

Network Centric Warfare in the U.S. Navy's Fifth Fleet

Network-Supported Operational Level Command and Control in Operation Enduring Freedom

Dr. Mark Adkins

Director of Research

Ph.D Human Communication

adkins@arizona.edu

Dr. John Kruse

Director of Programming

Ph.D Management Information Systems

kruse@arizona.edu



Outline

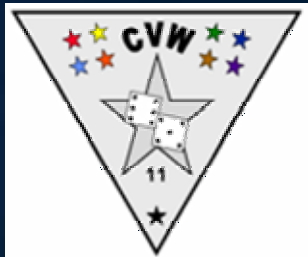
- Environment
- Theory
- Investigation
- Findings
- Other Lessons
- Implications
- Questions

Environment



Who: U.S. Navy's Commander Task Force Fifty (CTF-50) aboard the USS Carl Vinson (CVN 70)

- Carrier Group Three (CARGRU3)
- Air Wing Eleven (CVW11)
- Destroyer Squadron Nine (DESRON9)

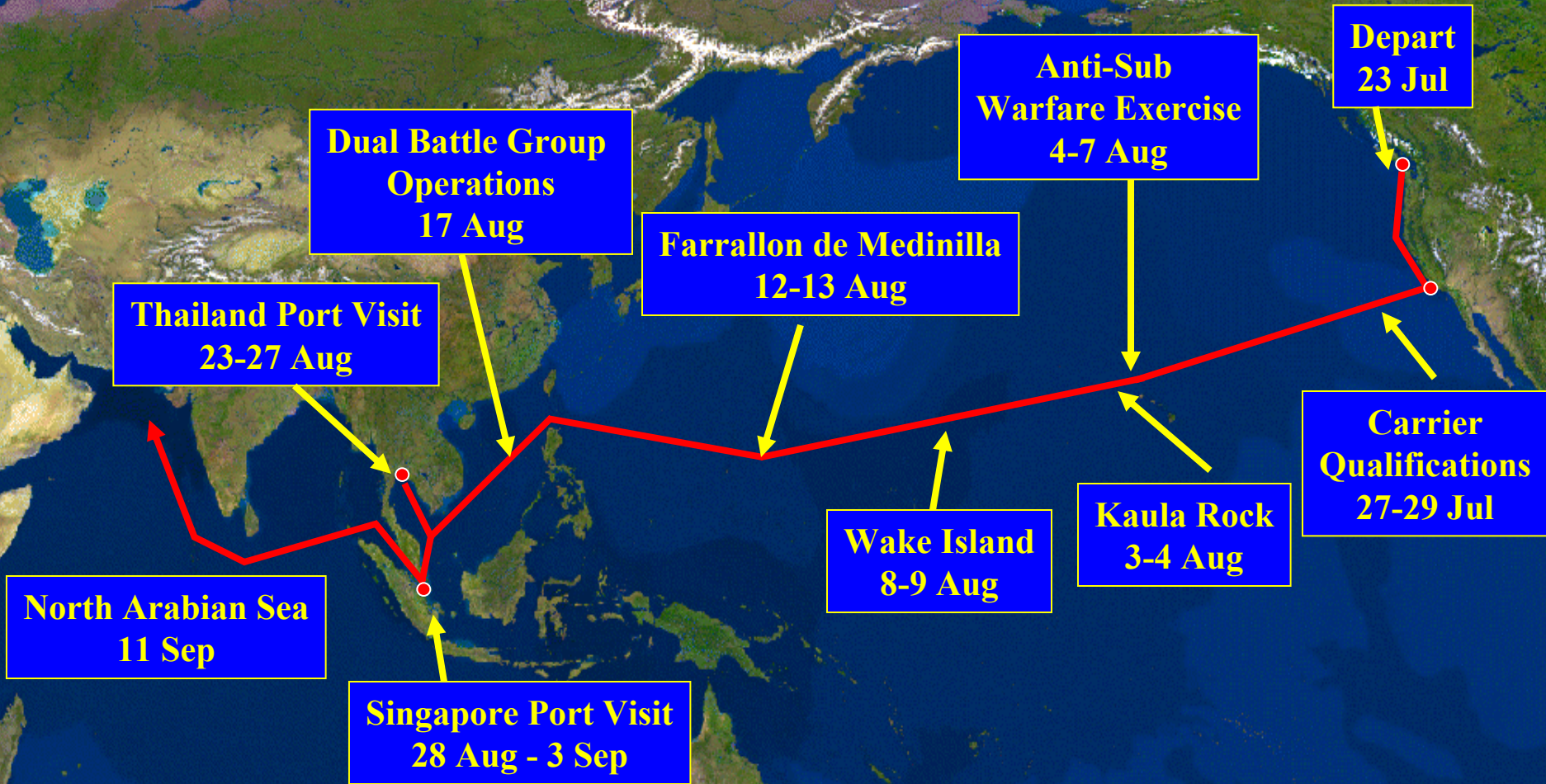


Environment

When: Operation Enduring Freedom, July 2001
– January 2002

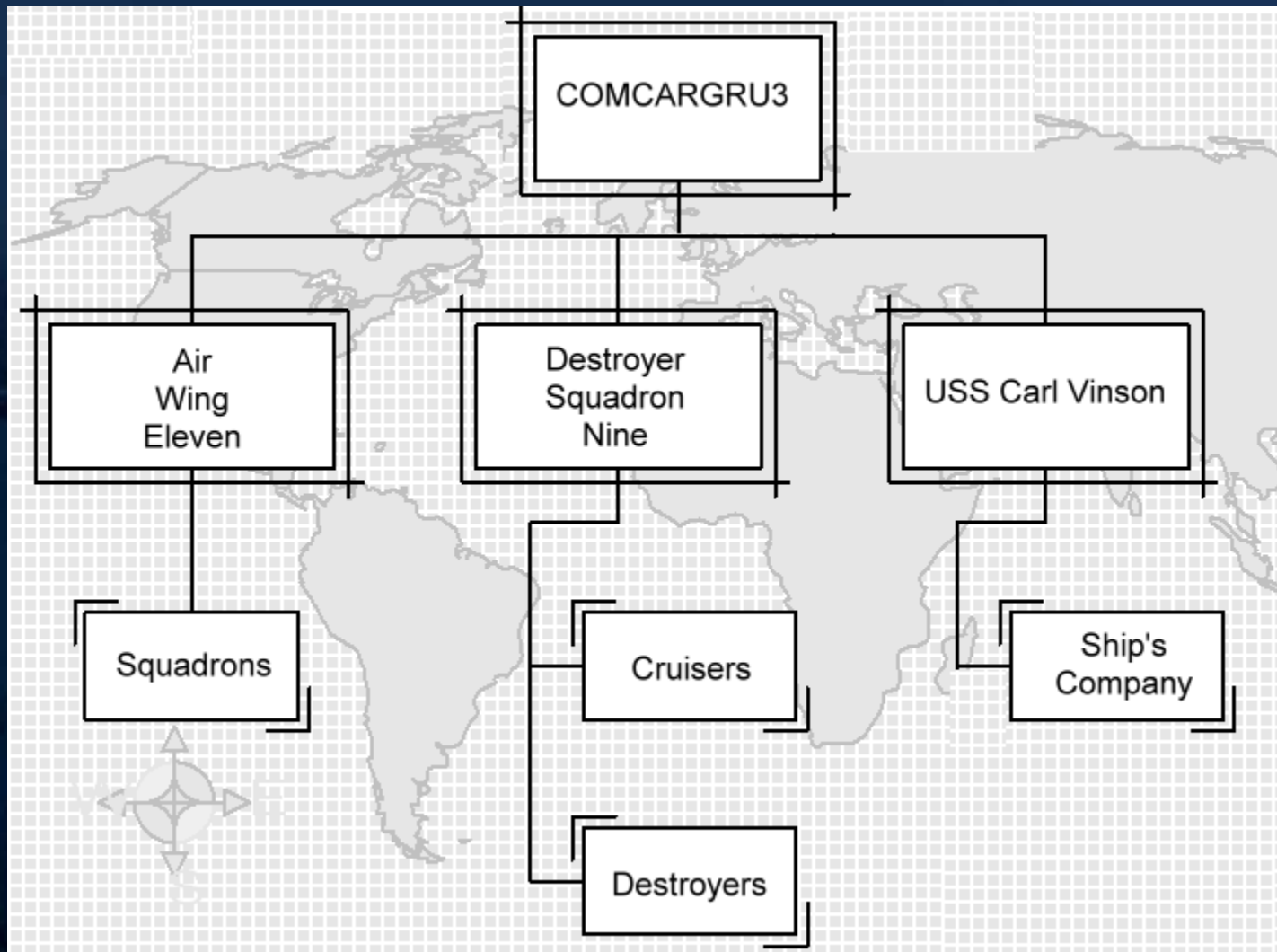


TRANSIT

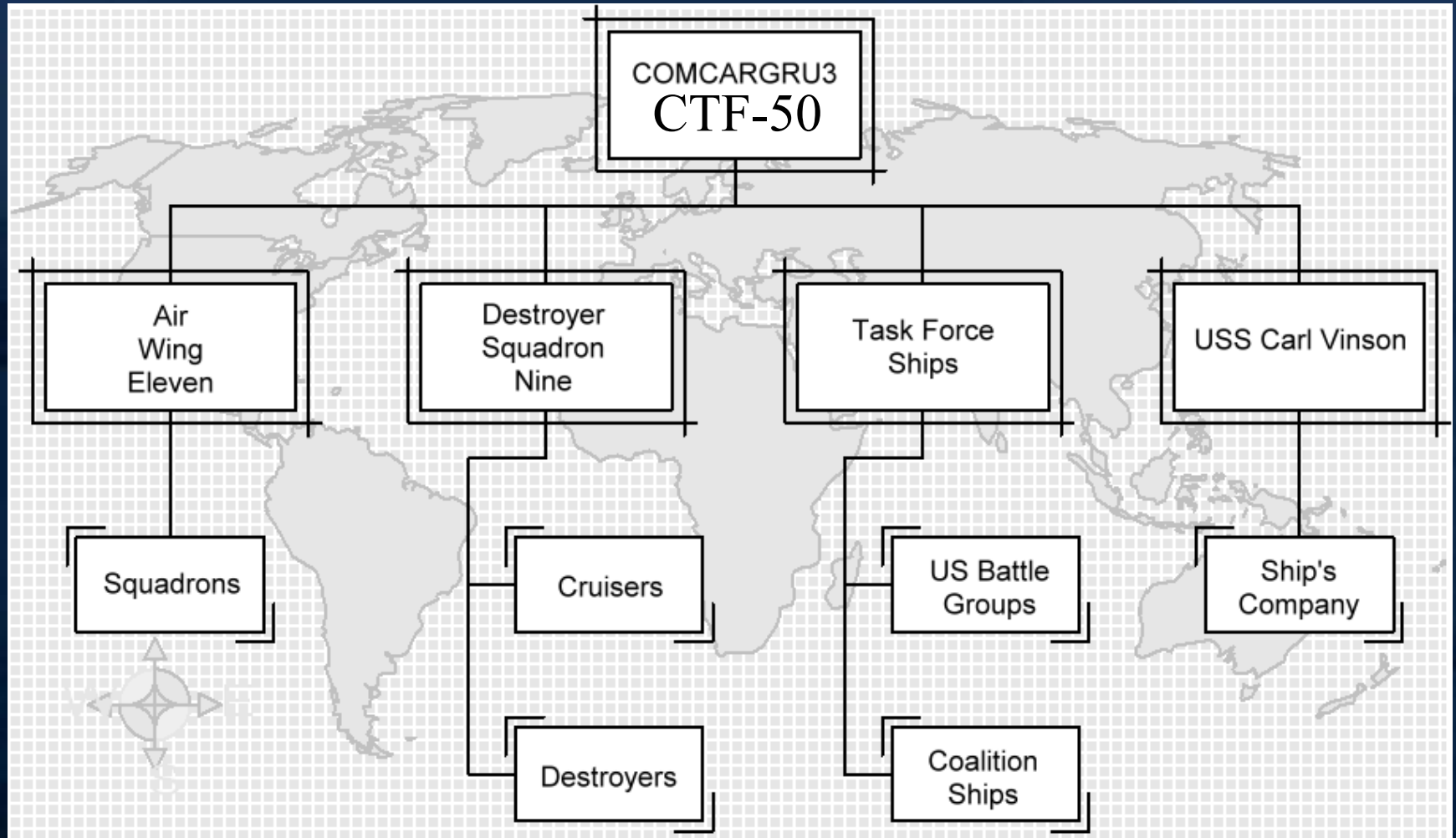


**EN ROUTE NORTHERN ARABIAN GULF FOR
OPERATION SOUTHERN WATCH / MARITIME
INTERDICTION OPERATIONS VS IRAQ**

COMCARGRU3 Org Chart

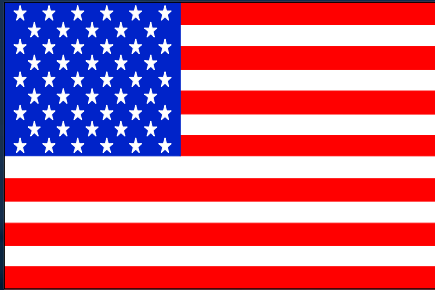


CTF-50 Org Chart



Environment

59 Coalition Ships (6 Aircraft Carriers in RED)



USS Enterprise
USS Nicholson
USS Obrien
USS McFaul
USS Arctic
USS Providence
USS John Paul Jones
USS Kitty Hawk
USS Curtis Wilbur
USS Gary
USNS Rappahannock
USNS Saturn
USNS Niagara Falls
USNS John Ericsson

USS Carl Vinson
USS Antietam
USS Ingraham
USS O'Kane
USS Sacramento
USS Key West
USS Olympia
USS Peleliu
USS Comstock
USS Dubuque
USS John Young
USS Russell
USS T. Roosevelt
USS Leyte Gulf
USS Peterson
USS Detroit
USS Hartford
USS Bataan
USS Shreveport
USS Whidbey Island



JDS Hamana
JDS Kirisame
JDS Kurama
JDS Towada



FS Courbet
FS Var



HMS Illustrious
HMS Southampton
HMS Kent
HMS Bayleaf
HMS Triumph
HMS Trafalgar
RFA Fort Victoria



ITS Garibaldi
ITS Aviere
ITS Zeffiro
ITS Etna

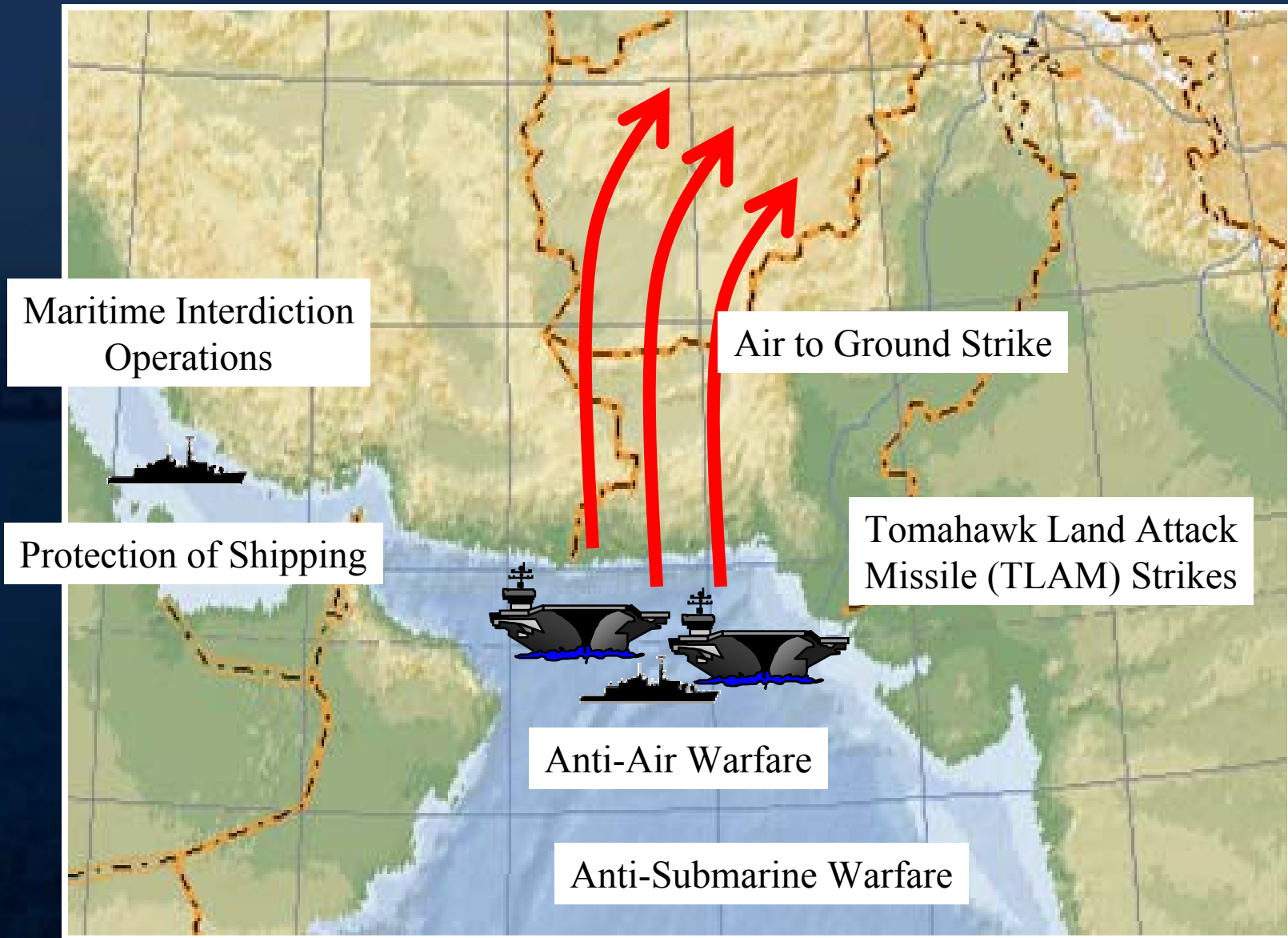


HMAS Sydney
HMAS Anzac
HMAS Kanimbla
HMAS Adelaide



HMCS Iroquois
HMCS Charlottetown
HMCS Halifax
HMCS Preserver

Missions



Maritime Interdiction Operations (MIO)

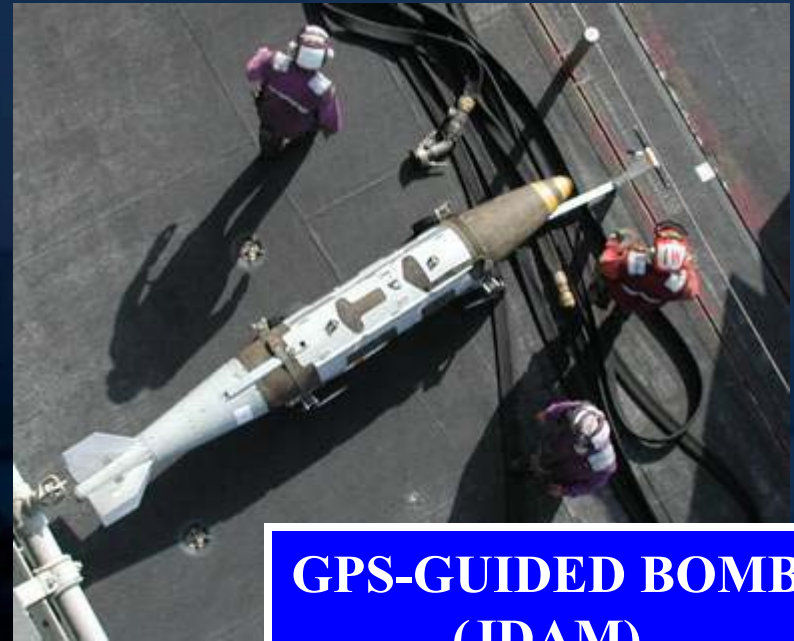
- Multi-national maritime interception forces implementing sanctions against Iraq
- An average of 200 queries, 100 boardings, and 10 diverts per month



Munitions



LASER-GUIDED BOMB



**GPS-GUIDED BOMB
(JDAM)**



TOMAHAWK LAND-ATTACK MISSILE (TLAM)

Scale of Operations



24,905

FLIGHT HOURS



8,688

TOTAL SORTIES



2009

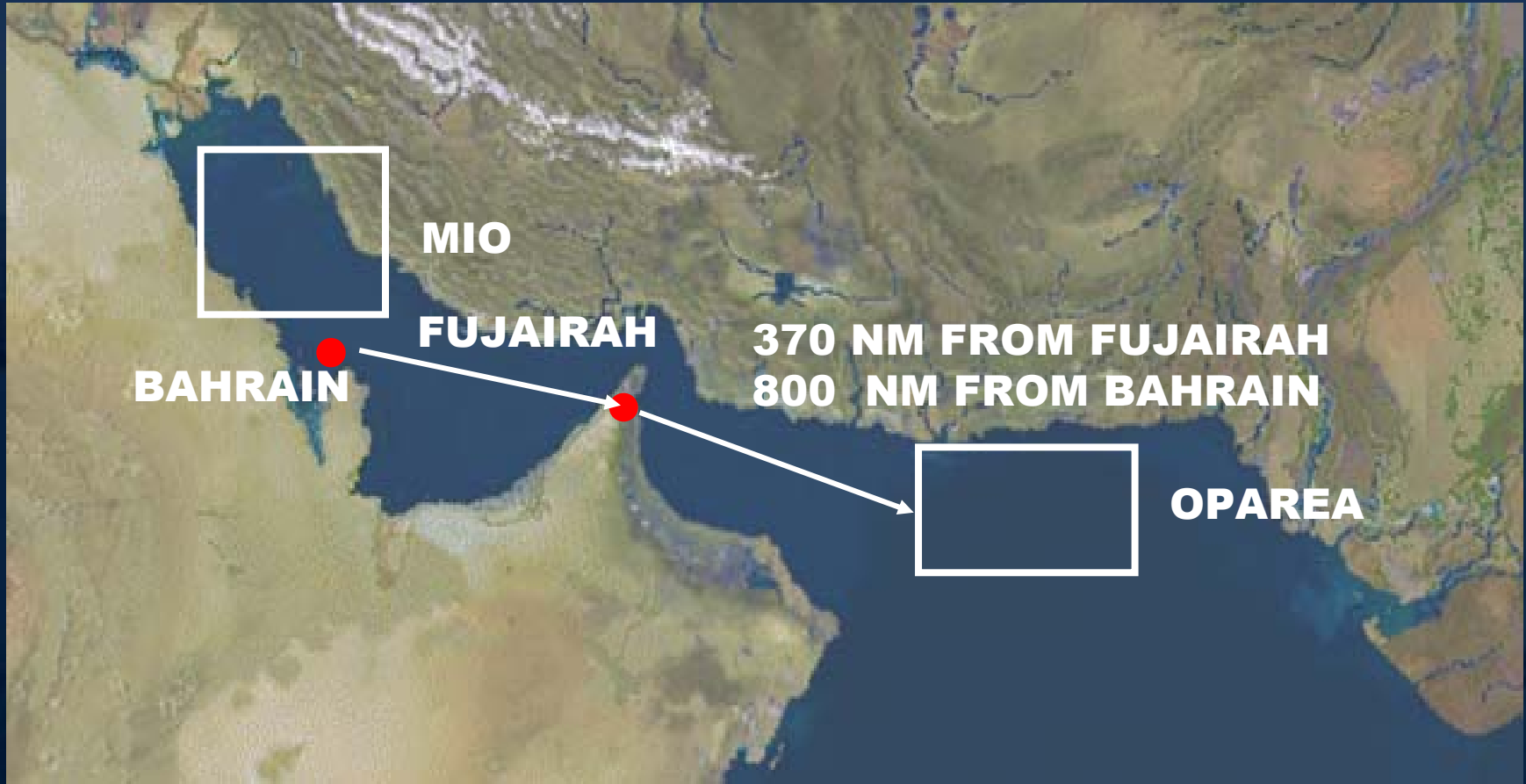
BOMBS DROPPED



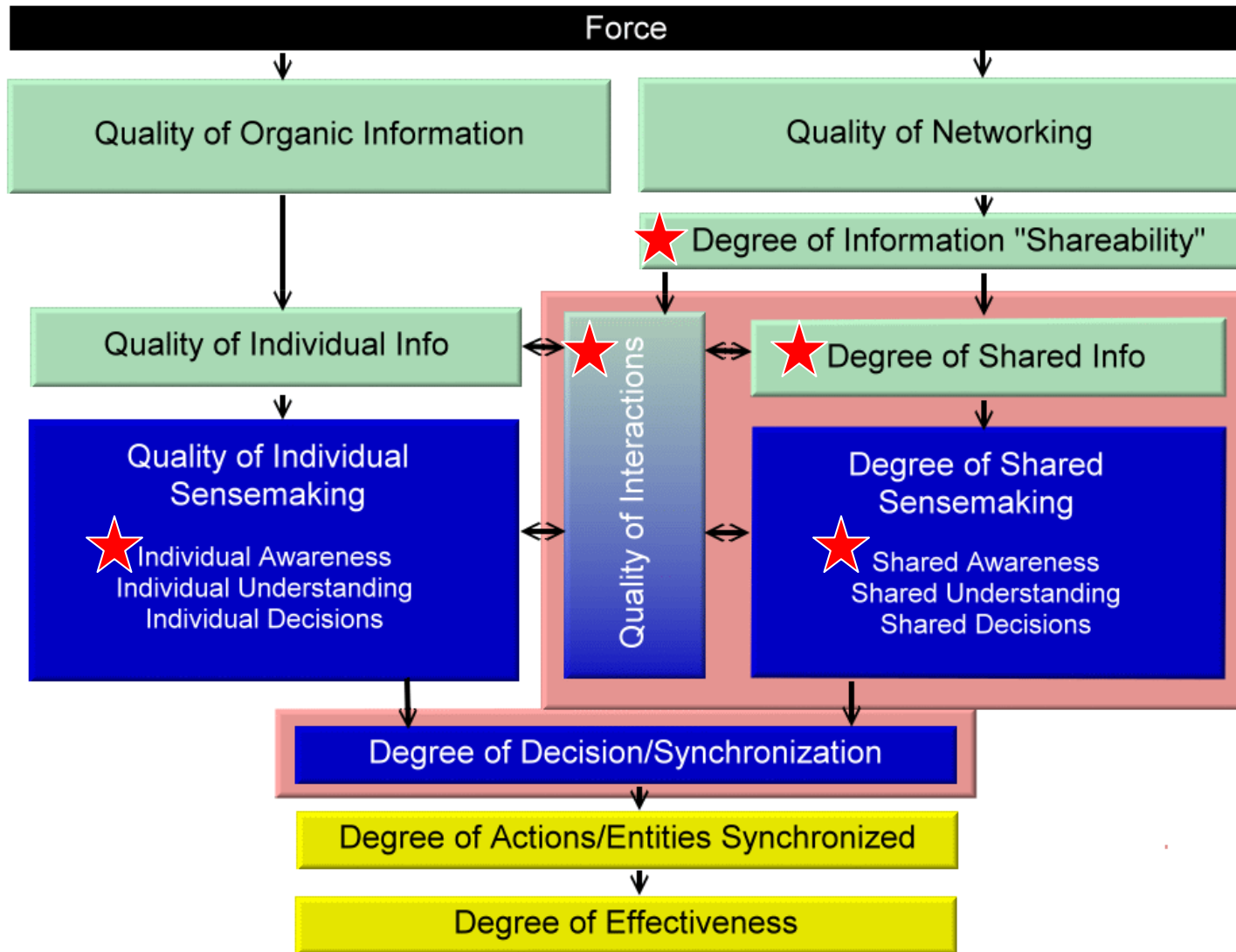
2,020,000

POUNDS OF ORDNANCE

Distributed Forces



The Bottom Line



The Bottom Line

Network Centric Operations (NCO) in CTF-50

- Increased information accessibility (Shareability)
- Greater breadth/depth of information dissemination (Degree of shared information)
- Improved quality of interaction
- Greater quality of individual awareness
- Greater degree of shared awareness

The Bottom Line

- Other Findings (Social & Cognitive Domains)
 - NCW technology acceptance lessons
 - Establishing trust and collaboration in NCO
 - Cultural & organizational change for facilitating NCO success

Theory

- Decision-Making Theory
- Network Centric Warfare
- Technology Adoption
 - Technology Adoption Model
 - Technology Transition Model

Making Decisions?



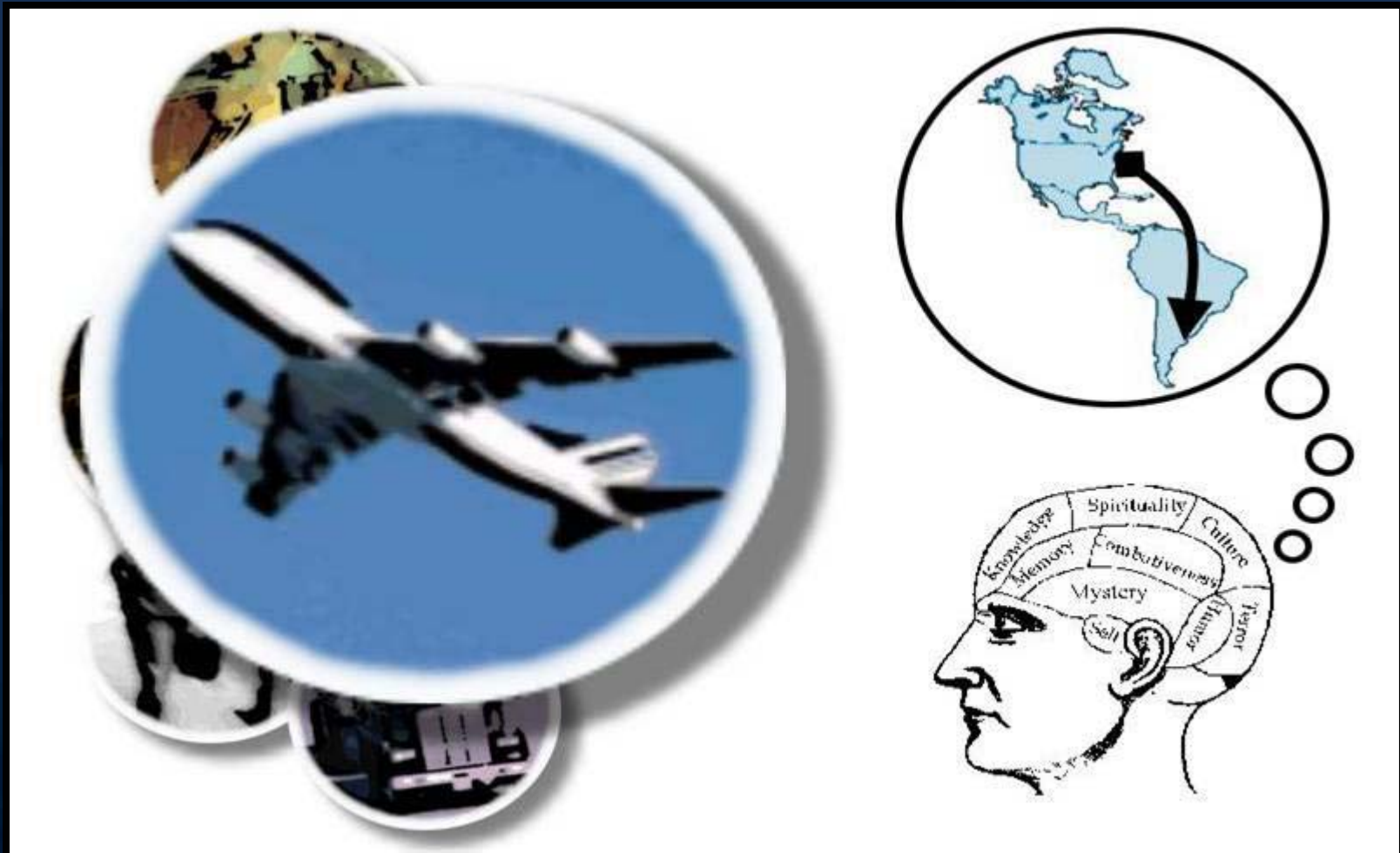
People build mental models of the world and how it works

Making Decisions?



Decision-makers try to “recognize” a situation and match it to their mental model

Making Decisions?

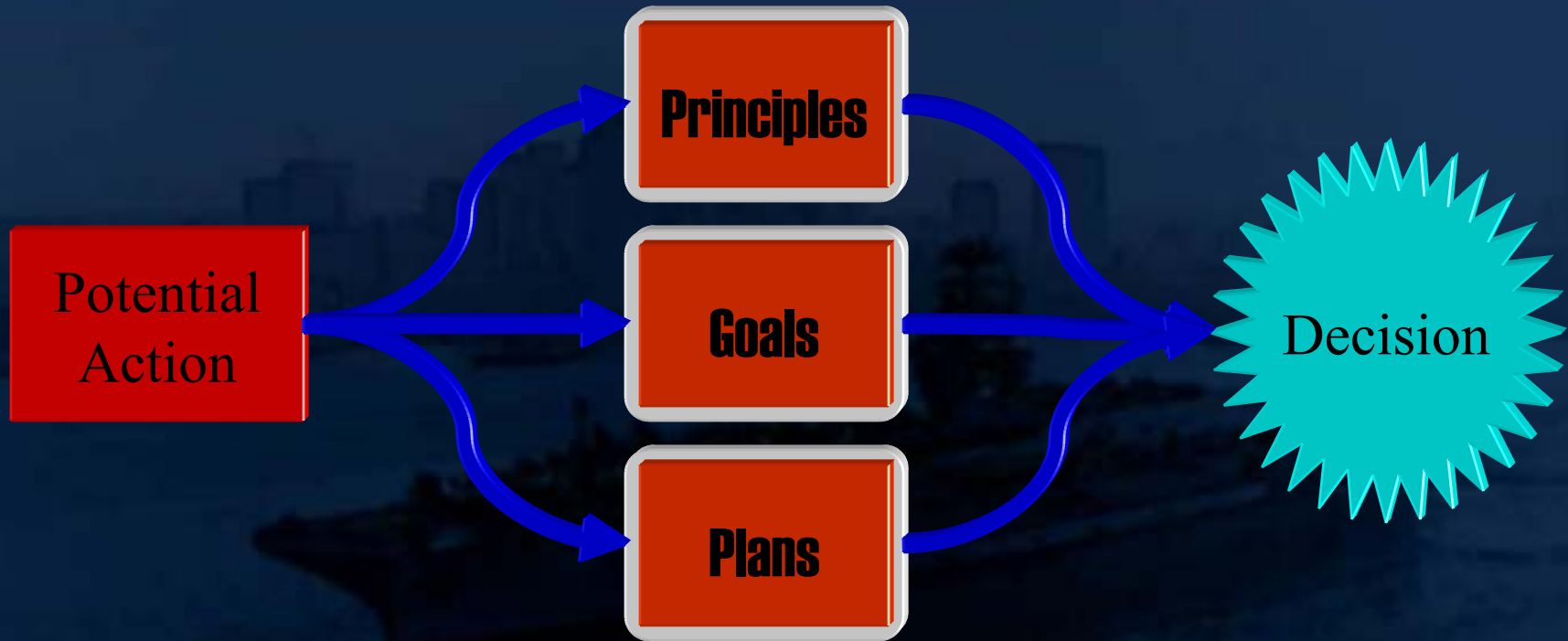


Decision-makers try to “recognize” a situation and match it to their mental model

Taking a Step Back

- What are we really trying to do?
- Why are these things important?
- How do we make them happen?

Making Decisions?



A potential course of action must conform to three “images” – Beach & Mitchell

Requirements for Decision Support

- Current Situation - What is Happening?
- History - What has Happened?
- Plans – OPORDs, FRAGOs, etc
- Goals – Commander's Intent
- Principles – Rules of Engagement
- Also...
 - Accurate Information
 - Timely Information
 - Shared Information

Boyd's Decision-Action Cycle



Advantage can be gained through faster tempo

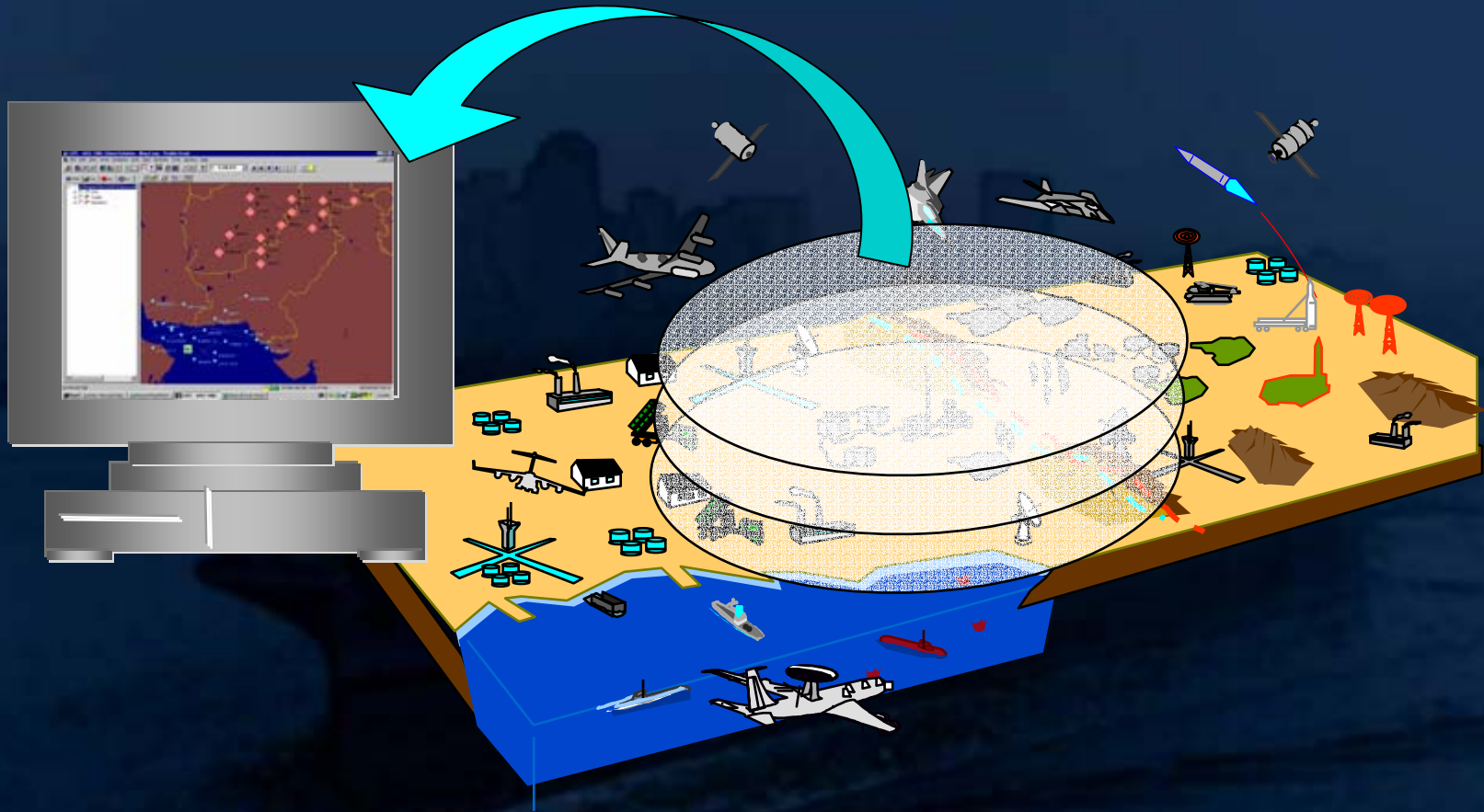
NCW Theory

- Network Centric Warfare theory expands on this by providing a means to the end

NCW Tenets

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

Shared Awareness



...requires complete, accurate, relevant and timely information shared over a robust network

Collaboration



Concerted Action Requires Concerted Thought

MIO Collaboration

- Creates an Information Advantage
 - working concurrently with shared information
- Exploits an Information Advantage to create a Tactical Advantage

Video of boarded ship transmitted from helo to frigate

The screenshot displays a Sametime Online Meeting Room titled "Sametime Online Meeting Room: SPI demo". The main window shows a video feed of a ship's deck with red arrows pointing to "PRIMARY" and "SECONDARY" insertion points. A chat window titled "DESRON 21 TAO/CDS21/Navy's Message [started: 5:40 PM]" is open, showing a conversation about boarding operations. The chat text includes:

Watch Captain Battl... I am in the meeting center now.
DESRON 21 TAO rgr.
Watch Captain Battl... Is this the latest picture of the smuggler.
DESRON 21 TAO Roger sir. Just got this is the latest including recommended insertion points. You can see the secondary is on further after and the primary is one deck up.
Watch Captain Battl... When are you planning to send the seals in.
DESRON 21 TAO Once with XB approve, we will have the HVBSS package reconfirm via FLIR that the insertion points are actually clear. If they are, the mission commander will confirm to XJ and then we'll give the go ahead.
Watch Captain Battl... From another chat, the helo aircraft commander prefers the secondary insertion point, please pass to Rentz. XB gives approval.
DESRON 21 TAO Roger sir, secondary insertion point approval. Will report once SEAL Team is aboard, and follow on with m/v secure report.
DESRON 21 TAO Have informed AA of non-compliant HVBSS authorization.

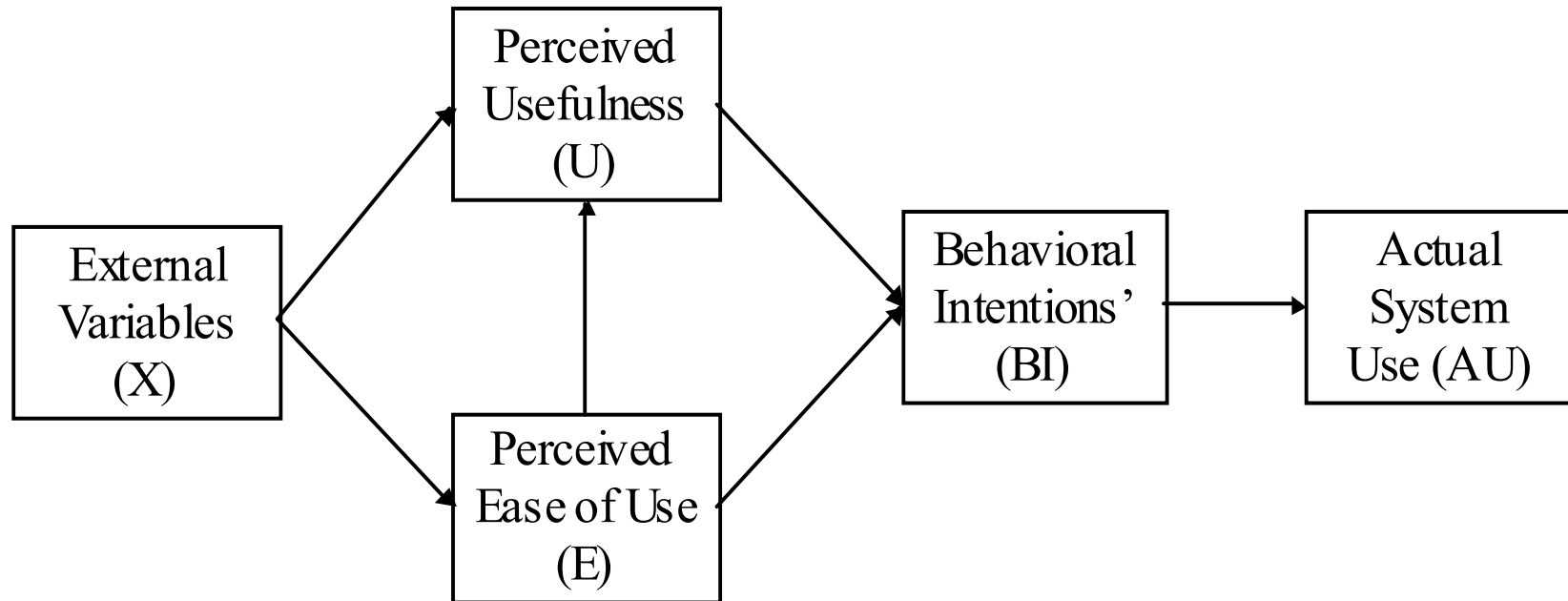
The chat window also shows a list of participants: DESRON 21 TAO, Elliot TAO, PRW-1 Det Bahr, Rentz TAO, Russell TAO, Watch Captain B, Watch Officer F, and XJ Watch Office.

Simultaneous chat discussion about boarding

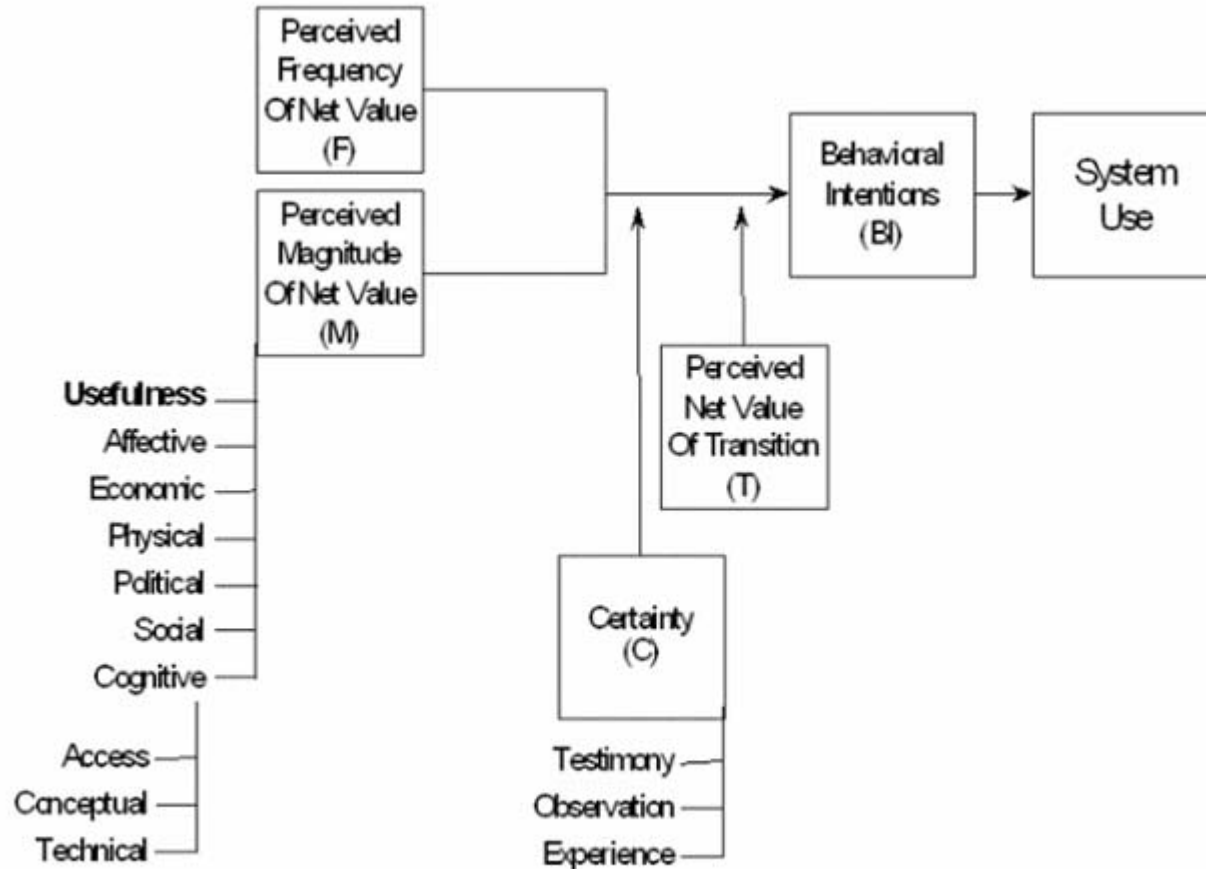
Technology Adoption Theory

- Identify what influences people in using new NCW systems

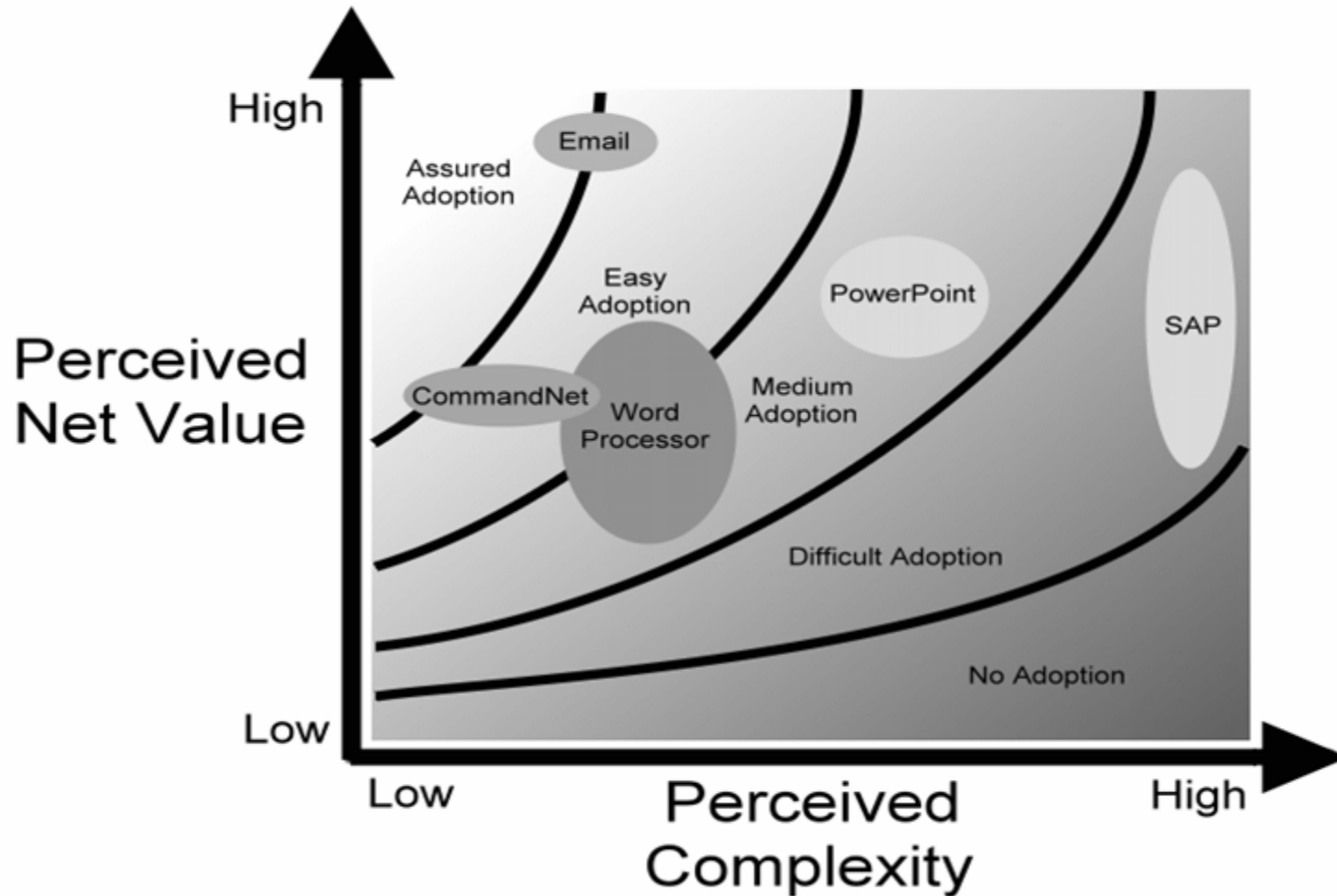
Technology Acceptance Model



Technology Transition Model



Simplified Tech Transition Model



Problem Formulation

How did CTF-50 use of Network Centric Warfare capabilities to enable:

- Self-synchronization
- Speed of command
- Mission effectiveness

Variables of Interest

Effectiveness & Efficiency

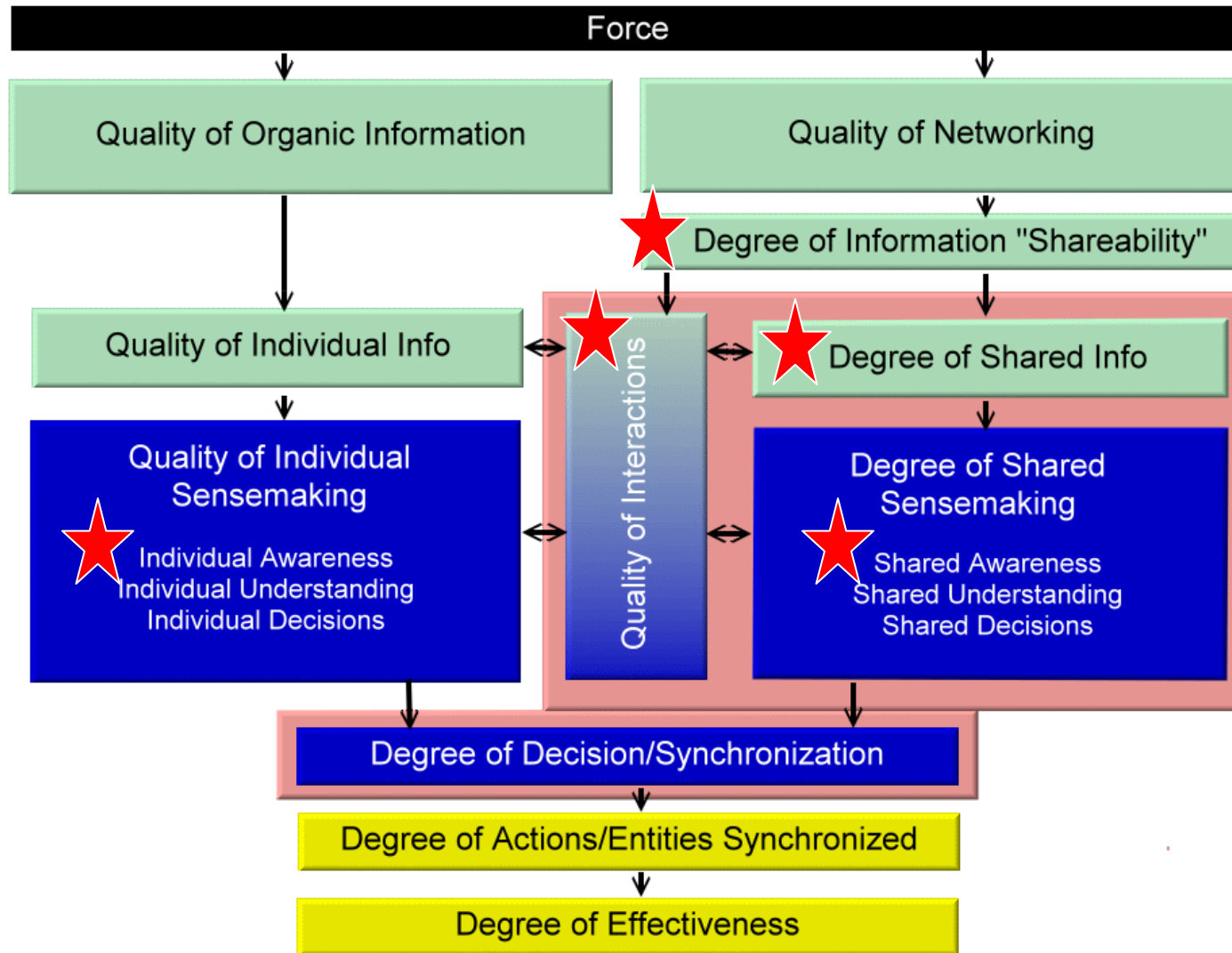
- Speed of command
- Breadth/Depth of information dissemination
- Individual awareness
- Shared awareness

Variables of Interest

Social Domain

- Technology acceptance
- Cultural & Organizational change

NCW Framework



Procedure

1. Identify actors (ships, squadrons, staffs & individuals)
2. Gather qualitative data – interviews
3. Fit the data to framework
4. Gather supporting and triangulating data
5. Write the story
6. Develop conclusions, recommendations and implications

CTF-50's Tools

- Knowledge Web (KWeb)
- CommandNet
- Chat

How did it work?

- Tailored information flow
 - Voice nets for imminent threat and orders
 - Secure chat for time-sensitive information to Tactical Action Officers (TAOs)
 - Web-based “CommandNet” logs for critical events
 - Web pages for analytical details and further information
 - Chat rooms for supporting administration

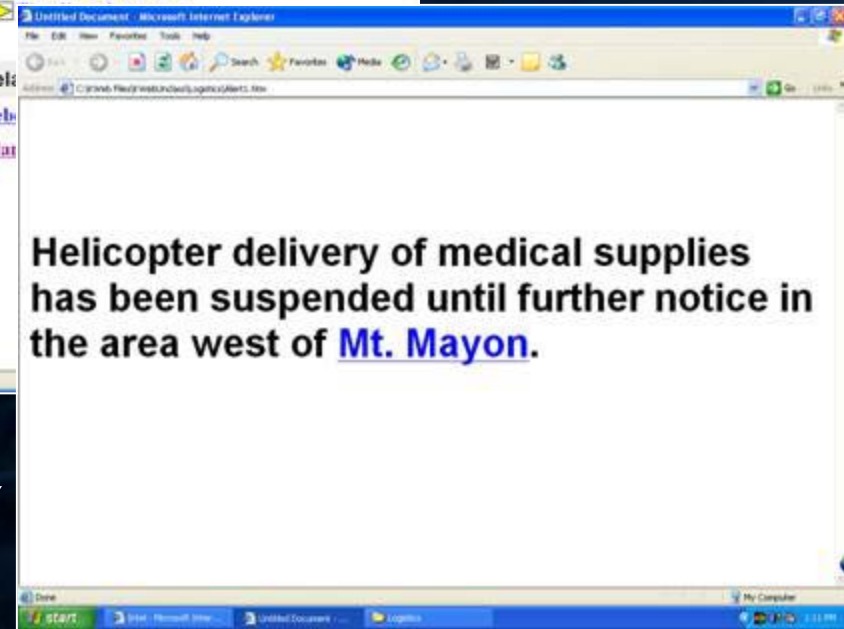
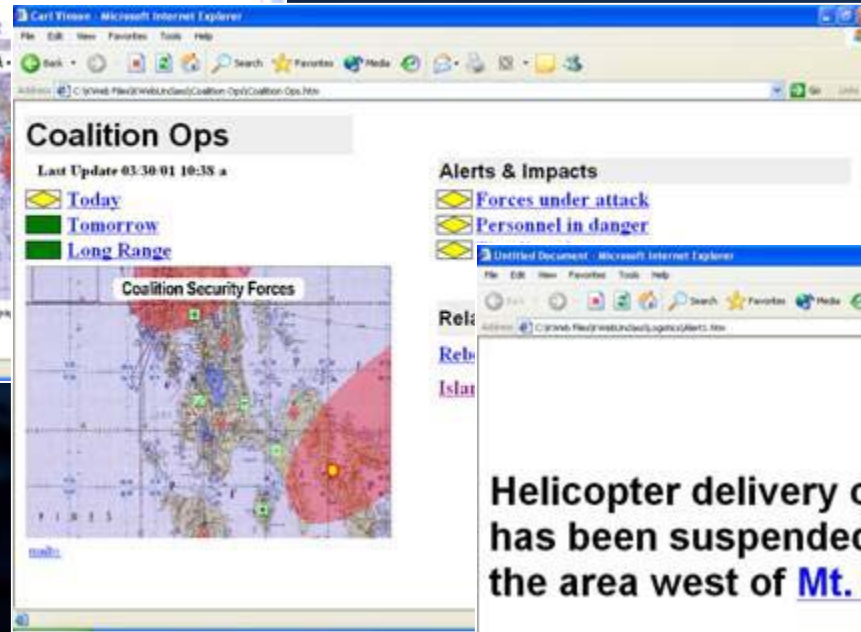
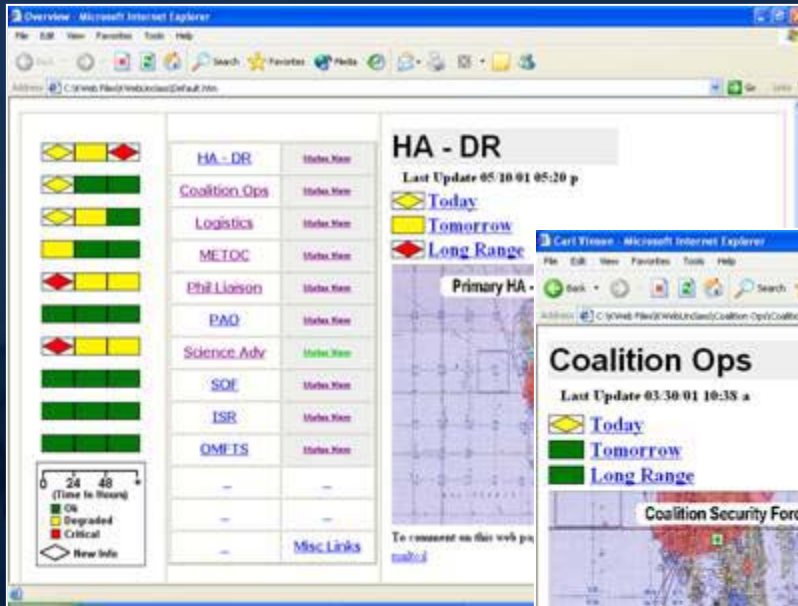
Video Wall
2x4 Matrix of Projector Cubes



K-Desks (3)
2x3 Matrix of LCDs



KWeb Hierarchy



Knowledge Web (KWeb)

- Web-Based Information Portal

KWeb Overview Page

The screenshot displays the KWeb Overview Page, which provides a comprehensive view of operational status and intent. On the left, a vertical column of status indicators uses colored diamonds to represent different operational areas: CWC, Metoc, Intel (circled in red), Air Defense, Maritime Ops, Strike, Info Warfare, Force Protect, Air Ops, Carl Vinson, C3, BG Logistics, ROE-JAG, TLAM, and Schedules. A legend below these indicators defines the colors: green for 'Ok', yellow for 'Degraded', red for 'Critical', and a white diamond for 'New Info'. A scale at the bottom left indicates time in hours (0, 24, 48, +).

The main content area is titled 'CWC' and includes the following information:

- Last Update 01/02/02 07:13 p**
- Last 24 hrs** (indicated by a green diamond)
- Today's CDR's Intent** (indicated by a green diamond)
- Future OPS and Plans** (indicated by a green diamond)

Below this information is a map of the Persian Gulf region, showing the coastline and various military assets. The map is titled 'TF 30 KAG KAS CPAREAS' and '30 NOV 31 / 0600D'. The map shows several assets in the region, including the USS Carl Vinson (CVN-70) and the USS Zumwalt (DDG-105).

To comment on this web page, please contact: <mailto:>

Typical KWeb Summary Page

Intel

Last Update 11/25/01 09:49 a

-  [Intel SITREP](#)
-  [Indications and Warning Log](#)
-  [Collections/Systems](#)

INN DELHI DDG










UNCLASSIFIED

To comment on this web page, please contact:

mailtc

Alerts & Impacts

-  [Atta's Post-War Plans](#)
-  [Anti-Taliban Primer](#)
-  [Kandahar Situation](#)
-  [Arabs Flee Afghan in Disguise](#)
-  [Small Boat Interdiction](#)
-  [Messages of Interest](#)
-  [Current OPINTEL](#)

Related Info & Links

- [USS CARL VINSON CVIC Homepage](#)
- [BF 50 BDA](#)
- [Return to Intel Brief](#)
- [Return to Sample KWEB](#)

Sample Underlying Content Page

OPINTEL Pakistan

GEOPOL

Naval Activity

MARPAT Activity

Air Activity

Air Defense Activity

Emitter Activity

Ground Activity

Terrorist Activity



- PK Protest Page
- JICPAC Pakistan PTMIG page
- Pakistan Recent Nuclear Activity as of 28JUL
- Tactical Activity Log
- PK Plotsheets
- Pakistan INTEL BRIEF
- Pakistan's Intelligence and Security Services
- Afghanistan Page
- PK AOB.jpg

Page Maintained By Supplementary Plot (SUPPLOT) Knowledge Manager (SKM)

- e-mail: SKM@ccq3.navy.smil.mil
- Chat name: CVIN_RDBM
- J-dial: 6220

Degraded TACAIR conditions due to low level cloud cover and fog.

Red: Recommend GPS only

NORTH
 Sky: Mostly cloudy
 Winds: VRB 5-10kts
 Vis: 4-6 in haze, 1-3 in

Yellow: Recommend mixed GPS and LGB loads.

Clear: No LGB restrictions!

EAST AFGHANISTAN
 Sky: Partly cloudy
 Winds: NW 7-12kts
 Vis: 3-5 in haze.

Central
 Sky: Mostly cloudy
 Winds: WNW 7-12kts
 Vis: 4-6 in haze, 3-5 in susp dust

WEST
 Shindand
 Sky: Mostly cloudy
 Winds: NNW 20-25G35kts
 Vis:

Brown: GPS only

Degraded lasing due to Blowing Dust after 28/12Z

AFGHANISTAN TACAIR IMPACTS FORECAST VALID 12Z TO 00Z

Marginal impacts to TACAIR

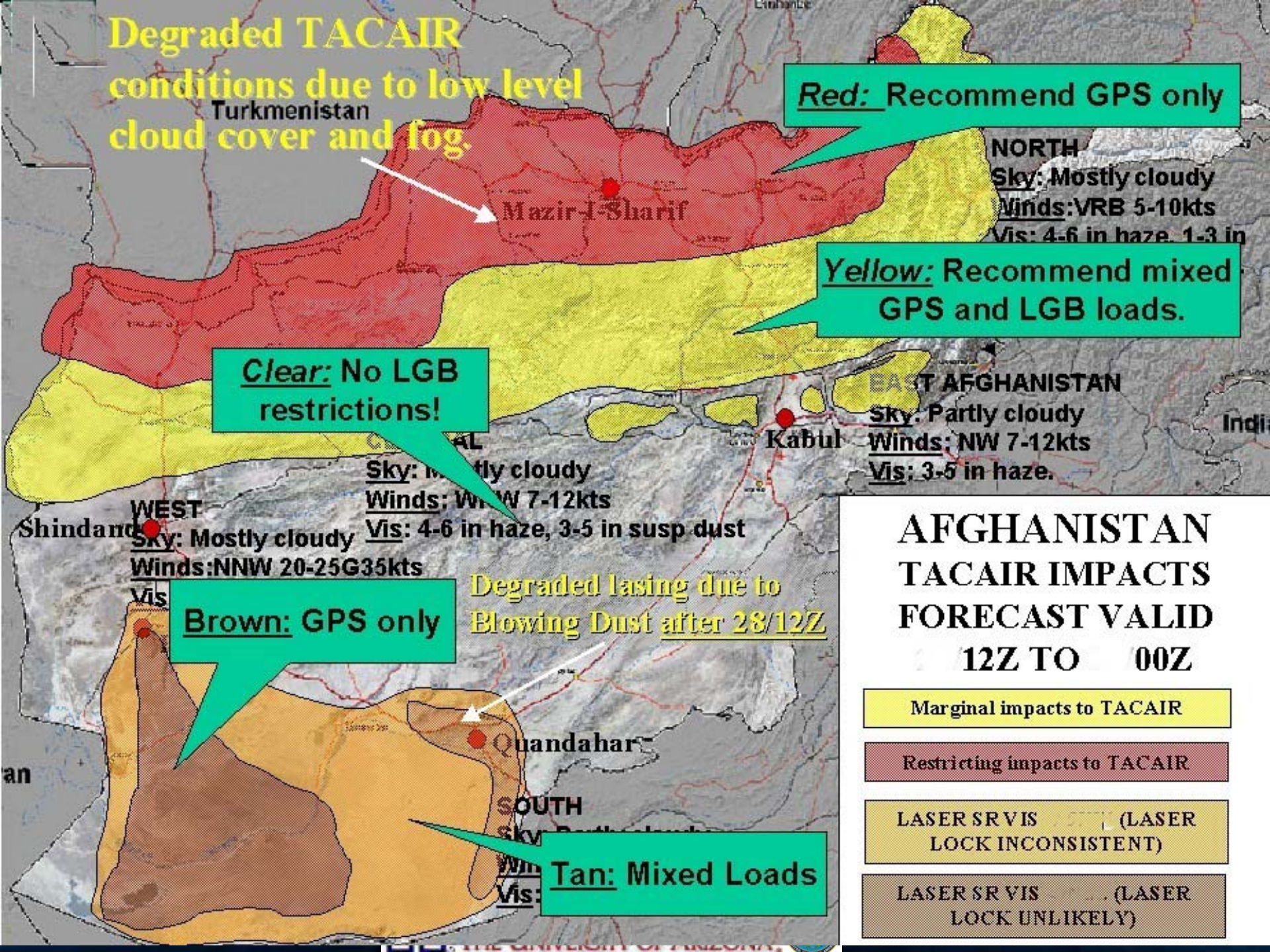
Restricting impacts to TACAIR

LASER SR VIS (LASER LOCK INCONSISTENT)

LASER SR VIS (LASER LOCK UNLIKELY)

SOUTH
 Sky: Partly cloudy
 Winds: WNW 7-12kts
 Vis:

Tan: Mixed Loads



Battle Damage Assessment Spreadsheet

DATE (MISREP)	FACILITY NAME (Pre-strike imagery)	BHA (WSV)	BDA (Post-strike imagery)	WEAPON	ACFT	PKG	DMPI DESCRIPTIO	DMPI	BE NUMBER	PILOTS' COMMENTS/	MSN NUM
11/25/01	12P	N/A	N/A	N/A	N/A	CAS 3	COMPOUND	CMPND	12P	MES gun fight, missile shot	
11/17/01	10G	HIT	Pending	Bomb1	Fighter1	SCR 2	VEHICLE	VEH	10G	No luck for guys that get out of vehicle and	
11/17/01	17P	HIT	Pending	Bomb1	Fighter1	XCAS 4	TRUCK	TRUCK	17P		2543
11/16/01	17P	HIT	Pending	Bomb1	Fighter1	XCAS 3	TROOPS IN BLDG	TROOPS	17P		
11/14/01	16P	HIT	Pending	Bomb3	Fighter2	INT 4	BARRACKS	BKS	16P	Entire area lit up	
11/12/01	17L	HIT	Pending	Bomb5	Fighter1	SCR 5	VEHICLE	VEH	17L		2605
11/10/01	16P	HIT	Pending	Bomb5	Fighter1	SCR 2	VEHICLE	VEH	16P		
11/8/01	QANDAHAR MOTOR TRANS FAC	HIT	DESTROYED	Bomb4	Fighter1	SCR 2	POL STORAGE	ADM499	0442CA0035	Continuing explosion	
11/6/01	KESHEND YA PAIN DSA	HIT	Pending	Bomb1	Fighter1	FAC 4	VEHICLE	VEH	0337ST0008		2705
11/5/01	130	HIT	Pending	Bomb1	Fighter1	FAC 2	TROOPS	TROOPS	130		2703
11/1/01	120	HIT	Pending	Bomb1	Fighter1	SCR 4	VEHICLE	VEH	120		2605
10/29/01	17L	HIT	Pending	Bomb1	Fighter1	SCR 3	VEHICLE	VEH	17L		
10/27/01	HOSEYN KUT ARMY BKS	HIT	PROB DESTROY	Bomb5x2	Fighter1	FAC 7	BUILDING	BLDG	0431-00160		2703
10/7/01	FARAH EW RADAR FAC	HIT	DESTROYED	Bomb1	Fighter1	B	CTR OF SPT BLDG	A0G475	0430CA0085		
10/7/01	HERAT AFLD	HIT	DESTROYED	Bomb1	Fighter1	B	CTR RWY	A20306	0430-08400	Hit one MIG-21	

CommandNet

- Collaborative Logging Tool

CommandNet Entry Screen

Entry Area

Classification

Select Priority

Select Category

Hyperlink

Log Title: Test
Author: Mark Adkins
DTG: 22-OCT-01 13:22
Classification: SECRET REL UK
Importance: Routine
Category: Mining Activity
URL Link:
URL Desc:

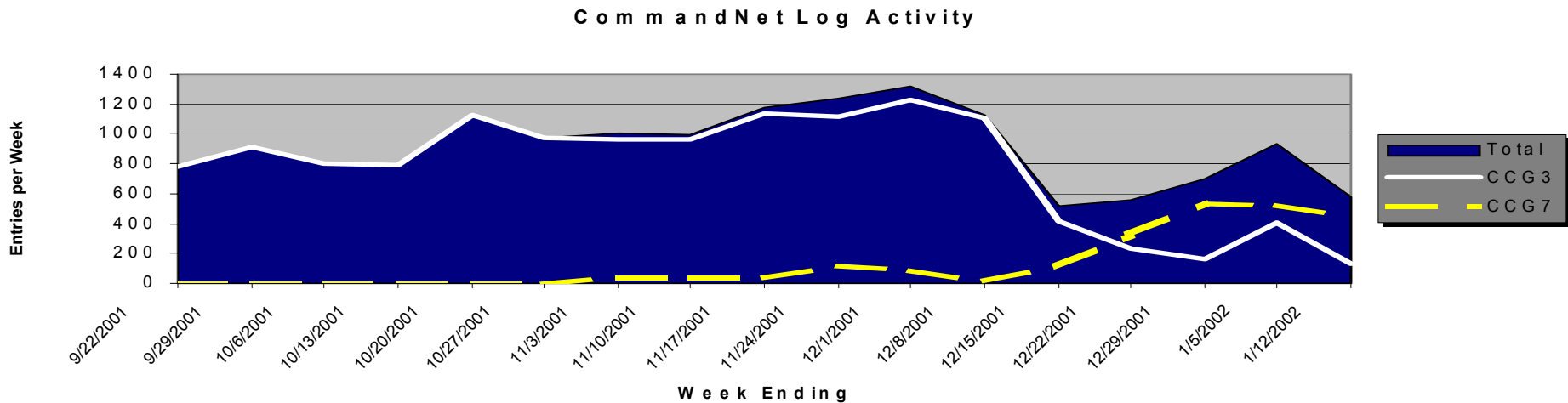
#	Imp	Time	Category	Classification and Entry
#25	R	1454 U 21 OCT 01 2254 Z 21 OCT 01	Submarine OPS	SECRET P-3 buoys away at 050 37 33E 33 00 30N
#24	R	1452 U 21 OCT 01 2252 Z 21 OCT 01	Pass Down	UNCLAS LKC completed 2 VBSS between 0001 and 0600. SPUR and TAL FEATHER.
#23	R	1450 U 21 OCT 01 2250 Z 21 OCT 01	Air OPS	UNCLAS MG-29 dirty with max load AA-7 Kerry and AS-14 Kedge MG 29 Technical Review
#22	P	1448 U 21 OCT 01 2248 Z 21 OCT 01	MEDVAC	CONFIDENTIAL 1 pax with coreman on moose 7 for transfer to qual run medical facility. ETA 0633
#21	R	1448 U 21 OCT 01 2248 Z 21 OCT 01	MO	UNCLAS LKC rpts Gompin vessel Spur has proper papers to sell oil
#20	R	1444 U 21 OCT 01 2244 Z 21 OCT 01	Submarine OPS	SECRET USS Tucson rpt contact with OSCAR 33 in montebella gulch Information on OSCAR Class Submarines
#19	R	1443 U 21 OCT 01 2243 Z 21 OCT 01	Air OPS	UNCLAS INTEL RFTS 4 MG 29s took off from Famous Grouse at 0533.
#18	R	1442 U 21 OCT 01 2242 Z 21 OCT 01	MEDVAC	CONFIDENTIAL SMO on Boxer rpts man down with degloving of left index and pinkie. Situation may require transport to land based facility.
#17	P	1513 U 21 OCT 01 2313 Z 21 OCT 01	MEDVAC	UNCLAS Pax arrived at Zongo hospital and are being attended to by Dr. Zule
#16	R	1441 U 21 OCT 01 2241 Z 21 OCT 01	SITREP	UNCLAS COMMS check complete all in BG up 100% Green
#15	P	1440 U 21 OCT 01 2240 Z 21 OCT 01	Air OPS	UNCLAS CAPT Moose rpts deck follow on JCS due to hydraulics on #2 wire. Launch package 33 3 rev 3 is canceled. Looking for divert AA33 to Desktop in at 0545Z.
#14	R	1439 U 21 OCT 01 2239 Z 21 OCT 01	Air OPS	SECRET P-3 on station at 0533Z

CommandNet Usage

- **USS Carl Vinson 13,880**

Log entries

- Battle Watch (4026)
- Maritime Intercept Operation (MIO) Surge (1513)
- Network Centric Feedback (28)
- Sea Surveillance Coordinator (SCC) Watch Log (47)
- Submarine Watch (559)
- Tactical Flag Command Center (TFCC) Watch Supervisors Log (986)
- Warfare CDR SITREP (6730)



Sources of Data

Interviews

Archival Data

- CD-ROM of KWeb Site
- CommandNet Logs
- Unclassified Post Deployment Brief
- Published U.S. Naval Institute Proceedings Paper
 - “Network-Centric Intelligence Works!” - CAPT McKrell
 - “Knowledge Web plays big in transformation” - LCDR Majeranowski

Sources of Data

Interviews

1. Commander CTF-50 – Rear Admiral, USS Carl Vinson
2. Commanding Officer of Cruiser (CG) - USS Antietam - AEGIS Anti-Air Warfare (AAW) - MIO operations in North Arabian Gulf
3. Commanding Officer – Frigates - FFG - USS Ingraham - MIO operations in North Arabian Gulf
4. Commander Carrier Group - 3
 1. COMCARGRU3-N6 - CAPT (O6) – Command, Control, Communications, Computer
 2. COMCARGRU3-N2 - CAPT (O6) – Intelligence
 3. COMCARGRU3-COS - CAPT (O6) - Chief of Staff
 4. COMCARGRU3-N3D – CAPT (O6) – Deputy Operations
 5. Assistant Battle Watch Captain & Tomahawk Land Attack Missiles (TLAMs) Officer - LCDR (O4)
 6. Battle Watch Captain & Air Operations Officer – CDR (O5)

Interviews

- **Duration:** 14APR03-06MAY03
- **Time:** 60-75 minutes
- **Location:** Officer's Office
- **Props:** 4 slide Pre-Interview Brief
 - Who we are, how we got here, model, what we need
- **Interviewers:** Lead & Scribe
- **Format:**
 - NCW capabilities enable self-synchronization, speed of command & mission effectiveness
 - “End to End” story of how
 - Verifiable evidence
 - Tell us about
 - the dramatic success you had
 - a typical day using NCW capabilities
 - what you noticed that was different with NCW

Pre-interview Brief

Supplied to each subject prior to
meeting with researchers



Who we are...

- Center for the Management of Information University of Arizona
 - Research Center established in 1985
 - Develop collaborative technology in the field and laboratory
 - Technology transfer GroupSystems.com
 - DoD Sponsorship – DoD/OFT, Air Force, Army, Naval Forces
 - Navy Focus
 - 1995 DARPA Funding
 - Applied Research Experience
 - Fleet commands
 - Carl Vinson, Constellation, Lincoln, Chosin, Belleau Wood
 - Exercises
 - » RIMPAC 98, 00; FBE A, B, E, J; Kernel Blitz, JTFEX –XX
 - » Global 2001
 - CommandNet development and implementation
 - Network Centric Innovation Center
 - C3F Commander Conferences
 - TACTRAGRUPAC – NCW Commanders Course –MAY03
 - ForceNet Campaign Plan

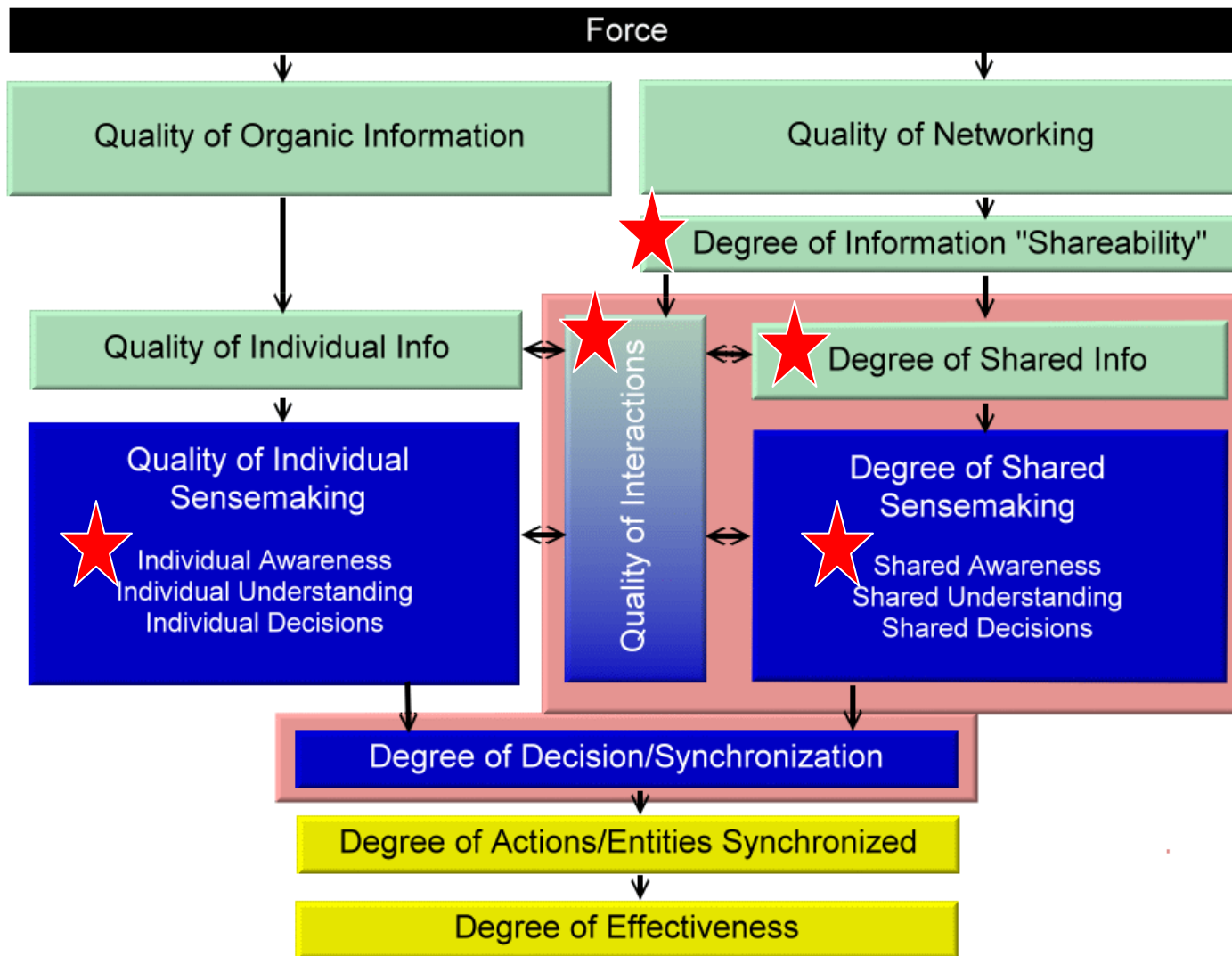
How we got here...

- Thousands of hours of time at sea observing and living collaboration technology and concepts
- Developed and implemented CommandNet collaborative logging tool
- CommandNet Brief
 - Battlespace Information Conference
 - Network Centric Warfare: Leveraging The Power of The Network To Enhance Your Warfighting Capability – Brussels
- Office of Force Transformation
 - John Garstka

What we need...

- An “End to End” story of how NCW capabilities enable self-synchronization, speed of command & mission effectiveness
- Verifiable evidence of NCW capabilities enabling self-synchronization, speed of command, and mission effectiveness
 - Types of evidence – Indirect and Direct
 - Outcome evaluations
 - Observational studies
 - Systematic Reviews – Archival data
 - Experiments
- A case study illustrates NCW concepts and increases understanding

What we got...



Speed of Command

- “In my heart I know we improved speed of command...” RADM Zelibor
- Updates posted continuously – faster than old methods
 - The chat is better because it gives history, you can watch things unfold in near real time.
 - In the old days you had an OS3 writing while someone was talking at mach 3 on the radio. They would miss a lot.
- Morning briefs last 30-45 minutes
 - Usually 1 to 2 hours
 - Post brief meetings were ad hoc that dealt with future plans and how to improve situations

Speed of Command

- CARGRU3 was inside of the Third Fleet decision loop before we even sailed.
 - Intelligence gathering was the key.
 - We were acting on pictures and nuggets rather than 100 page documents.
- Increased speed of command allowed for “slack.”
 - Increased time for rest & relaxation – e.g. Battle group staff playing cards vs. typical “You can sleep when you’re dead” attitude
 - Measurable benefits to the staff

Speed of Command



RADM Zelibor, Commander Task Force Fifty

Information Accessibility (Shareability)

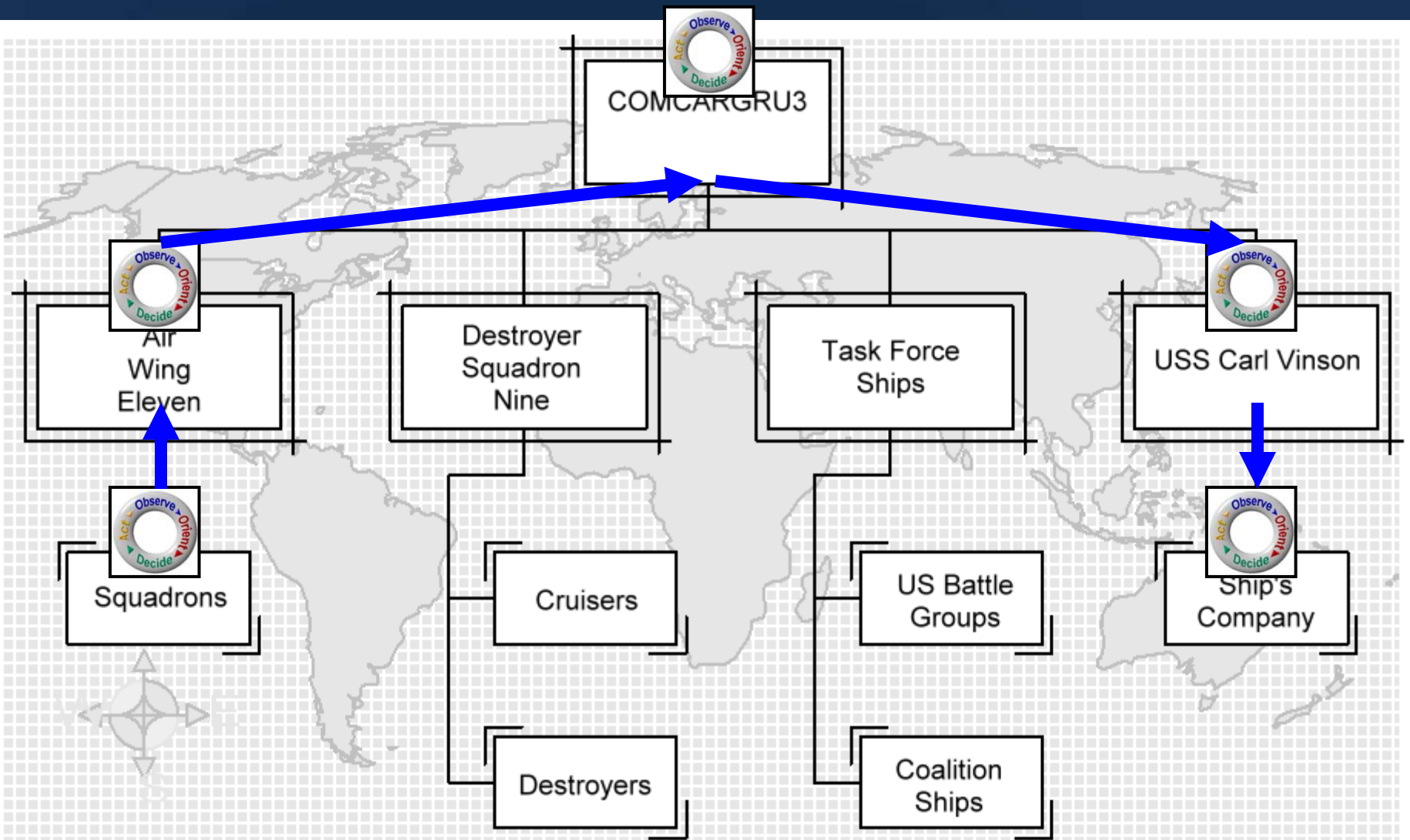
- Before
 - Normal operations are built around operational summaries and intentions messages. Every night they would send out their daily intentions. You went thru all of those and the operational task structure
 - People carried big tabbed notebooks of their info, ops officer's notebook, 3-4 guys would just spend their time updating notebooks
- With NCW Tools
 - With KWeb you don't have to read thru everything to get info
 - “I didn't read a single intentions message” - Cruiser Commander
 - More time to plan tactics and strategy

Information Accessibility

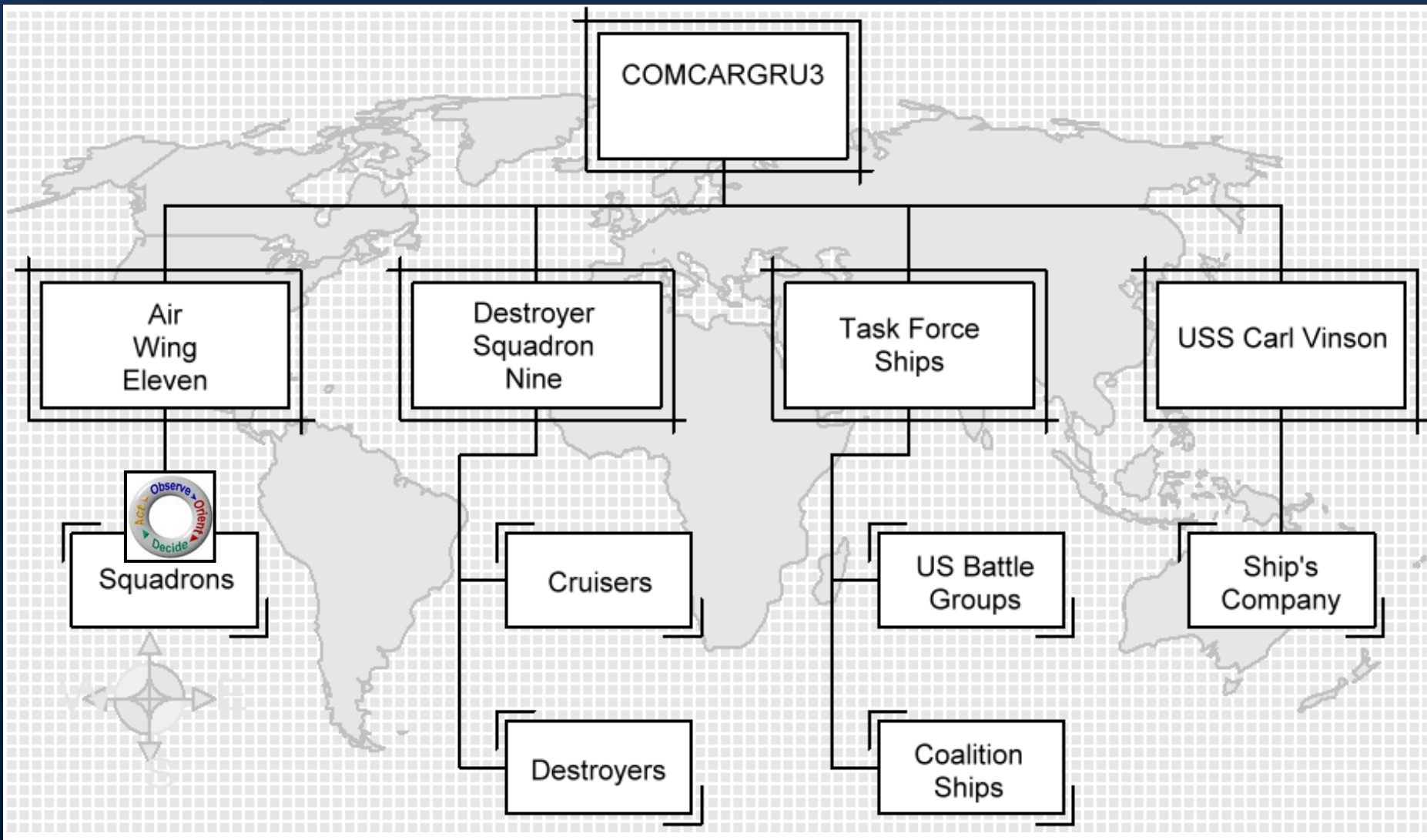


CAPT Fitzpatrick, Deputy Operations

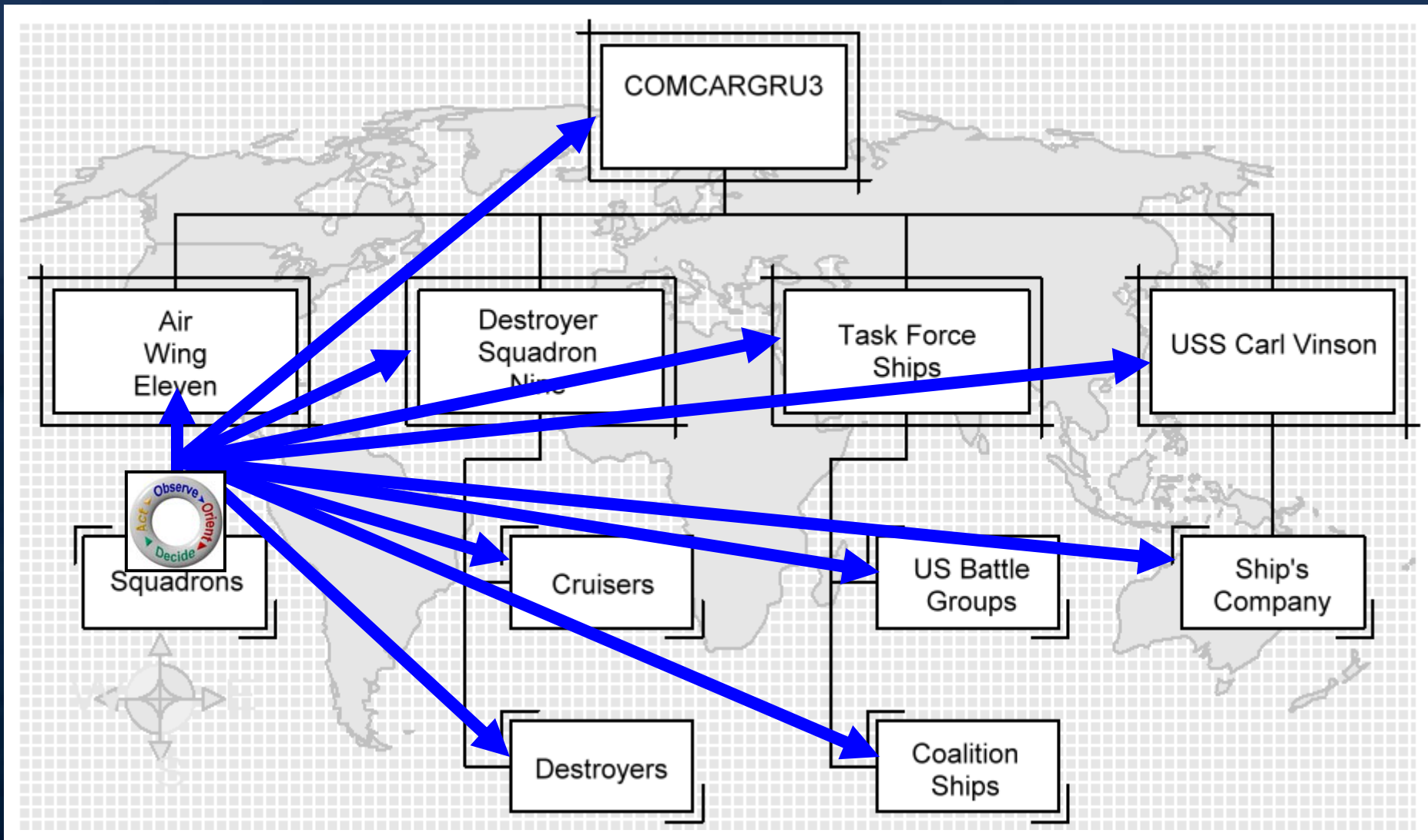
Hierarchical Information Flow



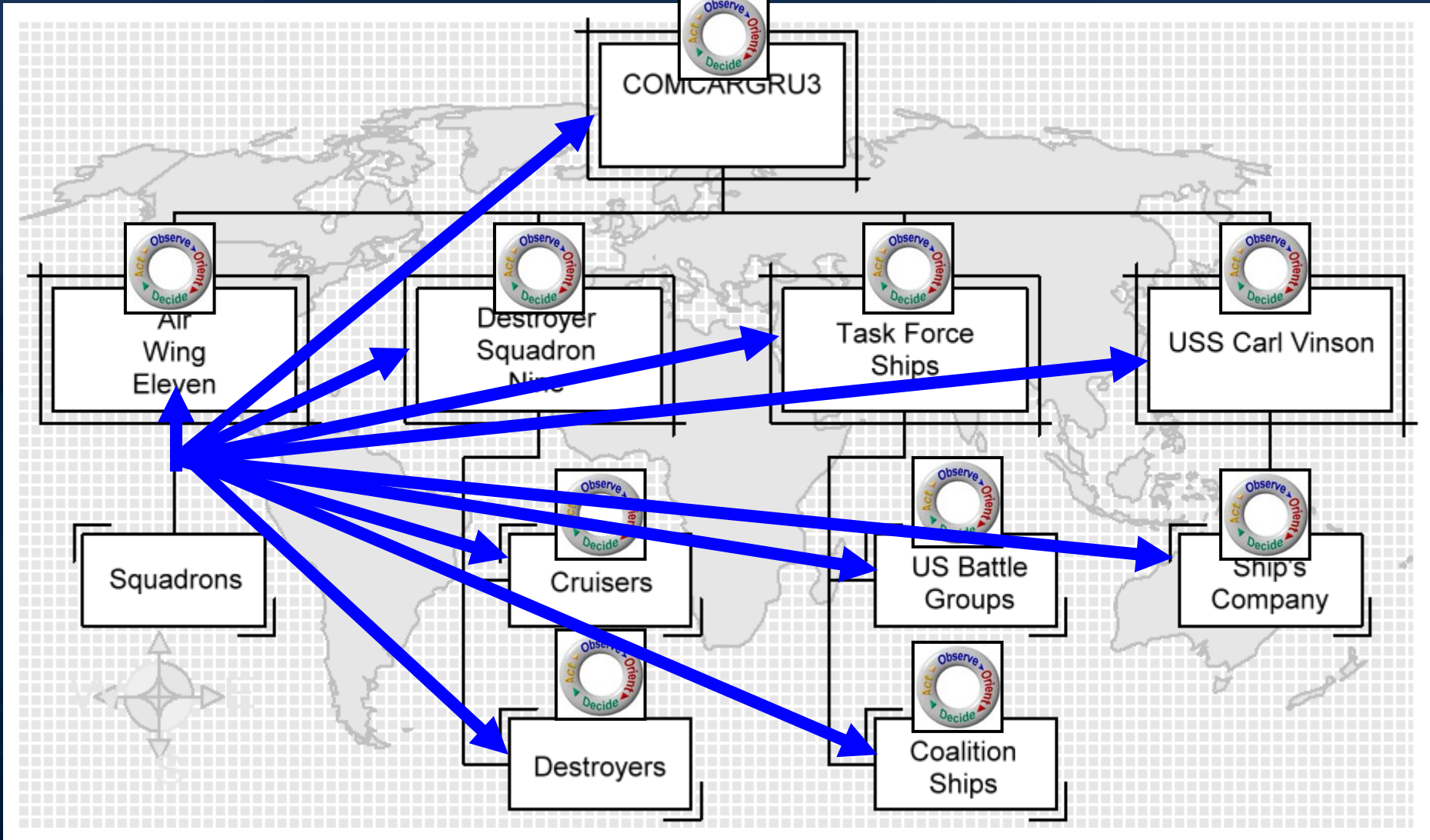
Old Information Flow



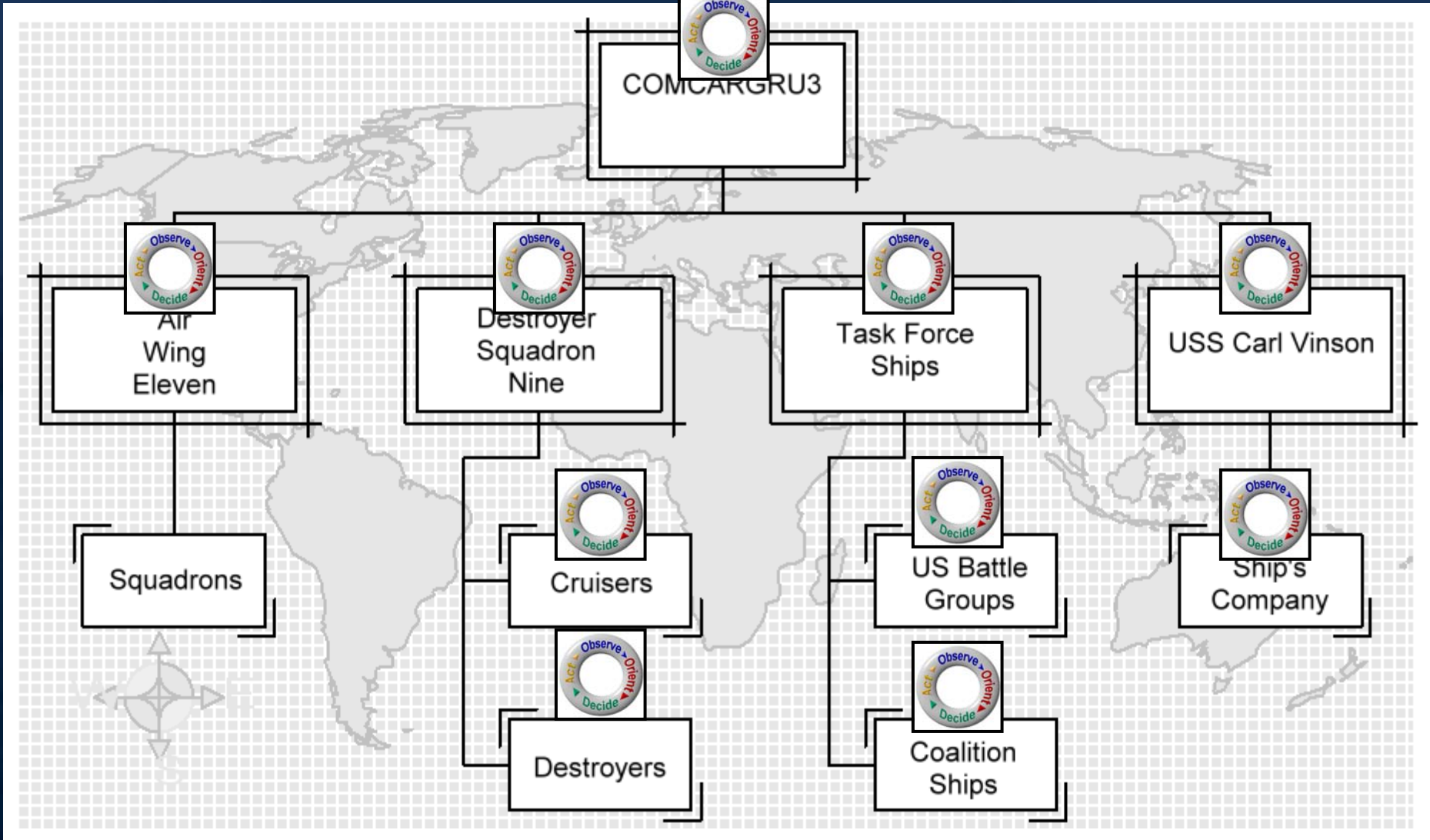
CTF-50 Information Flow



CTF-50 Information Flow



CTF-50 Information Flow



Information Dissemination

- **Before**

- Intel briefs every day, walking around with classified stuff, record messages, daily intelligence summary in message format
- This meant that intelligence team spends night before getting brief together, day old stuff. 0800 brief is 1-2 days old in some cases. Once a day snapshot that is a kludge of old, new data. Don't have the people to do it twice a day.

- **With NCW Tools**

- Inestimable value to having an assistant J2 that can do other things besides create a brief
- Fixed it so that dynamic web pages could be edited every 5 minutes in word.

Breadth/Depth of Info Dissemination

With NCW Tools

- Watch standers had greater situation awareness
 - “The difference was night and day, what I saw was the level of knowledge of the watch standers increase.”
- CommandNet logs open to the world
- Information posted once, eliminating redundant effort
 - ...ad hoc meetings were much easier because of all of the info easily at hand.
- Predictability – users knew where to go and didn’t waste effort

Breadth/Depth of Info Dissemination

With NCW Tools

- If we didn't update, we got calls from around the globe...when the data was timely the phone calls stopped.
- FBI had pulled “stuff”
- N2 heard complaints when COMCARGRU3 was leaving - “Who will keep this up when you leave?”

Shared Awareness

Before

- When I was on southern watch as a department head with a squadron all I had was the Air Tasking Order. The squadron is looking only at what they need to do not the big picture.

With NCW Tools

- Battle Watch Captain knew the flight schedule, logistics flight, vertical replenishments, where Pakistani forces would be. I had a picture in my mind what was happening.

Shared Awareness



CAPT Fitzpatrick, Deputy Operations

Self-Synchronization

- Search and Rescue
 - USAF B-1B bailout over Indian Ocean
 - I look at one log that has the coordinates of the bailout.
 - Surface ship heading north towards the bailout area didn't have the same communication ability.
 - I pulled the lat/long and gave it to the surface ship and he said thank you.
 - It was fast and efficient rescue. The network centric capabilities saved time and allowed the search and rescue team to act faster.

Self-Synchronization



RADM Zelibor, Commander Task Force Fifty

Technology Acceptance

- Commitment from high-level champion
 - When everybody in the battle group knows the leadership used the web for information it works
- Difficult with some warfare commanders
 - Resistance to change
 - Screen real-estate limited KWeb implementation
 - Bandwidth limited use on Cruisers and Destroyers
- "Chat was awesome. Chat is like getting 20 new radios and being able to work all at once."
 - There were times, however, when the subordinates moved too quickly and agreed to things on chat that they couldn't perform. Had to back them off. Need to delegated chat authority.
- Floodgates opened after “posters” got credit for information

Problem: The theories didn't explain it all

- What was different about CTF-50 that made this successful when so many others had failed?
 - Situation?
 - People?
 - Technology?
 - Training?
 - Leadership?
- Back to the drawing board...

Insights on Social Domain

- People develop trust and understanding through living and working together
- As groups grow larger and distribute it is harder to maintain trust and understanding (i.e. I completely trust my platoon, I trust the Marine Corps a lot, I'm less trustful of the Navy, etc)
- To overcome the lack of social bonding, and the associated trust and understanding, the military has settled on a division of responsibility (e.g. each unit has a bounded area of responsibility)

Insights on Social Domain

... But NCW demands that boundaries are lowered

- Units should know the goals of the operation and be free to act
- But, distributed units cannot rely on usual social & contextual information to build trust and understanding
- To make up for a lack of richness, communication must be explicit – I can't move my chess piece and expect you to notice, I have to tell you about each move I make
- Updates must be accurate and timely to foster trust and understanding

Theory

- Decision-Making Theory
- Network Centric Warfare
- Technology Adoption
 - Technology Adoption Model
 - Technology Transition Model
- Human Communication
 - Social Context
 - Trust and Affinity
 - Channel Expansion

Communication Needs

Command Information

Command Information is explicit. It is what is intentionally expressed or transmitted.

Contextual Information

Contextual Information is tacit. It is the non-verbal, backchannel, status and social messages.

In communication literature there are two classifications of information.

Communication Needs

Command Information

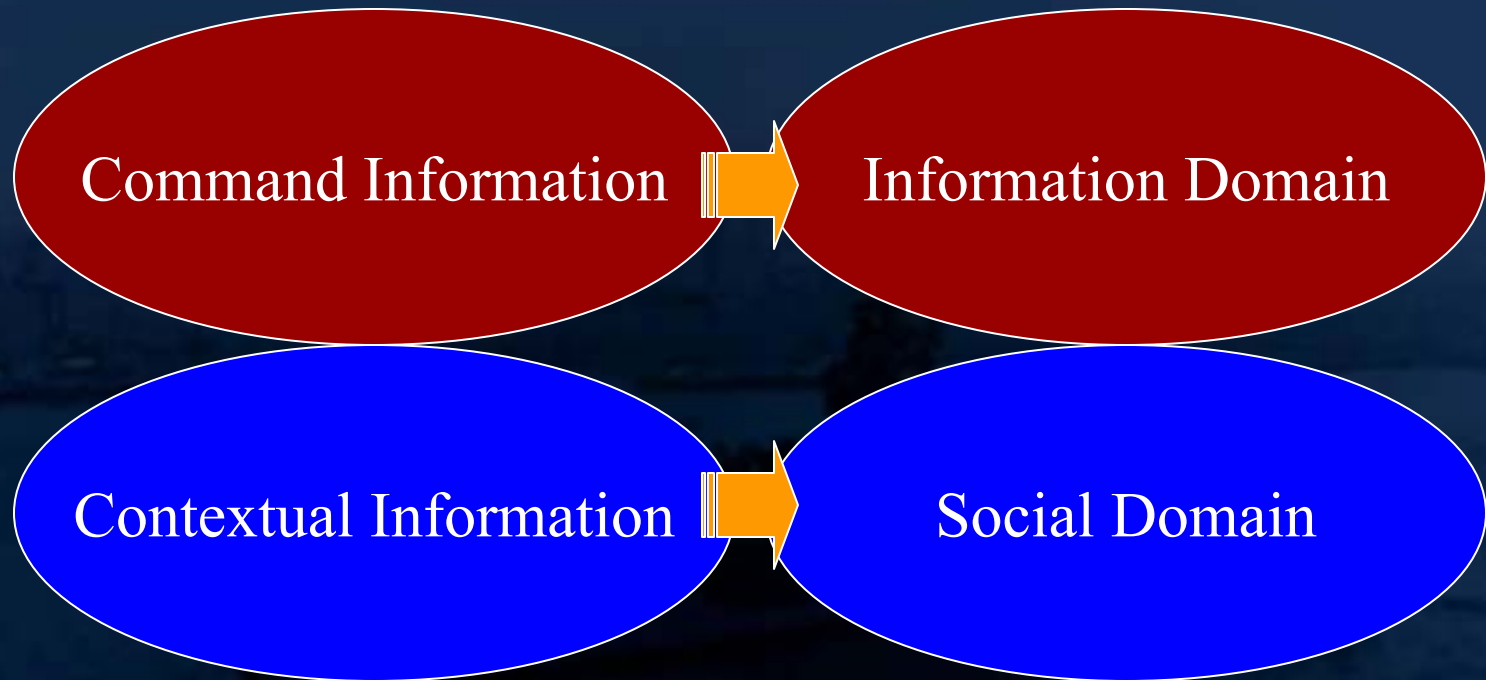
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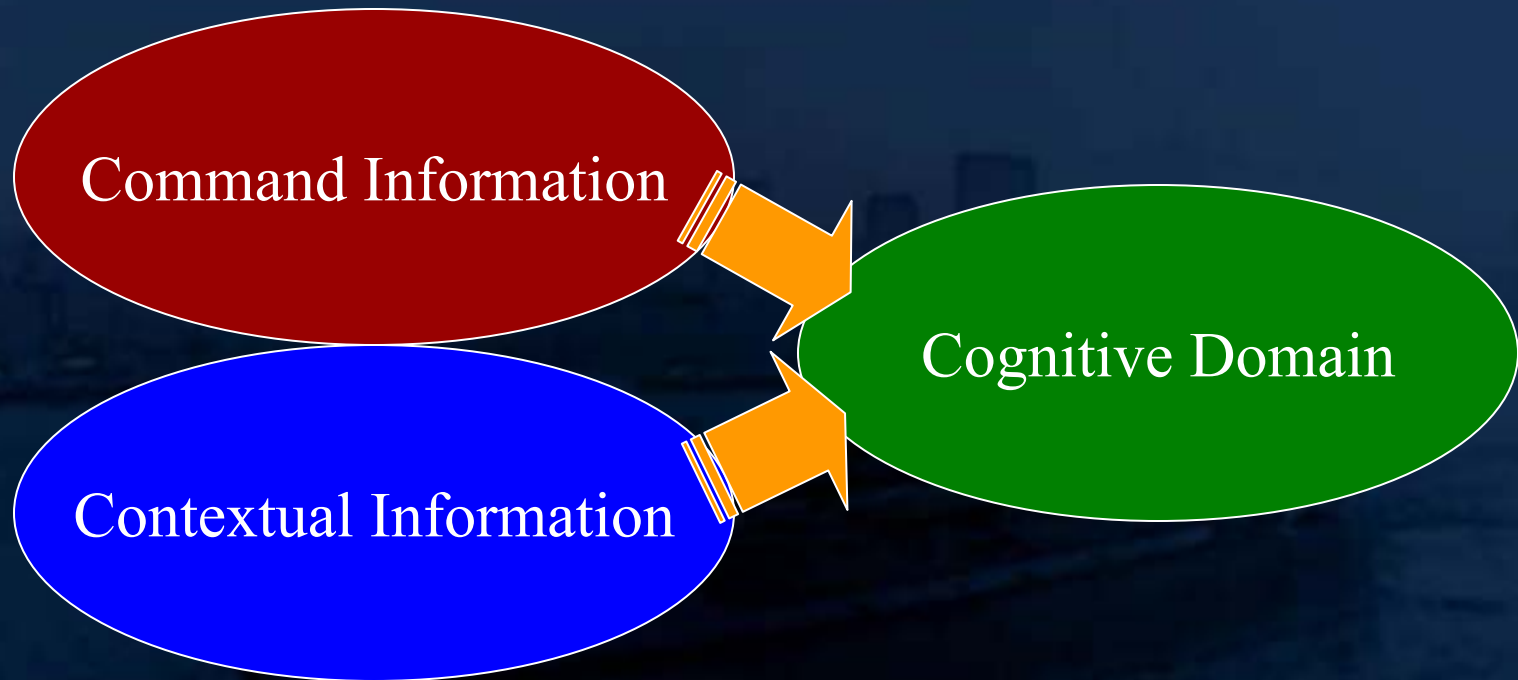
People use both of these types of information in making decisions

Social and Information Domains



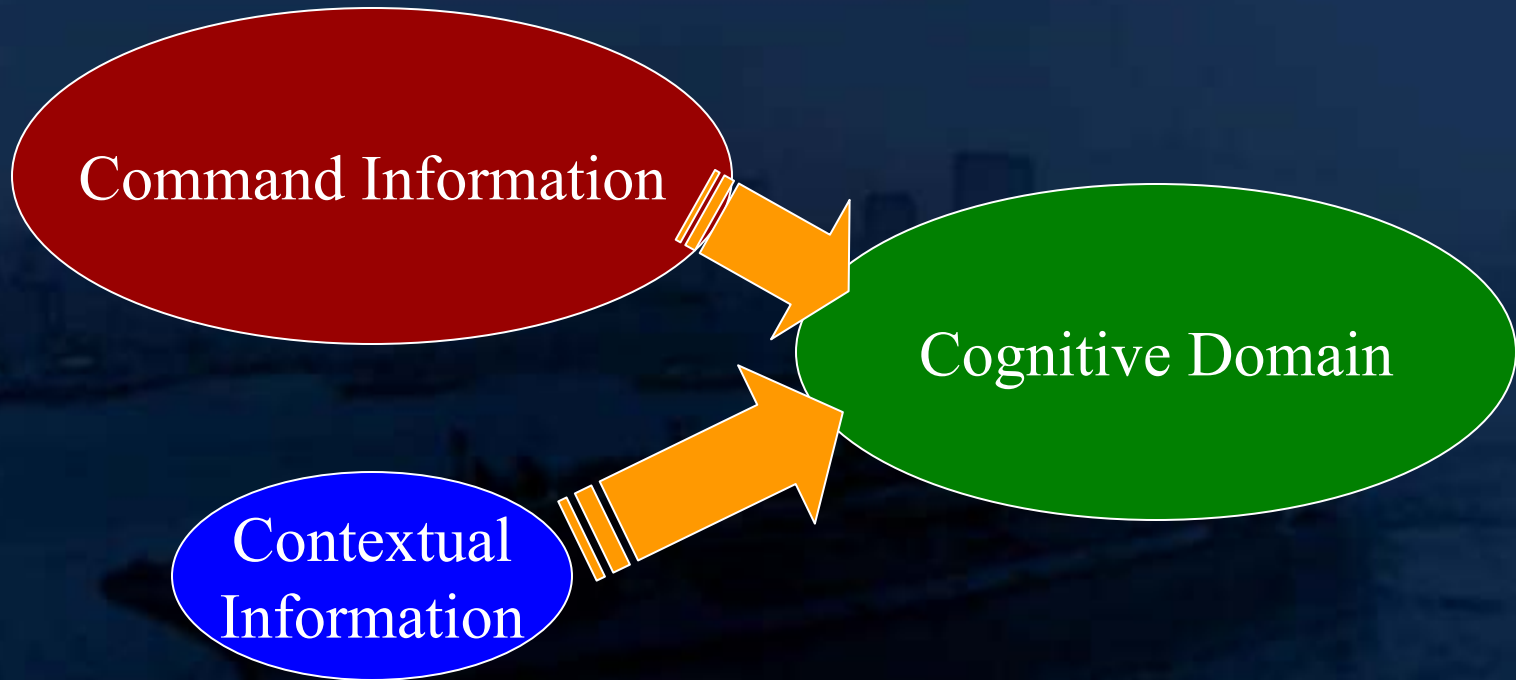
These can be informally mapped to the Information and Social Domains of NCW

Feeding the Cognitive Domain



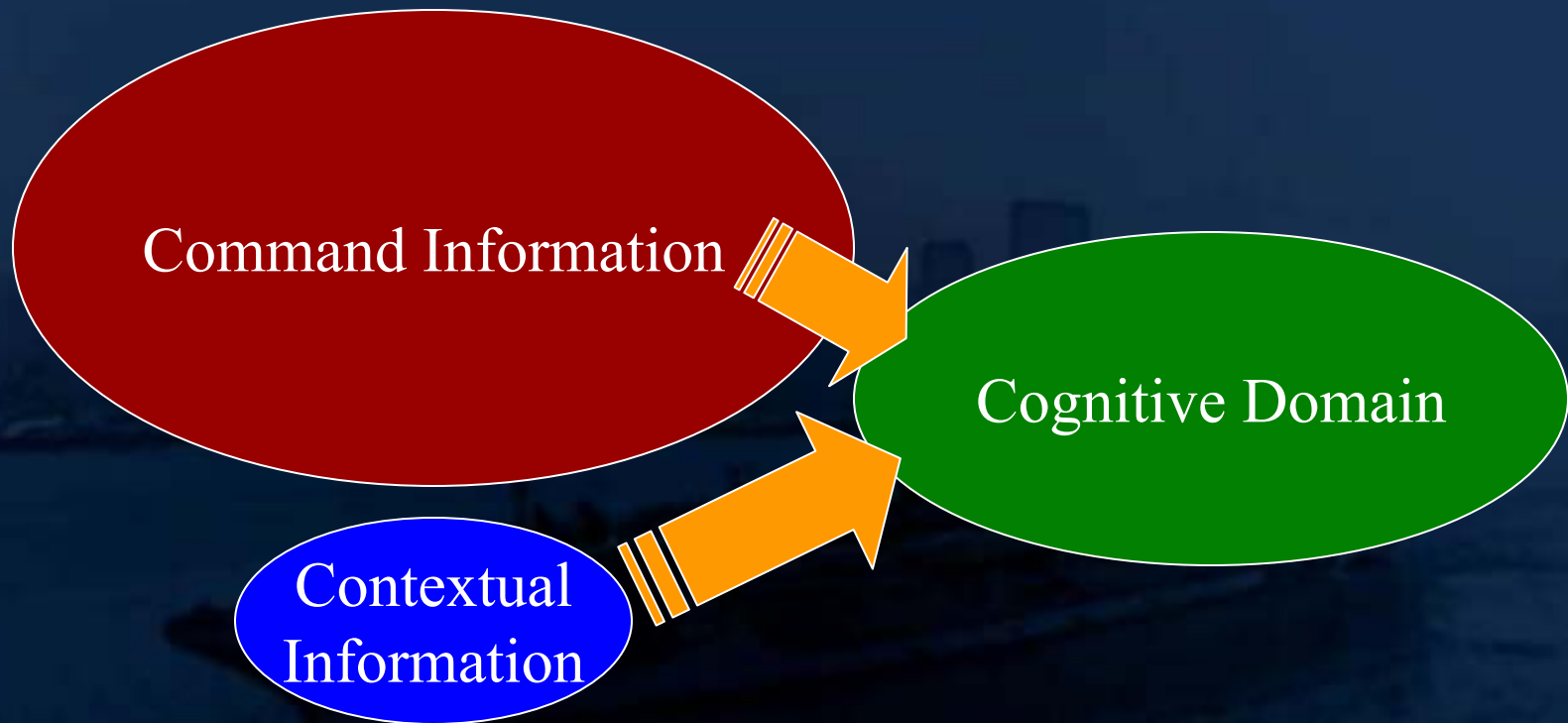
They provide the situation awareness needed by the warfighter to make decisions in the Cognitive Domain

Social Domain Squeezed Out



NCW systems struggle to carry Contextual
(social domain) Information

Information Domain Adjusts



...so in response communication must become more explicit to fill the void. Command Information must increase to make up for lost body language, water cooler chat and just being together.

Communication Richness

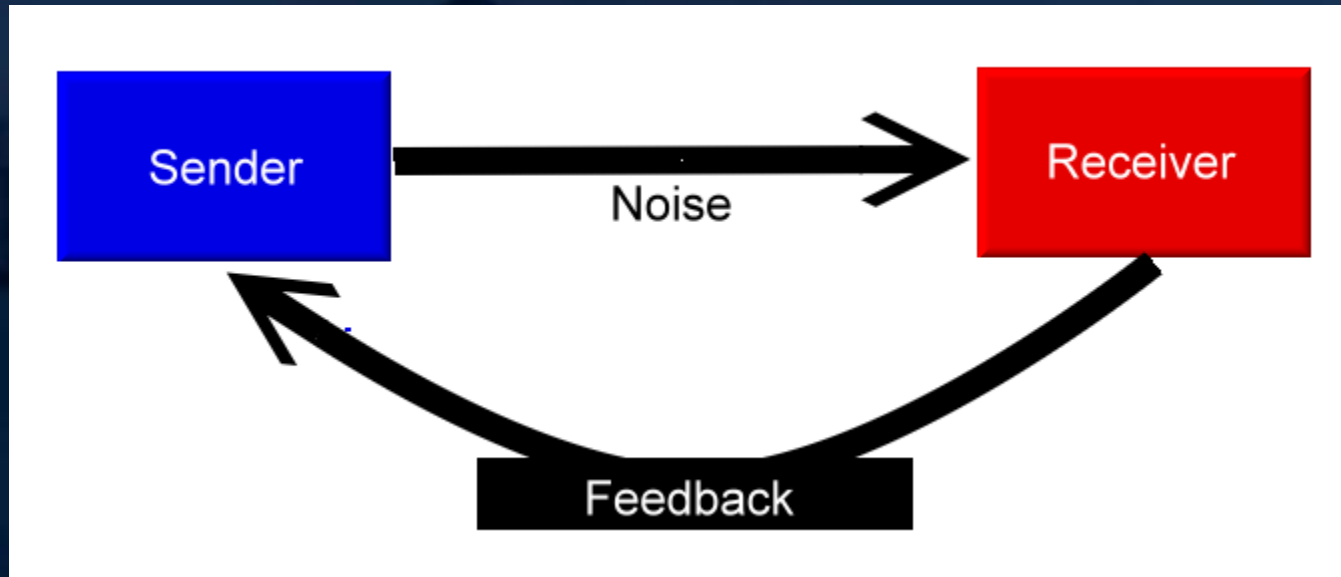


Communication ranges from simple transmitted messages to complex face-to-face interactions

Channel Expansion Theory

- As users gain experience with a communication medium they are able to use it more effectively and efficiently

Communication Channels

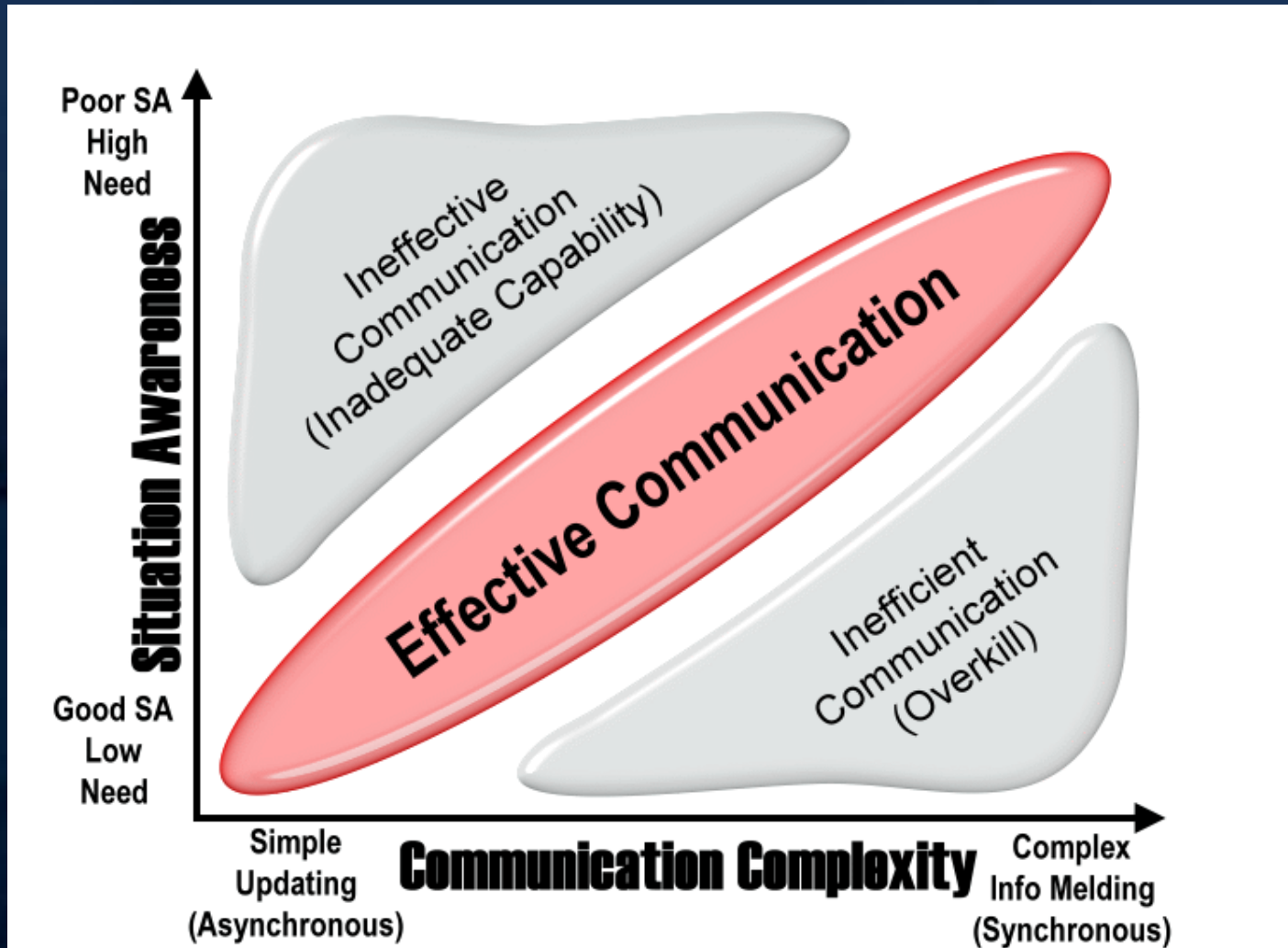


Communication is more than wire diagrams of sender, receiver & message

Communication Channels

- Situation awareness effects communication needs
 - Maintenance of high situation awareness requires only simple asynchronous “I” updates
 - Improving poor situation awareness requires complex synchronous communication
- Communication needs, in turn, effect communication complexity
 - Simple communication can be done through lean channels (chat)
 - Complex communication needs rich channels (VTC)

Complexity Requirements



Communication complexity should meet SA Requirements

Cultural & Organizational change

- "A smarter more informed boss makes life a whole lot easier."
 - "I probably had 10 times more information than if we didn't have this technology. It took me some time, but I read every web page. I'd get up in the morning and read webpages. I was cued by yellow and reds, then would go into those issues. By the end, I had the web pages memorized."
- Trust issues (Rumor control)
 - Trust was established because the commander said "this is how we are going to do business." More trusted than the email / chat buzz that flies around on the outside
- Delegation & empowerment – Petty officers allowed to post independently, without review
- *In six months of cruise, we never built a single PowerPoint Intelligence brief*

Cultural & Organizational change

- Issues with information shareability “transparency”
 - Another battle group officer wanted to control what his admiral saw and hated instant update KWeb
 - A USAF general stated the CTF-50 Commander was crazy as he would be micro managed to death by the "bosses."
The CTF-50 Commander found the exact opposite.
- Delegation – leaders must be disciplined to avoid micromanagement
- Knowing 80% is better than 0%
 - “It doesn't have to be perfect”
- *"I've always maintained that the hardest part of this isn't the technology, its the culture"* - RADM Zelibor

Social Domain Insights & Recommendations

- Systems that provide value up and down the chain of command get used
- **Recommendation: Field systems that benefit more than just the boss (CommandNet languishes while millions are spent on gold-plated systems)**
- Frequency of Use is key to both adoption of tools and establishing communities of trust
- **Recommendation: Select systems that require regular interaction from contributors and consumers**
- Cheap and Simple Tools can be very effective if a common structure is enforced
- **Recommendation: Put less emphasis on searching for “holy grail” systems and field simple ones now**

Social Domain Insights & Recommendations

- NCW shouldn't create more work
- **Recommendation: Emphasize the desired communication channels**
- Waiting for perfection has costs
- **Recommendation: Take calculated risks – a best guess today is often better than a perfect answer next week**
- Engaged people will innovate
- **Recommendation: Let people experiment – experienced users expand communication channels and derive more value**

CTF-50 NCW Payoffs

- Better quality of information
- More timely distribution
- Broader dissemination of information
- Deeper understanding throughout the force
- Greater efficiencies
- Effective delegation
- Better decisions
- Increased speed of command

A More Effective Staff



RADM Zelibor, Commander Task Force Fifty

Questions

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