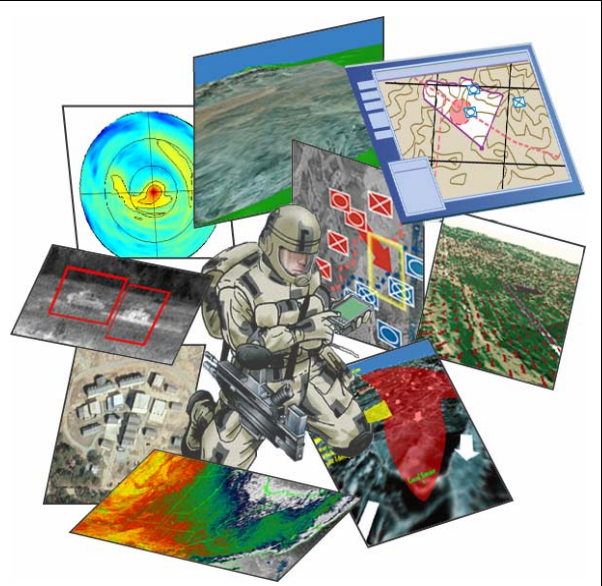

AIR FORCE RESEARCH LABORATORY



Cyber-Craft: Concept Linking NCW Principles with the Cyber Domain in an Urban Operational Environment

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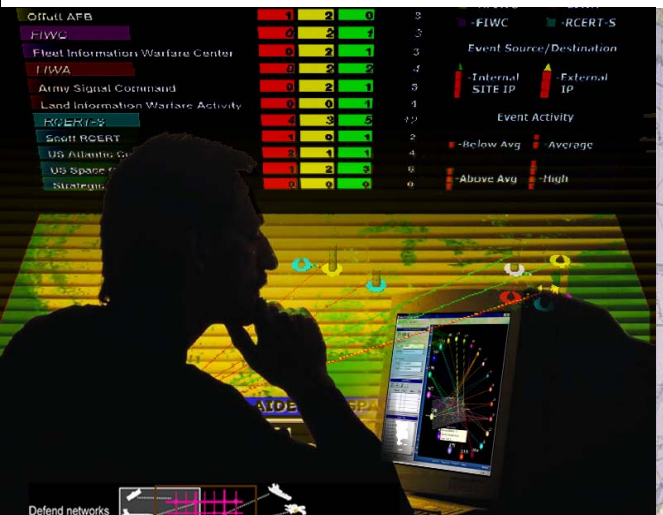
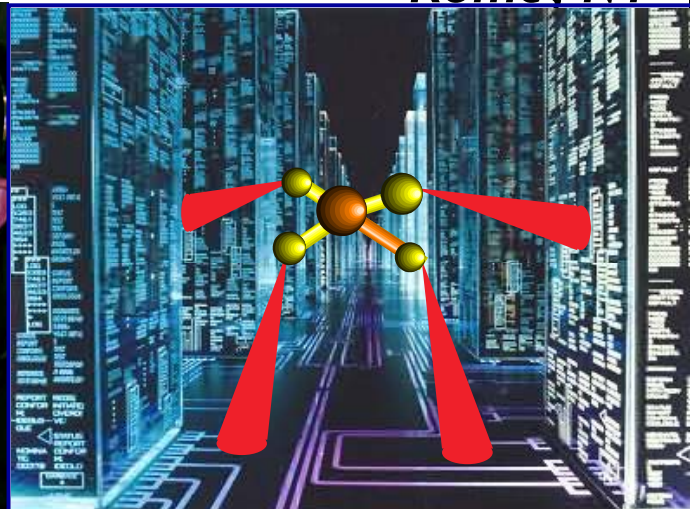
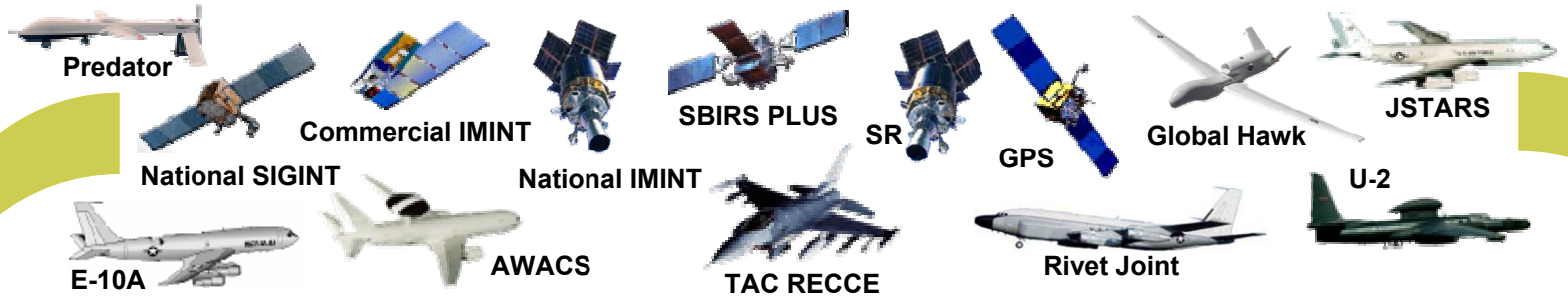




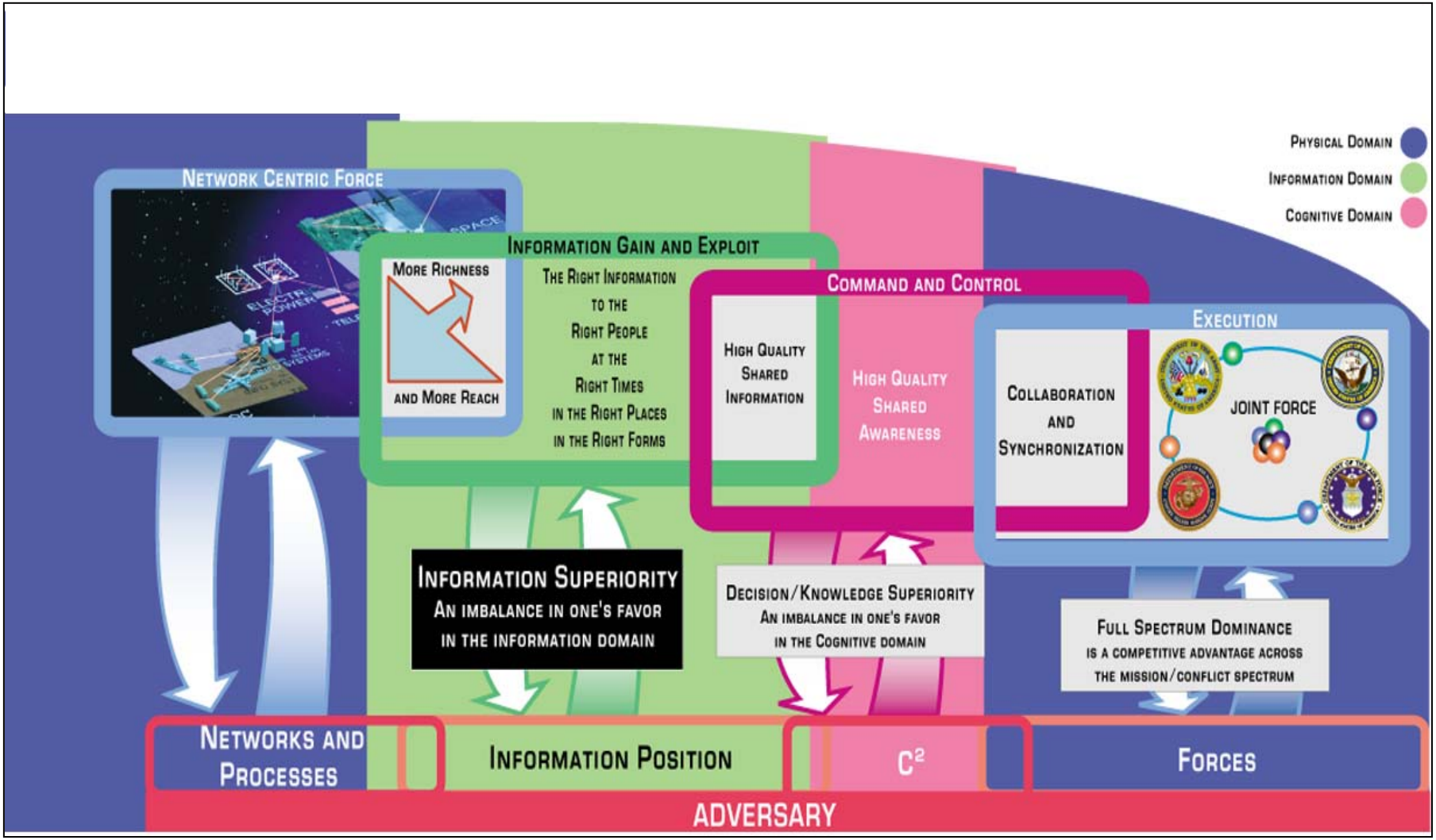
Network Centric Warfare



Information is Power

Vice Adm (Ret) Cebrowski: "The source of Power in the OIF was information sensors, not shooters."

Network Centric Warfare Value Chain



Changing Landscape of Kinetic and Cyber Warfare

Kinetic Warfare

Characteristics:
Air and Space Vehicles: UCAVs
Flight Medium: Air & Space
Weapons: Missiles & Bombs
Desired "Effect": Destroy Target
Control: Air/Space/Ground movement
Low Probability of Intercept: Stealth (Physical)
Low Probability of Detection: Terrain Masking
Homebase: Predetermined Airfield
Logistics: Heavy, Continual

Cyber Warfare

Characteristics:
Cyberspace Vehicles: Cyber-Crafts
Flight Medium: Cyberspace
Weapons: Virus, Worm
Desired "Effect": Destroy, Degrade, Co-opt
Control: Network Links that support enemy Air/Space/Ground movement
Low Probability of Intercept : Stealth (Software)
Low Probability of Detection : Network Masking
Homebase: Any Cyberspace Portal
Logistics: Light, Infrequent (software)

New Capabilities for Similar Effects: *IMPEDE THE ENEMY*

Changing Landscape of AFRL's Research

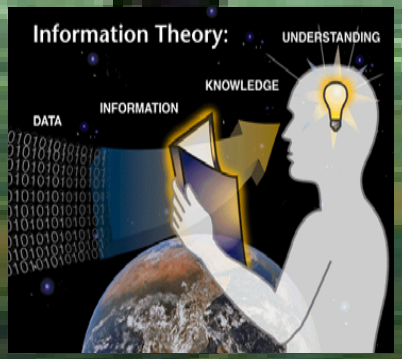
Virtual Presence

Virtual Worlds

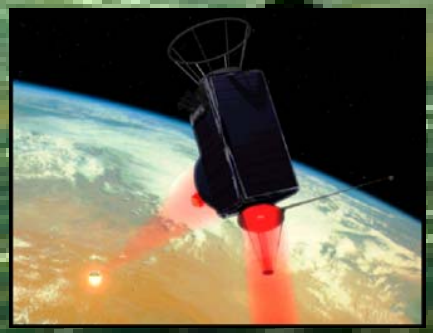
Advanced Computing

AFRL "Inside"

Cyber World

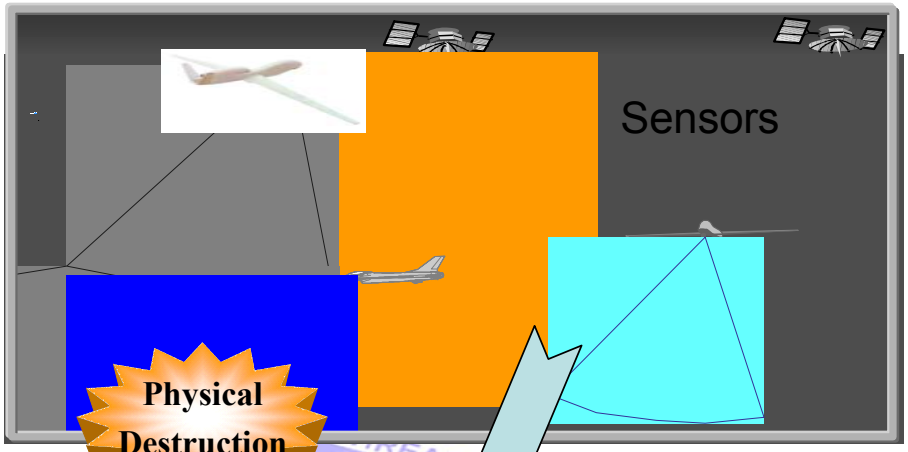


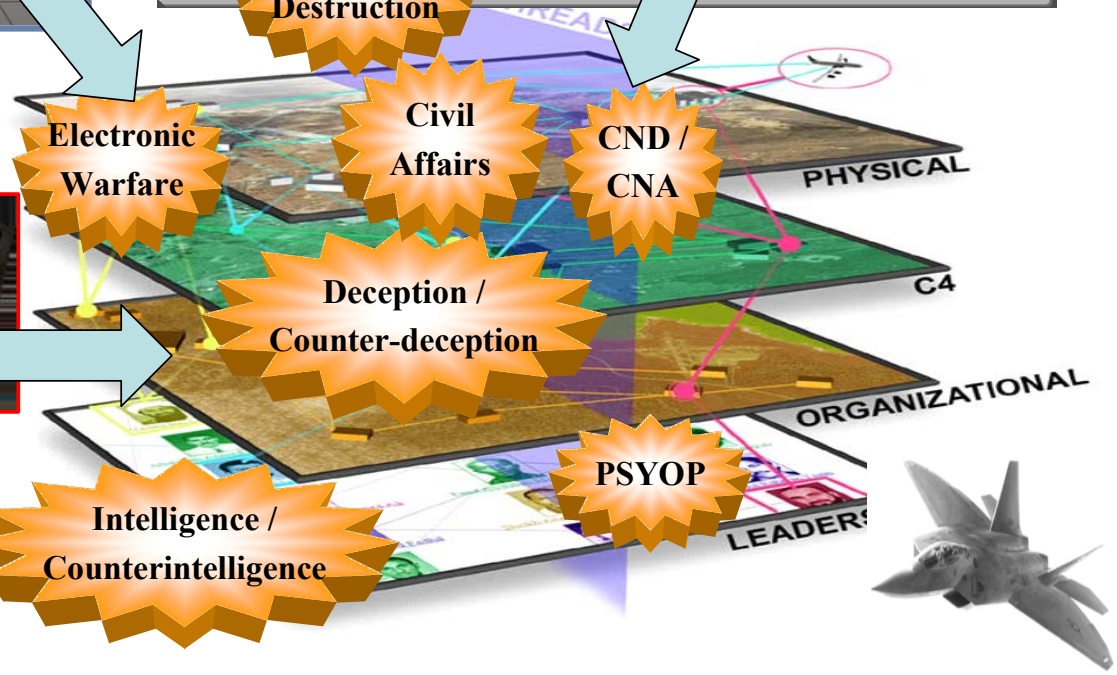
Cognitive Sciences



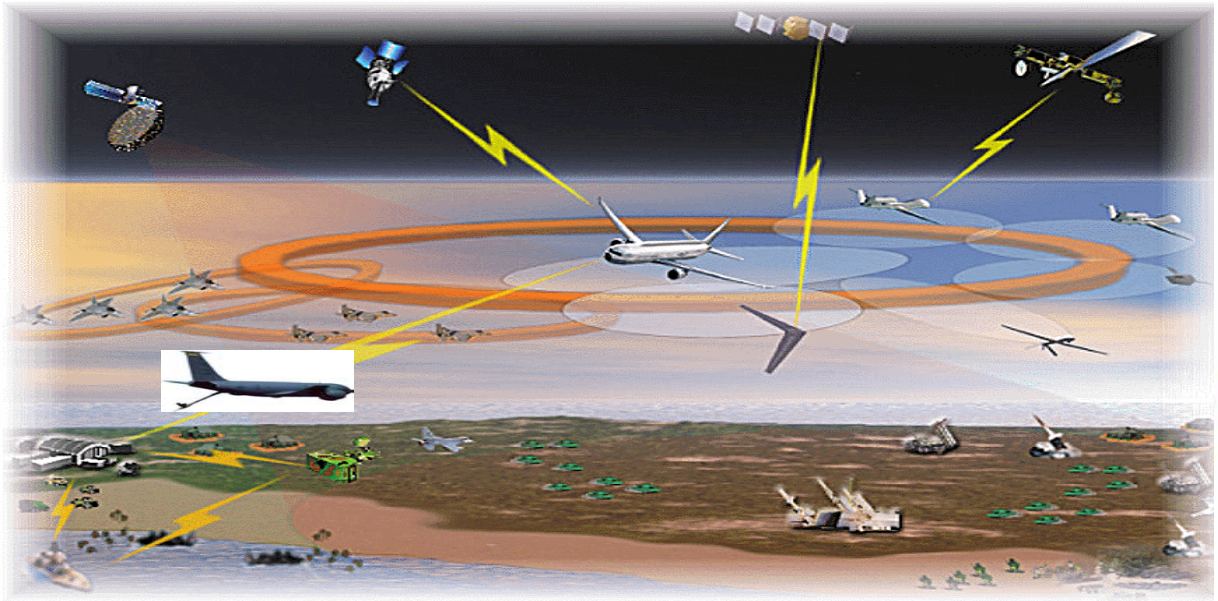
IT in Space

Effects Based Operations



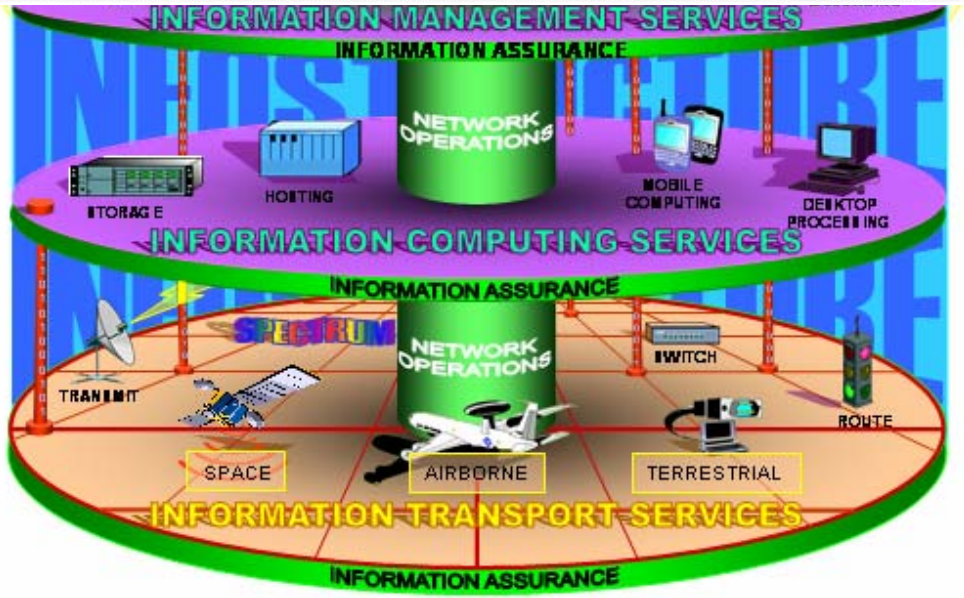


Network Centric Warfare
Friendly vs Adversary

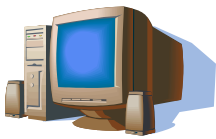


Network Centric Operations

Adversary Boundary



Network Centric Infrastructure



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Technology Challenges within a Joint Urban Environment

- **ISR:** man-made structures, non-combatants, functional infrastructure
- **C2:** obstructions, shadowing and multi-path effects regarding communications and position
- **Weapons:** precision engagement
- **Modeling and Simulations:** concept development, experimentation, acquisition, testing, training
- **Training and Training Facilities:** interoperability and joint urban training

Technology Challenges for Development of a "Cyber-Craft"

- How to we develop a "Cyber-Craft"?
- How can we "trust" the "Cyber-Craft" to "do the right thing"?
- How do you control the "Cyber-Craft"?
- How can a "Cyber-Craft" determine the "landscape" or "terrain" of an adversary's network?
- How do you provide stealthy feedback mechanisms?
- What would be possible missions of the "Cyber-Craft"?
- What effect measures would the "Cyber-Craft" have to gather?

Summary

- Role of AF S&T is to target critical technology areas that are essential to the warfighter and work in smart partnership with industry and academia.

- AFRL's "technology push" over the Next 25 Years will provide significant benefit to the warfighter.

- Information Operations is providing next generation warfare capabilities.

- Role of a "Cyber-Craft" is just beginning to take shape and may provide a significant new "weapon" for the 21st Century.

AFRL "Inside"

Record of Successful Technology Transitions to the Warfighter

Back-ups