Joint Innovation and Experimentation (JI&E) Directorate

Briefing To

Precision Strike Association

Rear Admiral James "Sandy" Winnefeld
Director
Joint Innovation and Experimentation
USJFCOM, J9

J9 – United States Joint Forces Command

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)

ROVER antenna on F-14D

IED

Unclassified
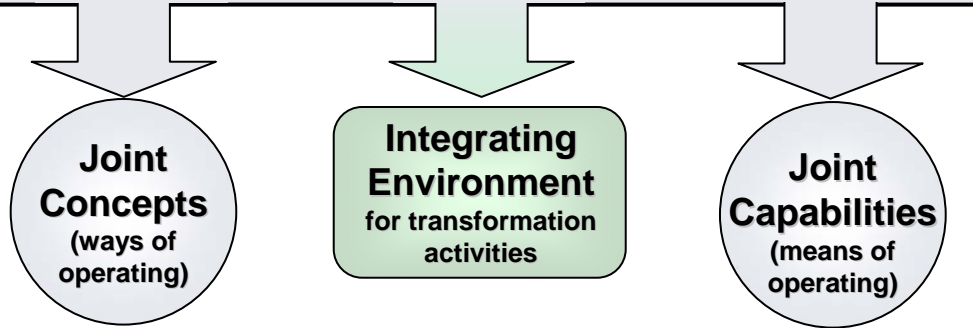
JFCOM Transformation

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

  ➢ Complex terrain

  ➢ Weapons effects

  ➢ 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.
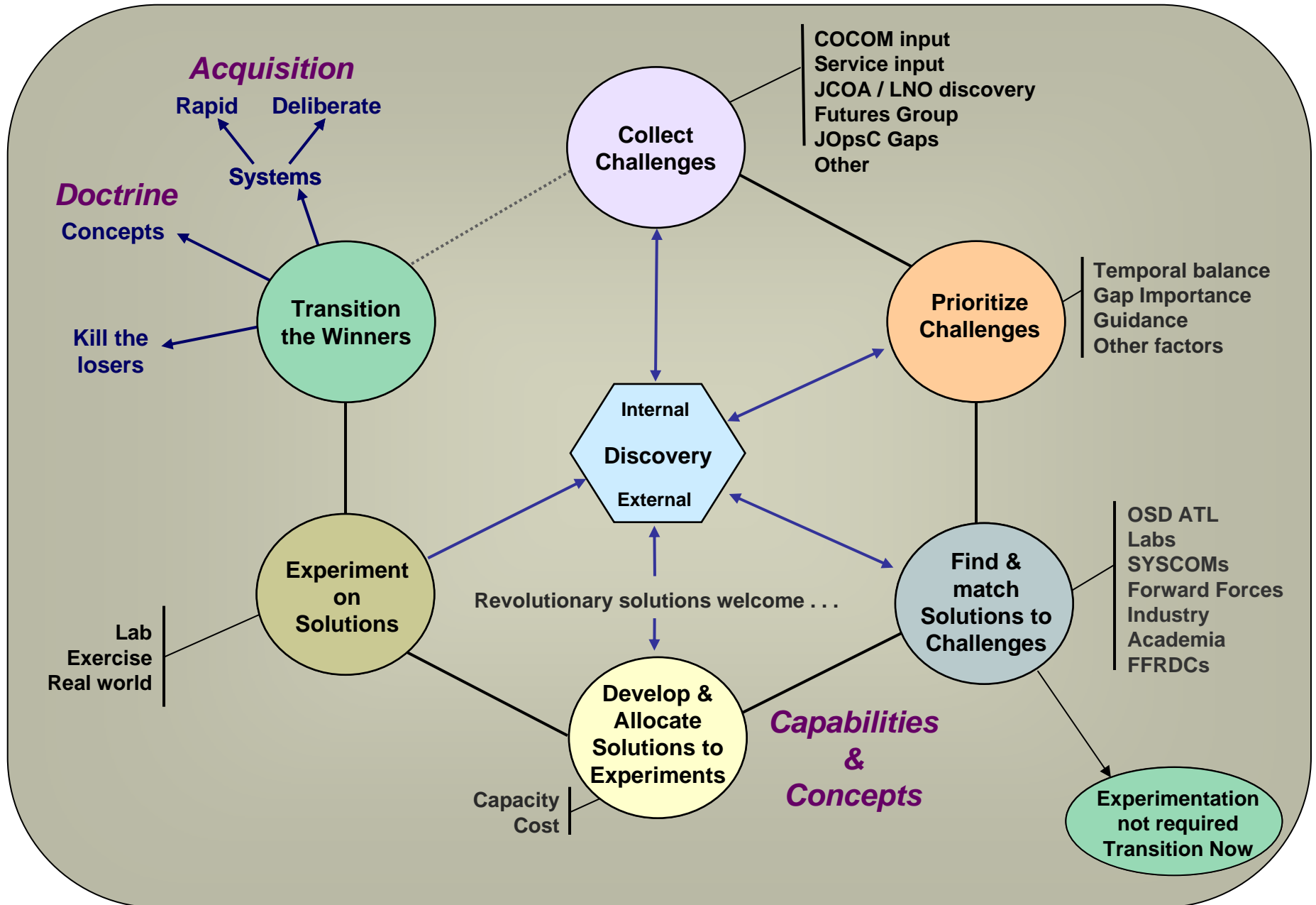

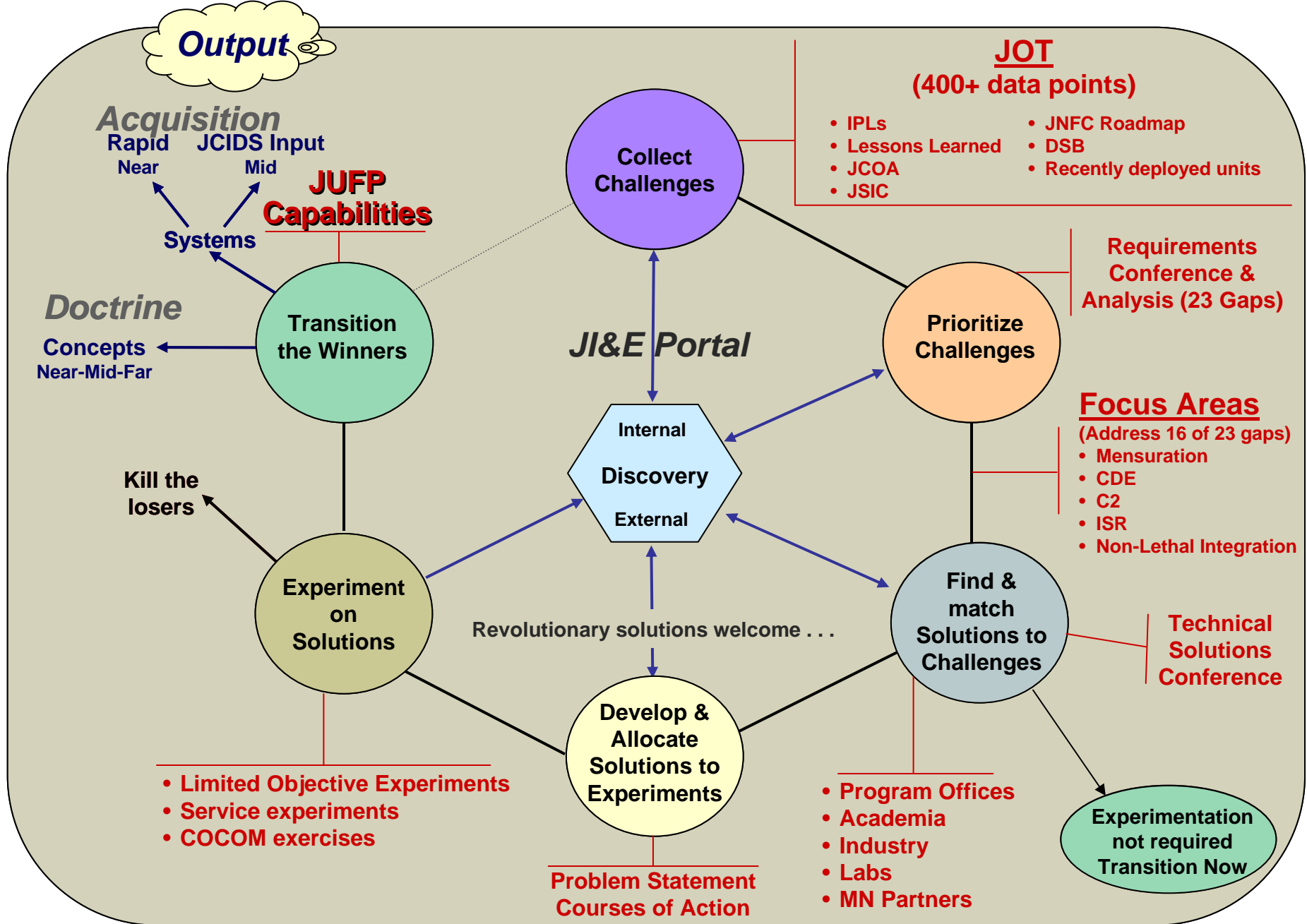*Improved Precision, Discrimination and Response*

JI&E Customers and Partners

How We Do It: The JI&E Enterprise Process

Acquisition

Rapid   **Deliberate**

Systems

Doctrine

Concepts

Kill the losers

Collect Challenges

COCOM input
Service input
JCOA / LNO discovery
Futures Group
JOpsC Gaps
Other

Transition the Winners

Prioritize Challenges

Temporal balance
Gap Importance
Guidance
Other factors

Internal

Discovery

External

Experiment on Solutions

Lab
Exercise
Real world

Revolutionary solutions welcome . . .

Find & match Solutions to Challenges

OSD ATL
Labs
SYSCOMs
Forward Forces
Industry
Academia
FFRDCs

Develop & Allocate Solutions to Experiments

Capacity
Cost

Capabilities & Concepts

Experimentation not required Transition Now

JI&E Enterprise Process Applied to JUFP Development

Output

Acquisition

Rapid
Near

JCIDS Input
Mid

JUFP Capabilities

Systems

Doctrine

Concepts
Near-Mid-Far

Transition the Winners

Collect Challenges

JOT
(400+ data points)

- IPLs
- Lessons Learned
- JCOA
- JSIC
- JNFC Roadmap
- DSB
- Recently deployed units

JI&E Portal

Prioritize Challenges

Requirements Conference & Analysis (23 Gaps)

Internal Discovery External

Focus Areas
(Address 16 of 23 gaps)
- Mensuration
- CDE
- C2
- ISR
- Non-Lethal Integration

Kill the losers

Experiment on Solutions

Revolutionary solutions welcome . . .

Find & match Solutions to Challenges

Technical Solutions Conference

- Limited Objective Experiments
- Service experiments
- COCOM exercises

Develop & Allocate Solutions to Experiments

- Program Offices
- Academia
- Industry
- Labs
- MN Partners

Experimentation not required Transition Now

Problem Statement Courses of Action

Improve joint fires C^2 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
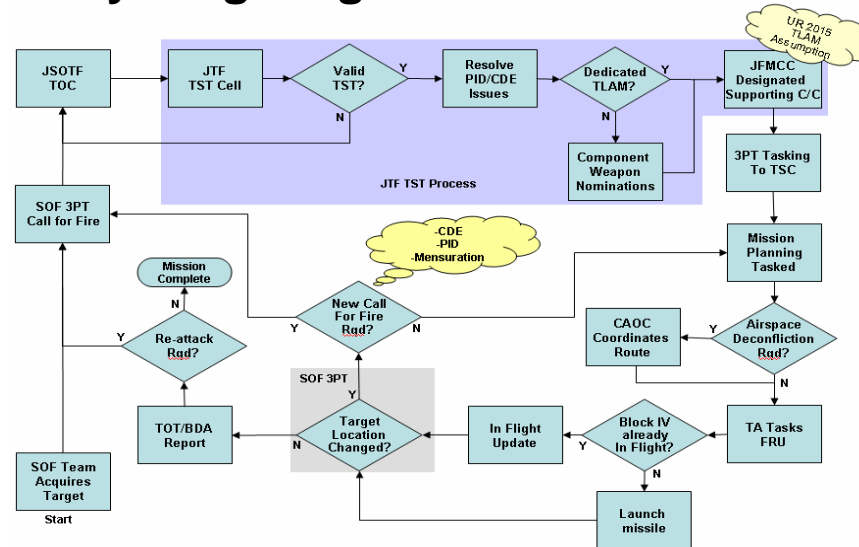
Mensuration

- 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

Iraqi Airfield

Zoom to the TACAN station

Collateral Damage Estimation

- Problem: No single integrated collateral damage estimation tool

- Focus: Incorporate common automated CDE module into fires systems
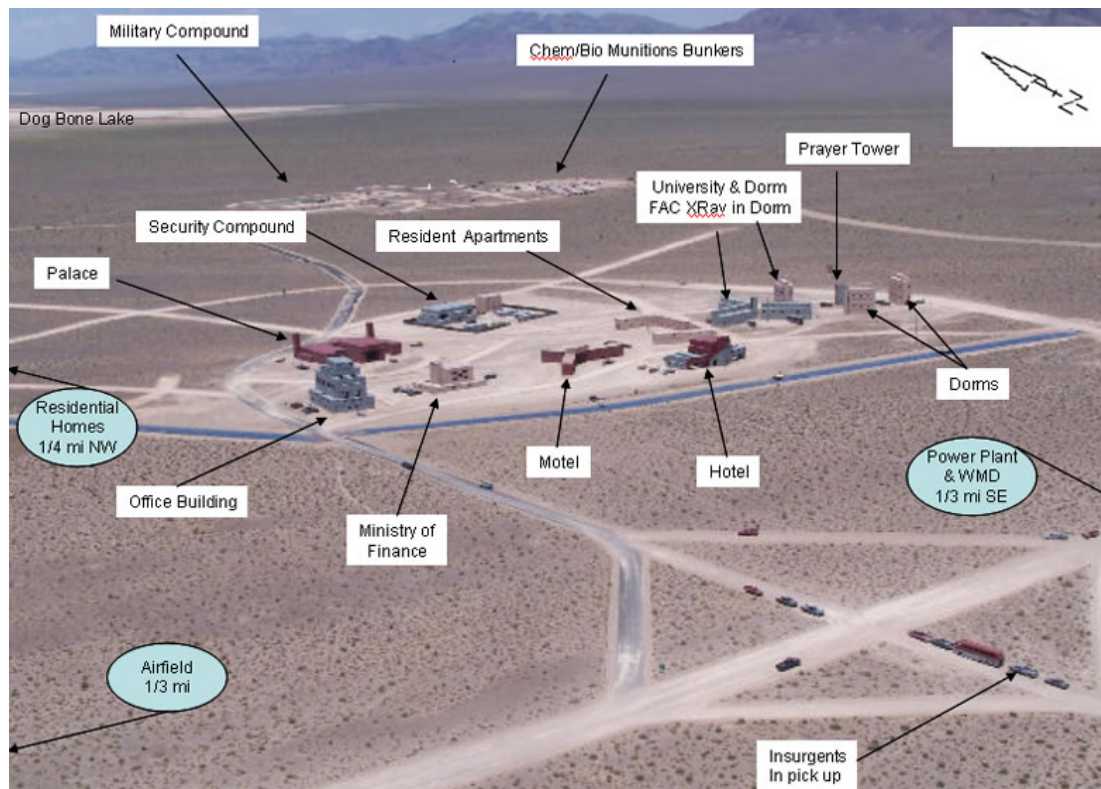
JUFP LOE-2

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 C^2 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. Lap top 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.
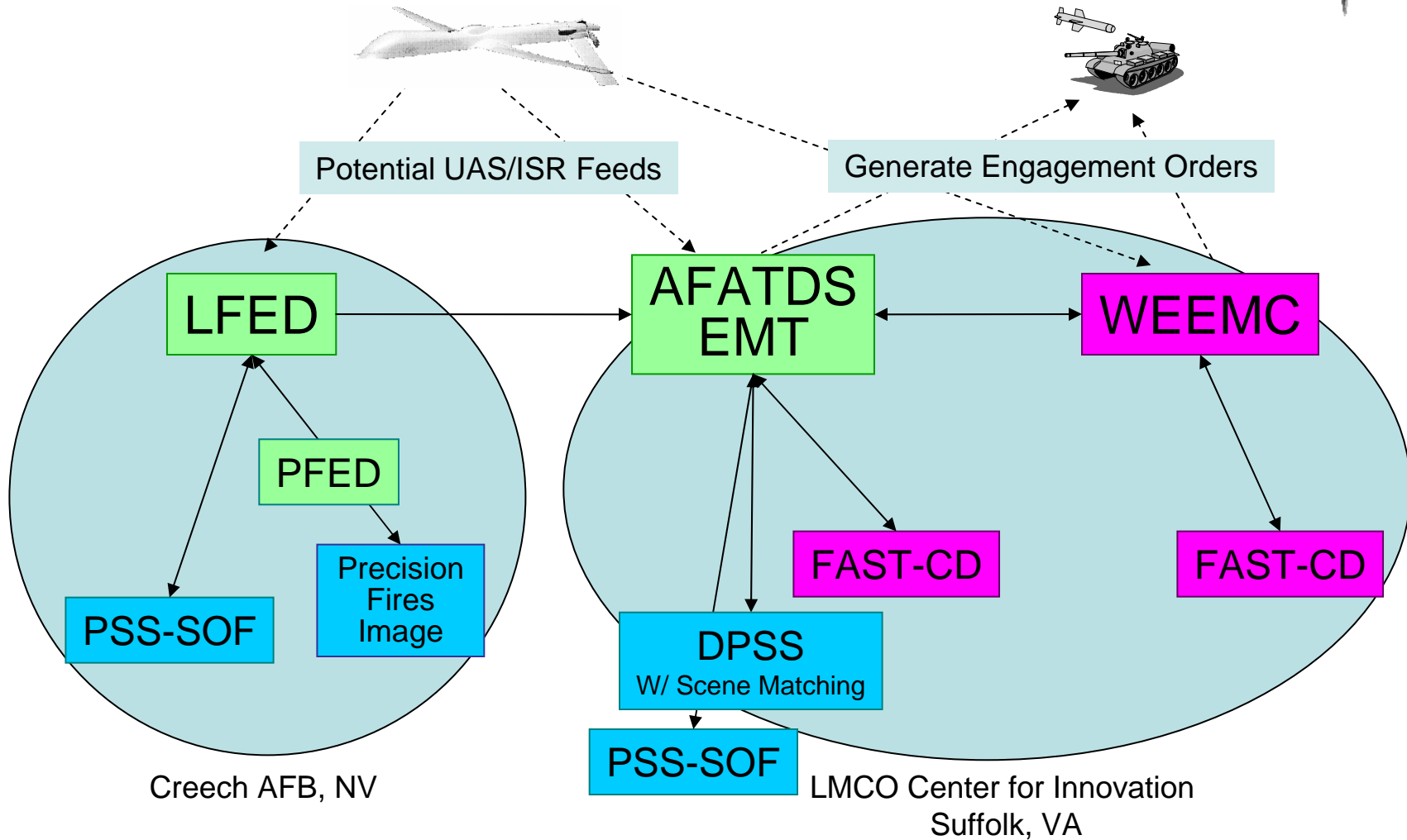
Glossary

- **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

Generate Engagement Orders

LFED

AFATDS EMT

WEEMC

PFED

Precision Fires Image

PSS-SOF

FAST-CD

FAST-CD

DPSS
W/ Scene Matching

PSS-SOF

Creech AFB, NV

LMCO Center for Innovation
Suffolk, VA

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

PFED – Pocked Sized Forward Entry Device
PSS-SOF – Precision Strike Suite Special Operations Force
WEEMC – Web Enabled Execution Management Capability

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
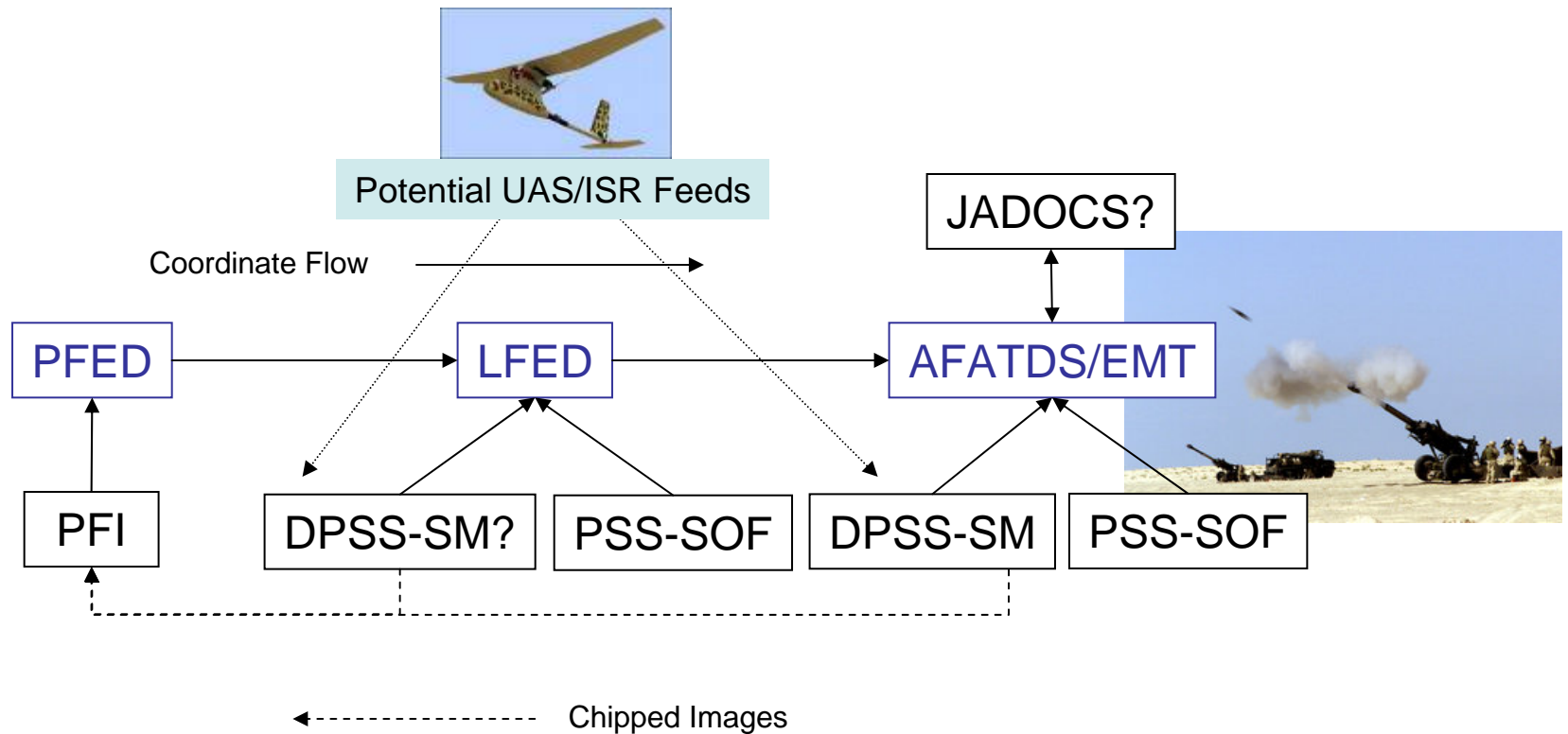 - ➤ Joint TTP needs to be further developed and refined for tactical level mensuration

Empire Challenge 07

Goal: Exercise using the most up to date imagery in the delivery of coordinate seeking weapons

Potential UAS/ISR Feeds

Coordinate Flow

JADOCS

PFED → LFED → AFATDS/EMT

PFI

PSS-SOF
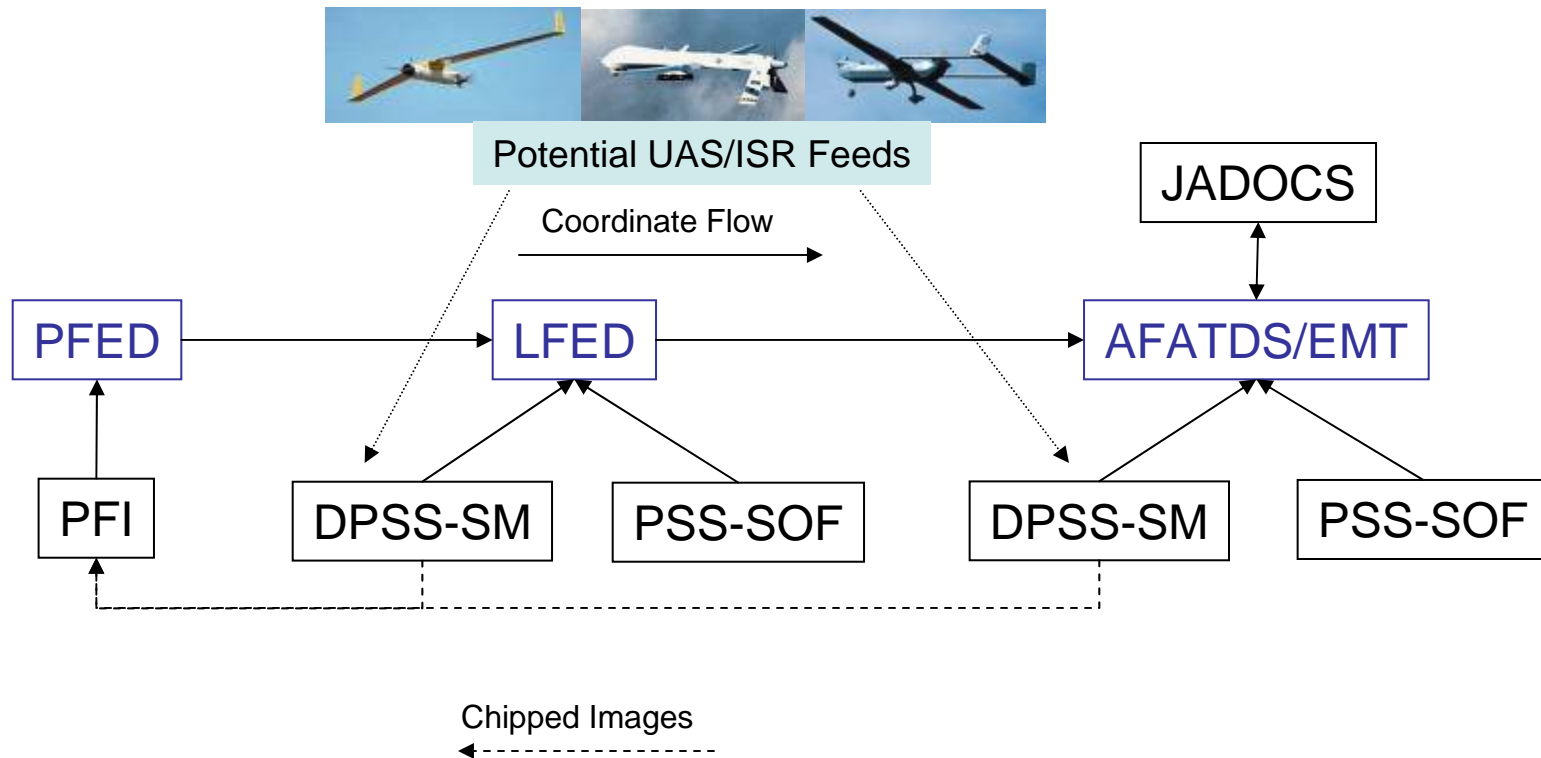
DPSS-SM

PSS-SOF

Chipped Images
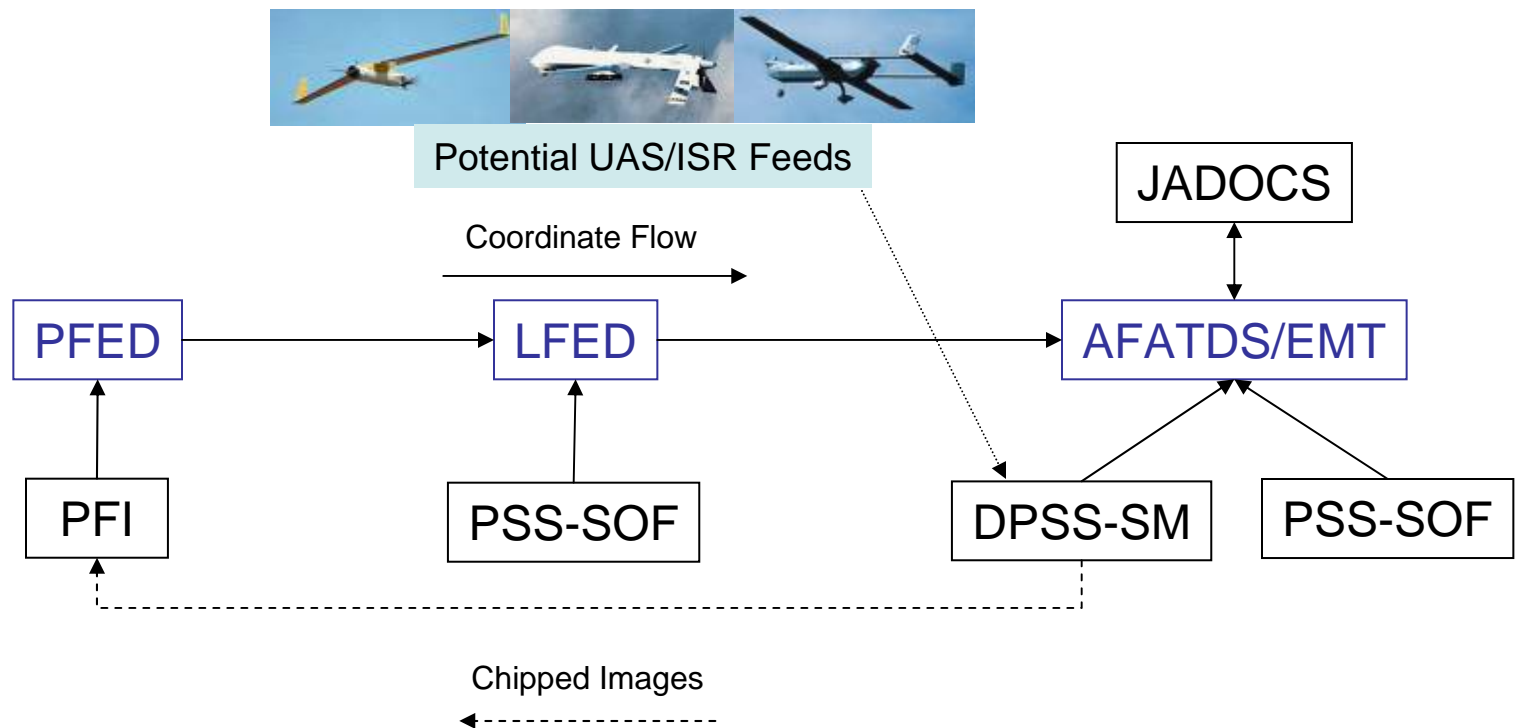
Ft. Sill Field Experiment

Goal: Update the JFCOE on the effort to expand mensuration capabilities to the tactical level using the most up to date imagery
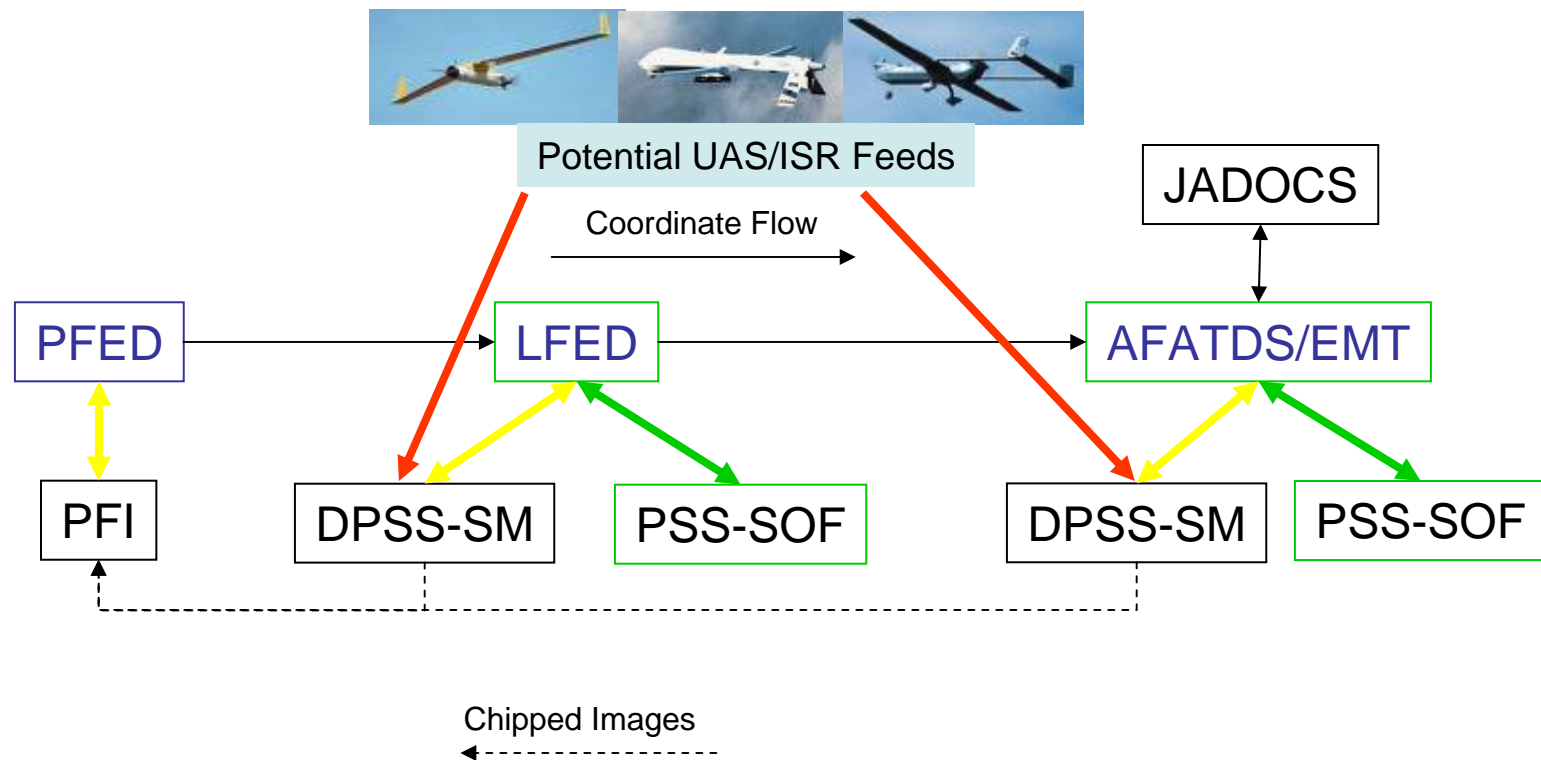
Potential UAS/ISR Feeds

Coordinate Flow

JADOCS?

PFED → LFED → AFATDS/EMT

PFI   DPSS-SM?   PSS-SOF   DPSS-SM   PSS-SOF

Chipped Images

Precision Strike Vision

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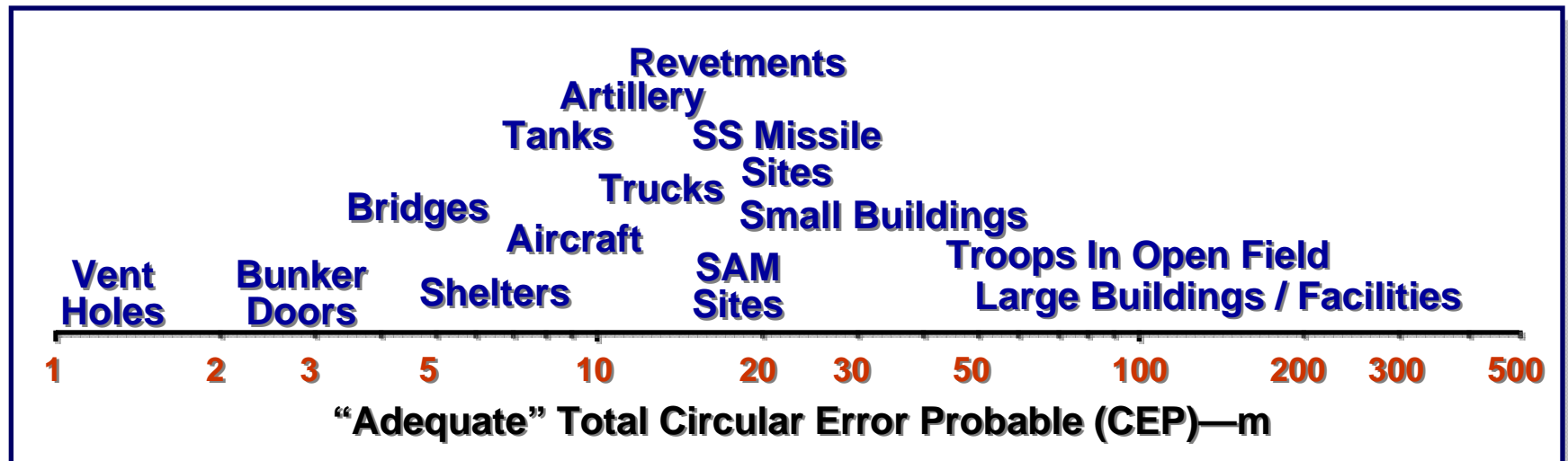

Potential UAS/ISR Feeds

Coordinate Flow

JADOCS

PFED → LFED → AFATDS/EMT

PFI   DPSS-SM   PSS-SOF   DPSS-SM   PSS-SOF

Chipped Images

Precision Strike Vision

How do we get here?

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

Potential UAS/ISR Feeds

Coordinate Flow

JADOCS

PFED — LFED — AFATDS/EMT

PFI   DPSS-SM   PSS-SOF   DPSS-SM   PSS-SOF

Chipped Images

Accuracy Requirements

What is good enough?

Revetments
Artillery
Tanks   SS Missile
Sites
Trucks
Small Buildings
Bridges
Aircraft
Vent   Bunker   Troops In Open Field
Holes   Doors   Shelters   SAM   Large Buildings / Facilities
Sites

1   2   3   5   10   20   30   50   100   200   300   500

"Adequate" Total Circular Error Probable (CEP)—m

- There is <u>no single value or accuracy threshold</u> for PGMs (CSWs)

- Accuracy requirements will depend on:
  - ➢ **Commander's intent (P_K Level, etc.)**
  - ➢ **Weapon & target pairing**
  - ➢ **Rules of engagement (collateral damage)**
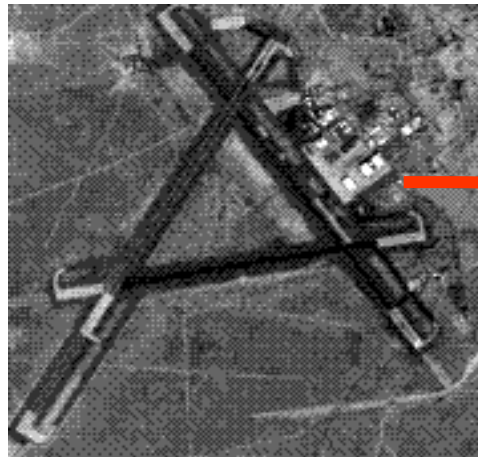 - ➢ **Approach limitations (end-game trajectory)**

Weapon and Target Uncertainty

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

Target Location Uncertainty Volume
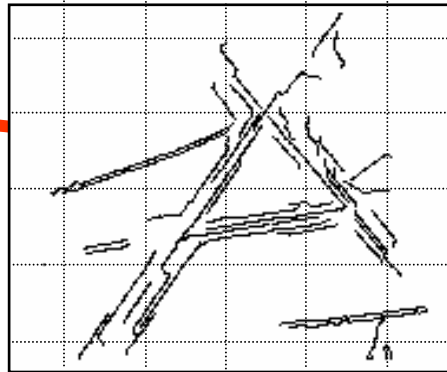
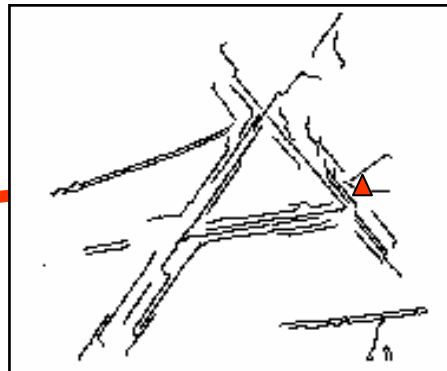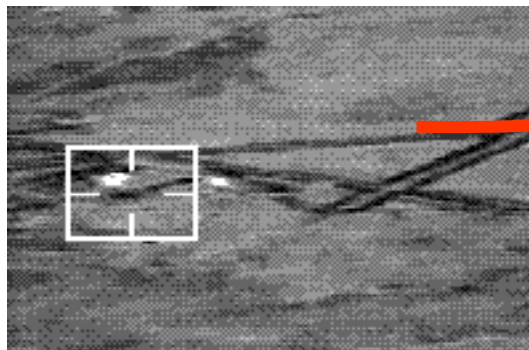**GPS Guidance Uncertainty Volume**
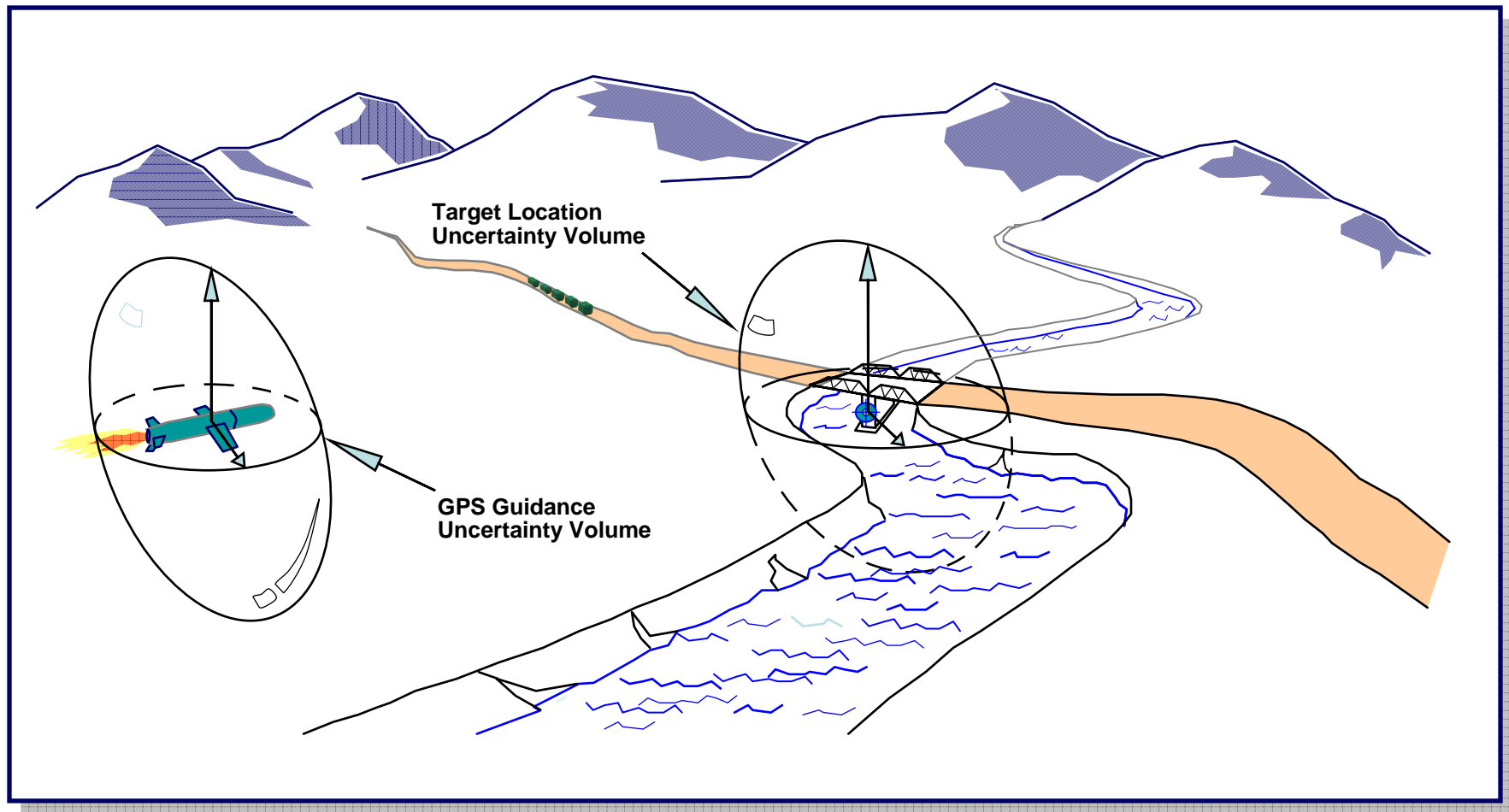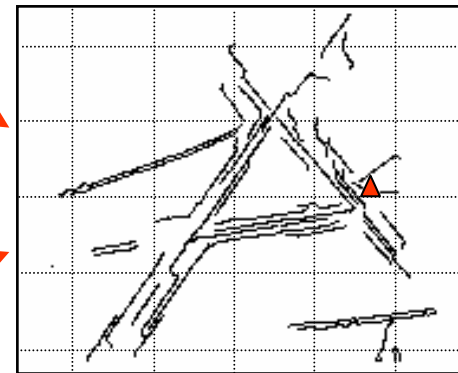
Automated Registration

GEO-REFERENCED DPPDB TEMPLATE

EDGE-EXTRACTION
ALGORITHMS

RECCE TARGET AREA
TEMPLATE

GEOREFERENCED TARGET
AREA TEMPLATE

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

JUFP Requirements

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

JUFP Requirements

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
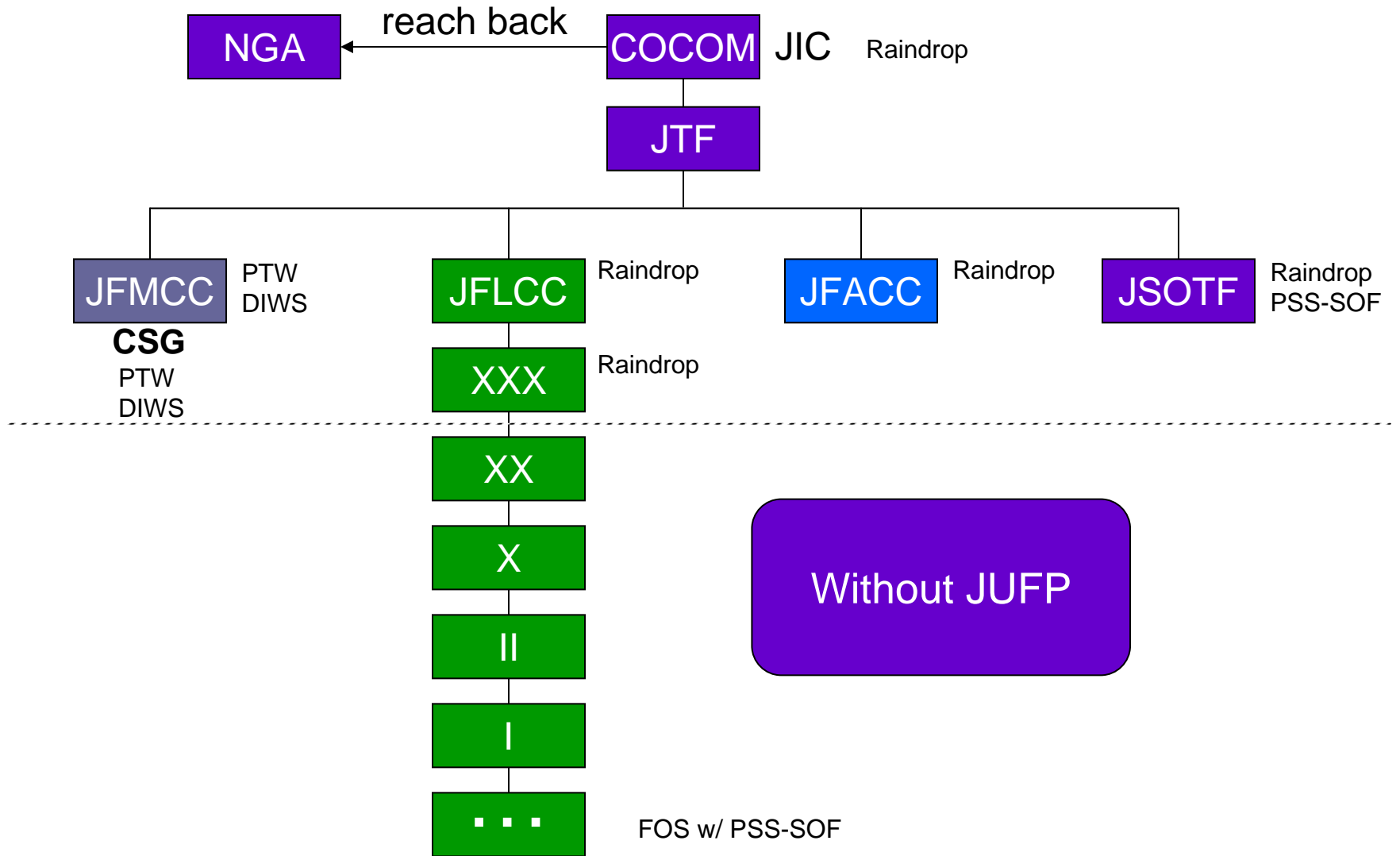
JUFP Requirements

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 | PTW DIWS | JFLCC | Raindrop | JFACC | Raindrop | JSOTF | Raindrop PSS-SOF |

CSG
PTW
DIWS

XXX   Raindrop

XX

X

II

I

· · ·   FOS w/ PSS-SOF

Without JUFP

Typical Mensuration After JUFP

NGA	← reach back —	COCOM JIC Raindrop

JTF

JFMCC	JFLCC Raindrop	JFACC Raindrop	JSOTF Raindrop PSS-SOF

JFMCC — PTW DIWS (TLAM)

CSG
PTW
DIWS (TLAM)

JFLCC — XXX Raindrop AFATDS/DPSS

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