Joint Command and Control for Net-Enabled Weapons (JC2NEW) Joint Test (JT)

Managing the Net-Enabled Weapons Kill Chain

Testing in a Live-Virtual-Constructive Environment

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Director

Report Documentation Page

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the way it is now…..

The Good Guys

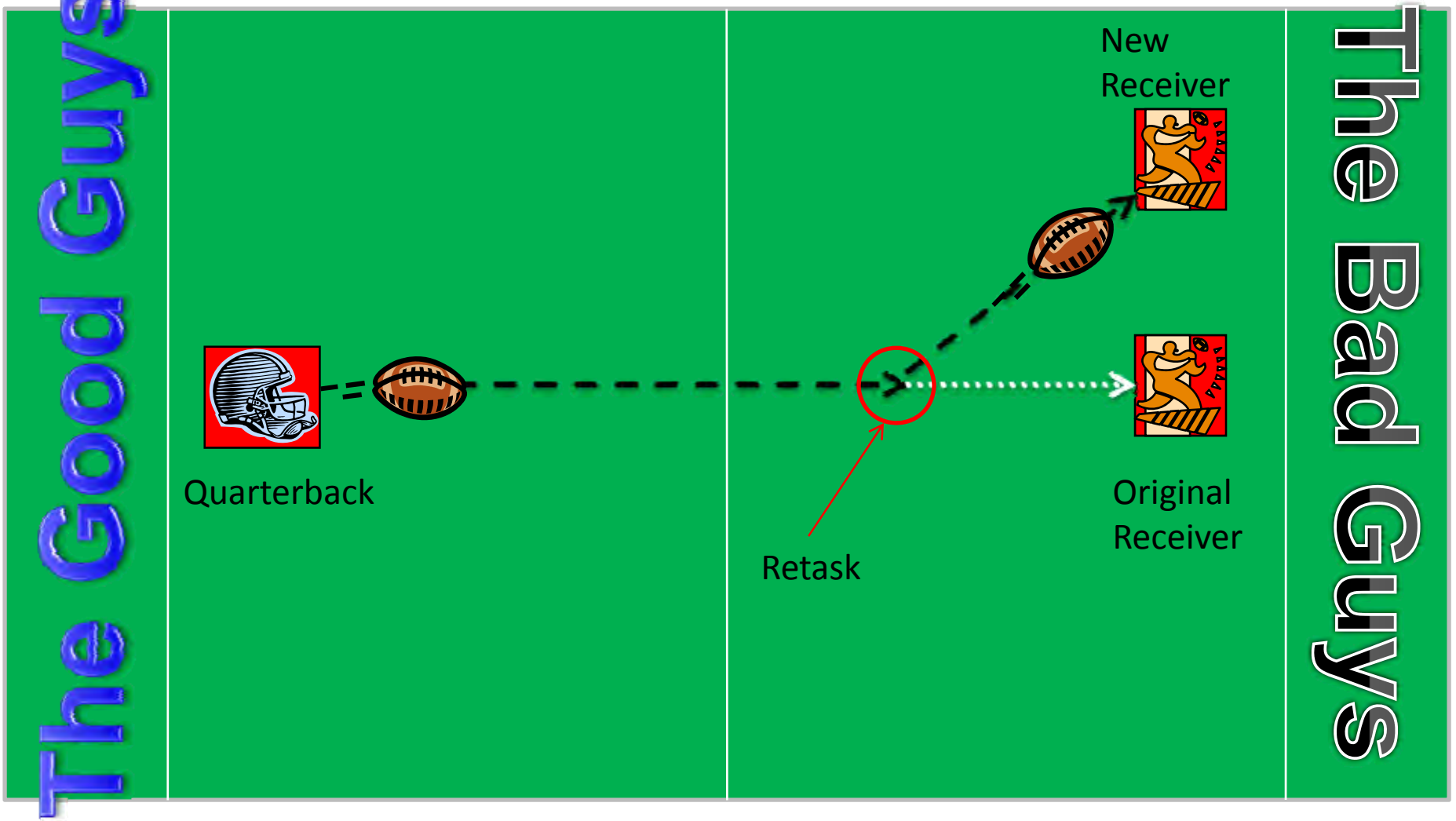
Quarterback

Receiver

The Bad Guys

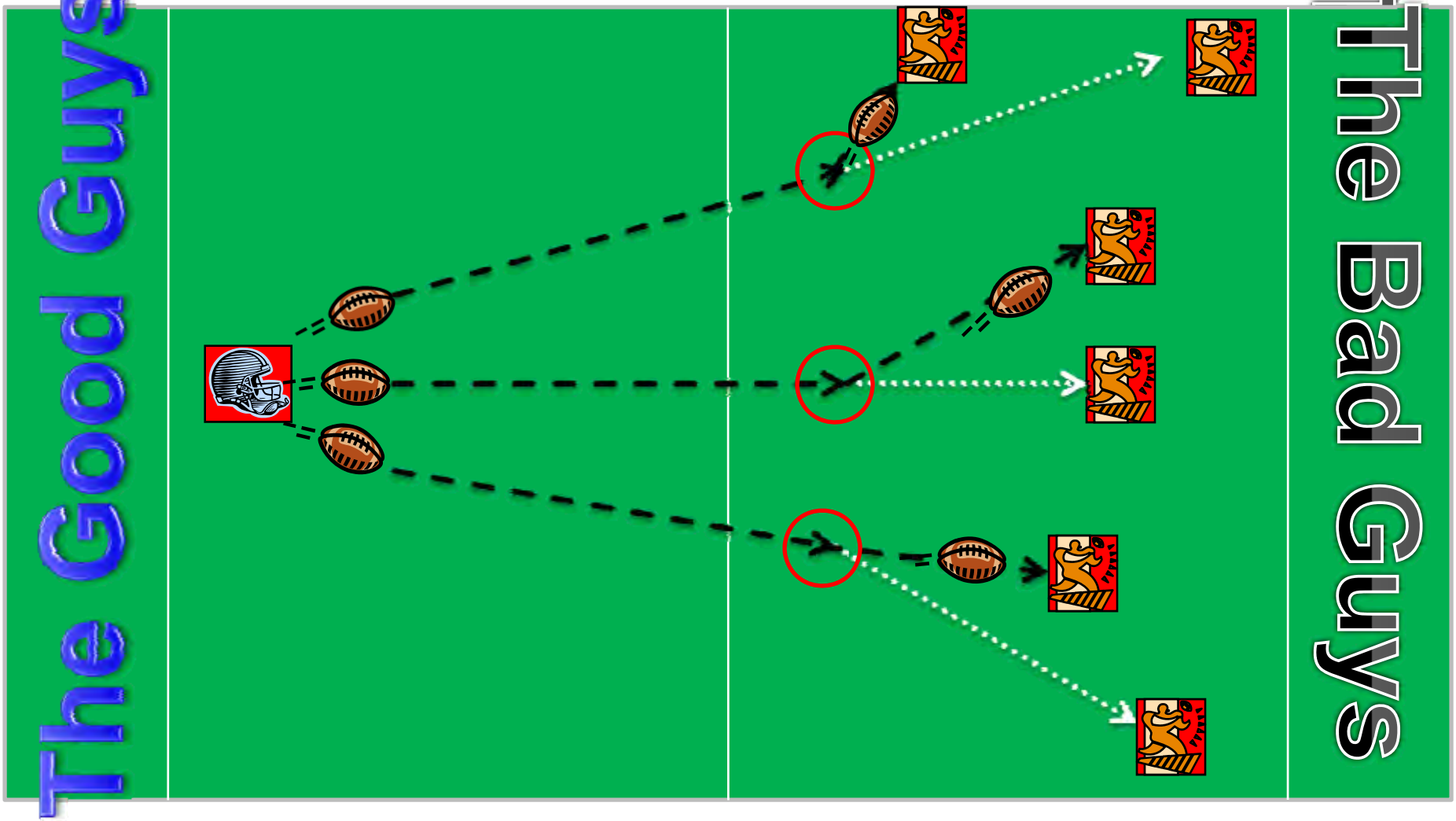
Fire and forget…

What if you could call the football?

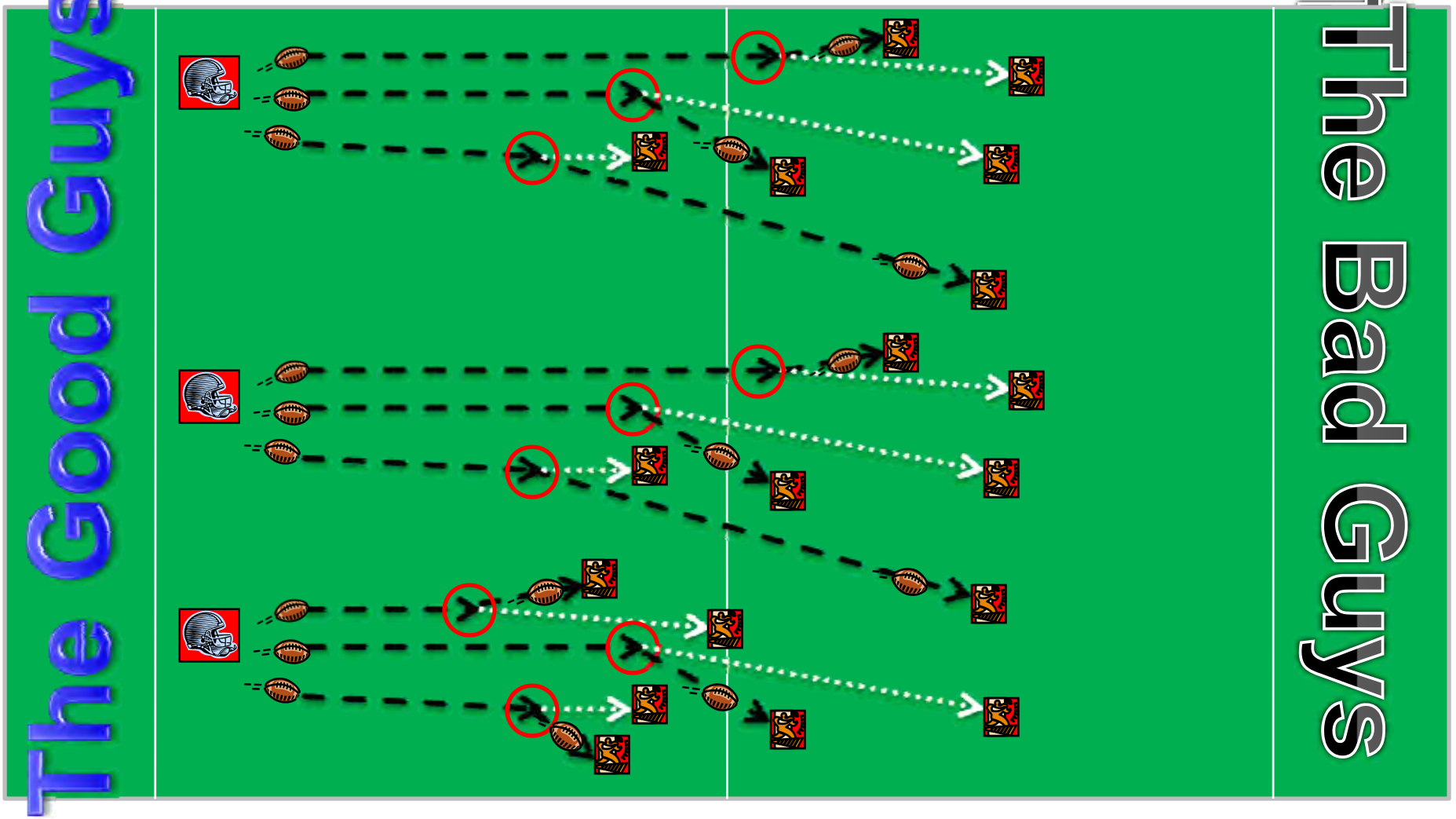


You enable QB to change receiver after he throws the ball!

What if you had more than one ball?



More than one quarterback?



We can do this now with Net-Enabled Weapons using C2 processes

Net-Enabled Weapon

- **Evolving Definition:**

  “Weapons whose functions can enhance, or be enhanced by, network operations to include initial targeting; launch; fly-out; re-direction; re-targeting; bomb-hit-indications (BHI); health and status; location; sensor operations; and loiter/self-destruct actions.”*

- **Warfighter Translation**
  “A net-enabled weapon is another weapon in our tool kit. We need to understand and learn how to optimize its effectiveness.”

*Joint Capabilities Integration and Development System Architecture Concept of Operations for Network Enabled Weapons, developed by the Weapons Data Link Network Advanced Concept Technology Demonstration

Current or Near-Term Net-Enabled Weapons

Direct Attack

WEAPON	SERVICE	IOC	TGT set/profile
NLOS-LS Precision Attack Missile (PAM)	ARMY	2010-11	Moving, mobile or fixed / short range ~40nm
Small Diameter Bomb 2	USAF	2014	Moving, mobile or fixed / short range ~30-50nm

Stand Off

WEAPON	SERVICE	IOC	TGT set/profile
SLAM-ER 	**NAVY/USMC**	**FIELDED**	**mobile or fixed / medium-long range 50-150nm**
JSOW C-1	NAVY	2009-10	Mobile or fixed / short-medium range 15-65nm
Harpoon III	NAVY	2010-11	Moving, mobile, or fixed / short-medium range

Long Range / Loiter

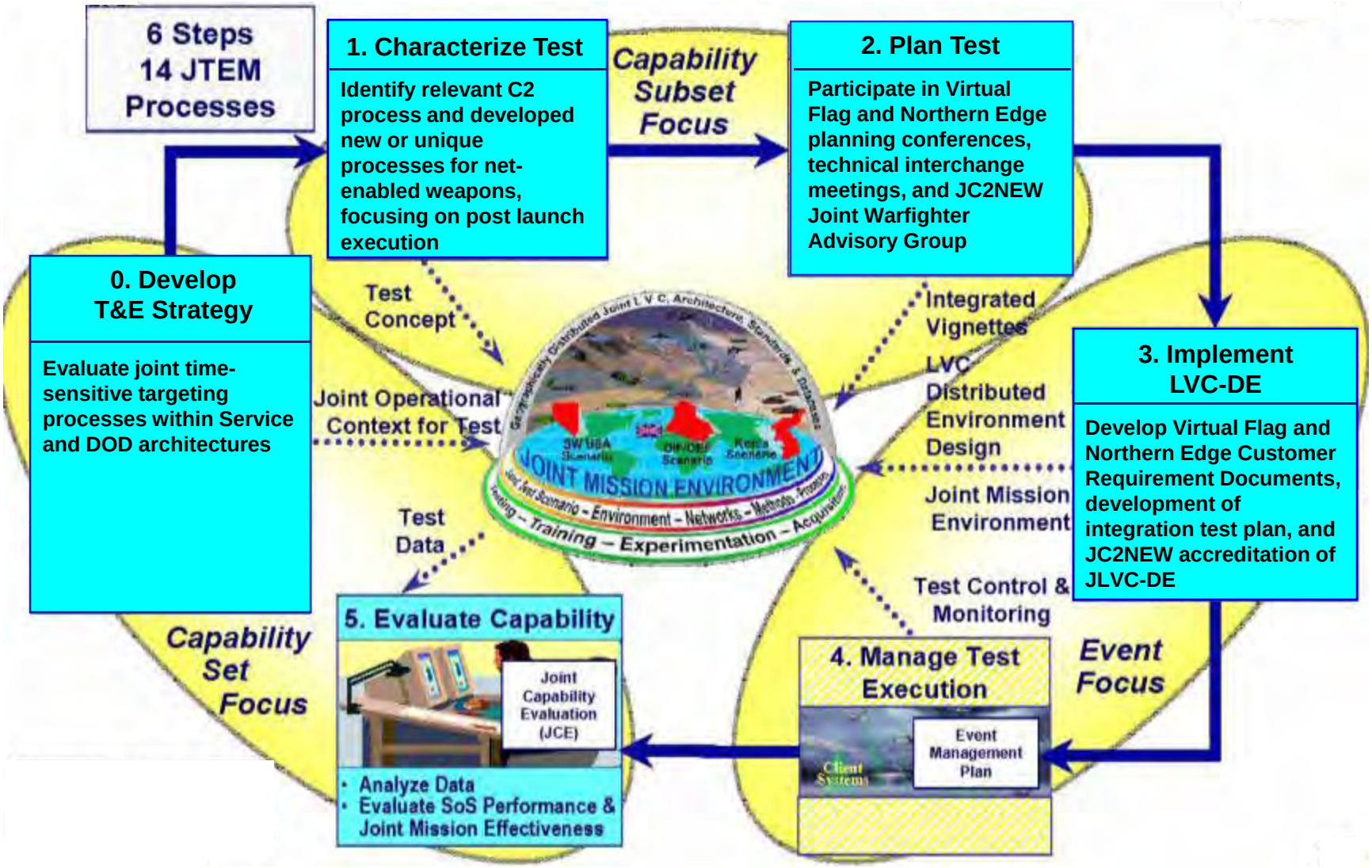
WEAPON	SERVICE	IOC	TGT set/profile
TLAM Blk IV Tactical Tomahawk 	**NAVY**	**FIELDED**	**Mobile or fixed / long range 700+nm**
JASSM-MI Maritime Interdiction	AIR FORCE	2012 ?	Mobile or fixed / medium-long range 200+nm

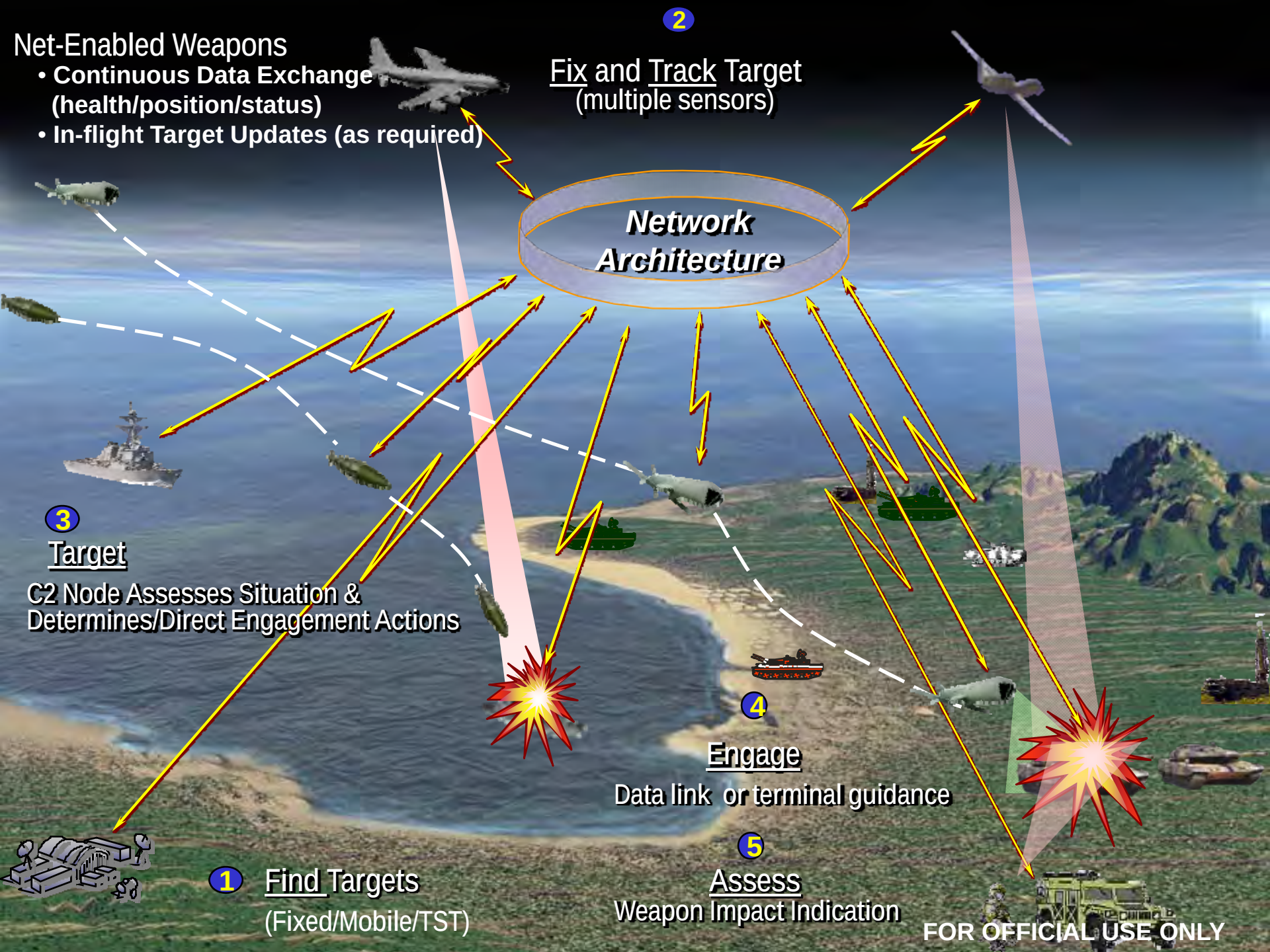
Problem Statement

Current operational concepts and joint command and control procedures do not support the joint force's ability to employ net-enabled weapons against dynamic targets

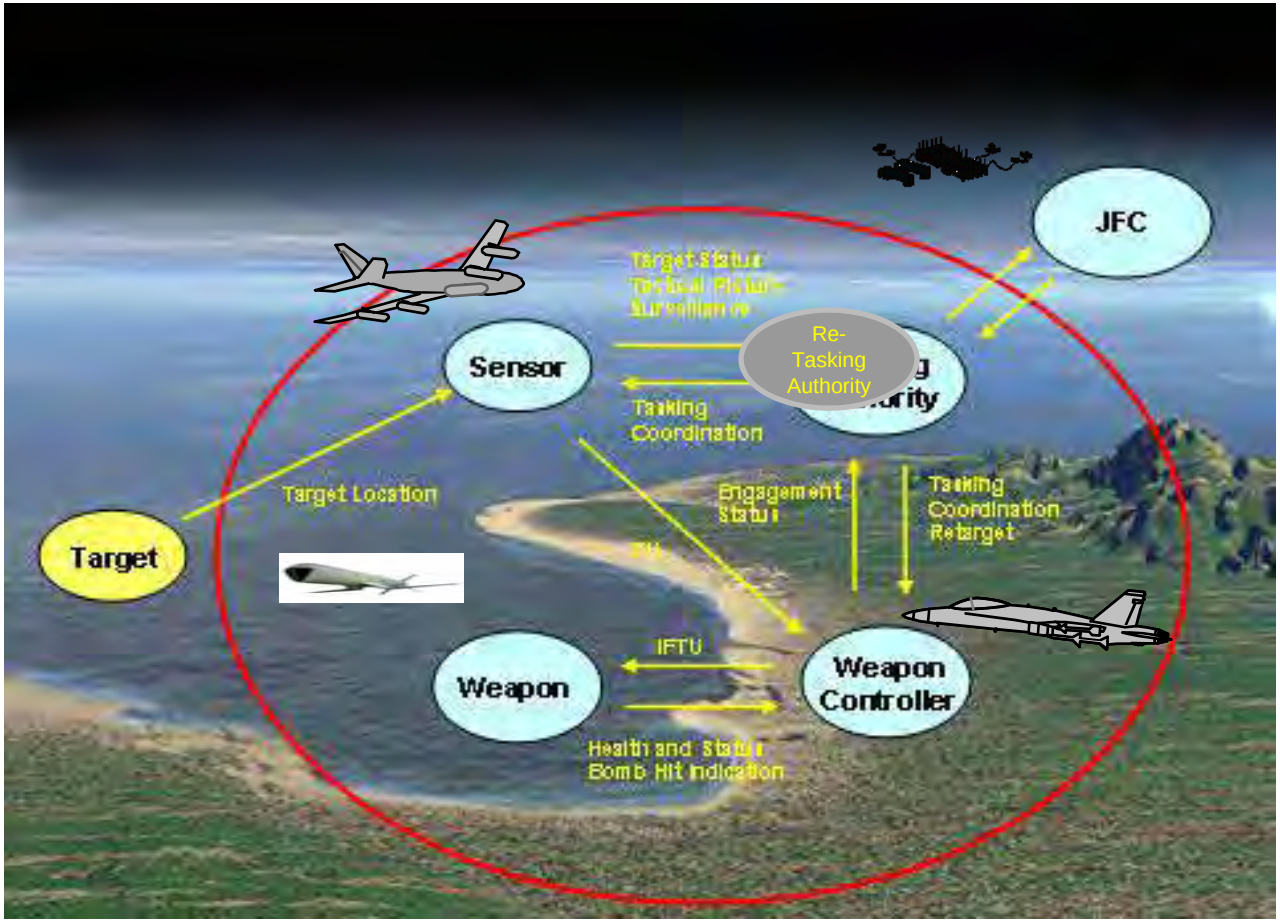
Reviewed and validated by USPACOM sponsor and Joint Warfighter Advisory Group

JC2NEW Test Design Approach



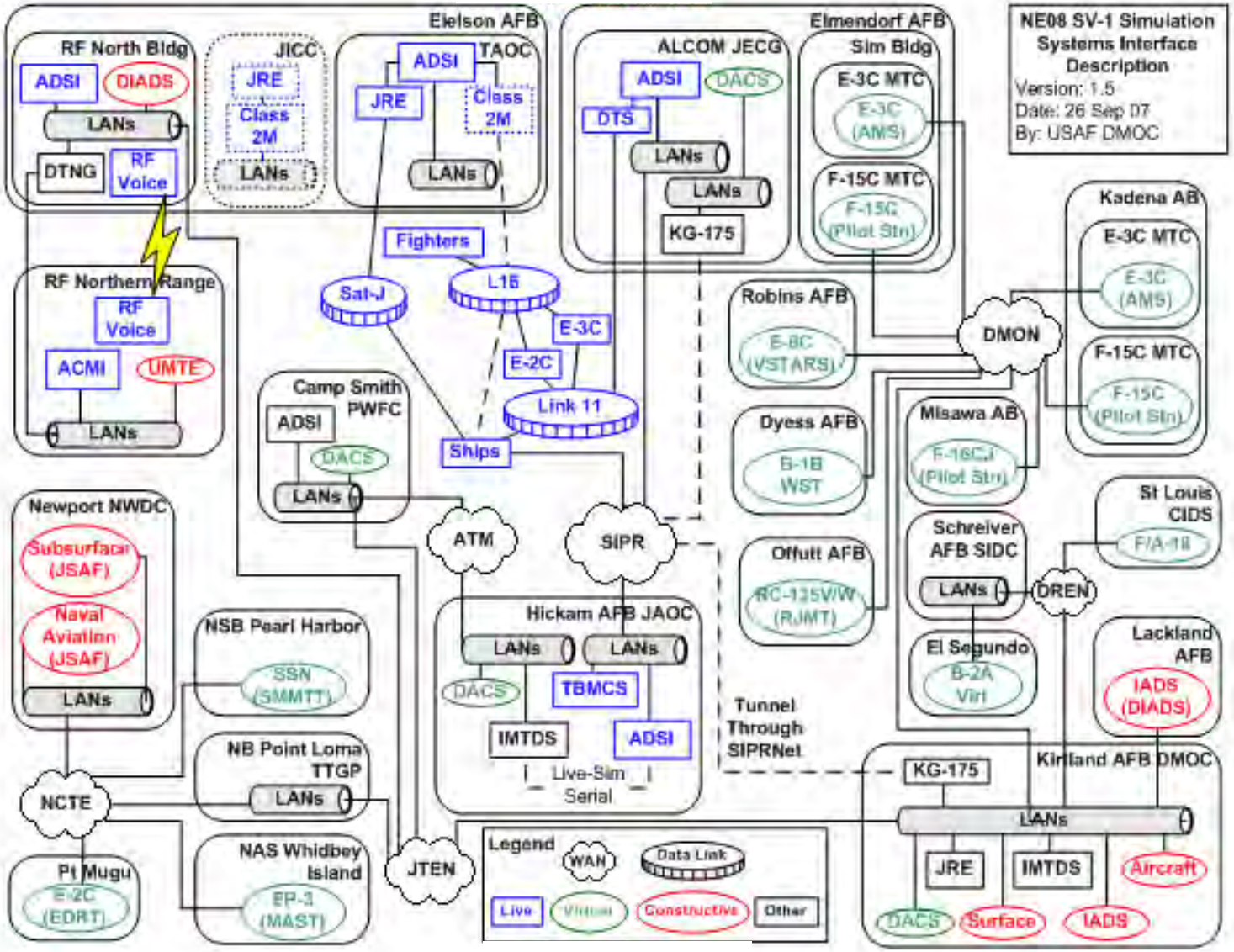

Net-Enabled Weapons
• Continuous Data Exchange (health/position/status)
• In-flight Target Updates (as required)
2
Fix and Track Target
(multiple sensors)
Network Architecture
3
Target
C2 Node Assesses Situation & Determines/Direct Engagement Actions
4
Engage
Data link or terminal guidance
5
Assess
Weapon Impact Indication
1
Find Targets
(Fixed/Mobile/TST)
FOR OFFICIAL USE ONLY

Basic Net-Enabled Weapon Entities



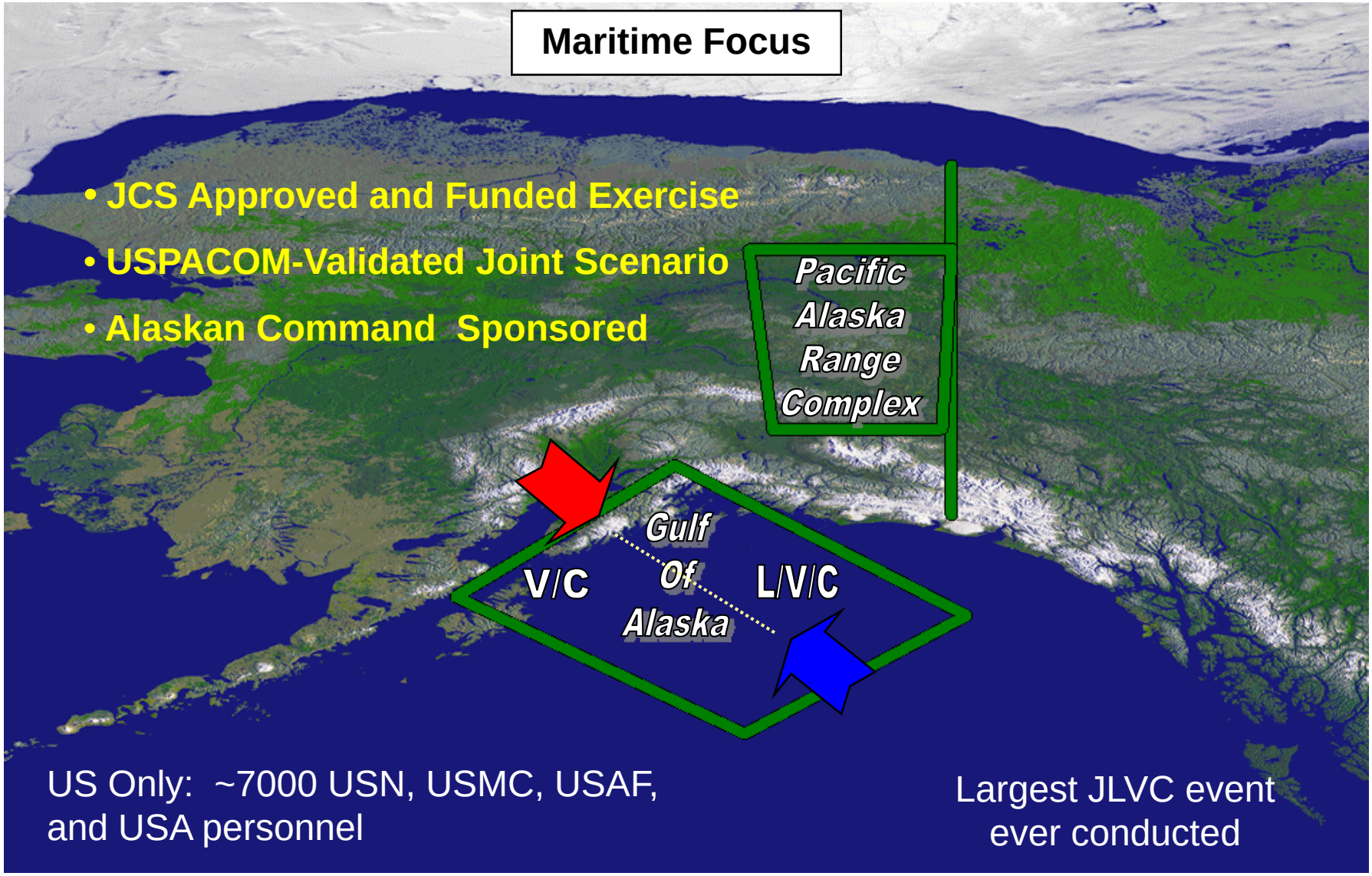
- **Re-<u>Tasking Authority</u> (RA) is the entity with authority to direct post-launch execution (PLE) of a net-enabled weapon (NEW)**
- **The <u>weapon controller</u> (WC) is the entity designated to provide in-flight target updates, abort, loiter, and retarget NEW commands**
- **The <u>sensor</u> is the entity designated to track and report the target's location**

DMOC NE 08 Systems



NE 08 – DMOC LVC Hub

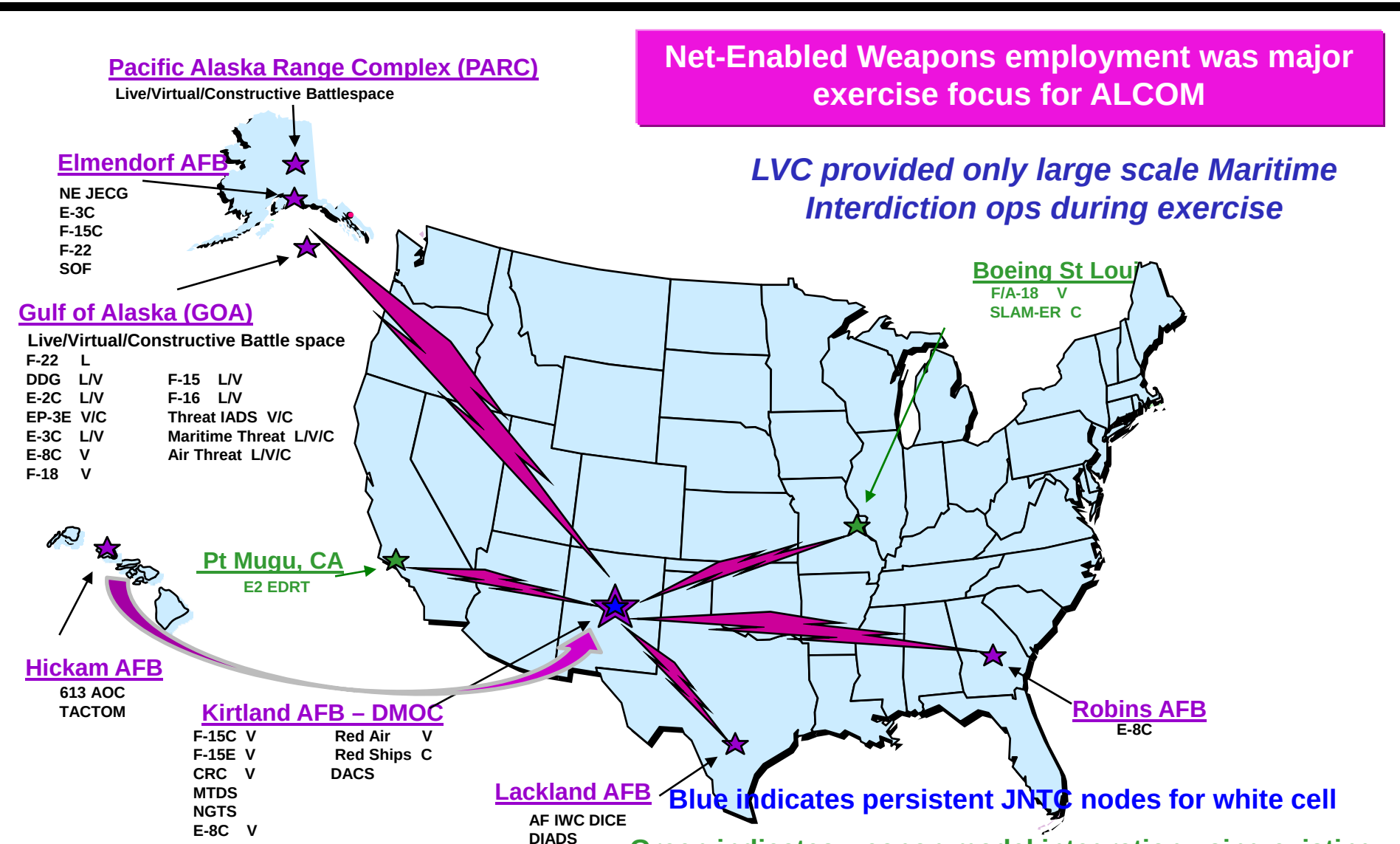
JC2NEW Field Test 1 (FT-1)



NE 08 (JC2NEW FT-1)
Distributed Mission Environment

Net-Enabled Weapons employment was major exercise focus for ALCOM

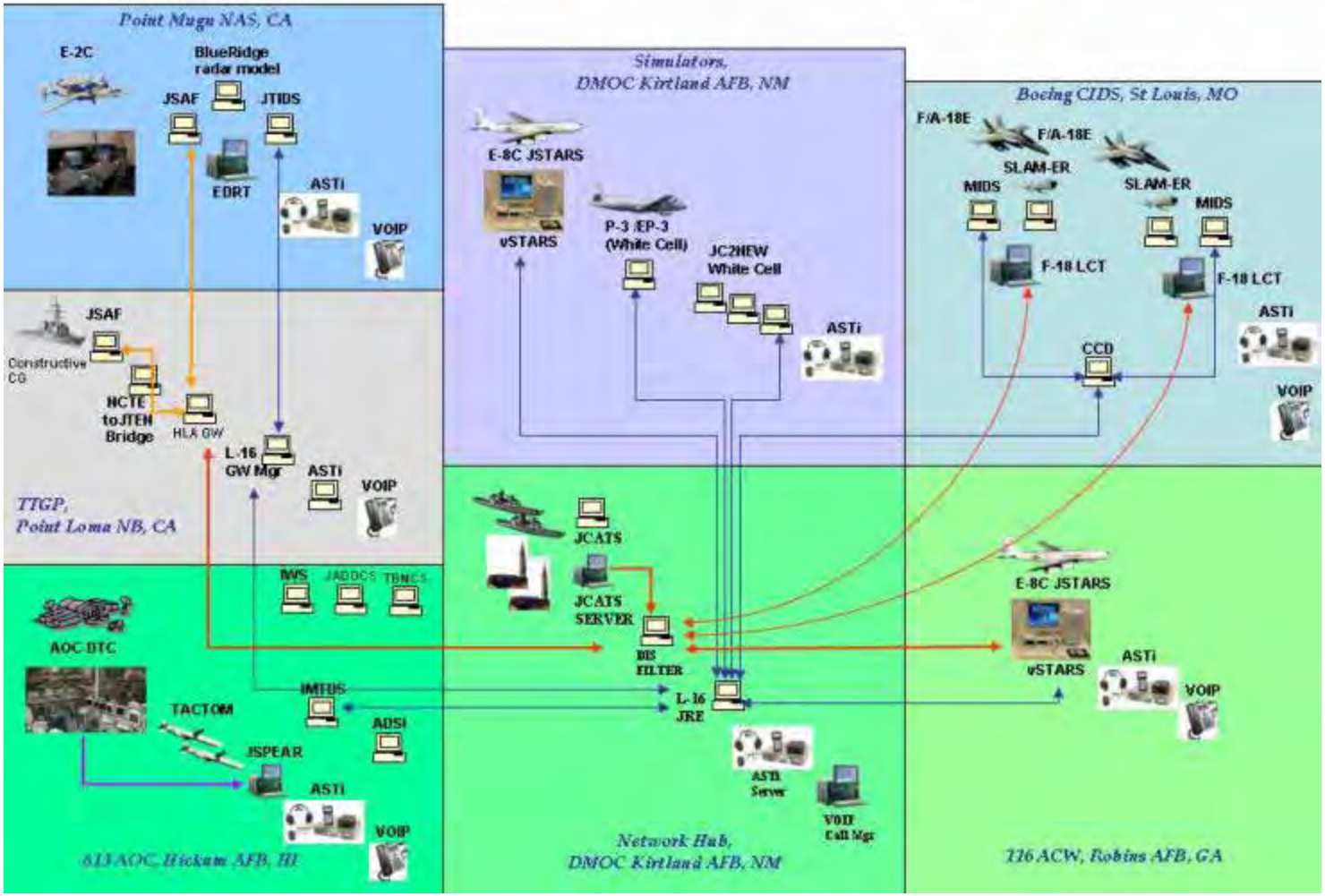
LVC provided only large scale Maritime Interdiction ops during exercise



Blue indicates persistent JNTC nodes for white cell

Green indicates weapon model integration using existing DREN/JTEN

JC2NEW FT-1
Systems for NE 08



JC2NEW NE 08 Nodes

- **705 CTS, DMOC, Kirtland AFB, NM**
  - LVC Network Hub; E-8C Virtual Surveillance Target Attack Radar Simulation (VSTARS), constructive P-3/EP-3 simulation, White Cell test control; DREN, JTEN, Distributed Mission Operations Network (DMON) connectivity
- **Pt. Mugu, CA, Naval Warfare Development Center**
  - E-2C Enhanced Deployable Readiness Trainer (EDRT); NCTE connectivity
- **Tactical Training Group Pacific (TACTRAGRUPAC) Pt. Loma Naval Base, CA,**
  - Network and simulation tool interface for E-2C simulation; NCTE to JTEN connectivity
- **Boeing CIDS St. Louis, MO**
  - F/A-18E/F Low Cost Trainer (LCT), SLAM-ER 3-degrees of freedom constructive simulation; DREN connectivity
- **613th Air and Space Operations Center (AOC), Hickam AFB, HI**
  - AOC Combat Operations to include Chief Combat Operations (CCO), Senior Offensive Duty Officer (SODO)/Offensive Duty Officer (ODO), Senior Air Defense Officer (SADO)/Command and Control Duty Officer (C2DO), Senior Intelligence Duty Officer (SIDO)/Intelligence Duty Officer (IDO), Dynamic Targeting Cell (DTC), Attack Coordinator, Targeting Technicians, Tomahawk Land Attack Missile (TLAM) Duty Officer (DO) using Tomahawk Command and Control System (TC2S); JTEN connectivity
  - Tomahawk Command and Control System (TC2S) integration at the AOC representing the TACTOM planning and strike cells
- **116 Air Control Wing (ACW), Robins AFB, GA**
  - VSTARS; DMON connectivity

Mission Thread Implementation
LVC Environment

- The JT demonstrated the following attributes of the distributed LVC FT-1 environment:
- Integrated Sensor – C2 – shooter system simulations
- Functional Link-16 simulated data network
- Functional voice communications
- Functional collaborative tools
- JC2NEW scenarios provided a robust integrated dynamic and time-sensitive targeting environment
- CONOPS and TTP were clearly defined in the Net-Enabled Weapons Handbook
- Operators trained for net-enabled C2 process implementation by JT personnel
- JT personnel trained for the LVC exercise venue

FT-1 Bottom Line

FT-1 focused on a specific maritime environment comprised of a maritime interdiction mission scenario.

The overall objective of FT-1 was to:

' Refine and evaluate the TTP developed during JC2NEW's Phase I to meet the needs of the warfighter in a maritime environment.'

- **Warfighters successfully executed post launch weapon re-tasking against dynamic and time-sensitive targets in the NE 08 LVC environment**
  - Significantly improved engagement opportunities and responsiveness against mobile and rapidly emerging high-priority targets
  - Warfighters provided invaluable feedback on JC2NEW-developed TTP, which will be incorporated in the Net-Enabled Weapons Handbook

Observations - General

For many warfighters, this exercise was their first exposure to net-enabled weapons capabilities and processes. The 613th Air and Space Operations Center (AOC) participants recognized the value gained to the extent that they requested JC2NEW participation in future Northern Edge and Virtual Flag scheduled events

- **LVC events can improve operational integration and training**
  - Leverage VC to augment/replace low density, high demand (LDHD) assets, replicate MI assets/targets, and stimulate AOC level training

- **The NE 08 LVC venue proved a credible environment for integrated C2 operations at Operational-Tactical level**
  - Joint systems capabilities/limitations education and training lacking
  - C2 constellation fully leveraged in various configurations
    - Identified TTP opportunities for degraded ops - capability gaps addressed
    - “Best opportunity we’ve ever had for joint ops” - AWAC Msn CC

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Summary

- C2 processes are the critical link to effectively engage emerging, time-sensitive, moving, or relocated targets using net-enabled weapons

- The JC2NEW tailored net-enabled weapon C2 dynamic processes enable a flexible and responsive kill chain – they require:
  - Preplanning for supporting assets (ISR, 3PS)
  - A knowledgeable C2 structure
  - Clear lines of authority for actionable events
  - Comprehensive battlespace situational awareness
    - Target timeline
    - Weapon timeline
    - C2 Process timeline

- Training, training, training – Well planned LVC exercises are excellent venues for TTP development and testing in a joint environment

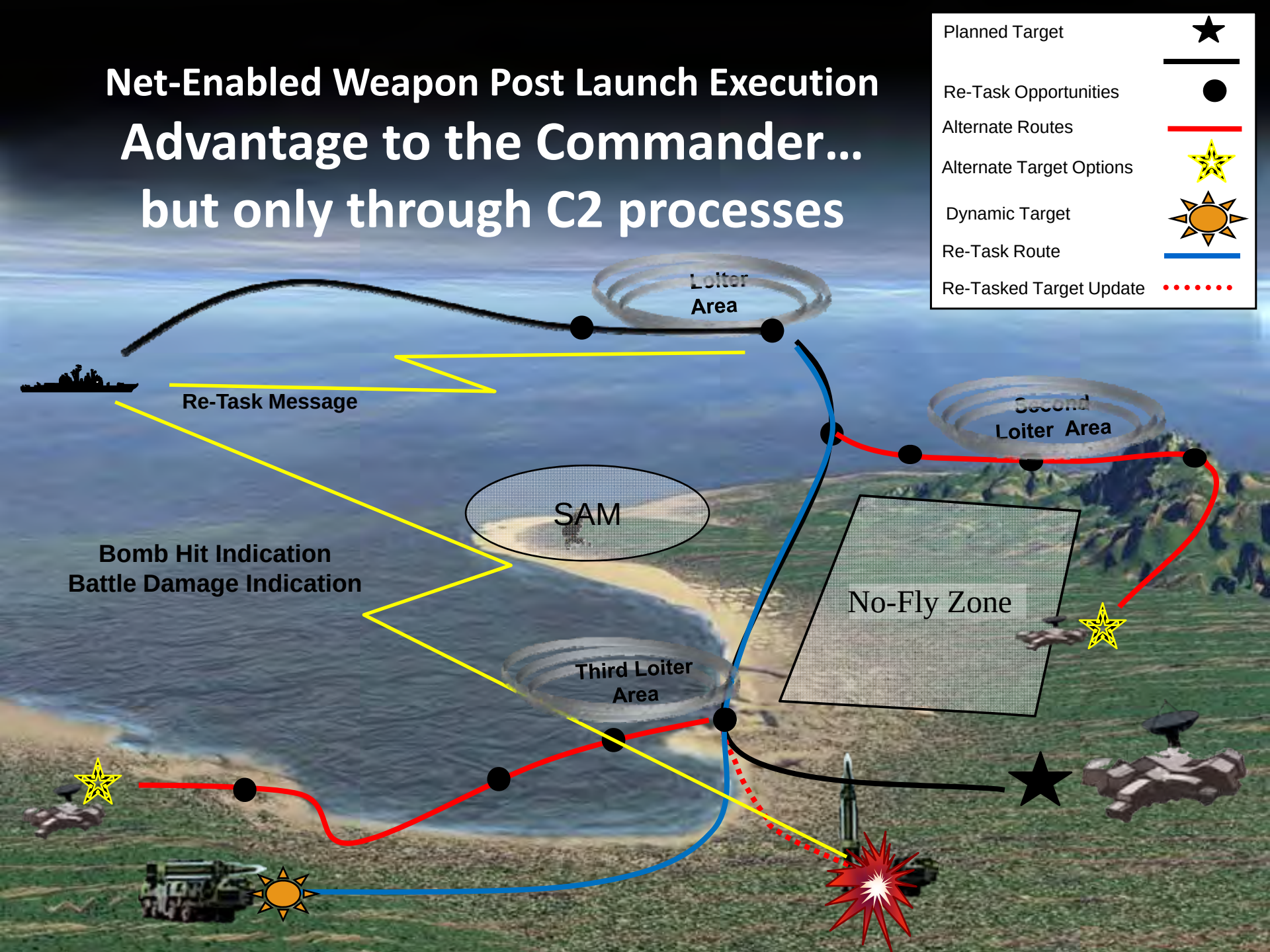
When the strike of a hawk breaks the body of its prey, it is because of timing.

-Sun Tzu

Back-up Slides

Net-Enabled Weapon Post Launch Execution

Advantage to the Commander…
but only through C2 processes



Example: Tactical Tomahawk

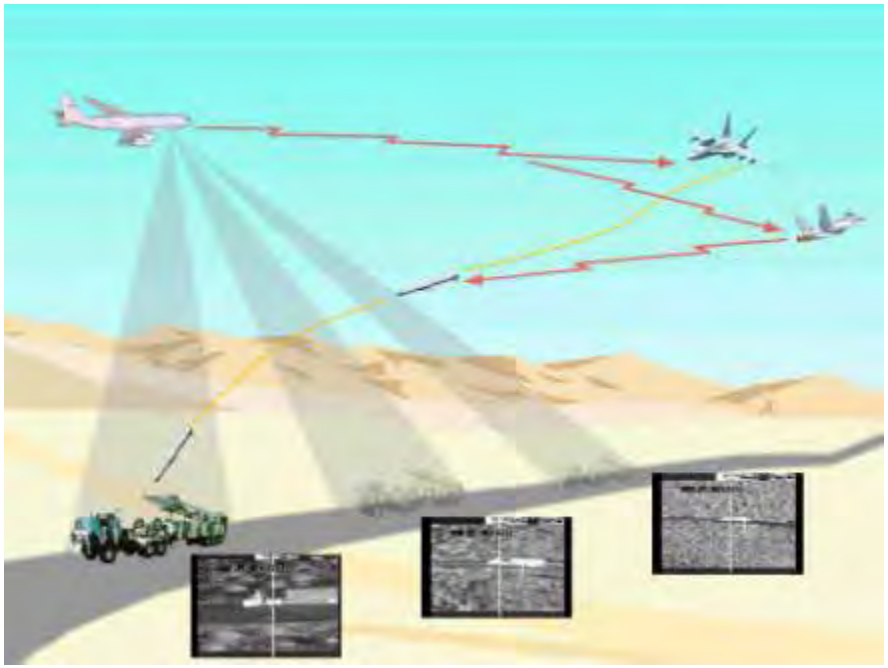
- Two-way satellite data link
- 15 preprogrammed alternate targets
- Net-Enabled Weapon (re-task to new target!)
- Ability to loiter over battlefield awaiting TST
- Transmits battle damage indication (BDI) imagery
- Anti-jam GPS receiver

Block IV -109E

• Length	18.25 feet
• Diameter	20.3 inches
• Cruise Speed	~475 miles per hour
• Range	~1000 SM
• Warhead	WDU-36/B
• Launch Platform	Submarine/Ship
• Navigation	Inertial/TERCOM/Anti-Jam GPS/DSMAC+
• Data Link	UHFSATCOM
• In Inventory	385

High Priority Pop-Up Target

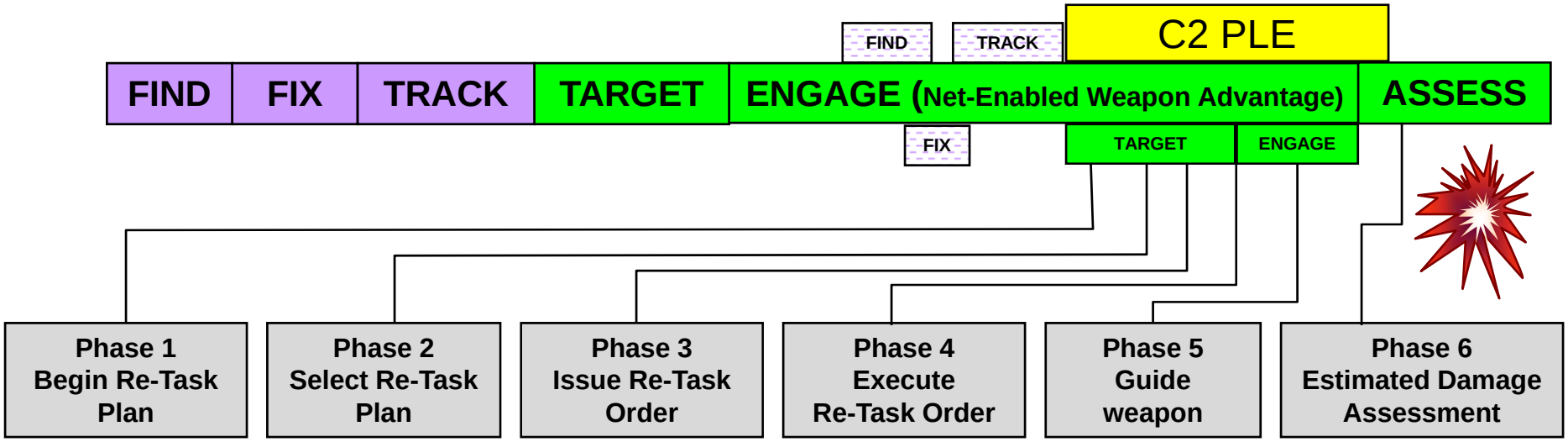
- TACTOM is already launched to a preplanned ATO target
- Intel is received on the location of a high priority target
- TACTOM is in range
- AOC coordinates and re-tasks TACTOM to strike higher priority target
- Target has a bad day



Testing the C2 Phase Concept for PLE

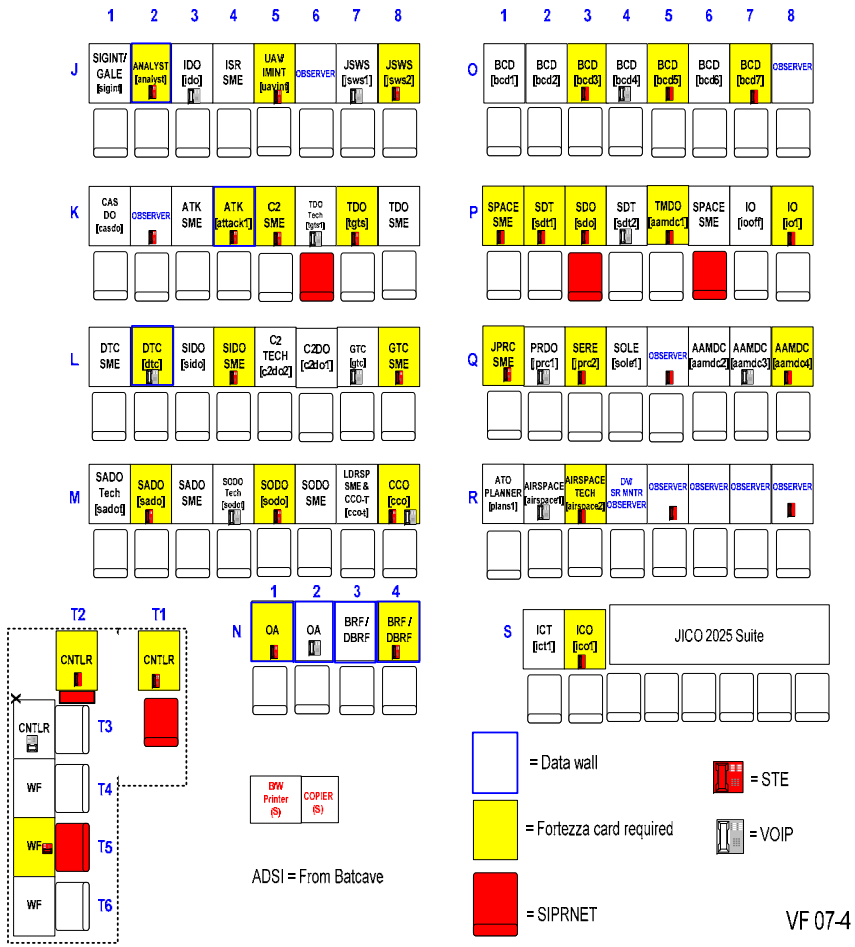
Situation: After a net-enabled weapon is launched, the designated target is moving, has relocated, or a different target becomes a higher priority.

A Commander has the ability to authorize the net-enabled weapon to be re-tasked post-launch if critical C2 activities are accomplished.



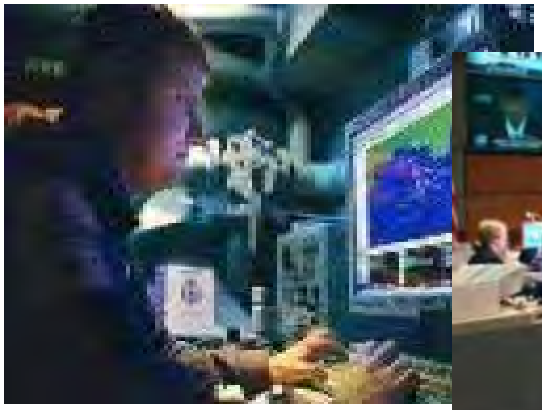
Easy right? Not quite…

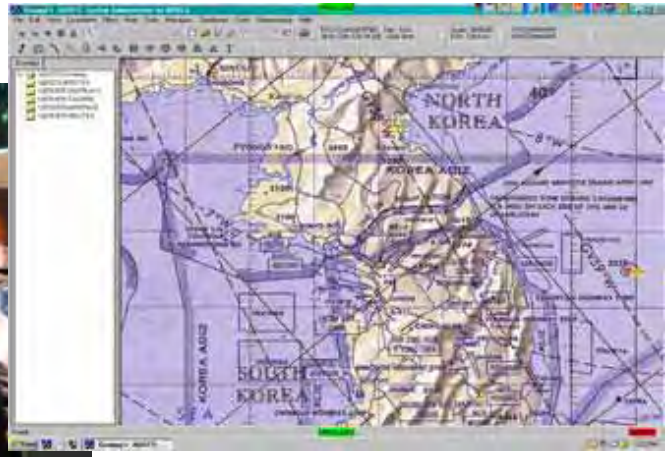
- **Many players in AOC involved:**
  - DTC
  - SIDO
  - SODO
  - SADO
  - CCO
  - TLAM DO
  - Airspace Tech
- **Effective communication flow and C2 are critical**

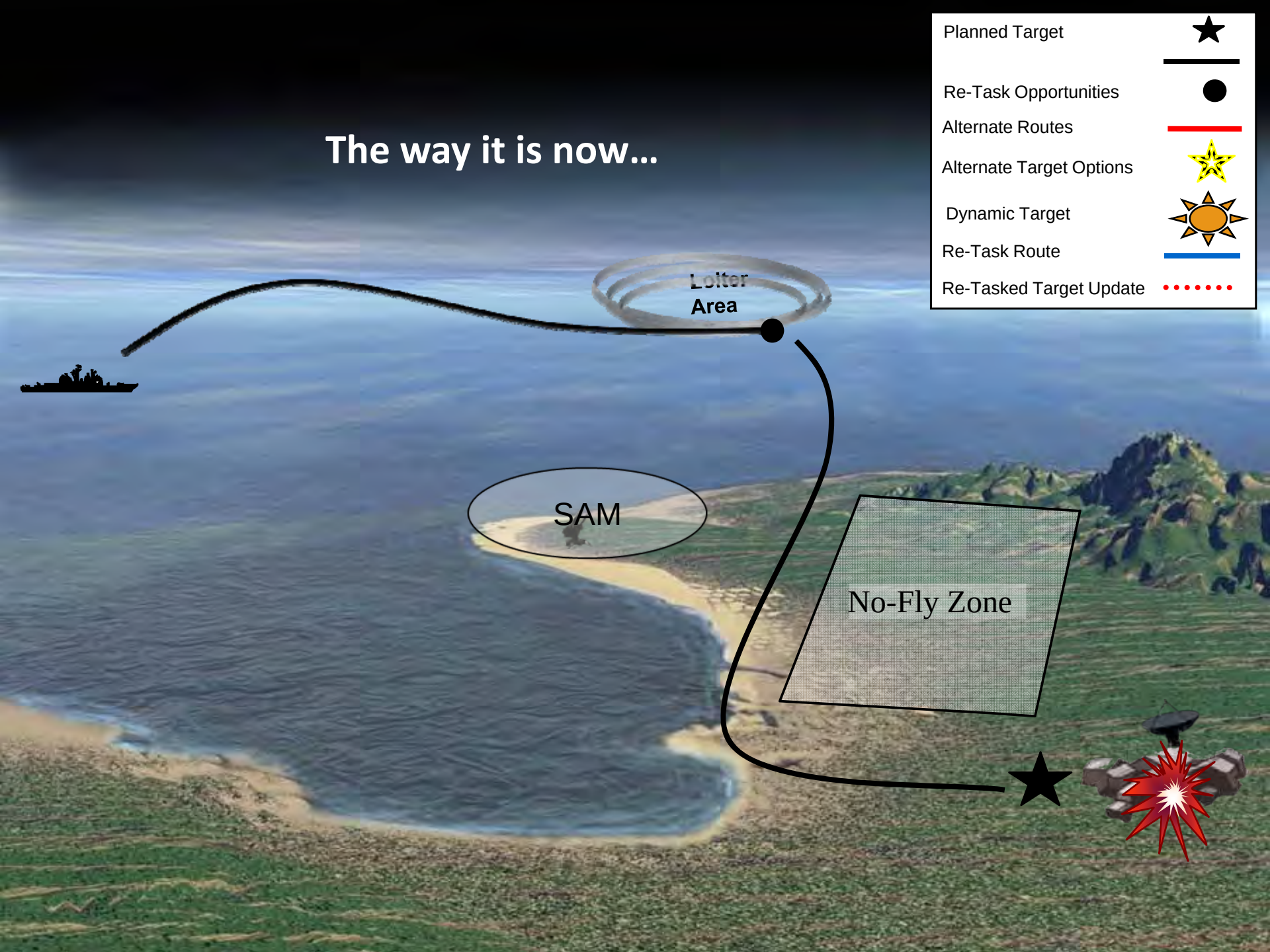


What is JADOCS?

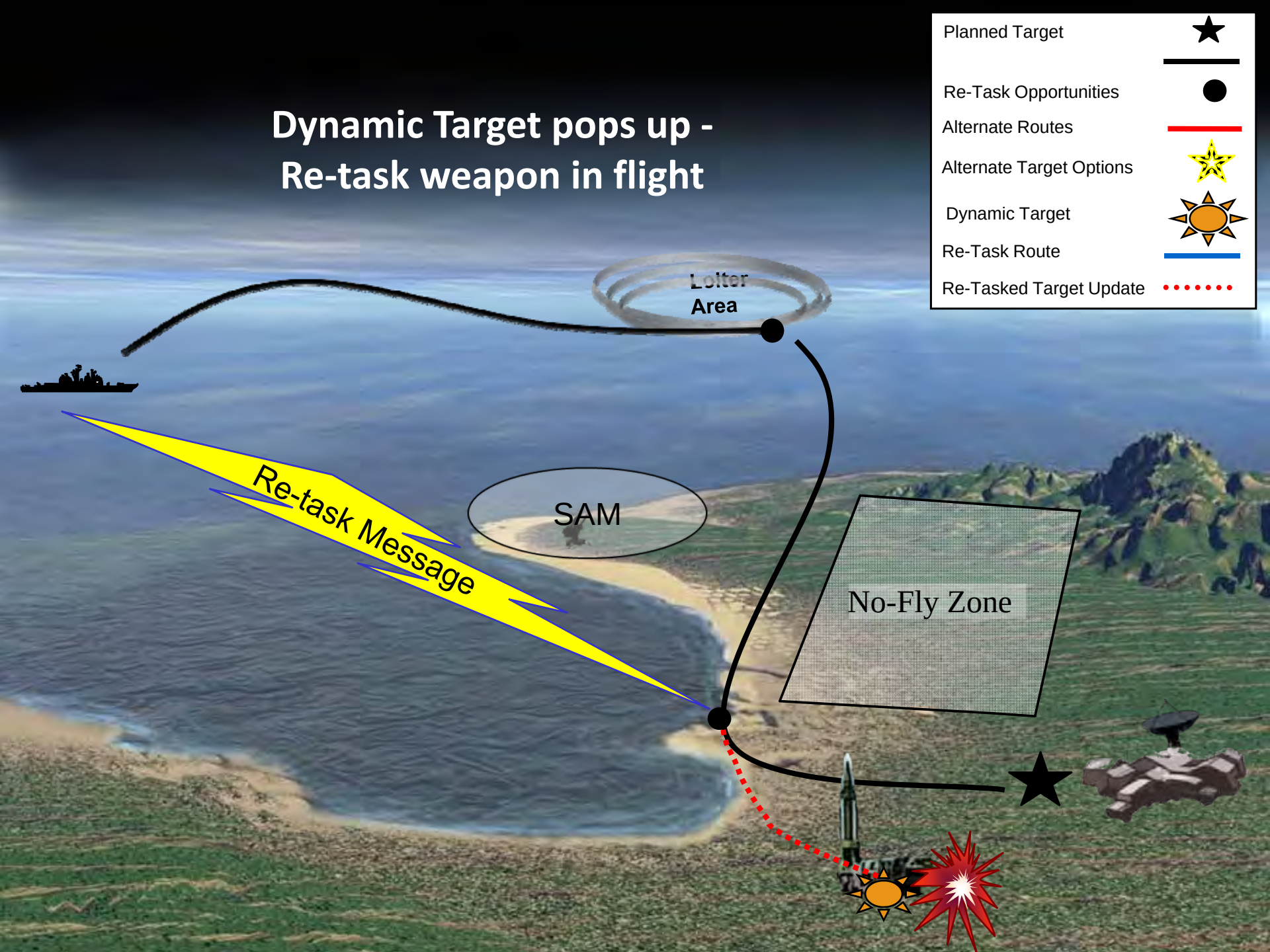
- **Joint Automated Deep Operations Coordination System (JADOCS)**
  - Joint mission management software application
  - Suite of tools/interfaces for horizontal and vertical integration across battlespace functional areas
  - Provides capability to integrate ISR data and task offensive resources
    - Improves strike timing to coincide with enemy movements
  - Over 3000 users worldwide
    - Used in support of operations in Iraq and Afghanistan, used in all US unified commands



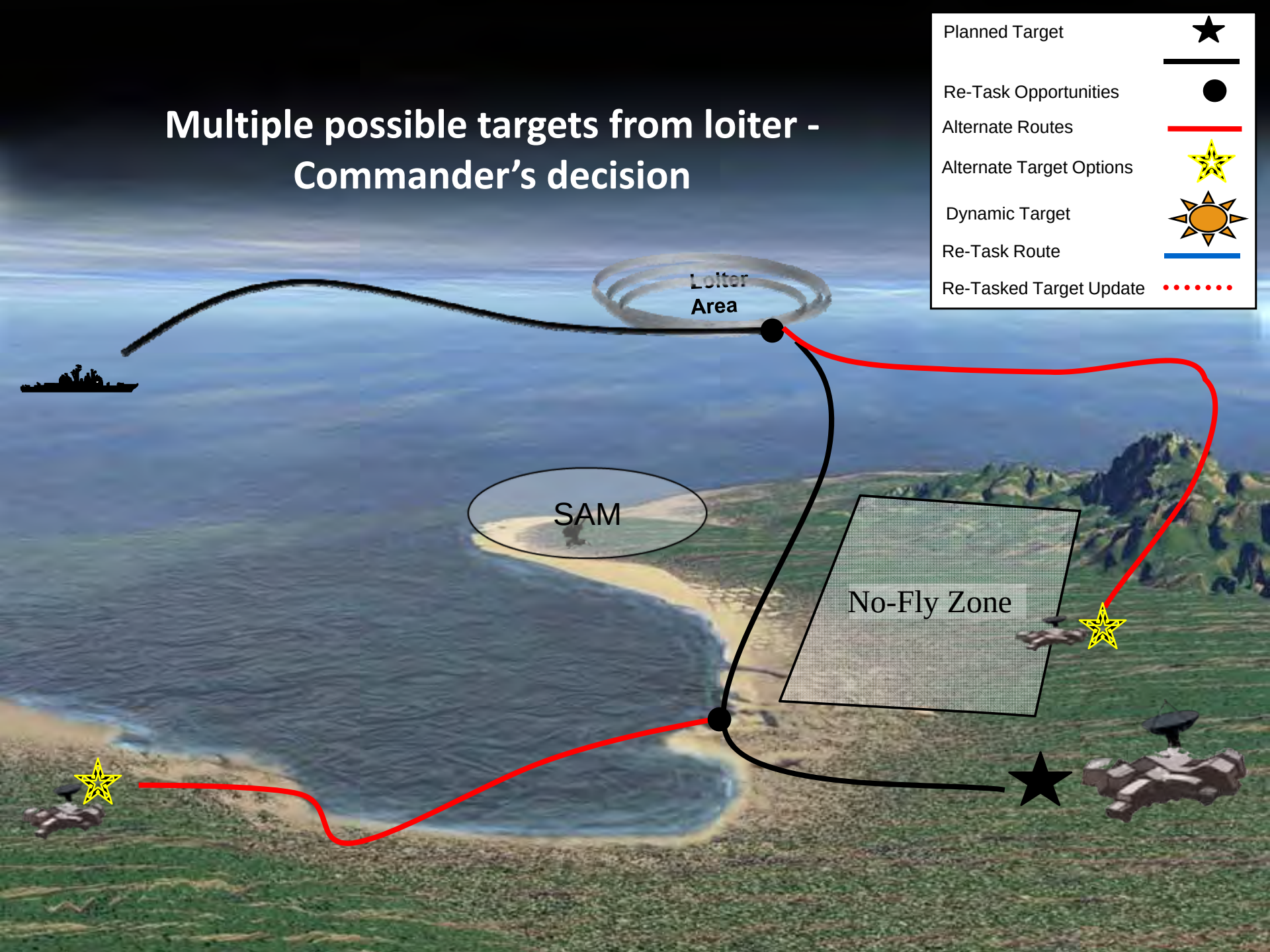


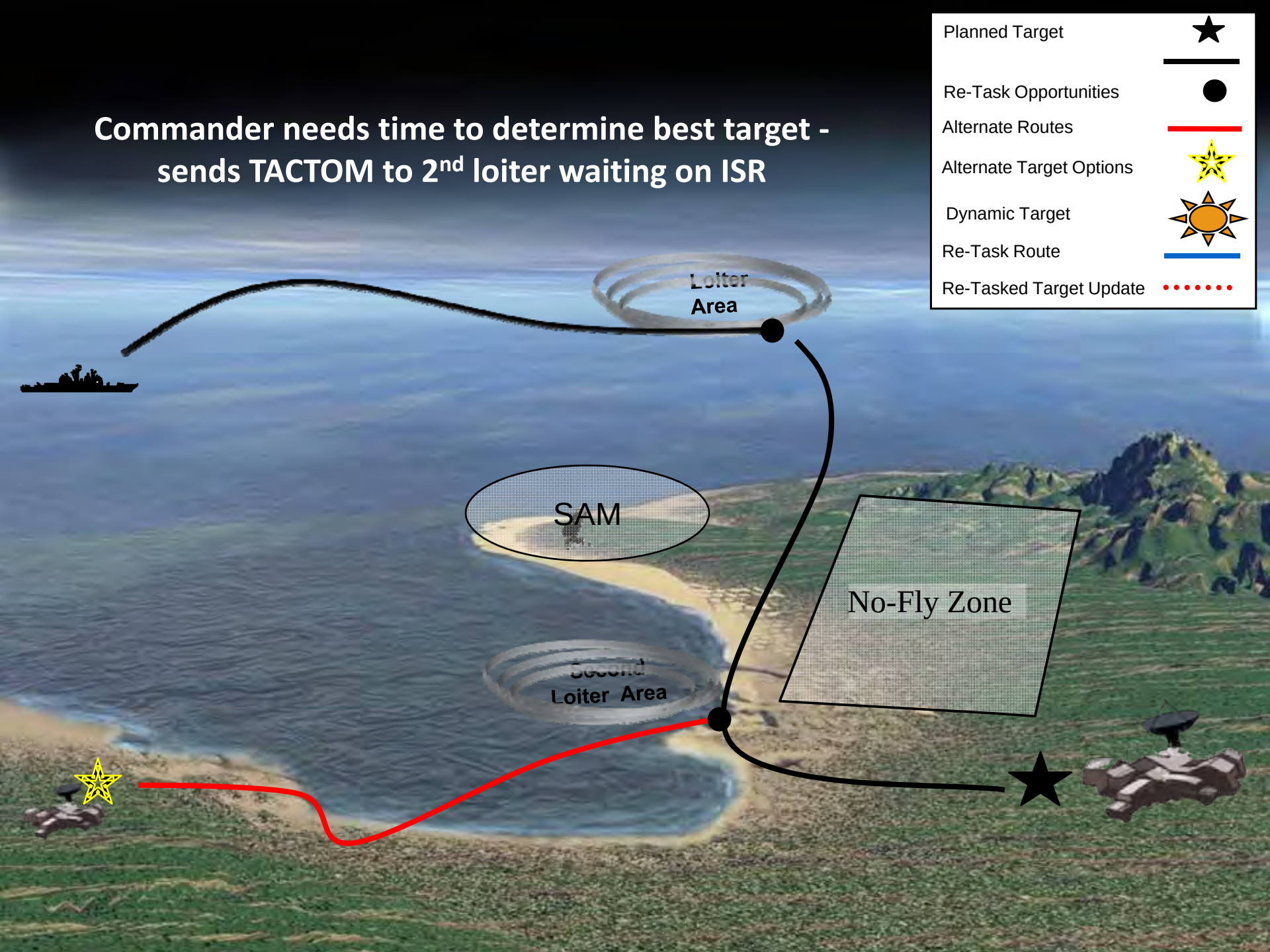

The way it is now…
Planned Target
Re-Task Opportunities
Alternate Routes
Alternate Target Options
Dynamic Target
Re-Task Route
Re-Tasked Target Update
Loiter Area
SAM
No-Fly Zone

Dynamic Target pops up - Re-task weapon in flight



Multiple possible targets from loiter - Commander's decision

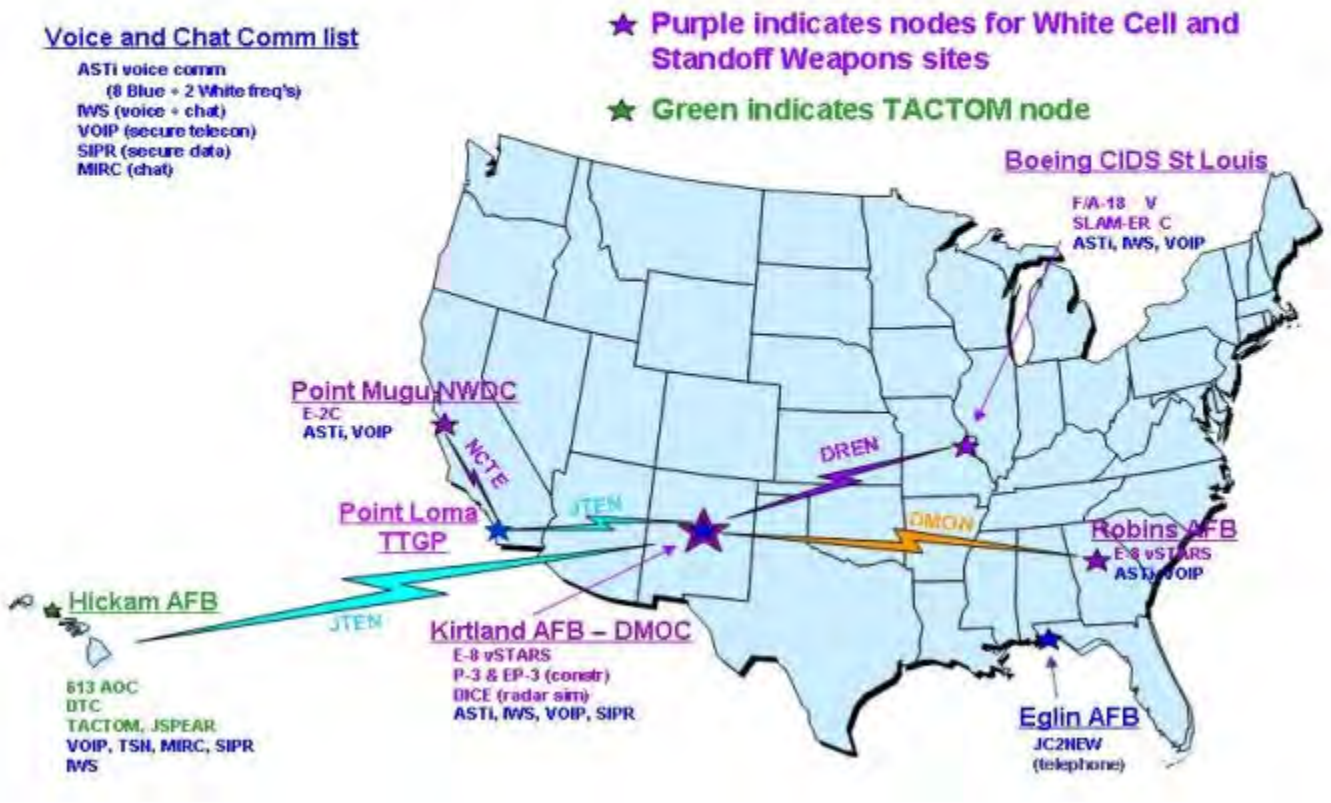



Commander needs time to determine best target - sends TACTOM to 2nd loiter waiting on ISR
Planned Target
Re-Task Opportunities
Alternate Routes
Alternate Target Options
Dynamic Target
Re-Task Route
Re-Tasked Target Update
Loiter Area
SAM
No-Fly Zone
Second Loiter Area


After re- task to new target, dynamic target pops up - Commander re-tasks again for TST kill
Planned Target
Re-Task Opportunities
Alternate Routes
Alternate Target Options
Dynamic Target
Re-Task Route
Re-Tasked Target Update
Loiter Area
Re-task to Second Loiter Area
Re-task to Dynamic Target
SAM
No-Fly Zone
Second Loiter Area

FT-1

JC2NEW Voice Comm and Wan Connections



Observations - Standoff

The JT integrated a standoff LVC environment in which Navy pilots executed F/A-18E and SLAM-ER weapons employment utilizing JSTARS third party source target data with an E-2C command and control platform in a maritime interdiction scenario.

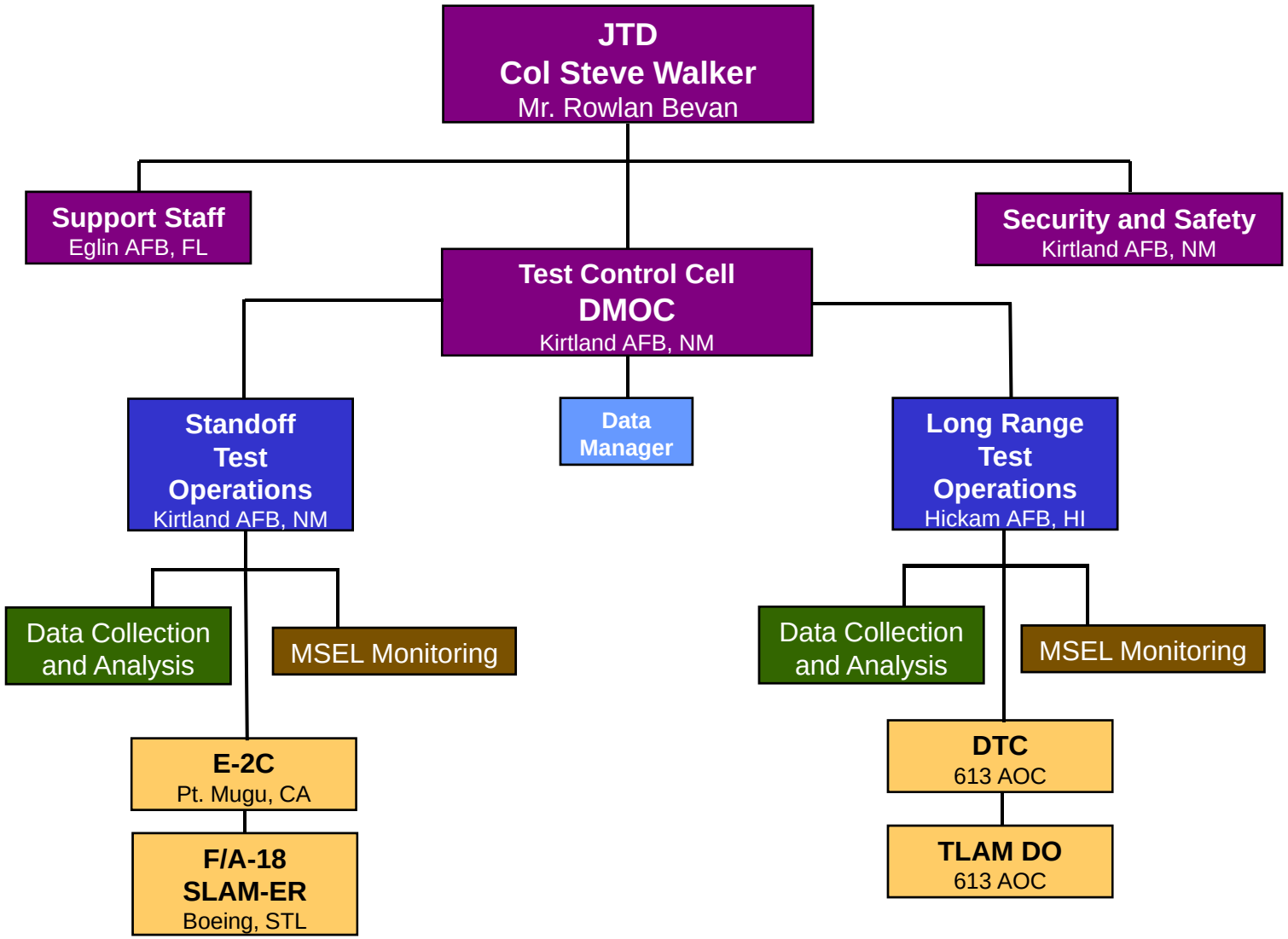
- **JSTARS 3rd Party Source track information was critical to successful target prosecution.**
- **Sweeper weapon TTP was utilized and increased ordnance on target in constrained operational environment.**
- **Estimated Damage Assessment TTP was critical to most efficient use of limited resources.**

Observations
Long-Range Net-Enabled Weapons

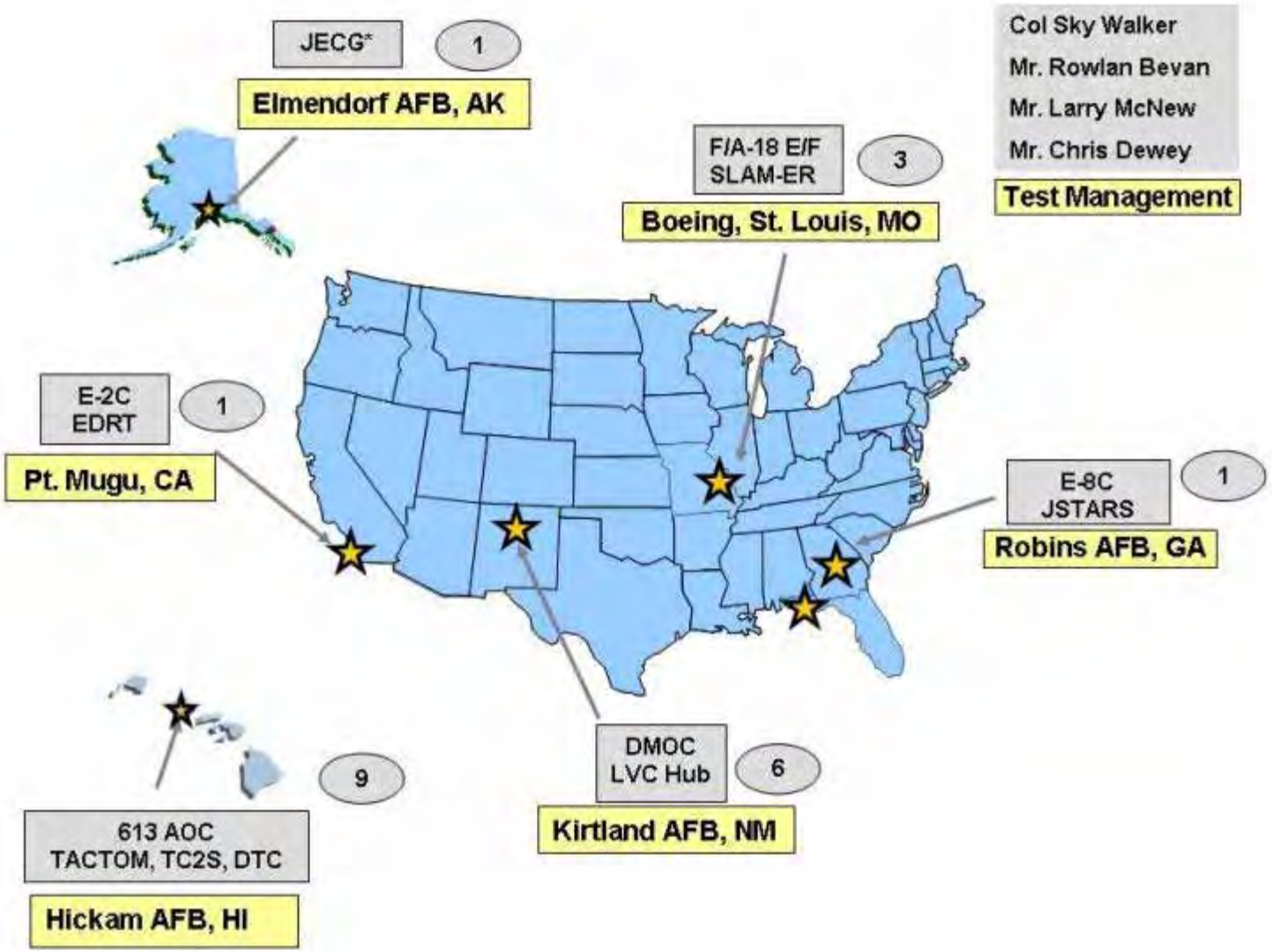
The JT integrated a long range LVC environment in which the 613th AOC Combat Operations Division, through the Dynamic Targeting Cell, executed Tactical Tomahawk missions against relocated dynamic targets using Tomahawk Mission Distribution System (MDS) to relay target and routing information to the missile post launch.

- **Addition of the TLAM Duty Officer at the AOC significantly enhanced the use of TACTOM by the JFACC to counter dynamic targets.**
  - This duty position may transition into a Net-Enabled Weapons Duty Officer
- **Allowed the AOC to visualize the location and status of individual TACTOM missions**.
  - This capability dramatically improved the AOC's situational awareness and ability to re-task airborne long-range weapons in dynamic targeting missions.
- **Additional training and TTP development required for coordinated joint weapons engagements**

JC2NEW FT-1 Test Team Structure

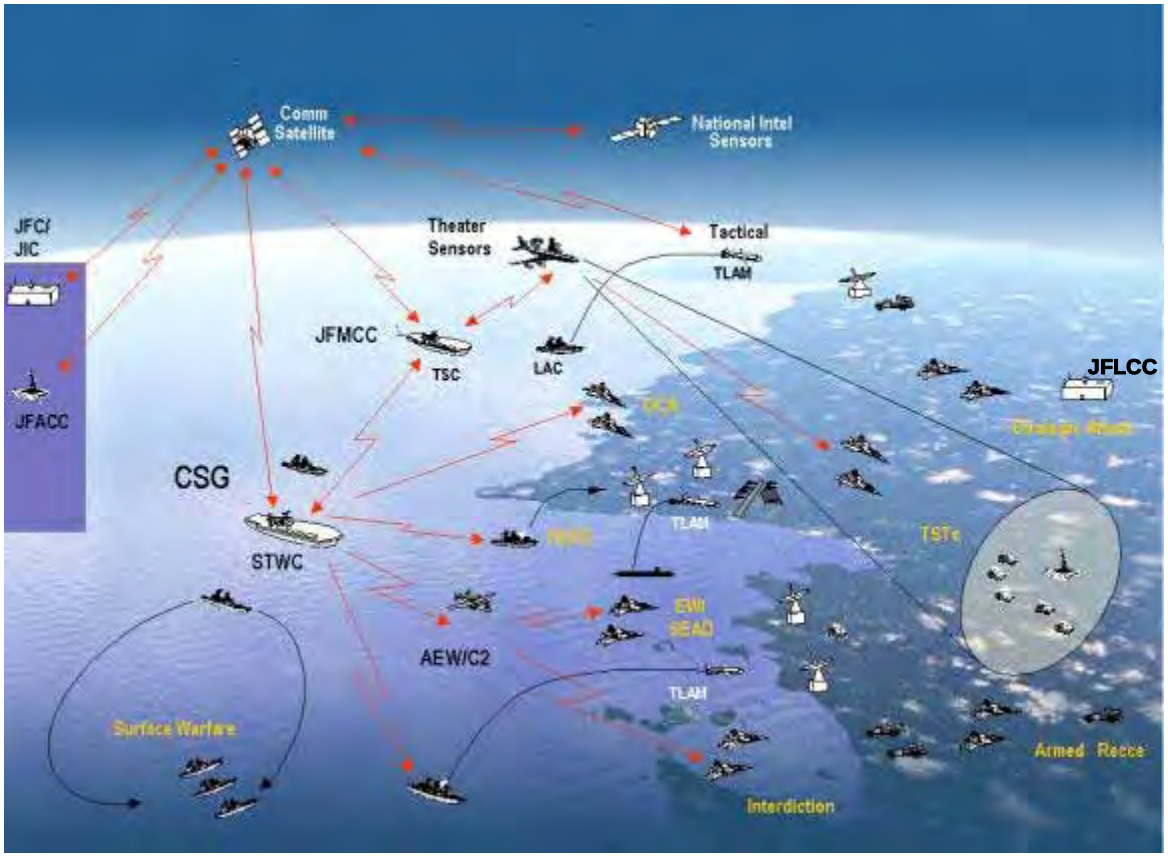


FT-1 Data Collection Nodes



21st Century Warfighting

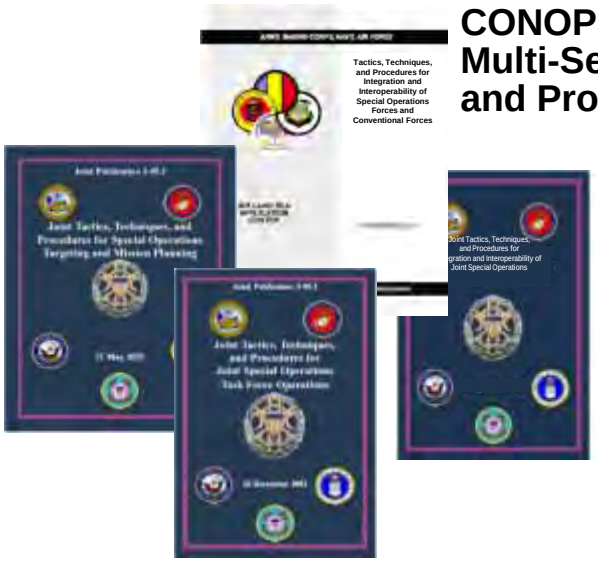
Precision Engagement
Full Spectrum Dominance



- **Exploit every source**
  - **leverage what we have**
- **Provide shared situation awareness & understanding**
- **Support dominant speed of command**
- **Provide precise, synchronized execution**
- **Allow agility and flexibility**

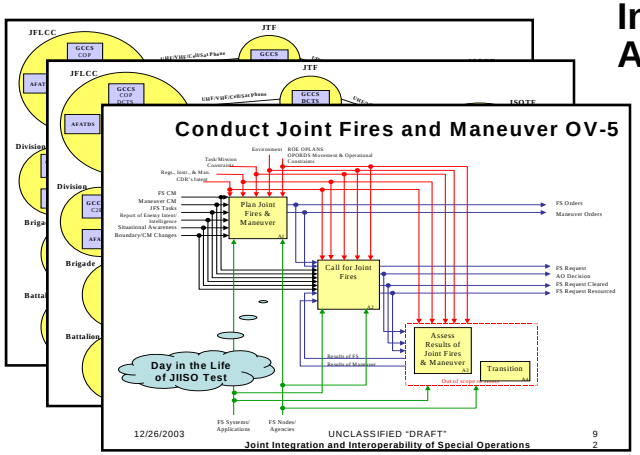
Enabled By Network Centric Warfare

JC2NEW Products



CONOPS, Handbooks, Multi-Service Tactics, Techniques, and Procedures

DOTMLPF Change Recommendation



Integrated Network Architectures Assessment

Test and Training Methodologies and Infrastructure