Joint Innovation and Experimentation (JI&E) Directorate

Briefing To

Precision Strike Association

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USJFCOM, J9
Carrier Air Power and Stability Ops

• Flew 95 out of 97 line days . . .
  • Very sustainable...Non-skid is the only thing holding us back

• Networking with ground forces - liaison officer at the ASOC was a key enabler
  • Teach ground troops/JTACs to fish vice giving them fish

• ROVER installation was a high leverage force multiplier
  • 5 weeks from request to 22 Tomcats complete, at a cost of $16K

• Finding IEDs is a growth industry for ATFLIR
  • Thermal differences . . . signal to noise . . . false alarms

• Weapons:
  • GBU-38 certification on F-14 a wise move
  • GBU-12 reliability a concern
  • Laser Maverick JTAC weapon of choice
  • Coordinate self-generation is the future
  • Night strafe a reality and a challenge (low CDE option for JTAC)
  • Working with attack helos, to include buddy lasing

• NTISR mission would benefit from specialized training
  • More training with JTACs
  • Trigger-man hunting scenario
  • Incorporate ROVER at Fallon
  • Hunting IEDs with ATFLIR (training range)

Missions
• XCAS – Strike sorties
• Non-traditional ISR (NTISR)
• Counter IED – before, during & after
• Counter Mortar – before, during & after
• Convoy Support
• Show of Force
• Overwatch of Raids / MEDEVACs
• Air Defense of Baghdad
• Helo & S-3 support to MND(SE)
JFCOM Transformation

**CDR’s Strategic Goals**

- Provide focused support to win the War on Terror
- Deliver trained, capable, interoperable joint force
- Ensure Global Force Management and visibility
- Develop robust, capable Joint Command and Control
- Lead continuous effort to transform the joint force
- Establish enhanced, agile business processes

**CDR’s Transformation Objectives**

1. Enable Achievement of Unified Action
2. Integrate Operations with Intelligence
3. Enhance Joint Command and Control
4. Improve Joint Force Deployment and Sustainment
5. Develop Joint Concepts
6. Enable Strategic Communications
7. Develop & Support JI&E Community Processes

- **Joint Concepts** (ways of operating)
- **Integrating Environment** for transformation activities
- **Joint Capabilities** (means of operating)
Joint Urban Fires Prototype (JUFP)

Problem Statement

• The urban environment inhibits the commander from employing dominant joint fires
  Ø Complex terrain
  Ø Weapons effects
  Ø Proximity of non-combatants

• The impact on joint fires is even more severe during stability operations, where the concern for collateral damage is greater and requires more precise fires
**JUFP Objective**

Provide joint warfighters with the ability to call for and apply timely precision fires, from any source, in an urban environment.

*Improved Precision, Discrimination and Response*
How We Do It: The JI&E Enterprise Process

**Discovery**
- Revolutionary solutions welcome...
- Experimentation not required
- Transition Now

**Internal**
- Collect Challenges
- Gap Importance
- Guidance
- Other factors

**External**
- Collect Challenges
- Temporal balance
- OSD ATL
- Labs
- SYSCOMs
- Forward Forces
- Industry
- Academia
- FFRDCs

**Acquisition**
- Rapid
- Deliberate
- Systems

**Doctrines**
- Concepts
- Kill the losers

**Transition**
- Transition the Winners
- Kill the losers

**Experiment**
- Lab
- Exercise
- Real world
- Temporal balance
- Gap Importance
- Guidance
- Other factors

**Capabilities and Concepts**
- OSD ATL
- Labs
- SYSCOMs
- Forward Forces
- Industry
- Academia
- FFRDCs

**Develop and Allocate Solutions to Experiments**
- Capacity
- Cost

**Find and match Solutions to Challenges**
- OSD ATL
- Labs
- SYSCOMs
- Forward Forces
- Industry
- Academia
- FFRDCs

**Transition the Winners**
- Lab
- Exercise
- Real world

**Prioritize Challenges**
- Transition Now
JI&E Enterprise Process Applied to JUFP Development

**JI&E Portal**

- **Collect Challenges**
- **Prioritize Challenges**
- **Find & match Solutions to Challenges**
- **Develop & Allocate Solutions to Experiments**
- **Experiment on Solutions**
- **Transition the Winners**

**Acquisition**
- Rapid
- Near
- Mid
- JCIDS Input
- Systems

**Doctrinal**
- Concepts
- Near-Mid-Far

**JUFP Capabilities**

- **Collect Challenges**
  - Revolutionary solutions welcome . . .
  - Kill the losers

- **Prioritize Challenges**
  - Requirements Conference & Analysis (23 Gaps)
  - Focus Areas (Address 16 of 23 gaps)
  - • Mensuration
  - • C2
  - • ISR
  - • Non-Lethal Integration

- **Find & match Solutions to Challenges**
  - Technical Solutions Conference
  - Experimentation not required Transition Now

- **Develop & Allocate Solutions to Experiments**
  - Problem Statement
  - Courses of Action

- **Experiment on Solutions**
  - • Limited Objective Experiments
  - • Service experiments
  - • COCOM exercises

- **Transition the Winners**
  - Kill the losers

- **Collect Challenges**

**JI&E Portal**

- **JOT**
  - (400+ data points)
  - • IPLs
  - • Lessons Learned
  - • JCOA
  - • JSIC
  - • JNFC Roadmap
  - • DSB
  - • Recently deployed units

**Output**

- **JOT**
  - (400+ data points)

**JOT**

- Requirements Conference & Analysis (23 Gaps)
- Focus Areas (Address 16 of 23 gaps)
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- • C2
- • ISR
- • Non-Lethal Integration

**JI&E Enterprise Process Applied to JUFP Development**

- **Acquisition**
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  - Near
  - Mid
  - JCIDS Input
  - Systems

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- **JUFP Capabilities**

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  - Kill the losers

- **Collect Challenges**
Improve joint fires C² systems

- Problem: Many service oriented architectures and TTP with non-integrated systems
- Focus: Integrate common systems with a common data schema under a JTF level joint fires architecture
- Mission areas: CPOF, JADOCS, TLAM Suite

Third Party Targeting of Tactical TLAM in UR2015
Mensuration

• Problem: Mensuration only performed at specific locations with outdated imagery
• Focus: Expand mensuration capabilities throughout the joint fires architecture and facilitate the use of real time ISR assets.

US Army PFED with JUFP precision image
Collateral Damage Estimation

- Problem: No single integrated collateral damage estimation tool
- Focus: Incorporate common automated CDE module into fires systems

JUFP LOE-2
15-17 Sept 06
Creech AFB, NV
MOUT Complex
FY07 Efforts

• Series of tech spirals with partners
  – Risk reduction for FY07 experiment series

• Major experiment with wider number of partners (Empire Challenge 07), Jul 07
  – Exercise using the most up to date imagery in the delivery of coordinate seeking weapons

• Field experiment with the Joint Fires Center of Excellence (JFCOE) at Fort Sill, OK, Aug 07
  – Update the JFCOE on the effort to expand mensuration capabilities to the tactical level using the most up to date imagery

• Transition workshop, Sep 07
  – Ensure delivery and sustainment of capabilities to the warfighter, Sep 07
FY08-09 Focus Areas

• Problem: Many ongoing ISR fusion efforts yet none are integrated in the current fires architecture
  – Focus: Integrate ongoing ISR fusion efforts M2M with fires C2 systems

• Problem: Non-lethal weapons are all nominated for use in pre-planned targeting yet there is limited nomination under a dynamic targeting situation
  – Focus: Integrate non-lethal weapons nomination for use in dynamic targeting
“Unique joint solutions to the problems our customers are trying to solve”
**Glossary**

- **AFATDS**: Advanced Field Artillery Tactical Data System. AFATDS is a totally integrated fire support C2 system that uses fire mission and other related information to coordinate and optimize the use of all fire support assets, including mortars, field artillery, cannon, missile, attack helicopters, air support, and naval gunfire. AFATDS will provide processing capabilities from the corps to the platoon Fire Direction Center.

- **EMT**: Effects Management Tool. EMT is a thin client application allowing disadvantaged users access to some AFATDS capabilities.

- **DPSS-SM**: Digital Precision Strike Suite, Scene Matching. Laptop based mensuration using scene matching technology using a stereo image data base.

- **FAST-CD**: Fast Assessment Strike Tool, Collateral Damage. FAST-CD is a collateral damage estimation tool developed by the Joint Warfare Analysis Center (JWAC).

- **JADOCS**: Joint Automated Deep Operations Coordination System. JADOCS is a Windows™ software application that is hosted on operational area communication infrastructures (i.e. SIPRNET). JADOCS provides an interface between Service systems and allows target attack planning, development and display of situational awareness, and engagement execution monitoring.
• **PFED**: Pocket Sized Forward Entry Device. The PFED is a military grade Personal Digital Assistant (PDA) application designed primarily for dismounted forward observers, artillery fire direction and target acquisition missions. The PFED can communicate direct to AFATDS or through the LFED.

• **LFED**: Light-weight Forward Entry Device. A vehicle mounted military grade laptop for generating calls for fire from forward observers to AFATDS. Runs the Forward Observer System (FOS) software which is integrated with PSS-SOF. FOS provides field artillery forward observers with the capability to direct and coordinate field artillery, mortar, close air support, and helicopter munitions onto targets.

• **PFI**: Precision Fires Image. PFI is a digitalized image where every pixel represents a mensurated coordinate.

• **PSS-SOF**: Precision Strike Suite, Special Operations Force: Similar to DPSS, PSS-SOF performs tasks including but not limited to the generation of true geodetic coordinates and elevation of an item or a location, utilizing a stereo image database.

• **WEEMC**: Web-Enabled Execution Management Capability. WEEMC is designed to allow numerous commanders to collaboratively plan and execute time-sensitive strike missions, as well as search and rescue efforts. The system will link Army, Navy, Air Force, Marine, and Special Operations systems into a unified application, giving warfighters instant, integrated access from any command and control location, including Navy ships, Air Operations Centers, or forward deployed command posts. WEEMC is scheduled to replace JADOCS sometime in the future.
JUFP LOE-2 Overview

Potential UAS/ISR Feeds
- LFED
- PFED
- PSS-SOF

Generate Engagement Orders
- AFATDS-EMT
- FAST-CD
- DPSS
- WEEMC

Creech AFB, NV
- Precision Fires Image

LMCO Center for Innovation, Suffolk, VA
- PFED – Pocked Sized Forward Entry Device
- PSS-SOF – Precision Strike Suite Special Operations Force
- WEEMC – Web Enabled Execution Management Capability

AFATDS-EMT – Advanced Field Artillery Tactical Data System – Effects Management Tool
DPSS – Digital Precision Strike Suite
LFED – Light-weight Forward Entry Device
LOE-2 Findings

• CDE
  - Component level CDE can provide the JTF commander with an improved decision making process for Joint engagements
  - Pushing CDE below the Brigade/Strike Group level may be difficult

• Mensuration
  - Tactical level mensuration is feasible and can reduce the kill chain timeline for the employment of GPS weapons
  - Joint TTP needs to be further developed and refined for tactical level mensuration
Empire Challenge 07

Goal: Exercise using the most up to date imagery in the delivery of coordinate seeking weapons
Ft. Sill Field Experiment

Goal: Update the JFCOE on the effort to expand mensuration capabilities to the tactical level using the most up to date imagery
Precision Strike Vision

Goal: Allow the commander to use the most up to date imagery in the delivery of coordinate seeking weapons
Precision Strike Vision

How do we get here?

1. C2 Fires Architecture
2. Complete DPSS-SM integration
3. UAS Integration

Potential UAS/ISR Feeds

PFED

LFED

AFATDS/EMT

PFI

DPSS-SM

PSS-SOF

Chipped Images
Accuracy Requirements

What is good enough?

- There is no single value or accuracy threshold for PGMs (CSWs)
- Accuracy requirements will depend on:
  - Commander’s intent ($P_K$ Level, etc.)
  - Weapon & target pairing
  - Rules of engagement (collateral damage)
  - Approach limitations (end-game trajectory)
Weapon and Target Uncertainty

$$\text{Total CEP} = \sqrt{(\text{TLE CEP})^2 + (\text{Weapon CEP})^2}$$
Automated Registration

Technical Issues:
- Terrain Effects
- Error Propagation
JUFP Requirements

1. Develop a technology-based, standardized Collateral Damage Estimation (CDE) tool that can be used at the tactical level with seamless operational level interface.

2. Develop a more rapid (possibly automated) system for establishing Positive Identification (PID). System must shared access with joint/interagency/coalition databases.

3. Expand the use/application of the “attack guidance matrix,” or other TTP to include CDE/PID criteria.

4. Incorporate a 10 digit grid coordinate as the standard for urban operations.

5. Develop a ground/observer-based remote mensurating system accurate to less than 7m/20 ft (equivalent to current stereoscopic mensuration standards). System must support both Height above Ellipsoid (Global Positioning System (GPS) guided weapons) and the Mean Sea Level reference systems.

6. Field a reliable GPS accurate to 1 meter.
7. Develop a capability similar to the “Google Earth” type functionality, using National Geospatial-Intelligence Agency imagery, which allows commanders to better view/understand the 3-D urban terrain

8. Provide further sub-divisions in Global Area Reference System (below the 5 min x 5 min box.

9. Improve Joint Professional Military Education coverage of the Rules of Engagement (ROE), including major Judge Advocate General input that focuses on operational ROE and commander’s guidance

10. Pre-deployment training needs to address theater ROE in order to develop proper Standard Operating Procedures

11. Change policy to widen coalition access to the Secret Intranet Protocol Router Network (SIPRNET) (or SIPRNET-like system) through multi-level security and role/permissions-based access systems

12. Develop an enhanced Blue Force tracker/Future Battle Command Brigade and Below (FBCB2) that includes the capability to display maneuver graphics and applicable Fire Support Coordination Measures down to platoon level
13. Establish Air Control Measures to better coordinate low altitude operations to deal with the expanding use of Unmanned Aerial Vehicles at the tactical level

14. Provide a single integrated high fidelity Common Operating Picture with an enhanced ability to manage low altitude air assets in urban operations

15. Develop air-to-surface and surface-to-surface technologies, associated weaponeering and CDE tools, and training and employment doctrine (concept of operations and Tactics, Techniques and Procedures (TTP)) that will improve weapons’ accuracy and ability to provide specific timely effects to meet operational requirements while minimizing collateral damage

16. Develop a standard for the specific employment considerations/requirements and evaluation methodology for all weapon systems (i.e.; target location accuracy (Target Location Error/Circular Error Probability), surface danger zones, danger close distance, CDE distance, minimum safe distance and weapon reliability factor) and disseminate/publish in a Joint Tactics, Techniques, and Procedures (i.e. Joint Close Air Support/Joint Fires) to facilitate application of fires at the tactical level. Expand the application of the “attack guidance matrix,” to include CDE/PID criteria

17. Improve the integration of lethal and non-lethal fires by coordinating throughout the planning, execution, and assessment process. This effort must be supported by further refinement of TTP, development of collaborative tools, and comprehensive training concerning the capabilities and use of non-lethal fires
JUFP Requirements

18. Develop the technologies and trained assets to provide the appropriate mix of sensors and observers with the density and interoperability required to meet all F2T2EA observer requirements in an environment where multiple, near-simultaneous events are common.

19. Develop technologies, doctrine and TTPs required to overcome the effects of urban terrain on communications systems.

20. Develop a standardized data schema which allows an automated capability to integrate, correlate and display near real-time ISR data from multiple intelligence sources (ranging from soldiers to national assets) to support urban targeting.

21. Develop a capability to capture and dynamically display ISR asset parameters (including coalition assets) to give joint forces a comprehensive picture of all ISR assets in the battlespace for integrated collection operations.

22. Develop or improve the technologies to acquire, positively identify, geo-rectify and report potential targets.

23. Develop an ISR data exchange capability that allows sharing to include multinational and interagency considerations.
Typical Mensuration Before JUFP

NGA reach back COCOM JIC Raindrop

JTF

JFMCC

CSG

PTW DIWS

JFLCC

JFACC

JSOTF

Raindrop

Raindrop

Raindrop PSS-SOF

Without JUFP

FOS w/ PSS-SOF
Typical Mensuration After JUFP

reach back

NGA

COCOM

JIC

Raindrop

JTF

JFMCC

PTW

DIWS (TLAM)

CSG

PTW

DIWS (TLAM)

JFLCC

Raindrop

JFACC

Raindrop

JSOTF

Raindrop

PSS-SOF

ESG

AFATDS/DPSS

XX

AFATDS/DPSS

X

AFATDS/DPSS

II

AFATDS/DPSS

I

AFATDS/DPSS

FOS w/ PSS-SOF

PFED w/ PSI

With JUFP

With JUFP