Fighting the Networked Force

Presentation to
SAS-055
Analytical Support to Defense Transformation
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Mr. John J. Garstka
Asst. Director for Concepts and Operations
Office of Force Transformation
Office of the Secretary of Defense
(703) 696-5713
john.garstka@osd.mil
www.oft.osd.mil

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Bottom Line Up Front

- **Network Centric Warfare (NCW)**
  - **An emerging Military Response to the Information Age**
  - **Maturing capabilities demonstrated during OEF/OIF**
  - **Evolving evidence base provides insight into capabilities of networked forces**

- **NCW Implementation**
  - **Not just about technology**
  - **Involves all lines of development**

Transformation

…U.S DoD Perspective

- ☑ **Continuing process**
- ☑ **Creating/anticipating the future**
- ☑ **Co-evolution of concepts, processes, organizations and technology**
- ☑ **New competitive areas / competencies; revalued attributes**
- ☑ **Fundamental shifts in underlying principles**
- ☑ **New sources of power**
- ☑ **Broadened capabilities base**

- *New technology context*
- *Broadened threat context*
- *New strategic context*

A Broad and Sustained Competitive Advantage

A US Transformation Goal:
Desired Attributes of a Transformed Joint Force

- **Fully Integrated:**
  - All DoD component capabilities are born joint and are able to **integrate** into a **focused effort with a unified purpose**

- **Networked:**
  - Linked and synchronized in time and purpose— **allowing dispersed forces to communicate**, maneuver, and **share a common operating picture**

- **Adaptable:**
  - Forces that are **tailorable and scalable**, prepared to quickly respond to any contingency

- **Expeditionary:**
  - **Rapidly deployable**, employable, and sustainable—regardless of anti-access, or area denial environments

- **Decision Superior:**
  - **Gain and maintain information superiority** to shape the situation or react to changes

- **Decentralized**
  - Uses **collaborative planning** and shared knowledge to empower subordinate commanders to **compress decision cycles**

- **Lethal**
  - **Capability to destroy** an adversary and/or his systems in all conditions and environments

Source: United States Armed Forces - Joint Operations Concepts (JOpsC)

How a Networked Force Operates:
Network Centric Operations

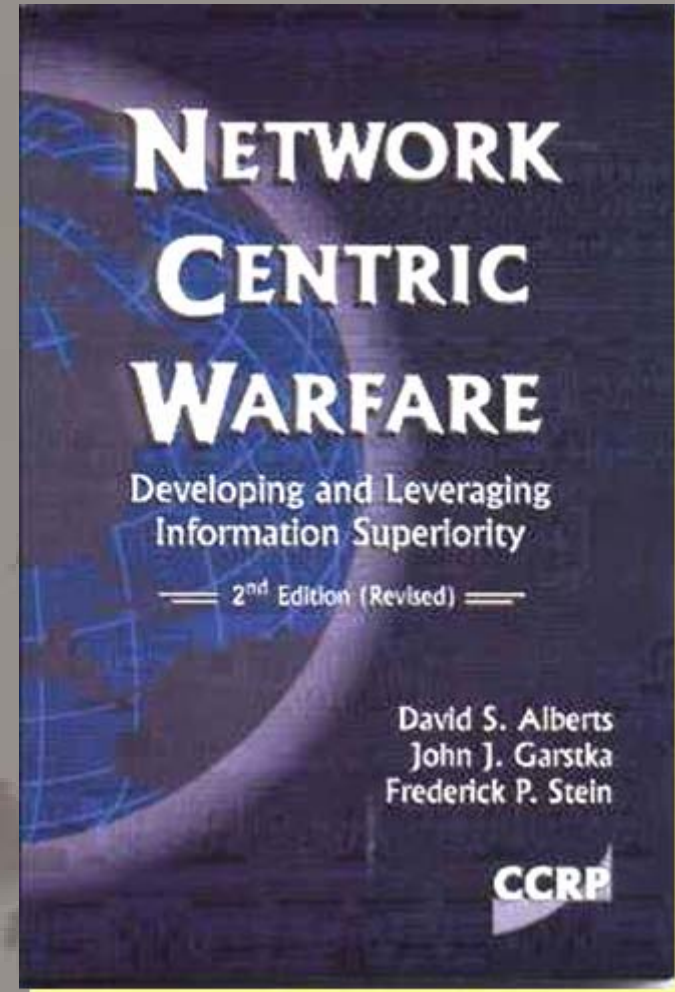Creates an **Information Advantage** and translates it into a decisive **Warfighting Advantage**

Information Advantage - enabled by the robust networking of **well informed** geographically dispersed forces

Characterized by:

- Information sharing
- Shared situational awareness
- Knowledge of commander's intent

Warfighting Advantage - exploits behavioral change and new doctrine to enable:

- Self-synchronization
- Speed of command
- Increased combat power

NETWORK CENTRIC WARFARE
Developing and Leveraging
Information Superiority
═══ 2nd Edition (Revised) ═══

David S. Alberts
John J. Garstka
Frederick P. Stein

CCRP

Exploits <u>Order of Magnitude</u> Improvement in Information Sharing

Domains of Warfare

Shared Situational

- Understanding
- Awareness
- Assessment

Social Domain

Leadership
Unit Cohesion
Morale

Situational

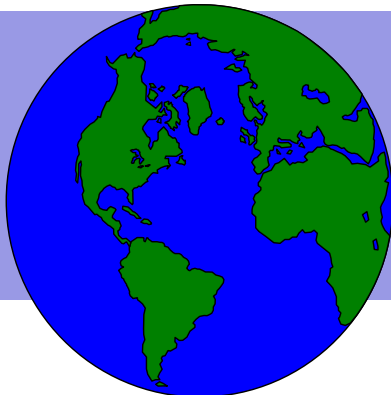- Understanding
- Awareness
- Assessment

Mind of the Warfighter

Cognitive Domain

Where Information is Created , Shared …..

Information Domain

**Strike
Maneuver
Protect**

Physical Domain

Tenets of Network Centric Operations
…The New Value Chain

Tenets of NCW: A Hypothesis Regarding Sources of Power

- 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**
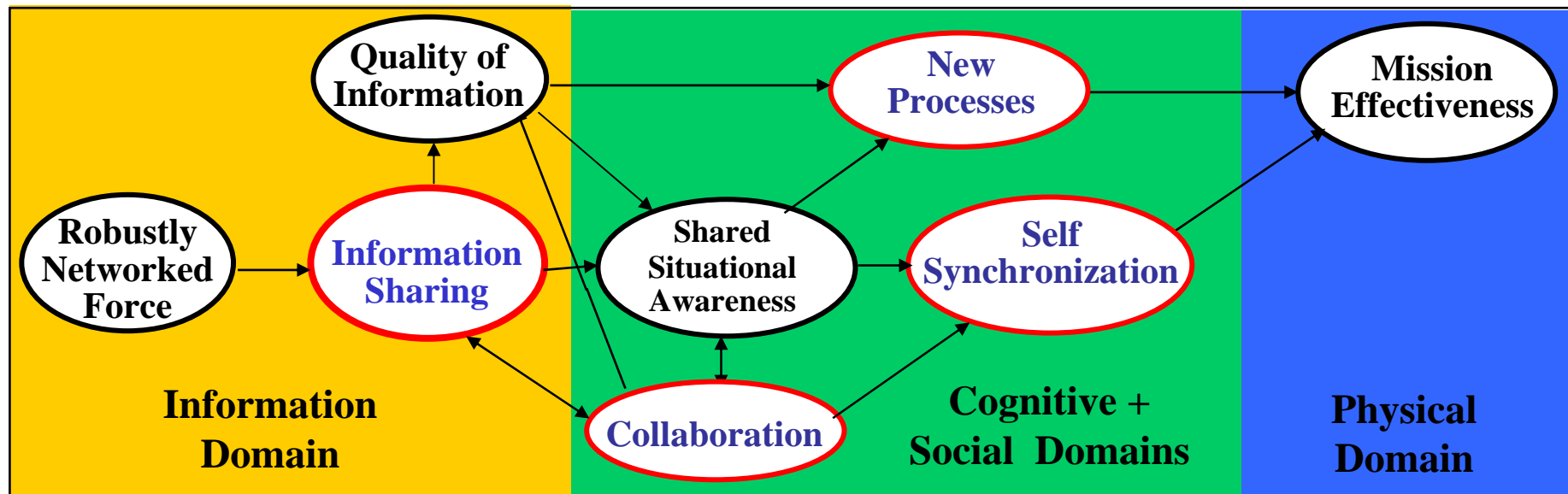
Bottom Line

"*Networked Forces*

Outfight

Non-Networked Forces"

"…it allowed us to make decisions and execute those decisions faster than any opponent."

Lt. Gen. David D. McKiernan
Coalition Forces Land Component
Commander, OIF
23 April 03

Warfighting Advantage:
Evidence for Increased Mission Effectiveness

- **Maneuver – Networked Ground Forces**
  - **Networked coalition forces demonstrate unprecedented operational agility and speed of maneuver in defeating opposition forces (Operation Iraqi Freedom)**
  - **Networked Stryker Brigade decisively engages OPFOR at JRTC -- 10 fold reduction in loss/exchange ratio form 10/1 to 1/1 (2003-2004)**

- **Protect (Counter Air) – Networked Air Forces**
  - **USAF found F-15Cs, working with data links (shared awareness), increased kill ratio by over 100% -- 2.6:1 for both Day & Night Ops (JTIDS Operational Special Project - Mid 1990's)**

- **Fires – Networked Air and Ground Forces**
  - **Networked Air and Ground Forces decisively defeat OPFOR at night (USA Division Capstone Exercise - Phase I, Apr 2001)**
  - **Networked Air and Ground Forces decisively prosecute counter TBM mission (*Operation Iraqi Freedom – Western Iraq*)**

Network Centric Operations Case Studies

- Office of Force Transformation is conducting a series of case studies which focus on how networked military forces operate *and* transform to enable network centric operations

- These Network Centric Operations case studies
  - Are being conducted across a range of mission areas
  - Examine exercises, combat operations, and peace keeping operations
  - Explore how US forces, US led coalition forces, NATO forces, and US allies operate with varying degrees of networking capabilities
  - Employ a conceptual framework and a rigorous data collection and analysis methodology

- The findings developed to date clearly demonstrate
  - That networked forces outperform non-networked forces
    - Mission effectiveness performance increases for high intensity conflict range from 1.5 x to 10 x
  - Deployment of less than perfect networks can have a significant impact on force effectiveness by:
    - Significantly improving information sharing
    - Dramatically enhancing situational awareness for commanders and their forces
  - Transformation processes that involve organizational and process change are key to achieving high levels of increased mission effectiveness

Breakout of NCO Case Studies

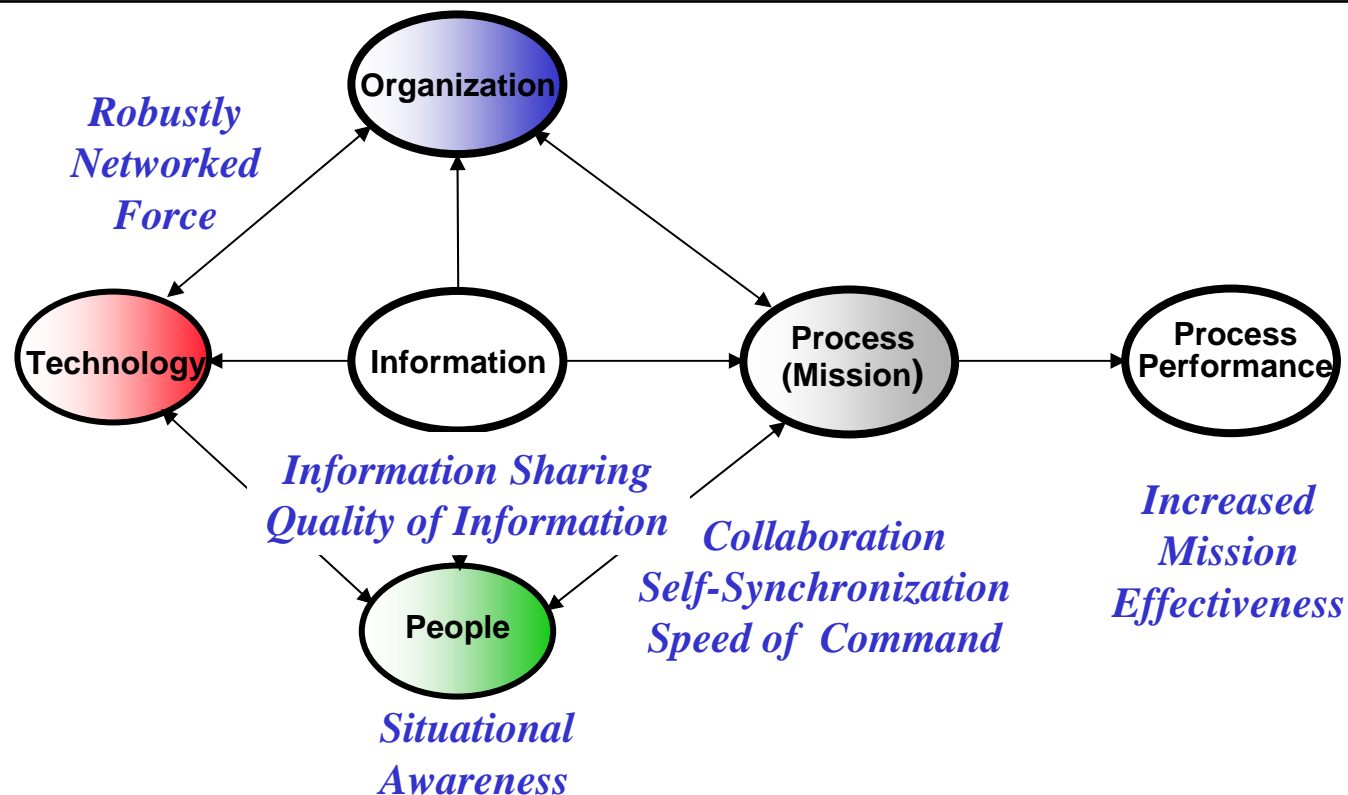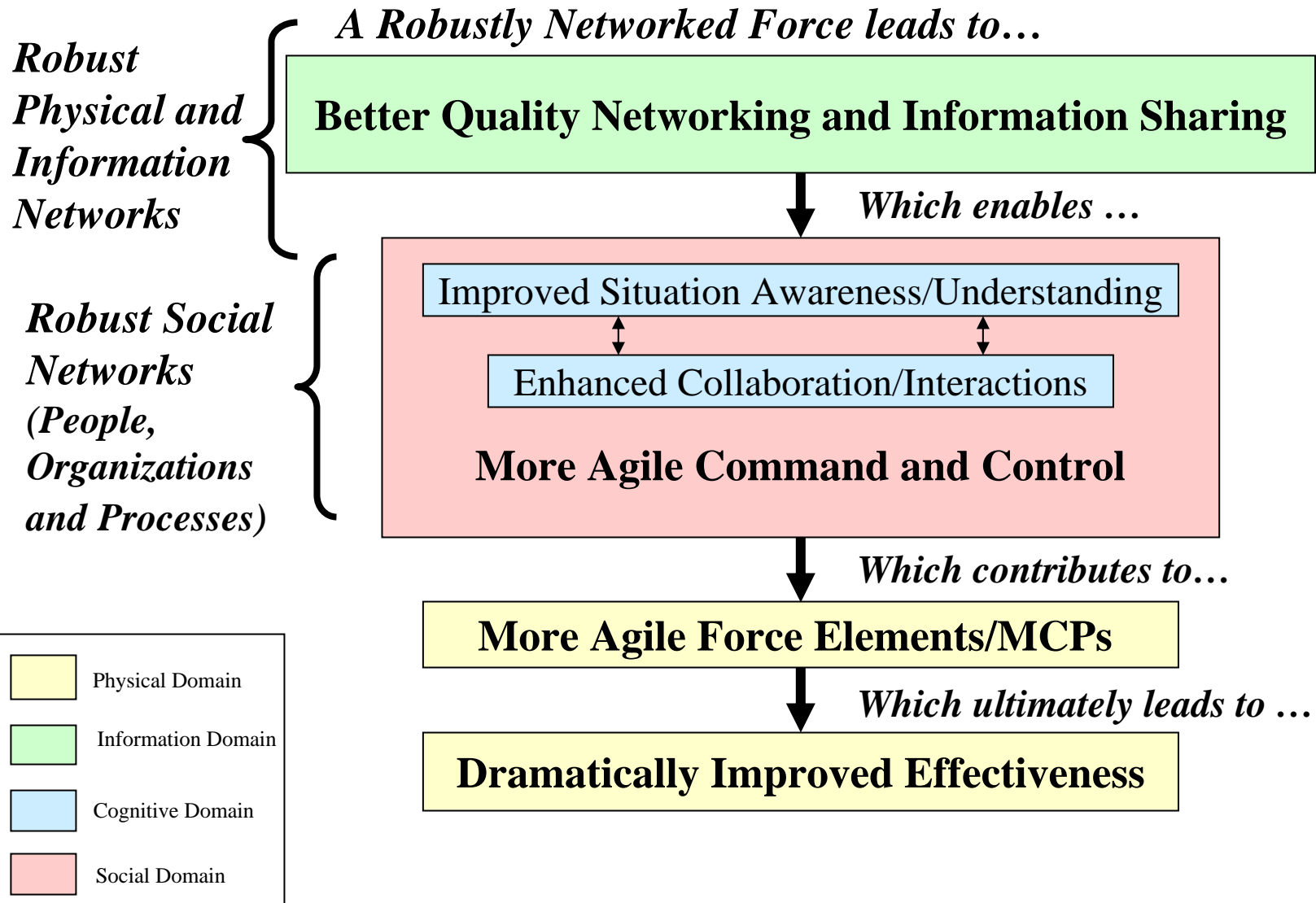|	Service	Joint/Inter-Agency	Coalition
Sea	CTF-50 (OEF) NSWG I (OEF/OIF)		**Coalition Maritime Ops (OIF)**
Land	V Corps/3 ID (OIF) Stryker BCT (JRTC) Stryker BCT (SASO)		**US/UK Coalition (OIF)** **NATO ACE Mobile Force Land** **NATO Task Force Fox**
Air	Air-to-Air (JTIDS)	Air-to-Ground (OEF/OIF) Air-to-Ground w/ SOF ⟶	
Other		NCO in SASO UK Low Intensity Conflict SARS - Singapore Swedish NBD	**NATO Response Force Assessment**

Tenets of Network Centric Operations: An Alternative View

- 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

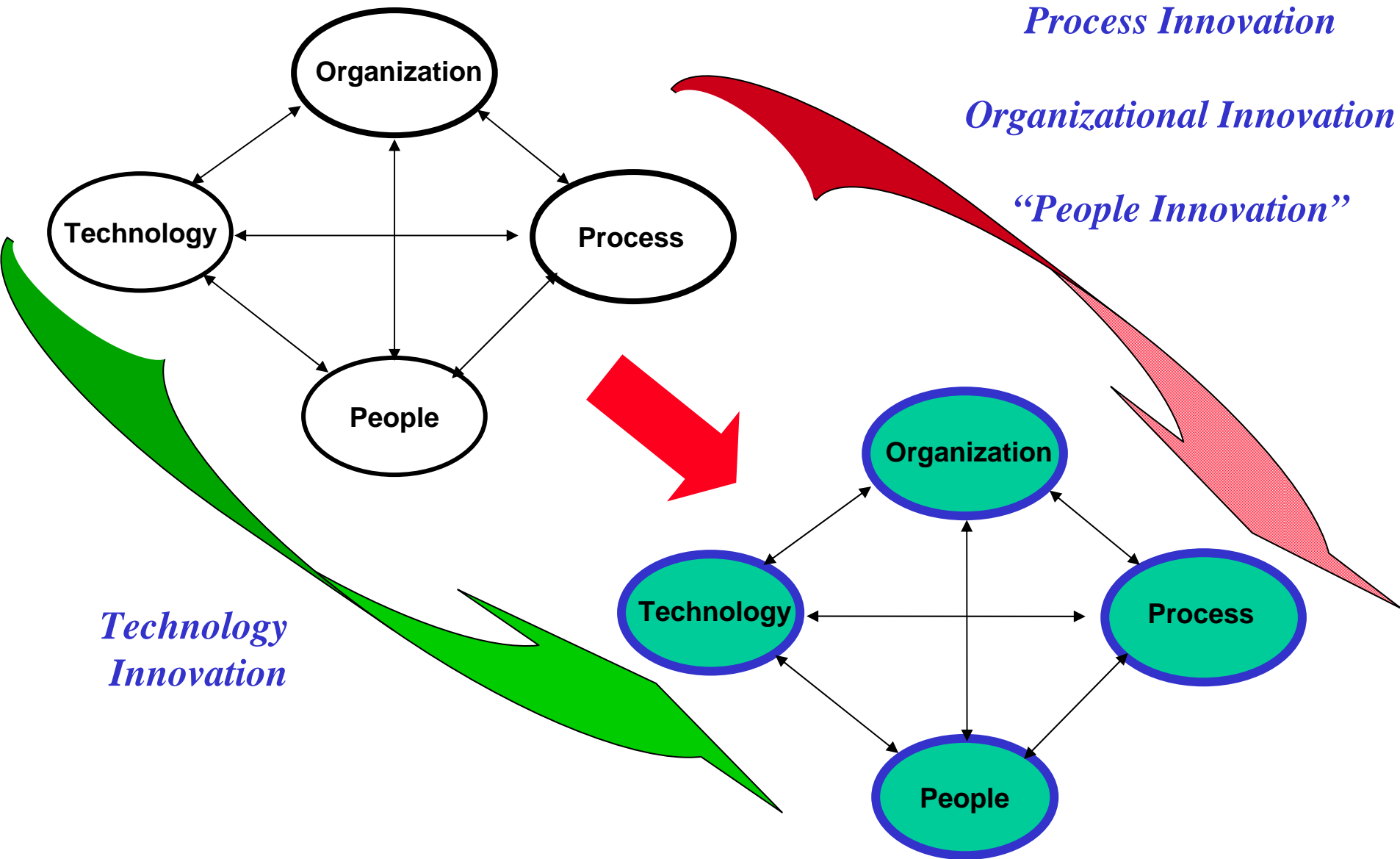# Tenets of Network Centric Operations: Linkage to NCO Conceptual Framework

Robust Physical and Information Networks

Robust Social Networks (People, Organizations and Processes)

A Robustly Networked Force leads to…

Better Quality Networking and Information Sharing

Which enables …

Improved Situation Awareness/Understanding

Enhanced Collaboration/Interactions

More Agile Command and Control

Which contributes to…

More Agile Force Elements/MCPs

Which ultimately leads to …

Dramatically Improved Effectiveness

Physical Domain

Information Domain

Cognitive Domain

Social Domain

Implementing Network Enabled Capabilities:
…Requires Innovation Across all Lines of Development

Process Innovation

Organizational Innovation

"People Innovation"

Technology Innovation

Organization

Technology

Process

People

Organization

Technology

Process

People

Implementing Network Enabled Capabilities
…Trajectory of Innovation and Experimentation

Warfighting Benefit of Information Sharing

Organizational Innovation

Process Innovation

Technology Innovation

We are successfully employing new processes and organizational concepts

New Process Employment

Process Innovation

We are **innovating** and **experimenting** with new processes and organizations

Process Integration

We have integrated existing processes and can collaborate with each other

Transformation Chasm

Transformation Required

Application Integration

Our applications are integrated and we can share information seamlessly: Common Operational Picture

Data Integration

We have integrated our data

Digital Information Sharing

We are networked and can share digital information: E-Mail – Web Chat – 9 Line Messages

Voice Connectivity

We can communicate and share information via voice

Degree of Information Sharing

Implementing Network Enabled Capabilities
...Trajectory of Innovation and Experimentation in U.S. DoD
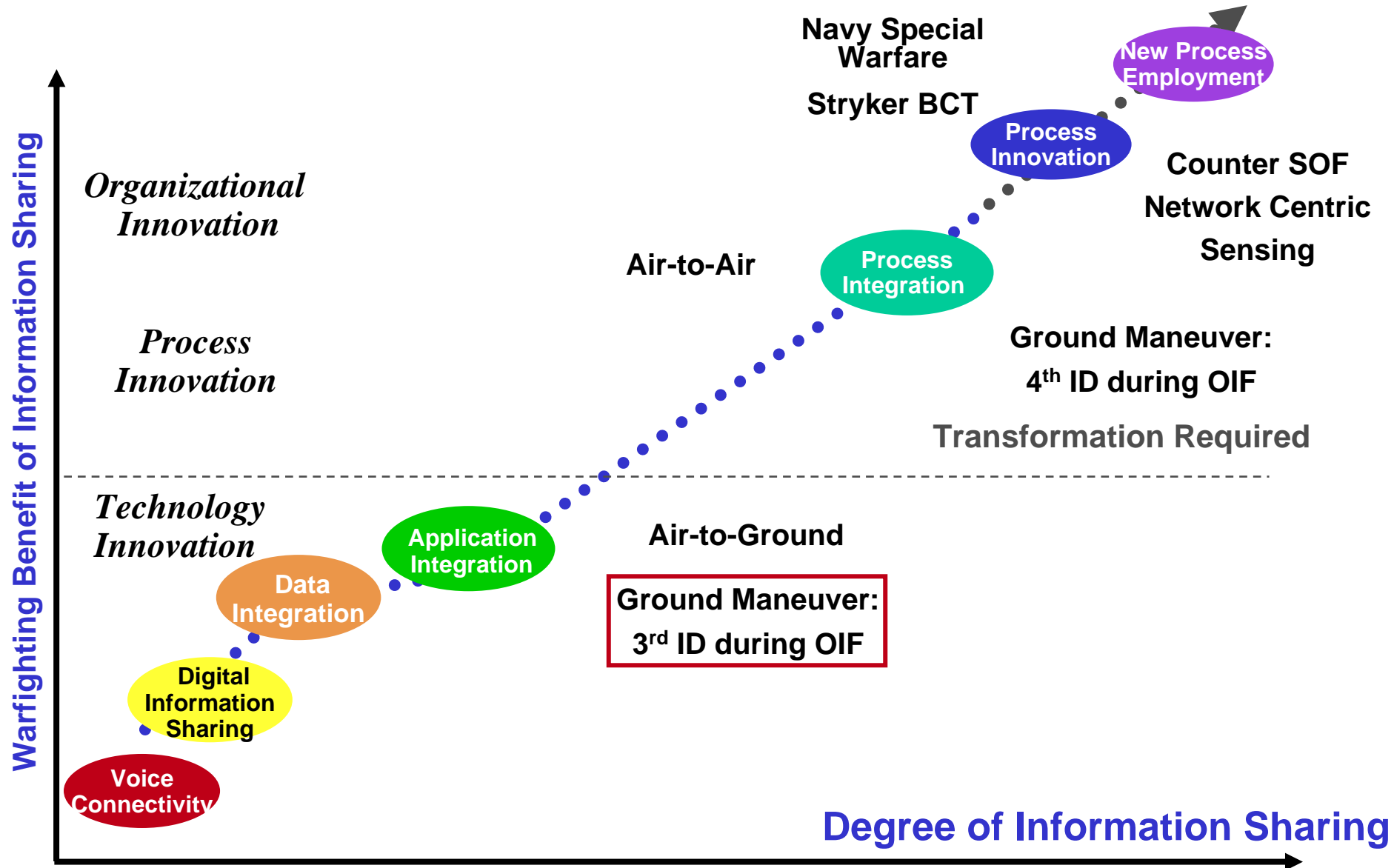
Operation Iraqi Freedom in Context

A Campaign of significant scope, scale, complexity and risk, and new capabilities

Contributing Factors
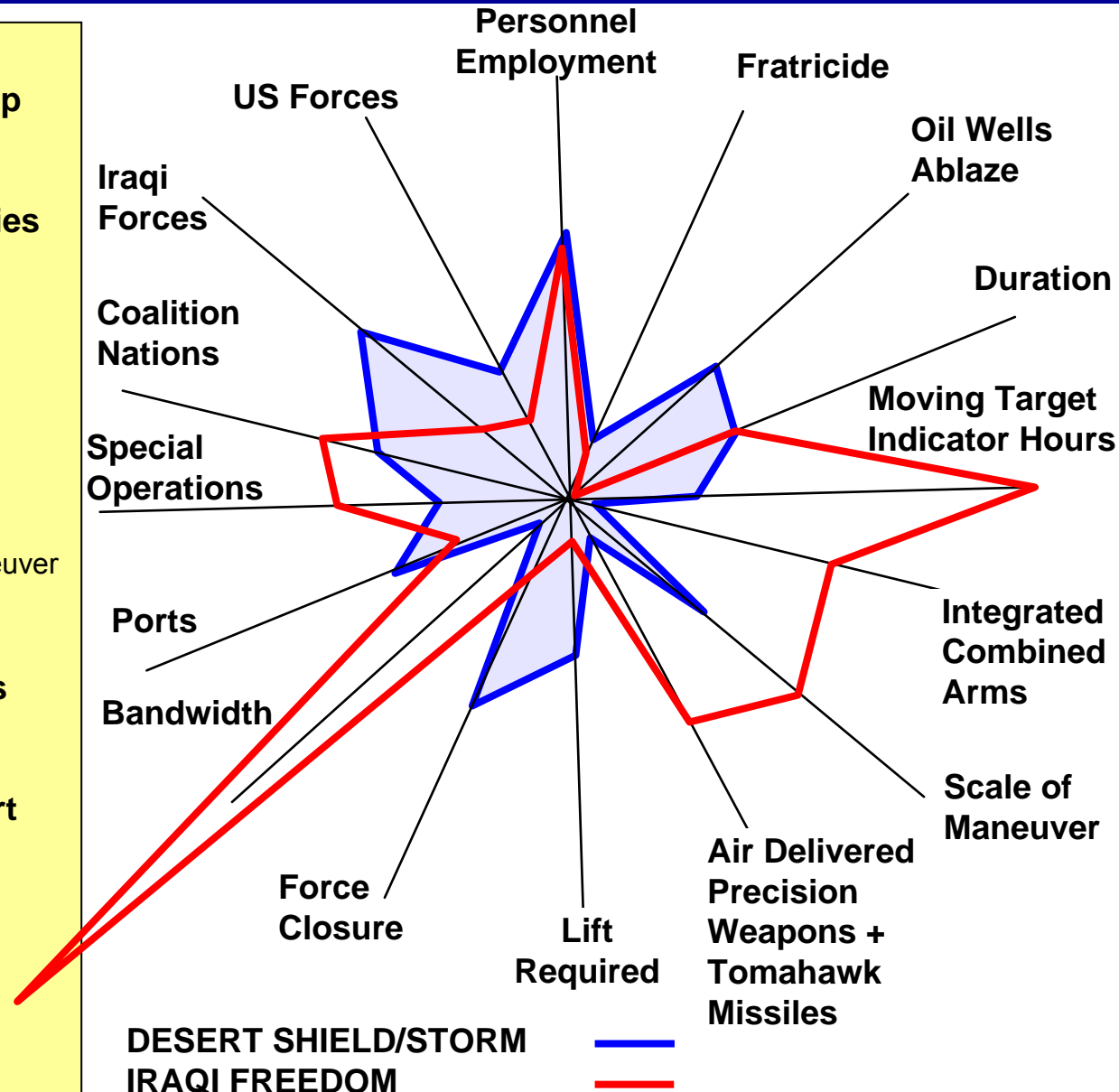- **Northern/Southern Watch--12 yr prep**
- **OEF Afghanistan Experience**
- **Existing Joint Headquarters**
- **Existing Command & Control facilities**
- **Land and Sea prepositioned stocks**
- **Lift improvements ($48B)**
- **Greater bandwidth capability**
- **Mission rehearsal exercises**
- **Overmatching Power**
  - Determined time and place of attack
  - Information superiority
  - Rapid Air and Sea supremacy
  - Precision fires; Speed and depth of maneuver

OIF vs Desert Storm
- **Fewer land and air forces**
- **Extensive use of Special Operations**
- **First use of Land Component Commander**
- **Robust Collaborative Planning Effort**
- **Greater maneuver distances**
- **Fewer Iraqi missile launches**
- **Fewer oil wells set ablaze**
- **Fewer munitions used**
- **Reduced costs**

Radar chart axes: Personnel Employment, Fratricide, Oil Wells Ablaze, Duration, Moving Target Indicator Hours, Integrated Combined Arms, Scale of Maneuver, Air Delivered Precision Weapons + Tomahawk Missiles, Lift Required, Force Closure, Bandwidth, Ports, Special Operations, Coalition Nations, Iraqi Forces, US Forces

DESERT SHIELD/STORM ▬▬ (blue)
IRAQI FREEDOM ▬▬ (red)

Operation Iraqi Freedom:
Joint Force Synergy

- Finding: Operation Iraqi Freedom was characterized "…by shock, by surprise, by flexibility, by the employment of precise munitions, on a scale never before seen, and by the application of overmatching power." (GEN Franks)

- Why it happened:
  - Highly flexible and mature plan
  - Robust, well-trained, quickly adaptable joint capabilities
  - Early & continuous emphasis on strategic imperatives
  - Improved Service capabilities

- What should be done:
  - Develop a fully joint, interoperable Command and Control network
  - Sustain / expand lethality & survivability overmatch for all ground forces
  - Develop robust live and simulated Joint & Multinational training capability
  - Develop transparent Joint Fires system

Source: USJFCOM OIF Lessons Learned

Objectives
1. **Finish the Regime**
2. **Eliminate WMD**
3. **Capture/drive out terrorists**
4. **Gain terror & WMD Intel**
5. **Secure the oil fields**
6. **Deliver humanitarian relief**
7. **Create conditions for representative government**
8. **Insure territorial integrity**
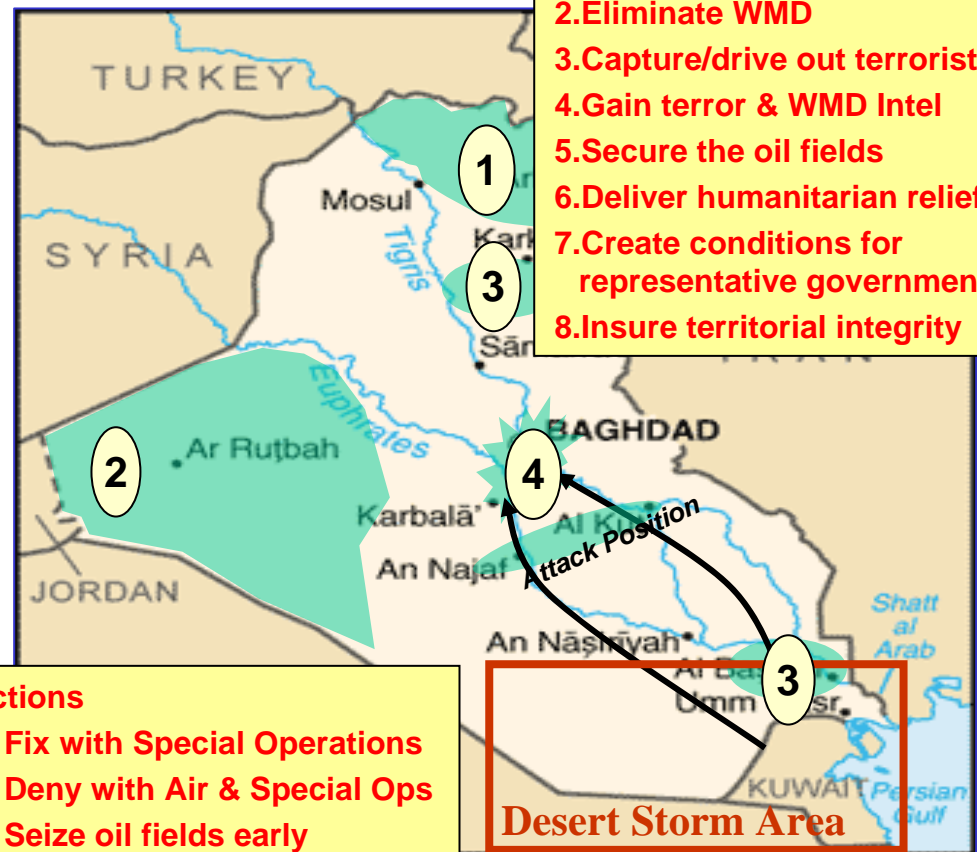
Actions
1. **Fix with Special Operations**
2. **Deny with Air & Special Ops**
3. **Seize oil fields early**
4. **Kinetic and non kinetic attacks**

Desert Storm Area

Operation Iraqi Freedom: Scheme of Maneuver
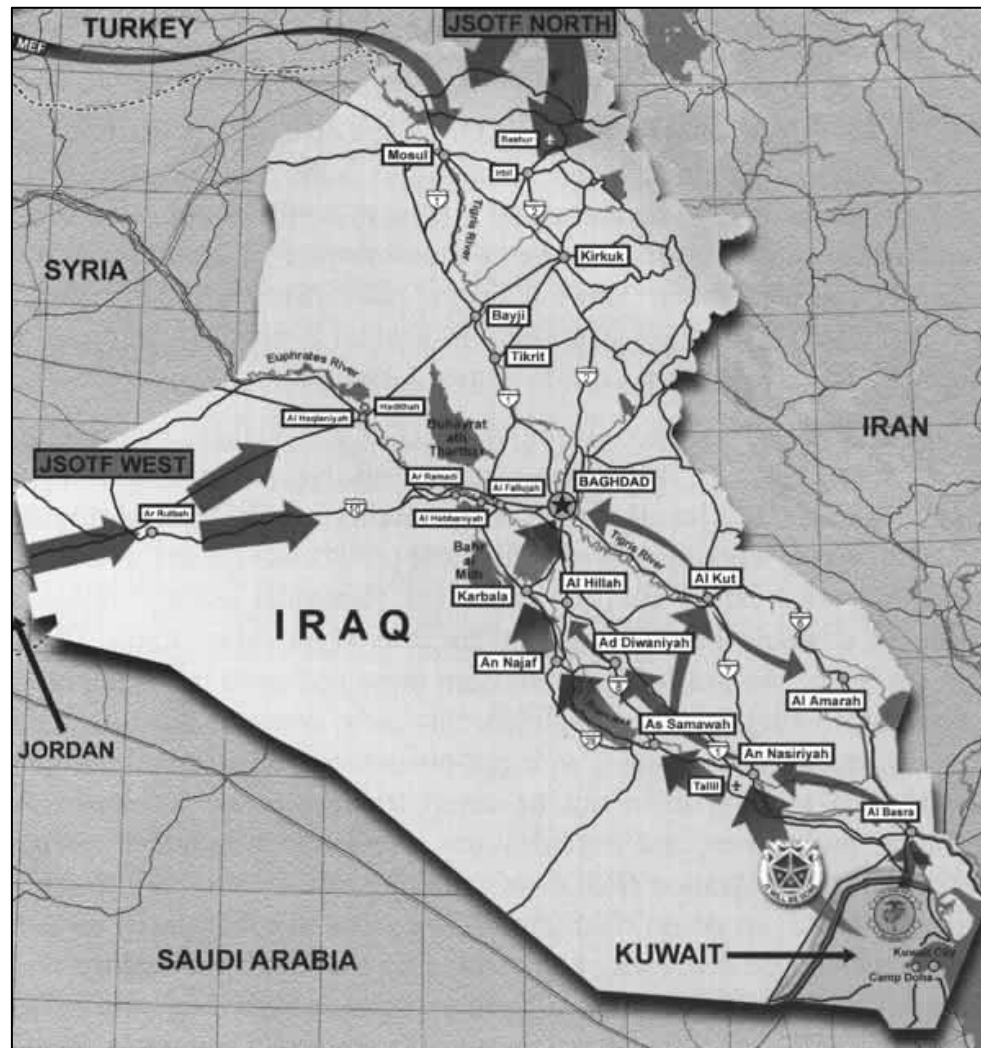
Operation Iraqi Freedom: Ground Maneuver in Southern Iraq

- **Controlled by V Corps / 1st Marine Expeditionary Force**
- **Traditional land battle w/heavy Joint & Coalition flavor**
  - Very high operational tempo
- **Common Operational Picture for Ground Forces**
  - Unprecedented in History of Warfare
  - Enabled by networking of distributed ground forces via Satellite Communications

Insight from an OIF Commander

 "What I will tell you is that the technology advances in our military today, compared to my experiences in Desert Storm, allowed me to talk via tactical satellite communications and other means across a battle space of hundreds of miles; to be able to conduct, when we need to, video teleconferences, where commanders can plot out where they're and what decisions they need to do next; and put all that together in a joint construct, where I could see where all the airframes were, where all the ships were, where my counterparts in air and maritime components can see where the ground formations are.

When you put all that together, that allowed us to make decisions with situational awareness of where we were at, where the enemy was, and our view of the terrain and the weather much, much faster than we ever could in the past and exponentially faster than our opponent could. So when you put that all together, it allowed us to make decisions and execute those decisions faster than any opponent."

Lt. Gen. David D. McKiernan
Coalition Forces Land Component
Commander, OIF
23 April 03

Ground Maneuver during Operation Iraqi Freedom: Key NCW Relationships
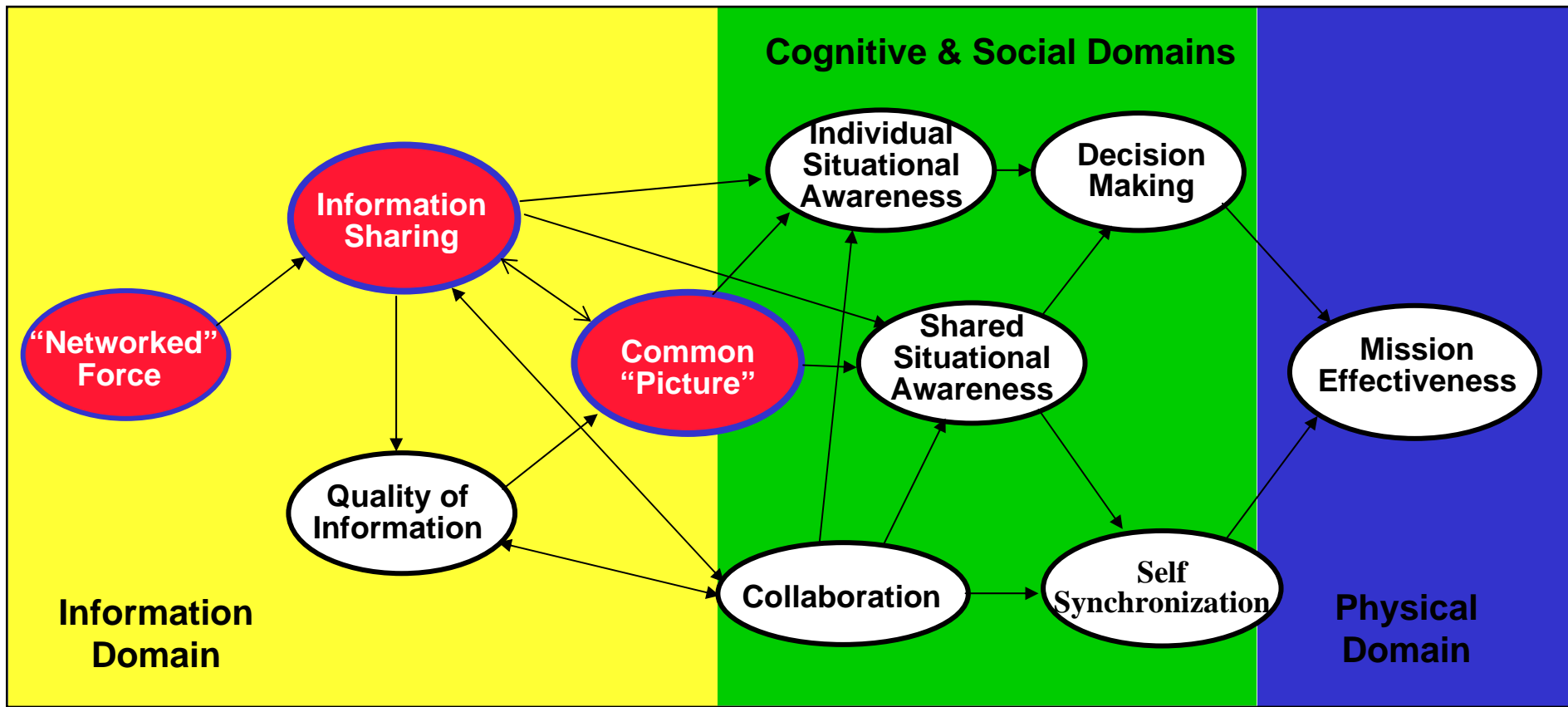
Key Communications Enablers of the "Networked Force"

- Military Satellite Communications
  - Voice
  - Data

- Commercial Satellite Communications
  - Voice
  - Data

- Line of Sight Communications
  - Data Links
  - Mobile Subscriber Equipment (MSE)

- Fiber Optics Cable

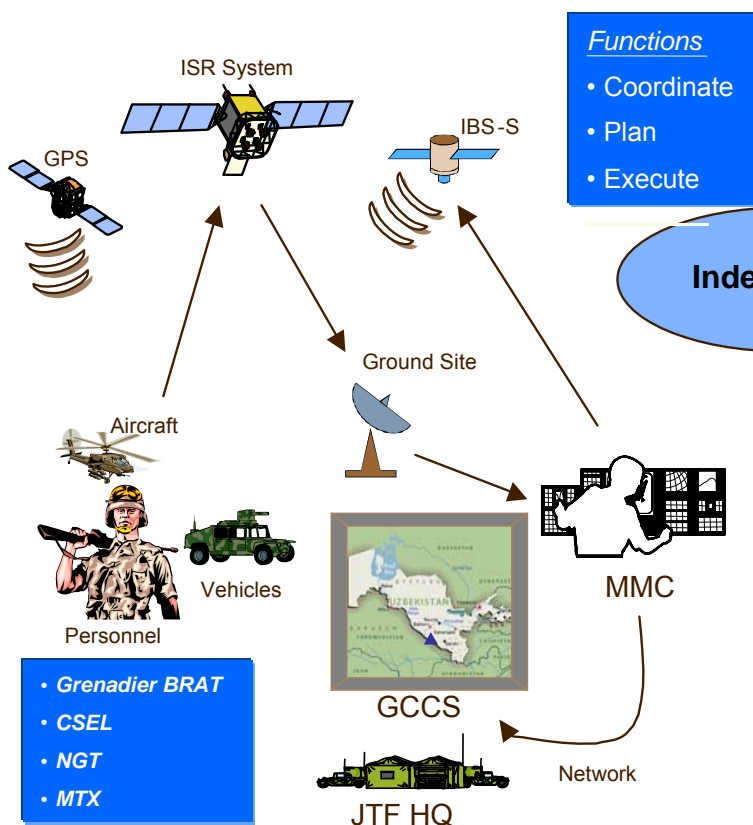# Blue Force Tracking Capabilities Employed During OIF
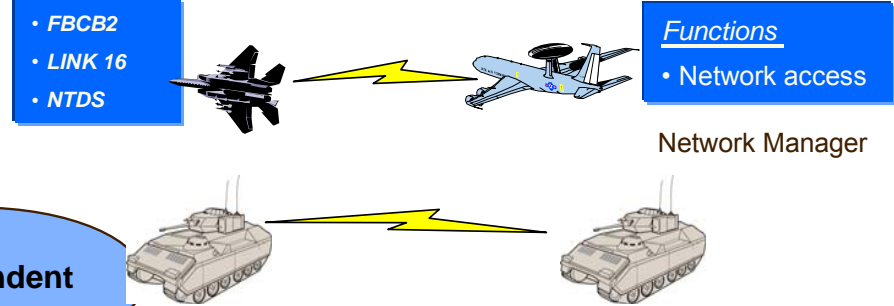
Three Independent Management Models

- ISR Systems (Piggyback) — Collection Requirements Management Based
- Comm Systems Based — Bandwidth Allocation Based
- LOS Network Systems — Network Access and Management

ISR Based Model (National)

ISR System

GPS

IBS-S

Functions
- Coordinate
- Plan
- Execute

Aircraft

Personnel

Vehicles

Ground Site

GCCS

MMC

- *Grenadier BRAT*
- *CSEL*
- *NGT*
- *MTX*

JTF HQ

Network

Independent

LOS Network Systems Model (Service)

- *FBCB2*
- *LINK 16*
- *NTDS*

Functions
- Network access

Network Manager

Communication Systems Mode (Theater)

FBCB2/BFT
- *OmniTRACS*
- *MTS*
- *LEOPARD*

Functions
- Bandwidth and frequency allocation

C2 System Manager

Personnel

Logistics

Maneuver

JTF HQ
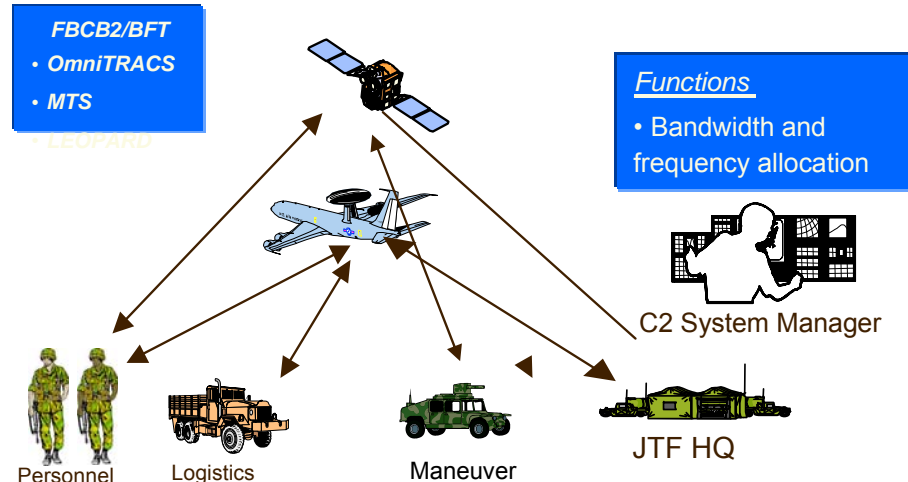
Seven Different BFT Capabilities Deployed – Limited Interoperability

Networking the Force:
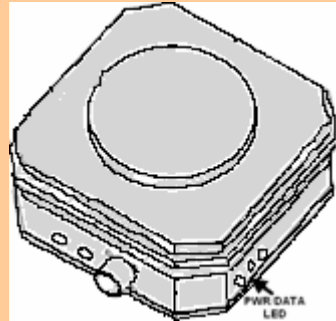# Blue Force Tracking Architecture for Ground Maneuver Forces
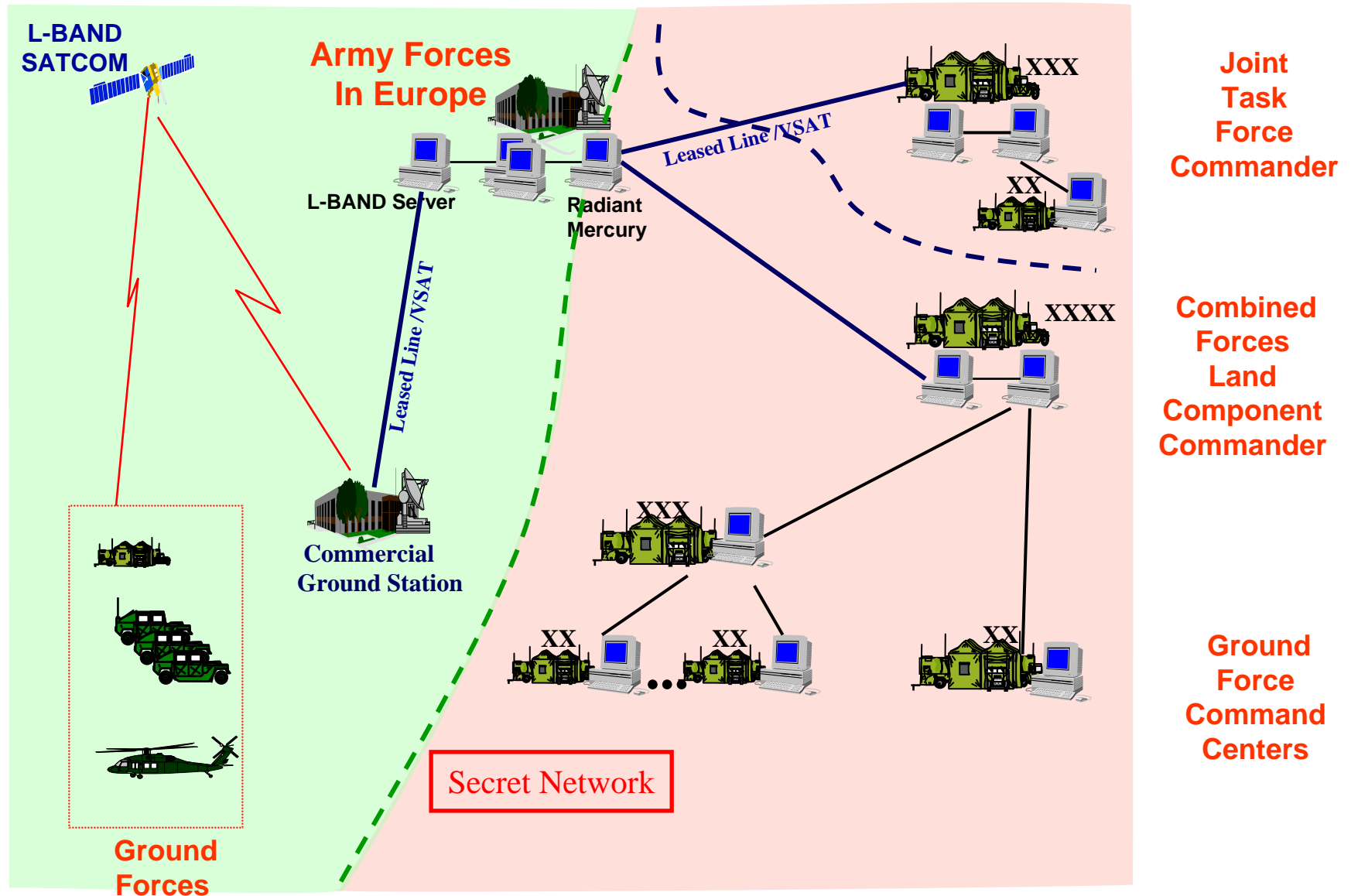
Networking the Force:
Installation of Blue Force Tracking Capability on Ground Forces
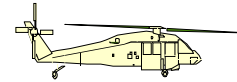
L-BAND Satellite Transceiver

Global Positioning System

Command & Control Capability (FBCB2)

Installed on

Helicopters

Tanks

Fighting Vehicles

Jeeps ("Hummers")
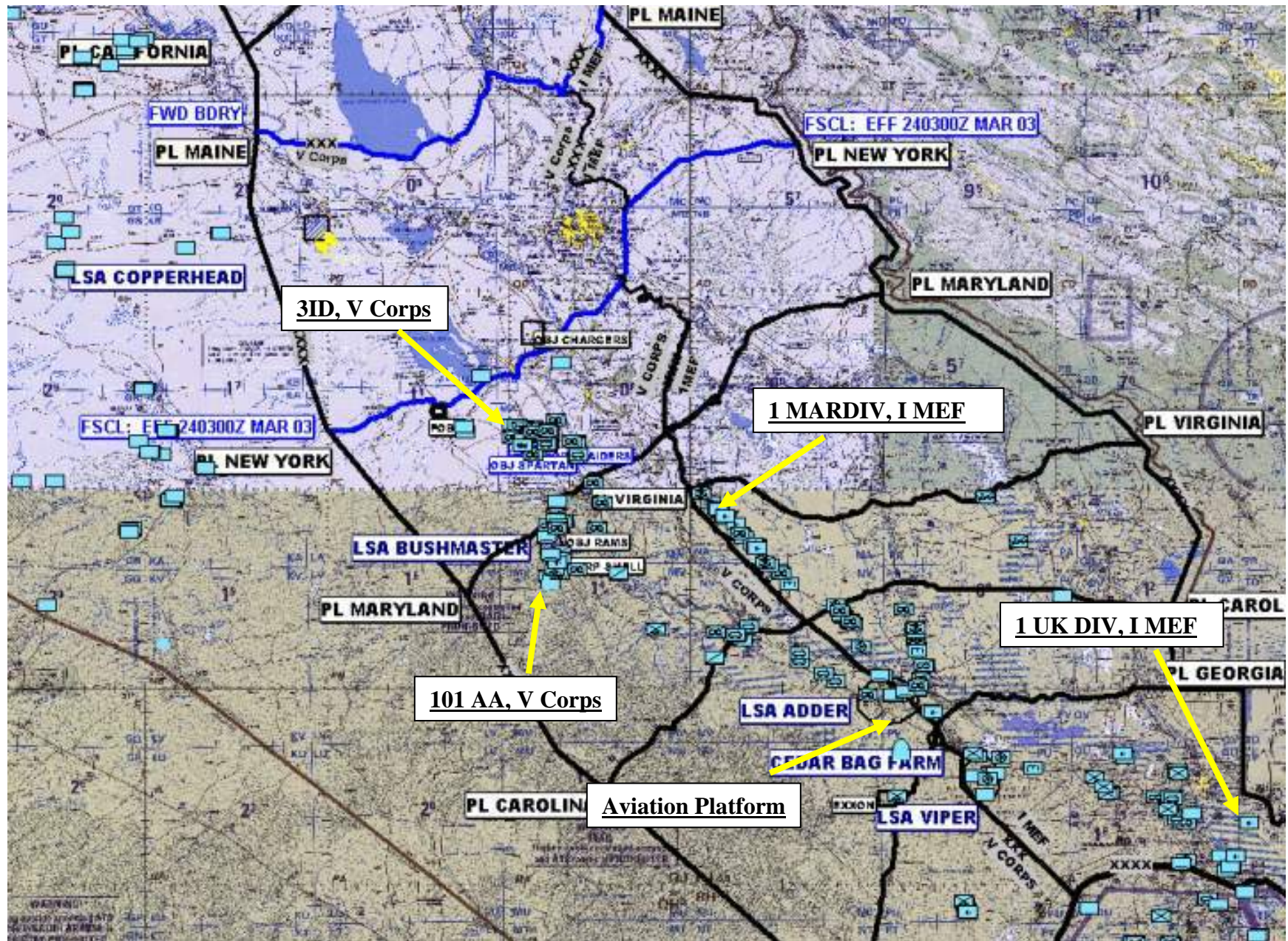
FBCB2 = Force XXI Battle Command, Brigade and Below

Networking the Force:
Installation of Blue Force Tracking Capability on US Ground Forces
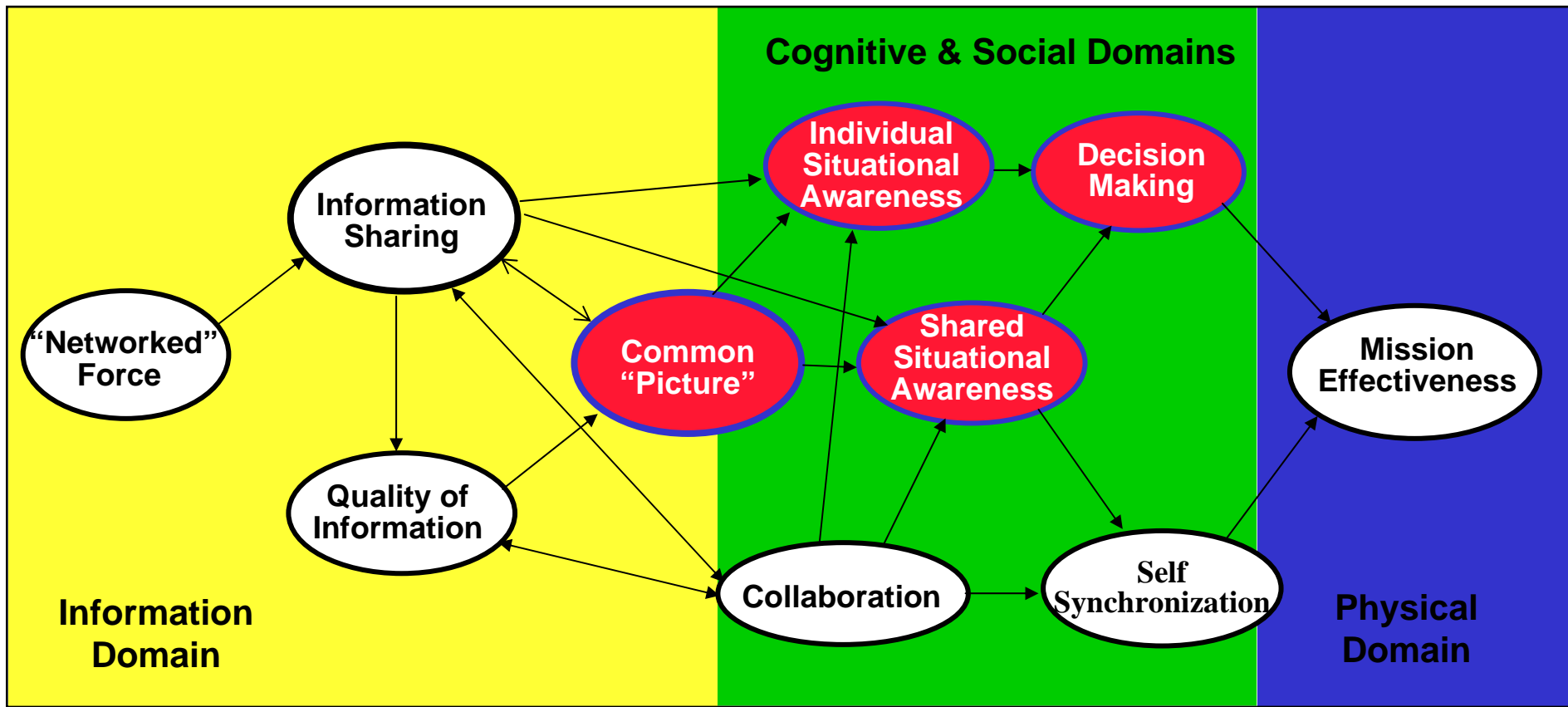
M2A2 Fighting Vehicle

M1A1 Tank

HMMWV

Common Operational Picture (Blue Forces)
OIF - 25 March 2003 (D+6)

Ground Maneuver during Operation Iraqi Freedom: Key NCW Relationships

Impact of Increased Situational Awareness on Command and Control at the Division Level

Major General Blount, Commander, 3rd Infantry Division

Impact of Increased Situational Awareness on Command and Control at the Division Level
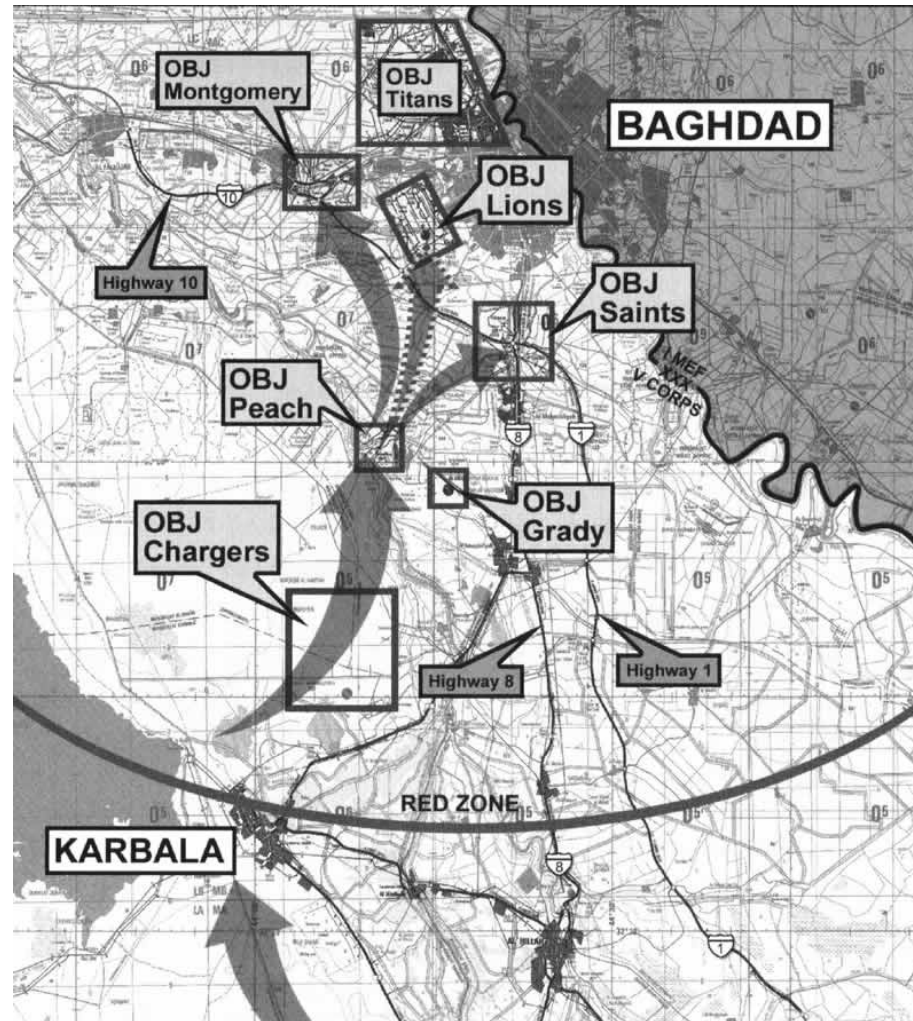
"During actual combat operations, the FM backbone was our C2 platform. FBCB2 provided critical real-time situational awareness"

"Increased situational awareness and the lethality of our systems gave me the confidence to take additional risk…"

Major General Blount, Commander, 3rd Infantry Division

V Corps Maneuver Objectives: Karbala to Baghdad

Attack on Karbala:
V Corps Intel Situation

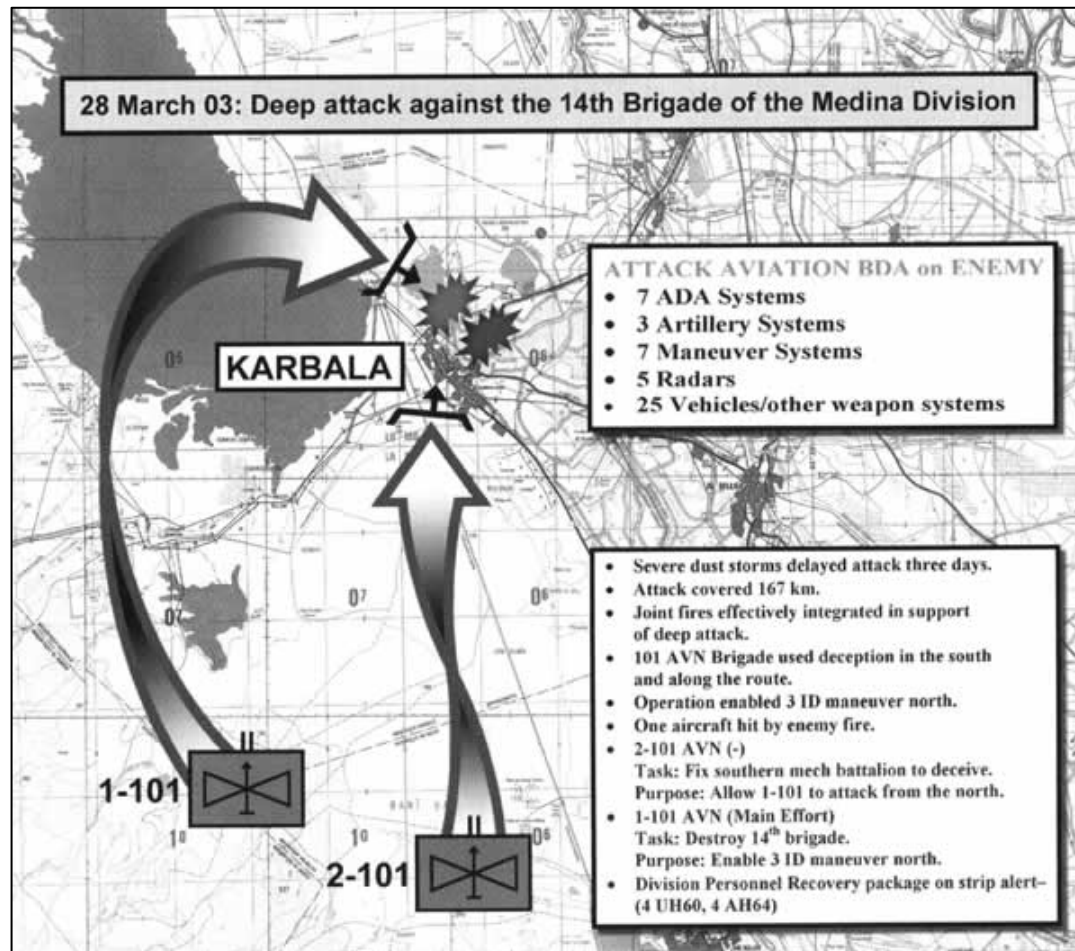*"At the other echelon, two battalions were shown as un-located and one battalion was in the vicinity of its garrison location. One echelon assessed a maneuver defense from Karbala with one battalion in the gap, while another had the enemy defending from its garrison and controlling bridges, and a third echelon had the enemy defending bridges from the eastern side."*

Major John Altman, Brigade Intel Officer, 1st BCT, 3rd ID

Deep Attack Against Iraqi Forces at Karbala
28 March 2003 (D+9)

28 March 03: Deep attack against the 14th Brigade of the Medina Division

KARBALA

ATTACK AVIATION BDA on ENEMY
- 7 ADA Systems
- 3 Artillery Systems
- 7 Maneuver Systems
- 5 Radars
- 25 Vehicles/other weapon systems

- Severe dust storms delayed attack three days.
- Attack covered 167 km.
- Joint fires effectively integrated in support of deep attack.
- 101 AVN Brigade used deception in the south and along the route.
- Operation enabled 3 ID maneuver north.
- One aircraft hit by enemy fire.
- 2-101 AVN (-)
  Task: Fix southern mech battalion to deceive.
  Purpose: Allow 1-101 to attack from the north.
- 1-101 AVN (Main Effort)
  Task: Destroy 14th brigade.
  Purpose: Enable 3 ID maneuver north.
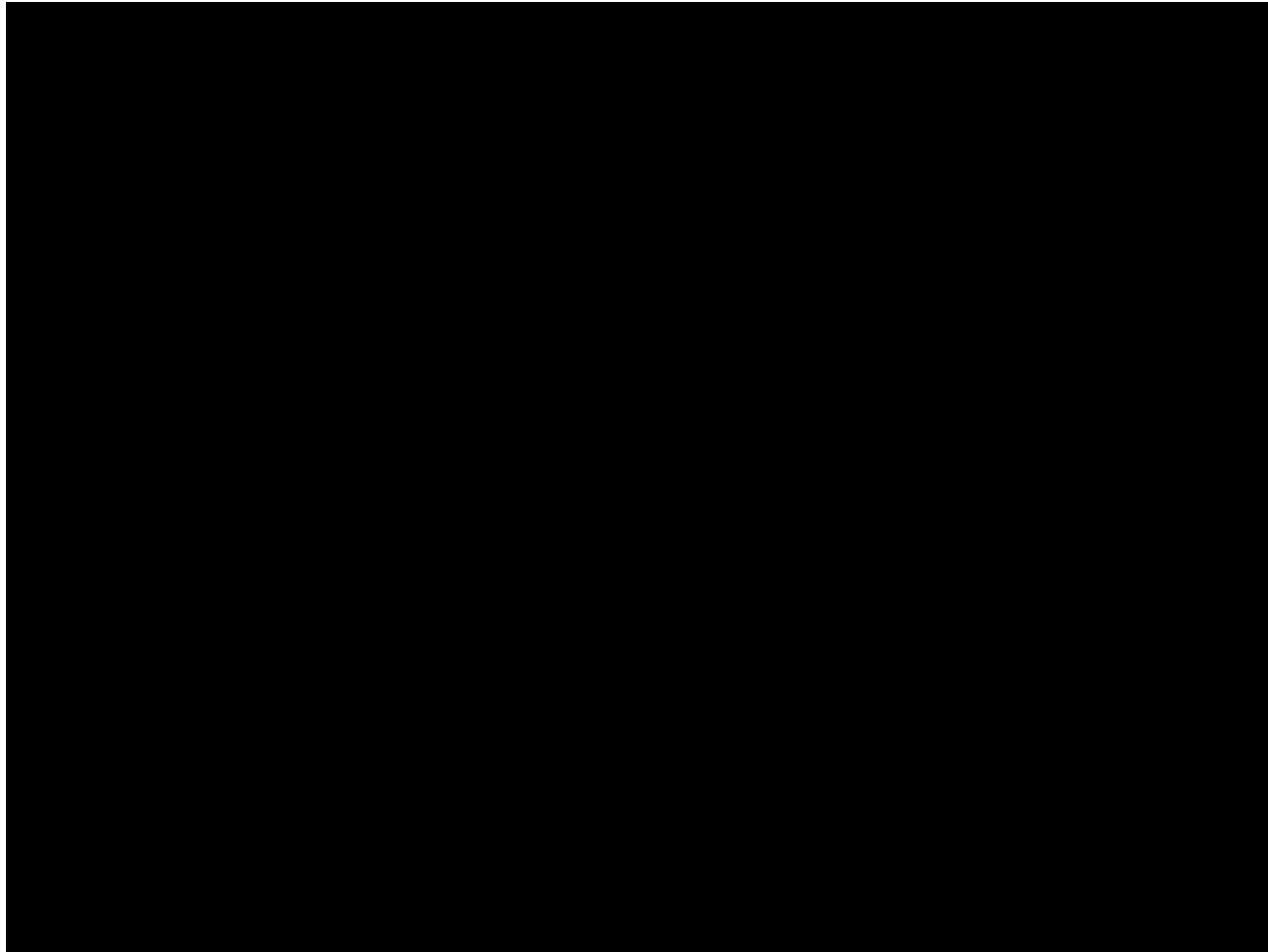- Division Personnel Recovery package on strip alert–
  (4 UH60, 4 AH64)

1-101

2-101

101st Airborne – Deep Attack Against 14th Brigade of Medina Division

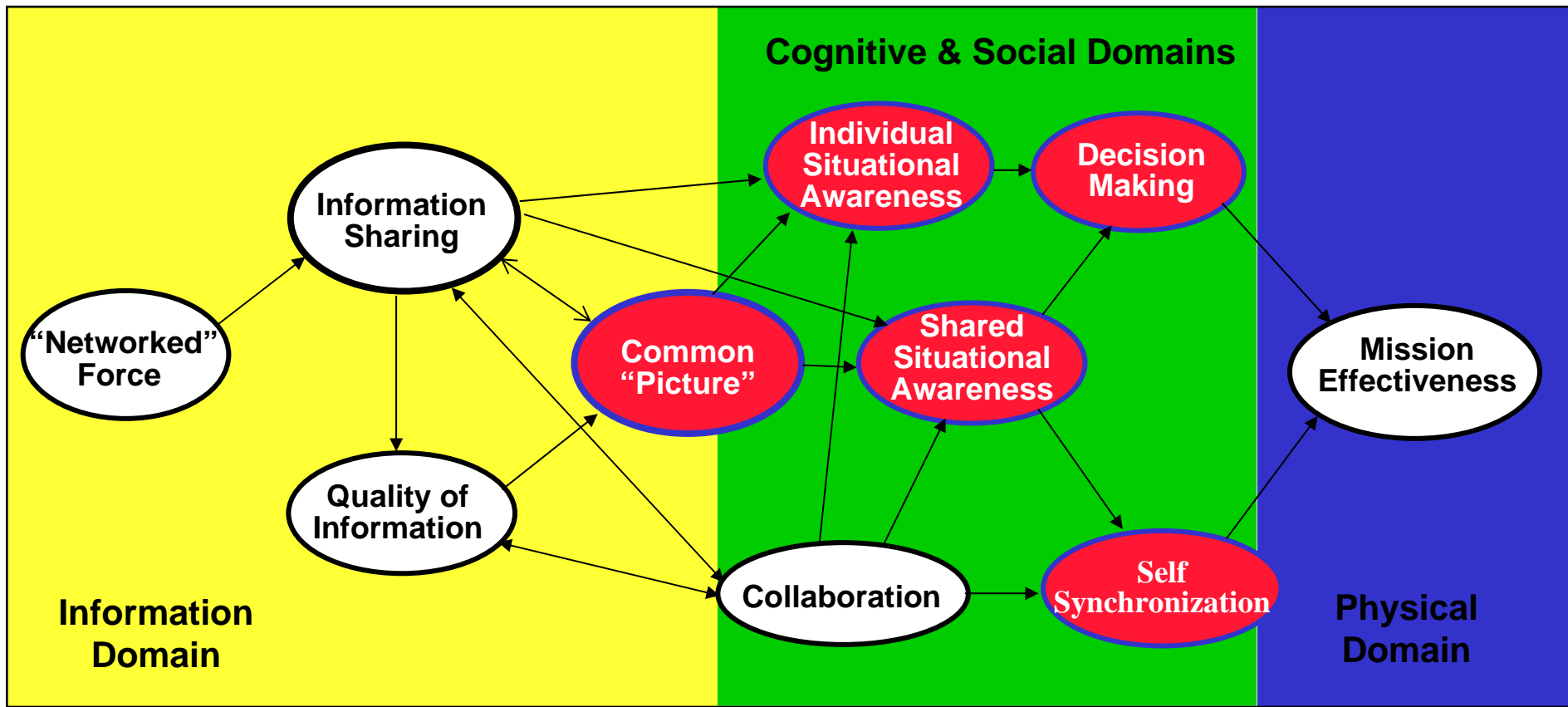# Deep Attack Against Iraqi Forces at Karbala
28 March 2003 (D+9)

FBCB2/BFT Common Operational Picture enables integration of Joint Fires During Deep Attack at Karbala

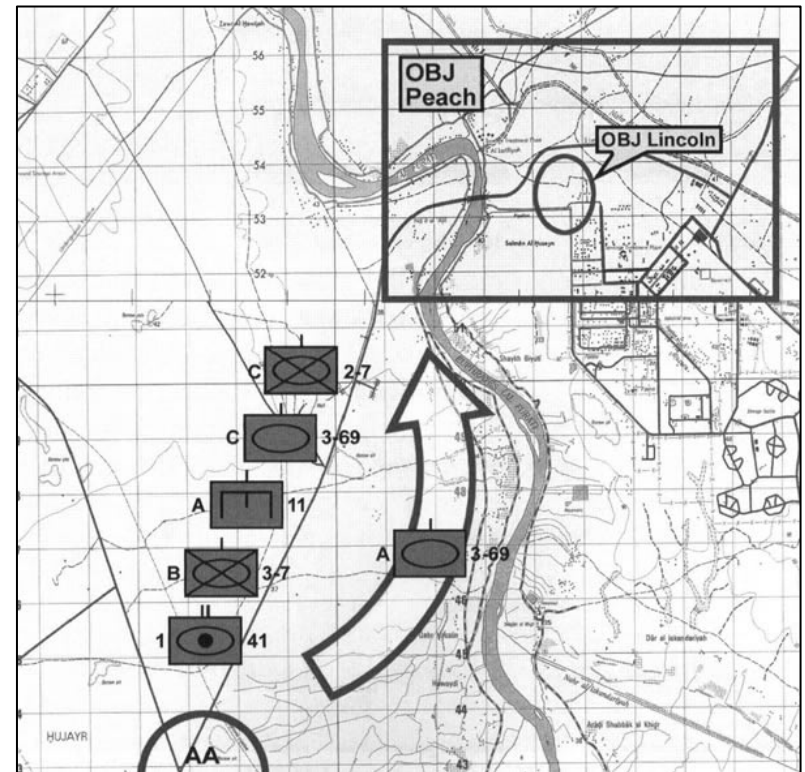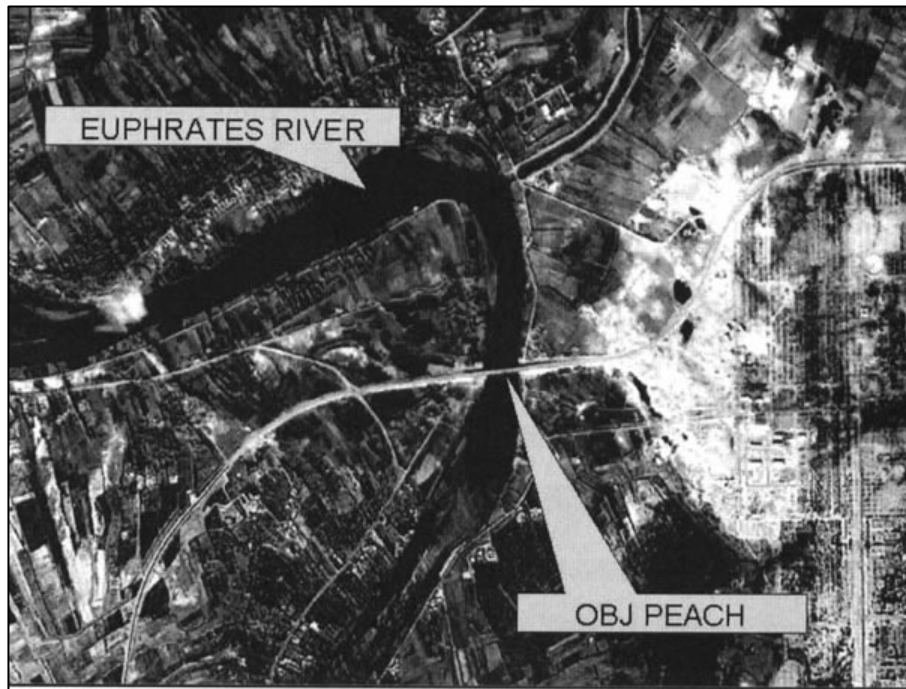# Ground Maneuver during Operation Iraqi Freedom: Key NCW Relationships

Seizing Objective PEACH:
Bridge across the Euphrates River

Seizing Objective PEACH:
Movement to Objective

"This would not have been the … course of action that anyone would have selected. Everyone was under contact – 1-61 AR destroyed several motorized rifle companies going through Karballa; 1-15 got into contact at 2100 when it turned into a swamp; and 4-64 turned west and got into a firefight … what I think helped was that we had FBCB2 and BFT; I could track where the brigade was on all the 'snail trails.' I could conduct time-distance calculations to determine how long it would take for units to cover their respective routes."

Col Perkins, Commander, 2nd BCT, 3rd ID

Self-Synchronization:
Seizing Objective PEACH

2 April 2003   (D + 14)

LTC Marcone – Commander 3/69 Armor – 1st BCT, 3rd ID

Seizing Objective PEACH:
3/69 Armor Intel Situation

*"**Next to the fall of Baghdad, that bridge was the most important piece of terrain in the theater, and no one can tell me what's defending it. Not how many troops, what units, what tanks, anything. There is zero information getting to me. Someone may have known above me, but the information did not get to me on the ground.**"*

LTC Marcone – Commander 3/69 Armor – 1st BCT, 3rd ID

Iraqi Counter Attack at Objective Peach

- ## 3 Iraqi Brigades
  - 5,000-10,000 Iraqi soldiers
  - 25 – 30 Tanks
  - 70 – 80 Armored Personnel Carriers

    vs.

- ## 1 US Battalion: 3/69 Armor – 1st BCT
  - 1000 Soldiers
  - 30 Tanks
  - 14 Bradley Fighting Vehicles
  - Close air support
  - Indirect fires

Shared Situational Awareness

"The bottom line is that FBCB2/BFT presented me with accurate information/knowledge as a Task Force Commander, and as a result I felt as though I was making better tactical decisions"

- LTC, Commander, 2/504 Parachute Infantry Regiment

*"FBCB2 cleared the whole command net so we could focus on maneuver".*

- CPT Tim Terese, 3rd ID Main

"The single most successful C2 system fielded for OIF was the FBCB2-BFT system…BFT gave commanders situational understanding that was unprecedented in any other conflict in history"

- 3rd ID Operation Iraqi Freedom AAR

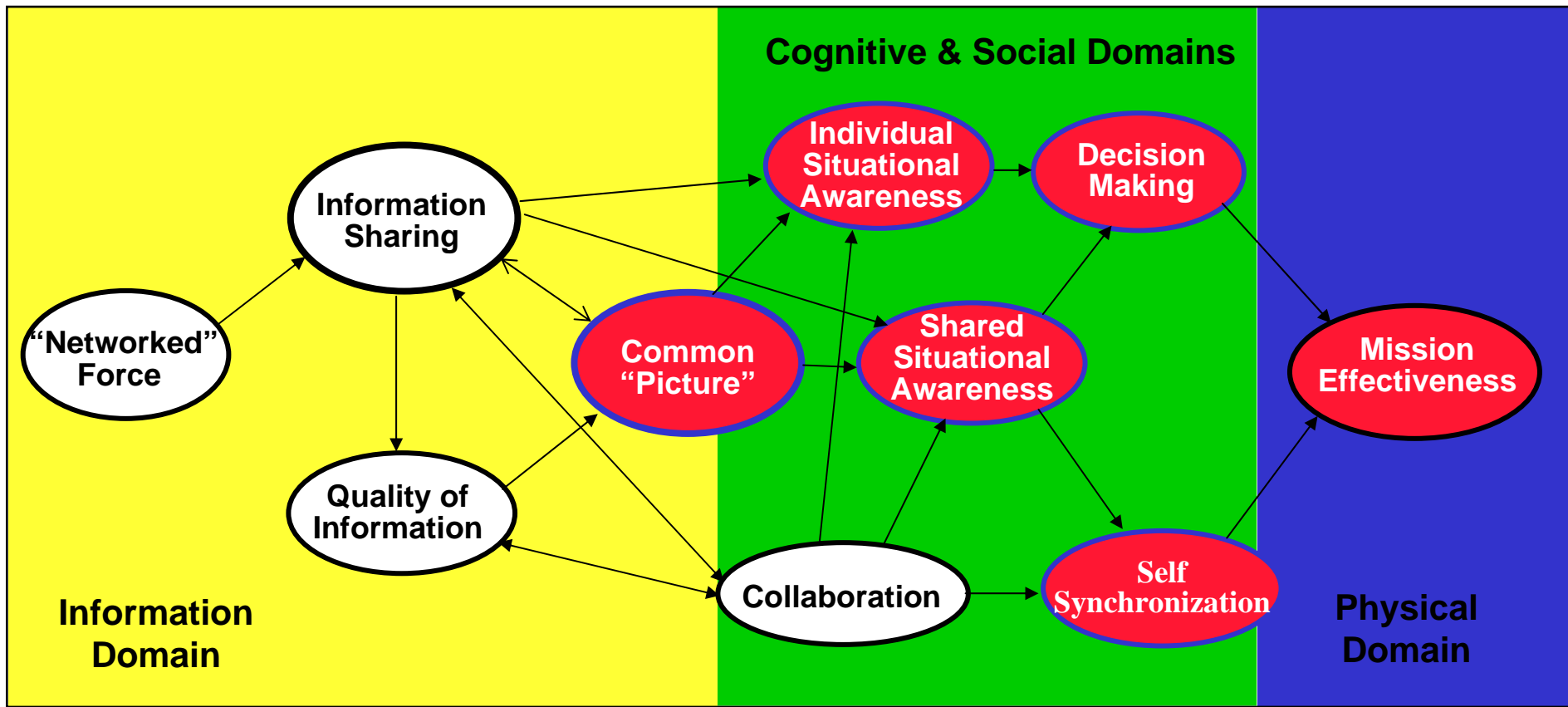# Shared Situational Awareness:
Seizure of Objective SAINTS
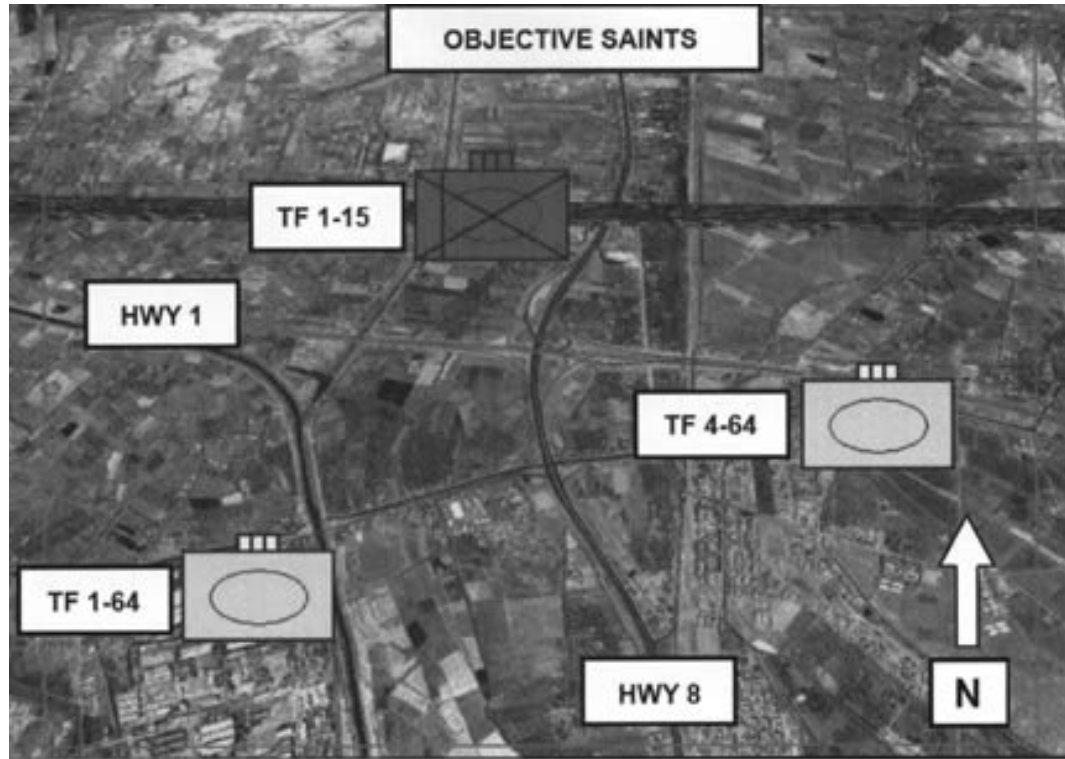
"When my TF seized a key highway intersection south of Baghdad, I could see the company commander icons at each blocking position and I knew we had control of the objective."

LTC John Charlton
Commander TF 1-15 IN , 3rd ID

Ground Maneuver during Operation Iraqi Freedom: Key NCW Relationships

Increased Mission Effectiveness: Reduced Fratricide

"I'm the lead company of the lead TF of the lead Brigade…There was nobody to my front.. I was able to look at my screen and see where friendly units were to my left, right, and to my rear. I was able to pass that information immediately down to my platoons so fratricide was basically eliminated"

- CPT Stewart James, Commander, A-2/69 AR, 3rd BCT, 3ID

"The whole squadron was in column on a highway. FBCB2/BFT displayed the locations of all blue forces. I knew the location of observed red, and was able to call for fire based on FBCB2/BFT knowledge"

- CPT, Commander, A Troop 3/7 Cavalry Regiment, 3rd Infantry Division

"Our counter battery radar picked up rounds through the Marine sector.   Prior firing counter battery, the Fire Officer checked the BFT screen and ascertained that a 3ID unit (Army) had crossed over into the Marine sector and was firing at the enemy. Had it not been for BFT (FBCB2), we probably would have fired upon a friendly 3ID unit"

- LTC, USMC Division Forward Senior Watchkeeper

# Increased Mission Effectiveness: Achieving Surprise

2nd Royal Tank Regiment – 1st (UK) Armd Div, used a combination of the satellite imagery and the positioning capability of FBCB2/BFT to identify targets for urban raids. During operations in Az Zubayr and Basrah, information was provided on likely insurgent operating bases. These were, generally, houses in urban neighborhoods. Using FBCB2/BFT these locations could be pinpointed and could be reached rapidly using FBCB2/BFT for navigation. This enabled 2nd Royal Tank Regiment to achieve surprise and also minimized the impact of collateral damage through misinterpreting information.

Source: NCO Case Study on US/UK Coalition Operations during Operation Iraqi Freedom

Increased Mission Effectiveness: Increased Tempo

AL BASRAH, IRAQ

Source: NCO Case Study on US/UK Coalition Operations during Operation Iraqi Freedom

- Coy Comd in *1st Battalion Royal Regiment of Fusiliers - 1st (UK) Armored Division* battle group exploits NCW capabilities ability to de-conflict his sub-unit's movements to get to line of departure for a company group attack
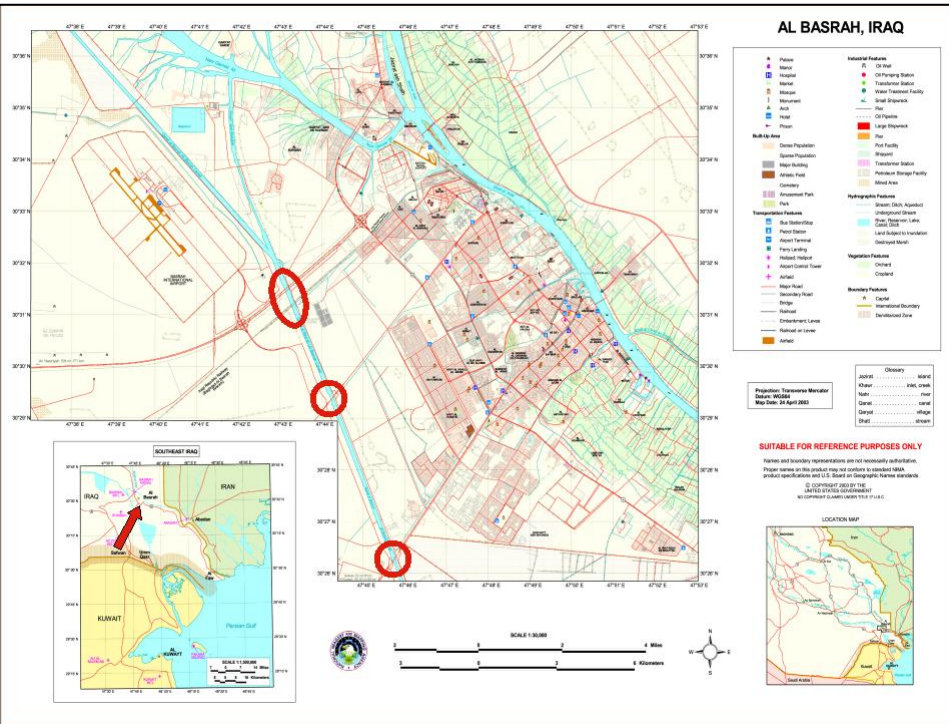
  - **D+2 - situation was extremely complicated following the advance into SE Iraq, there was significant Coalition activity and movement**
  - **1 RRF BG were to advance north-east to seize 4 crossings on the Al Basrah Canal**
  - **Company group had to manoeuvre across a significant main supply route (MSR) that was being trafficked by vehicles supporting the US advance north-west**
  - **Using FBCB2/BFT the Coy Comd analysed the traffic movement and timed the crossing of the MSR to avoid US movement**
  - **The affect was that he was able to generate tempo and conduct his attack 12 hours prior to other sub-unit groups who were delayed due the MSR vehicle movement**

Getting the Theory Right:
Command and Control of a Networked Force

What's Different?

- **"Common" Operational Picture**
  - **Reduced "Fog" of War**
- **Shared Situational Awareness (SA)**
  - **Significantly increased SA for :**
    - Commander
    - Subordinate Commanders
    - Individual Warfighters
  - **Decreased "cognitive loading" in developing SA**
- **Command Intent**
  - **Increased shared situational understanding**
  - **Enhanced by capabilities for real-time collaboration**
- **Enhanced Decision Making**
  - **Speed + Better Decisions**
- **Increased Tactical Agility**
- **Reduced Risk**

Network Centric Warfare:
Key Relationships
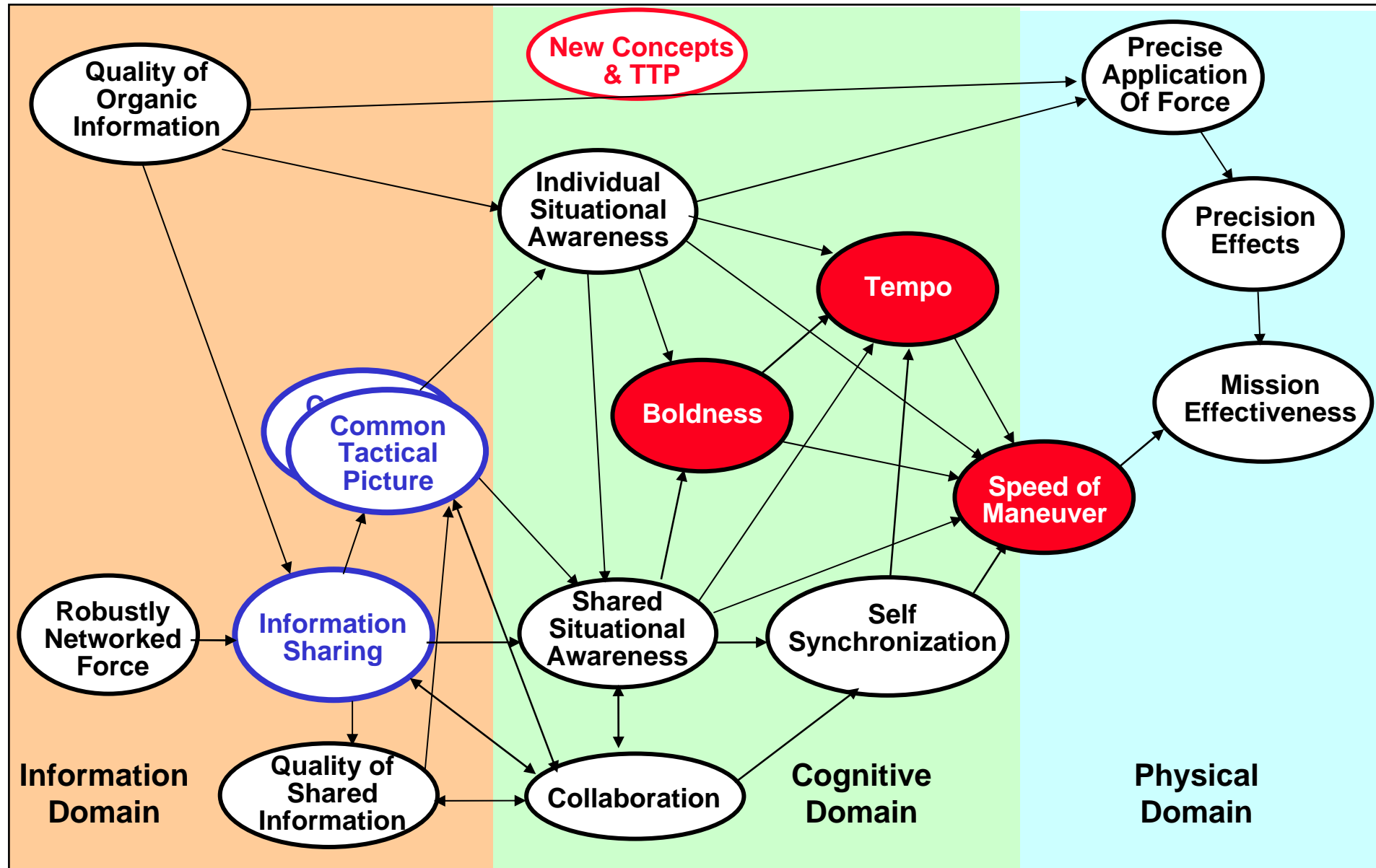
Transformation:
The Key Elements

Today   *Future*
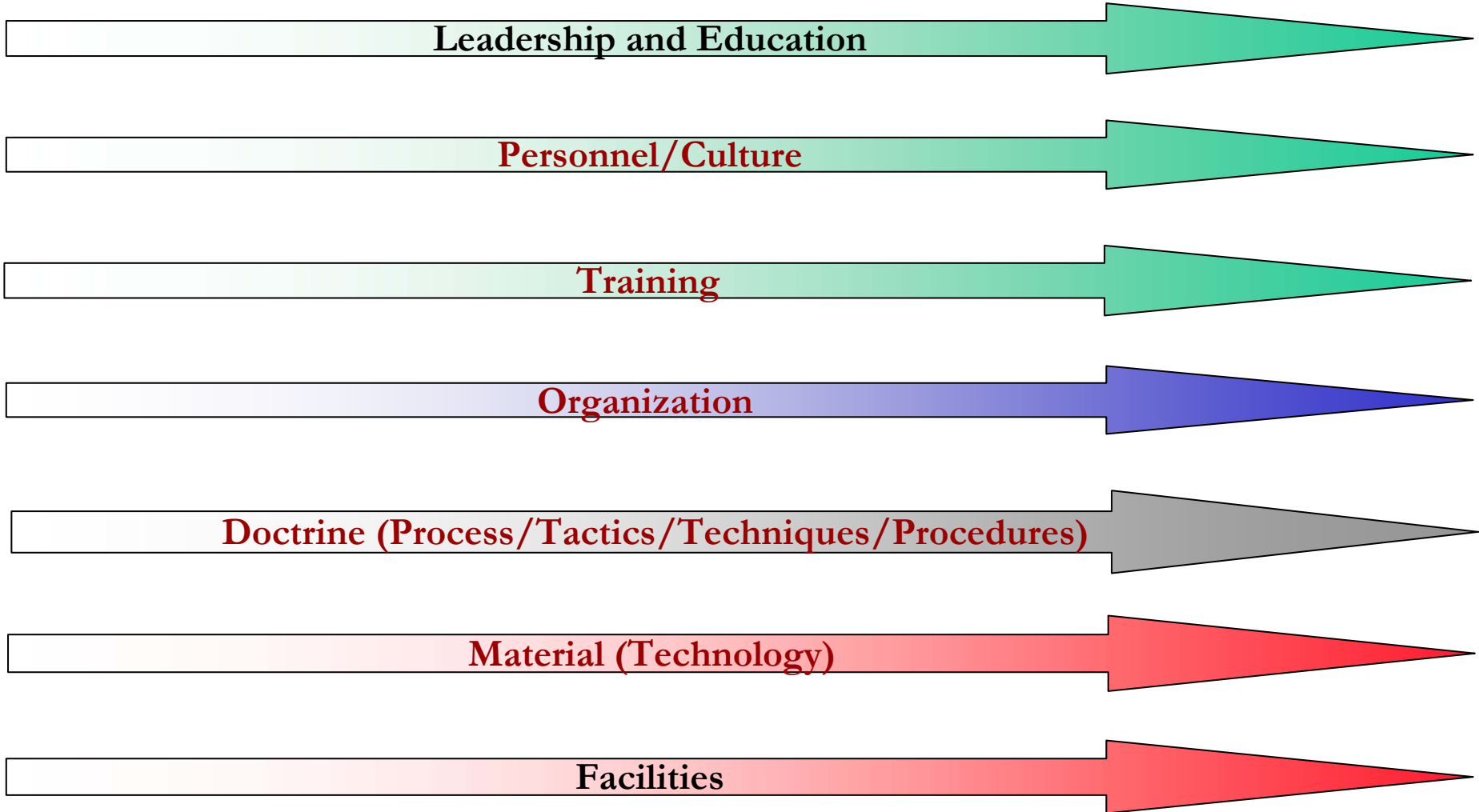
Leadership and Education

Personnel/Culture

Training

Organization

Doctrine (Process/Tactics/Techniques/Procedures)

Material (Technology)

Facilities

NCO Transformation: OIF Ground Forces

2002　　　　　　　　　　　　　　　　　　　　　　　　　*2003*

Leadership and Education

CFLCC and V Corps Commanders have previous experience with networked forces

Personnel/Culture

Clear willingness to use new technology under fire

Training

Very limited training with FBCB2/BFT

Organization

Doctrine (Process/Tactics/Techniques/Procedures)

Networked Forces Fought Differently

Material (Technology)

ABCS + FBCB2 (Company Level Deployment) + SATCOM + C2 Vehicles

Facilities

In Theater Facilities for installing FBCB2/BFT

OFT Perspective on NCO Case Studies

- NCO Case Studies provide quantitative and qualitative insights with respect to value of networking to military operations

- In-depth analysis of the NCO case studies has the potential to provide insight into strategies for integrating existing and emerging networking and IT capabilities over time to:
  - Maximize warfighting capability in near, mid, and far term
  - Accelerate development of tactics, techniques, and procedures for NCO that leverage improved information sharing
  - Accelerate organizational learning with respect to NCO
  - Develop increased advocacy in operational forces for continued investment in networking enablers

Transformation to Network Centric Operations: Insights and Challenges

- Transformation to network centric operations involves all "lines of development"
- Technology
  - Information Technology (IT) is critical enabler
  - Clear benefit to focused IT investments
- Doctrinal (Process) and Organization
  - Changes in these areas are to key achieving mature capabilities for network-centric operations
- Leadership
  - To achieve their full potential, networked forces must be led by leaders who understand how networked forces can operate
  - Education and training are key to developing this understanding
  - Operational experience can accelerate individual and organizational learning

Conclusion

- **Network Centric Operations**
  - **Military response to the Information Age**
    - **Exploits new source of power – information sharing**
  - **Key tenets and concepts increasingly well understood**
  - **Maturing body of evidence exists**
    - **Key NCW capabilities demonstrated during OEF/OIF**
- **Transformation to Network Centric Operations**
  - **Involves all lines of development**

Fighting the Networked Force

John J. Garstka
Office of Force Transformation
1050 Defense Pentagon
Room 3A 287
Washington, DC 20301-1500
USA

john.garstka@osd.mil

This paper was received as a PowerPoint presentation without supporting text.