





# Knowledge Centric Warfare: Next Evolution of Network Centric Warfare

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# Outline



- **Premise**
- **Transition Path**
  - **Platform Centric Warfare**
  - **Network Centric Warfare**
  - **Information Centric Warfare**
  - **Knowledge Centric Warfare**
- **Technologies Required**
- **Summary**



# Premise



- **Conduct of Warfare is ever evolving – No Surprise**
- **Incorporation of computer systems have “revolutionized” the conduct of warfare – No Surprise**
- **Doctrine is ever changing to incorporate new technologies – No Surprise**

**Basic Premise of Paper:**

**Network Centric Warfare is**

**just one step in the evolution or conduct of warfare**

**And the Next Steps are Information  
and Knowledge Centric Warfare**



# The Air Force Vision: Battlespace Dominance through Information Superiority

**“The area with the greatest potential payoff... is in C4ISR... [to] ensure our commanders have the best information for rapid battlefield decision-making”**

Gen Richard B. Meyers, CJCS, SASC testimony, 5 Feb 02



**“Command and control systems—based on information and communications technology—and precision-guided munitions are critical to all stages of the Pentagon’s efforts to transform itself to deal with 21st century threats.”**

Paul Wolfowitz, DSECDEF  
at AIAA lunch, 19 Feb 02



# Platform Centric Warfare



WW II: Formation of 1000



Desert Storm I: Formation of 1

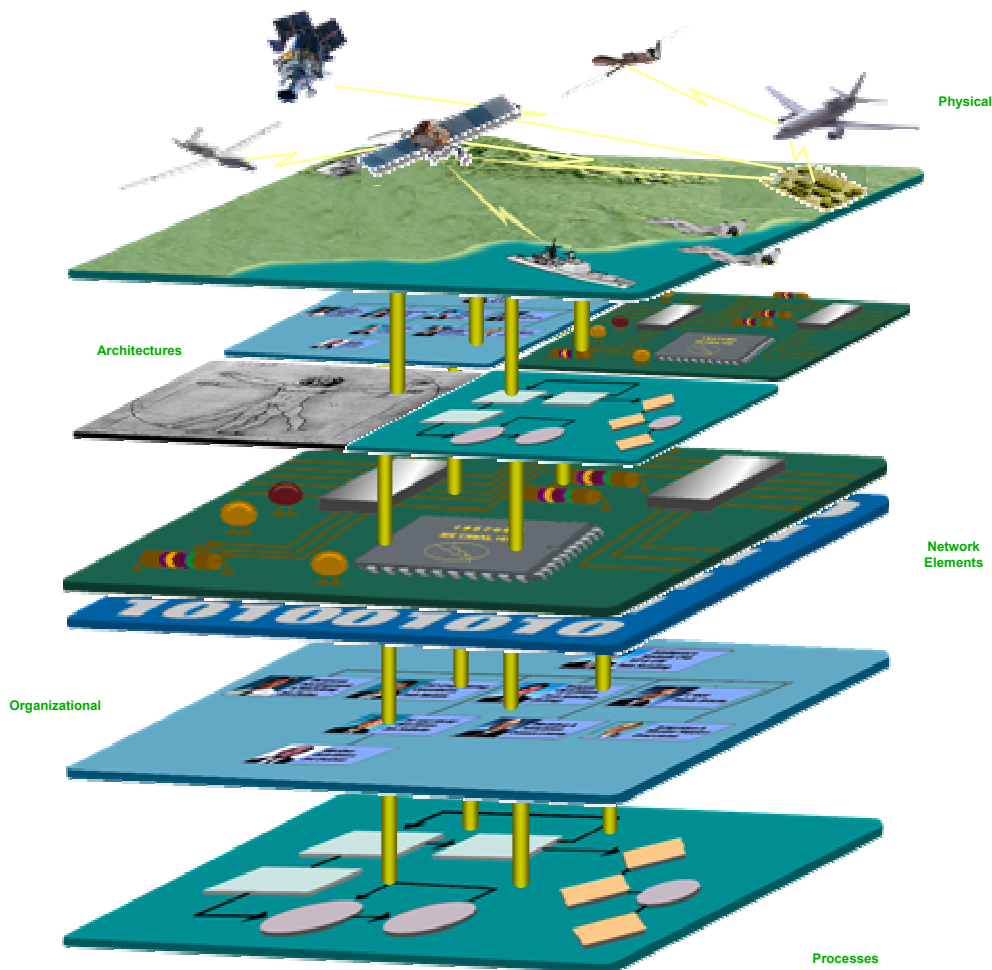


Vietnam: Formation of 4-6

**1940s to 1990s**



# Network Centric Warfare



**BUILD the Net**

**POPULATE the Net**

**PROTECT the Net**

**Power TO the Edge**

**1990s to 20XXs**

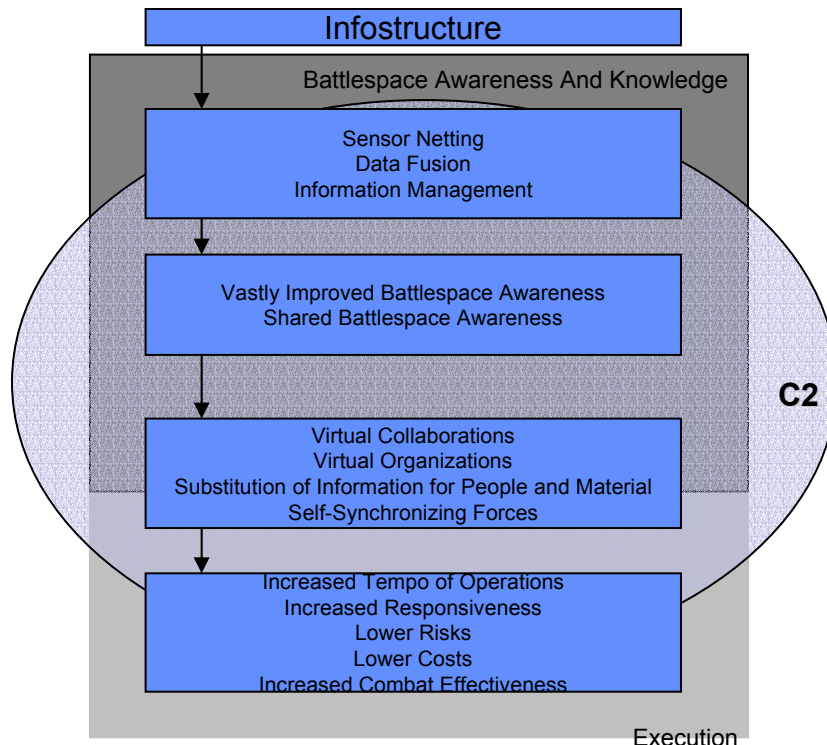


# 1999 NCO Conceptual Framework



Tenets of NCW (*DoD Report to Congress on Network Centric Warfare*):

- A robustly networked force improves information sharing
- Information sharing and collaboration enhances the quality of information and shared situational awareness
- Shared situational awareness enables collaboration and self-synchronization, and enhances sustainability and speed of command
- These in turn dramatically increase mission effectiveness

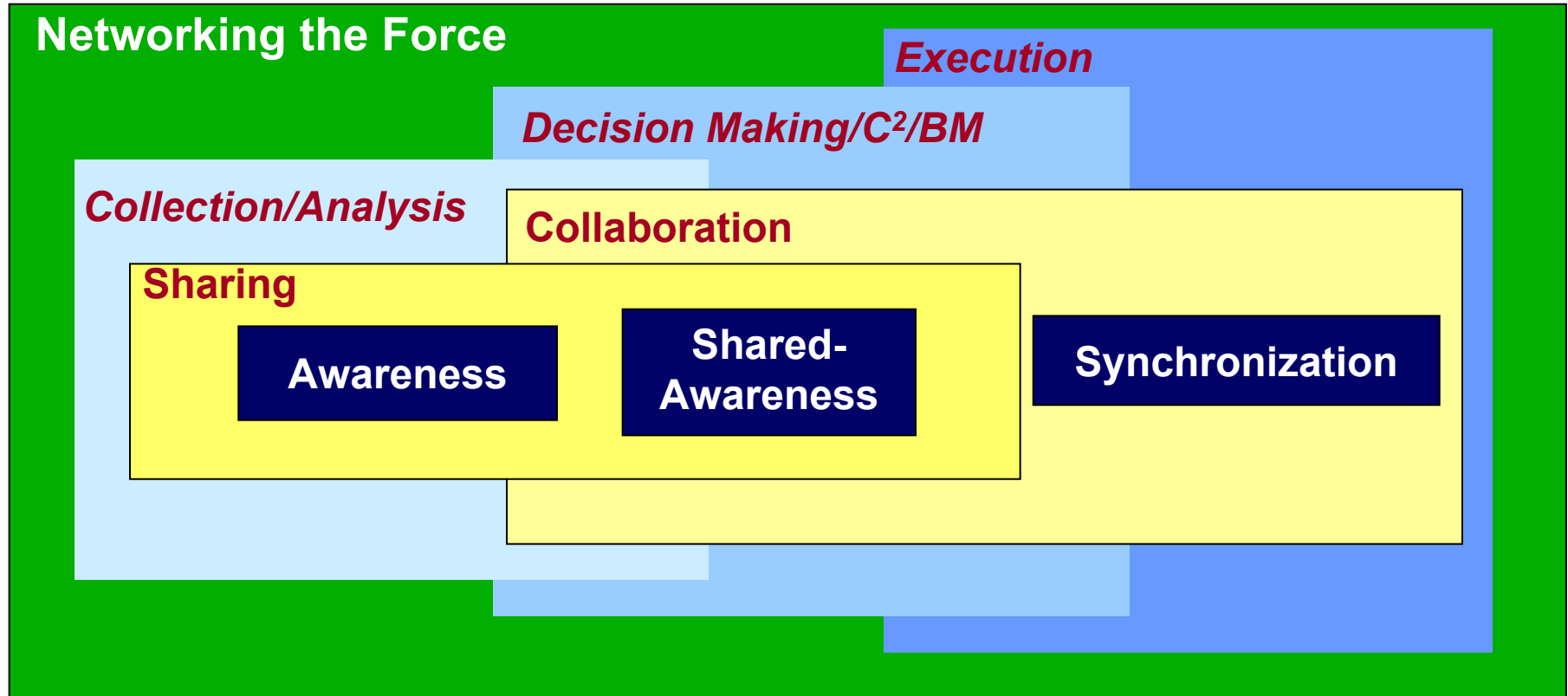


**Predominately  
Related to Networking the Force  
With goal of Self-Synchronization  
To increase Combat Effectiveness**





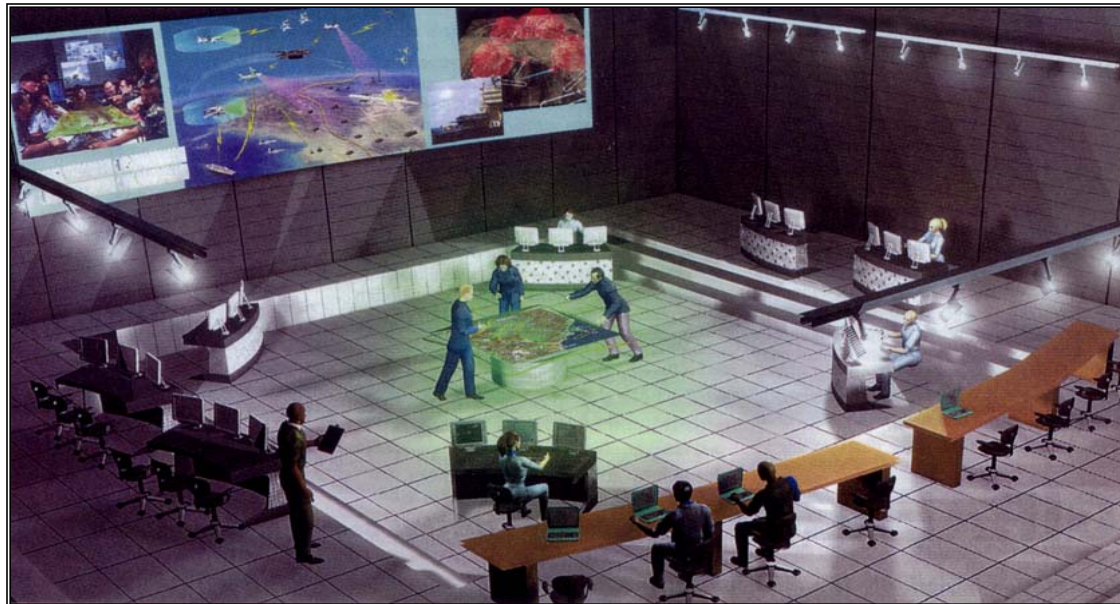
# Network Centric Operations New Mental Model



**Information Superiority and Network Centric Warfare  
serve to integrate military operations, providing opportunities  
to employ new C2 approaches and warfighting concepts**



# Information Centric Warfare



**Centers of Gravity Become Centers of Information**

**Effects Based Operations and Effects Based Assessments Become Centerpiece**

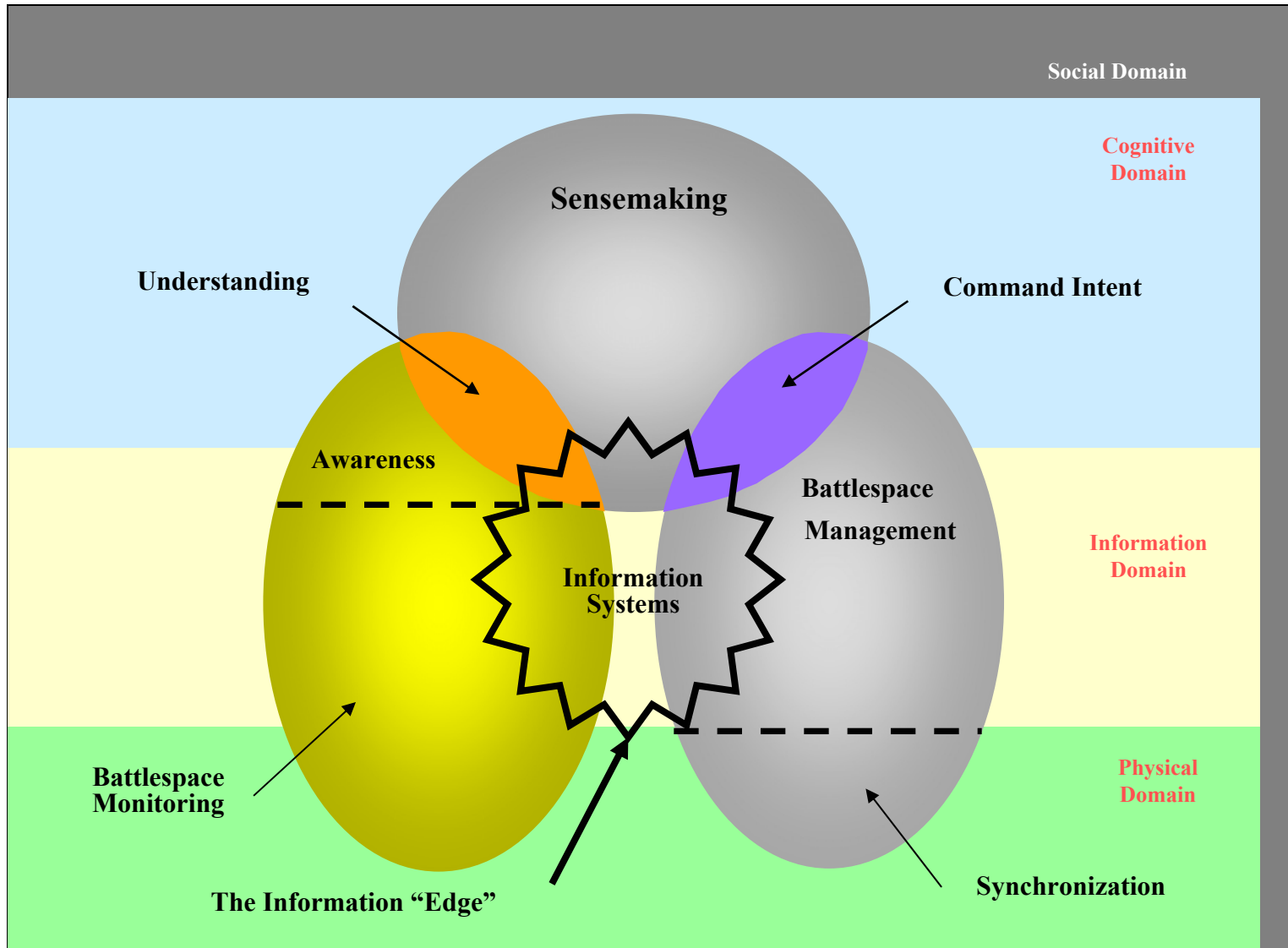
**Predictive Battlespace Awareness Becomes Standard Process**

**Single Integrated Family of Operational Pictures at All Levels**

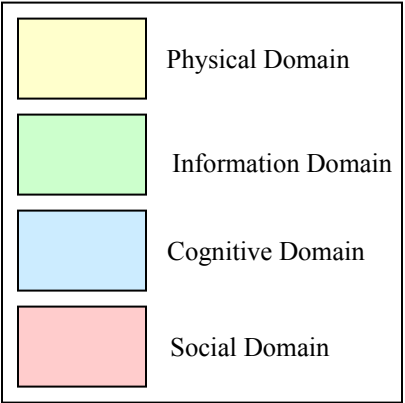
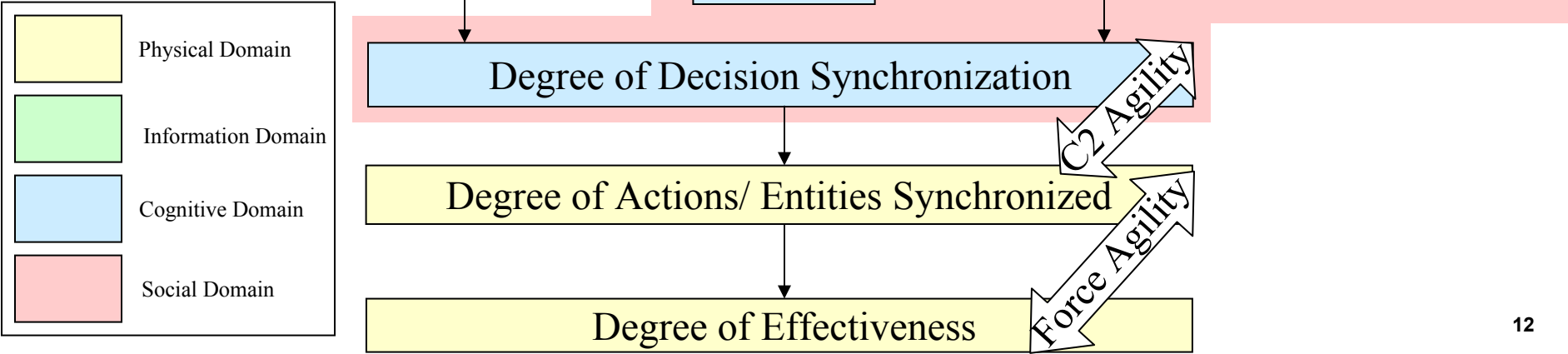
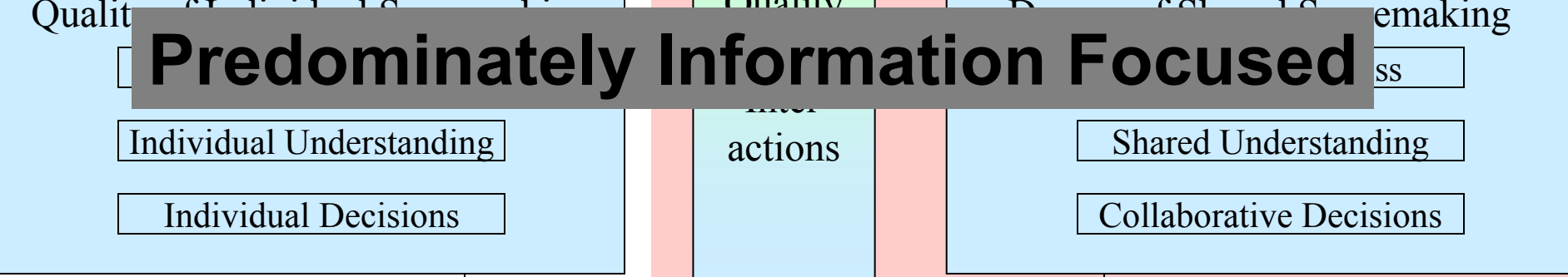
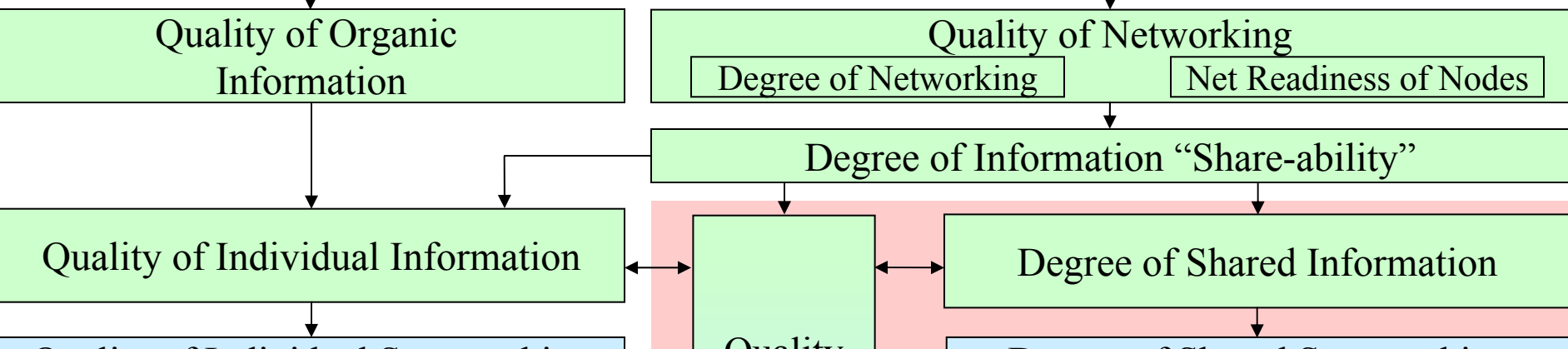
**20XXs to 20XXs** 10



# Command and Control “Egg”



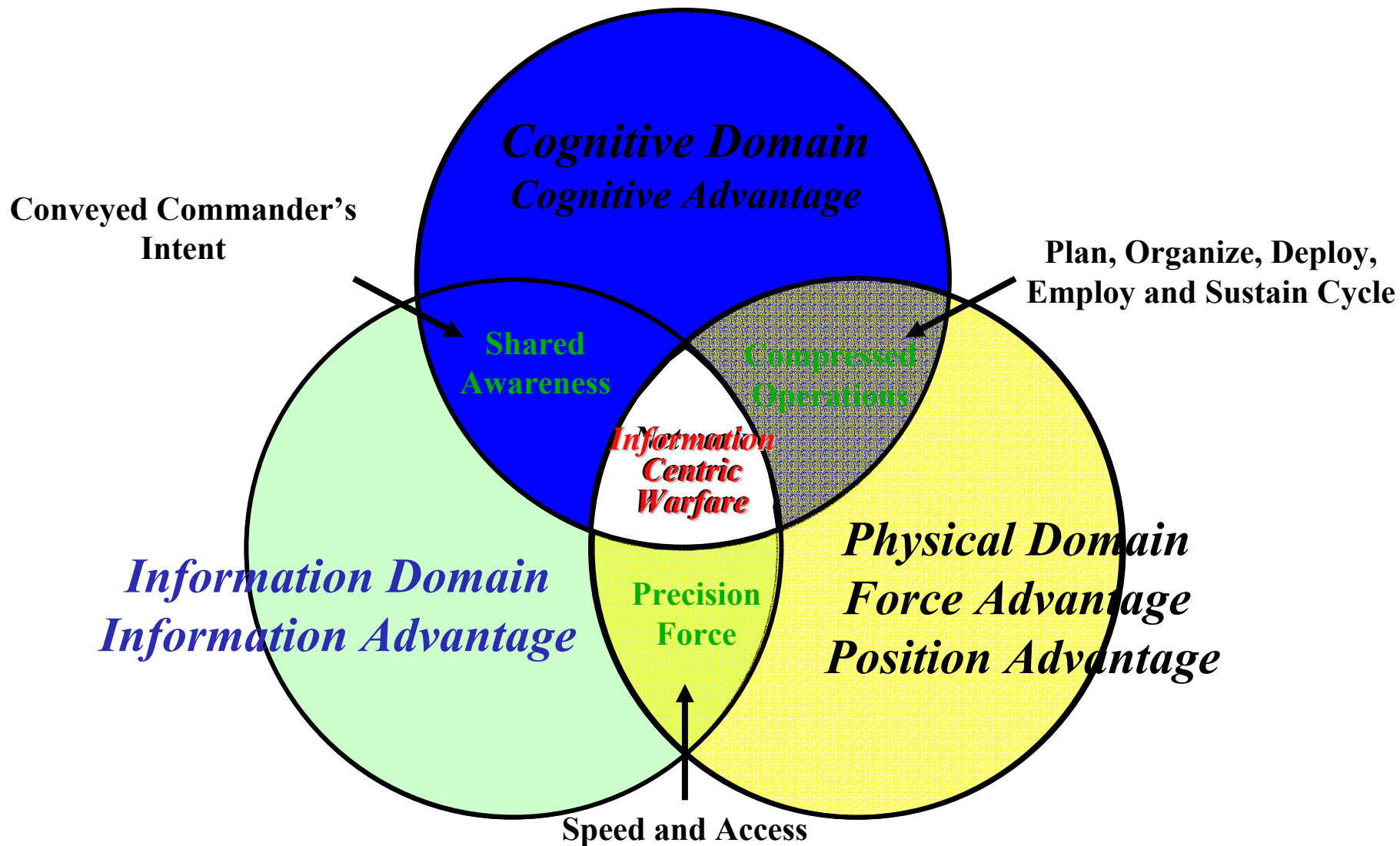
# 2003 NCO Conceptual Framework





# Information-Age Warfare

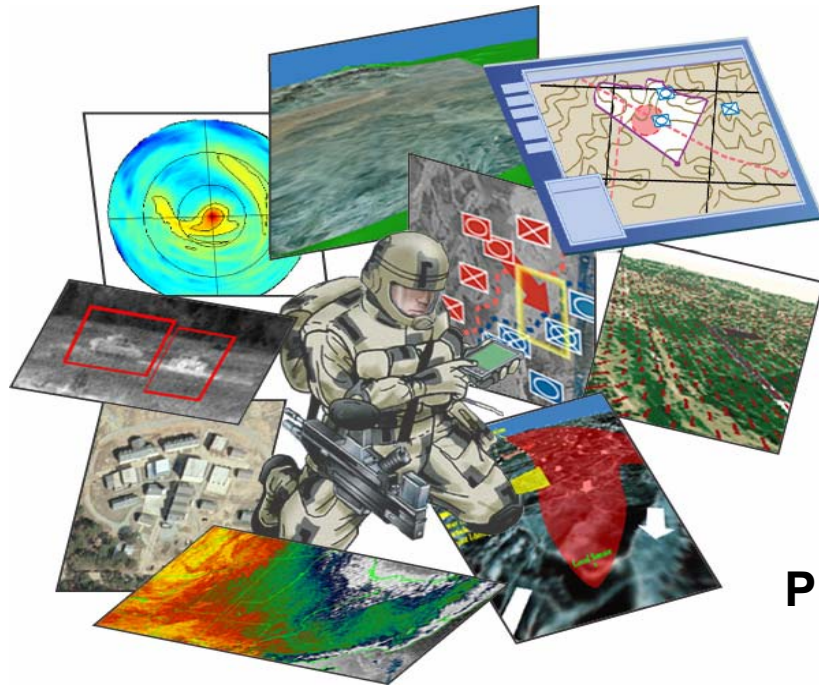
... Domains of conflict



**Have We Already Transitioned to Information Centric Warfare?**



# Knowledge Centric Warfare



**BUILD the Net -- USE the Net**  
- Surfing the Net becomes Commonplace

**POPULATE the Net -- KNOW the Net**  
- Knowledge Centers of Gravity -

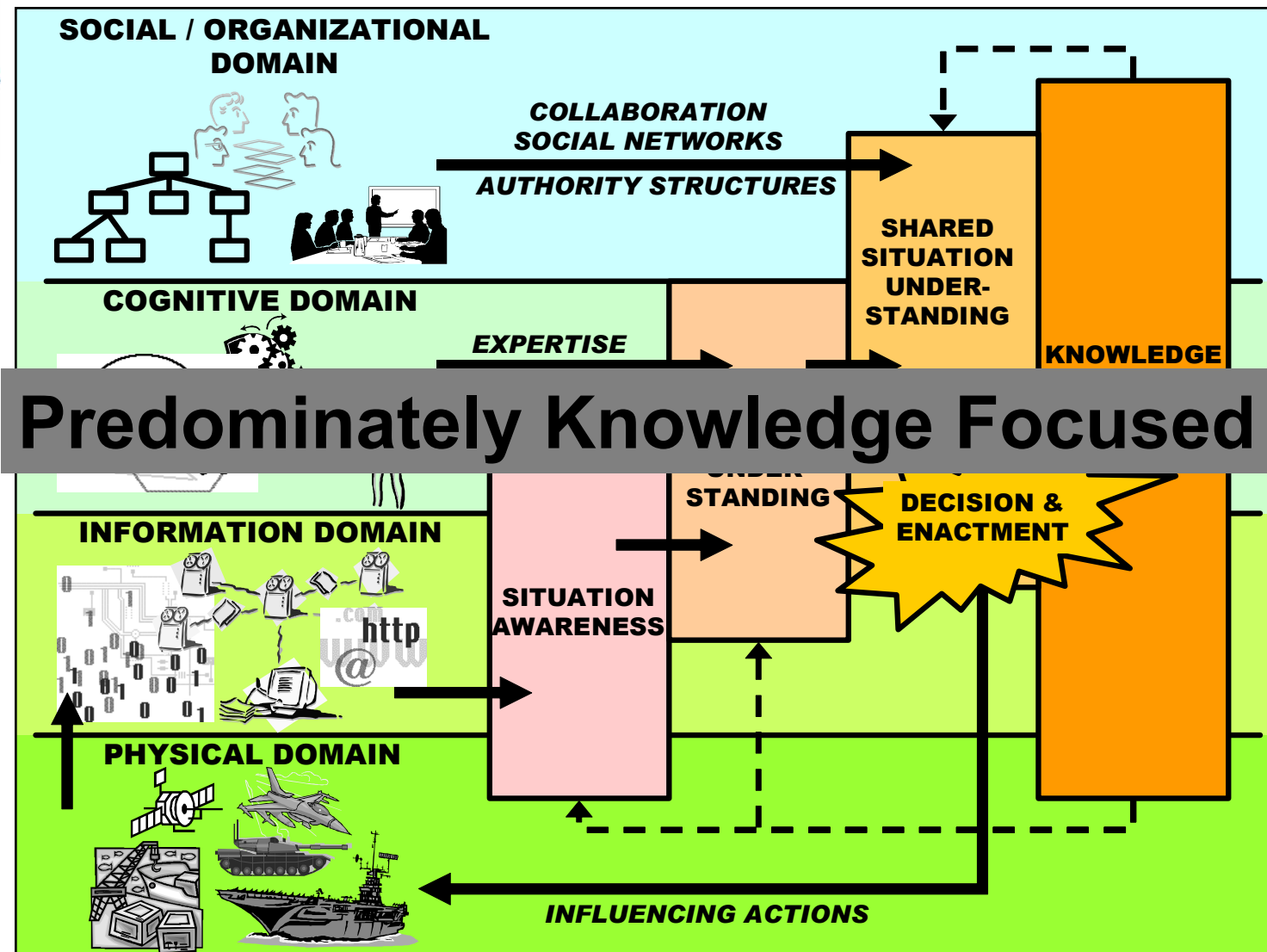
**PROTECT the Net -- Protect the KNOWLEDGE**  
- Next Generation Information Assurance -

**Power TO the Edge --- Power OF the Edge**  
- Single Entity Becomes Knowledgeable of All -

## 20XXs to 20XXs



# EXPANSION OF THE OODA LOOP: THE SENSEMAKING PROCESS

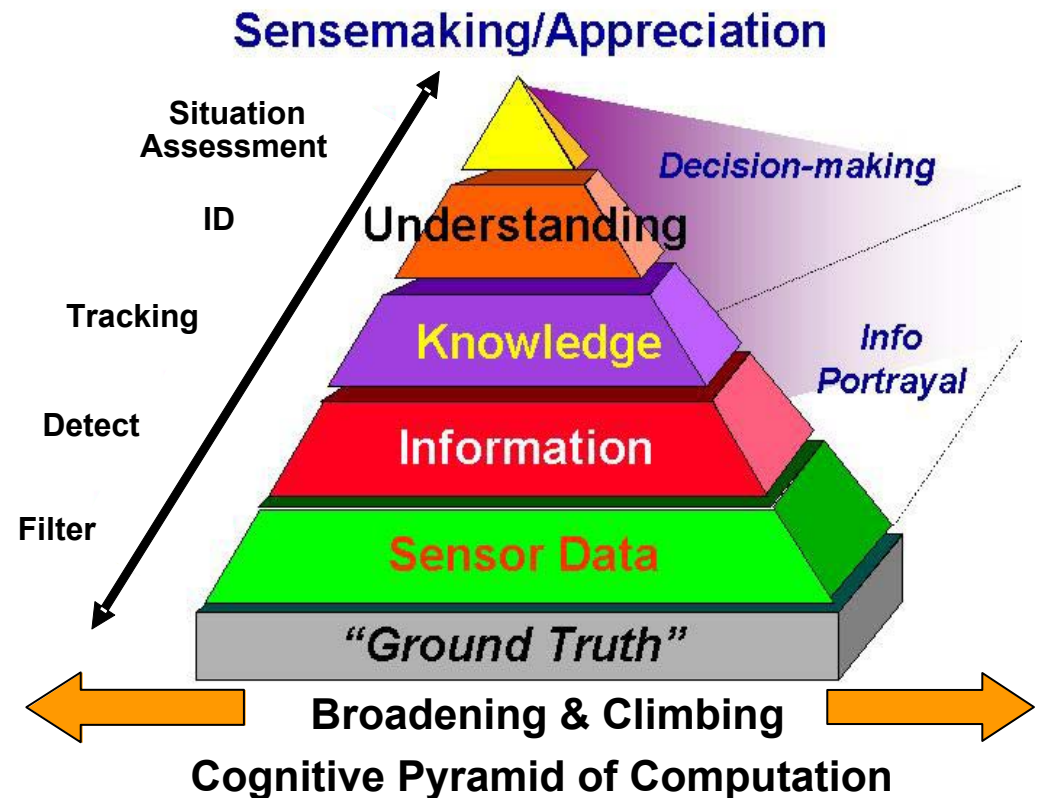




# “Knowledge” Technologies



- Publish/Subscribe/Broker
- Predictive Battlespace Awareness
- Effects Based Operations
- Distributed Decision Making
- Cognitive Reasoning
- Behavioral Modeling
- Advanced Simulations (“Holodeck”)
- Knowledge Reasoning
- Intelligent Agents
- Modeling and Simulations
  - Pattern based
  - Real-time
  - Self-organized
- Multi-domain information fusion
- Knowledge Pedigree
- Information Assurance
- Self-learning Knowledge Extraction







# Summary



- **Network Centric Warfare is just one step in the evolution or conduct of warfare**
- **Evolutionary Steps**
  - **Platform Centric Warfare**
    - **Network Centric Warfare**
      - **Information Centric Warfare**
        - **Knowledge Centric Warfare**
- **What's the next step?**
  - **Understanding Centric Warfare????**



# Questions?



*“Information superiority becomes a precondition for fighting to achieve air and space superiority.”*

**LtGen Liu Shunyao**

**Chief, China Peoples Liberation Army Air Force**

**28 Feb 2000**