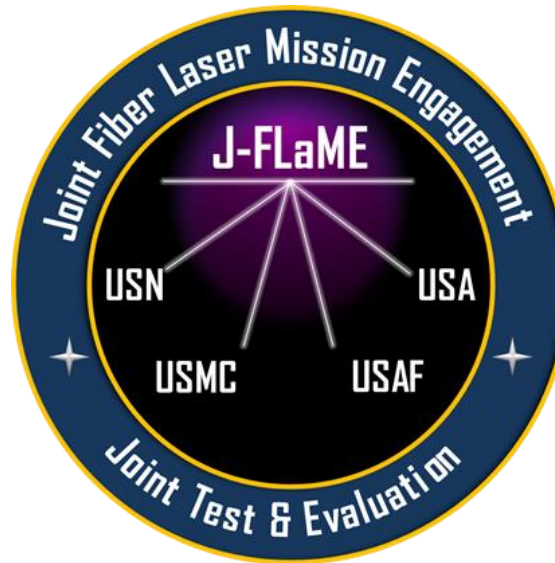




Joint Fiber Laser Mission Engagement (J-FLaME) Joint Test



Precision Strike Technology Symposium 2016

by
Mr. Scott Boyd
Joint Test Director
clifton.boyd@navy.mil

27 October 2016

Overall Classification for this briefing is:

UNCLASSIFIED – for Public Release



Joint Test & Evaluation Summary

A Unique OSD Program



- A conduit for warfighters to solve joint operational issues
- Under Secretary of Defense (OSD) / Director, Operational Test and Evaluation (DOT&E) manages the program; partnerships with Services and Combatant Commands (CCMDs) critical for executing two-year Joint Tests and one-year Quick Reaction Tests
- Provides **non-materiel solutions** to warfighter issues
- Works on **process improvements** so that fielded equipment is used more effectively in a joint operational environment
 - Does not assess weapon system performance
 - Not a hardware acquisition program
 - Not an experiment
- Test products are:
 - Improved tactics, techniques, and procedures (TTP) and architectures
 - New test and evaluation methodologies
- Other products:
 - Inputs to Service and Joint publications, or training materials



Test Overview

Problem Statement & Description



The Joint Force lacks Fire Support and Airspace Control TTP to employ emerging directed energy laser (DEL) capabilities to conduct Joint Fires and Force Protection missions

- Laser weapon TTP addresses threats from a challenging anti-access/area denial environment
- Limited, high-cost munitions against low-cost asymmetric threats is not sustainable
- DEL offers low-cost per shot, “deep” magazine, precision, and scalable effects
- All Services are developing near future DEL weapons
- DEL multi-Service TTP do not exist and lag behind DEL deployment
- DELs possess some unique characteristics compared to traditional munitions
- Many Joint and Service pubs that addresses airspace, fires, and targeting may be affected

TTP is needed to employ DEL *now* and for *future* doctrine



Test Overview

Laser Weapon Systems



- **USN Solid State Laser – Quick Reaction Capability (SSL-QRC)**

- Prototype SSL-QRC completed at sea demonstration on board USS DEWEY in Aug 2012; deployed on USS PONCE in Sep 2014 to counter small boats and Unmanned Aircraft Systems (UAS). SSL-Technology Maturation (SSL-TM) is now in development at ONR



- **USA Systems**

- HEL-Mobile Test Truck (HEL-MTT) in development to provide force protection capability for counter-Rockets, Artillery & Mortars (C-RAM) as well as Counter-UAS (C-UAS)
- MEHEL – Mobile Expeditionary High Energy Laser in development for C-RAM and C-UAS; 2017 fully Integrated Air Defense System (IADS) with dedicated air detection radar / Direction Finding (DF) capability



- **USMC Ground Based Air Defense (GBAD) On-the-Move**

- Under development using a light tactical vehicle to augment low altitude air defense (LAAD) systems for airborne threats such as UAS



- **USAF HEL AC-130**

- C-130 Air-to-Ground capability (near-term effort)



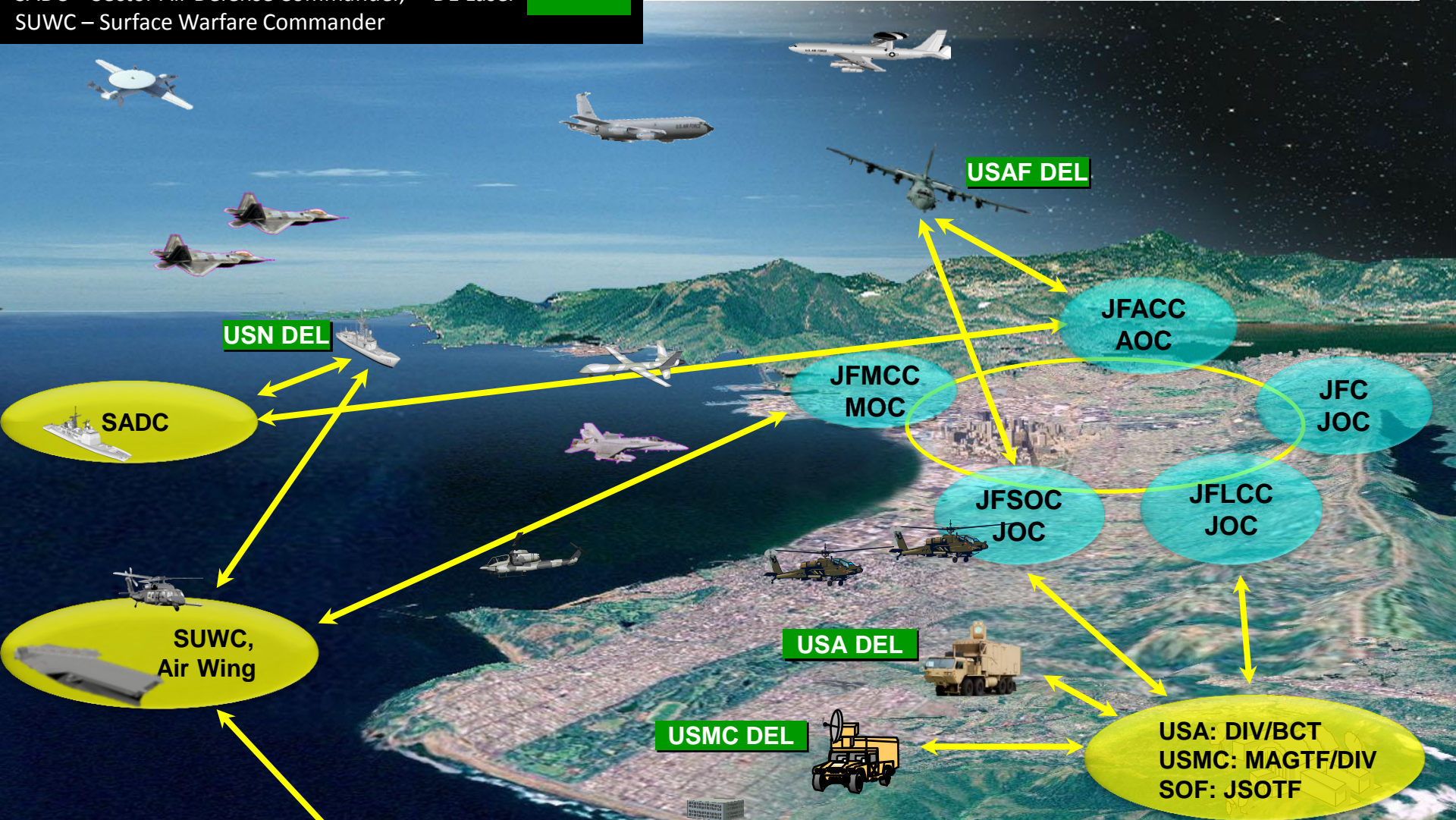
Common Characteristics

- Solid state laser – the “Game Changer”
- Low cost per shot
- “Deep” magazine
- Precise laser tracking/ranging
- Enhanced ISR capability
- Scalable effects

Test Overview

Operational View

Coordination Measure (CM) Info Flows ↔
 Tactical Operations ○
 Joint and Component Operations ○
 SADC – Sector Air Defense Commander, DE Laser
 SUWC – Surface Warfare Commander



(AOC) Air & Space Operations Center
 (JFACC) Joint Force Air Component Commander
 (JFC) Joint Force Commander
 (JFLCC) Joint Force Land Component Commander
 (JFMCC) Joint Force Maritime Component Commander
 (JOC) Joint Operations Center
 (JFSOC) Joint Force Special Operations Command
 (MOC) Maritime Operations Center
 (SOF) Special Operations Forces

UNCLASSIFIED



Test Overview

Key Participating Organizations



- OSD Policy (SO & CT)
- Joint Staff J39, J6, J7, J8
- Central Command (CENTCOM)
- Pacific Command (PACOM)
- Special Operations Command (SOCOM)
- Joint Special Operations Command (JSOC)
- Joint Integrated Air and Missile Defense Organization (JIAMDO)
- High Energy Laser-Joint Technology Office
- Air, Land, Sea Application (ALSA) Center
- Army Training and Doctrine Command / Army Capabilities Integration Center
- Army Space and Missile Defense Command (SMDC)
- Army Fires Center of Excellence (FCoE)
- US Naval Forces Central Command
- Chief of Naval Operations N84
- US Fleet Forces Command
- Office of Naval Research
- Naval Sea Systems Command
- Navy Warfare Development Command
- Naval Surface and Mine Warfighting Development Center (NSMWDC)
- Naval Surface Warfare Center Dahlgren
- Marine Corps Warfighting Laboratory
- Marine Corps Combat Development Command (MCCDC)
- Air Combat Command (ACC)
- US Air Forces Central Command
- Air Force North (AFNORTH)/1st Air Force
- Air Force Special Operations Command
- Air Force Research Lab (AFRL)



General Officer Steering Committee (GOSC) Members



- **Chairman: RADM Mathias Winter**, USN, Chief of Naval Research
- **BG John A. George**, USA, Director, Capabilities Development Directorate, Army Capabilities Integration Center, Training and Doctrine Command
- **Brig Gen Shaun Morris**, USAF, PEO Weapons and Director of the Armament Directorate
- **BGen Julian Alford**, USMC, Commanding General, Marine Corps Warfighting Lab and Vice Chief of Naval Research
- **Brig Gen Murphy**, Joint Staff J-6, Deputy Director
- **Mr. James Geurts**, SOCOM, Acquisition Executive
- **Dr. George Ka'iliwai III**, PACOM J-8, Director, Resources & Assessment
- **Mr. Michael D. Crisp**, OSD, Deputy Director Air Warfare, DOT&E
- **Lt Gen Bradley A. Heithold**, USAF, Commander, Air Force Special Operations Command
- **Lt Gen William H. Etter**, USAF, Commander, Air Force North (AFNORTH) and 1st Air Force



Test Overview

Key Events



2 x Field Tests (FT)

- **FT-1 - Advanced Concepts Event (ACE) 2015**, Kirtland AFB, 20-23 Jul 15, Joint Fires and Air Defense trials performed
- **FT-2 - Maneuver and Fires Integration Experiment (MFI) 2016**, Fort Sill, OK, 11-15 Apr 16
 - ✓ 38 Air-to-Ground / 65 Ground-to-Air / 41 Ground-to-Ground trials
 - ✓ Two “Live” ground-based DE Laser Weapons (MEHEL, HEL-MTT)
 - ✓ Simulated air-based Laser Fires from live AC-130 Specter aircraft and the AFSOC Joint Terminal Attack Controller (JTAC) Simulation (AJS) Desktop System

3 x TTP Development Events (TDEs)

- **TDE-1 - CENTCOM AOR**, 12-16 Jun 15, Data collectors located at Maritime Operations Center (MOC) (MOC Watch Officer, CTF-51 Battle Watch and Land Component), Combined Air Operations Center (CAOC), Senior Air Defense Officer (SADO) & USS PONCE
 - Conducted in conjunction with Office of Naval Research (ONR) lethality test, focused on Surf-Air (Air Defense) & Surface-Surface (USN Fast Attack Craft/Fast Inshore Attack Craft (FAC/FIAC) TTP
- **TDE-2 - Virtual Flag 16-1**, Kirtland AFB, 2-4 Dec 15, further developed Surface-Air (Air Defense) and Surface-Surface (USN FAC/FIAC TTP)
- **TDE-3- AFSOC Exercise**, Hurlburt Field, 7-10 Dec 15, focused on Air-Surface TTP

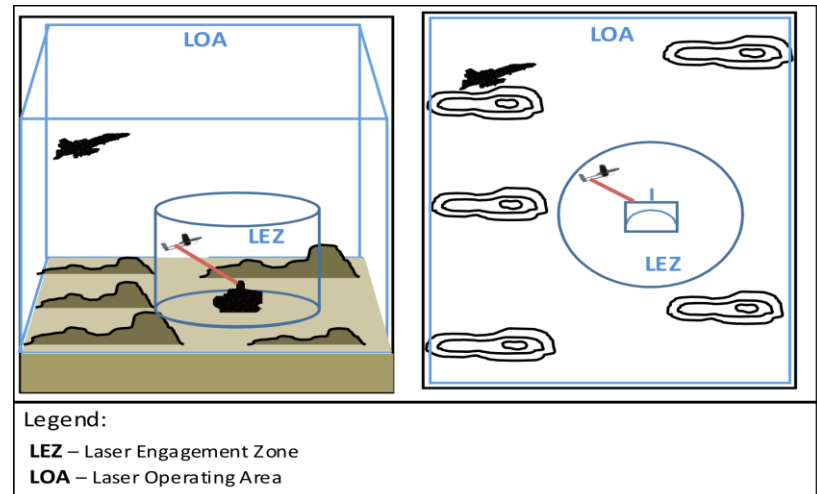


TTP Development

TTP Highlights (1 of 2)



- Overview of DEL Capabilities and Limitations
- Considerations for Planning and Executing Air Defense and Joint Fires Missions
- Checklists for conducting Air Defense and Joint Fires Missions
- New Proposed Coordination Measures:
 - Laser Engagement Zone (LEZ)
 - Laser Operating Area (LOA)
- Risk Management Considerations
 - Ocular and Skin Hazard
 - Sensor Hazard
 - Risk Estimate Distances (RED)



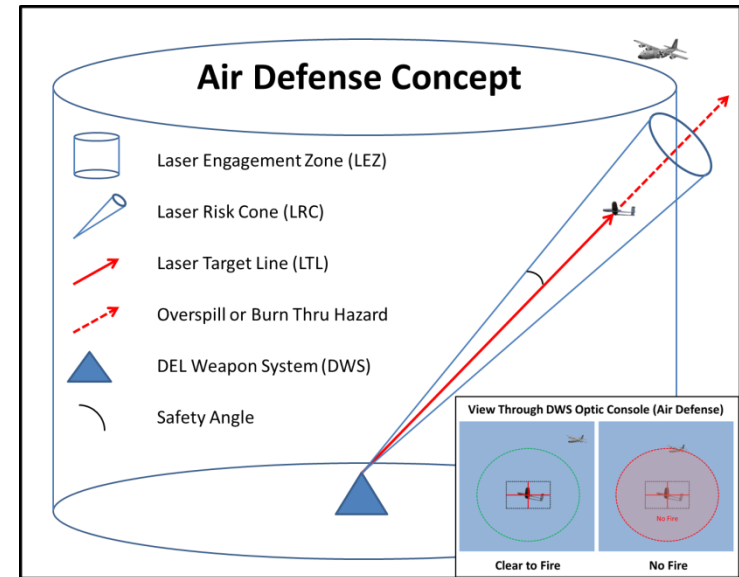


TTP Development

TTP Highlights (2 of 2)



- Command and Control Clearance of Fires Procedures
- Operator Clearance of Fires Procedures
 - Laser Risk Cone (LRC)
 - Laser Target Line (LTL)
- Updated Brevity Codes
- Service DEL Initiatives
- Rule of Thumb Lethality Ranges and Dwell Times





TTP Transition Plan



Directed Energy Laser
Operations in the Joint Battlespace

20 August 2016

Distribution Statement D
Distribution authorized to U.S. Government Agencies and their
Contractors only
Administrative/Operational Use, 20 August 2016
Other requests for this document shall be referred to:
Naval Surface Warfare Center (NSWC) - Dahlgren
Directed Energy Warfare Office
Attn: Mr. Scott Boyd, Phone: 540-653-1760

TTP transitioned to US Fleet Forces (USFF) Command on 31 August 2016. USFF has designated Navy Warfare Development Command (NWDC) as the holder for the J-FLaME TTP. NWDC will nominate applicable portions of the J-FLaME TTP for inclusion into Air, Land, Sea Application (ALSA) Center multi-Service publications as relevant publications come up for revision. ALSA will incorporate relevant portions of the J-FLaME TTP into appropriate multi-Service publications based on the needs of the Services and the DEL weapon system fielding timelines.



Based on the success of J-FLaME and interest from both operational and development communities to pursue laser weapon lethality and weaponeering, the following Joint test has been proposed:



Joint Laser Systems Effectiveness (JLaSE) Special Project Nomination



Lead Sponsor:

NSWC Dahlgren Division



Operational Endorsers: Joint Staff J2, USSOCOM, USPACOM, USCENTCOM, USNORTHCOM/NORAD, USMC MCWL, JSOC

Proposed Product Transition Leads: USSOCOM (JSOC, AFSOC, DEVGRU) and Joint Technical Coordination Group-Munitions Effectiveness (JTCG-ME)

Mr. Scott Boyd, GS-15

Directed Energy Division

NSWC Dahlgren Division

540-419-1690

NIPR: clifton.boyd@navy.mil

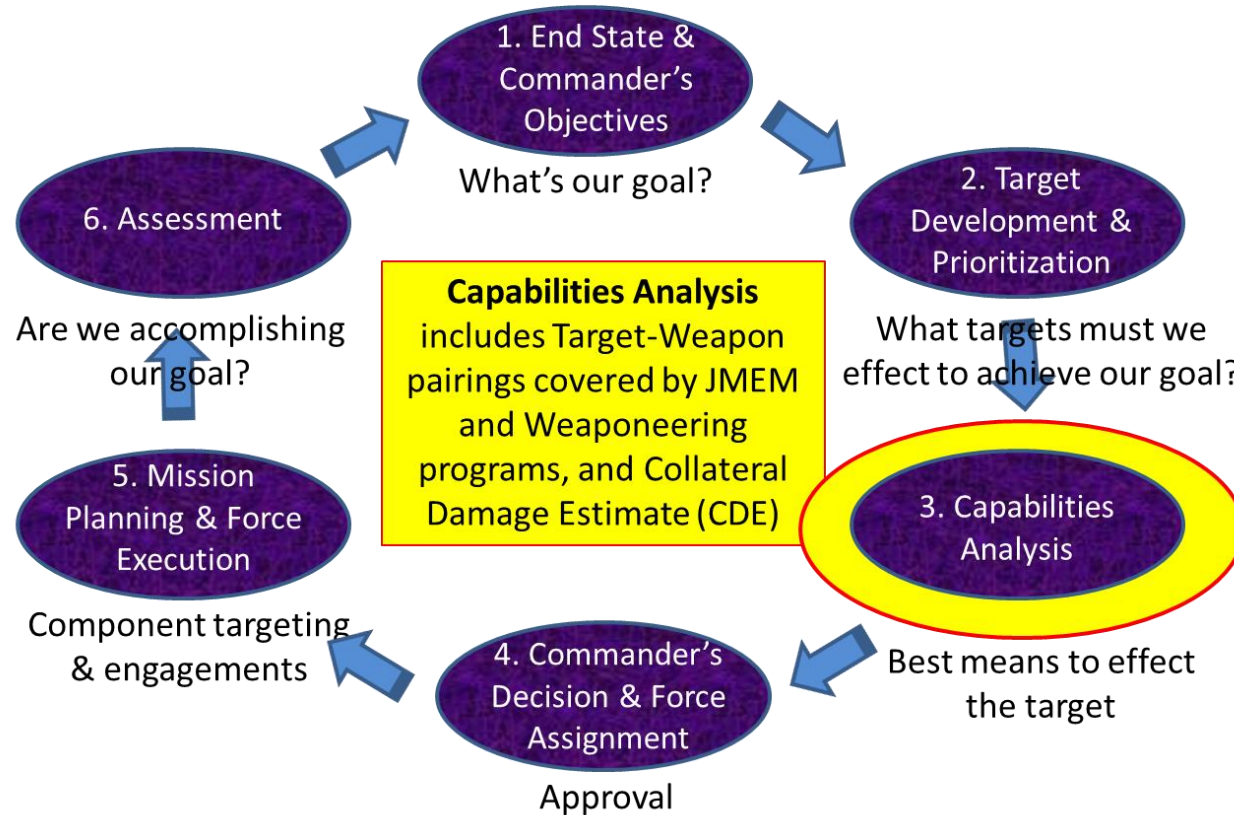
SIPR: clifton.boyd@navy.smil.mil

PROBLEM STATEMENT

Joint Fire Support Planners and Targeteers lack Tactics, Techniques and Procedures (TTP) for Joint Targeting Cycle Capabilities Analysis – specifically, **Weaponneering**, and **Collateral Damage Estimate (CDE)** methodology to adequately prepare for the use of Directed Energy Laser (DEL) weapons in the joint battlespace

BACKGROUND

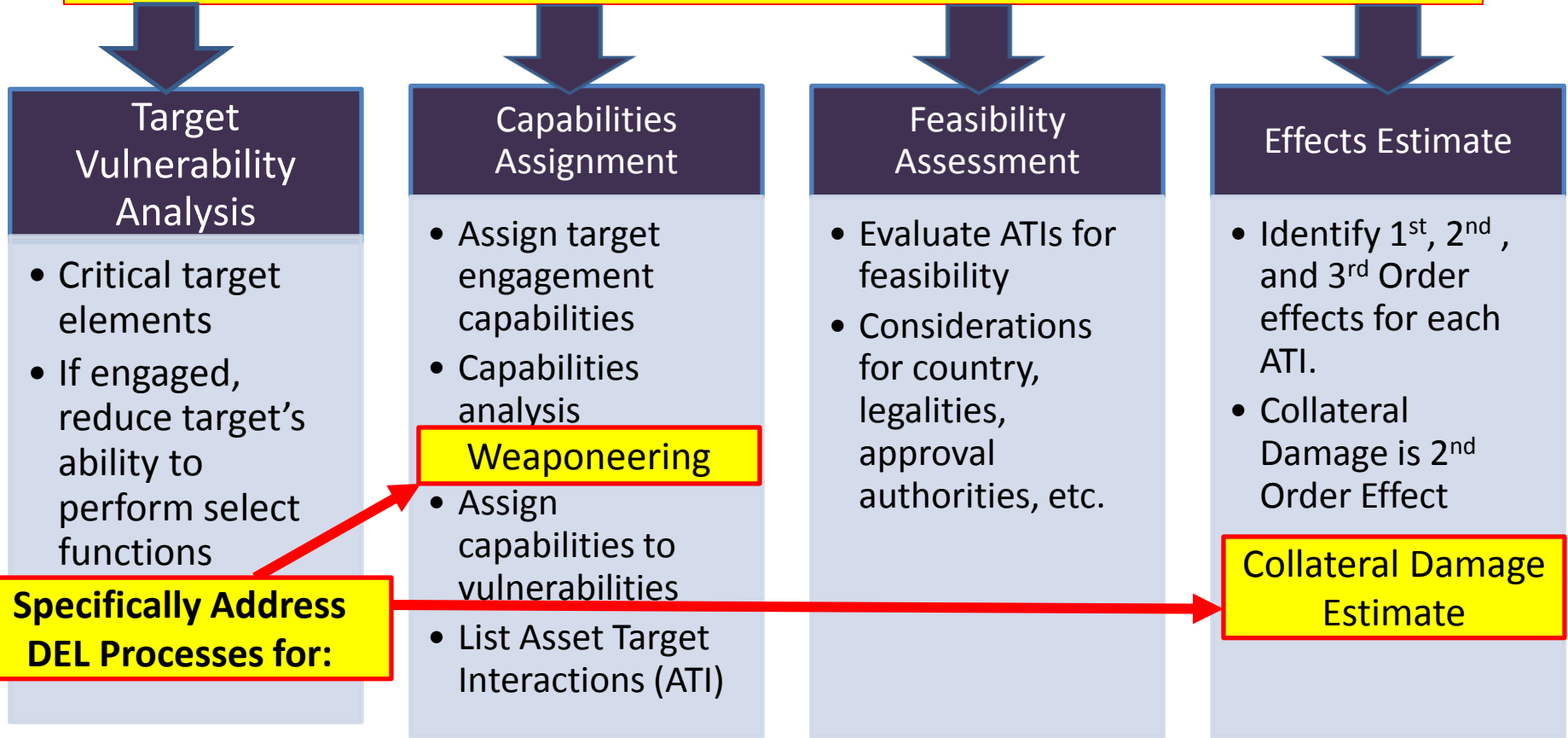
Joint Targeting Cycle



Joint Force and Service Laser Weapon operators, planners and targeteers *lack laser lethality and target vulnerability data as well as the procedures to support the Joint Targeting Cycle capabilities analysis phase to include weaponeering and collateral damage estimate (CDE) methodology*

SCOPE

Integrate DEL Weapon Characteristics & Capabilities into this four step Capabilities Analysis Process



“The primary purpose of **Phase 3 - Capabilities Analysis** is to maximize the employment efficiency of forces through application of enough force to create the desired effects while minimizing collateral damage and waste of resources.” JP 3-60

PROJECT FOCUS

WEAPONNEERING

Weapon-Target Pairings

Project Focus for Weapon-Target Pairing priorities will be based on DEL fielding timelines and target priorities for Operational Users and JTCG-ME Joint Non Kinetic Effects Operational Users Working Group (JNKE OUWG) recommendations

Target Types & Effects

Soft/Small/Fast

- E/O sensors (Dazzle or Destroy)
- Target tagging
- Small UAVs
- Manpads

Moving/Tactical

- Land vehicles
- Small boats
- Radar antennas
- Power grids/Transformers
- Ceramic RF radomes
- Rockets, artillery, & mortars

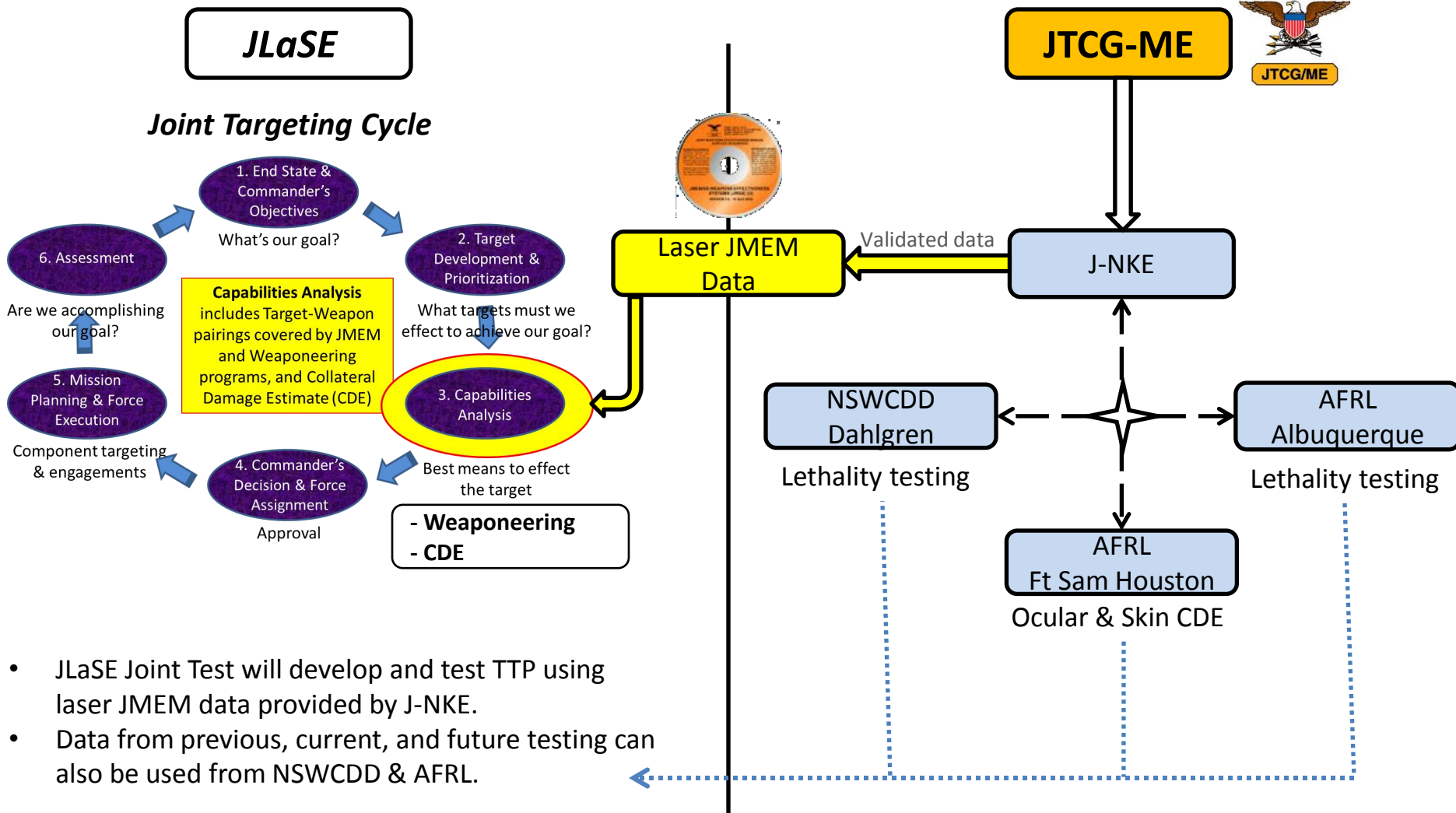
Laser Power

2kw 10kw 30kw 100kw

DEL Weapons Power & Type



JLaSE – JTCG Relationship



- JLaSE Joint Test will develop and test TTP using laser JMEM data provided by J-NKE.
- Data from previous, current, and future testing can also be used from NSWCDD & AFRL.

SUMMARY

To make you aware of the JLaSE Special Project nomination to develop and assess multi-Service TTP for Directed Energy Weapons Joint Targeting Cycle Capabilities Analysis for:

- Weaponneering and
- Collateral Damage Estimate Methodology