAI

eLORAN

Infrastructure & Enablers

Commercial Augmentations

Clock

CORS

6:18

JPALS

Time Transfer

Pedometers

Compass

INS

User Interface Orgs

GPSOC

NOCC

NAVCEN

W N E S

ENABLERS & INFRASTRUCTURE

NGA   NSA   Cryptography   Industrial Base   NGS   Policies   Science & Technology   Modeling

Mapping/Charting/Geodesy   Standards

Star Catalogs   EO Info.   USNO   NIST   Laser Ranging   Reference Frames   Testing

Version 19 Jan 2007

PNT User Perspectives (2025)

User Group Size

- Huge (10M+)
- Large (1M+)
- Many (100K+)
- Some (1000+)
- Few/None

* = Color accounts, to some extent, for indirect users
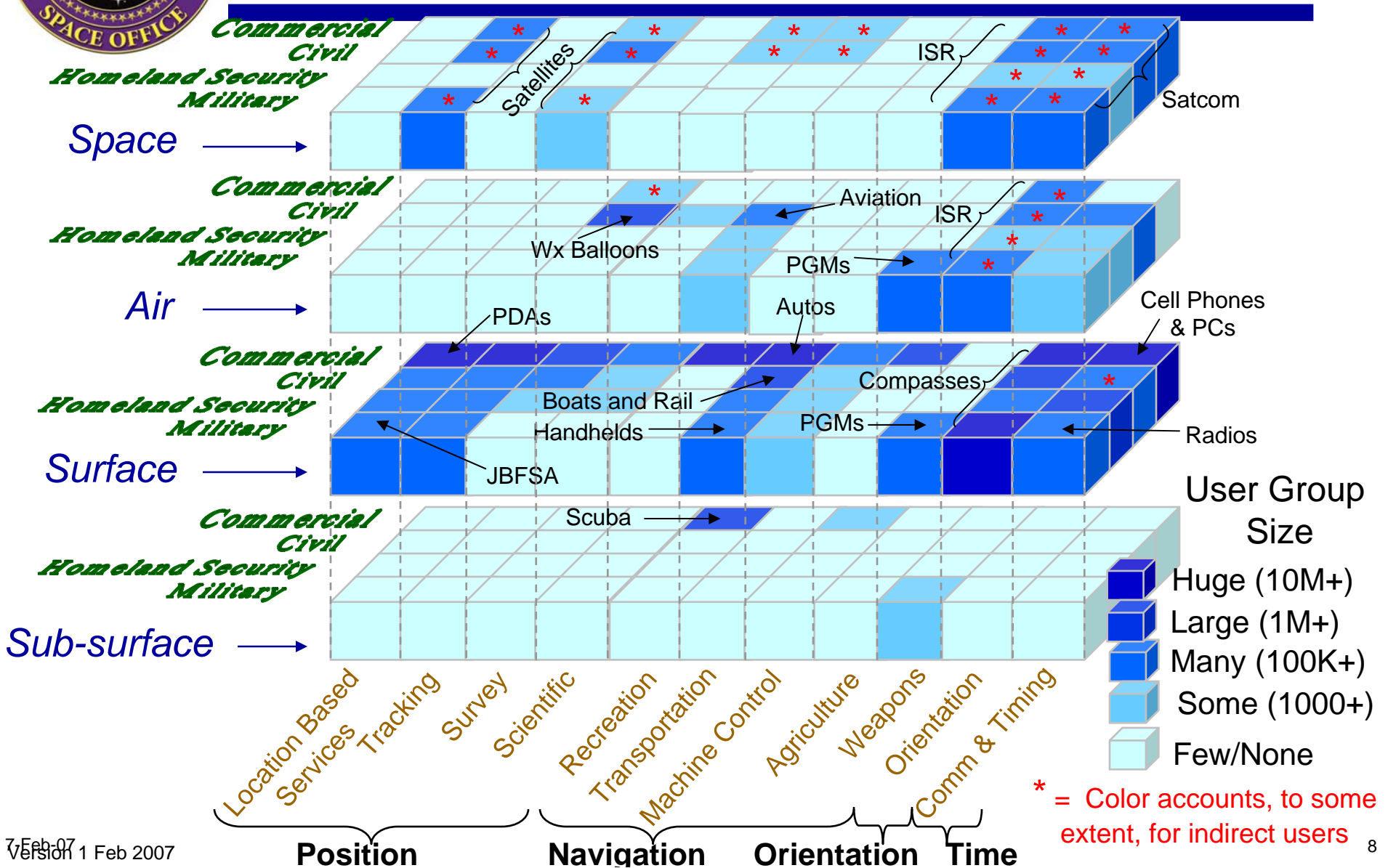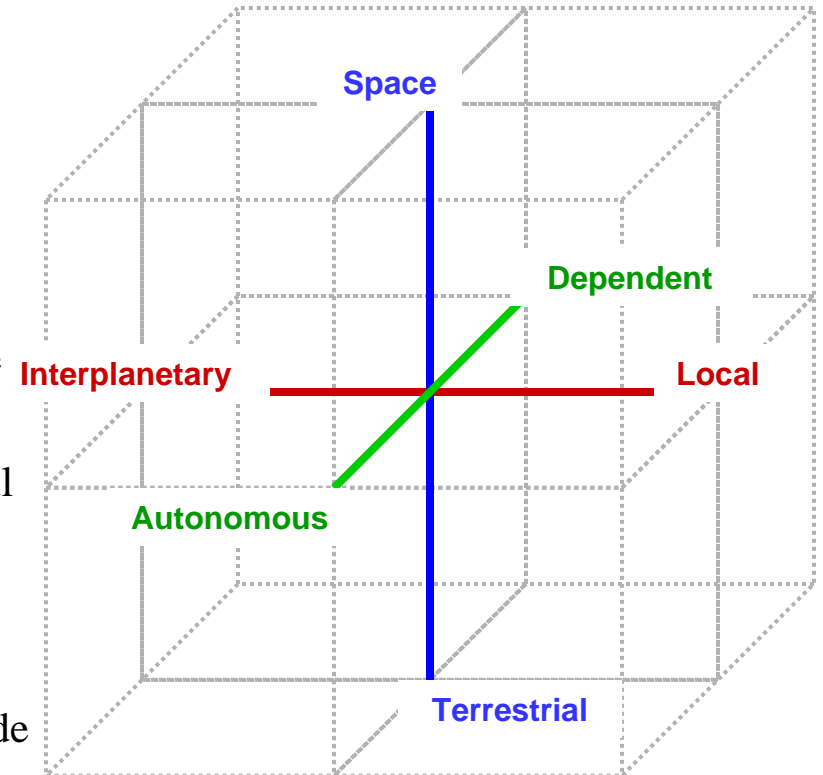
PNT Architecture Trade Axes

- **Source Location** (of the service provider)

  - Terrestrial: concept provides service from, near, or beneath the surface of the earth

  - Space: concept provides service from space

- **Service Volume** (of the service provided)

  - Local: concept provides a meaningful service only at a fixed point

  - Interplanetary: concept provides a meaningful service throughout the solar system

- **Autonomy** (of the user)

  - Dependent: concept requires frequent refresh of information from external sources to provide a meaningful service

  - Autonomous: concept, once initialized, is self-contained; requires no refresh of info from external sources to provide meaningful service
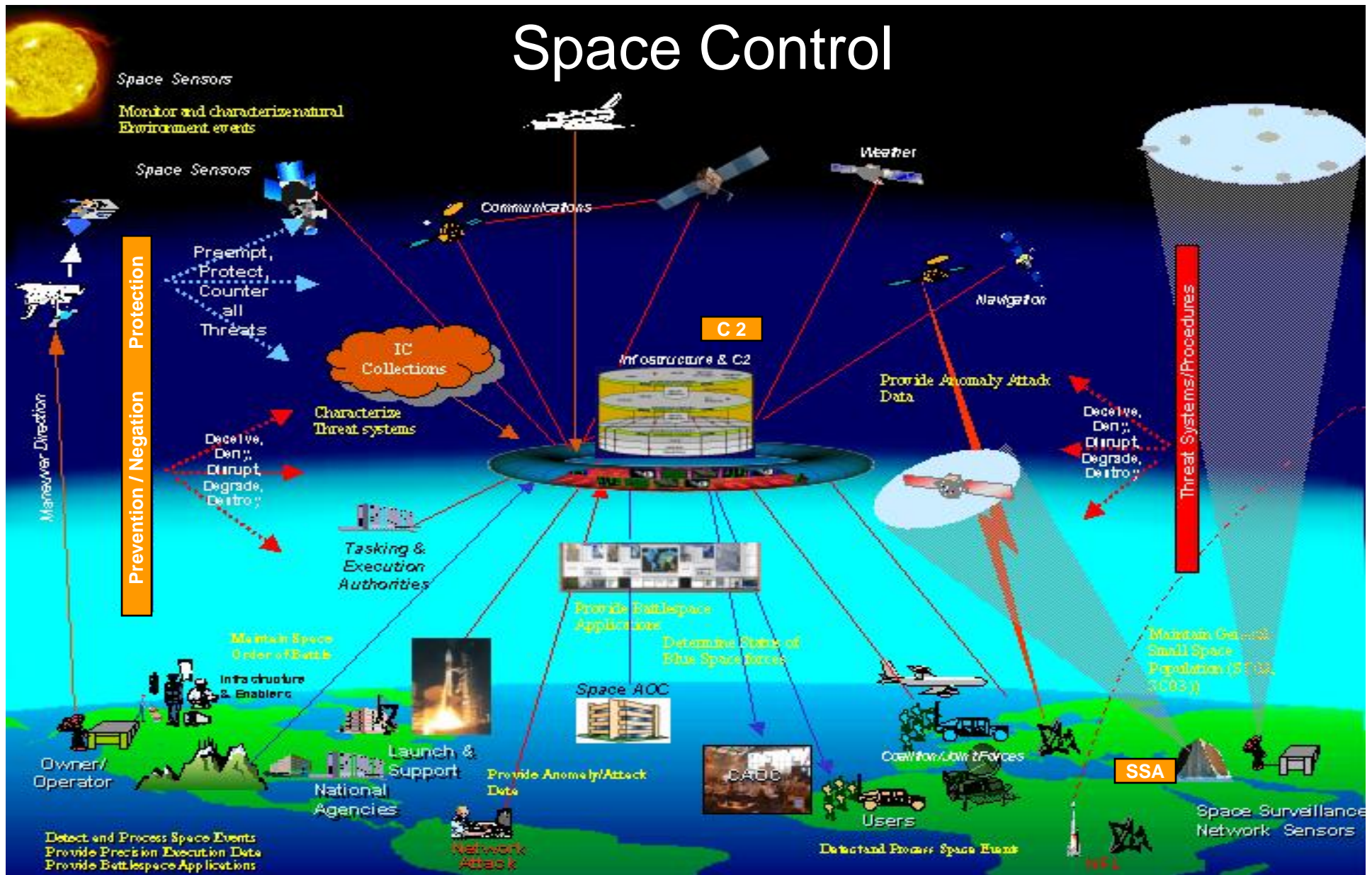

Space

Dependent

Interplanetary

Local

Autonomous

Terrestrial

TRADE AXES ENSURE CONSIDERATION OF A FULL RANGE OF ARCHITECTURAL OPTIONS

Intelligence, Surveillance, and Reconnaissance (ISR) Architecture
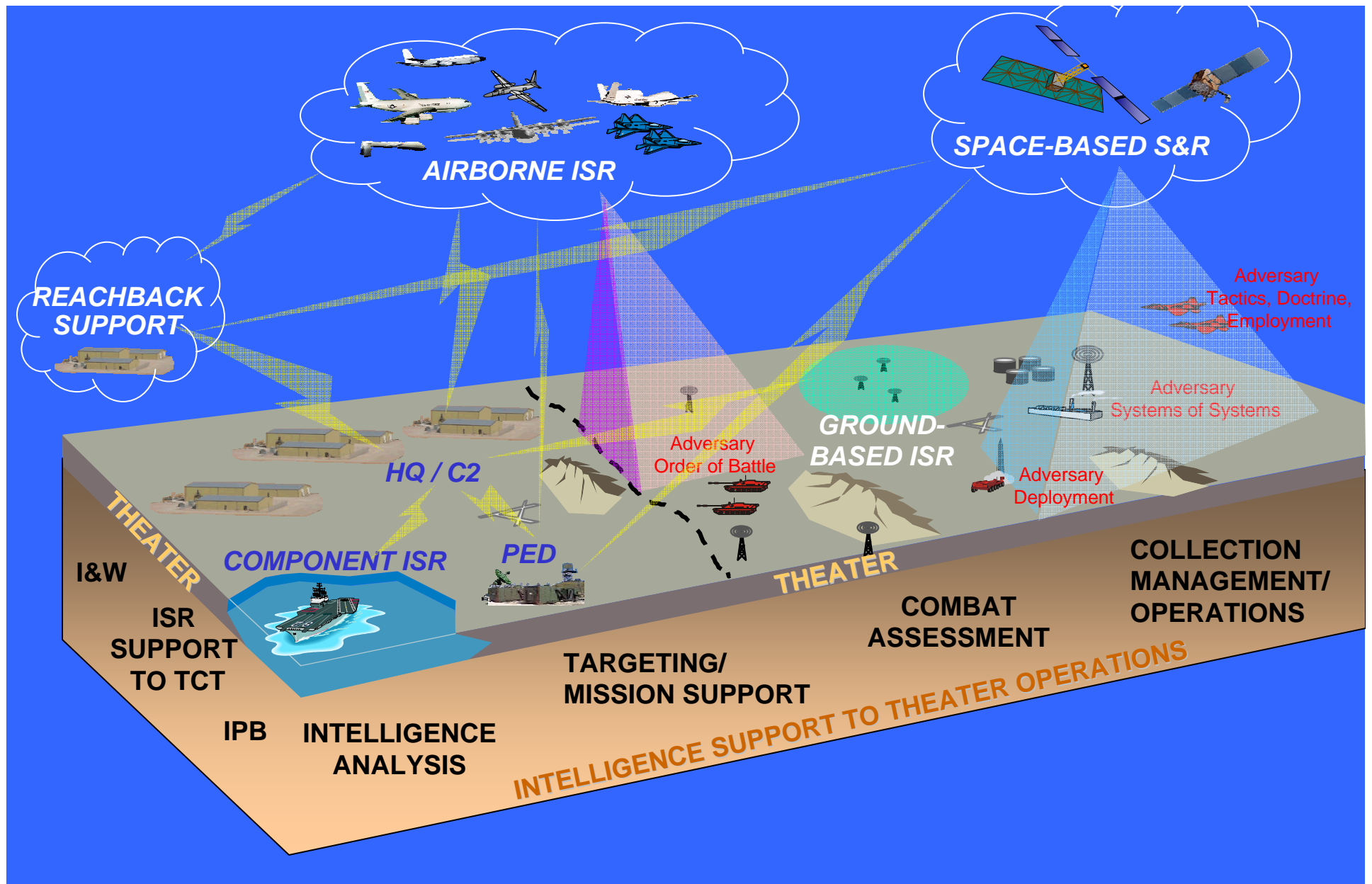
Space Control

Assuring access to Space for US & Allied Forces
Denying access to our Adversaries

Summary

- Vision and planning across the community is needed to maintain US preeminence

- Build the bridge from <u>both</u> sides

It's time to stop acting "systems" and start acting architectures