



Trailblazer

A Federation for Joint Experimentation



High Level Architecture

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REPORT DOCUMENTATION PAGE

Form Approved OMB No.
0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 01-06-2002	2. REPORT TYPE Briefing	3. DATES COVERED (FROM - TO) xx-xx-2002 to xx-xx-2002
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4. TITLE AND SUBTITLE Trailblazer A Federation for Joint Experimentation Unclassified	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME AND ADDRESS Defense Modeling & Simulation Office 1901 N. Beauregard St., Suite 500 Alexandria, VA22311	8. PERFORMING ORGANIZATION REPORT NUMBER
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9. SPONSORING/MONITORING AGENCY NAME AND ADDRESS United States Department of Defense Defense Modeling and Simulation Office 1901 N. Beauregard St., Suite 500 Alexandria, VA22311-1705	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT APUBLIC RELEASE
--

13. SUPPLEMENTARY NOTES

14. ABSTRACT Trailblazer/Pegasus represents the continuing evolution of DMSO's interest in supporting the M&S requirements for Joint Experimentation

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19. NAME OF RESPONSIBLE PERSON
a. REPORT Unclassified	Public Release	11	Fenster, Lynn lfenster@dtic.mil
b. ABSTRACT Unclassified			
c. THIS PAGE Unclassified			

	19b. TELEPHONE NUMBER International Area Code Area Code Telephone Number 703767-9007 DSN 427-9007
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Background



- **Trailblazer/Pegasus represents the continuing evolution of DMSO's interest in supporting the M&S requirements for Joint Experimentation**
- **Program initiated in FY98 as part of DDR&E-sponsored "Joint Warfighting Program" (JWP)**
 - **Intended to improve the information superiority of US military forces through the exploration and co-evolution of technologies, doctrine and organizations**
 - **DDR&E identified DMSO as the agent for JWP M&S**
- **In FY98 DMSO**
 - **developed a working example of the application of DoD standards and infrastructure to JV2010 experimentation**
 - **conducted a "Trailblazer" activity to rapidly execute the end-to-end process of using HLA federations to an example experiment.**



Trailblazer Objectives



- **DMSO objective:**
 - Explore the use of federations in experimentation arena
 - Capture lessons learned to improve application of M&S
- **Specific guidance:**
 - Use the High Level Architecture
 - Distribute development at federate home sites
 - Conduct integration and execution at single site in DC area
 - Operate at a classified, but no higher than collateral SECRET, level
 - Complete development within fixed budget and schedule (<5 months)
 - Consider closed loop, faster-than real time simulations



FEDEP Overview

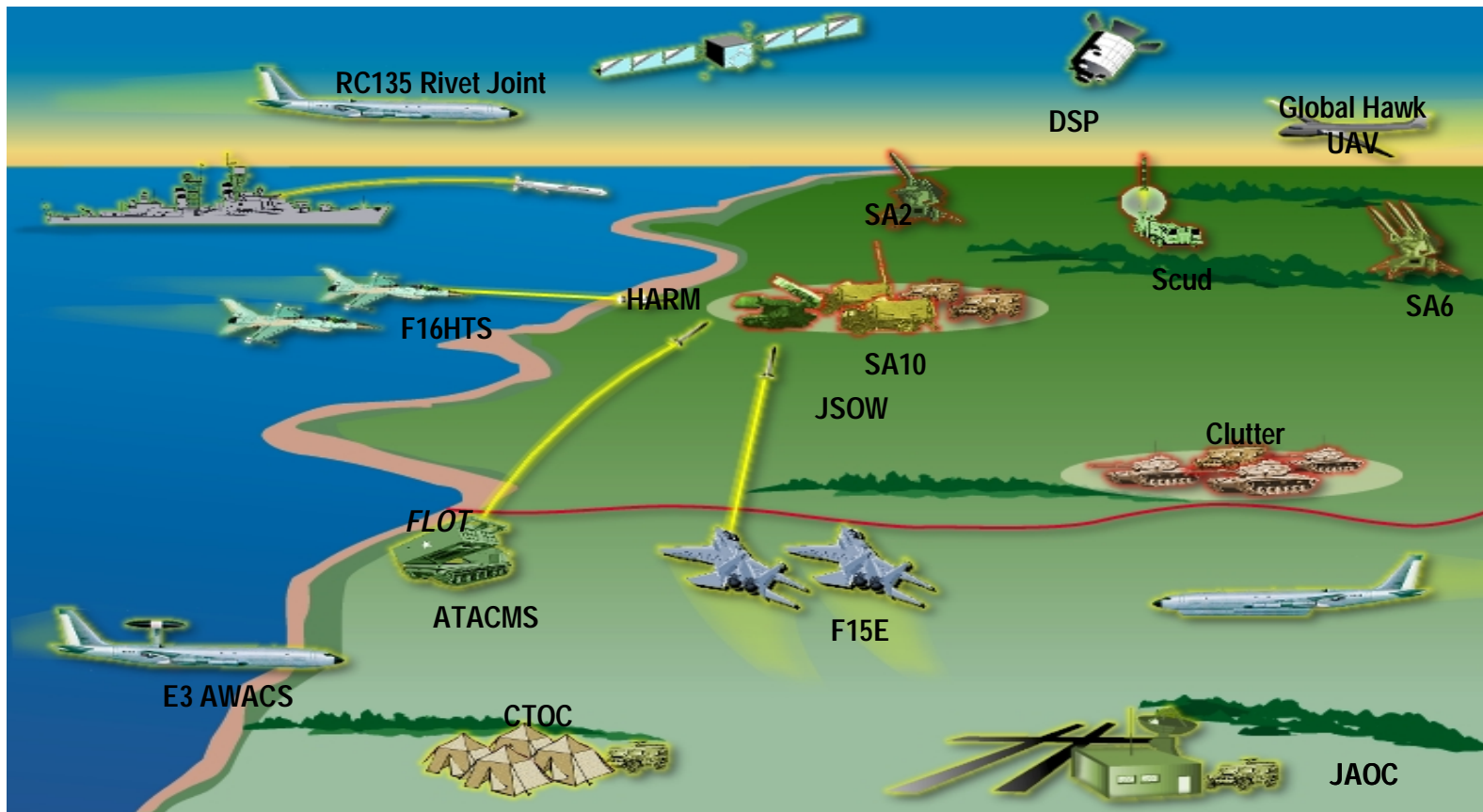


Define Federation Objectives	Develop Federation Conceptual Model	Design and Develop Federation	Integrate and Test Federation	Execute Federation and Analyze Results
Identify Sponsor Needs	Develop Scenario	Design Federation	Plan Execution	Execute Federation
Develop Objectives	Perform Conceptual Analysis	Develop Federation	Integrate Federation	Analyze Results
	Develop Federation Requirements		Test Federation	Prepare Feedback

Trailblazer Battlespace

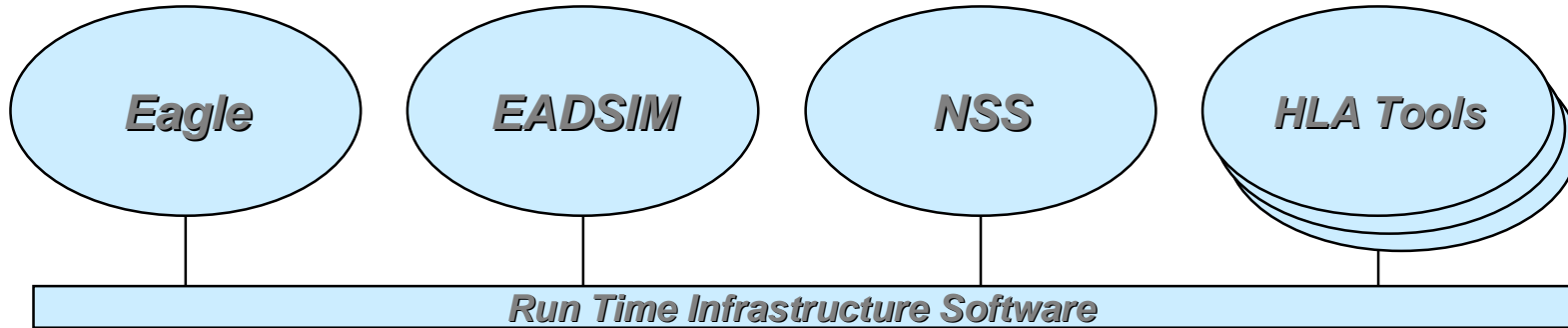
2010 JSEAD against mobile SAMs

- Adopted high priority experiment from J-6 plan¹
- J-6 LIVEX of same experiment conducted in FY98





Trailblazer Federation Composition



Federates

Eagle



Extended Air Defense Simulation



TELEDYNE BROWN ENGINEERING
Common sense . . . uncommon in innovation

Naval Simulation System



HLA Tools



Virtual Technology Corporation
Software and Systems Engineering Professionals

Functionality

Red ground clutter
Red tactical SAMs
CTOC
ATACMS

Red strategic SAMs
Air Force strike a/c
JSTARS, AWACS
JAOC

Aggregate ELINT
Infrared launch detection
Naval strike a/c

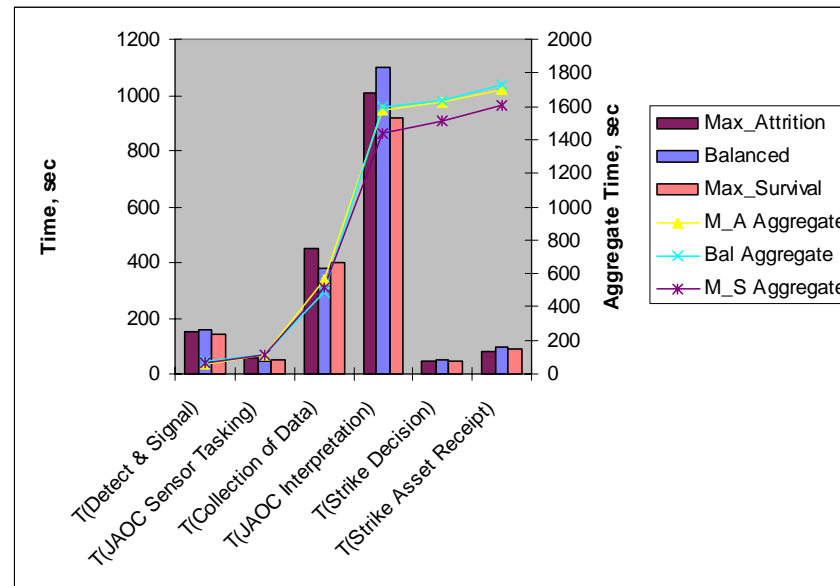
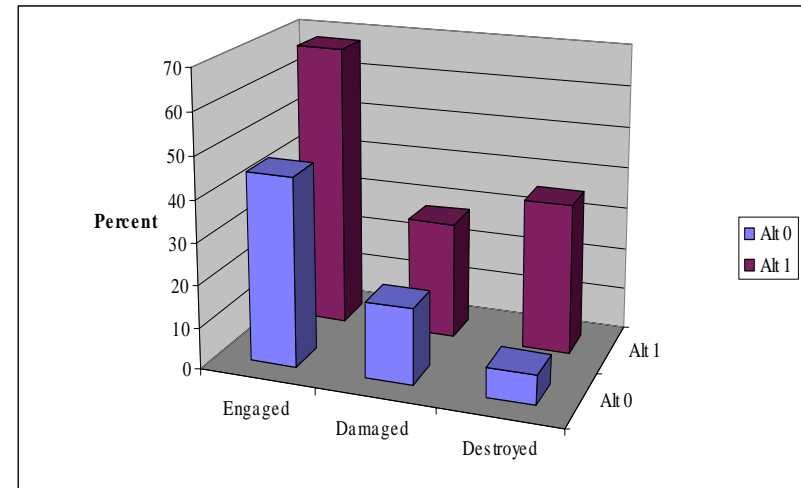
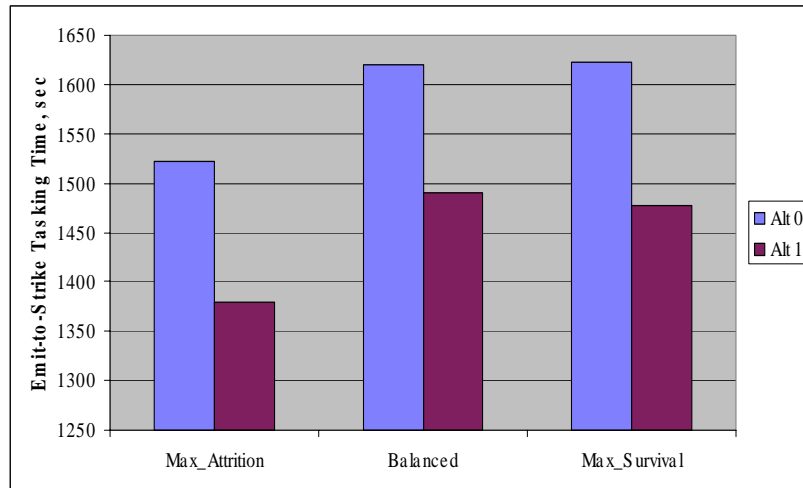
Sponsor:



Systems Engineer: MITRE - Washington



Prototypical Experimental Results





Summary: Federations for Joint Experimentation



- **Federations will be necessary for many joint experimentation-focused issues**
 - For experimentation, federates must have explicit and flexible representations of systems, humans, and C2 organizations
 - Flexibility can be enhanced by interfaces to other simulations, systems, or federates
- **The HLA provides the common architecture, tools, and processes to meet new requirements in a fast and cost-effective manner**
 - Use of HLA enables improved interoperability and reduces technical integration costs
 - Allows users to focus on more fundamental challenges of experimentation (e.g., problem definition, scenario development, data collection and interpretation, etc.)

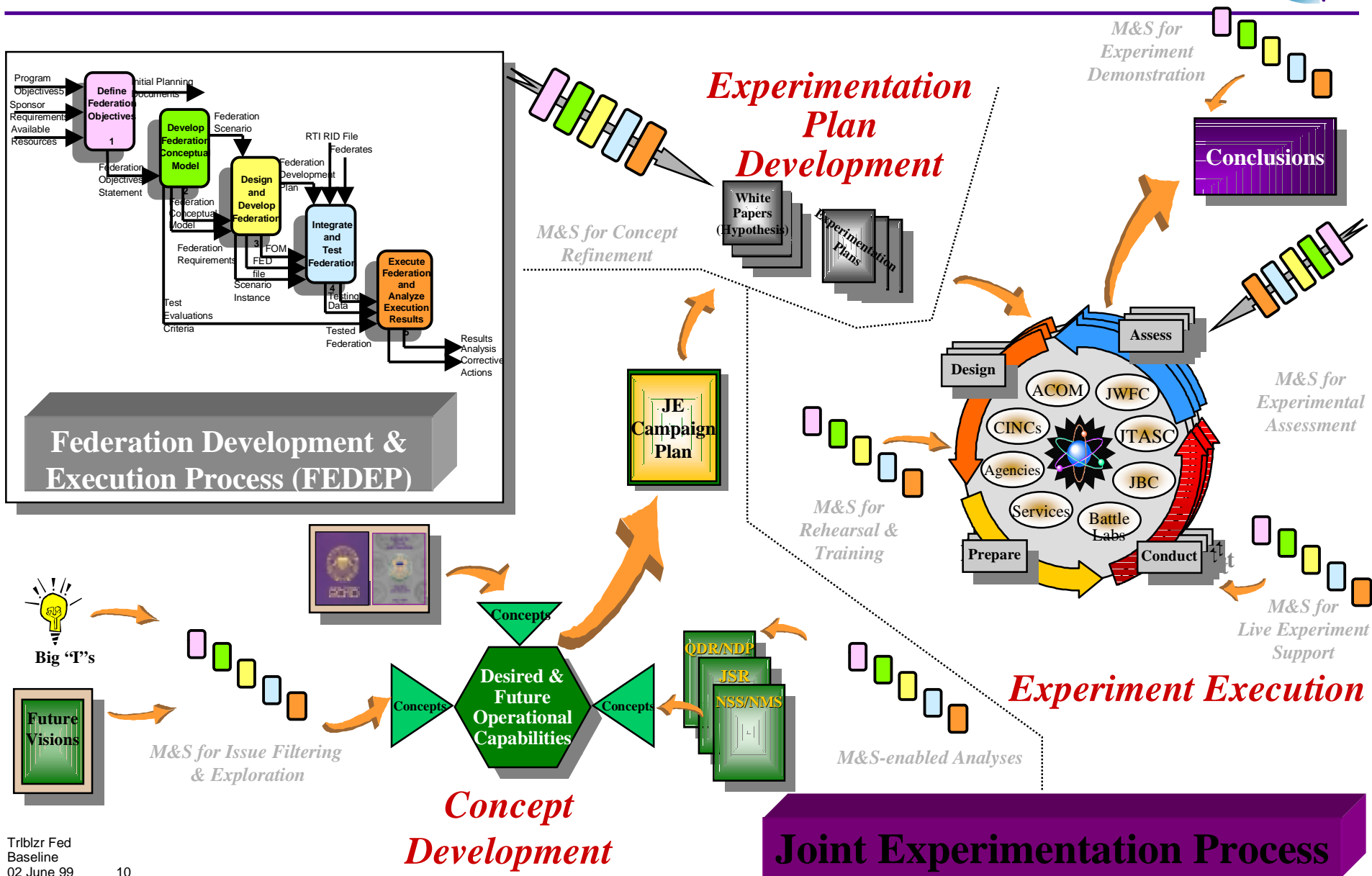


Evolution to Pegasus



- **Trailblazer effort successfully concluded by end of FY98**
 - **Completed entire FEDEP including generation of prototypical analytical results**
- **Project and federation re-named Pegasus in early FY99**
- **USACOM J9 has expressed interest in employing Pegasus as a tool in analysis of AOACMT**
 - **Concept focus is Attack Operations Against Critical Mobile Targets in 2010 timeframe**
 - **Primary target set is tactical ballistic missiles (TBMs)**
- **Degree of overlap between objects and interactions in current federation and AOACMT make Pegasus a particularly attractive capability**

Laying the Foundation for Joint Experimentation





The Road Ahead



- **Currently exploring technological enhancements to the FEDEP in support of the JE domain**
 - Continue to enhance the application of the HLA to JE
- **Making operational enhancements to the Pegasus federation**
 - Provide powerful, flexible analytical tool to USACOM for use in AOACMT and other emerging concepts
- **Ongoing explorations:**
 - Scenario agility
 - Common / more detailed representations
 - Performance enhancement
 - Data collection and reduction
 - Distributed classified operations
 - Multi-level operations with SCI level federates
- **Anticipate federation being ready for early FY00 operational use by USACOM J9**