

**Missions & Means Framework
based Test & Evaluation
7 March 2005**

Communicating Mission Space Knowledge: One Way

- Warfighter: FO calls in mission. FA Btty fires it.
- Developer: What's an FO?

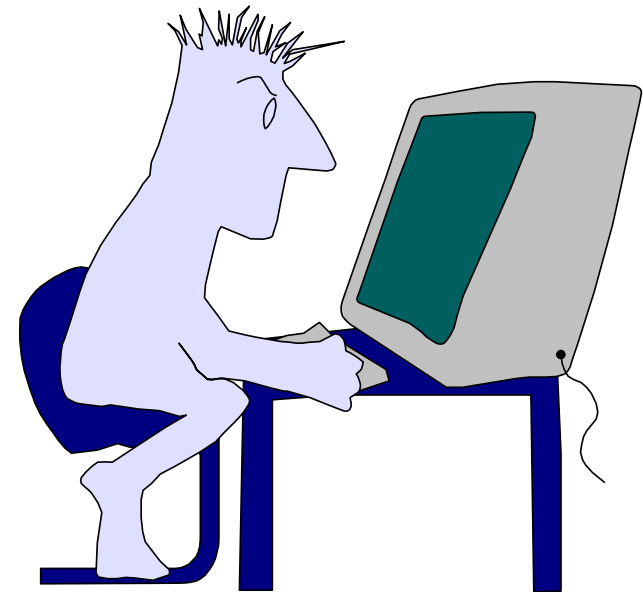
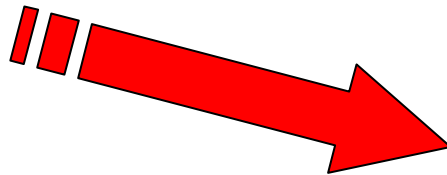
- Warfighter : Forward Observer -- the guy with the grunts that has a DMD.
- Developer: What's a DMD?

- Warfighter : Digital Message Device -- the FO uses it to send in Fire Requests to the FIST.
- Developer: What's a FIST?

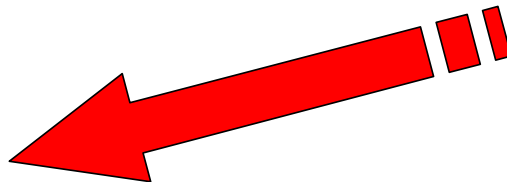
Ambiguity is an Issue



FO calls in mission.
FA Btty fires it.



Is he calling the priest to
warn him that he's going to
set the mission on fire?



But why is the church burning?

Future Combat Systems High-Level Concept Diagram

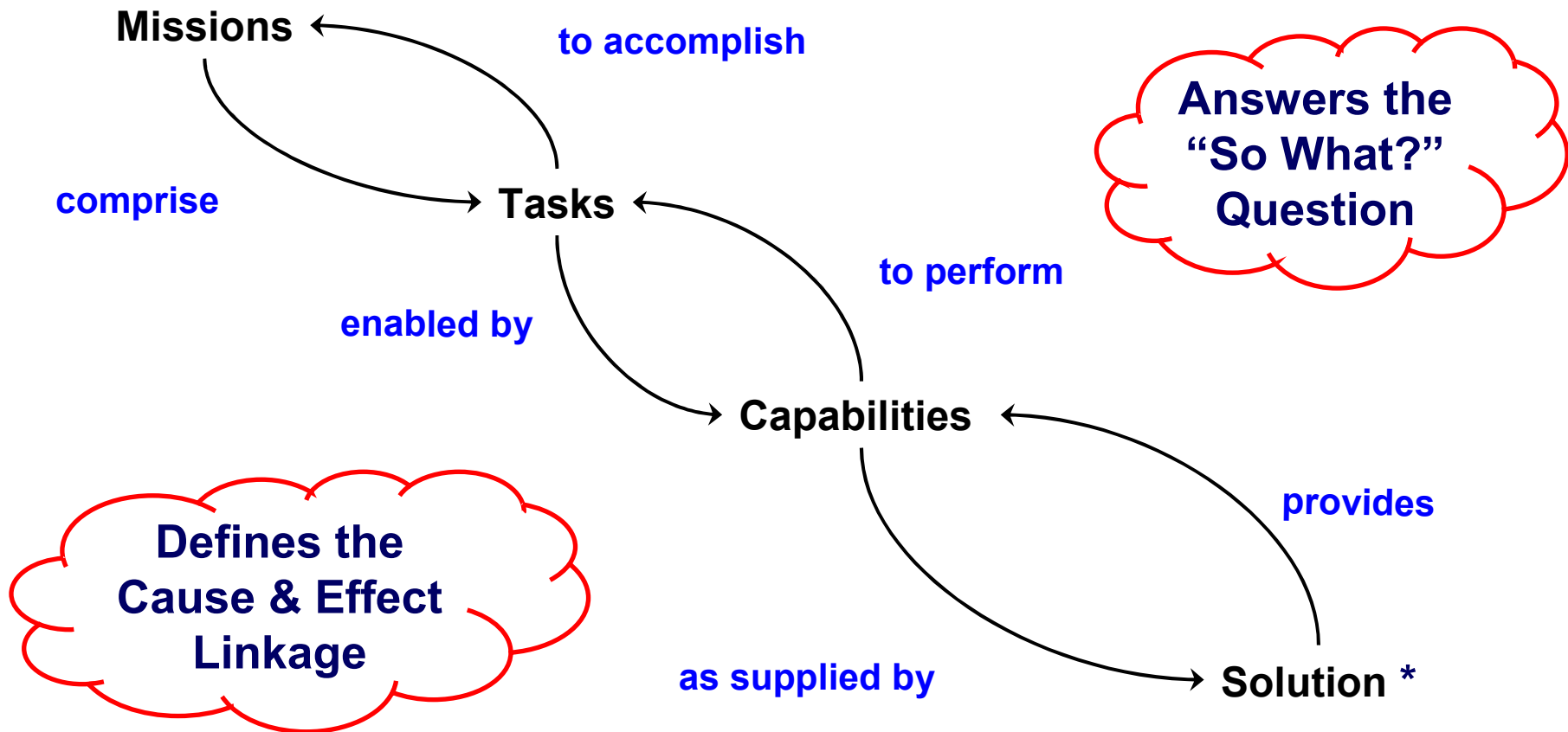


Source: PM UA

Missions & Means Framework

Four Iterative (and Recursive) Procedures:

- 1) *Top-down mission decomposition to identify interdependencies*
- 2) *Execution and adjudication to determine capabilities/limitations*
- 3) *Bottom-up effects traceability to estimate mission impact*
- 4) *Plan, re-plan to adapt behavior to warfare outcomes*



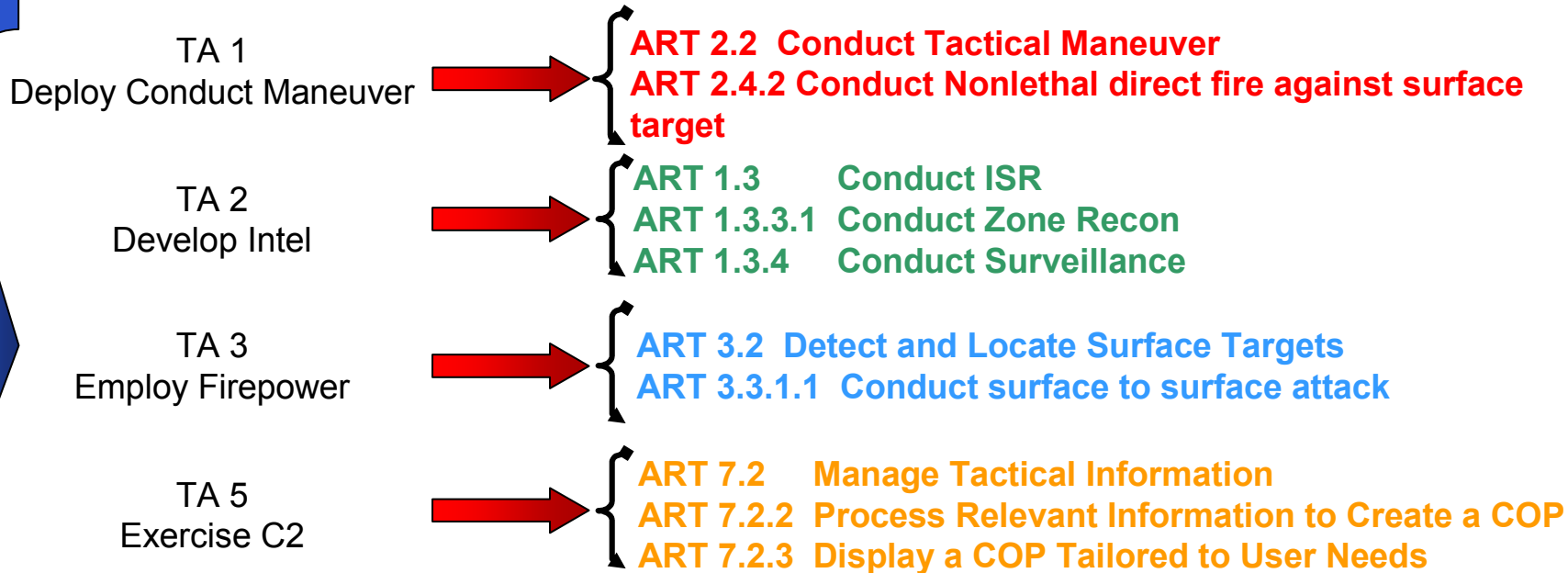
* Solution is the integrated Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities (DOTMFPF) Systems of Systems (SoS)

TASKS

CAB2

- 1. Secure OBJ CAMEL in order to facilitate UA2 attack on OBJ BAT
- 2. Attack to defeat rebel forces attempting to return to capital on MSR

ART 8.5.1 Attack by Fire an Enemy Force or Position



FCS Required Operational Capabilities (1/2)

Lethality
F1: Capability to destroy enemy formations via LOS, BLOS and/or NLOS
F2: Organizationally employ fire delivery
F3: Scale effects to focus precisely
F4: Employ minefields
F5: Maximize lethality of dismounted
F6: "Avenge" kill enemy systems engaging or preparing to engage friendly systems
F7: Air defense (AD) lethality

C4ISR
F8: Support mission planning/mission rehearsal
F9: enable battle command and control
F10: Enable continuous estimate of situation
F11: Enable visualization of tactical scheme
F12: Enable dissemination of tactical scheme
F13: Detect presence/identify disposition of anti-tank/personnel mines, booby traps
F14: Detect, locate other non-mine/booby trap, man-made obstacles
F15: Enable continuous situational understanding through networked force
F16: Facilitate automatic language translation
F17: Enable information exchange via adaptive integrated communications
F18: Detect/prevent intruders/malicious software; identify points of intrusion
F19: Enable POSNAV

C4ISR (cont.)
F20: Enable information management to fuse, monitor and disseminate information to support CCIR, combat action, decision-making and analysis
F21: Establish an adaptive learning repository to build and manage a library of friendly and enemy DTLOMS and lessons learned
F22: Enable terrain analysis
F23: Integrate synergistic use of ISR to see the full range of operational variables
F24: Provide combat identification to detect, locate and identify friend, foe and noncombatants and systems
F25: Determine what is most dangerous
F26: Enable command and control needed to synchronize fire, maneuver and ISR
F27: Enable sensor to shooter linkage
F28: Provide improved early warning and dissemination of threats

FCS Required Operational Capabilities (2/2)

Mobility
F29: Maneuver into and out of contact
F30: Enable decisive maneuver
F31: Enable development of situation out of contact
F32: Provide for tactical mobility
F33: Counter/neutralize/clear/mark anti-tank/personnel mines, booby traps
F34: Breach disrupting/fixing obstacles
F35: Cross gaps (i.e. streams, irrigation ditches)
F52: Conduct air assault operations

Survivability
F36: Enable protective countermobility and survivability support
F37: Enhance individual soldier survivability
F38: Degrade enemy detection and terminal targeting
F39: Defeat/intercept enemy threats
F40: Enable blinding the enemy
F41: Provide area suppression capability

MANPRINT
F42: Facilitate improved soldier performance
F51: Provide a multi-echelon training construct

Sustainability
F43: Enable medical treatment and evacuation of wounded soldiers
F44: Enable reduction in the maneuver sustainment footprint and demand for replenishment
F45: Enable organic Unit of Action sustainment
F46: Simplified systems maintainability to reduce maintenance and replenishment burden
F47: Water generation and replenishment
F48: Provide capability to monitor, report and submit requests to facilitate anticipatory sustainment
F49: Provide a means of transporting people and materiel
F50: Dismounted forces must be self-sustaining

Mission Decomposition:

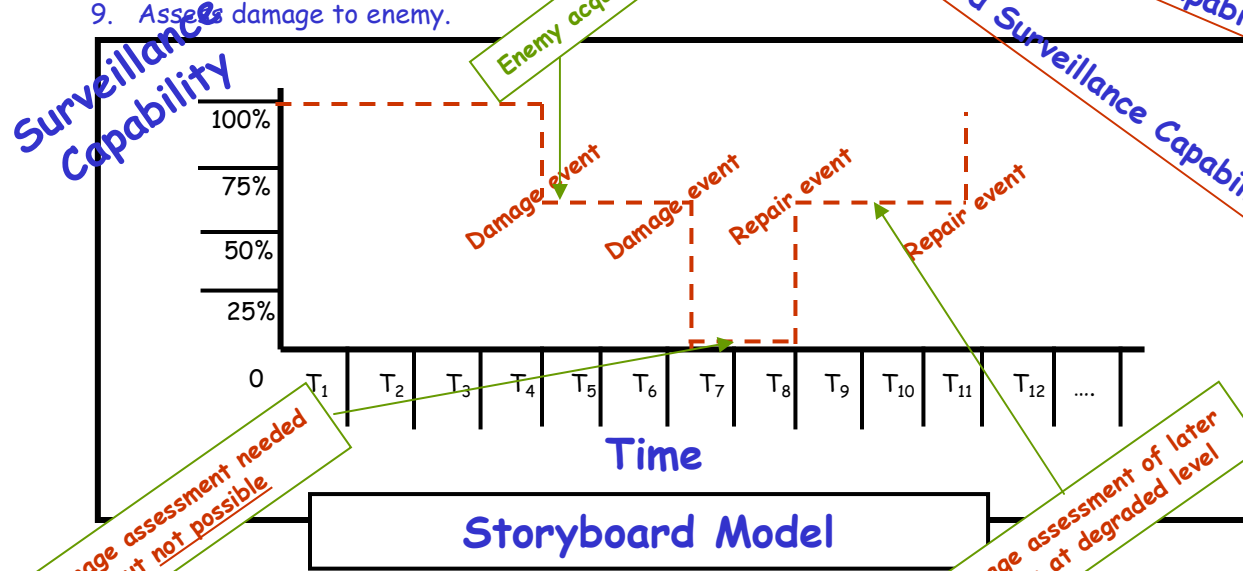
“First the synthesis, now the execution”

MISSION: *On order, attack to defeat Rebel forces and secure urban stronghold northeast of OBJ CAMEL.*

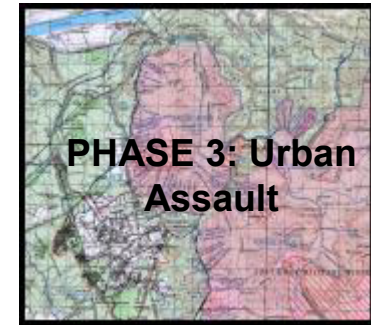
COMMANDER'S INTENT: *Control ingress/egress of city by enemy.*

TIMED SEQUENCE OF EVENTS/TASKS:

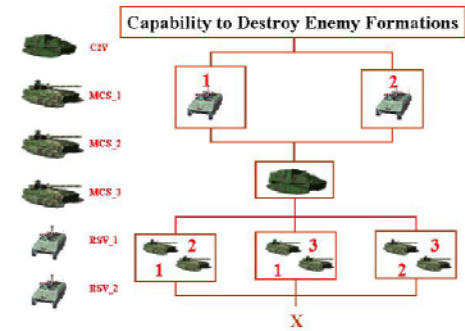
1. Move into position
 - a. Reconnaissance Surveillance Vehicle (RSV) observe Target Areas of Interest
 - b. Mounted Combat System (MCS) to target range area
- example** → 2. **Maintain surveillance. (sensor capability)**
3. Acquisition Report to C2V.
4. Clearance of fires (Situational Awareness).
5. Call for fire from C2V to shooters (Adjusted Fire).
6. Update target location
7. Fire munitions (Fire For Effect).
8. Munitions arrive on target.
9. Assets damage to enemy.



Source: SLAD



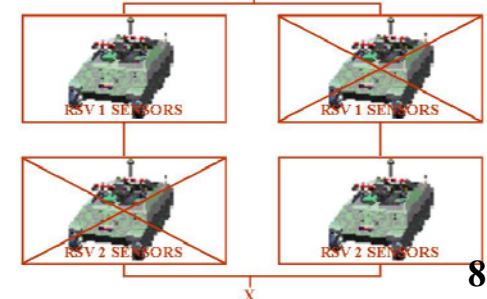
Top Level Fault Tree at T_0



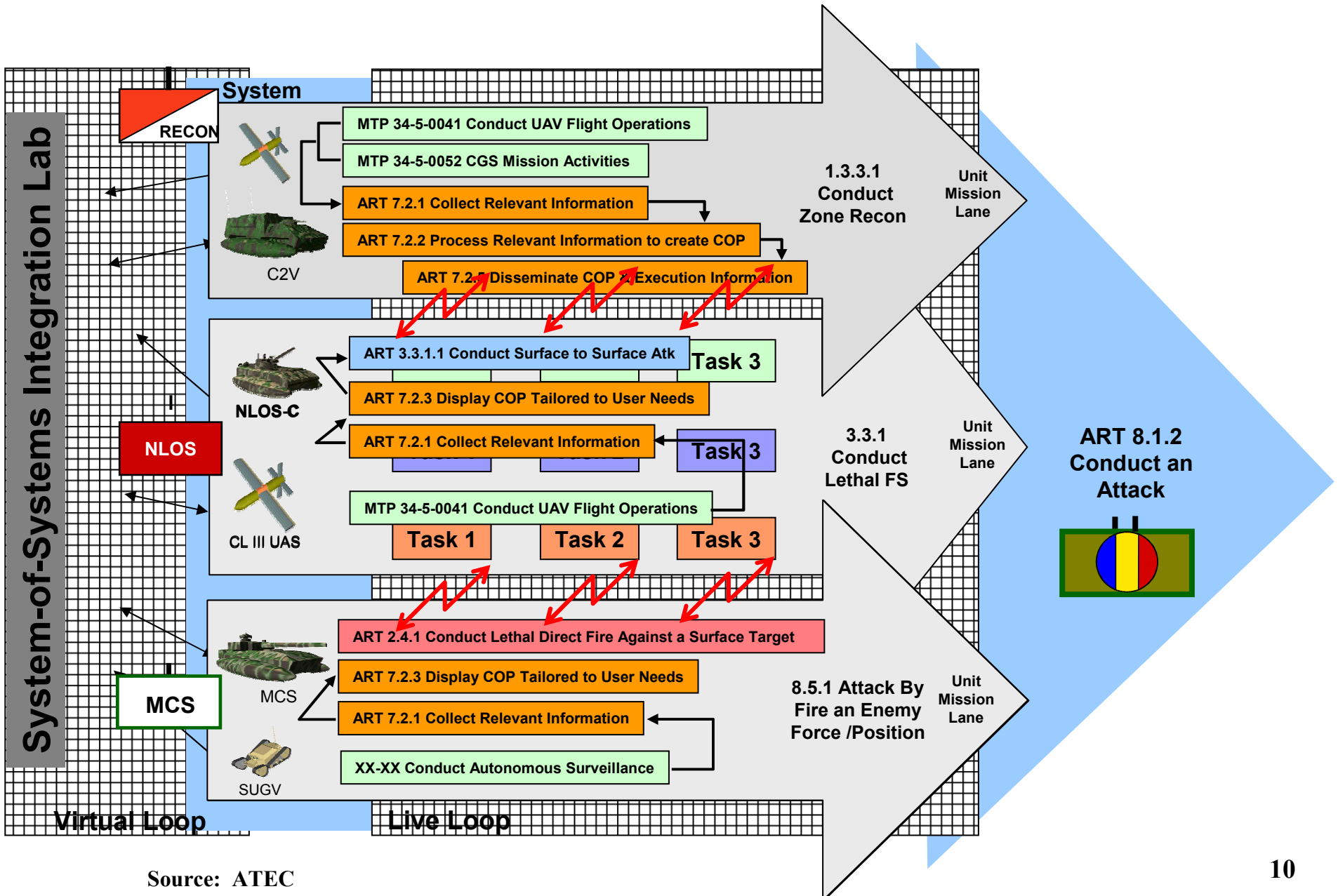
Z0-Maximum Surveillance



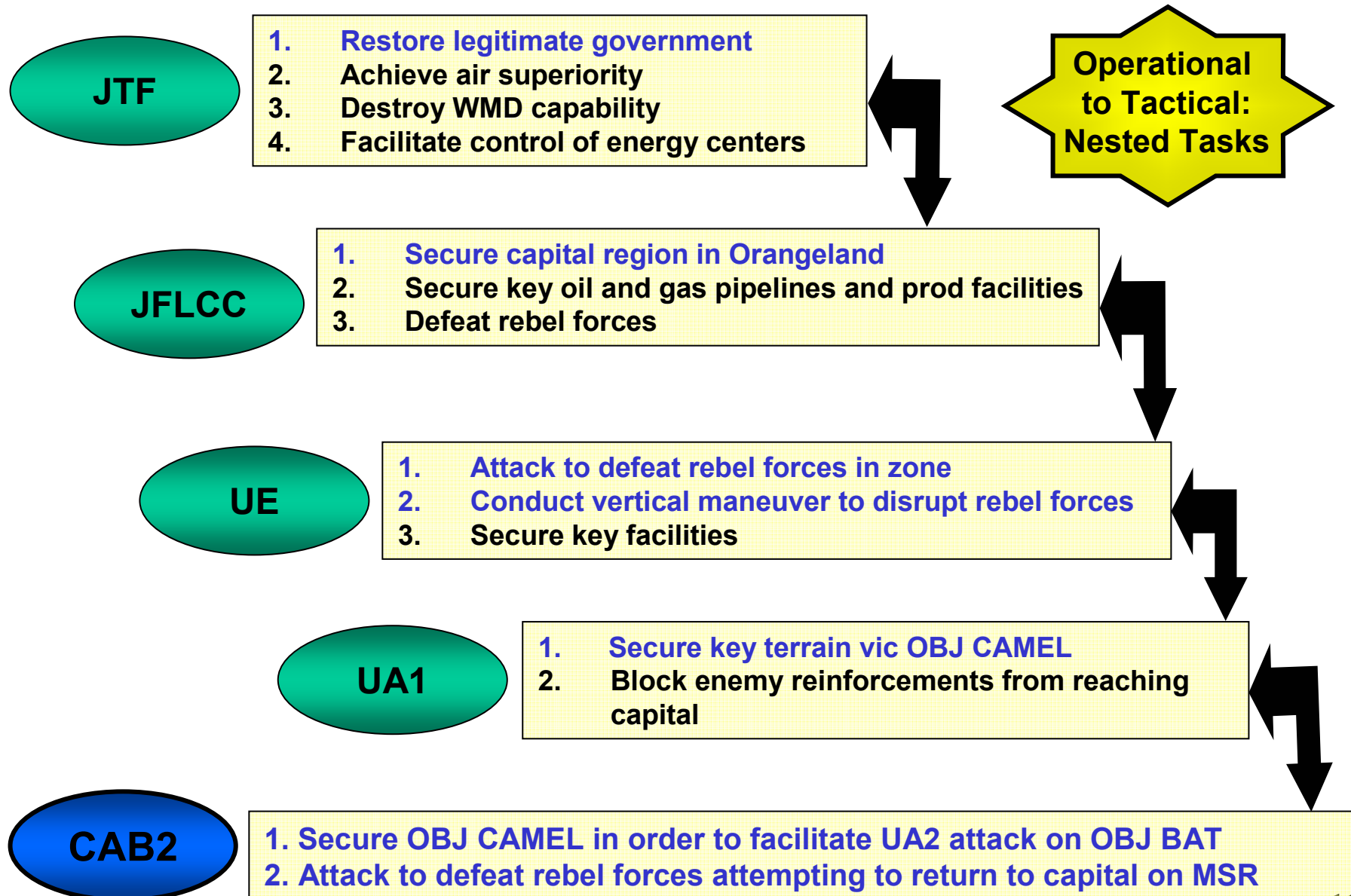
Z1-Loss of One Surveillance Subsystem



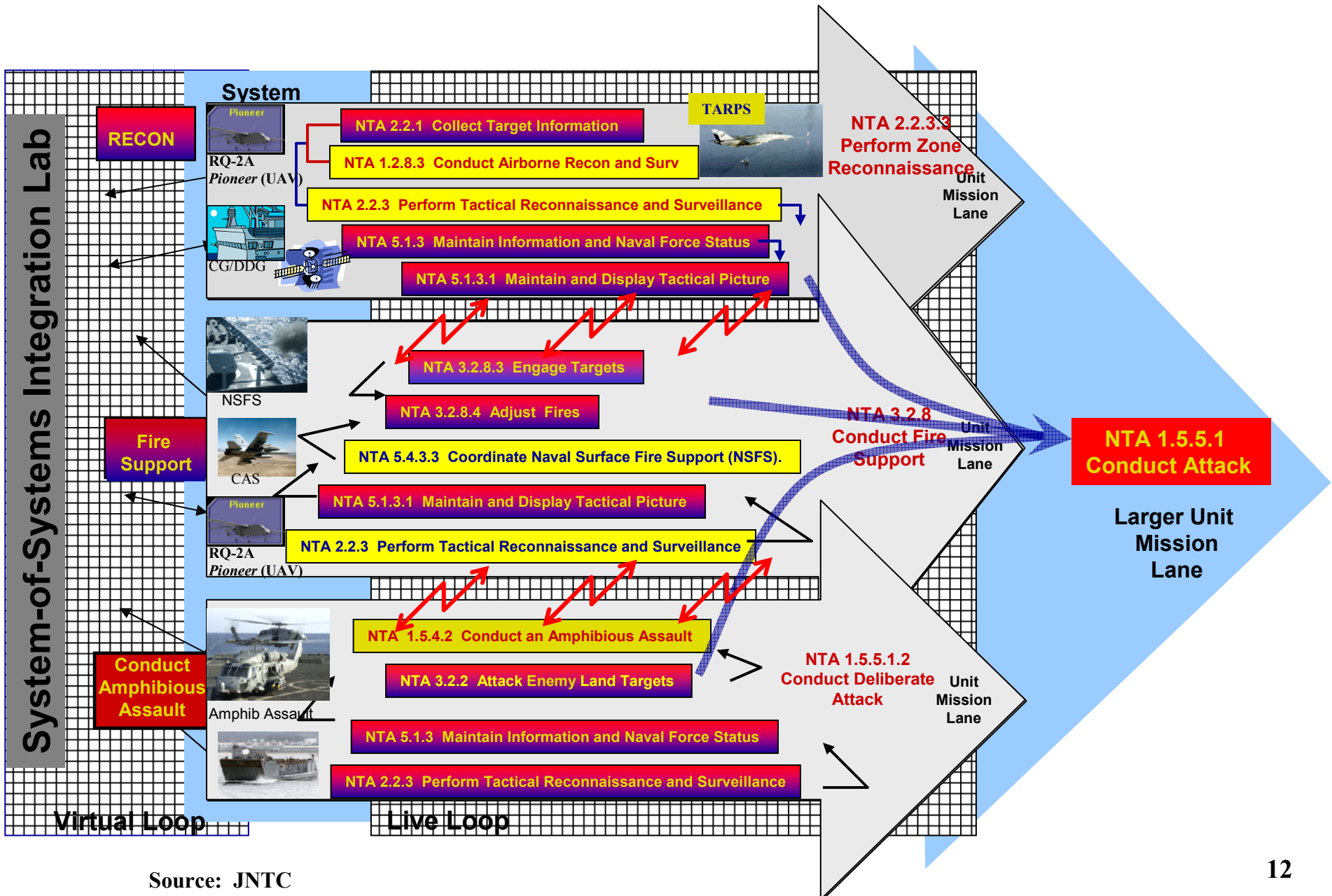
Sample Army Task Set Applied to OT Model



Top-Down Decomposition



Sample Naval Task Set Applied to OT Model



Missions and Means Framework

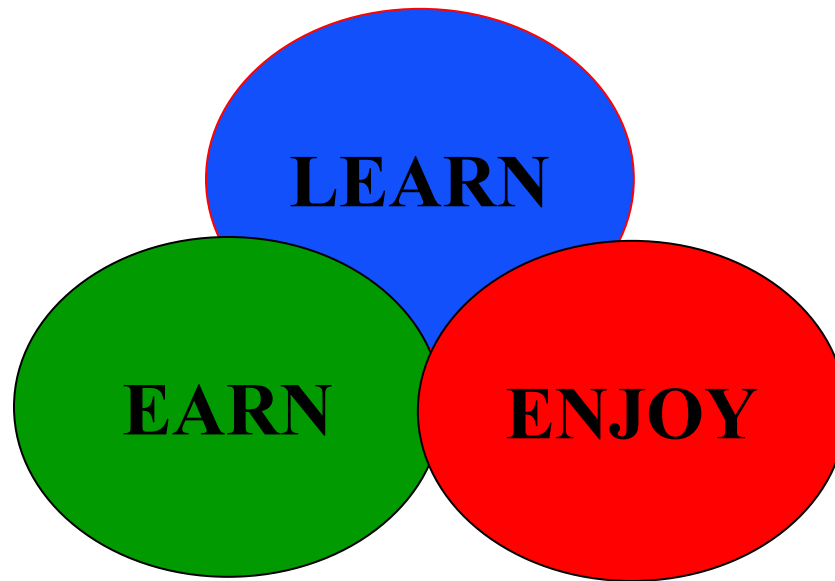
Purpose: Provide a methodology for explicitly specifying the military mission and quantitatively evaluating the mission utility of alternative warfighting Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) services and products.

Objective: Provide a disciplined procedure to explicitly specify the mission, allocate means, and assess mission accomplishment by:

- Unifying the warfighter, engineer, and comptroller understanding of missions and means.
- Accounting for traditional testing and evaluation factors and traditional warfighter expertise factors that constitute mission success.
- Being sufficiently credible, timely, and affordable to make hard decisions that stay made.
- Being consistent, concise, repeatable, and scalable.
- Providing a disciplined process to implement the Defense Secretary's transformation guidance and associated acquisition reform.

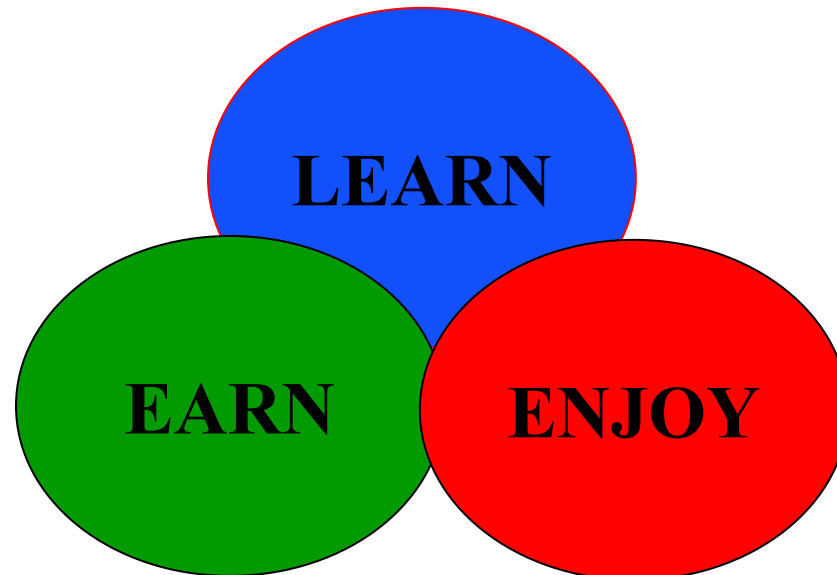
Non-Military Example:

Select an Automobile



- Level 7 MoE's: utility for Learn, Earn, Enjoy
- Level 4 MoP's: Tasks, Measures,
Conditions, Standards

Missions:



- Primary Task: Transit, Carry
- Supporting Task: Consume, Protect, Park
- Ancillary Task: Display, Stimulate

Primary Tasks:

- Learn
 - Transit: to Class, to Library, to Activity
 - Carry: Student, Siblings, Peers, School Materials
- Earn
 - Transit: to Office, to Client, to Airport, to Lunch
 - Carry: Worker, Car Pool, Peers, Subordinates, Superior, Work Materials
- Enjoy:
 - Transit: to Supplies, to Entertainment, to Church, to Vacation
 - Carry: Family, Friends, Associates, Rec Materials

Supporting Tasks:

- Consume
 - Fuels, Fluids, Tires, Drive Train
- Park
 - At Home, At Work, Other
- Protect
 - During Collision

Ancillary Tasks:

- Display
 - Status, Style
- Stimulate
 - Senses, Ego

Measures of Performance:

- Cost:
 - purchase price, repair cost, supply cost, space occupied, useful life
- Capacity:
 - passengers, personal items, cargo
- Comfort:
 - ingress-egress, seating, climate control. Amenities
- Reliability:
 - MTF core function, MTF amenities, repair availability, expected downtime

Measures of Performance:

- Maneuverability:
 - turn radius, acceleration, speed, stability, dexterity, braking
- Survivability:
 - visibility, mass, energy absorption, protection volume, restraints
- Aesthetics:
 - shape, color, decor
- Resonance:
 - with personality

Conditions:

- Driver:
 - young, middle age, elderly
- Geography:
 - urban, suburban, rural, wilderness
- Road:
 - interstate, highway, blvd, city street, residential avenue
- Visibility:
 - dust, fog, precipitation
- Traction:
 - water, mud, ice, snow
- Traffic:
 - rush, midday, evening, late-night-early-morning

JOINT TASK FORCE (JTF)

JTF MISSION:

Conduct military operations in the JOA in order to set the conditions for restoring legitimate government by defeating Rebel forces, secure energy centers, and isolating Rebel government in the capital region of Orangeland.

KEY TASKS:

- | | |
|--|-----------------------------------|
| (1) Achieve air superiority | (4) Destroy WMD Capability |
| (2) Facilitate control of energy centers | (5) Defeat resisting Rebel forces |
| (3) Isolate rebel government | |

END STATE: Rebel forces are defeated and legitimate government is restored

JTF ORGANIZATION

Ground (CJFLCC/JFMCC)

1x UE (3x UA's, 3x SBCT, 1x PIR BN)
1x Mechanized Division
1x SBCT
1x MEB
1x AASLT BDE

Air (JFACC/JFMCC)

1 x MAW
2 x AEG
2 x CAW
B-1B, B-2, B-52 Missions

SOE/PSYOP/CAB (JPOTF/JSOTF)

1 x SFG (-)
1 x Ranger BN
2 x SEAL Teams
PSYOP/CAB

Sea (JFMCC)

2 x CBG

JOINT FORCES LAND COMPONENT COMMAND (JFLCC)

JFLCC MISSION:

Conduct offensive operations in order to defeat Rebel forces in Orangeland, secure key energy production facilities and secure rebel government inside the capital of Orangeland.

KEY TASKS:

- (1) Defeat the Rebel forces in zone
- (2) Destroy WMD capability
- (3) Secure key oil and gas pipelines and production facilities
- (4) Surround capital region of Orangeland
- (5) Secure rebel government leadership inside capital of Orangeland

END STATE: Rebel forces have been defeated, the flow of oil and gas is uninterrupted, capital region is secure with rebel government inside, WMD threat is eliminated

JFLCC ORGANIZATION

Ground (CJFLCC/JFMCC)

1x Mech Division

1x UE (3x UA's, 3x SBCT, 1x PIR BN)

1x SBCT

1x MEB

1x AASLT BDE

UNIT OF EMPLOYMENT

UE MISSION:

Attack to defeat Rebel forces in zone, surround the capital of Orangeland and isolate the rebel government inside the capital

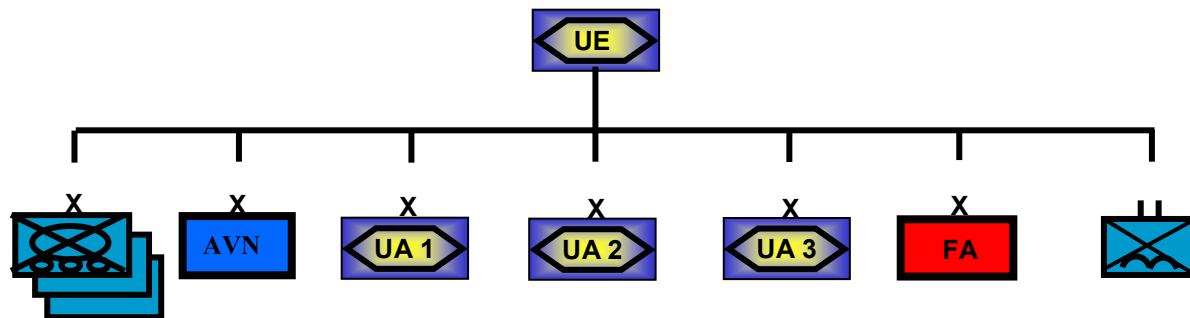
INTENT:

PURPOSE: Set conditions for restoration of legitimate government in Orangeland

KEY TASKS:

- (1) Conduct vertical maneuver in order to isolate enemy forces
- (2) Conduct deliberate attack to Defeat Rebel forces in zone and prevent return to capital
- (3) Secure key facilities with minimal collateral damage

END STATE: Rebel forces are defeated, UE has surrounded the capital, rebel government leadership and facilities are secured.



UNIT OF ACTION 1

(Increment 1, Threshold Design)

MISSION:

UA1 attacks in order to cause Rebel forces to fight in multiple directions and facilitate the attack to secure OBJ CAMEL

INTENT:

Purpose: Prevent Rebel forces from repositioning to Orangeland capital

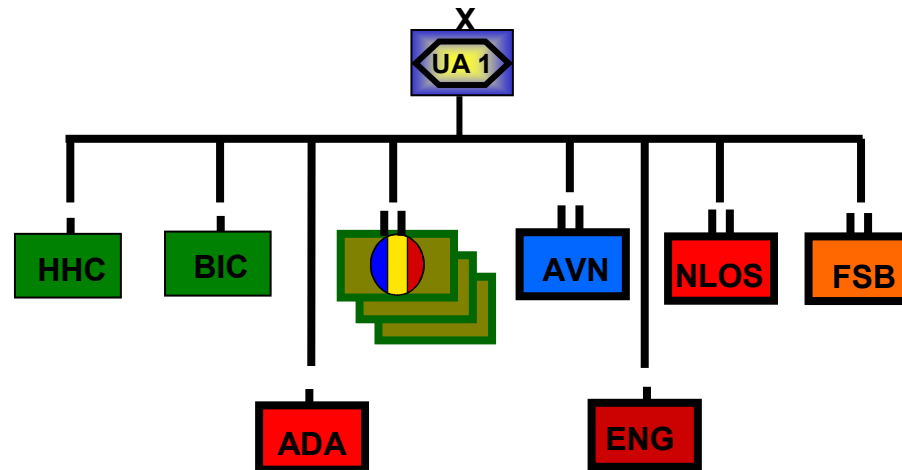
Key Tasks:

CAB1 Secure OBJ BLOCK in order to protect left flank of CAB2

CAB2 Secure OBJ CAMEL in order to enable UA2 seizure of OBJ BAT

CAB3 Secure OBJ KNIGHT in order to protect left flank of CAB2

End State: Rebel forces defeated and cut-off, CABs in position to conduct follow on ops.



COMBINED ARMS BATTALION -- 2

MISSION: Attack to secure OBJ CAMEL. On order support UA2 attack on OBJ BAT.

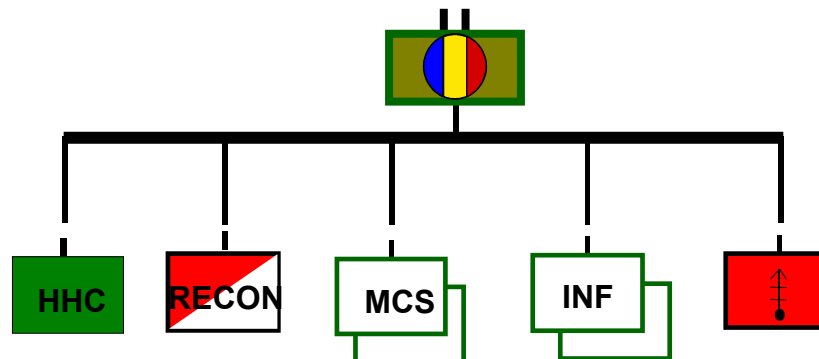
INTENT:

Purpose: Enable UA2 attack to seize OBJ BAT

Key Tasks:

- (1) Conduct Vertical maneuver to cause Rebel forces to fight in multiple directions
- (2) Isolate & defeat Rebel forces vic OBJ CAMEL.
- (3) Secure OBJ CAMEL in order to facilitate UA2 attack on OBJ BAT

End State: OBJ CAMEL secure, CAB2 prepared to conduct follow-on urban operations



Status

- **Top-Down Decomposition to Identify Interdependencies**
 - METL generation for OIF CFLCC Battle Drills
 - Joint Staff, PACOM to-be 5026 War Plan
 - Joint Training System (JTS) Phase I Requirements, Phase II Plans
 - FCS O&O, ORD, SORC, SoS Spec, and PCD cross-walk
 - JNTC required capabilities for CAS, Fires, Combat ID, Personnel Recovery
- **Execution/Adjudication to Determine Capabilities/Limitations**
 - OIF and OEF interoperability data sets for ABCS and BFT
 - C3 Driver certification of ABCS and BFT software
 - Joint Training System Phase III Execution
 - Boeing/SAIC Systems of Systems Proposal that became FCS baseline.
 - Live-Fire AJEM, Air Force VSO, TMAP SimuLink, CERDEC Comm's
- **Bottom-Up Effects Traceability to Determine Mission Impact**
 - Joint Training System (JTS) Phase IV Assessment
 - Boeing/SAIC QFD procedure for FCS
 - FCS Evaluation Concept (in progress)
 - Testing in a Joint Environment gap analysis (in progress)
- **Planning/Re-Planning to Adapt Behavior to Warfare Outcomes.**
 - MMF Degraded States Demonstration
(in progress, to be presented at FCS T&E Summit VI in September)