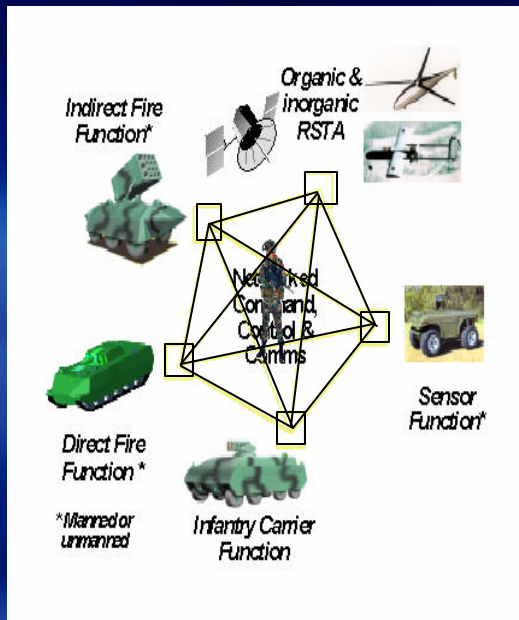


# Taming the Monster: The Next Computing Revolution

Ron Brachman

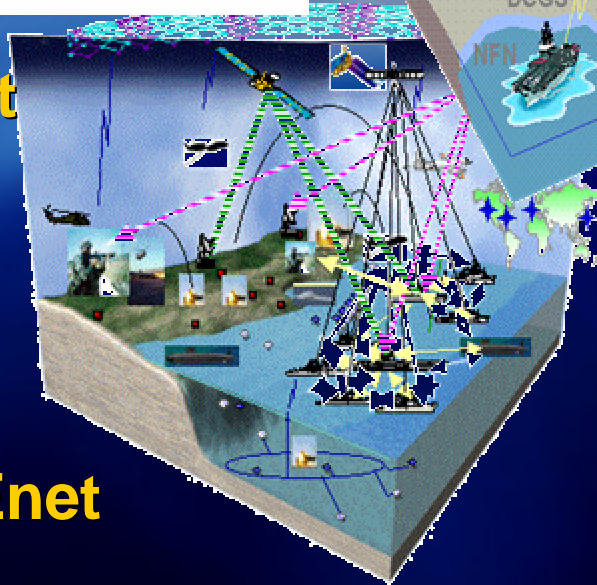




# Future Combat Systems

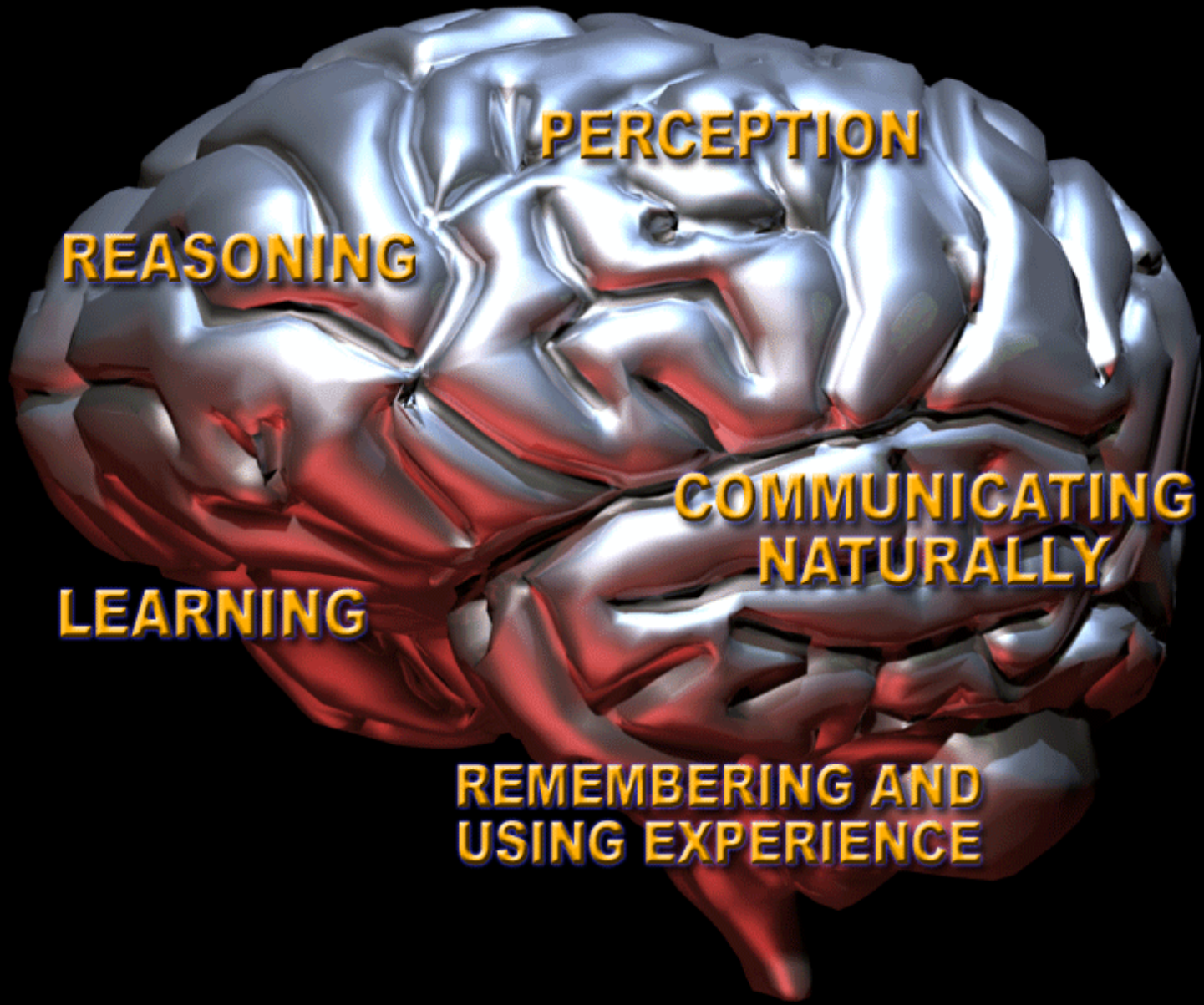
# Joint Battlespace Infosphere

# FORCEnet





THE GAP



**PERCEPTION**

**REASONING**

**COMMUNICATING  
NATURALLY**

**LEARNING**

**REMEMBERING AND  
USING EXPERIENCE**

# Cognitive Systems

Real-World Learning

# Cognitive Systems

**Real-World Learning**

**Real-World Reasoning**

**Natural Language/  
Multimodal Communication**

**Episodic Memory**

**Self-Aware Reflection**

**Perception/Cognition**



# Cognitive Systems

**Real-World Learning**

**Real-World Reasoning**

**Natural Language/  
Multimodal Communication**

**Episodic Memory**

**Self-Aware Reflection**

**Perception/Cognition**



Cognitive Agent



External Environment





# Cognitive Systems

## *Single-Agent Cognition*

**Personalized Assistant  
that Learns (PAL)**

**Real-World Learning**

**Real-World Reasoning**

**Natural Language/  
Multimodal Communication**

**Episodic Memory**

**Self-Aware Reflection**

**Perception/Cognition**



# Cognitive Systems

*Single-Agent Cognition*

*Collaborative Cognition*

*Collective Cognition*

**Personalized Assistant  
that Learns (PAL)**

**Real-World Learning**

**Real-World Reasoning**

**Natural Language/  
Multimodal Communication**

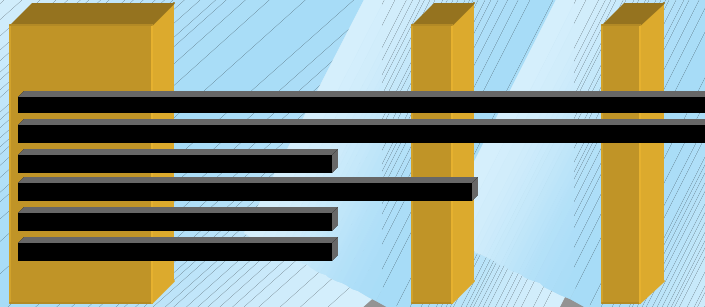
**Episodic Memory**

**Self-Aware Reflection**

**Perception/Cognition**



# Cognitive Systems



## Computing

**Architectures for Cognitive  
Information Processing**

...

# Cognitive Systems

## Computing Technologies

Architectures for Cognitive  
Information Processing

Self-Regenerative Systems

...

...

ROBOTS LEARNING APPLIED

REAL WORLD

LEARNING



**PAL**  
Personalized Assistant that Learns

*Self Regenerative Systems*

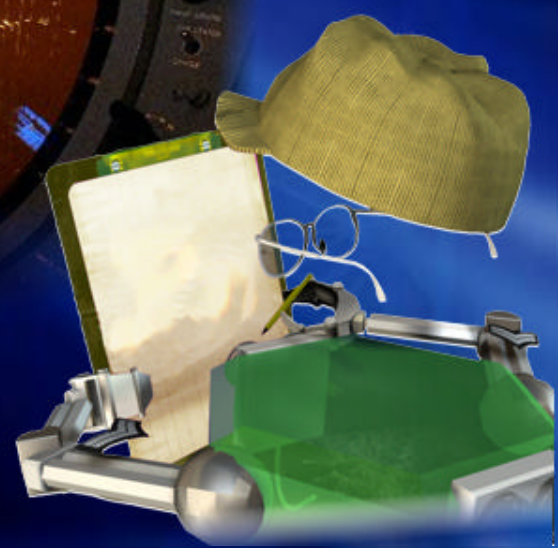


# Reasoning





*Experienced-based*



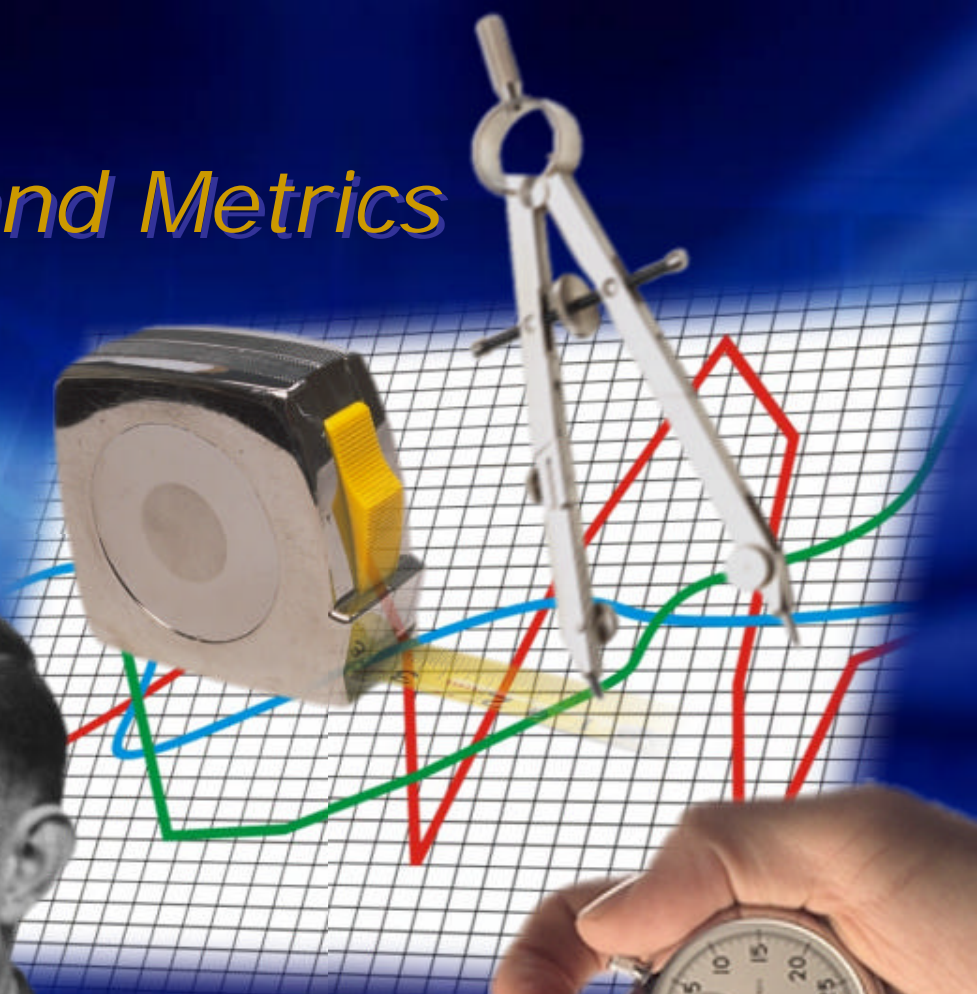


*Learning*

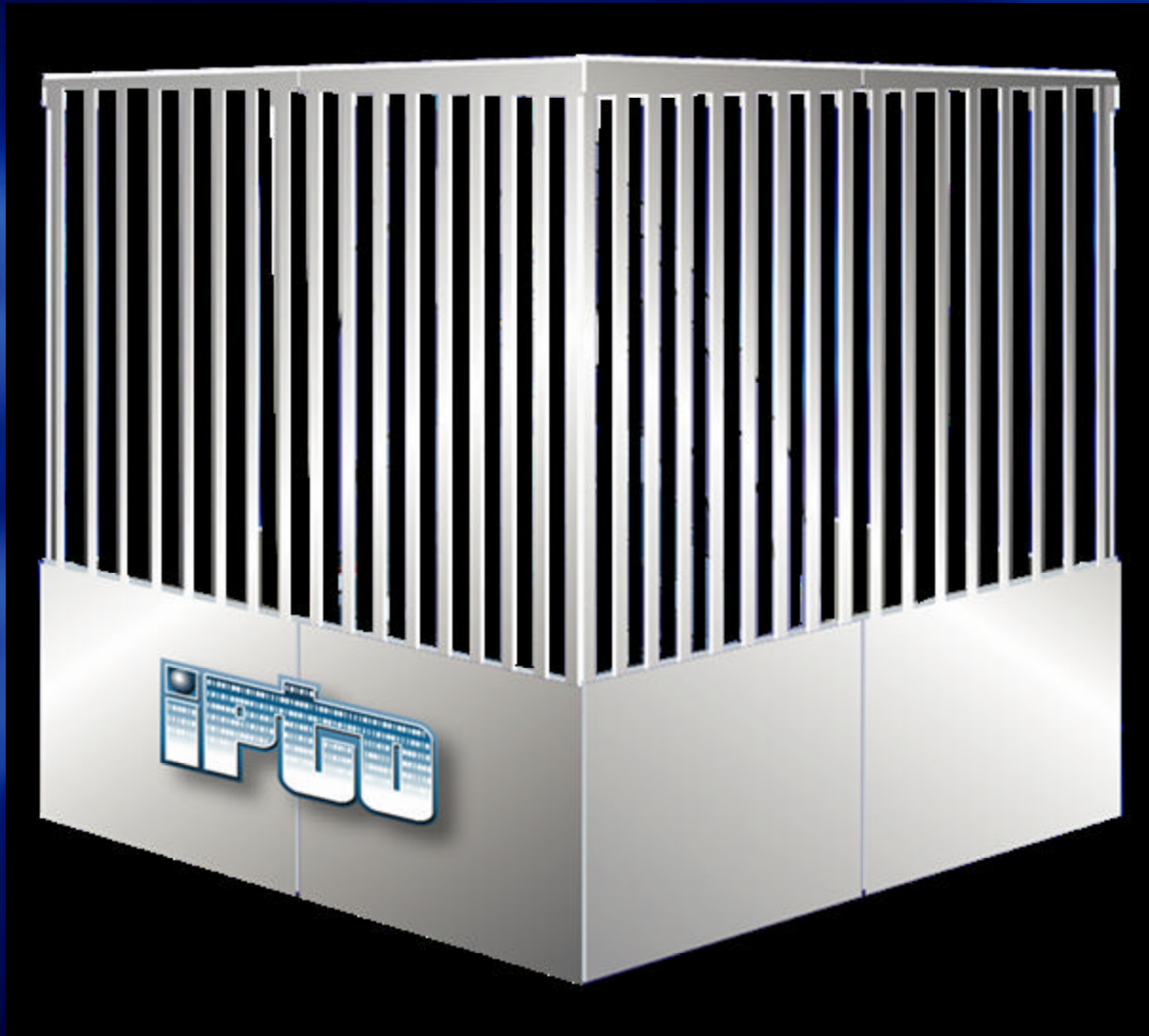
BRIDGING  
DARPA  
THE GAP



# Evaluation and Metrics









## Computer Science



