Making the World Safer: The Defense Threat Reduction Agency

WMD Assessment & Analysis Center (WMDAAC)

Al Graziano
## Report Documentation Page

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Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18
Outline

- Introduction to DTRA
- WMD Assessment and Analysis Center
  - Weapons of Mass Effect (WME) Battle Lab
- Transformation Planning Guidance
- Distributed Continuous Experimentation Environment (DCEE)
- Joint Operational Effects Federation (JOEF)
The Strategic Challenge of the New Millennium

To reduce the threat of weapons of mass destruction as complex security issues continue to challenge our nation.

“The Defense Threat Reduction Agency safeguards America and its friends from weapons of mass destruction by reducing the present threat and preparing for the future threat.”
Full spectrum of tools to reduce the present threat and prepare for future threats

Arms Control:
Inspecting threats and stopping them at national borders

Threat Reduction:
Dismantling the former Soviet nuclear arsenal in place and eliminating Iraqi weapons of mass destruction

Technology Development:
Developing, testing, fielding offensive/defensive technologies

Chemical and Biological Defense:
Assuring operations in hostile environments

Combat Support:
Assessing vulnerabilities, assuring the nuclear deterrent

Making the World Safer
**TD’s WMD Assessment and Analysis Center (WMDAAC)**

**Bridge** WMD modeling & simulation technology to user needs, emphasizing physics-based weapon effects.

**Educate** customers on policy, doctrinal and operational issues related to WMD.

**Enable** the warfighter with WMD analysis & assessment technology in education, training, exercises and live operations.

**Guide** the development of WMD modeling technology to best support the DoD M&S Master Plan regarding analysis, training & system acquisition (test & evaluation).
## Project
### Operational Support Technology

## Objectives
- Project DTRA support to warfighter and homeland defense community
  - Provide WME consequence prediction & analysis tools
  - Convey critical info to decision-makers through distributed interactive systems
  - Participate in appropriate ACTDs e.g. CINC 21, C-CINC 21, HLS C2 ACTD

## Approach
- Exploit new collaboration technologies for projection of DTRA tools
- Establish a WME-focused operations research/analysis and weapons effects M&S capability in the WME Battle Lab
- Develop robust CBRN/E M&S infrastructure for optimization of effects-based strategies to defeat WMD
- Validate, verify, and certify physics based simulations for C4ISR systems

## Deliverables
- WME Knowledge Layer Subsystem (KLSS)
- Weapons Analysis Lethality Tool Set (WALTS)
- CBRNE Federation Object Model
- Homeland Security C2 ACTD Services
- Exercise Support (white cell/experimentation) to Ulchi Focus Lens, Millennium Challenge Series 02-07, Unified Defense, and Determined Promise
- Redundant alternate ops/analysis support center enabling
**Mission:** Bridge WMD modeling & simulation technology to customer needs, with physics-based weapon effects

- **Provide Reachback Technology**
  - Combatant Commanders, Services, Agencies, First Responders
  - Secure, Web based Internet Connectivity
  - Websites, Links & Data Repositories
  - WE Models, Consequence Management Tools
  - Subject Matter Experts
  - Common Operational Picture

- **WME Battle Lab**
  - Collaborative Ops Research
  - Wargaming
  - Technical Engineering
  - Testing & Training
  - Facilitate M&S Development & Standards
WMD Assessment and Analysis Center - Activities/Projects

- Evaluate the application of emerging technologies and concepts to enhance warfighter capabilities against WMD threats
- Provide analytical support to ACTDs, military exercises, experiments, and demonstrations.
- Evaluate CONOPS and identify methods to mitigate effects of the use of CBRNE
- Support analysis of alternatives for acquisition programs, and conduct cost benefit/other studies
Area Security Operations Command and Control (ASOCC)

Information Push

Situational Awareness

Information Pull

Integrated View

Tactical Imagery

Data Fusion

Deployment Data

Real-time Logging
Common Operating Picture (COP) Today
(DTRA products are compatible in GCCS)

Today: Use HPAC Display to merge GCCs and GIS information

Example: VX Attack

VX Attack: XIS Display

Same Information, Different Systems

VX Attack: GCCS, C2PC Display

Making the World Safer
DTRA WME Battle Lab Will Support the JNTC and Experimentation
Joint Concept Development and Experimentation Progress Assessments

Commander Joint Forces Command (JFCOM) report annually to the SecDef on progress in priority experimentation areas and adequacy of the following dedicated experimentation infrastructures:

- War Gaming.
- Modeling and Simulation (M&S).
- Joint National Training Capability.
- Operational Lessons Learned.
JFCOM: Joint Concept Development and Experimentation Strategy

FY 02 Major Experiment

Millennium Challenge

FY 01
Unified Vision

FY 03 FY 04 FY 05
Joint Prototype Path

FY 03 FY 04 FY 05
Joint Concept Development Path

- Field the Standing Joint Force Headquarters (SJFHQ) – including the enabling concepts for developing transformational joint command and control.
- Pursue rapid, prototyping of capabilities to improve joint warfighting now.
- Include Combatant Commands, Services, Defense Agencies and Multinational partners; Distributed Continuous Experimentation Environment (DCEE) supports both Paths.
- Provide actionable recommendations from experimentation results to senior leaders to inform options for future force investments.
JFCOM: Mission of the DCEE

Provide a continuous, flexible and credible environment to develop, refine and evaluate concepts and technologies in support of transformational activities.
DTRA WME Battle Lab Will Support All JFCOM Joint Experimentation Methods

Modeling and Simulation Support Required

Capitalize on Strengths:
Use combination for most rigorous Experimentation

Wargame Experiments
- Partial Real Forces in
  - MapEX/Simulated Environment
  Human-in-the-Loop

Constructive Experiments
- Simulated Forces in
  - Simulated Environment
  Force-on-Force Modeling

Virtual Experiments
- Partial Real Forces in
  - Simulated Environment
  Human-in-the-Loop

Field Experiments
- Real Forces in
  - Actual Environment
  Field Exercises
Simulation Priority for Initial Connectivity Test

Core Sims/Tools
- WALTS
- AWSIM, GIAC
- JSAF/CLUTTER
- JCATS
- SPP

Supporting Sims/Tools
- IMPACT, STAFFS
- OTBSAF, MWTB, OneSAF
- Missile Server
- SLAMEM
- DISCO
- SIMPLE, JSWS
- NMS
- XMSF Viewer
- NETWARS
- LITMSS, SMAT
- OASES, MLST3

Remaining Army Tools
- JTEDS2
- MUSE, ATLOS, AutoSigs

All Others
DTRA & DOE Field Trials for Urban Modeling

Small Scale Testing
- UK - Wind Tunnel and Field Trials
- Canada - Water Flumes
- Dugway – Mock Urban Setting Test

Full Scale Testing
- Salt Lake City – 2000
- Joint Urban – Oklahoma City 2003

Joint Urban 2003 CFD Calculation
Sample 3-D views of buildings, trees, and imagery draped over terrain
WALTS Future
Closer 3-D view of puffs and dosage around buildings
R&D Initiatives: REASON
Response & Effects Analysis System for Operational Needs

Close up view of plume in urban area
R&D Initiatives:
Accredited tool to evaluate CBRNW operability at “fighter-type” air bases and aerial ports of debarkation

Expansion of the scope of JOEF to include seaports of debarkation (SPODs) and other land-based fixed site targets (i.e., depots).

Expansion includes mobile land and littoral forces. This block provides Output links into manpower, logistics and training planning models

Address the near real time, decision support requirements of war-fighting.
Basic Concept of JOEF Capability

JOEF Block 1
Role In Joint Wargames

Mission Effectiveness Simulation → Mission Results → Theater Wargame

Airbase 1 JOEF → Departing Sorties → AOC → APOD JOEF → Theater Wargame

Airbase 2 JOEF → Returning Sorties → AOC → Theater Wargame

Airbase N JOEF

APOD JOEF

TPFDD

NCBR

Cargo AC

Ships

Other Simulation e.g., NCBR

Multiple Instantiations Of JOEF

Making the World Safer
Primary Tasks for JOEF Demonstration

**PMO Goals**
- Provide a modeling and simulation (M&S) analytical capability to determine and assess the impact of CBRNW on military operations.
- Assess resource baselines, performance characteristics, operational effectiveness, and vulnerability based on measures of effectiveness (MOE) of conducting joint mission task:

**Prototype Goals**
- Enable communication between STAFFS/IMPACT and NBC CREST
- Address:
  - Contamination avoidance
  - Collective protection
  - Individual protection
  - Decontamination
  - Restoration training/planning
Information Flow from Target to Output

1. Military Event
2. Estimate Casualty / Consumption of Medical Resources
3. NBC CREST
4. STAFFS

IMPACT (DEMO) JEM (Block 1)

Chem/Bio impact on Military Activity based On C4I understanding

Chem/Bio Hazard

External

Internal API
Chem-Bio Functions Integration

HPAC / IMPACT

Challenge Environment

Impact on Operations

JOEJ Core

STAFFS

Movement

Individual & Collective Protection

Tasks Utilizing Personnel

Exposure

Impairment

Incapacitation

Return To Duty

NBC CREST

Dose Response

Vaccination

Prophylaxis

Treatment

Impact on Operations
Demonstration: Combination RTI / DLLs thru APIs

All Components are Developed EXCEPT where specified

SHaG  STAFFS Hazard Grid (SHaG)
SRF  Source Release Federate (SRF).

Approved Architecture by JOEF Pgm Office

RTI

FOMs

IMPACT (Federate)

SRF (Federate)

SHaG (Federate)

TCP/IP

FOMs

TCP/IP

JOEFGUI

STAFFS (DLL)

NBC CREST (DLL)

APIs

To be developed

STAFFS – NBC CREST DLL’s thru APIs
Follow-on JOEF Interfaces

- JOEF
- JWARS
- JSB
- JSIMS
- Other Sims
- ITEM

JOEF Components
- External Interface
- Web Applications
- User Web Interfaces
- CAISR Systems

External Systems
- C4ISR Systems
- ALSP
- Other Sims

Insertion point for DTRA Tools

- WAPO
- IWMDT
- BCF

Network Protocols
- RTI
- DIS
- DII/COE Interface

Web Applications
- Basic Components
- JWARN Interface
- RTI or API
Making the World Safer...

...by **reducing** the present threat

and **preparing** for future threats