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Network Centric Operations (NCO) Case Study: Stryker Brigade Combat Team



2004 Command & Control Research & Technology Symposium

June 2004

Outline



- **Background**
 - **Study Objectives**
 - **Study Context & Scenario**
- **Observations**
- **Stryker Bde NCW hypothesis**
- **Stryker Mission Capability Package**
- **Research Results**
- **Summary**

Study Objectives

- **The Stryker Bde - a new force design that utilizes**
 - **An information-centric concept of operations**
 - **First generation NCO capabilities**
 - **Interim mobile networks and satellite communications**
 - **evolving battle command systems**
 - **RSTA**
 - **Vehicle speed and stealth**
- **NCO capabilities are hypothesized to provide significant information and decision superiority and increase force effectiveness**

The objective of this study is to understand whether Stryker Bde NCO capabilities provide the above and are a source of combat power

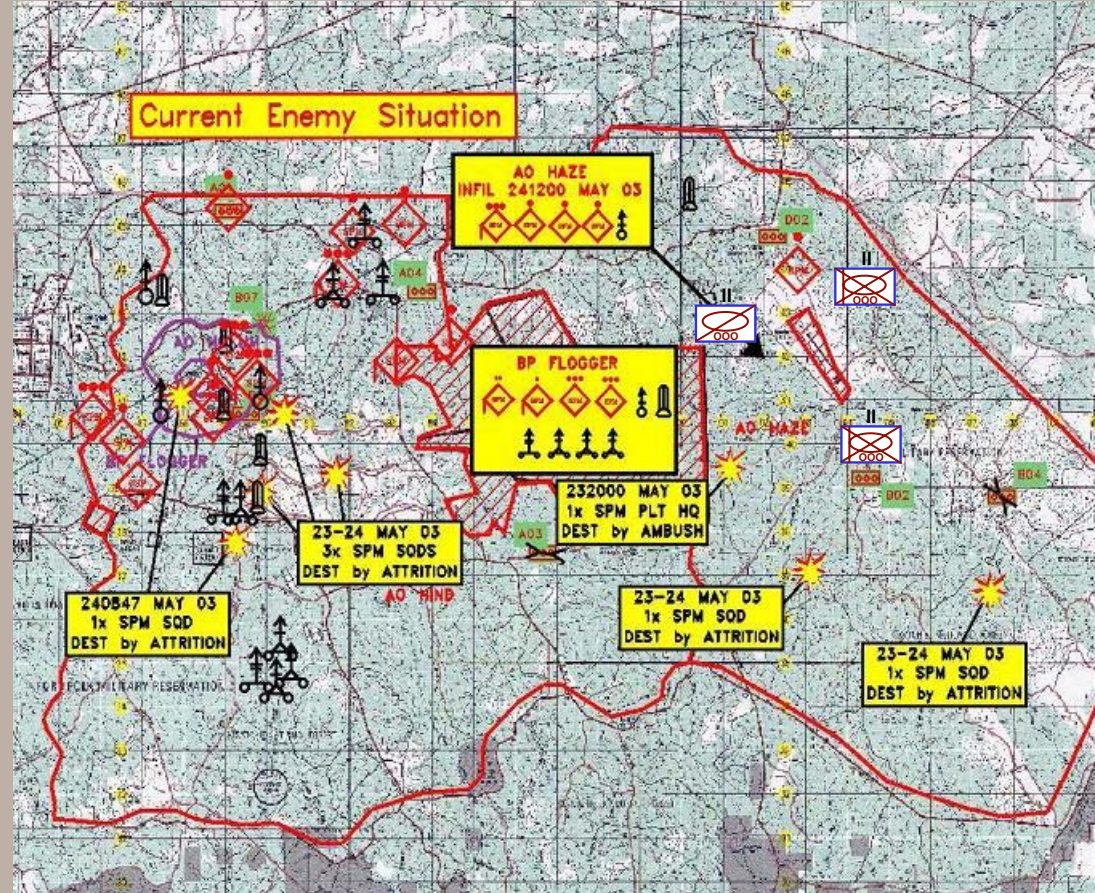
Study Context

- **Operational Environment**
 - **Small Scale Contingency (SSC)**
 - **Early Entry Operations in a rapid response/deployment scenario**
- **Analysis focus: Certification Exercise (CERTEx) for U.S. Army Stryker Bde Combat Team (SBCT)**
 - **Joint Readiness Training Center, May 2003**
 - **Scenario: SBCT Attack on Shughart-Gordon**
- **Baseline for comparison**
 - **Non-digitized light infantry brigade**
- **Measurable results and differences:**
 - **Measures of Mission Effectiveness (MOEs):**
 - **Force Effectiveness, Survivability**
 - **Measures of C2 effectiveness:**
 - **Quality of Situation Awareness, Speed of Command, Quality of Decisions, Force Synchronization**

Scenario - Enemy Situation

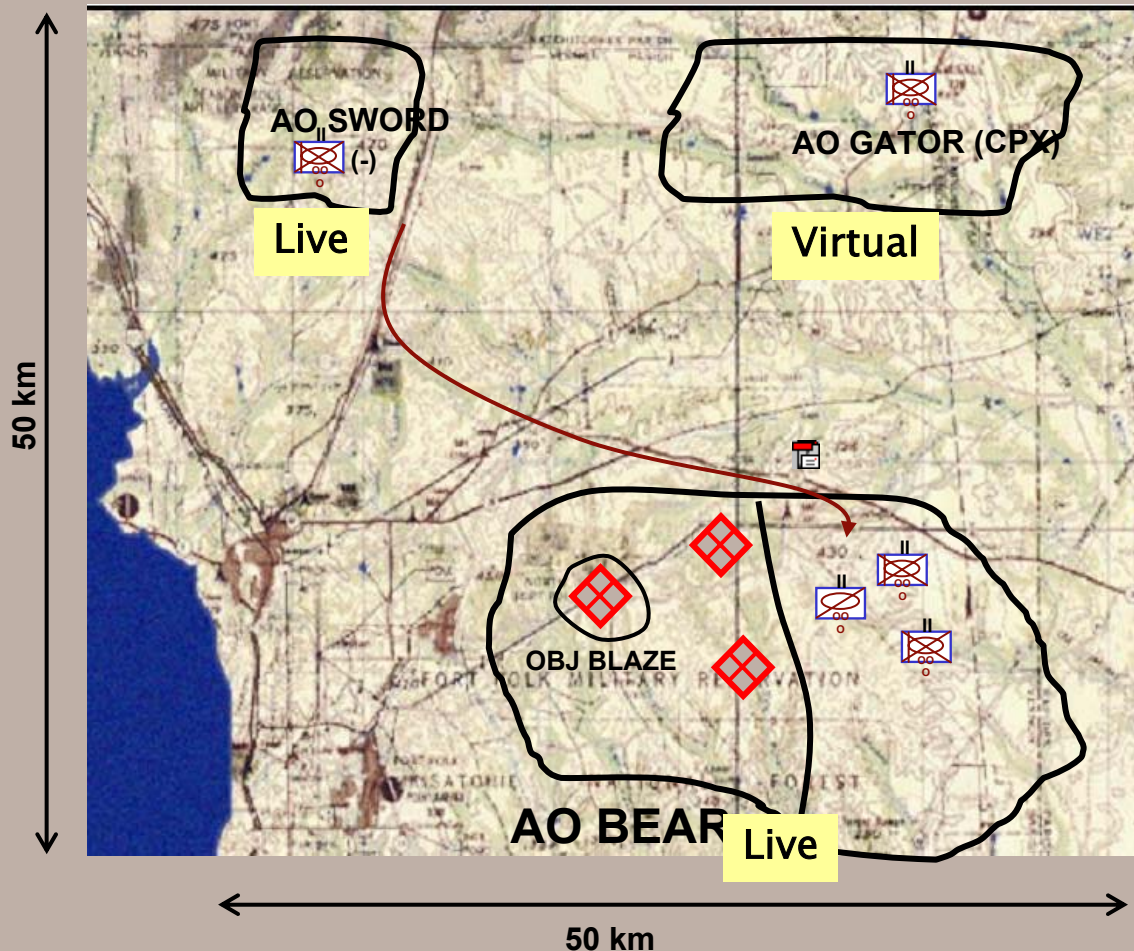
Realistic, Contemporary, Challenging Enemy

- Contemporary Operating Environment (COE)
- Conventional Threats:
- Unconventional Threats:
- Irregular Threats:
- Criminal Organizations harass civilians.
- Civilians on the Battlefield
- International Media Presence



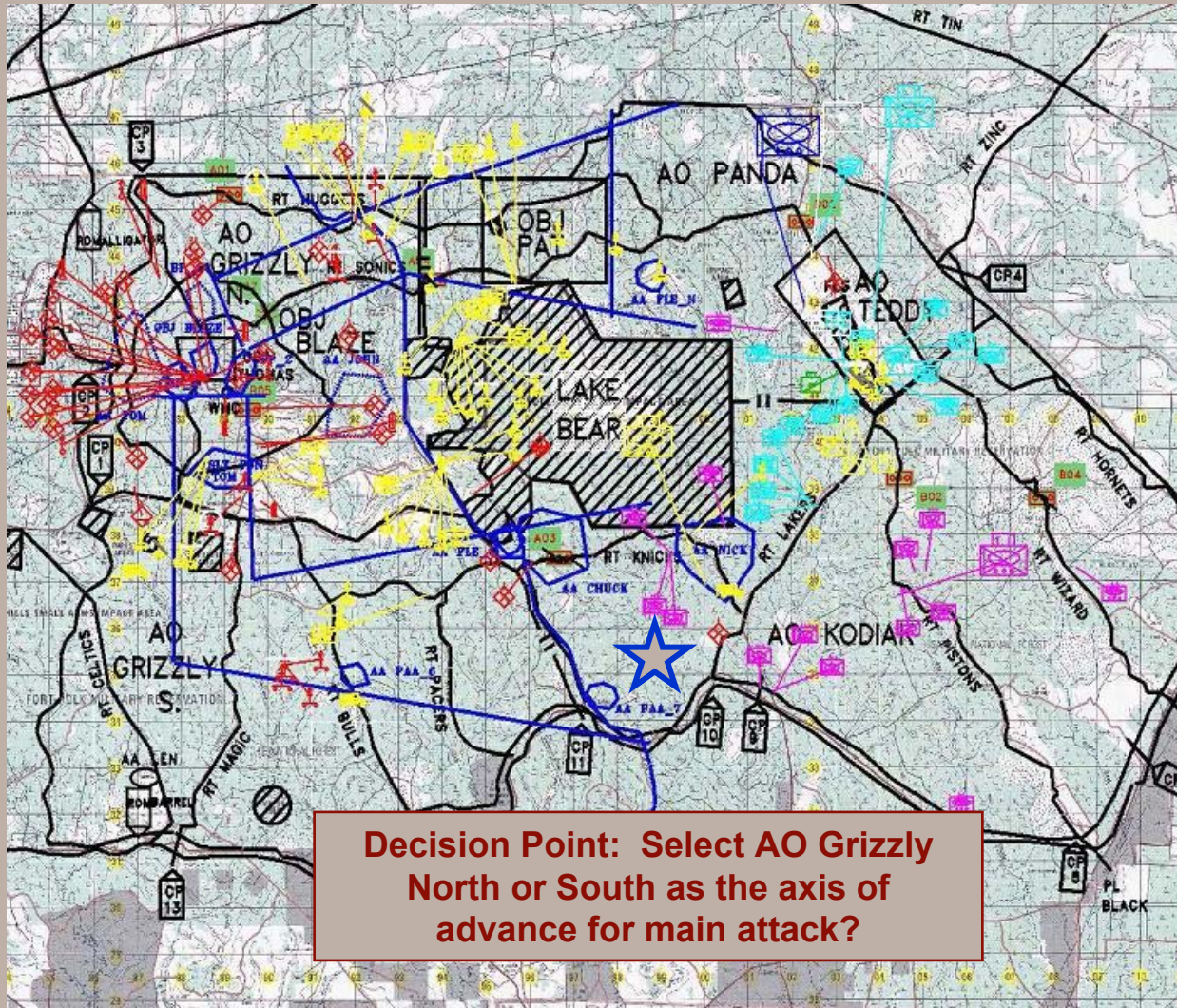
Scenario - Friendly Situation

Small Scale Contingency



- SBCT On-Going Tasks
- **Secure** FOB to deploy follow-on forces
- **Attack** in zone to defeat enemy insurgents.
- **Provide** Force Protection to local civil authorities
- Conduct Stability and Support Operations (**SASO**) to maintain popular support
- **Attack** to seize OBJ Blaze (Shughart-Gordon).
- **Transition** control of SHUGHART-GORDON to civil authorities.
- **Defend** to defeat enemy mechanized attack.

Stryker Brigade Concept of Operations



MCS Screen Shot
Day before the Attack

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Concept of Operations is predicated on NCO capabilities (high quality information and shared awareness)



- CAV SQDN (RSTA)**
- Route Recon
 - Recon OBJ Blaze

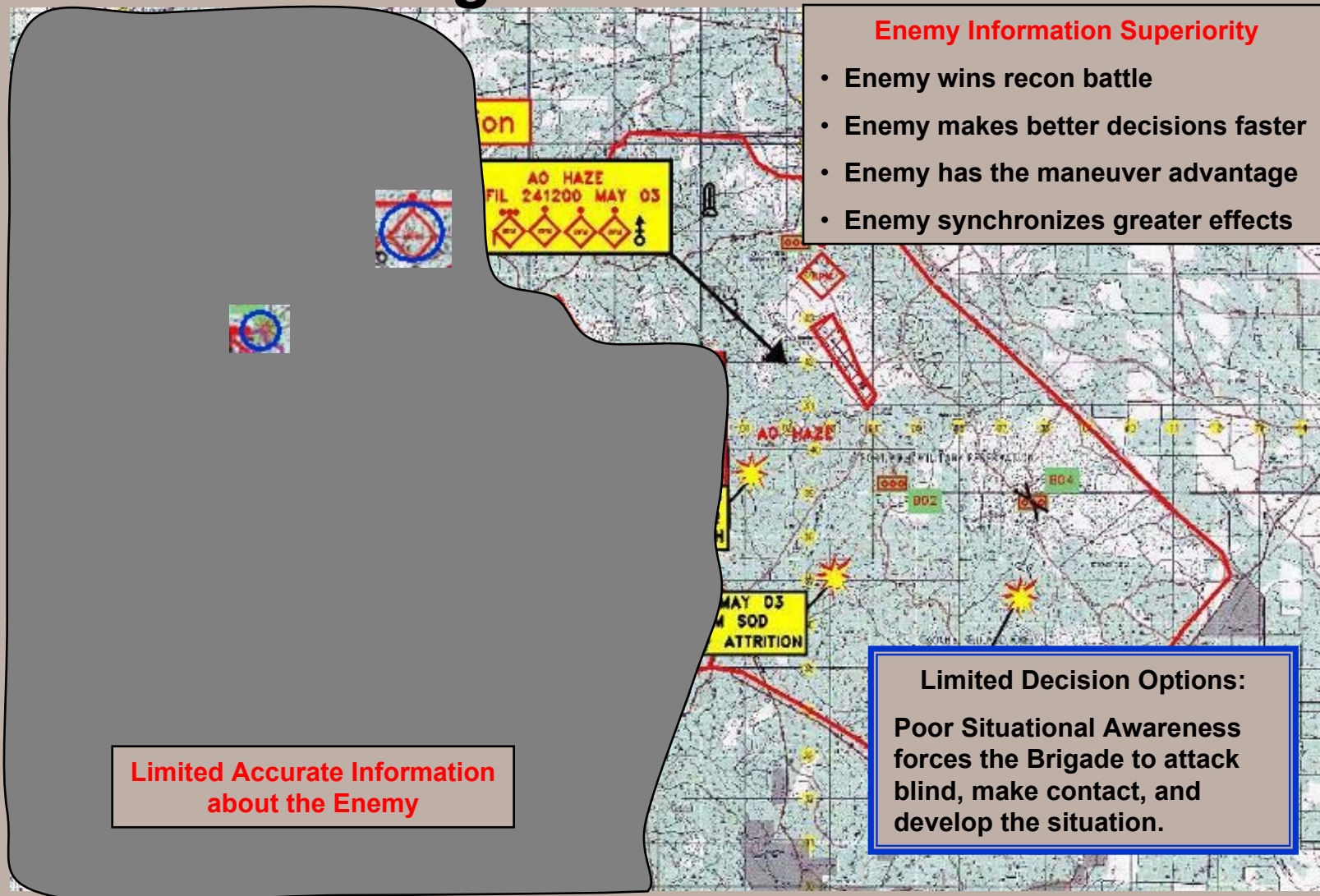


- SUPPORTING EFFORT**
- Attack to clear enemy forces in disruption zone
 - Isolate the OBJ Blaze

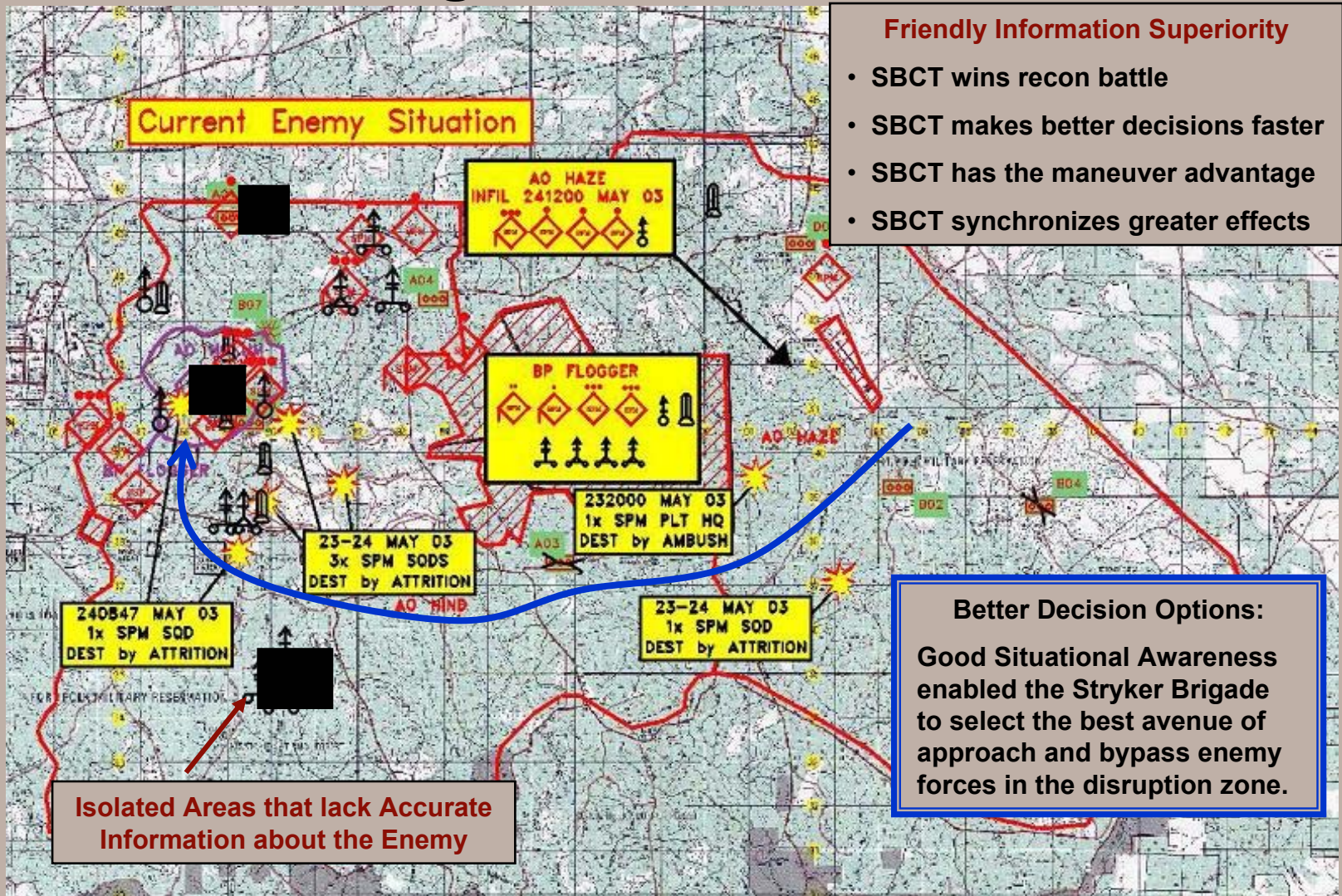


- MAIN EFFORT**
- Follow and Attack to seize OBJ Blaze

When the OPFOR Wins the Fight for Information

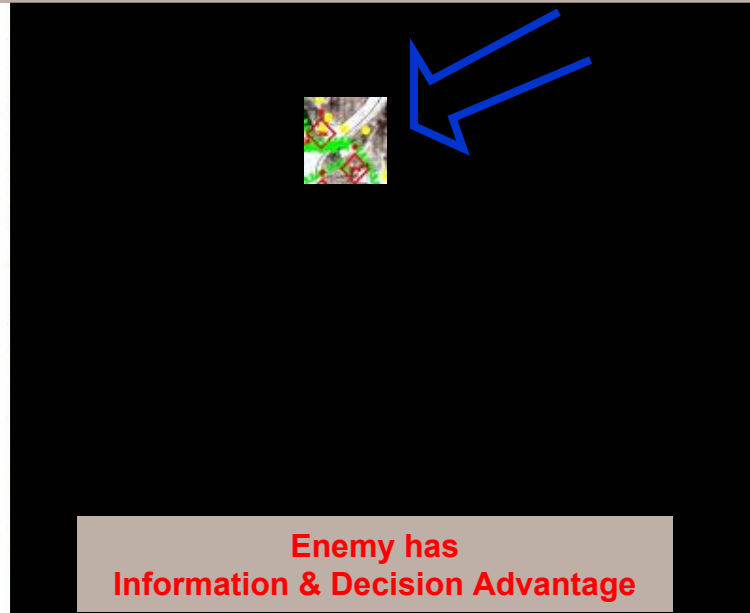


When Friendly Forces Win the Fight for Information



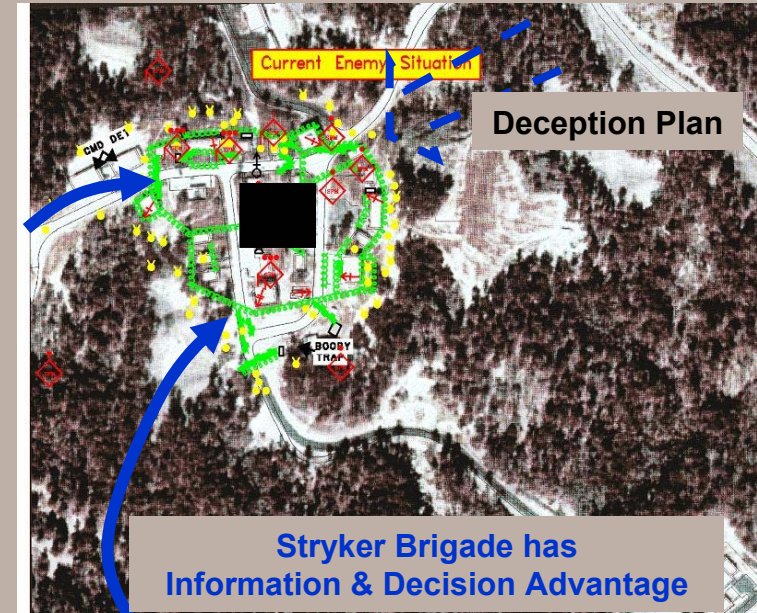
Better Decision Options

Lt Inf Bde



- Selected COA before gaining *some* situational awareness, made contact, developed the situation
- *Rarely* gained shared understanding of enemy defense
- Enemy forces retained the initiative; friendly forces continued to fight the plan
- Enemy forces massed effects of combat power to defeat the Brigade in detail. (Mission Failure)

Stryker Bde



- **See First:** *High quality situational awareness*
- **Understand First:** *Collaborative sense-making and planning – Shared Understanding - determination of enemy weak weakness*
- **Act First:** *Self-Synchronization, Agile forces seized the initiative, achieved surprise, and maintained tempo*
- **Finish Decisively:** *Destroyed enemy forces and cleared every building. (Mission Success)*

INF BN CDR: “We had a great read by RSTA confirmed by UAV. We selected the best avenues to attack the least defended areas.”

Observations

- The Stryker Bde is significantly more agile and capable than its closest predecessor – a non-digitized light infantry brigade
- Several NCW factors contribute to order of magnitude increase in SBCT force effectiveness
 - 75% of SBCT has networked battle command systems
 - High bandwidth beyond line of sight (B-LOS) SATCOM links
 - Increase in individual/shared information quality from about 10% to ~ 80%
 - Acceleration of speed of command from 24 to 3 hrs in key engagement
 - Ability to control speed of command
- Key results from recent SBCT CERTEX at JRTC:
 - Accomplished Mission, Defeated OPFOR, Cleared Every Building
 - **Friendly:Enemy** casualty ratio decreased from **10:1** to **1:1**
- Current results may underestimate future potential
 - Current Stryker network based on legacy LOS comms at the lowest tactical level
 - JTRS and future SATCOM programs will increase networking capabilities significantly

Caveats

- N=1
- Many factors contributed to increased force effectiveness:

NCW Factors


- *Quality of Battle Command Network*
- *Quality of Information (BDE RSTA)*
- *Quality of Interactions & Collaboration*
- *Quality of Shared Awareness & Understanding*

Non-NCW Factors

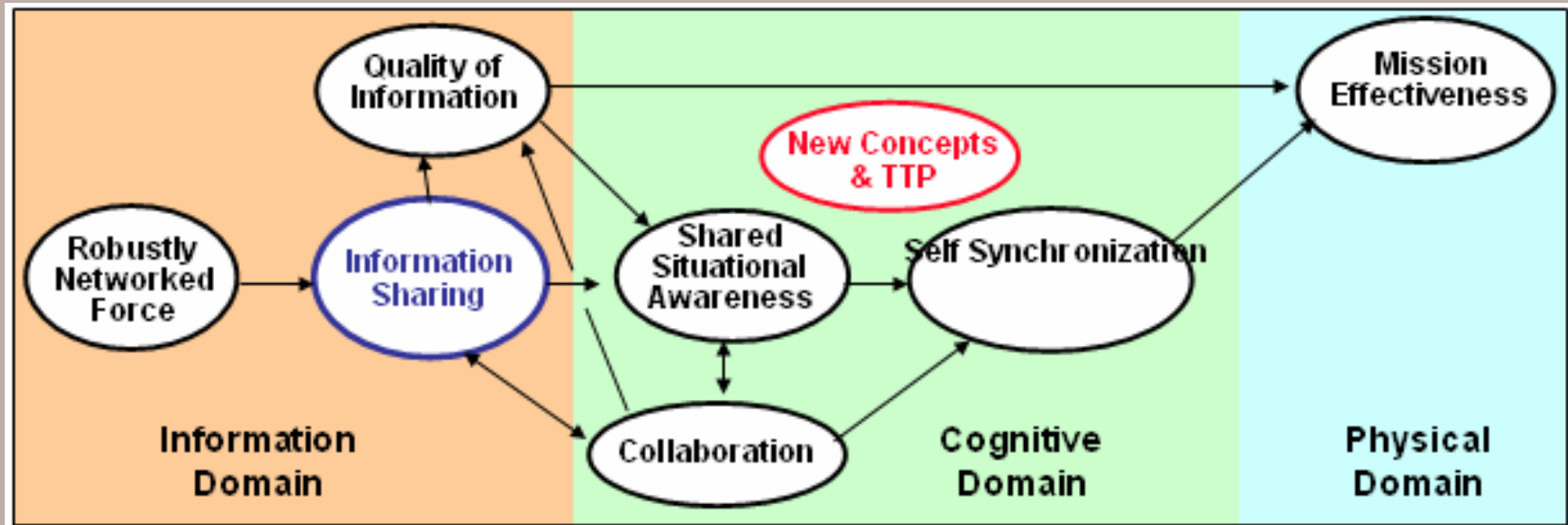
- *Vehicle mobility, protection, and firepower*
- *Personnel stabilization and training*

- It is not possible to isolate or quantify the contribution of each factor based on existing data.
- There is synergy between physical mobility & command agility.
- The NCW factors were necessary conditions to achieve the increase in force effectiveness.

Outline

- Background
- Observations
-  – Stryker Bde NCW hypothesis
- Mission Capability Package
- Research Results
 - Quality of Networking
 - Quality of Individual and Shared Information
 - Quality of Interactions and Collaboration
 - Quality of Shared Awareness and Understanding
 - Improved Force Effectiveness
- Summary

Tenets of Network Centric Operations (NCO)



- The NCO Hypothesis

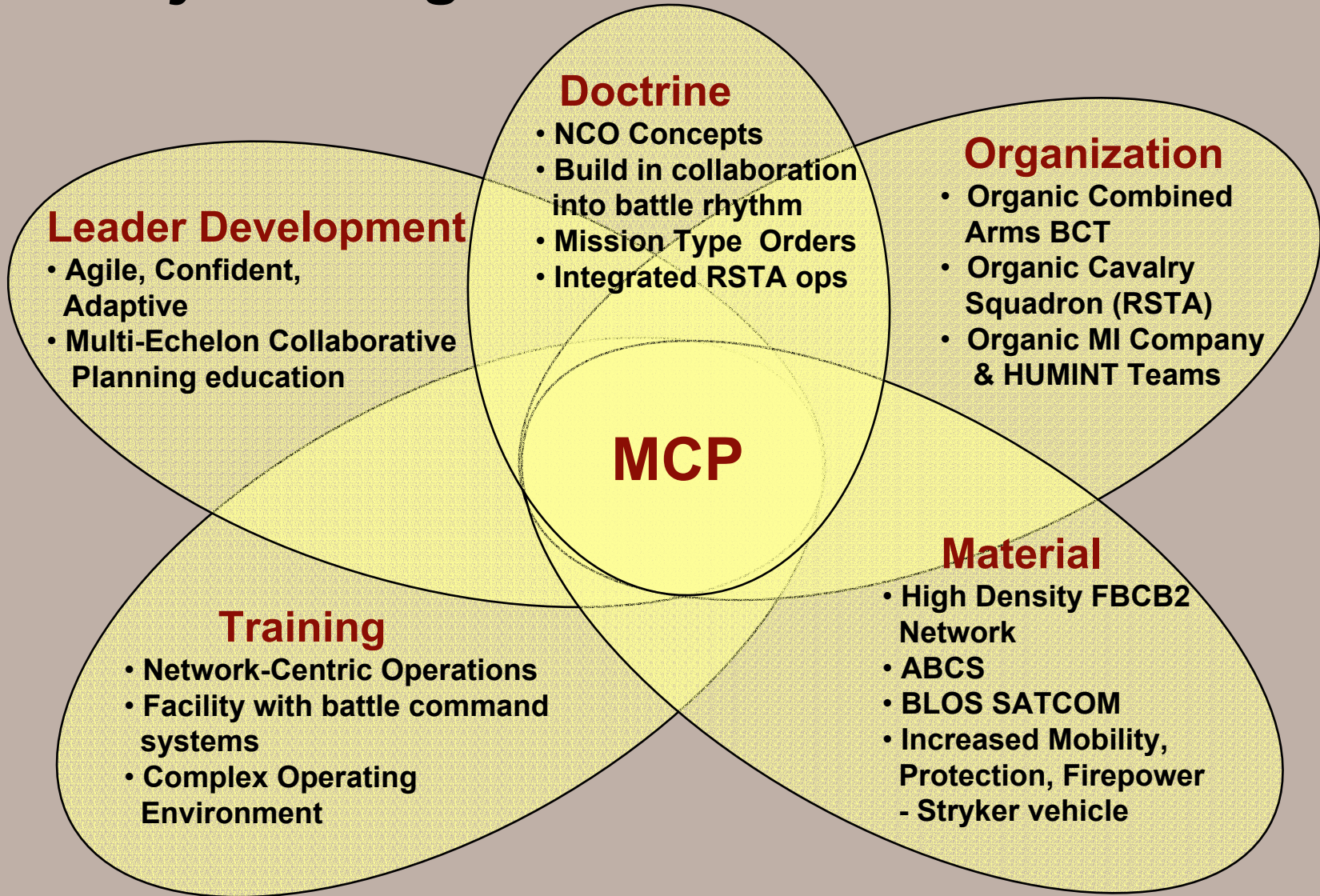
- *The NCO capabilities above, if effectively linked together, lead to increased combat power and mission effectiveness*

Stryker Brigade NCW Hypothesis

- **The Stryker Brigade's new organizational structure, battle command and networking capabilities, and evolving operational concepts:**
 - **Improve information quality**
 - **Which improves interactions and collaboration**
 - **Which improves shared awareness and understanding**
 - **Which**
 - *Provides the commander with better decision options*
 - *Enables better control of speed of command*
 - **Together, these make the force more agile and better able to exploit other force capabilities to increase combat effectiveness.**

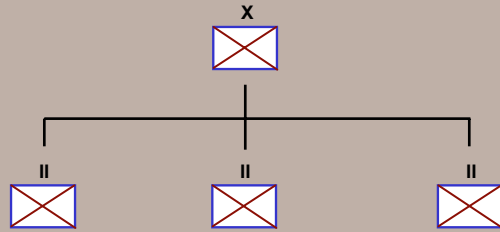
Army Concept: See First, Understand First, Act First, Finish Decisively

Stryker Brigade NCW MCP Overview

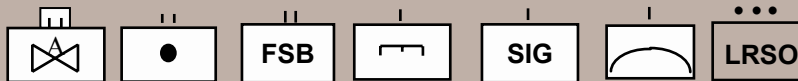


Organizational Structure Comparison

Lt Inf Bde

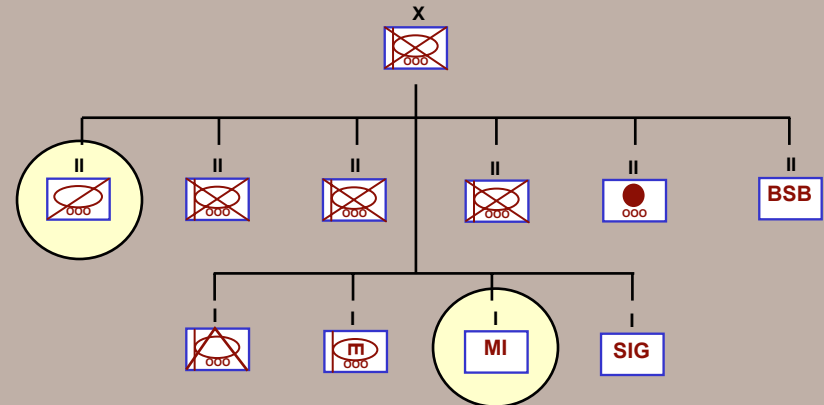


Organic Units



OPCON or DS to Lt Inf Bde at JRTC.

Stryker Bde



Organic Units



OPCON or DS to Lt Inf Bde at JRTC.

- *Stryker units all organic except for Aviation*
- *Stryker Bde - approximately 700 More “Boots and Eyes on the Ground”*
- *Stryker Bde - significantly more reconnaissance capability*
- *Stryker Bde MI Company - significant analysis and HUMINT capability.*

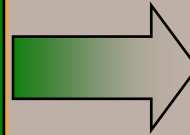
Comparison of Traditional and New Operational Concepts

Lt Inf Bde

- Make contact
- Develop the situation
- Maneuver reserve forces

Stryker Bde*

- **SEE First** - Make ISR Contact
- **UNDERSTAND First** - Develop Situation Out of Contact
- **ACT First** - Maneuver Out of Contact to Position of Advantage / Shape the Enemy
- **FINISH DECISIVELY** - Make Contact on Your Own Terms and Synchronize Combined Arms at the Decisive Point



Detailed Orders

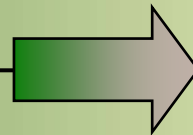
Command Push

Pre-Planned Synchronization

Mission Orders

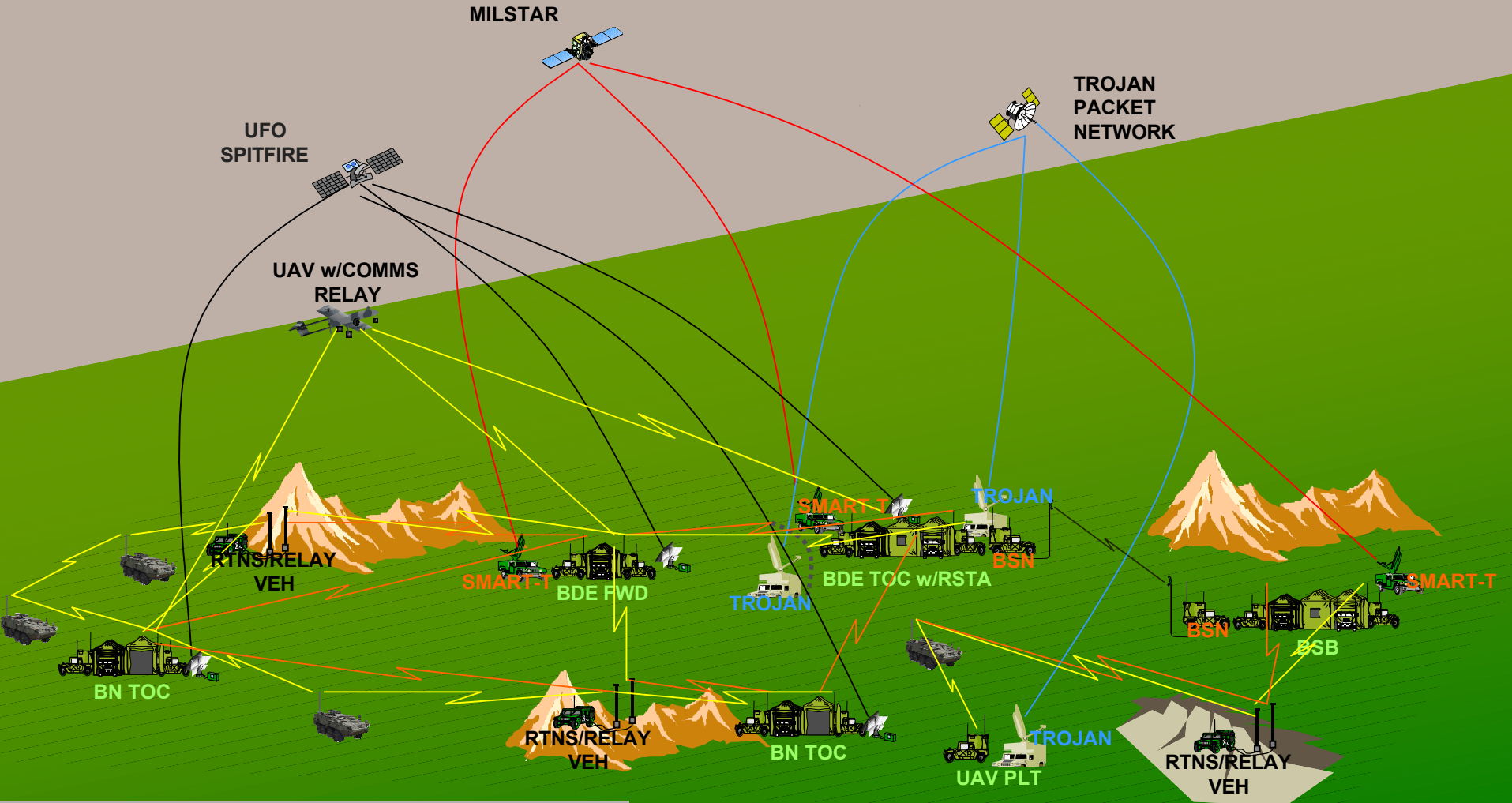
Recon Pull

Self-Synchronization IAW CDR Intent



Stryker Bde commanders endeavor to exploit NCW capabilities to make more effective use of mission orders, reconnaissance-pull operations, and self-synchronization guided by the Commander's Intent.

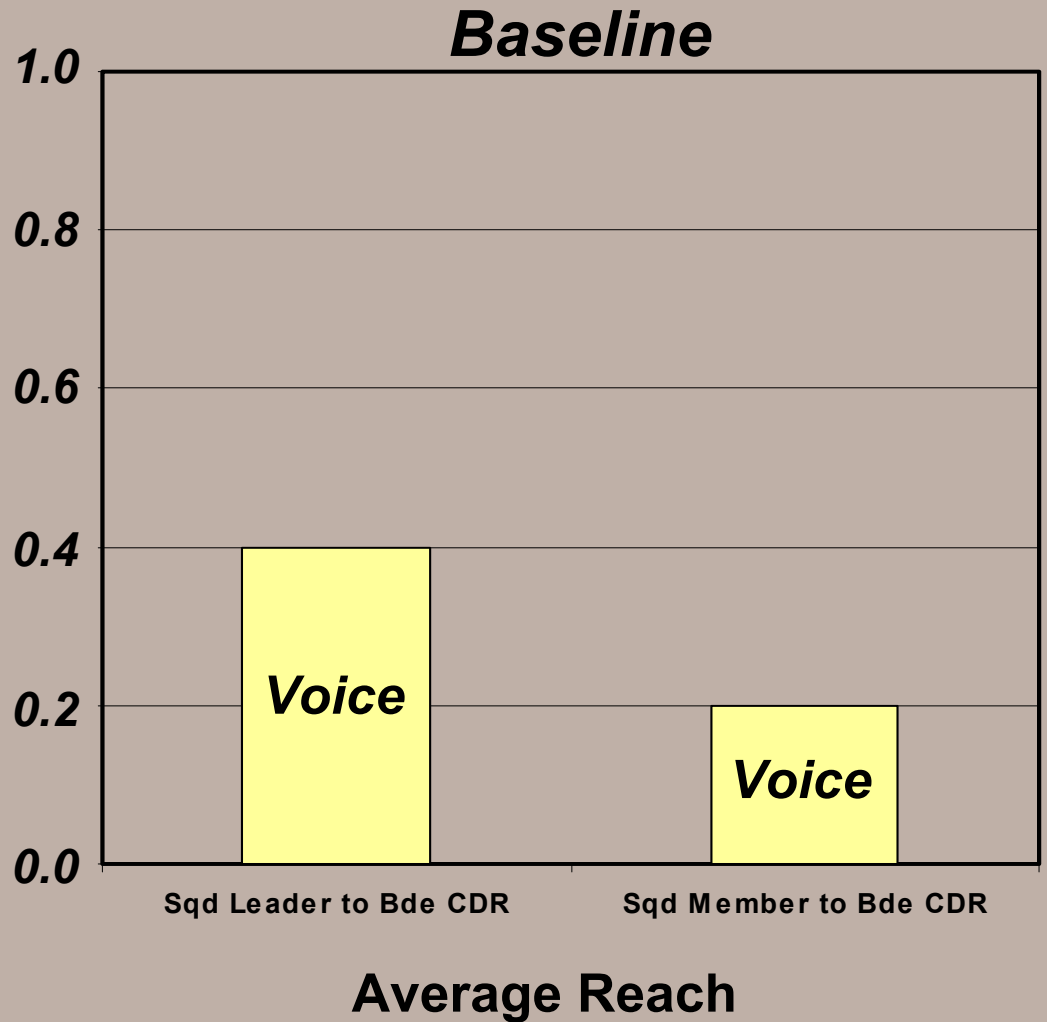
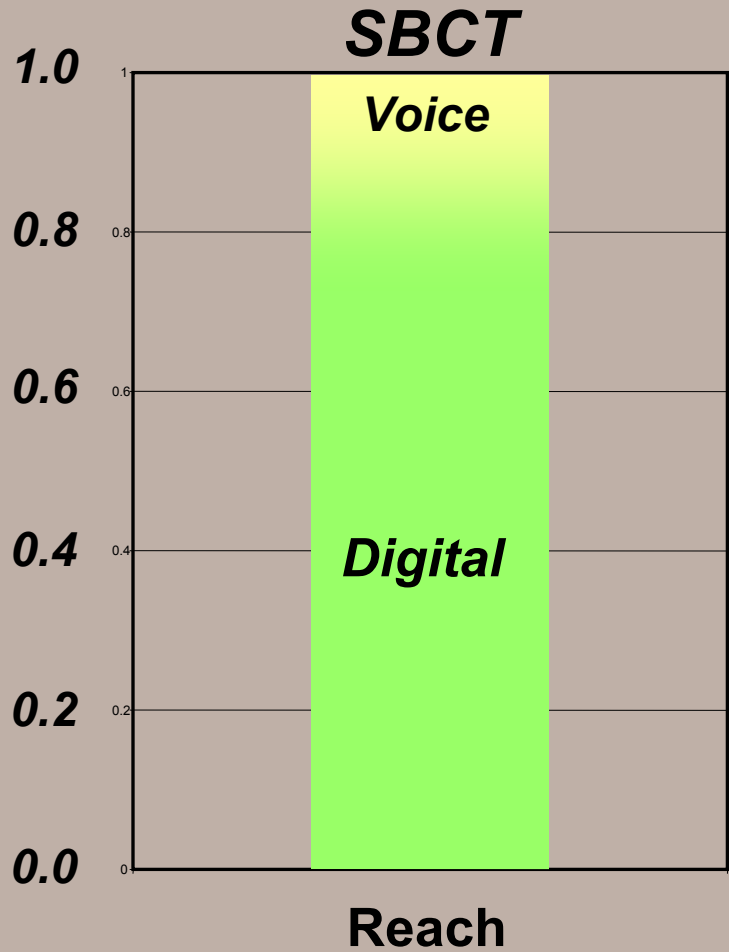
The SBCT Network is Heterogeneous



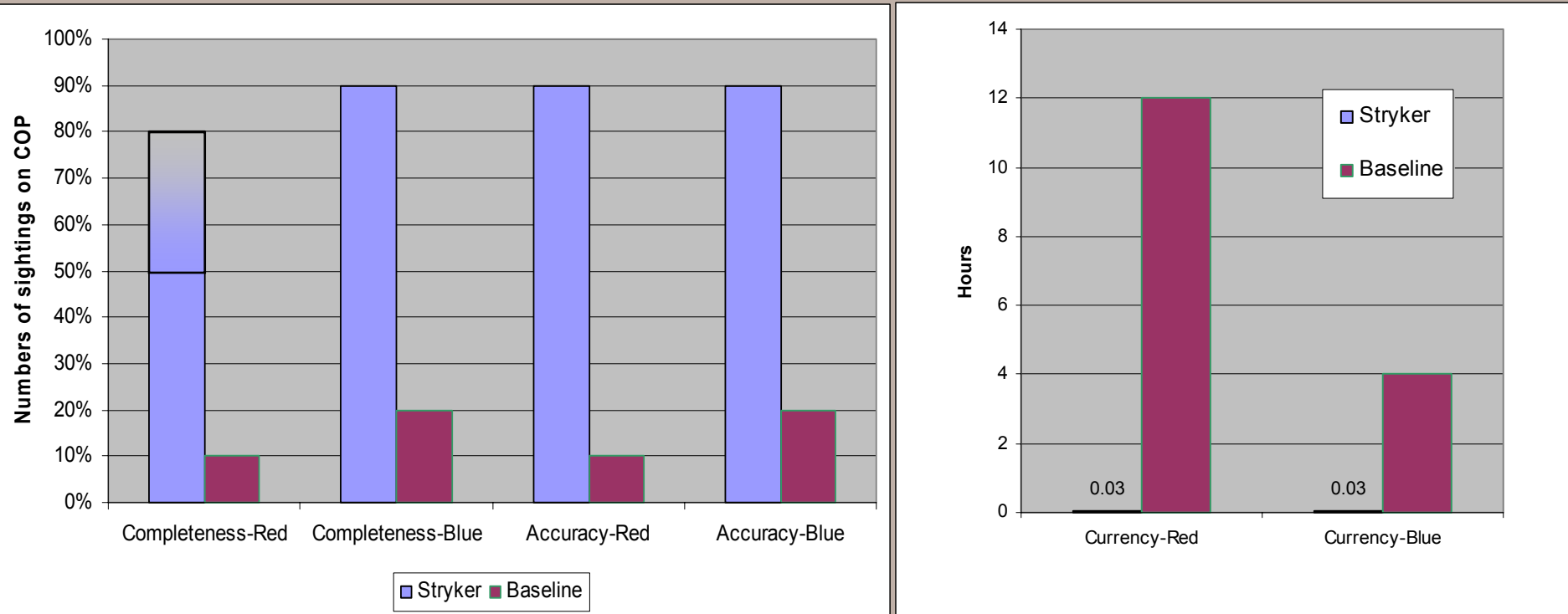
- EPLRS (14.4Kbs mean Rate)
- NTDR (28.8Kbs mean Rate)
- PSC-5 Spitfire (16Kbs max Rate)
- TSC-154 SMART-T (1536Kbs max Rate)
- TROJAN SPIRIT TERMINAL (1536Kbs max Rate)
- BSN-HCLOS Radio (8192Kbs max Rate)

**Digital Network Ready Nodes:
75% or more of Stryker Bde Combat Vehicles
Are Network Ready**

Comparison of Reach Metrics for SBCT and Baseline



Quality of Individual & Shared Information



- (1) Sources: BN CDR during the Shughart-Gordon Attack and LTC in the OE Control Group with 24 rotations as a JRTC OC.
- (2) Quality of Information achieved after 60 hours of reconnaissance before a deliberate attack at Shughart-Gordon.
- (3) Quality of Information varies over time and depends on the mission.

Improved Interactions & Collaboration

Lt Inf Bde

- Limited Interaction by FM Radio only
- Sequential planning and decision-making

Stryker Bde

- Widespread Horizontal Interaction using ABCS
- Parallel & collaborative planning and decision-making

• Brigade Commander Location:

- Forward with subordinates

OR

- Collaborating with staff at the TOC

• Brigade Commander Location:

- Forward with subordinates

AND

- Collaborating with staff at TOC using network in his Command Vehicle

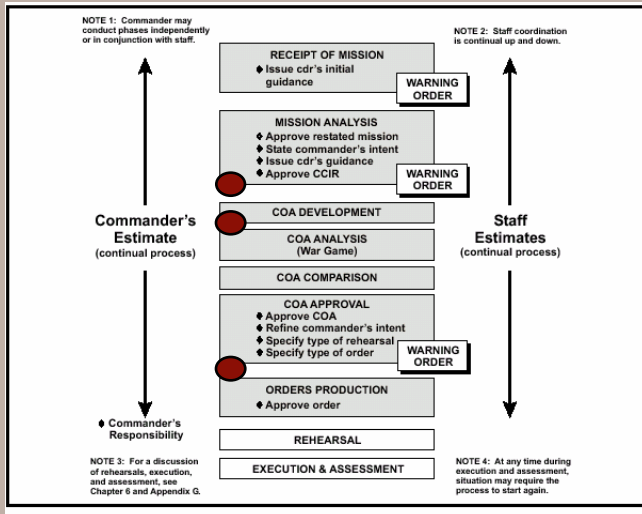
• JRTC Senior OC: “The Stryker Brigade best exemplified this capability with collaborative planning during all phases of CERTEX between main CP and the TAC CP.”

- “VTC capability should be expanded to lower echelons... It is a tremendous tool that would enhance SA/SU... Further distribution would further facilitate collaborative and parallel planning”

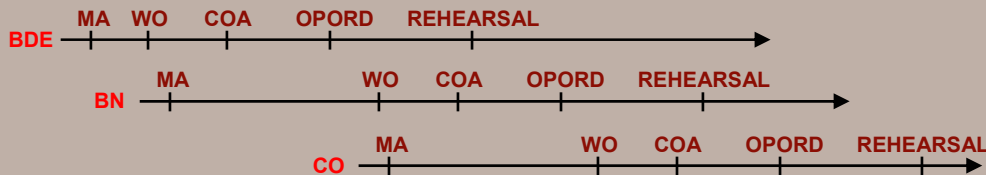
Military Decision-Making Process

Lt Inf Bde

- Linear, methodical decision-making process
- Little interaction between echelons
- Emphasis on IPB Estimates
- Product = Detailed Order based on 1 MLECOA

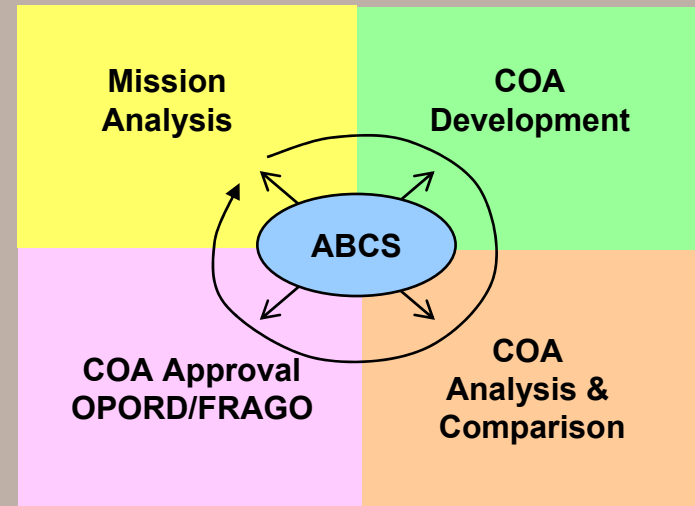


- Interaction between Commander & Staff during key briefings (MA, COA, OPORD)

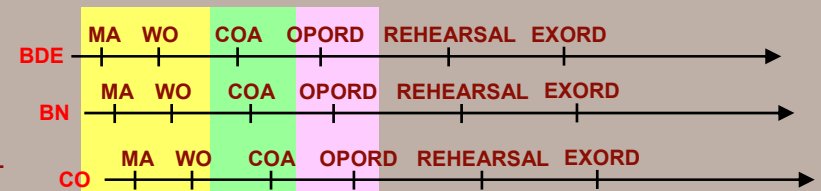


Stryker Bde

- Abbreviated, flexible decision-making process
- Multi-Echelon Collaborative Planning
- Emphasis on ISR Planning & Analysis
- Product = Better FRAGOs & CONPLANS

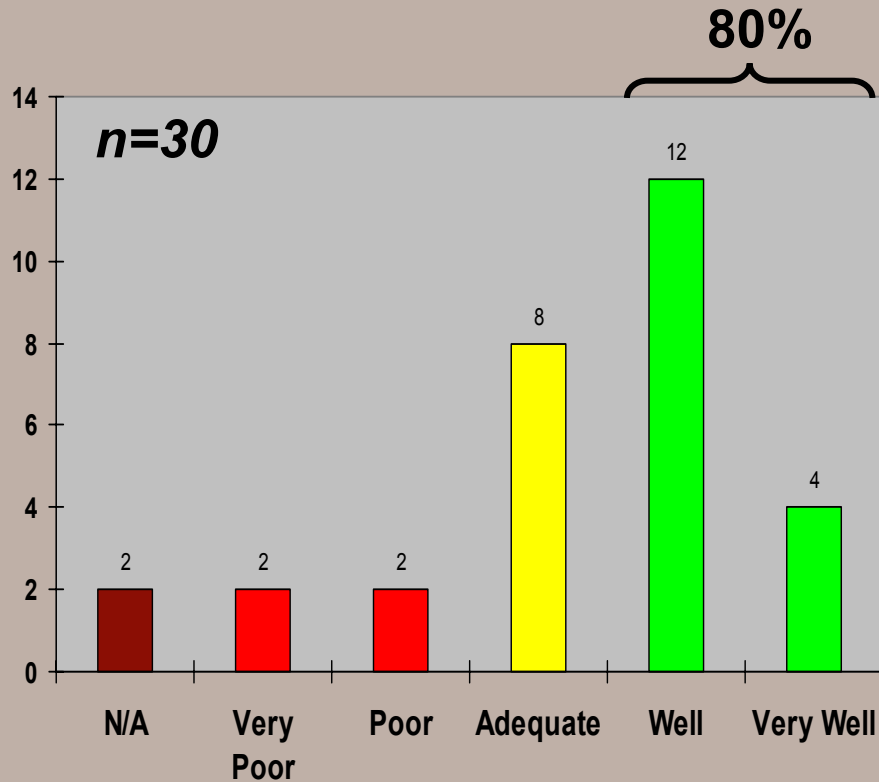


Commanders & Staff & Units Collaborate Together throughout MDMP using TAC-TOC Connectivity.



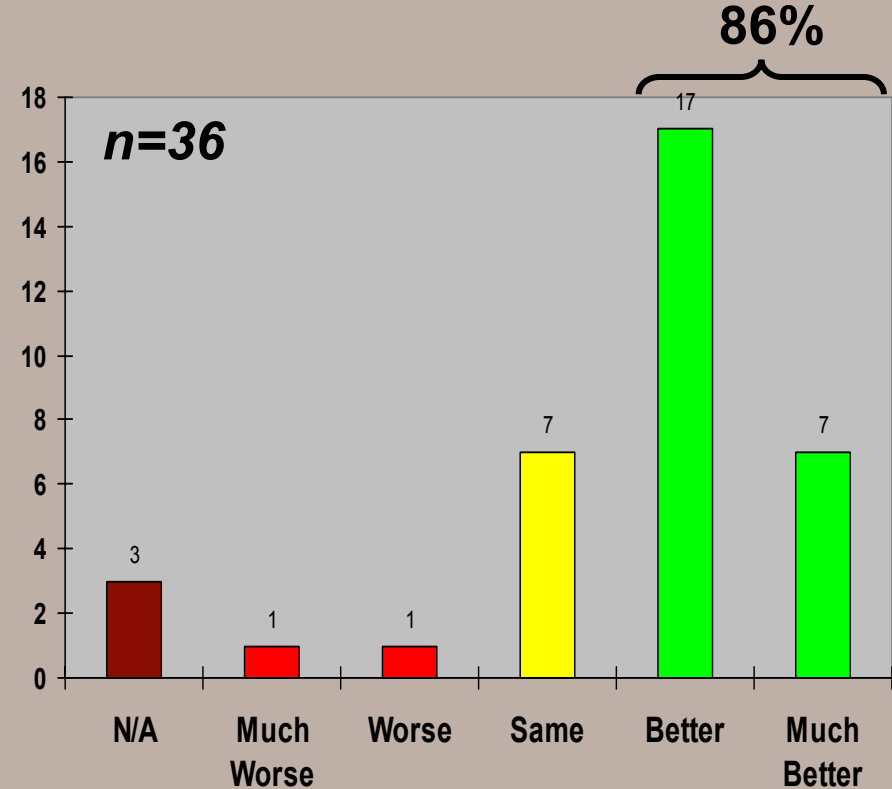
Interactions & Collaboration

Survey Responses from SBCT Operational Evaluation at JRTC



Interactions

- “How well did your CP organization and digital resources support simultaneous battle tracking and battle planning (seamless current and future operations)?”



Collaboration

- “In comparison to analog systems, how well did the ABCS tools facilitate better battlestaff decision-making?”

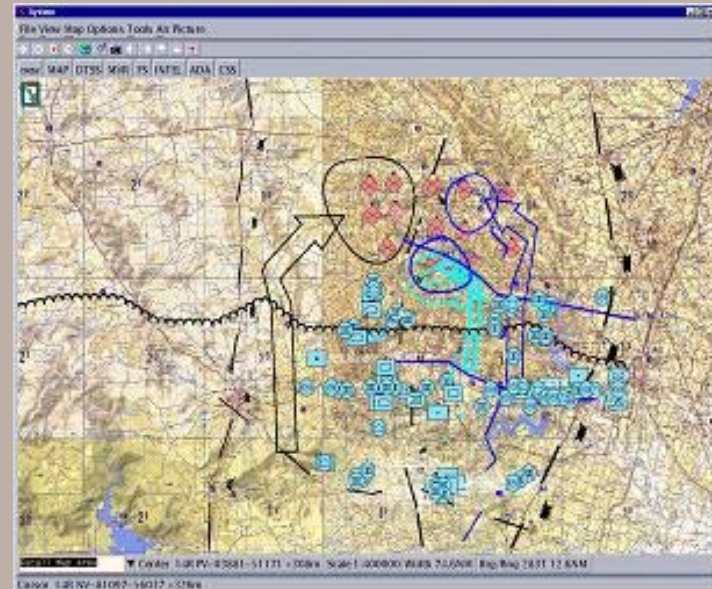
Improved Shared Awareness & Understanding

Lt Inf Bde

- Each leader must estimate own & enemy locations.
- Verbal spot reports are sent via FM radio.
- Each leader monitors own & higher command radio nets – no post/retrieve capability.
- TOC or Commander occasionally issues an integrated situation report.
- Each leader holds a poorly maintained map.
- **There is no COP.** Result: Very low level of shared awareness & understanding.

Stryker Bde

- Common Operational Picture easily facilitates Shared Awareness
- Shared Understanding is much improved but still requires analysis and trained, experienced judgment

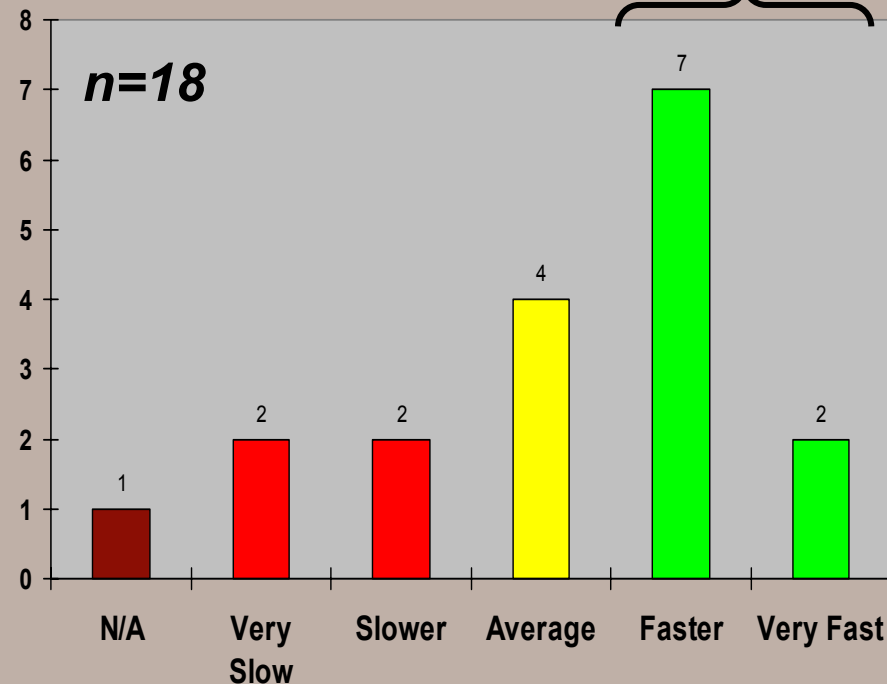
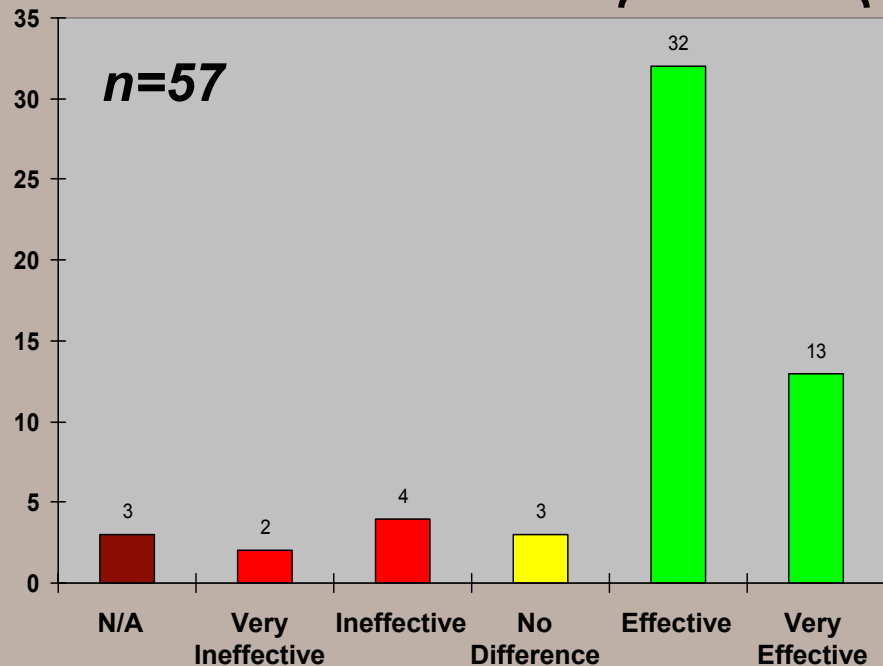


Shared Awareness & Understanding

Survey Responses from SBCT Operational Evaluation at JRTC

79%

50%



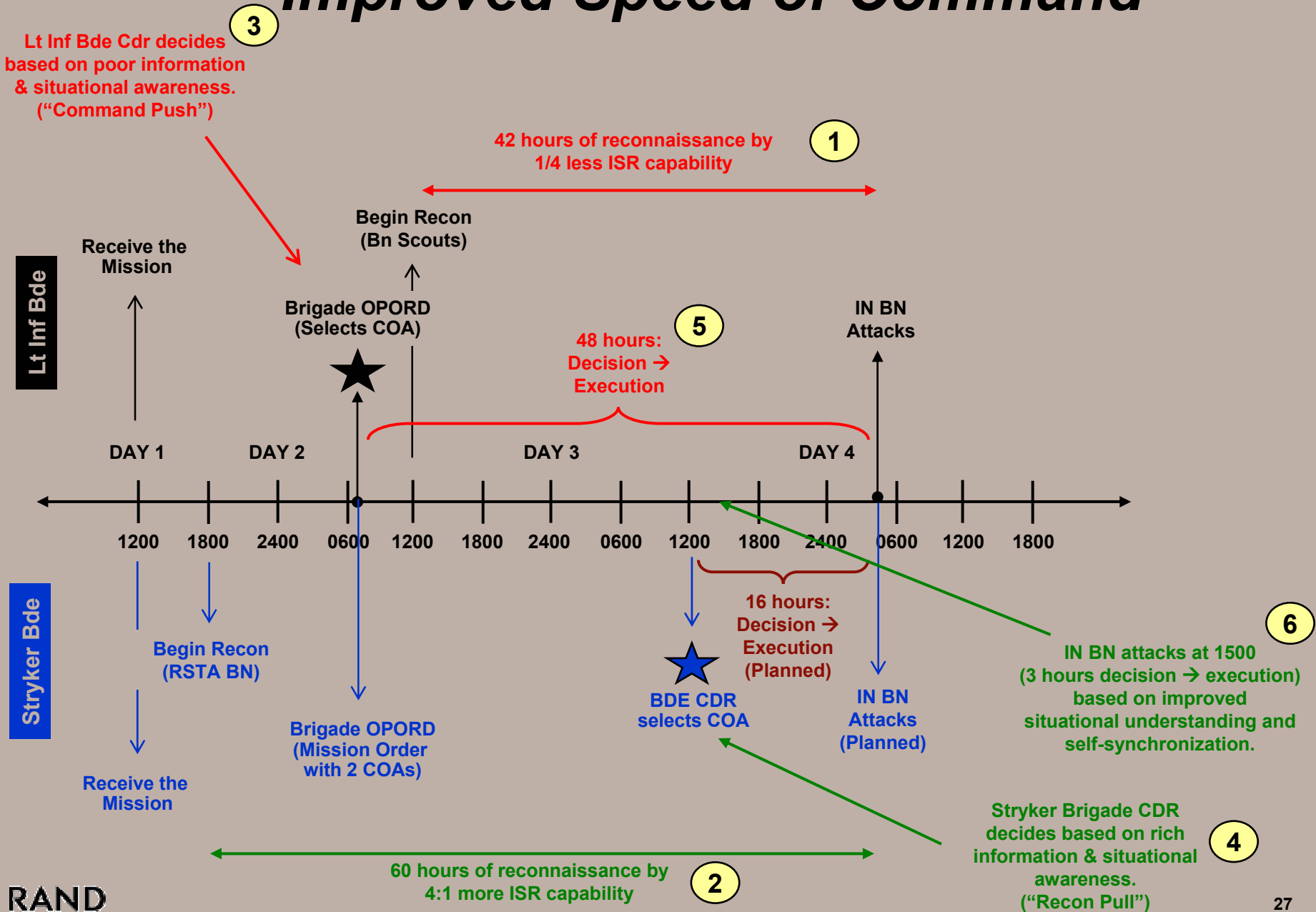
Shared Awareness

- “How effective was ABCS in enabling the battlestaff to see the battlespace?”

Shared Understanding

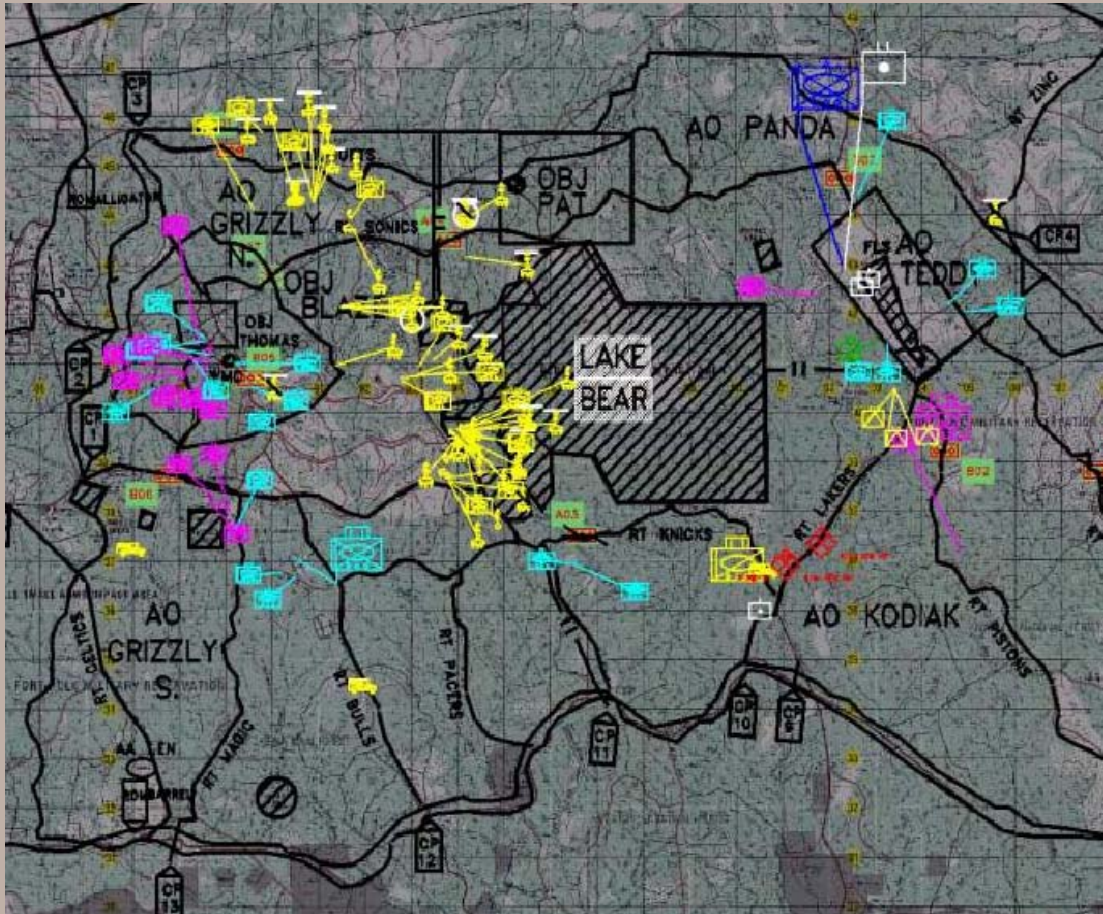
- “How quickly could you analyze and fuse information/intelligence for COP display or inclusion in the database?”

Improved Speed of Command



Improved Self-Synchronization & Tempo

INF BN CDR Decides to Attack early to maintain Fast Tempo



MCS Screen Shot during day of attack at Shughart-Gordon



- RSTA identified enemy forces in the disruption zone and OBJ Blaze



- Rapidly bypassed enemy forces in the disruption zone and isolated OBJ Blaze to prevent enemy surprise and engagement main effort



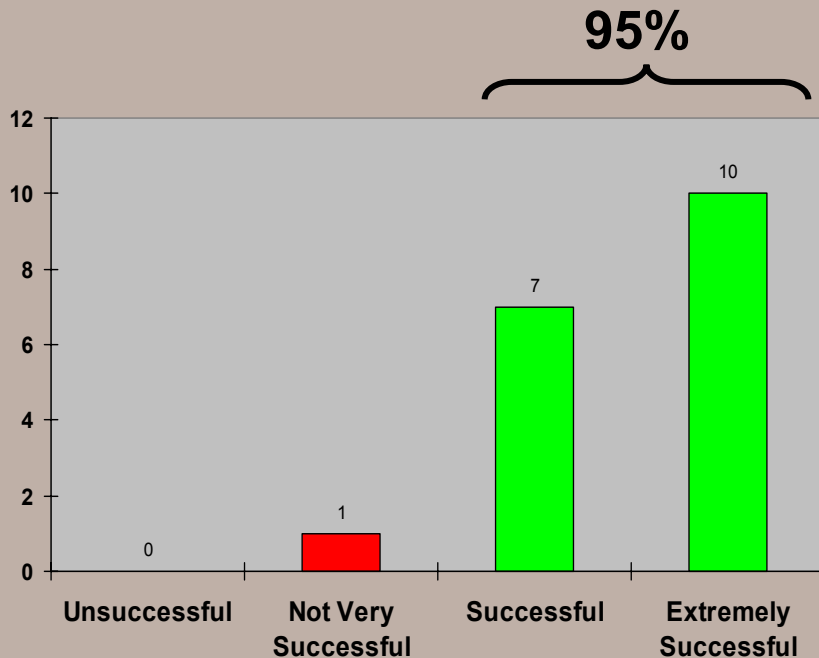
- Planned: Attack 250400 MAY 03
- Executed: Attacked 241500 MAY 03
 - 13 Hours Early

- **Tempo:** Attack covered 25 km and seized 20 buildings in 6 hours.

Infantry Battalion Commander on Self-Synchronization:
“I could see [on the COP] the lead Bn had accomplished its mission early. I moved up our attack time to maintain momentum.”

Improved Mission Accomplishment and Operational Concept Validation

Survey Responses from SBCT Operational Evaluation at JRTC



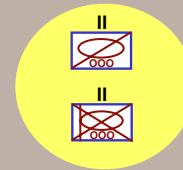
Mission Success

- “Rate your unit’s ability to successfully accomplish the missions encountered during this rotation.”

- **“See First:** The Stryker Brigade used assets like UAV and Stryker [Recon Vehicle] with the ability to see first. The Bde was not able to get eyes on everything, but it definitely provided a see first concept better than any other Bde rotation.
- **Understand First:** FBCB2 when populated shows the location of the blue forces and the enemies in almost real time providing SA to all leaders. FBCB2 made SA and SU seem like second nature to the Stryker Brigade.
- **Act First:** With the assets provided to the Stryker Brigade, they no longer have to wait for the info, it's already there. This allows the Bde to act immediately catching the enemy by surprise, which was demonstrated successfully at the attack at Shughart-Gordon.
- **Finish Decisively:** Stryker Brigade has the ability and assets to see first, understand first, and act first. During the attack at Shughart-Gordon the Bde proved that it could perform all three abilities which resulted in them finish decisively.” *

Stryker Brigade MCP Has Effectively Demonstrated Important NCW Capabilities

- The Stryker Brigade's organizational structure, battle command and networking capabilities, and evolving operational concepts:
 - Improved information quality
 - Which improved interactions and collaboration
 - Which improved shared awareness and understanding
 - Which
 - *Provided the commander with better decision options*
 - *Enabled better control of speed of command*
 - Together, these made the force more agile and better able to exploit other force capabilities to increase combat effectiveness.



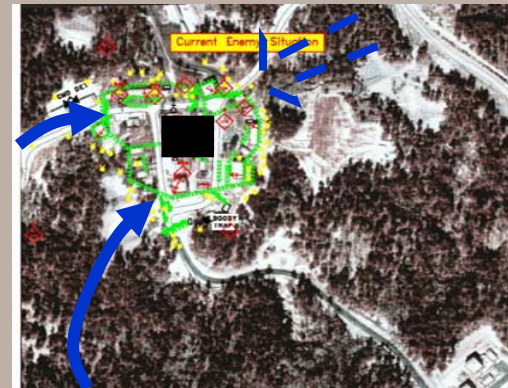
**Networked
ABCS**



- *SEE First*
- *UNDERSTAND First*
- *ACT First*
- *FINISH DECISIVELY*

- **~ 80% accurate information about enemy**
- **90% accurate information about friendly**

- Collaborative Planning
- Decentralized Execution / Self-Synch



10 : 1
Mission Failure → **1 : 1**
Mission Success

The NCW capabilities of the Stryker MCP provide a glimpse into the future and suggest FCS information concepts are viable



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Questions / Discussion



Recommendations for Further Study

- **Address the small “N” problem by:**
 - **Studying the NCW capabilities demonstrated by 3/2 SBCT during combat operations in OIF**
 - **Observing future Stryker Brigade rotations conducting the Shughart-Gordon attack at JRTC**
 - **Comparing Stryker Brigade with a non-digital Armor / Mech Brigade conducting combat operations at the NTC**
 - **Developing “RAND Card” surveys for NTC/JRTC rotations and post-combat analysis to gain deeper, more realistic understanding of NCW capabilities**
- **Apply insight from Stryker case study & OIF to analyze the NCW capabilities for the Future Force**
 - **Unit of Action**
 - **Units of Employment (UEx and Uey)**

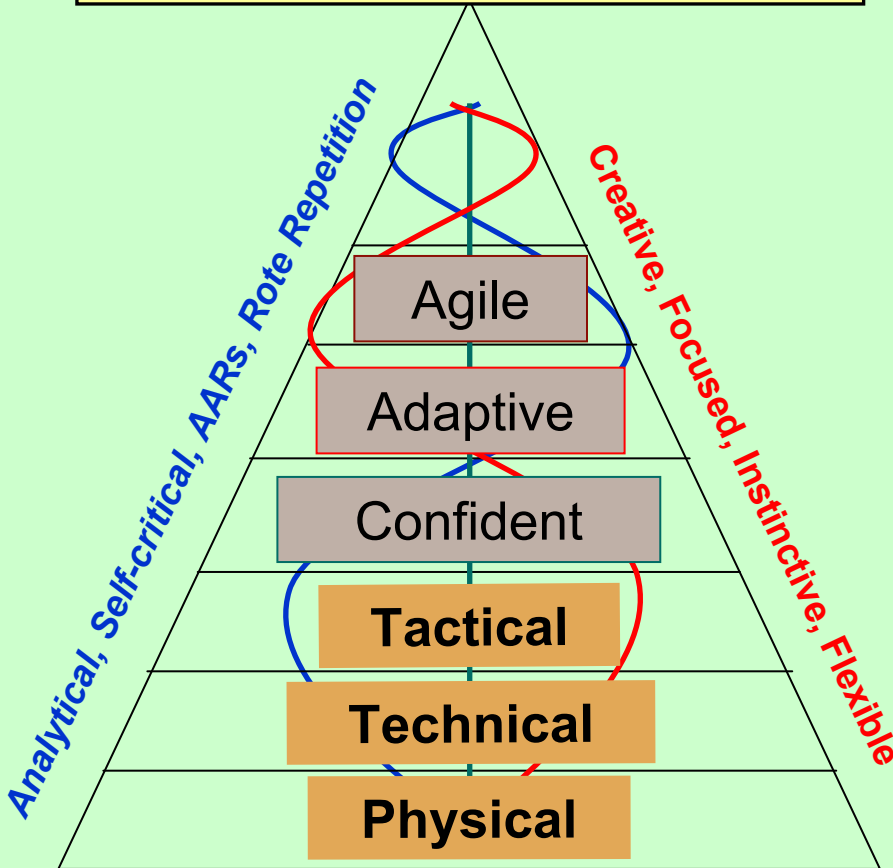
Translating NCW into Army Terms

NCW Hypothesis	Stryker Brigade Doctrine
Mission Capability Package	Doctrine, Training, Leader Development, Organization, Material
Organic Information	Tactical Information, Spot Reports
Network Enabled Valued added Services	Army Battle Command System, Upper TI
Shared Information	Information shared by Staffs (internal TOC) and across the network by units
Sense-making	Command & Staff Estimates, Operations & Intelligence Summaries
Interactions	Collaboration, Battle Updates, Commander's Huddle, Targeting Meeting
Individual & Shared Awareness	Situational Awareness, COP
Individual & Shared Understanding	Situational Understanding
C2 Agility	Agile & Adaptive Leaders, Operate inside enemy's decision cycle
Force Agility	Agility, Tempo, Rapid Decisive Operations

There is a close correlation between key NCW measures and Stryker Brigade Doctrine

Stryker Brigade Leader Development

Agile Training Mindset *



Attributes of NCW-Enabling Decision Making:

- Risk Propensity
- Competence
- Confidence
- C2 Agility
 - Flexibility
 - Adaptability
 - Innovativeness
 - Responsiveness

Close correlation between NCW attributes and Army / Stryker leader development initiatives

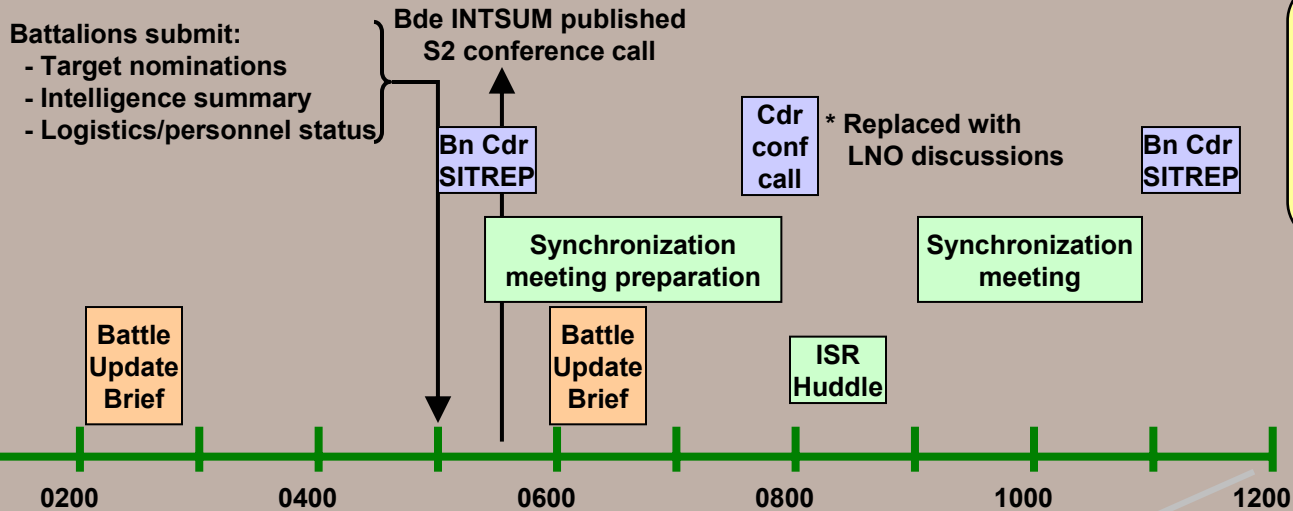
Current Focus of Leader Dev
 Old Proven Ways of Training
 Add New Ways of Thinking

The Light Infantry Bde Network Has Much Less Bandwidth and Reach

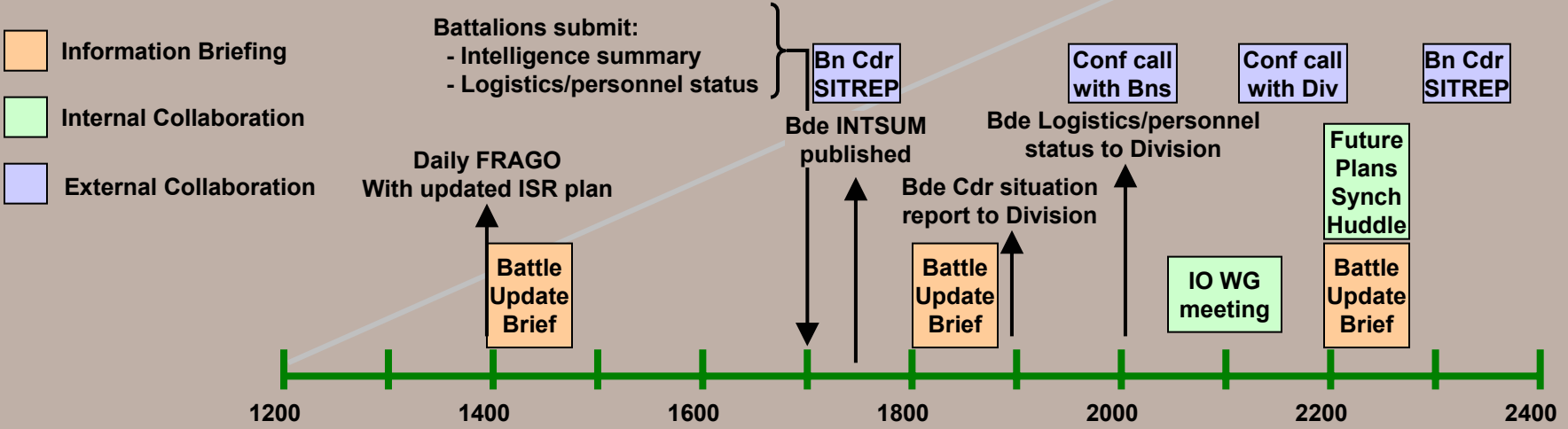
- Network composed of multiple, distinct FM Radio Nets
 - Soldiers pre-occupied with basic situational awareness (unit location & status)
 - Limited Reach
 - Digital network ready nodes: none
 - Poor information quality
 - Incomplete, Inaccurate, Late
 - No automated post & retrieval capability
 - Poor Quality of Service
- Manual data post & retrieval
 - Multiple Maps with “Stickies” and overlays
 - *No common operational picture*

Voice Net	Participants	Distance from Bde CDR	Comments
Squad	792	4	Assuming 9-person squads (Sqd Ldr on PL net)
Platoon	105	3	27 Rifle Sqd Ldrs, 8 SCT/MTR/SPT Sqd Ldrs per Bn
Company	84	2	PL Ldrs, PL Sgts, Co HQ SEC Ldrs
Battalion	99	1	Co CDRs/Co XO's (Inf and HHC) plus Bn Staff
Brigade	18	0	Bde XO, Bde S3, Bde FSO, Sig Off, Bde S2, Bde ADO, FSB CDR, BDE Engineer, Bde Tactical CP, OPCON/ATCH Unit CDR CP, Bn CDRs/XOs, Bde HHC CDR/XO
Total	1098		Only includes bde personnel rifle, mortar, or surveillance/reconnaissance Bde units

Stryker Brigade Battle Rhythm



Quality Interactions improved by Quality Shared Information



Stryker Brigade Synchronization Meeting

Multi-Dimensional Planning Enabled by Rich Info Sources

- **Key collaboration event**
 - **Brigade Staff**
 - **Subordinate Unit LNOs**
- **Goals:**
 - **Shared Situational Understanding**
 - **Develop Anticipatory Awareness**
 - **Improved Force Synchronization**
- **Product of Meeting = FRAGO**
 - **Easily Understood & Executable by Units**



**Complete ABCS
Quality Information
makes planning more
relevant & effective**

1. **Roll call**
2. **Review due-outs from previous synchronization meeting**
3. **Synchronize understanding of 0-24 hr period operations**
 - A. **Cdr guidance, intent, desired end-state**
 - B. **Population, enemy status and COA, PIRs, priority tgts, ISR plan**
 - C. **Mission/intent, key tasks, Cdr decision pts, convoy ops**
 - D. **Priority tgt list, effects synchronization matrix**
 - E. **Decisive, sustaining, shaping ops that influence 24-48 hr ops**
 - F. **Changes and finalize FRAGO for 0-24 hr period**
4. **Synchronize understanding of 24-48 hr period operations**
5. **Synchronize understanding of 48-72 hr period shaping operations**
6. **Review due-outs and conduct field grade discussions**

**Improved Quality of Information + Improved Quality of Interactions =
“A Very Worthwhile Meeting”**

Stryker Brigade Command Information Center

FBCB2
Display

MCS-Lite
Display

Making Shared
Awareness &
Understanding
Happen

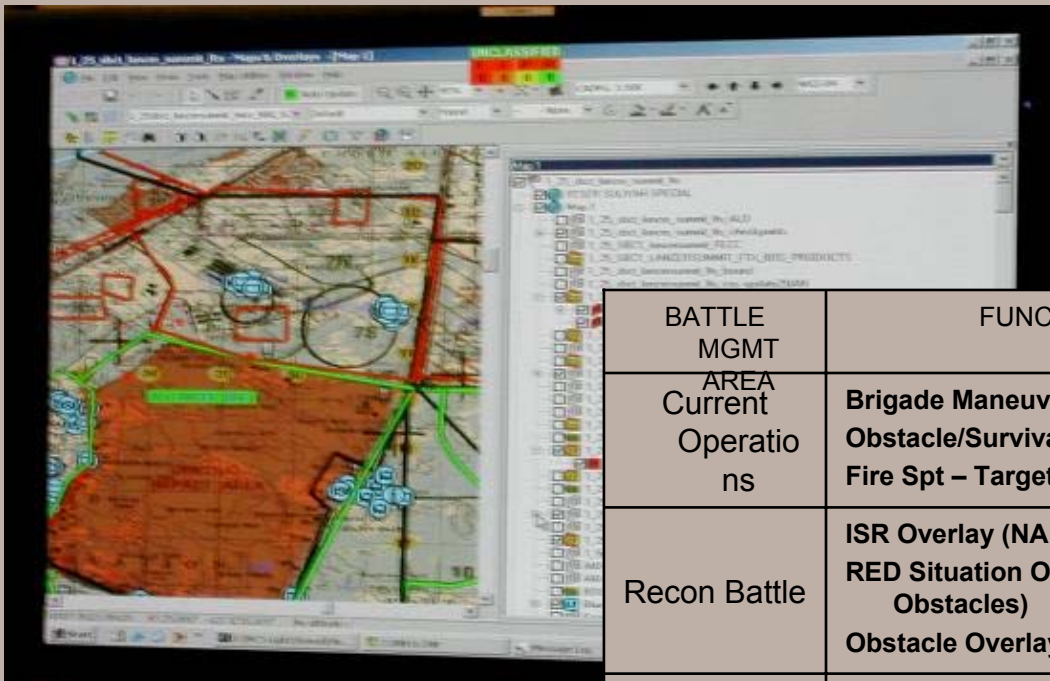


FBCB2 Live Blue Feed
+
**Analyst-Constructed or
Unit Reported Red Picture**
+
Functional Overlays

Composite
Information
Displays

- Unit Mission / Intent
- Commander's Guidance
- CCIR
- Synchronization Matrix
- CSS Status
- Key Events
- Battle Rhythm
- Staff Journal
- Rolling BUB

Shared Overlays Improve Shared Understanding



- **Baseline:** Separate Paper Maps, Acetate Overlays, and Red/Blue “Stickies”
- **Stryker Brigade:** Digital Information instantly shared throughout the unit

BATTLE MGMT	FUNCTIONAL OVERLAYS	SITUATION AWARENESS OVERLAYS
AREA Current Operations	Brigade Maneuver Overlay Obstacle/Survivability Overlays Fire Spt – Target Overlay	FBCB2 Live Feed Correlated RED Picture BLUE units (JCDB Overlay)
Recon Battle	ISR Overlay (NAI/TAI) RED Situation Overlays (Templated Units, Obstacles) Obstacle Overlays (Planned, Executed)	FBCB2 Live Feed Correlated RED Picture Recon units (JCDB Unit Overlay)
Fire Support	Brigade Maneuver Overlay Fire Spt – FASCAM Overlay Fire Spt – Target Overlay Fire Spt – Range Fan Overlay Air Control Measure Overlay Obstacle/Survivability Overlays	FBCB2 Live Feed Correlated RED Picture BLUE units (JCDB Unit Overlay)
Rear Battle	Brigade Maneuver Overlay CSS Route Overlay CSS Supply Point Overlay Obstacle/Survivability Overlays Medical Point Overlay	FBCB2 Live Feed Correlated RED Picture BLUE units (JCDB Overlay) Recon units (JCDB Overlay)

Digital Overlays improve Shared Understanding of new FRAGOs



Increases Speed of Command and Force Agility

Control of Speed of Command

• Lt Inf Bde

- Follow the 1/3 – 2/3 Rule to give time for:
 - Time-Intensive Sequential Planning
 - Distribute Paper Detailed Orders
 - Battalion Reconnaissance
 - Sharing Understanding of Plan
 - Rehearse Planned Synchronization
- Bde Cdr must select the COA early before he has gained situational awareness

“It’s too hard to bring everyone along when I make a decision.”

“It takes time for the brigade to adjust course...

like turning a battleship.”

• Stryker Bde

- Flexible Use of Time Available using:
 - Abbreviated Collaborative Planning
 - Transmit Digital Mission Orders
 - Increased Brigade Reconnaissance
 - Sharing Understanding of the Situation
 - Agile, Self-Synchronizing Units
- Bde Cdr may defer COA selection after he has gained situational awareness

NCW capabilities enabled the Stryker Brigade Commander to

Make, Communicate and Implement Better Decisions

Faster than the Enemy

Improved Mission Accomplishment and Survivability

Lt Inf Bde

- **Blue** : **Red** Casualty Ratios = **10** : **1**

Stryker Bde

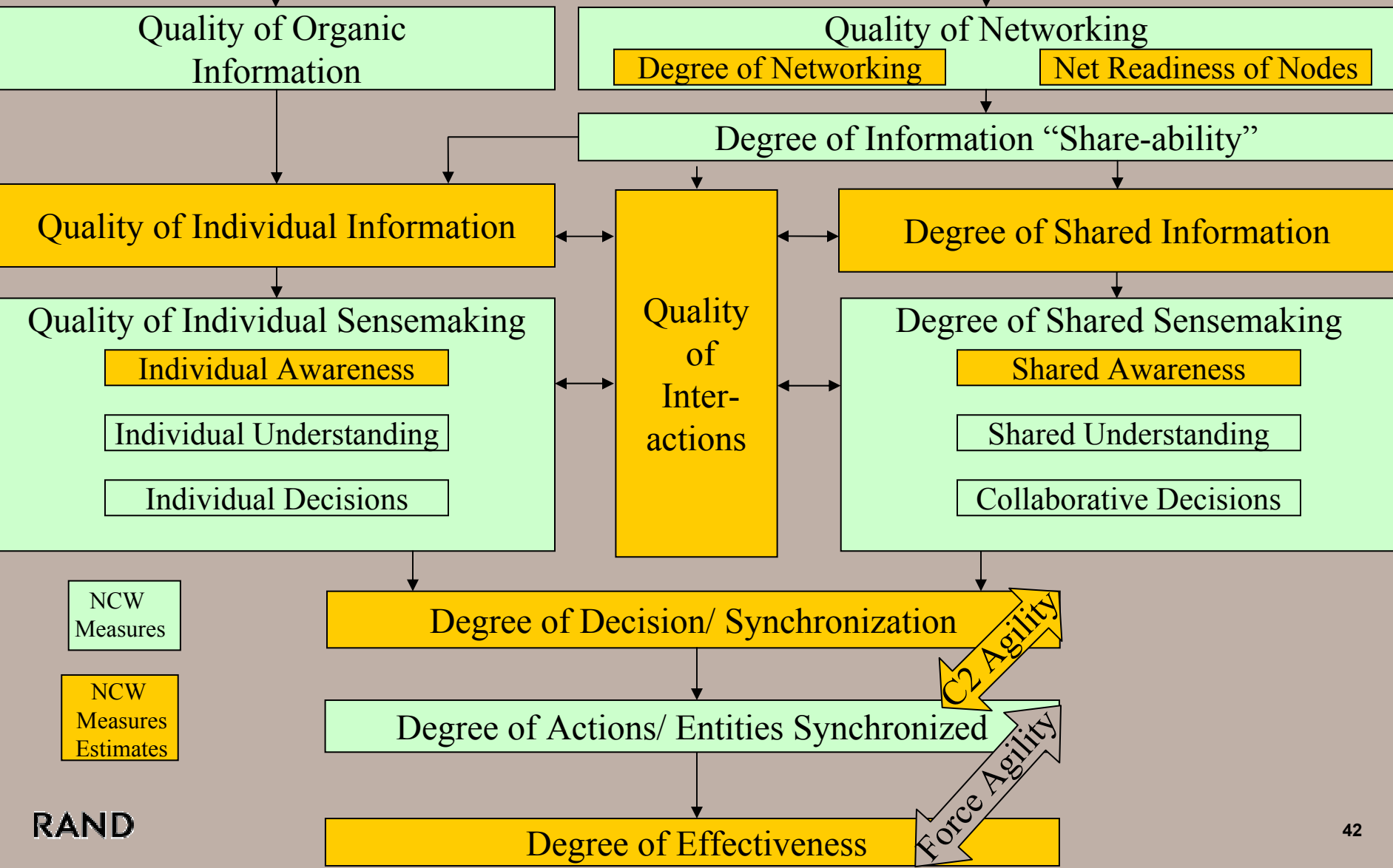
- **Blue** : **Red** Casualty Ratios = **1** : **1**

- “The **most impressive capability** demonstrated by the SBCT was the ability to **affect the enemy’s decision cycle through SA/SU** and combined with mobility and lethality. The best example of this was during the Shughart-Gordon urban attack operation...” (1)
- “The **SU/SA afforded** platoon leaders and commanders by the lower T/I and FBCB2 the ability to **maneuver** their forces and close with and **destroy the enemy** during urban operations in Shughart-Gordon.” (1)

“Observing 24 units attack Shughart-Gordon as a JRTC O/C, I have never seen a unit clear every building and still retain combat power to defeat an enemy counterattack.” (2)



NCW Conceptual Framework

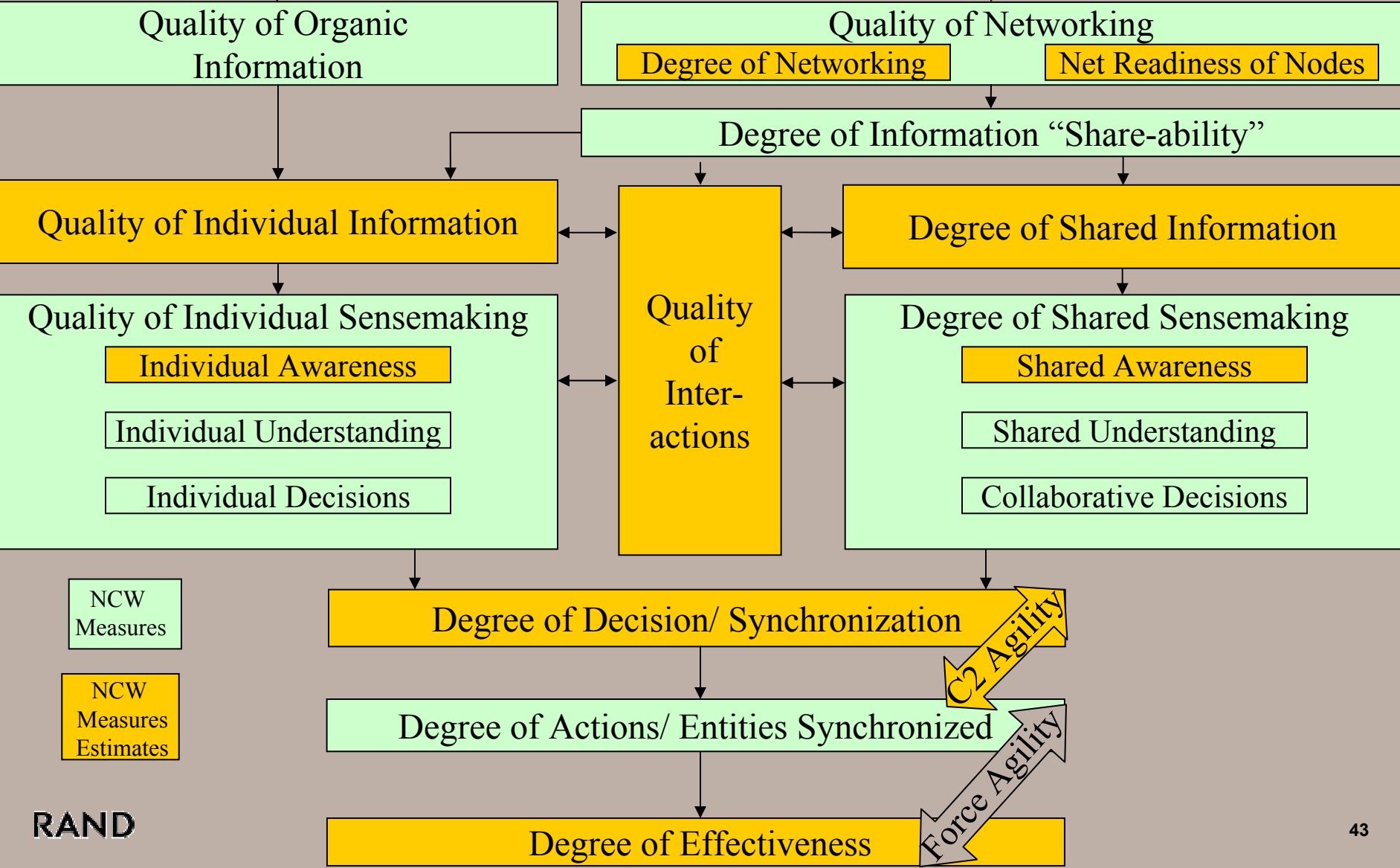


NCW Measures

NCW Measures Estimates



NCW Conceptual Framework



NCW Measures

NCW Measures Estimates