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

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information is Power

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

Advanced Computing
Virtual Presence
AFRL “Inside”
Virtual Worlds
Cyber World
IT in Space
Cognitive Sciences
Effects Based Operations

- Decision Making
- Physical Destruction
- Intelligence / Counterintelligence
- Electronic Warfare
- Deception / Counter-deception
- Civil Affairs
- CND / CNA
- Effector
- Intelligence / Counterintelligence
- PSYOP
Network Centric Warfare
Friendly vs Adversary

Network Centric Operations

Network Centric Infrastructure

Adversary Boundary

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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.
Back-ups