Littoral Combat
Future Naval Capability

Industry Day
13 August 2002

AGENDA

Welcome – Mr. Barry Blumenthal

ONR and Future Naval Capability Overview – Mr. Tom O'Leary

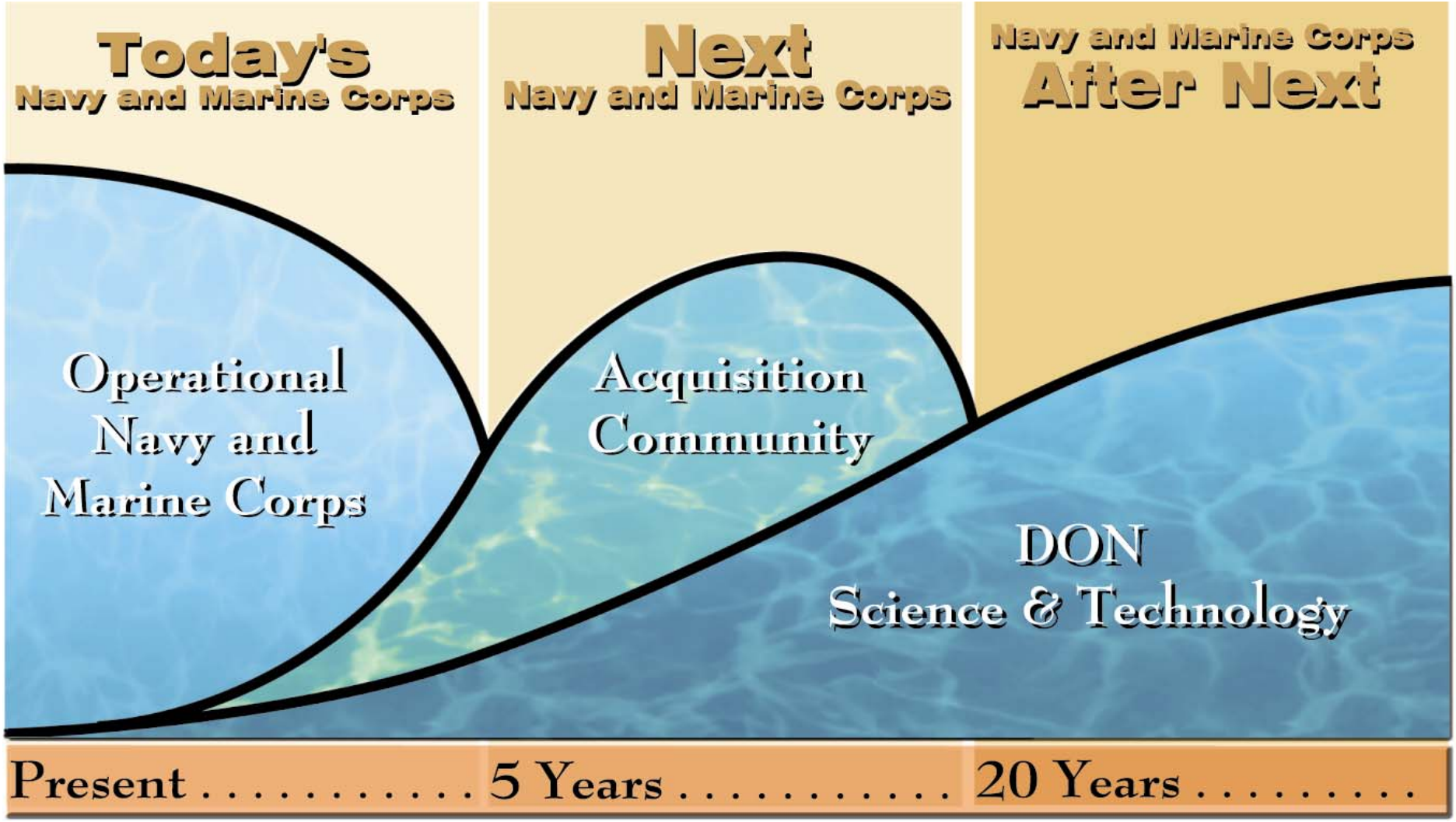
Wargame Results – Mr. Dwight Lyons (CNA)

BAA Process – Mr. Barry Blumenthal

ONR Mission

To provide the scientific and technological base that maintains and expands the technological superiority of the Navy and Marine Corps forces at reduced cost.

Concepts:Toward the Naval Services-After Next

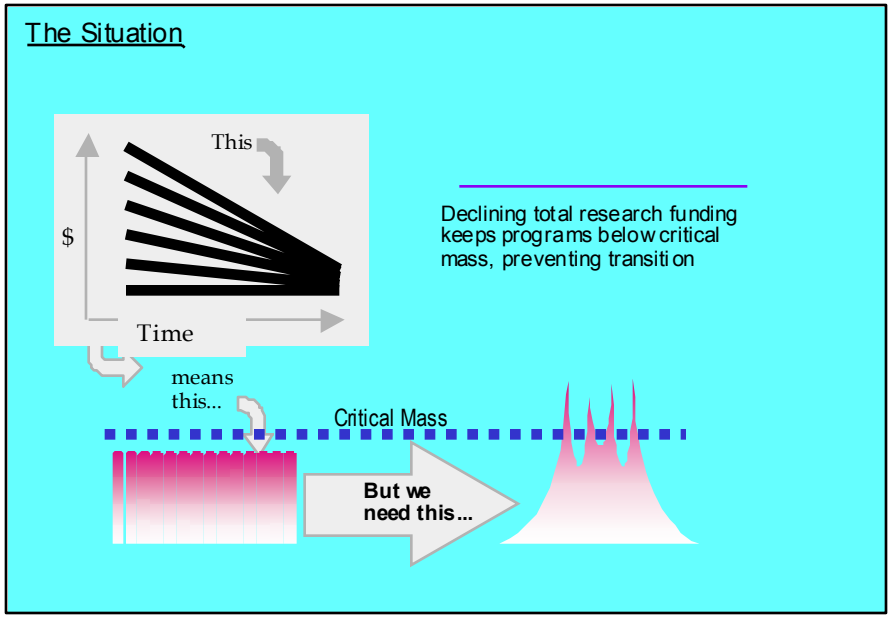


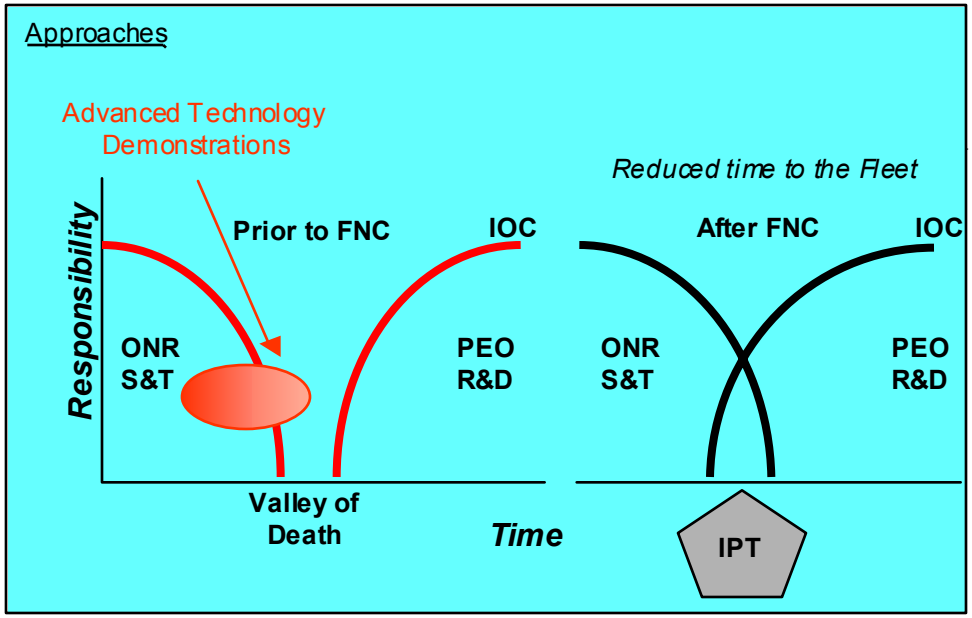
Future Naval Capabilities

- **What are Future Naval Capabilities (FNCs)?**
  - **A process to align and partner the Requirements, Acquisition and S&T communities to focus S&T investments to deliver and transition priority Naval capabilities within the FYDP**

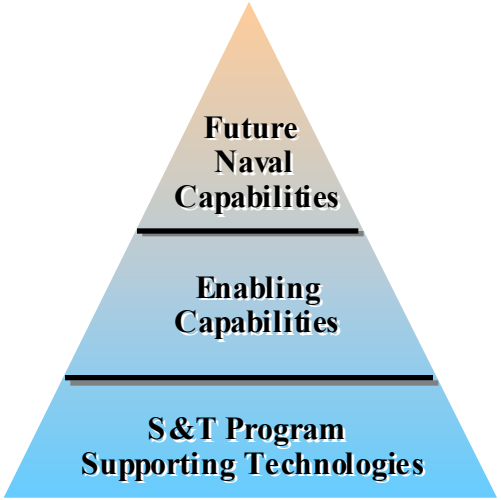
Why FNC Programs ?

- Under Secretary of Defense for Acquisition, Technology & Logistics "Directs" Reduction in Acquisition Time
- Naval S&T is actively engaged to enable the rapid transition of mature technologies to product developers.
- Future Naval Capabilities solve the existing S&T acquisition "Valley of Death" by partnering with Acquisition Managers.
- Future Naval Capabilities focus S&T funding on transitionable products.





FNC Spike Characteristics



S&T Investment Response to a DoN Top Priority Capability That:

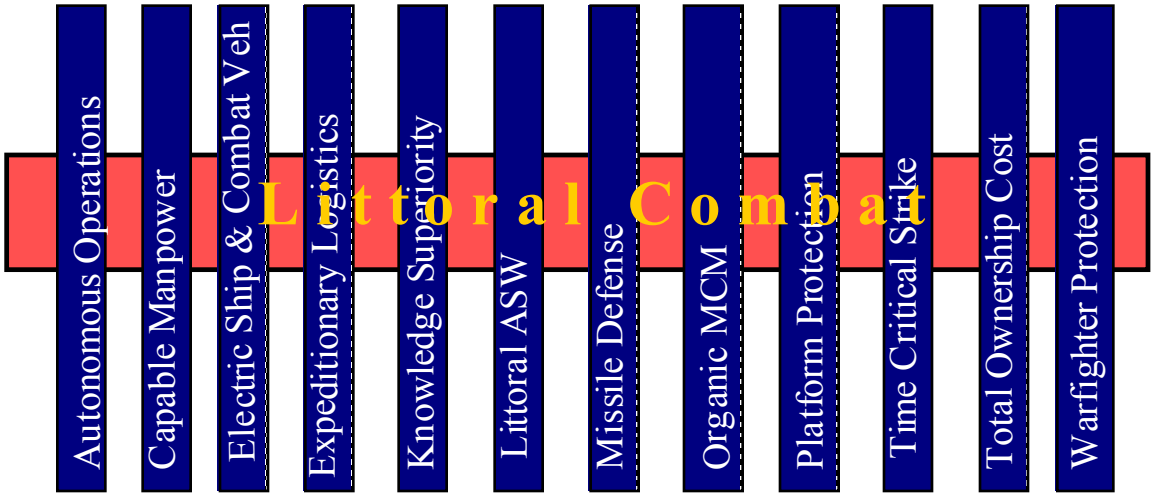
- Provides Significant Technology Options and Operating Concepts for the DoN Capability
- Has a Significant Budget
- Has Definite Milestones & Objectives
- Has Concrete Deliverables and a Finite End State
- Executes Well Defined Demonstrations
- Culminates in Firm Transitions

Characteristics of a Good FNC Product

- Closes an identified warfighting capability gap
- Is able to be demonstrated and delivered within the FNC window of time
- Has a transition commitment
- Is affordable (cost and opportunity cost) within a capped FNC budget

LC FNC Interfaces

Littoral Combat FNC cuts across other FNCs



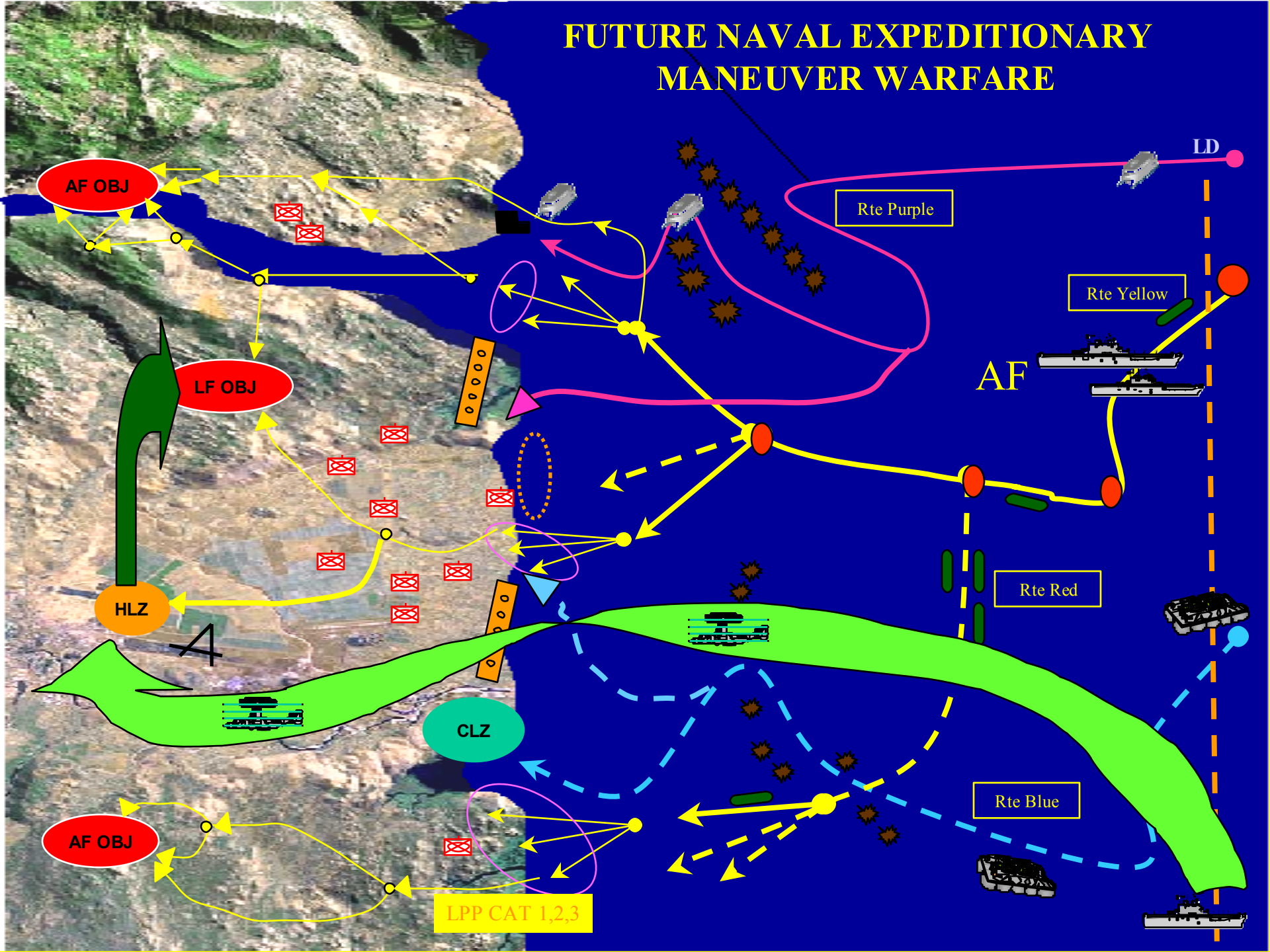
Littoral Combat is an expansive warfighting problem set
Littoral Combat is not a "Green" only concern
Littoral Combat is a Naval concern - It is where the future fight is

LC FNC Goal and EC's

- **Goal:** ***Support the development of Naval Expeditionary Maneuver Warfare via the application of technologies which enhance the ability of the Navy-Marine Corps team to achieve assured access and sustained operations in the littorals as the naval portion of a joint campaign.***

  - **EC #1 - Expeditionary ISR for the Amphibious Force (AF)**
  - **EC #2 –Expeditionary Fires Support for the MAGTF**
  - **EC #3 –MAGTF Maneuver in the Littorals**
  - **EC #4 –Expeditionary Task Force Command & Control in the Littorals**

FUTURE NAVAL EXPEDITIONARY MANEUVER WARFARE



Littoral Combat Gaming and Analysis Effort

- **April**
  - Expeditionary Maneuver War Game (1-4 April) ***Complete***
  - Technologists Panel (30 April) ***Complete***
- **July/August**
  - Publish Broad Agency Announcement (BAA) ***Complete***
  - Translate Industry/Government Lab White Papers into advanced capabilities that can be played in a technology insertion game
- **September**
  - Technology Insertion Game (24-26 September)

Expeditionary Maneuver Wargame

- Purpose – Identify, validate, and prioritize required capability shortfalls in order to develop the LC FNC S&T investment plan
- Game Design
  - **SWA Scenario**
  - **2 Game moves STOM/SOA**
  - **4 Breakout groups (C2, ISR, Maneuver, Fires)**
  - **90 Participants**
- Game Results
  - **209 Required capability shortfalls identified**
  - **23 S&T candidates**
    - **C2 – 4**
    - **ISR – 4**
    - **MAN – 9**
    - **Fires – 6**
  - **Game final report to be posted on web at http://www.onr.navy.mil/explog/litcom/lc_start.asp**
- **CNA Analysis in progress**

BAA Focus

- Tactical Command and Control
  - BLOS Communications Relay
  - Information Management
  - Data Flow Optimization
- UAV Sensor Payloads
- Common Relevant Operational Picture (CROP) Enhancements
- Netted Fires

Expeditionary Maneuver Wargame Results

Characteristics of Proposed Littoral Combat Future Naval Capabilities

Analysis results

13 Aug 02

Purpose

- Distill results of EMW War Game for industry to focus on specific areas
- Amplify information in the BAA
  - Increase understanding of the BAA focus areas
- Provide a range of options to help industry decide which technologies to propose to LC FNC

LC FNC enabling capabilities

- Command and Control (C2)
- Intelligence, Surveillance and Reconnaissance (ISR)
- Maneuver
- Fires

➢ ***BAA focus areas are in C2/ISR arena, to include C2/ISR technologies that improve maneuver and fires***

➢ ***Overarching goal is to improve Common Relevant Operational Picture (CROP) and tactical commanders' ability to dynamically plan and adaptively execute***

The process

- LC FNC Wargame
  - Operational basis
  - 18 capabilities, some characteristics
- Technology panel
  - Combined technology assessment with operational capabilities
  - Further refined list, eliminated some capabilities
- IPT approval and guidance
  - Capabilities for technology match
  - Studies

The process (cont'd)

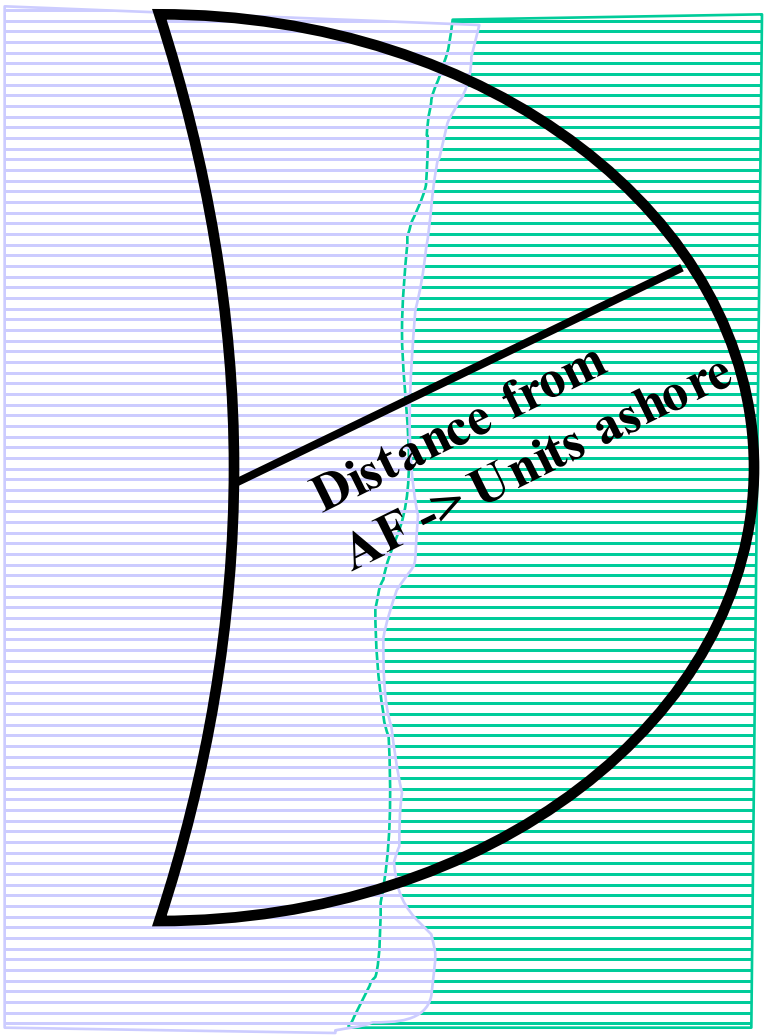
- Capability/technology search and analysis
  - Begin with characteristics of operational scenarios
  - Derive performance characteristics from operational literature search
  - Combine with technology feasibility research
  - Confirm results with Program Manager
- Result is "reasonable" expectations for performance in BAA focus areas

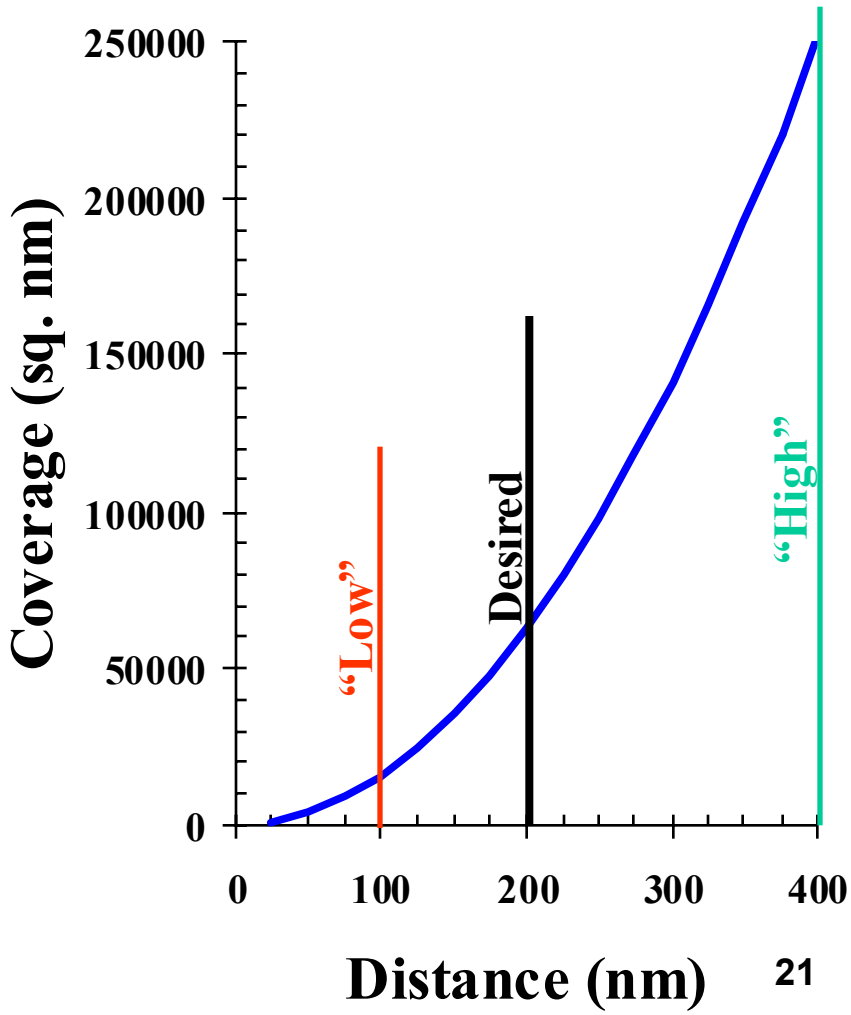
➢ ***Feel free to exceed expectations***

BAA focus areas

1. Tactical Command and Control
   - BLOS communications relay
   - Information management
   - Data flow optimization
2. UAV sensor payloads
3. Common Relevant Operational Picture (CROP) enhancements
4. Netted fires

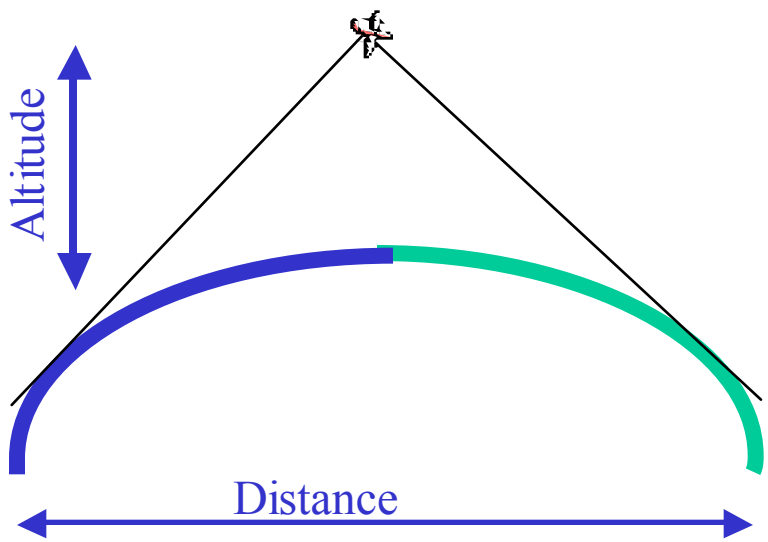
1. C2: BLOS Comm Relay – coverage*

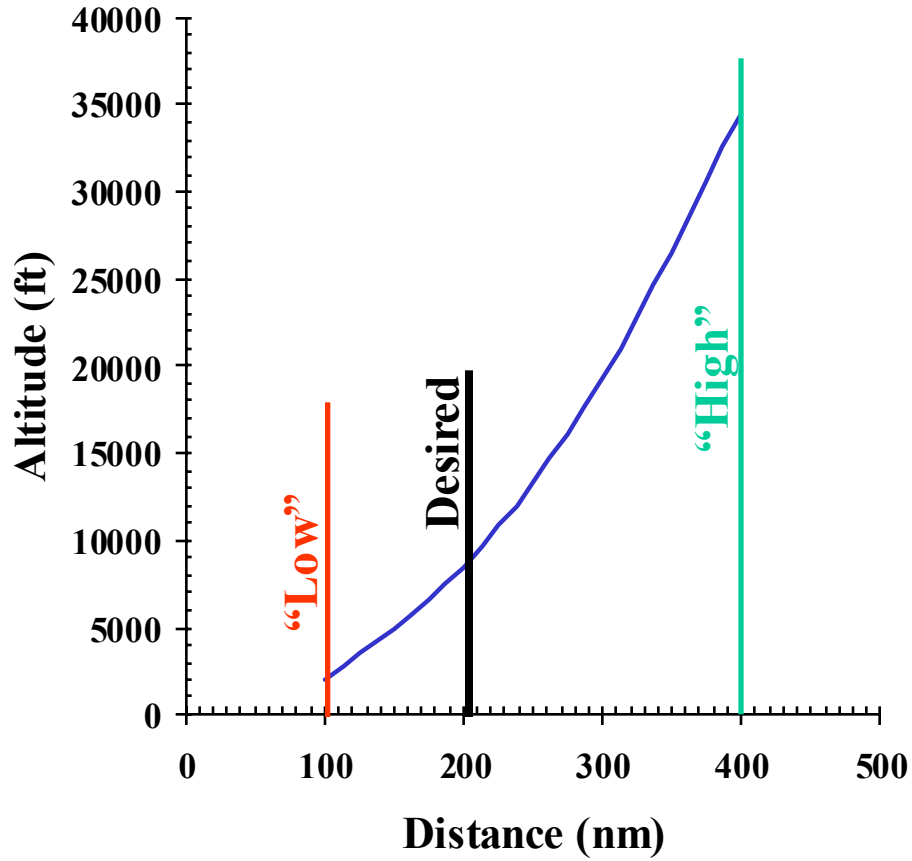




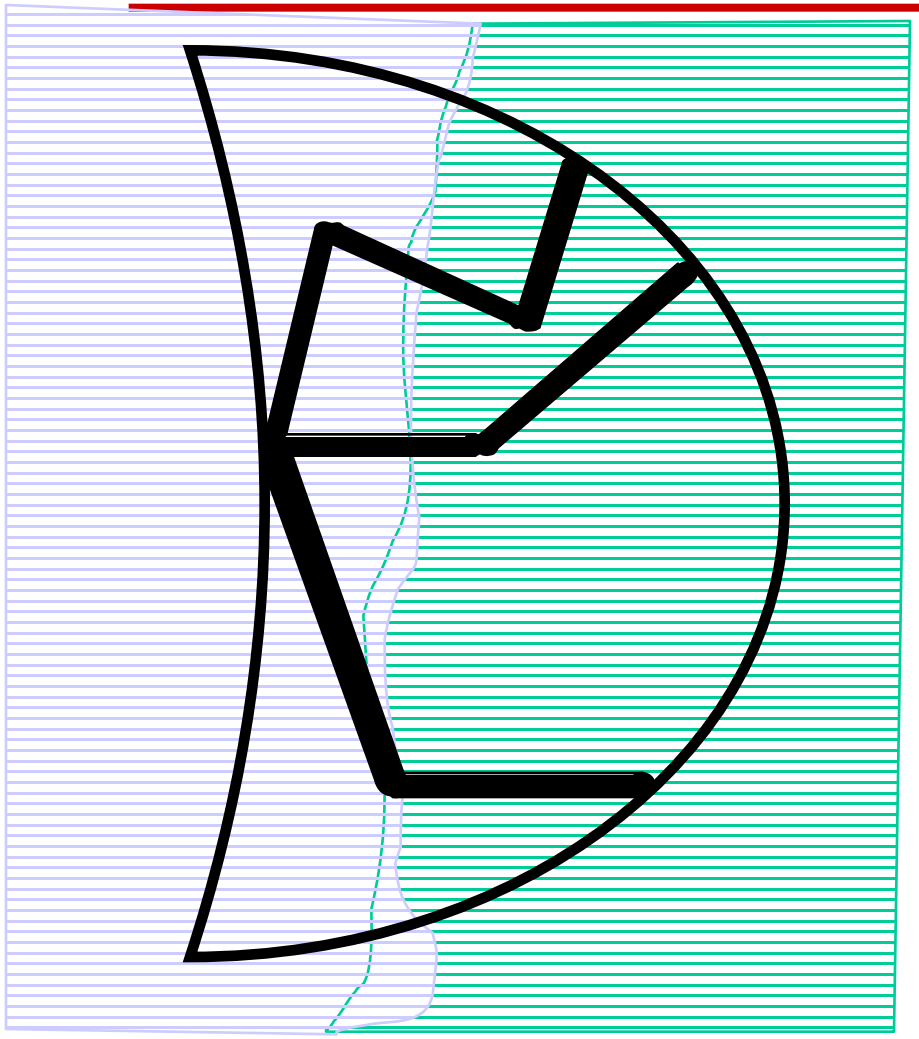
* Goal: reliable tactical comms in AF AO, including complex terrain ashore

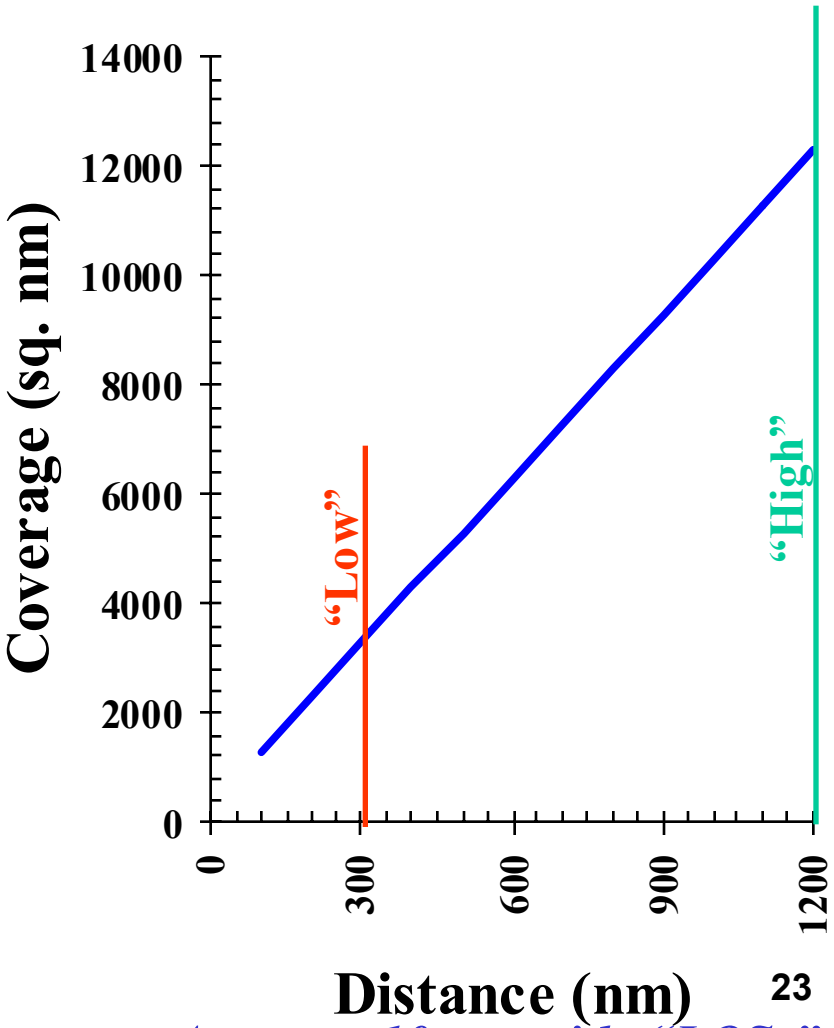
Tactical BLOS Comm Relay
Aerial relay altitude





Tactical BLOS Comm Relay – linear coverage





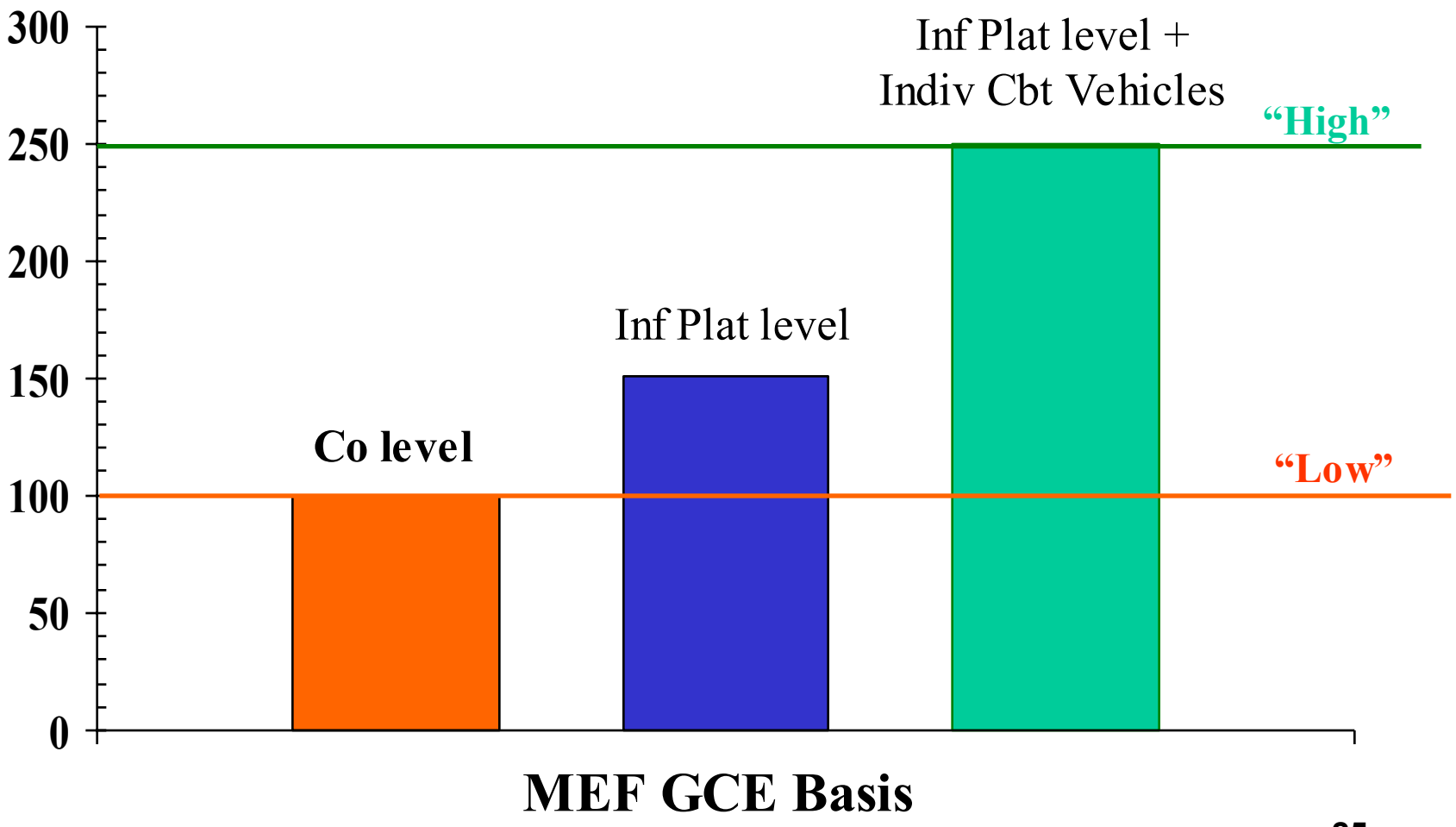
Assumes 10-nm wide "LOSs"

Tactical BLOS Comm Relay

- Must be compatible with existing/ planned tactical (Regt and below) systems (e.g., JTRS WNW*)
- Must be compatible with security/encryption systems
- Must be expeditionary – able to fit within constrained lift
- Must be able to be set up/emplaced quickly or “on the fly”

* Joint Tactical Radio System Wideband Network Waveform

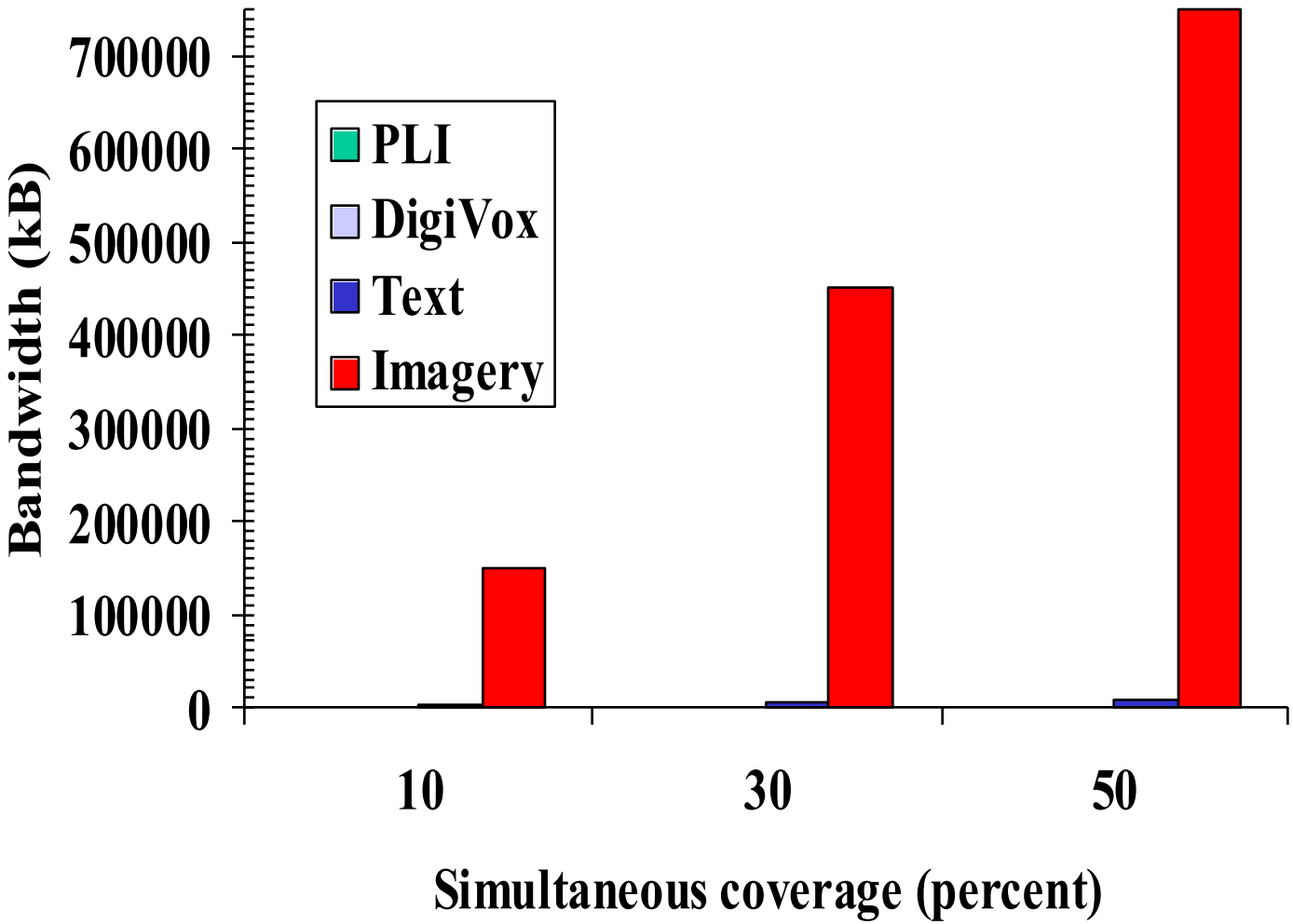
Tactical info management: Number of users



Tactical data flow
Bandwidth by function (per user)

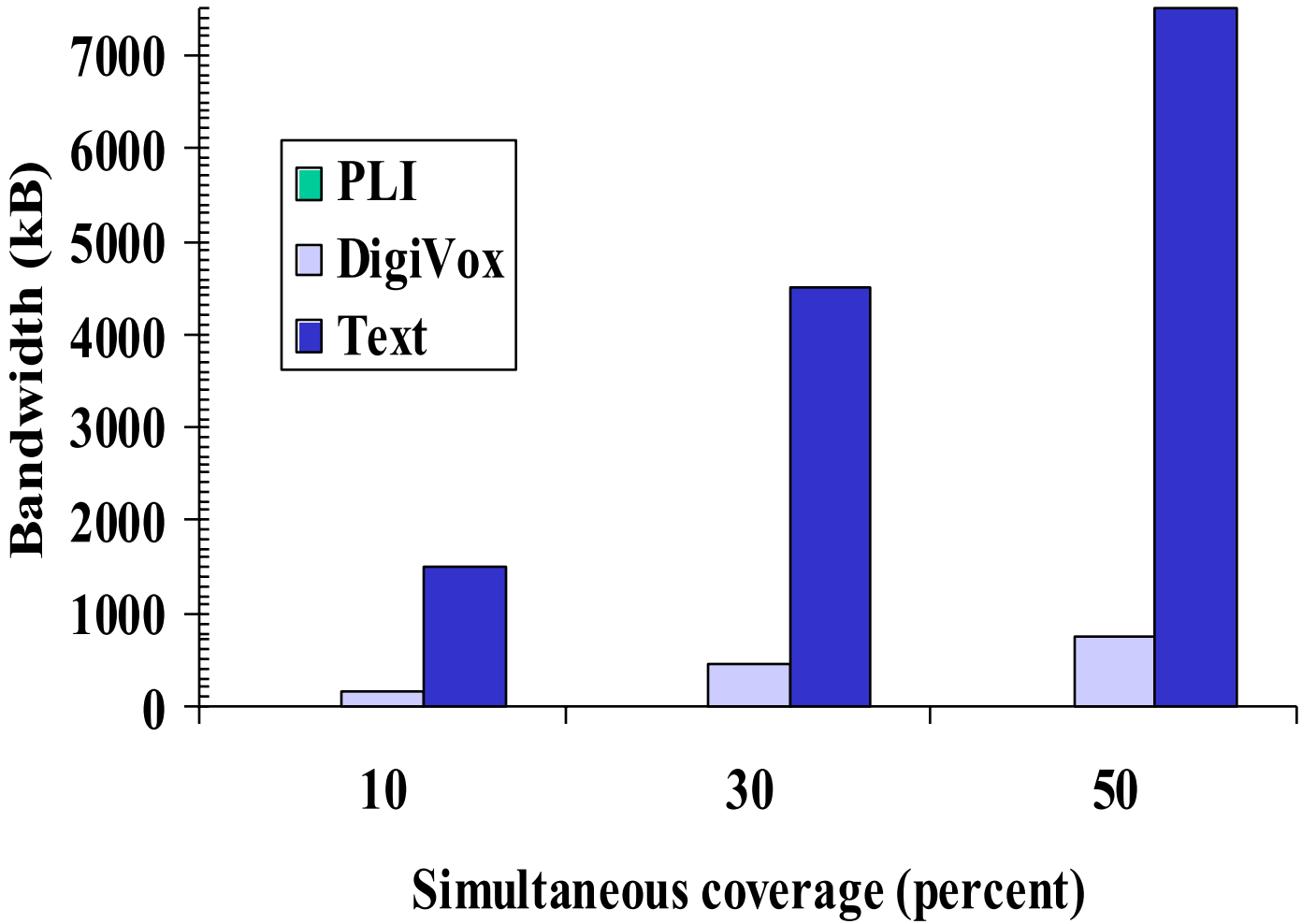
- PLI ~ 100 B
- Digital voice: ~ kbps – and improving
- Digital text messages: ~10 kB
- Digital imagery: ~ MB

Info Mgmt/Data flow Bandwidth example



Inf Plat level basis

Info Mgmt/Data flow Bandwidth example



Inf Plat level basis

(Same graph, w/o "imagery" bars)

Info Mgmt/Data flow considerations

- Information needs at each tactical level
  - Wideband between command posts
  - Narrowband between combat elements
- Connectivity to transmit the information (hierarchical, or web, or ???)
- Terminal display requirements in tactical platforms (e.g., AAAV, MV-22, LCAC)
- *The tactical environment, e.g.*
  - Complex terrain
  - Cover/protection
  - RF penetration

Summary

- We're asking for a comm backbone (secure mobile network and innovative relays)
- We're asking you to consider the kinds of information needed to support dynamic execution and adaptive planning
  - Friendly PLI
  - Enemy PLI
  - Plans and changes (overlays)
  - Near-real time ISR feeds
- How much bandwidth needed? = How much have you got?
- *Tell us what your proposed technology can do*

2. UAV sensor payloads*

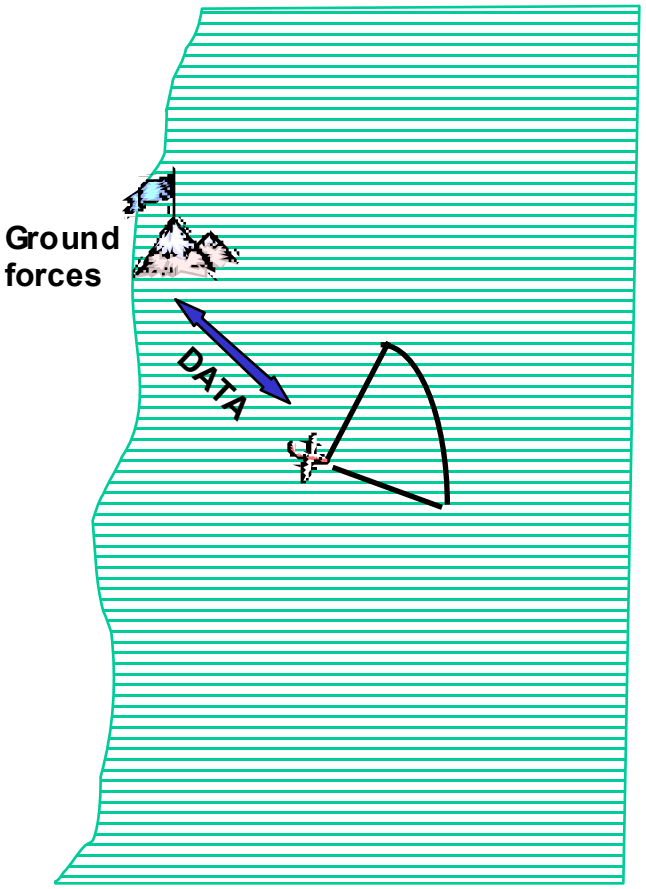
Ground forces (from Regt level down to individual scout/recon teams) need responsive intel inputs to establish and maintain SA

Low end

- Payloads that can fit on UAVs in the current/planned inventory
- Day/night, “all weather” sensors (assuming UAV can fly)

High end

- Payloads that can fit on developmental UAVs, particularly small UAVs
- Data manipulation/processing to render data acquired into tactically usable form (from “volumes” into “packages”) and transmit over tactical BLOS comm



*** Goal: Tactical payloads for locally tasked/controlled UAVs**

Recently developed UAVs below gross weight of 50 lbs.

Country	UAV Designation	Development	(lb) Gross Wt.	(lb) Payload Wt.	(ft) Wing Span	(h) Endurance	(nm) Op Radius	(ft) Ceiling
USA	Dragon Eye	Underway	4	1	3.75	1	6	1000
UK	MSV-20	Complete	9	1	9.1	0.5	3	2,000
USA	Pointer (FQM-151A)	Complete	9.1	2	8	2.2	3	3,000
USA	SLURS	Underway	10	2	5	1	5	500
USA	Sender	Complete	10	3	4	2	50	5,000
France	Azimut	Complete	14	1	11.3	2.5	6	1,000
USA	Javelin	Complete	20	3	8	2	1	1,000
USA	23F	Complete	20	6	Rotor = 5.1	0.5	1	7,500
China	Observer 1	Complete	22	5	8.8	1.2	3	5,000
UK	Nitro Hawk	Underway	22	5	Rotor = 5	0.5	5	1,200
USA	Backpack	Underway	25	4	3	1	5	5,000
France	Copter 2	Complete	40	10	Rotor = 6	2	3	1,600
USA	P-7180	Complete	40	8	8.5	2	5	5,000
UK	CSV-20	Complete	44	8	9.3	2	4	5,000
Spain	ALO	Underway	44	13	9.9	2	27	4,900
USA	60F	Complete	40	20	Rotor = 7.7	0.3	2	7,500
USA	Dragon Warrior	Underway	200	25				

Types of data/telemetry

Low end

Potential sensors/telemetry

- Real time daylight color full motion video
- Still photography
- Night vision/low light/IR
- GPS positions
- Atmospheric measurements (Met data)
- Chem/bio-sensing
- Laser targeting/designation with 3 km effective range and 10-35 meters resolution

High end

Threshold requirements plus:

- NIIRS 4 image quality* EO and imagery data
- NIIRS 5 image quality*
- Laser designation to 5 km

* See next slides

NIIRS 4 examples

NIIRS 4 [1.2 - 2.5 m GRD]

Visible NIIRS	Radar NIIRS	Infrared NIIRS	Multispectral NIIRS
Identify all large fighters by type (e.g., FENCER, FOXBAT, F-15, F-14). Detect the presence of large individual radar antennas (e.g., TALL KING). Identify, by general type, tracked vehicles, field artillery, large river crossing equipment, wheeled vehicles when in groups. Detect an open missile silo door. Determine the shape of the bow (pointed or blunt/rounded) on a medium-sized submarine (e.g., ROMEO, HAN, Type 209, CHARLIE 11, ECHO 11, VICTOR II/III). Identify individual tracks, rail pairs, control towers,	Distinguish between large rotary-wing and medium fixed-wing aircraft (e.g., HALO helicopter versus CRUSTY transport). Detect recent cable scars between facilities or command posts. Detect individual vehicles in a row at a known motor pool. Distinguish between open and closed sliding roof areas on a single bay garage at a mobile missile base. Identify square bow shape of ROPUCHA class (LST). Detect all rail/road bridges.	Identify the wing configuration of small fighter aircraft (e.g., FROGFOOT, F- 16, FISHBED). Detect a small (e.g., 50 meter square) electrical transformer yard in an urban area. Detect large (e.g., greater than 10 meter diameter) environmental domes at an electronics facility. Detect individual thermally active vehicles in garrison. Detect thermally active SS-25 MSV's in garrison. Identify individual closed cargo hold hatches on large merchant ships.	Detect recently constructed weapon positions (e.g. tank, artillery, self-propelled gun) based on the presence of revetments, berms, and ground scarring in vegetated areas. Distinguish between two-lane improved and unimproved roads. Detect indications of natural surface airstrip maintenance or improvements (e.g., runway extension, grading, resurfacing, bush removal, vegetation cutting). Detect landslide or rockslide large enough to obstruct a single-lane road. Detect small boats (15-20 feet in length) in open water

(NIIRS = National Imagery Interpretation Rating Scale; GRD = Ground Resolved Distance

NIIRS 5 examples

NIIRS 5 [0.75 - 1.2 m GRD]			
Visible NIIRS	**Radar NIIRS**	**Infrared NIIRS**	**Multispectral NIIRS**
Distinguish between a MIDAS and a CANDID by the presence of refueling equipment (e.g., pedestal and wing pod). Identify radar as vehicle-mounted or trailer-mounted. Identify, by type, deployed tactical SSM systems (e.g., FROG, SS-21, SCUD). Distinguish between SS-25 mobile missile TEL and Missile Support Vans (MSVS) in a known support base, when not covered by camouflage. Identify TOP STEER or TOP SAIL air surveillance radar on KIROV-, SOVREMENNY-, KIEV-, SLAVA-, MOSKVA-, KARA-, or KRESTA-II-class vessels.	Count all medium helicopters (e.g., HIND, HIP, HAZE, HOUND, PUMA, WASP). Detect deployed TWIN EAR antenna. Distinguish between river crossing equipment and medium/heavy armored vehicles by size and shape (e.g., MTU-20 vs. T-62 MBT). Detect missile support equipment at an SS-25 RTP (e.g., TEL, MSV). Distinguish bow shape and length/width differences of SSNS. Detect the break between railcars (count railcars).	Distinguish between single-tail (e.g., FLOGGER, F-16, TORNADO) and twin-tailed (e.g., F-15, FLANKER, FOXBAT) fighters. Identify outdoor tennis courts. Identify the metal lattice structure of large (e.g. approximately 75 meter) radio relay towers. Detect armored vehicles in a revetment. Detect a deployed TET (transportable electronics tower) at an SA-10 site. Identify the stack shape (e.g., square, round, oval) on large (e.g., greater than 200 meter) merchant ships.	Detect automobile in a parking lot. Identify beach terrain suitable for amphibious landing operation. Detect ditch irrigation of beet fields. Detect disruptive or deceptive use of paints or coatings on buildings/structures at a ground forces installation. Detect raw construction materials in ground forces deployment areas (e.g., timber, sand, gravel).

3. Common Relevant Operational Picture (CROP) Enhancements*

EXAMPLES

Low end

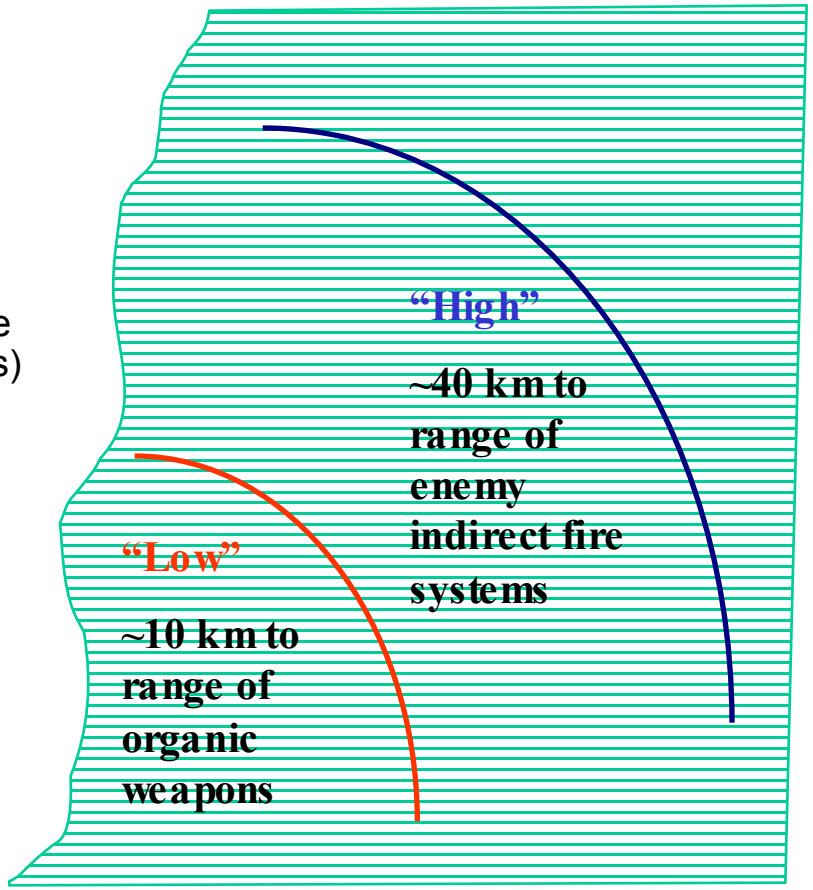
Terrain plus SA information in same picture

- Exploit mapping capabilities (e.g., display terrain grades or angles, water depths > vehicle fording depths)
- Overlay known terrain intelligence (e.g., presence of landmines, countermobility ditches & obstacles)

High end

In addition to above, provide friendly and enemy position data:

- When friendly units come into enemy range
- When LOS weapons are blocked by topography
- When LOS comms are blocked by topography
- When closing effective enemy concealment locations.
- Automatic alerts / filters



*** Goal is DII COE compatible software packages to augment existing planning tools that assist maneuver forces during STOM planning and execution**

4. Netted fires*

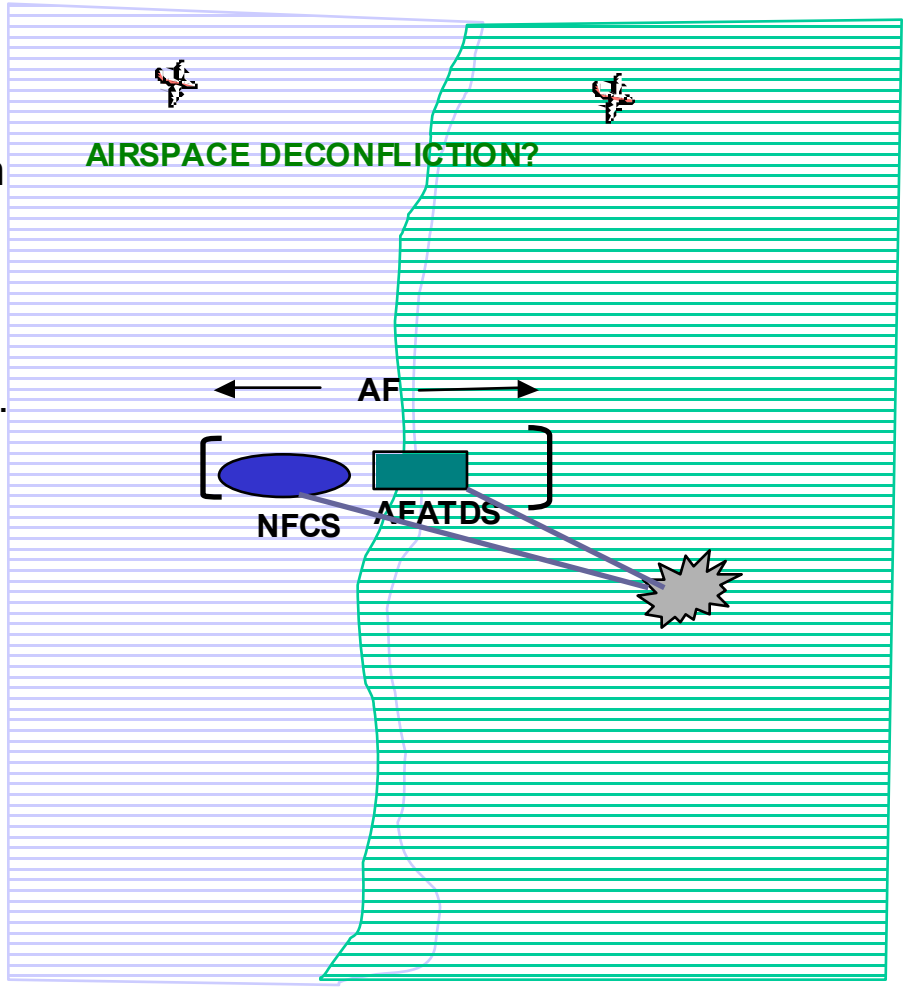
Low end

- Integrate TBMCS and AFATDS
- Continuous, real-time, USN/USMC deconfliction of artillery and NSFS engagement areas

High end

Threshold requirements, plus integrating graphical display of TBMCS and artillery data onto CROP.

- Integrate TBMCS, AFATDS, and PLI from the CROP.
  - Message translation and sequences
  - CFF processing between TBMCS and AFATDS
- Activated intelligent agents and alerts to commanders and weapons controllers.
- Continuous deconfliction of aircraft flight paths (may not be feasible in FNC timeframe)



***Goal: real-time coordination and deconfliction of fires across naval and joint platforms: trajectory data, target number/location, time on target/max. ordinate**

BAA PROCESS for BAA 02-027

BAA PROCESS

- White Papers
- Technology Insertion War Game
- Full Proposals

BAA PROCESS

White Papers

- White Papers are Mandatory
- Unclassified (highly desirable)
- 20 page limit (8.5”x11”)
- 2 Paper and 3 Electronic Copies

WHITE PAPER

Evaluation Factors

- Technical Merit
- Warfighting Contribution
- Cost

White Papers will be evaluated by panel and rated as Excellent, Good, or Fair

BAA PROCESS

Technology Insertion Game

- Technology Insertion Game 24-26 Sept
- One Page Description of Technology to be Included in White Paper

White Paper Input Document: **The following document must be provided with all white papers submitted:**

BAA Proposal Capability
White Paper Input

Name of Capability: _____

Physical Description: Include as appropriate:

1. Weight
2. Cube
3. Power requirements
4. Manning requirements
5. Maneuverability

Capability Description: Include the following minimum elements:

1. Current system(s) this proposed technology enhances.
2. Actual enhancement the proposed technology offers the targeted current system: (discuss as appropriate)
   - Increase in performance described in terms of range, all weather day/night capability, speed, effectiveness, reliability, interoperability or user friendliness
   - Decrease in operating costs
   - Reduction in weight/cube
3. Brief description of technology approach

Training required to maintain and operate:

Year available for transition:

Program cost:

Operational enhancement that the technology offers STOM: (Brief description of the way in which this technology contributes to the ability of an expeditionary force to conduct STOM.)

"Excellent"-rated White Papers will be "played" in the TIG

BAA PROCESS

Full Proposals

- Full Proposals Contain Both Technical and Cost
- 50 Page Limit (8.5”x11”) for Technical
- 2 Paper and 3 Electronic Copies

PROPOSALS

Evaluation Factors

- Technical
- Personnel Qualifications and Experience
- Management Approach
- Related Experience and Past Performance
- Cost

SIGNIFICANT DATES

- White Papers Due: 1400 28 Aug 2002
- TIG: 24 - 26 Sept 2002
- Full Proposals Due: 1400 15 Nov 2002

WEB SITES

- BAA Information
  http://www.onr.navy.mil/02/baa/02_027.htm
- FNCs
  http://www.onr.navy.mil/sci_tech/futurenaval.htm
- Littoral Combat FNC
  http://www.onr.navy.mil/explog/litcom/lc_start.asp
- Technology Readiness Level (TRL)
  http://www.deskbook.osd.mil/reflib/MDOD/031DR/016/031DR016DOC.HTM

QUESTIONS

Today:
Use the form provided

After Today:
E-mail Questions to:
Barry_Blumenthal@onr.navy.mil
or
Helen_Paul@onr.navy.mil

LITTORAL COMBAT/POWER PROJECTION
INDUSTRY DAY
QUESTION FORM

Questioner: Name: _____
Telephone: _____
E-mail: _____

Q: _____

Questions / Answers will be posted at:
http://www.onr.navy.mil/02/baa/02_027.htm