

**17956**

**Joint Munitions Safety Testing  
(JMST)**

Diane Dray  
Booz Allen Hamilton  
18<sup>th</sup> Annual NDIA Systems Engineering Conference  
Springfield, VA  
28 October 2015

# Disclaimer

- ▶ Any views or opinions presented in this presentation are solely those of the author/presenter and do not represent those of Booz Allen Hamilton nor the U.S. Department of Defense (DoD)

# Table of Contents

- ▶ Origins, Goals and Scope of JMST
- ▶ Process
- ▶ Accomplishments
- ▶ Applications and Opportunities

# Initiatives Interwoven to Enhance Support to the Joint Warfighting Environment



JOINT REQUIREMENTS  
OVERSIGHT COUNCIL

**THE JOINT STAFF**  
WASHINGTON, D.C. 20318-8000

JROCM 102-05  
20 May 2005

MEMORANDUM FOR: Vice Chief of Staff, US Army  
Vice Chief of Naval Operations  
Vice Chief of Staff, US Air Force  
Assistant Commandant of the Marine Corps

Subject: Safe Weapons in Joint Warfighting Environments

1. The Joint Requirements Oversight Council (JROC) approved the establishment of a Joint Weapons Safety Technical Advisory Panel (JWSTAP) to advise the Deputy Director for Force Protection, J-8, on joint weapons safety issues. The JROC also approved the institution of a Safe Weapons in Joint Warfighting Environments endorsement within the Joint Capabilities Integration and Development System (JCIDS) vetting process, upon the development and approval of a JWSTAP charter. The Joint Staff, J-8, Protection Assessment Division will develop and coordinate the JWSTAP charter for joint approval.

2. Because all weapons/weapon systems have the potential of being deployed together or employed in joint environments, weapons and weapon systems will be considered joint systems within the JCIDS process unless they are assigned the Joint Potential Designator of "Independent".

PETER PACE  
General, United States Marine Corps  
Vice Chairman  
of the Joint Chiefs of Staff

Copy to:  
Under Secretary of Defense for Acquisition, Technology, and Logistics

## Initiatives

- **Material Reviews:** Collaborate on Joint Weapons Safety Reviews
- **Requirements:** Integrate Joint Weapons Safety Requirements in Joint Capabilities Integration and Development System (JCIDS)
- **Testing:** Develop Joint Service Weapons Safety Testing Standards

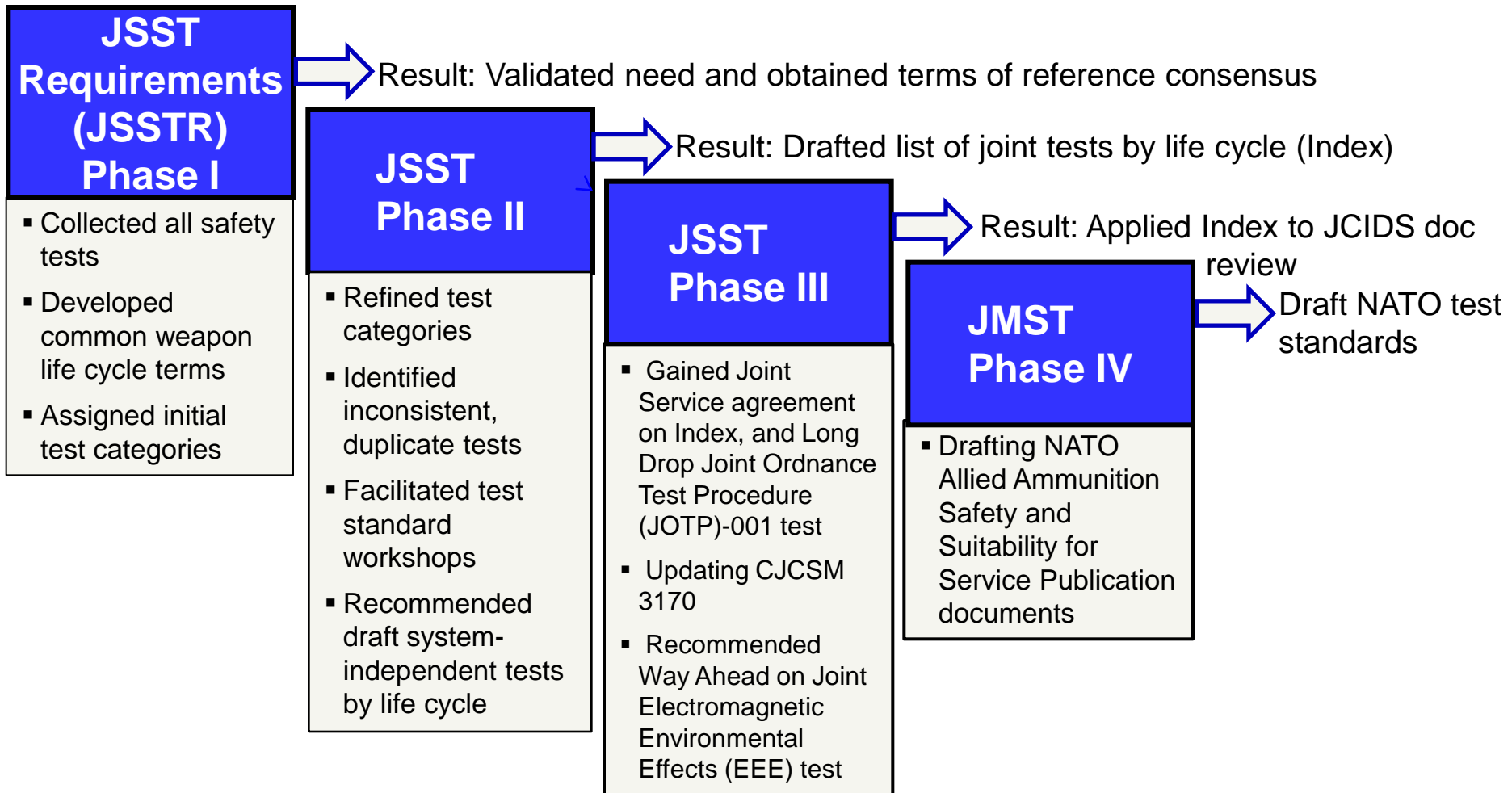
**Expedites safety processes and testing to field weapons to the warfighter faster.**

# ***The Challenge***

Basic munitions safety tests are used for Safety and Suitability for Service (S3) assessment as contained in Standardization Agreement (STANAG) 4629 (NATO 2011). DoD acquisition has challenges in safety testing of munitions:

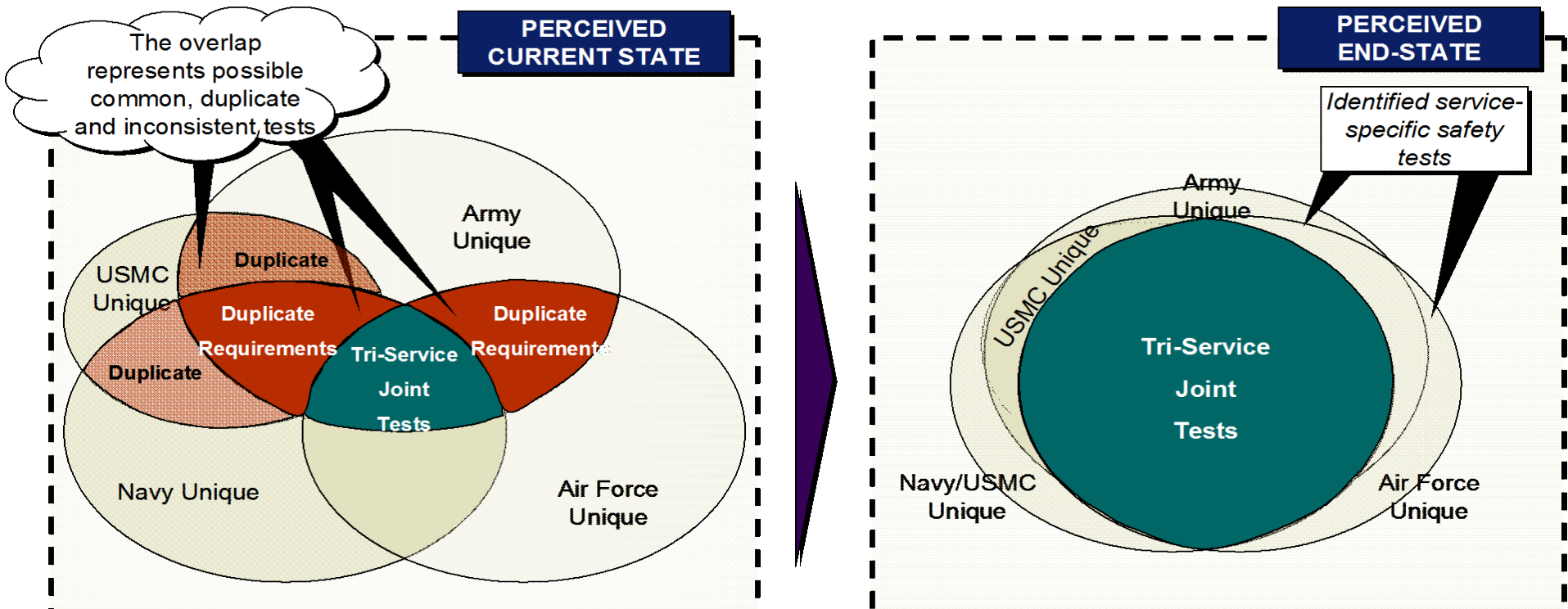
- ▶ Multiple duplicate/overlapping standards
- ▶ Multiple applications/interpretations of same standard by different Services
  - Electrostatic Discharge
  - Terminology differences
- ▶ Multiple (and redundant) tests conducted/Expense of reconciling multiple standards
- ▶ Users have told us acquisition takes too long

# Joint Service Safety Testing (JSST) Progression



# Validated Need for Joint Service Safety Testing Requirements

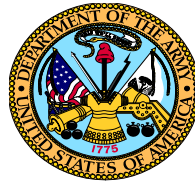
Given the increasingly joint nature of the current military conflicts, Services are increasingly hindered and delayed by the need to require duplicate and inconsistent safety tests in order to certify munitions for use, and qualify munitions for military transportation to deployed sites.



# ***JMST and Joint Weapons Safety Working Group (JWSWG) Roles, Responsibilities, and Relationship***

- ▶ **JMST** - an established project with munitions Subject Matter Experts (SME) working to develop Joint standardized safety tests enhancing transparency and data parity in Joint Service safety reviews, material release, and acceptance
  
- ▶ **JWSWG** – J8 Joint Staff-chartered Working Group is the National S3 Authority
  - Recommends harmonized safety review procedures, evaluation criteria and common safety capabilities and attributes across the DoD Components for conventional weapons
  
- ▶ **JMST-JWSWG** – JMST deliberations and product fall under the purview of the JWSWG and the JWSWG advises the JMST





## ***Army-Munitions Safety Testing (MST) and JSSTR Comparative Analysis by JWSWG:***

- ▶ Army-lead MST and JSST goals similar
- ▶ Levels are different and compatible
  - JSST is high level, system independent
  - Army-MST is commodity specific, system dependent
- ▶ Merged Army-MST and JSST are complimentary; combined, they bridge the capabilities developer community and material review acquisition community
  - Improved consistency in safety of use policy Department-wide; compressing time, factory to foxhole
  - Increase Program development stability for the Program Manager; conserving constrained resources

## ***JMST Goals:***

- ▶ Contribute to a more streamlined Safe Weapons Endorsement advisory function of the Joint Weapons Safety Technical Advisory Panel by providing members a template for consistency in addressing Joint Capabilities Integration and Development System (JCIDS) documents under review
- ▶ Establish Joint weapon safety requirements early in the acquisition process by calling out the appropriate standardized Joint test document within the JCIDS documents (Initial Capability Document, Capability Development Document, Capabilities Production Document)
- ▶ Enhance weapon safety by providing for common handling and storage environmental risk picture in support of a joint war fighting environment



## ***NATO AC326 SGB Working Group For The Development of Safety and Suitability for Service Documents***

- ▶ Under the auspices of the NATO AC326 Subgroup B, the Working Group for the Development of S3 documents developed STANAG 4629 (NATO 2011) “Safety and Suitability for Service Assessment Testing of Non-Nuclear Munitions,” a six-page standardization agreement paving the way for improved munitions type-specific joint test standards.
- ▶ The S3 Working Group efforts were complimentary with the Joint Service Safety Testing recommendations, the work was linked in a dual path domestic and international process.

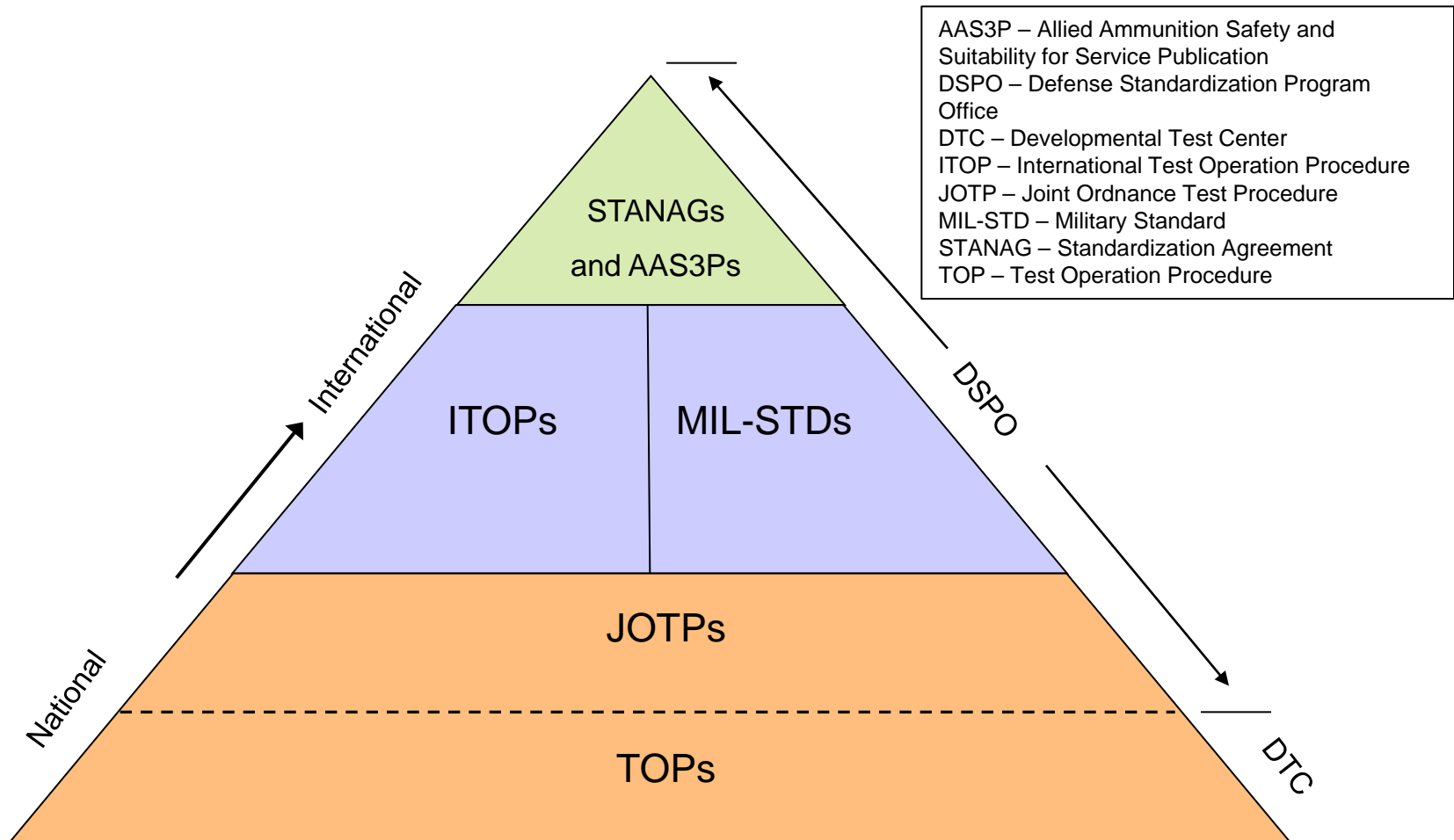


## *Participating NATO Nations*

- ▶ United States
- ▶ Canada
- ▶ United Kingdom
- ▶ Netherlands
- ▶ France
- ▶ Germany



# JMST Standardization Approach

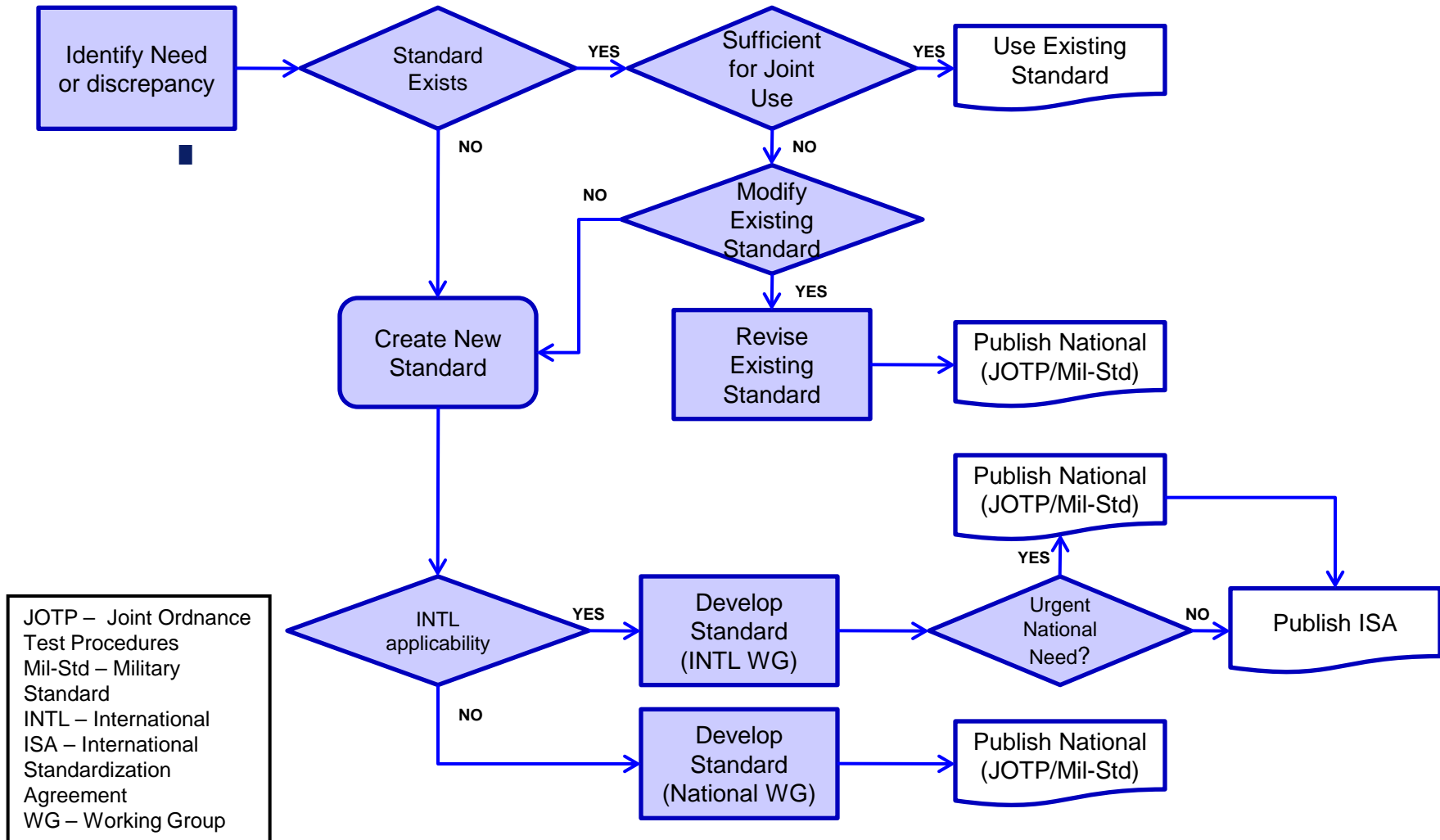


# ***Joint Ordnance Test Procedures (JOTP)***

The US Joint Working Group publishes a commodity-specific corresponding JOTP for each AAS3P. In most cases, these two products are developed at the same time, by the same group of SMEs, and contain identical procedures. Features and benefits of JOTPS include:

- ▶ Narrow coordination, can be developed quickly by a small inter-service team of SMEs
- ▶ Address an immediate need by developing JOTPs in 6 to 9 months, then use JOTPs as a basis for developing NATO Allied Publications to eventually replace the JOTPs
- ▶ Designed to be retired when the corresponding AAS3P is ratified. If the NATO Allied Publication route encounters difficulties, or is delayed, then the JOTP may remain active or incorporated into a MIL-STD.
- ▶ Established JOTP methodology and process may be used by a joint group to institutionalize their agreed-to best practices to address a non-commodity specific vulnerability, such as Electromagnetic Environmental Effects (EEE), Insensitive Munitions (IM), or fuze testing and design
- ▶ May be used as a US implementation document for the corresponding AAS3P. The AAS3Ps allow for tailoring of the test programs. In this case, if required, the JOTP would address nation specific tailoring that would meet or exceed the requirements in the AAS3P.
- ▶ May be developed in advance of the corresponding AAS3P development. In this case, the JOTP may be reissued after development of the AAS3P if international cooperation revealed technical superiority.

# JMST Standardization Process



Flow point sequence is based upon the need identified

# ***JMST Safety Test Development Methodology***

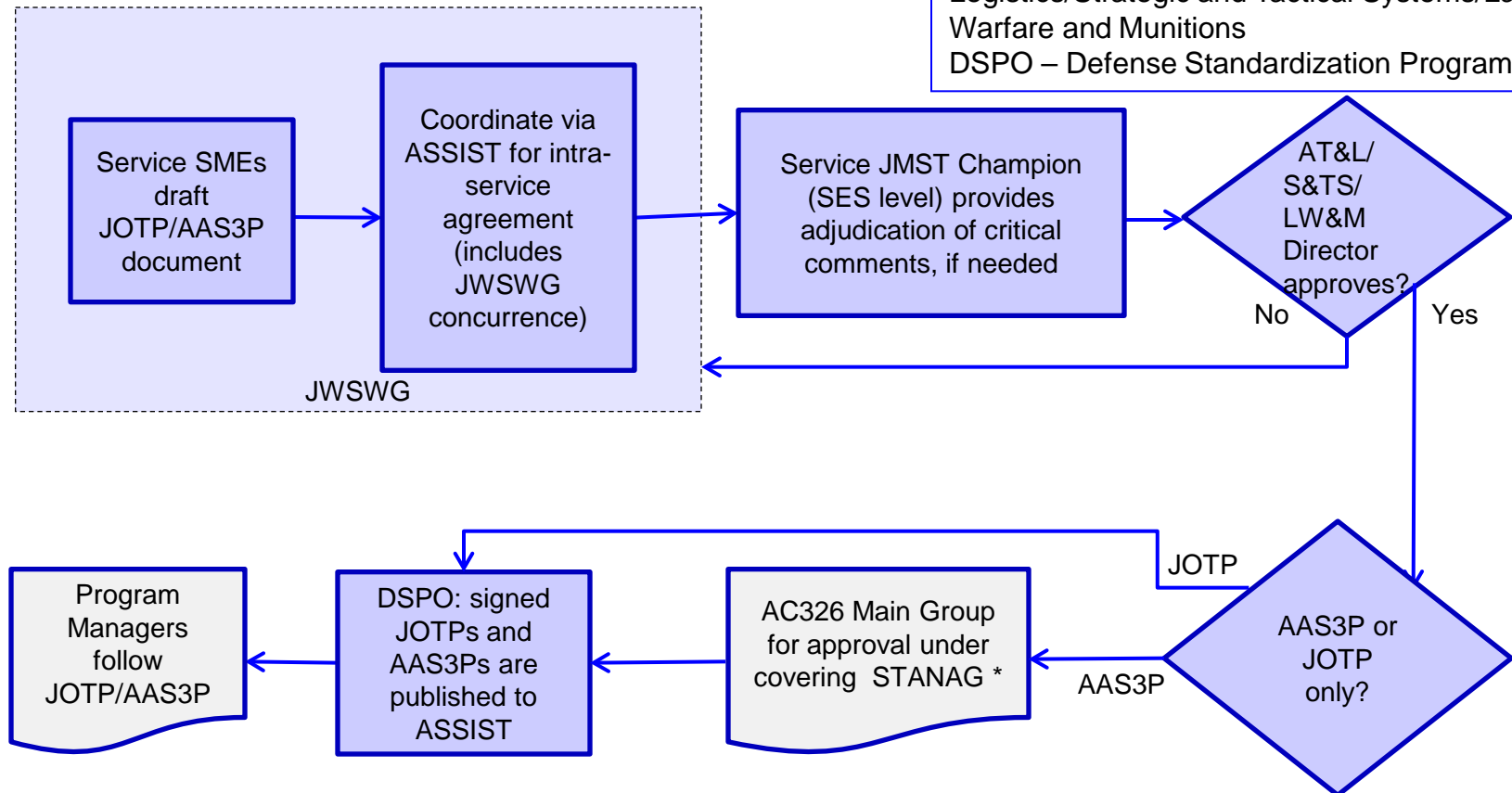
Develop Joint standardized munition safety tests by commodity grouping for all acquisition programs involved in developing weapons systems and for all sponsors involved in developing system-specific capabilities documents (Capabilities Development Documents/Capabilities Production Documents).

- ▶ Conduct initial analysis and detailed comparisons for purpose, applicability, item configuration, preconditioning requirements, conditions, pass/fail criteria, sample size
- ▶ Pre-Workshop activity captures common testing objectives, documents duplicative testing and validates technical rationale for any differences
- ▶ Conduct Workshops to resolve issues and create working draft test document by key SMEs
- ▶ Post-Workshop activity builds on consensus, is characterized by full transparency and collaboration, and expands the participation of stakeholders to the broader test community
- ▶ Documents are formatted and produced in accordance with AAP-3J and S3AP (Safety and Suitability for Service Allied Publication) of STANAG 4629 for AC326 approval



# JMST AAS3P/JOTP Approval and Implementation Process

SES – Senior Executive Service  
 AT&L/S&TS/LW&M – Acquisition Technology and Logistics/Strategic and Tactical Systems/Land Warfare and Munitions  
 DSPO – Defense Standardization Program Office



**\* We now must produce a covering STANAG for all AAS3P documents. This will add time to the NATO ratification and promulgation process.**

# Taxonomy for Drafting JMST Documents

## Philosophy of Test

STANAG 4297 – AOP15 STANAG 4629 – Overarching S3 AP

### Munition Specific

#### Missile/Rocket (MR) 10-Series

Shoulder Launched  
(MR-SL)

Surface and  
Underwater Launched  
(MR-SUL)

Air Launched  
(MR-AL)

Novel Aircraft  
(MR-NA)

#### Ammunition (A) 20-Series

Large Caliber (A-LC)

Med. Caliber (A-MC)

Small Caliber (A-SC)

Mortars (A-M)

Novel Surface  
Deployed (A-NSD)

Man Portable  
(A-MP)

#### Explosive Ancillary (D) 30 Series

Aircraft Non-stores (D-A)

Explosive Ancillary –  
Navy (D-N)

Man Carried Ancillary  
(D-M)

#### Other Designated Series\*

**50 Series - Fuzes**

**70 Series – Explosive Ordnance Disposal**

**90 Series – Miscellaneous (Batteries)**

\* Some series undesignated for future use

### Support

Guidance (G)

Single Environment  
(G-SE)

Glossary (G-G)

### Vulnerabilities

EEE  
**60 Series**

## ***AAS3P – Three Aspects of Tailoring:***

- ▶ S3 Working Group tailors test series to commodity item when developing the JOTPs
- ▶ Program tailors test program to projected commodity life cycle
  - Tailoring shall be approved by National S3 Authority
- ▶ Test Asset requirements are tailored
  - Tailoring shall be approved by National S3 Authority

**Example Annex B, Appendix 3 of AAS3P-10**, “An S3 test program is to be conducted for a previously fielded system with a new propulsion unit. The modifications include new propellant charge weight and new igniter, but structural and sealing components remain unchanged. Warhead, guidance, and seeker systems are unchanged, as is the anticipated user environment. The warhead safe and arm/fuze component(s) have been qualified (or has a favorable S3 assessment) in accordance with AOP-20.”

- ▶ Example uses the analytical approach and reduces the sample size from 52 down to 22 (additional rounds required for Insensitive Munitions, Hazard Classification, EEE, and logistical drop)

# ***JOTP-001 National Safety and Suitability for Service US DoD Authorities***

The following service contacts are responsible for the assessment of munitions safety:

- ▶ Joint National Authority – Joint Weapons Safety Working Group
- ▶ Army - Army Safety Office
- ▶ Navy/Marine Corps - (for weapon safety):
  - Commanding Officer
  - Naval Ordnance Safety & Security Activity, N3
- ▶ Navy/Marine Corps - (for IM):
  - Commanding Officer
  - Naval Ordnance Safety & Security Activity, N85
- ▶ Air Force - (for weapon safety):
  - Air Force Safety Center/Weapon Safety Division, Kirtland Air Force Base
- ▶ Air Force - (for IM):
  - Air Systems Command/YOX, Eglin Air Force Base

***On average, one JMST doc replaces 3 existing standards. For example, STANAG 4629, AAS3P-1, and Ammunition (A) Series Replaces:***

**STANAG**

4224 Ed 4	AAS3P-20	Large Calibre Artillery and Naval Gun Munitions Greater than 40mm, Safety and Suitability for Service Evaluation
4493 Ed 1	AAS3P-20	Tank Ammunition Safety and Suitability for Service Assessment
4517	AAS3P-20	Large Calibre Ordnance Greater Than 40mm, Design Safety Requirements and Safety and Suitability for Service Evaluation of Weapon/Munition Interface
4667 Ed 1	AAS3P-20	Gun Launched Guided Munitions
4423 Ed 2	AAS3P-21	Cannon Ammunition (12.7 to 40 mm) - Safety and Suitability for Service Evaluation.
4516	AAS3P-21	Cannon (above 12.7) Design Safety Requirements and Safety and Suitability for Service Evaluations of Weapon/Munition Interface
4608 Ed 1	AAS3P-22	Ammunition Below 12.7 mm calibre – Design Safety Requirements and S3 Evaluations
4225 Ed 2	AAS3P-23	The Safety Evaluation of Mortar Bombs
4433 Ed 1	AAS3P-23	Field Mortar Munitions, Design Safety Requirements
4520	AAS3P-2x	Rifle Launched Grenades, Design Safety Requirements and S3 Evaluation
4599 Ed 1	AAS3P-2x	Weapon Launched Grenades – Design Safety Requirements and S3 Evaluations

## ***For example, Missile/Rocket (MR) Series Replaces:***

### **STANAG**

4337 Ed 1	AAS3P-11	Surface-Launched Munitions, Appraisal Safety and Environmental Tests
3786 Ed 4	AAS3P-12	Safety Design Requirements for Airborne Dispenser Weapons
4325 Ed 2	AAS3P-12	Environmental and Safety Tests for the Appraisal of Air Launched Munitions
4432 Ed 1	AAS3P-12	Air-Launched Guided Munitions, Principles for Safe Design
4333 Ed 1	AAS3P-11	Underwater Munitions, Principles for Safe Design
4338 Ed 1	AAS3P-11	Underwater-Launched Munitions, Safety Evaluation

# AAS3Ps/JOTPs Posted to ASSIST (as of Oct 2015)

<b>JOTP-001: AAS3P-1: Revision 1 Amendment</b>	Allied Ammunition Safety and Suitability for Service Assessment Testing Publication – Guidance
<b>JOTP-010/AAS3P-010</b>	Safety and Suitability for Service Assessment Testing for Shoulder Launched Munitions
<b>JOTP-011*</b>	Safety and Suitability for Service Assessment Testing for Surface and Underwater Launched Munitions
<b>JOTP-012*</b>	Safety and Suitability for Service Assessment Testing for Aircraft Launched Munitions
<b>JOTP-020*</b>	Safety and Suitability for Service Assessment Testing of Large Caliber Ammunition Greater Than 40MM
<b>JOTP-050</b>	Safety Design Requirements for Active Hazard Mitigation Device (AHMD) Employed to Address Fast and Slow Cook-off Thermal Threats
<b>JOTP-051</b>	Technical Manual for the Use of Logic Devices in Safety Features
<b>JOTP-052</b>	Guideline for Qualification of Fuzes, Safe and Arm (S&A) Devices, and Ignition Safety Devices (ISD)
<b>JOTP-053</b>	Electrical Stress Test (EST)
<b>JOTP-061</b>	Hazards of Electromagnetic Radiation to Ordnance (HERO) Safety Test
<b>JOTP-070</b>	Identification Marking for Munitions
* Corresponding AAS3P awaiting NATO Allied Committee 326 approval	

## ***Other JMST Documents in Development:***

- ▶ JOTP- 62 Electrostatic Discharge/Precipitation Static (in preparation for OSD signature)
- ▶ JOTP/AAS3P-11 – Surface and Underwater-Launched Ammunition
- ▶ JOTP/AAS3P-21 – Medium Caliber Ammunition
- ▶ JOTP/AAS3P-22 – Small Caliber Ammunition
- ▶ JOTP/AAS3P-23 – Mortar Cartridges/Bombs



# ***JOTP Process is transferrable and scalable: Other Applications***

These functional communities have used the established JOTP approval process to address a shortfall/established need:

- ▶ Fuze Engineering Standardization Working Group
  - JOTP-050 Design Requirements for Active Hazard Mitigation Devices
  - JOTP-051 Technical Manual for the Use of Logic Devices in Safety Features
  - JOTP-052 Guideline for the Qualification of Fuzes, Safe and Arm (S&A) Devices, and Ignition Safety Devices (ISD)
- ▶ Explosive Ordnance Disposal
  - JOTP-070 Identification Marking for Munitions

## Conclusion

We have explored the JMST initiative to develop munitions safety testing standards and institutionalize these documents as DoD and NATO requirements in the near term.

## JOTP for Your Process...

Avoids Re-testing



Increases Acceptability of Test Data



Reduces Asset Quantity Required for Test: 'Interchangeability'



Saves  
Program  
Time +  
\$\$\$

# Questions?

**Diane Dray**

*Safety Engineer*

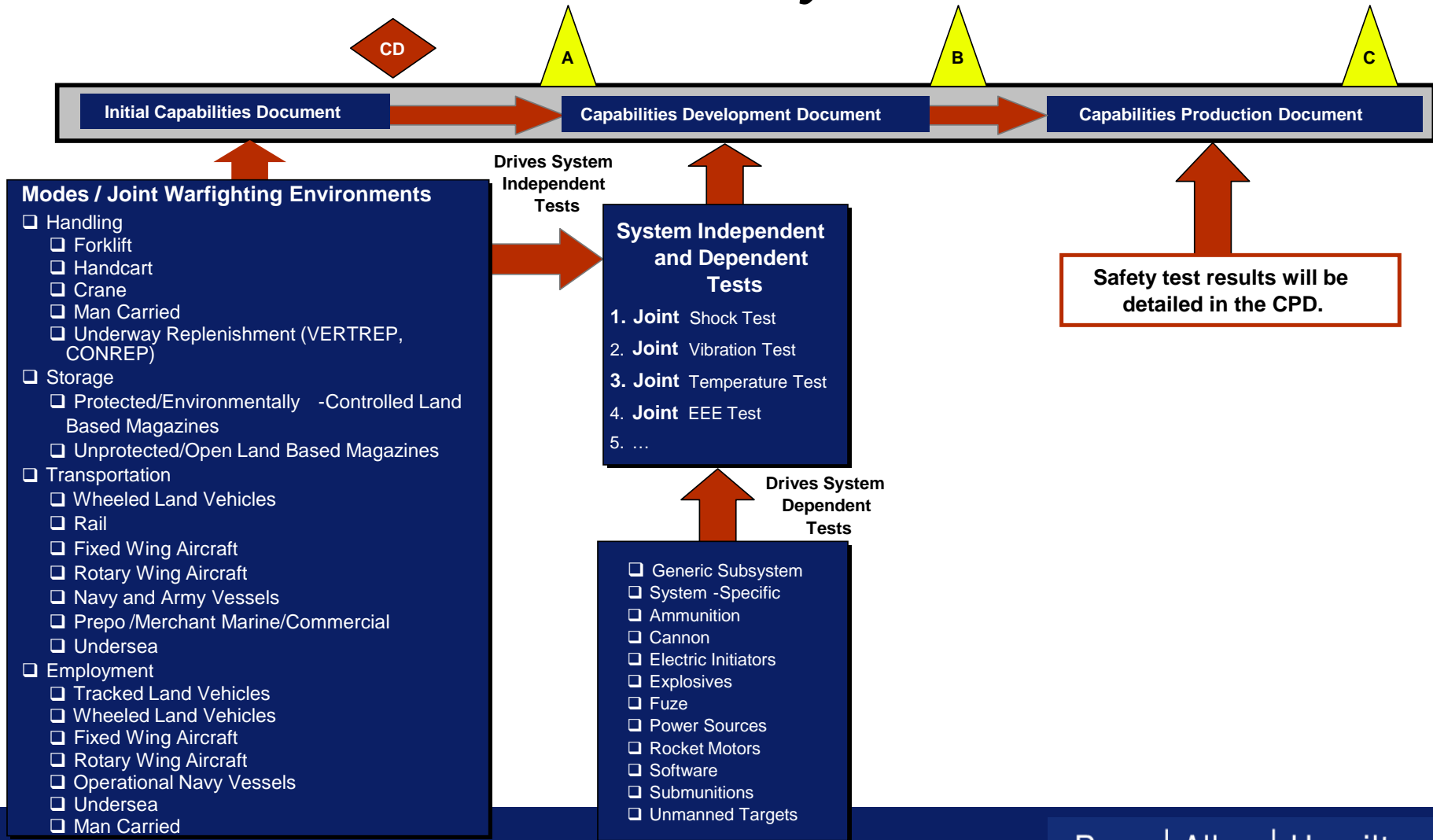
Booz | Allen | Hamilton

---

Booz Allen Hamilton  
1550 Crystal Dr, Suite 1100  
Arlington, VA 22202  
Tel (301) 838-3655  
[dray\\_diane@bah.com](mailto:dray_diane@bah.com)

# Backup Slides

# Result #2: Obtained Consensus on Terms of Reference for Munitions Life Cycle



# Result #3: Drafted Index of Joint Warfighting Modes for Munitions Safety Tests by Life Cycle

Handling	
Crane	STANAG 4375, Para 8a (Shock-Mechanical); MIL-STD-648, Test 5.8.3 (Lifting)
Man Carried	MIL-STD-331, Test F1.2 (Personnel-borne ESD) (EEE)
VERTREP	MIL-STD-331, Test F1.2 (Helicopter-borne ESD) (EEE); STANAG 4375, Para 8a (Shock-Mechanical); MIL-STD-648, Test 5.8.3 (Lifting)
Storage	
Protected/Climate--controlled Land-based Magazine	MIL-STD-2105C, Test 5.1.1 (T&H); MIL-STD-2105C, Test 5.1.2 (Vibration); MIL-STD-2105C, Test 5.1.3 (T&H); MIL-STD-648, Test 5.7 (Impact)
Unprotected/Open Land-based Magazine	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-STD-331, Test F1.2 (Lightning Strike) (EEE); MIL-STD-2105C, Test 5.1.1 (T&H); MIL-STD-2105C, Test 5.1.2 (Vibration); MIL-STD-2105C, Test 5.1.3 (T&H)
Transportation	
Wheeled Land Vehicle	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-STD-648, Test 5.11 (Storage)
Rail	MIL-STD-648, Test 5.2.7 & Appendix L (smaller items) OR Appendix M (larger items) (Impact); MIL-STD-648, Test 5.11 (Storage)
Fixed Wing Aircraft (Transport)	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-STD-648, Test 5.8 (Tiedown); MIL-STD-810, Method 500.4 (Pressure-Low)
Rotary Winged Aircraft	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-STD-331, Test F1.2 (Helicopter-borne ESD) (EEE); MIL-STD-648, Test 5.8 (Tiedown) ; MIL-STD-810, Method 500.4 (Pressure-Low)
Navy and Army Vessels	MIL-STD-464, Test No. 5.8.3 (EEE); MIL-S-901, Test 3.1.2a/b/c (Shock); STANAG 4375, Test 8a (Shock-Mechanical); MIL-STD-648, Test 5.8 (Tiedown)
Prepo/Merchant Marine/Commercial	MIL-STD-648, Test 5.8 (Tiedown); STANAG 4375, Test 8a (Shock-Mechanical)
Undersea	ITOP 4-2-601, Test 4.2 (Shock-Mechanical); MIL-STD-648, Test 5.8 (Tiedown)
Employment	
Tracked Land Vehicle	MIL-STD-464, Test 5.8.3, HERO (EEE); ITOP 4-2-601, Test 4.2 (Shock-Mechanical); ITOP 4-2-504(2), Test 4.8.9 (Function); MIL-STD-810, Method 514 (Vibration)
Wheeled Land Vehicle	MIL-STD-464, Test No. 5.8.3, HERO (EEE); ITOP 4-2-601, Test 4.2 (Shock-Mechanical); MIL-STD-810, Method 514 (Vibration)
Fixed Wing Aircraft	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-STD-331 (Lightning Strike), Test F1.2 (EEE); MIL-STD-810, Method 500.4(Altitude) (Low Pressure), Method 514 (Vibration)
Rotary Winged Aircraft	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-STD-331, Test F1.2 (Helicopter-borne ESD, Personnel-borne ESD and Lightning Strike) (EEE); MIL-STD-810, Method 500.4 (Pressure-Low), Method 514 (Vibration)
Operational Navy Vessel	MIL-STD-464, Test No. 5.8.3, HERO (EEE); MIL-S-901, Test 3.1.2a/b/c (Shock); STANAG 4375, Test 8a (Shock-Mechanical); MIL-STD-810, Method 528 (Mechanical-Vibration)
Undersea	MIL-S-901, Test 3.1.2a/b/c (Shock); ITOP 4-2-601, Test 4.2 (Mechanical-Shock)
Man Carried	MIL-STD-331, Test F1.2 (Personnel-borne ESD) (EEE)