



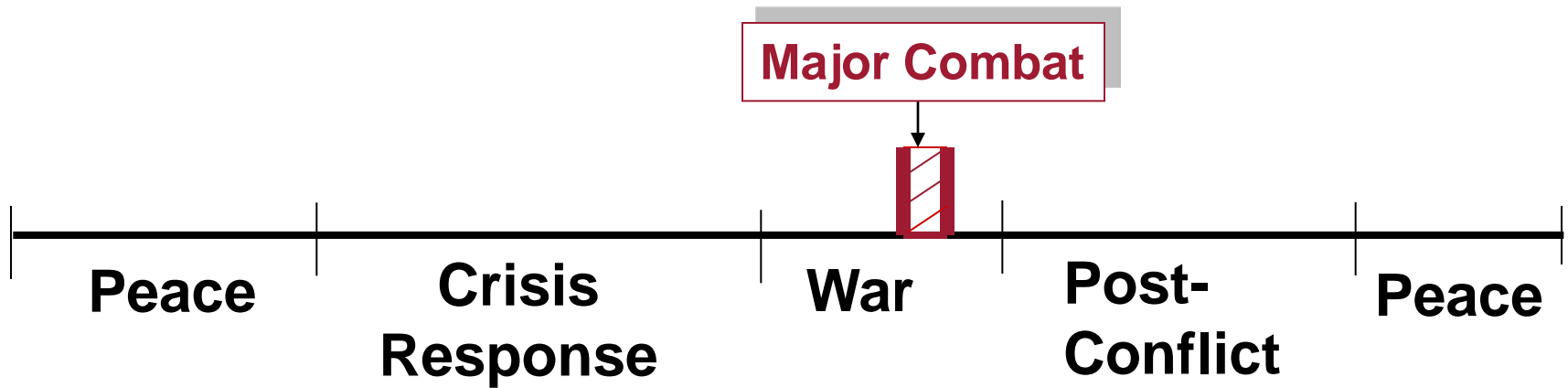
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Strategic Development and Experimentation

Comprehensive Thinking & Defense Analysis Transformation

Mark N. Clemente
16th ICCRTS
21-23 June 2011
Québec Canada

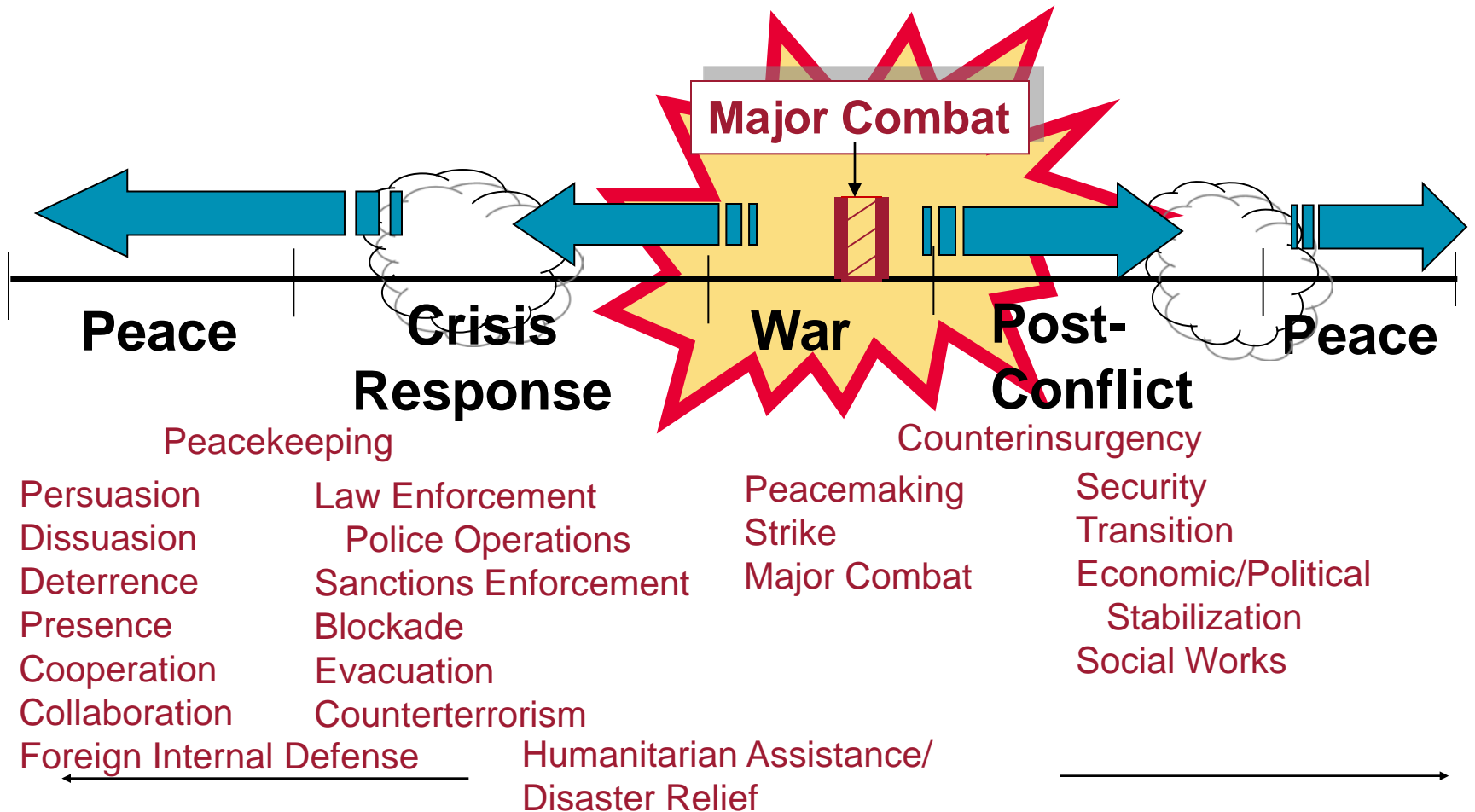
Traditional Thinking

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Comprehensive Thinking – Needed for all that stuff left & right of boom

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NATO's "Comprehensive Approach"

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“... today's challenges require a **comprehensive approach** by the international community involving a **wide spectrum of civil and military instruments**, while fully respecting mandates and autonomy of decisions of all actors, and provides precedents for this approach”

“ ... to improve coherent application of NATO's own crisis management instruments as well as **practical cooperation at all levels with partners, the UN and other relevant international organizations, Non-Governmental Organizations and local actors** in the planning and conduct of ongoing and future operations wherever appropriate.”

Riga Summit Declaration - 29 Nov 2006

Secretary Bob Gates

Foreign Affairs Jan/Feb 2009

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“The military and civilian elements of the United States’ national security apparatus have responded unevenly and have grown increasingly out of balance. The problem is not will; it is capacity. ... And various initiatives are under way that will better integrate and coordinate U.S. military efforts with civilian agencies as well as engage the expertise of the private sector, including nongovernmental organizations and academia.”

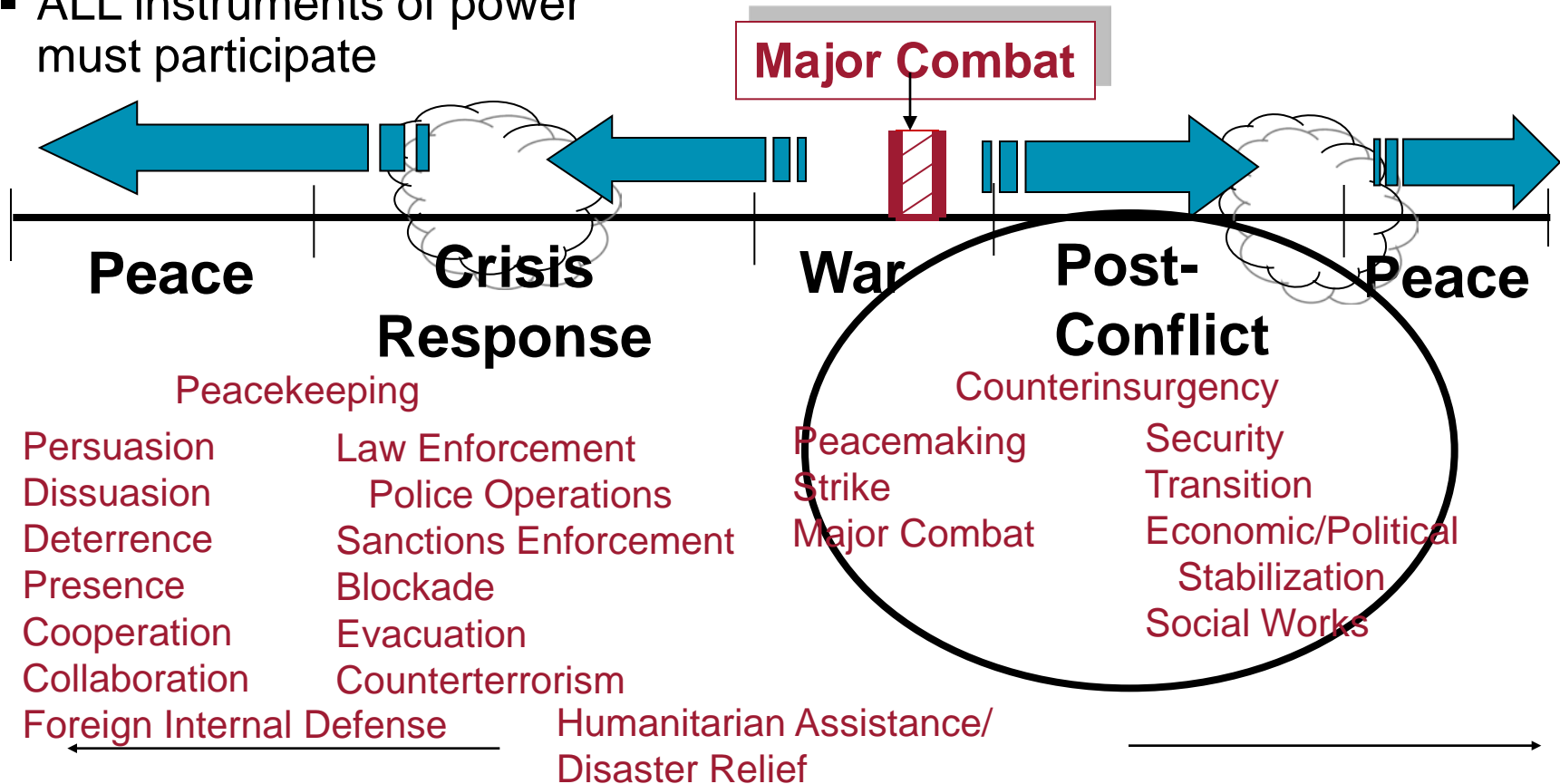


DoD photo by Master Sgt. Jerry Morrison, U.S. Air Force/Released

Comprehensive Thinking – Afghanistan Today Planning Across the Spectrum

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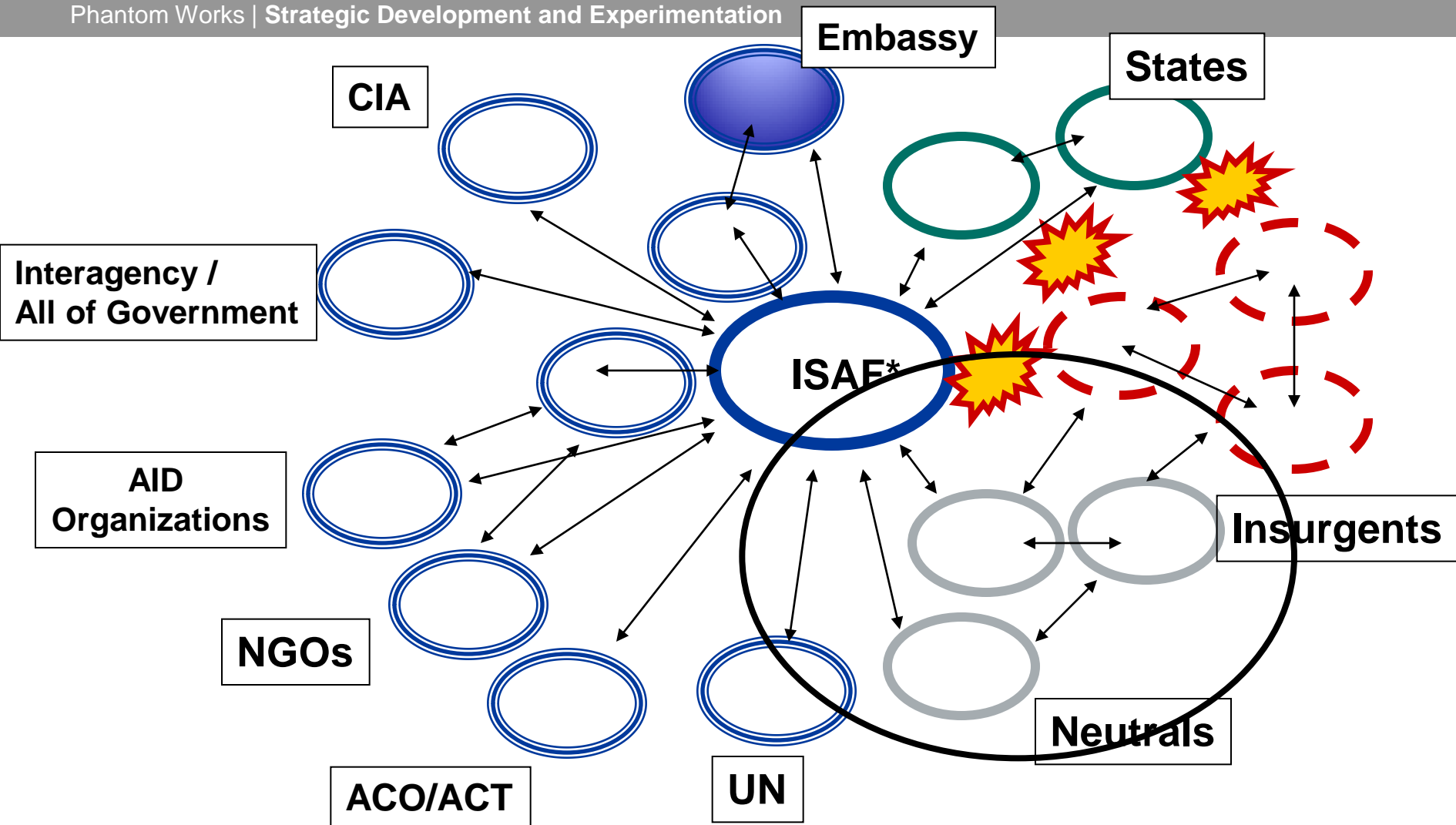
- Increasingly cross domain
- Increasingly social
- ALL instruments of power must participate



Integrating Disparate Systems

*International Security Assistance Force Afghanistan

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Diplomacy

Lateral and Vertical Networking

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International

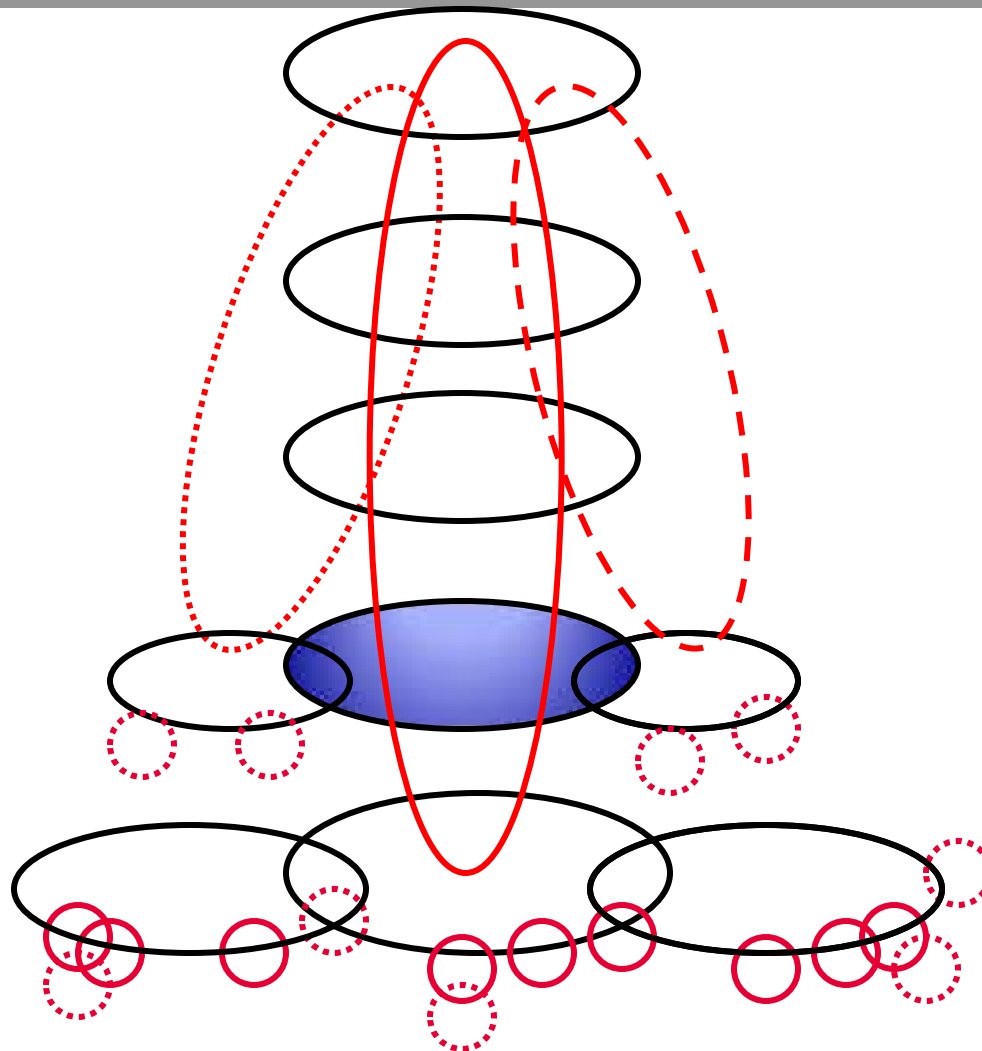
Nation State

Department

**Agency/
Embassy**

Section

**Foreign Service
Officer**



Complicated v. Complex

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Complicated / Linear

- Solving
- Whole equal to sum of the parts
- Outputs proportionate to inputs
- Repeatable results
- Predictable chain of causes and effects

Complex / Non-linear

- Bounding
- Whole not equal to sum of the parts
- Outputs not proportionate to inputs
- Results not repeatable
- No predictable chain of causes and effects

Defense Lateral and Vertical Networking

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International

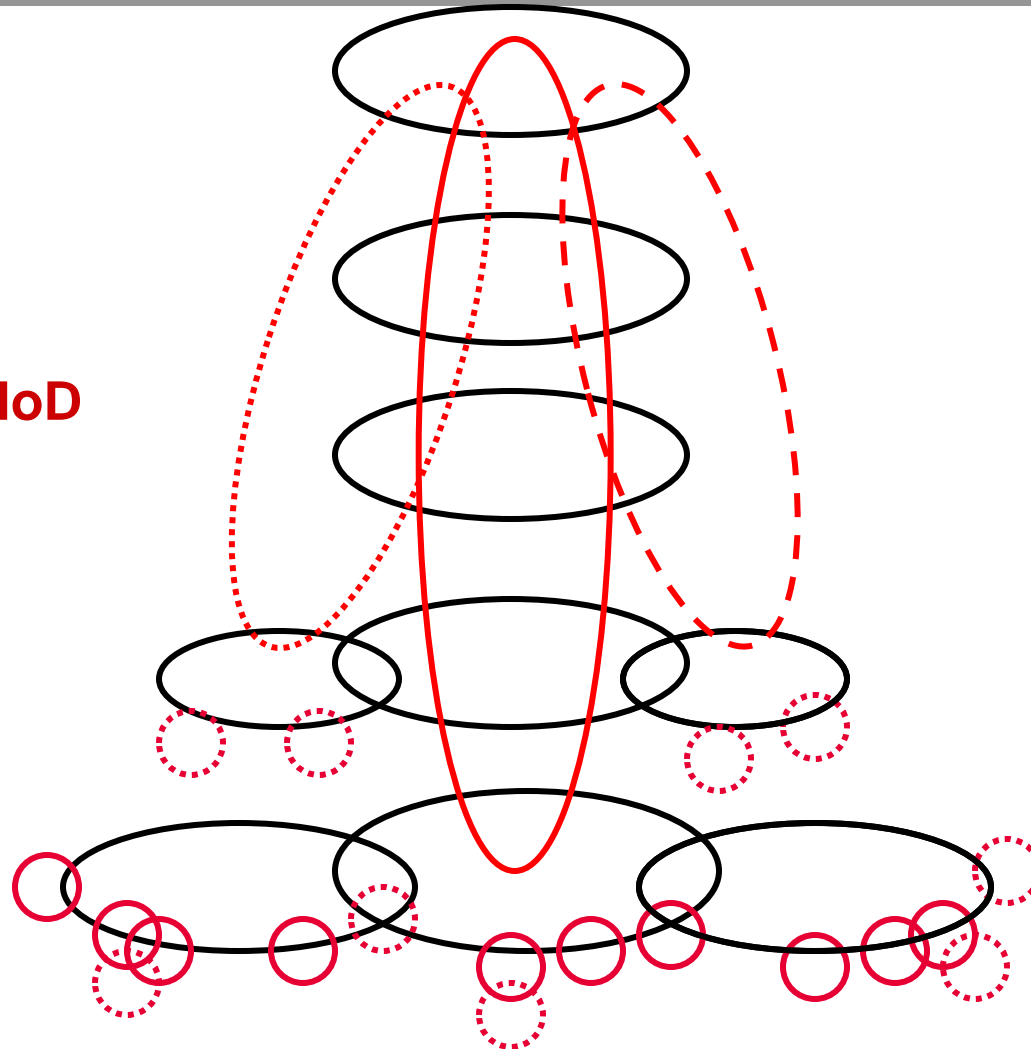
Nation State

Department / MoD

**Operational
Command**

Tactical Unit

Warfighter



Adversary too

Lateral and Vertical Networking

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International

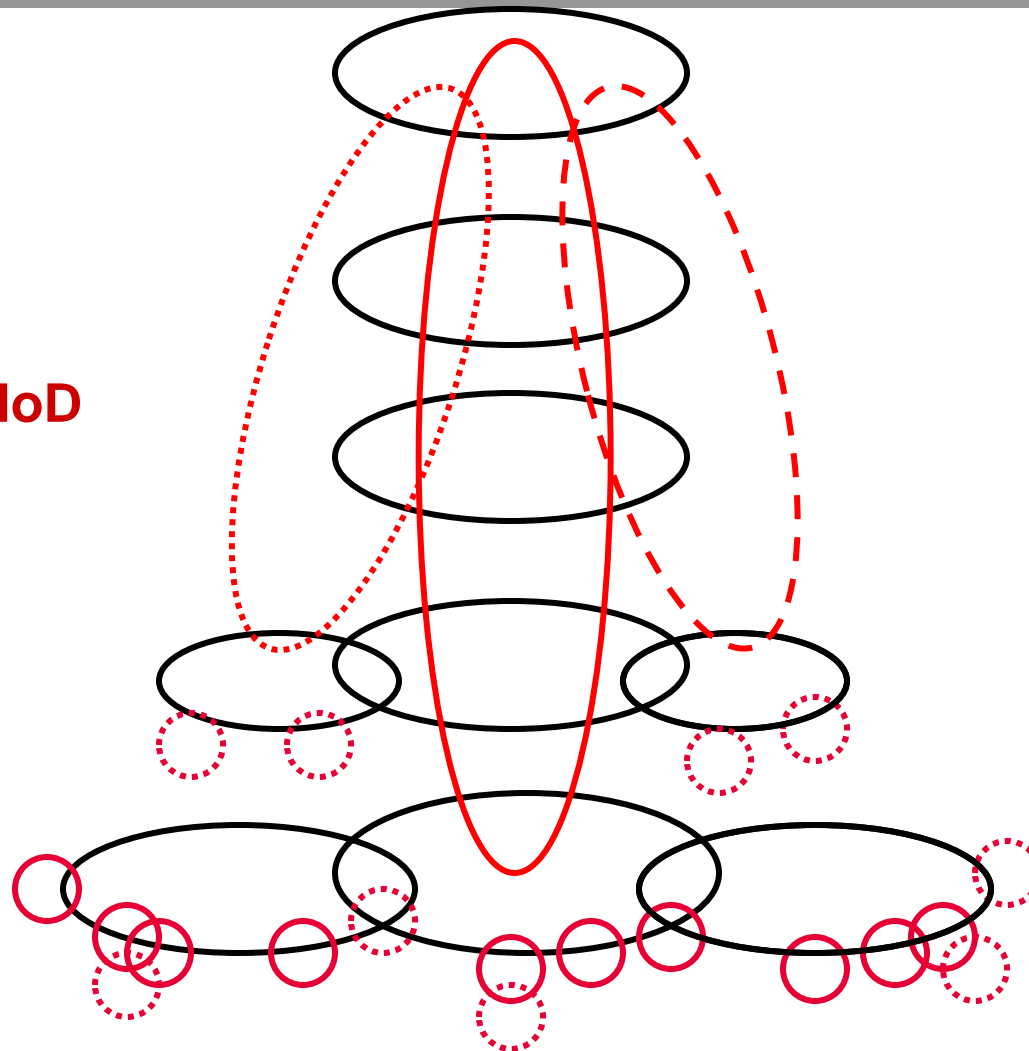
Nation State

Department / MoD

**Operational
Command**

Tactical Unit

Warfighter



AI Qaeda

**Regional
Franchise**

**Local
Network**

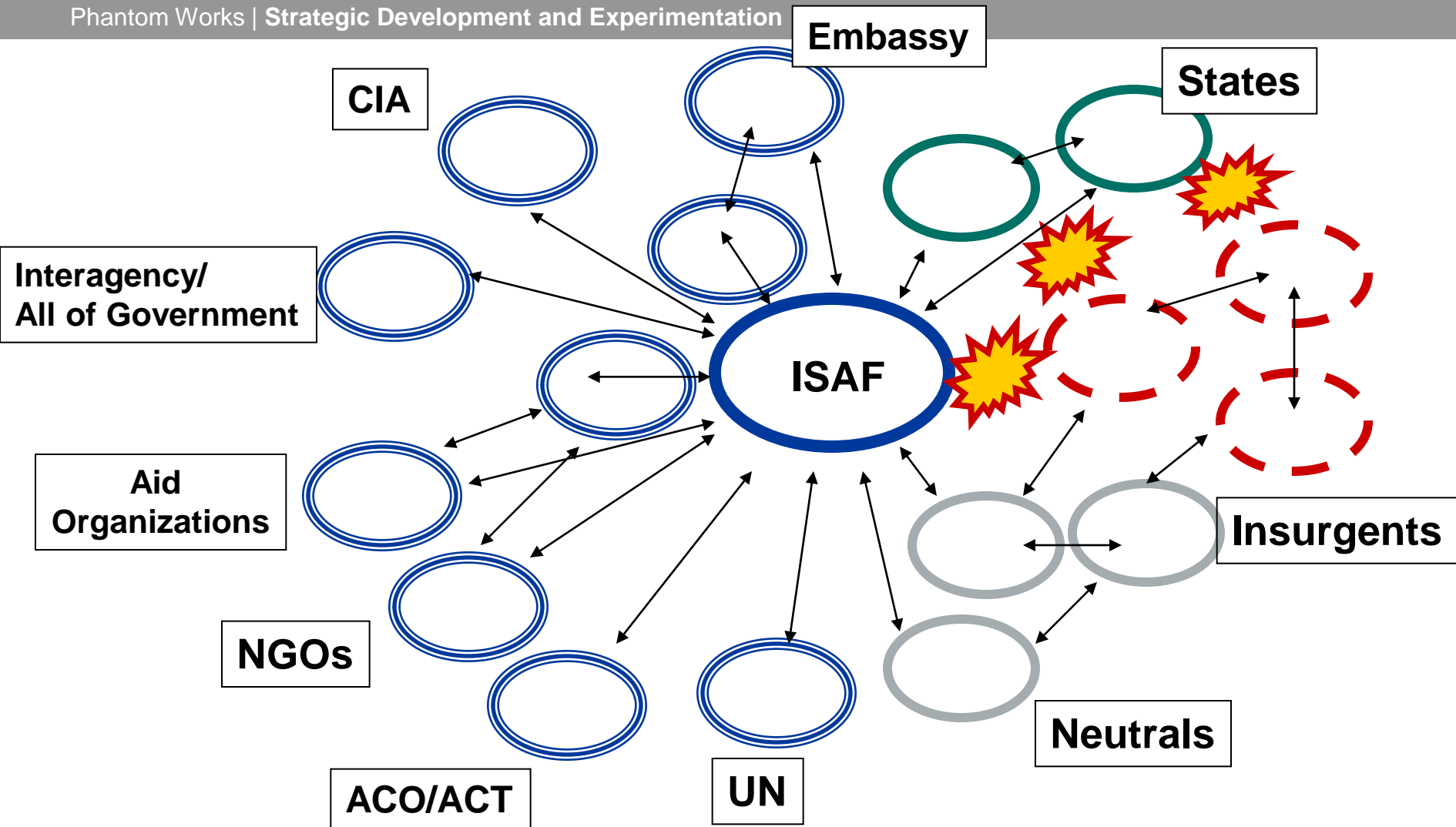
Terrorist Cell

Terrorist

Human Systems are Complex & Adaptive

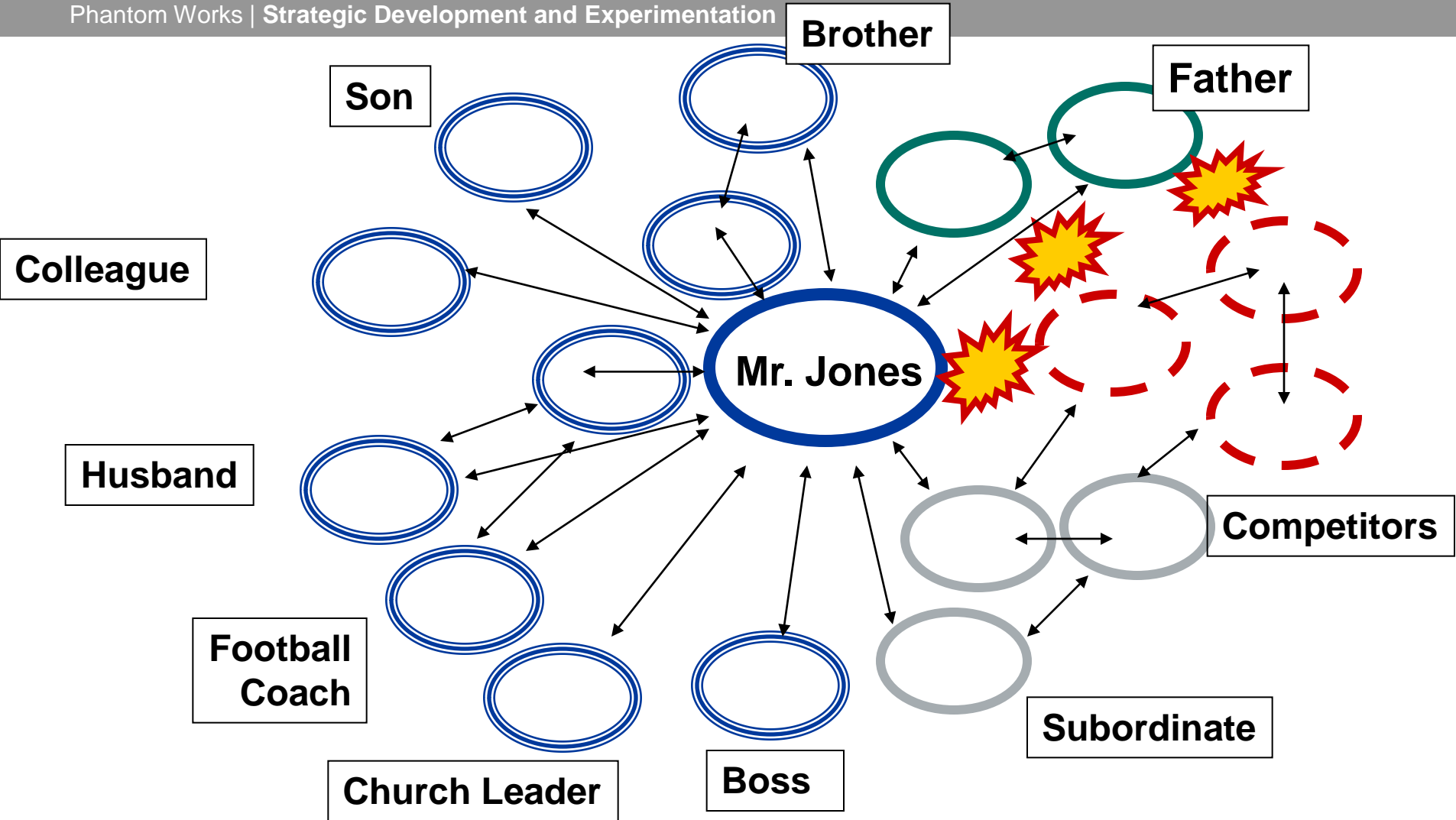
Will sometimes have competing goals

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You do this every day!

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Lateral and Vertical Networking

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- **Military Levels of War**

- More blurred today

- **GOOOAAAALLLL!!!!!!**

(an analogy)



Emergent functions at operational and tactical levels will require different approaches and...

Comprehensive Thinking Transforming Operations Analysis

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“Complicated” Operations Analysis is mostly

- Normative
- Quantitative

Seeks optimal solutions

Kinetic & Linear
Peace

Crisis

Major Combat

War

Post-Conflict

Peace

“Complex” Operations Analysis is more often

- Descriptive
- Qualitative

Seeks bounded solutions

Non-kinetic & Non-linear

Peacekeeping

Law Enforcement

Police Operations

Sanctions Enforcement

Blockade

Evacuation

Counterterrorism

Humanitarian Assistance/
Disaster Relief

Counterinsurgency

Peacemaking

Strike

Major Combat

Security

Transition

Economic/Political
Stabilization

Social Works

Transforming Operations Analysis

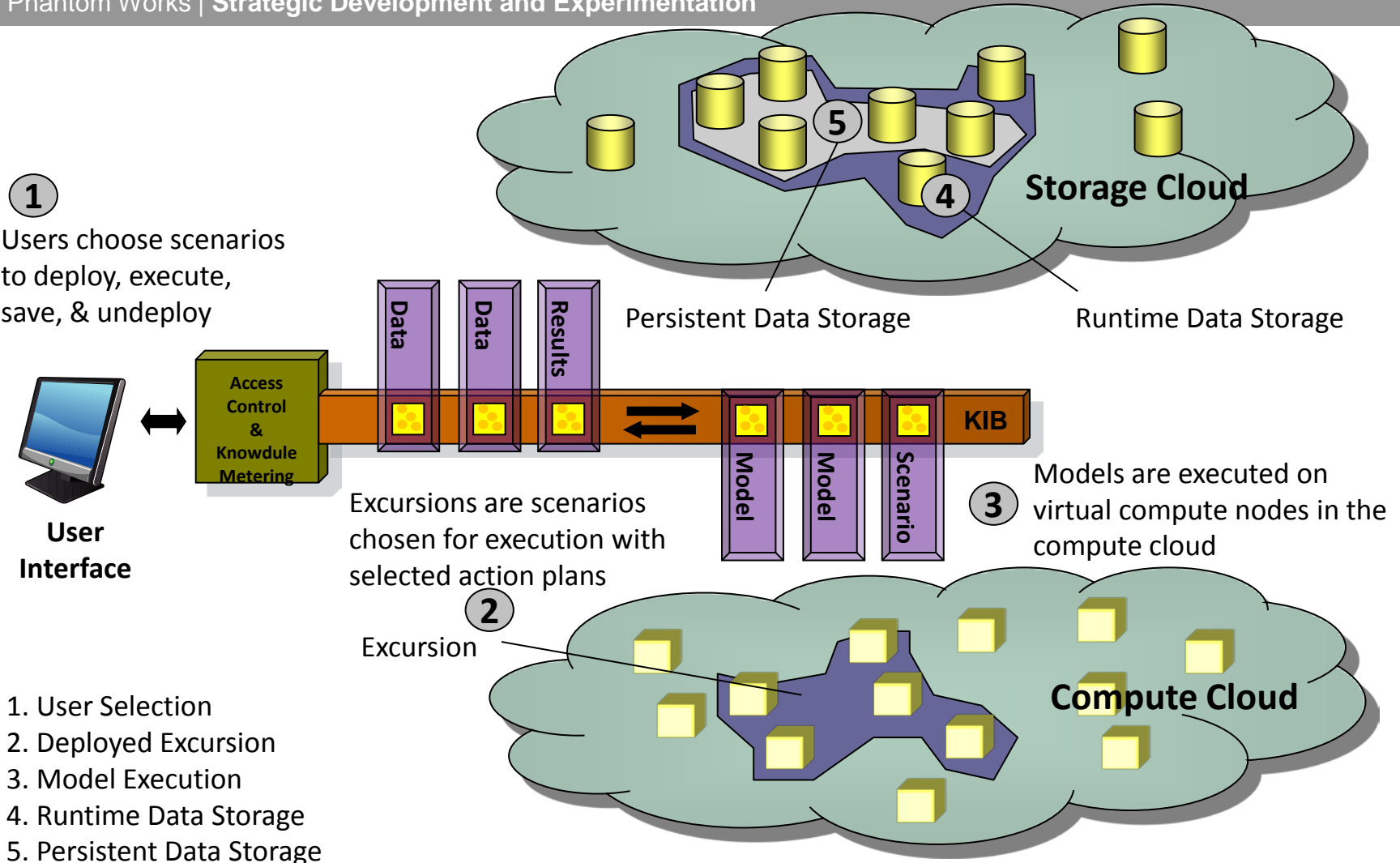
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No *Big Black Box* but...

- **Can bound the problem**
- **Potential Models to consider**
 - Human-in-the-loop
 - Computational → Agent-Based
 - System Dynamic
- **Or a “mashup” of different models and data**

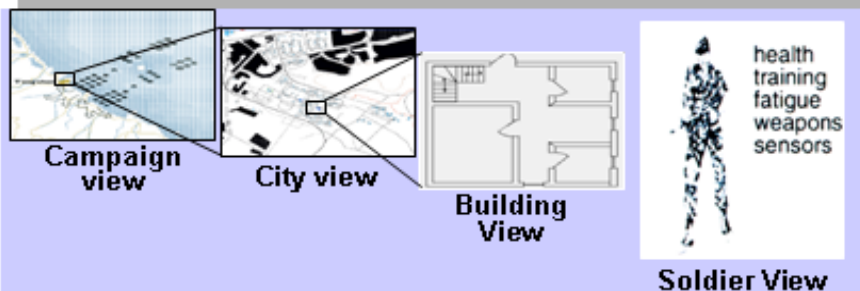
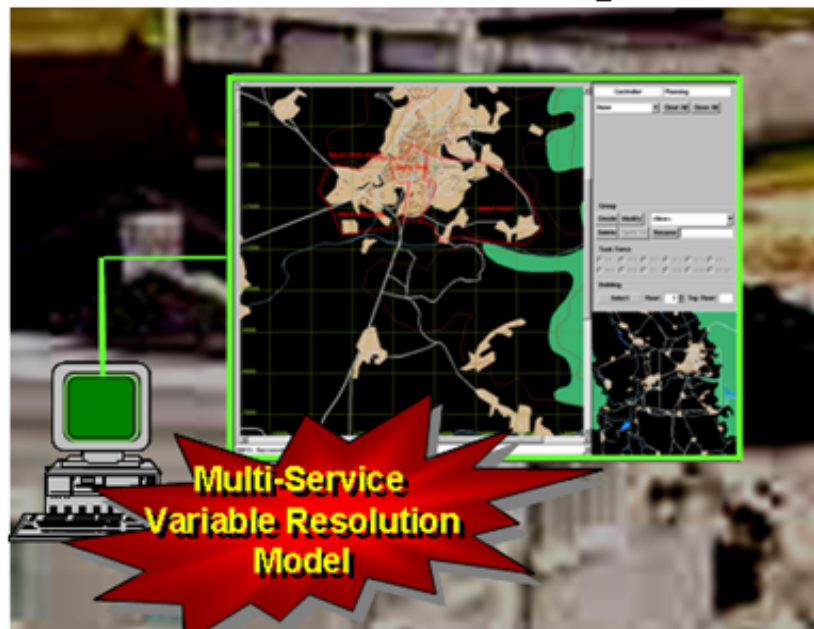
A Model and Data Mashup Experiment

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Joint Conflict and Tactical Simulation (JCATS)

JCATS is a multi-sided, high resolution, entity level, joint conflict simulation



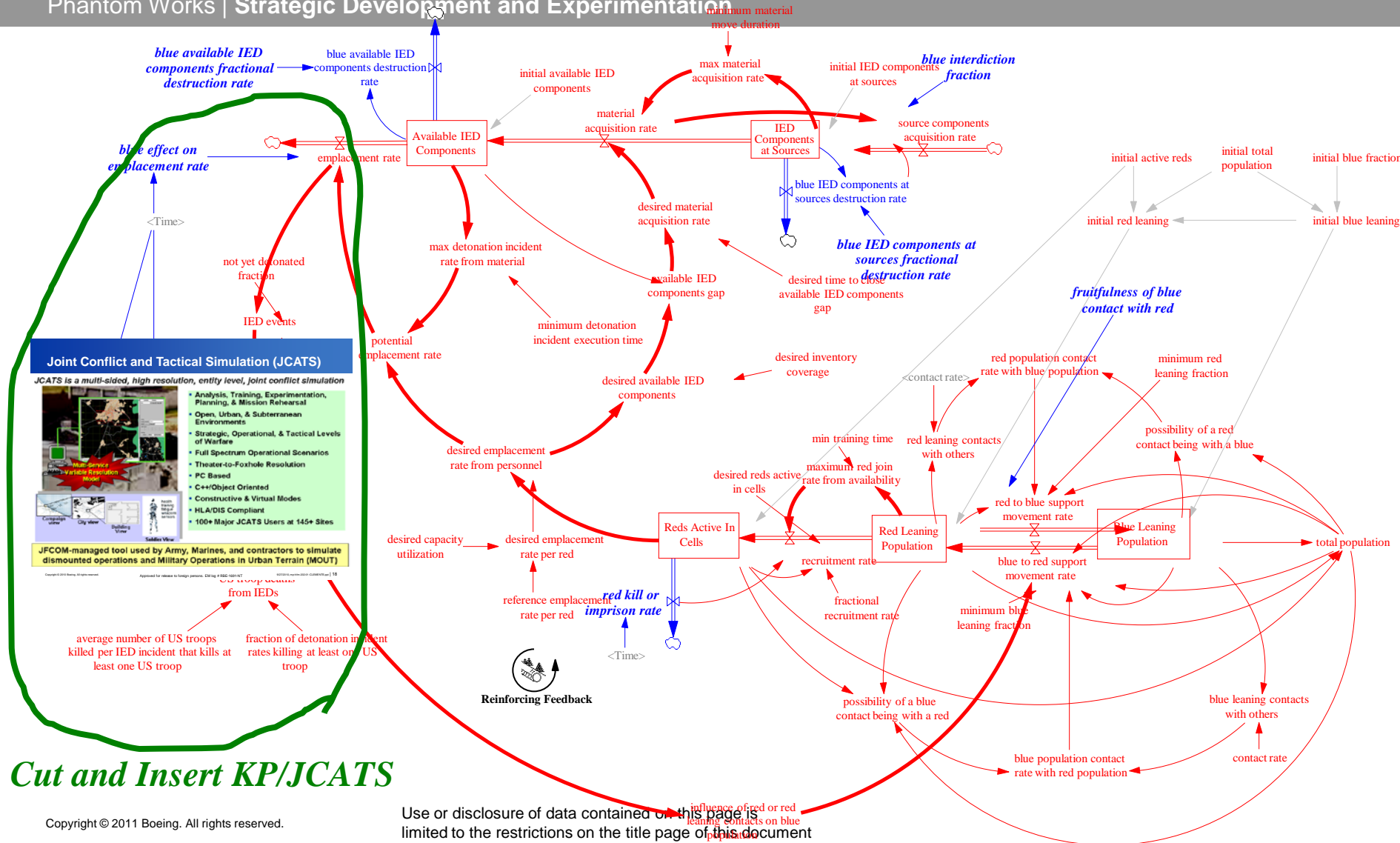
- Analysis, Training, Experimentation, Planning, & Mission Rehearsal
- Open, Urban, & Subterranean Environments
- Strategic, Operational, & Tactical Levels of Warfare
- Full Spectrum Operational Scenarios
- Theater-to-Foxhole Resolution
- PC Based
- C++/Object Oriented
- Constructive & Virtual Modes
- HLA/DIS Compliant
- 100+ Major JCATS Users at 145+ Sites

JFCOM-managed tool used by Army, Marines, and contractors to simulate dismounted operations and Military Operations in Urban Terrain (MOUT)

System Dynamic Model

IED Model Overview

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Conclusion

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- Comprehensive thinking is needed to holistically address real world challenges
- Complexity demands that we design systems that better inform and connect operators, not replace them
- Operations Analysis needs new tools and processes that provide insight on both physical & social networks – and at all levels

Questions

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“Perhaps oversimplifying, there seem to be two kinds of people in the world: those who build mathematical models, and those who focus on the world. The two groups usually don’t talk to each other. Each plays to a different audience. The modeler gains status by impressing other modelers and giving talks at professional societies. Those who focus on the world usually don’t go to such meetings. They play to an audience of what’s actually taking place on the battlefield, whether it is located in a foreign land or in a corporate board room.

In place of modeling complex and thinking simple, net assessment tries to model simple and think complex. The spirit is one of using relatively simple models, numbers, and trends, and to think long and hard about what they mean.”

From Paul Bracken’s “Net Assessment: A Practical Guide”