



U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND ARMAMENTS CENTER

**JOINT STANDARDIZATION BOARD
FUZE / INITIATION SYSTEMS**

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ARMY FUZE MANAGEMENT OFFICE (AFMO) | BRIAR OSTAR-EXEL / SANDY PICINIC

AGENDA



- Joint Standardization Board (JSB) for Fuze / Initiation Systems
 - Overview
- Fuze and Initiation systems
 - Definitions & Overview
- Standardization Initiatives
 - DoW Policy & Technology Advancements
- DoW Standards
 - Overview & Status
- NATO Standards
 - NATO Organization & Document Structure
 - STANAG Status
- Summary and Key Takeaways

FUZE / INITIATION SYSTEMS IN DOW MUNITIONS



**Critical technologies for safety, effectiveness,
versatility, and operational efficiency**

JSB ON FUZE / INITIATION SYSTEMS



DoW FESWG

- Fuze & Initiation Systems standardization authority for DoW
- **Chaired by:**
Army Fuze Management Office
- **Membership:**
 - ✓ Army
 - ✓ Air Force
 - ✓ Navy
 - ✓ Guests and Other Govt Agencies, including industry, academia, and national labs

In
operation
for over
50 years



AC326 SG/A (IST)

- Fuze & Initiation Systems standardization authority for NATO
- **Chaired by:**
FESWG
- **Membership:**
 - ✓ NATO Nations
 - ✓ Partner for Peace Nations
 - ✓ Other NATO affiliated Nations

The **Defense Standardization Program**
charters the Joint Standardization Board on **Fuze / Initiation Systems** represented by
DoW Fuze Engineering Standardization Working Group (FESWG)

FESWG OVERVIEW



- **Serves as the US body for Fuze & Initiation Systems Standardization**
 - Establish and Maintain Fuze & Initiation Systems Engineering Standards
 - US Documents
 - NATO Documents
 - Review and Standardize new technologies for safety
 - Interact with Industry
 - Advise the Munition Safety Boards
- **Frequent Coordination with Fuze Industry Partners**
 - DoW FUZE IPT Engagements
 - 69th Annual NAC Fuze Conference; May 12 – 14 2026
 - **Industry & Academia** can also be invited for guest appearances when there are new products of interest or specific expertise of interest needed
- **Meetings**
 - Two formal position meetings held each year
 - Ad Hoc working groups meet as needed
 - Next Meeting: 112th in September 2026

Continuous evolution of Standardization Documents due to emerging needs & technologies

FESWG STANDARDS



DEPARTMENT OF WAR STANDARDS	JOINT ORDNANCE TEST PROCEDURE (JOTP)
MIL-STD-1316 (Fuze safety design requirements)	JOTP-050 (Active Hazard Mitigation Device)
MIL-STD-331 (Fuze safety test procedures)	JOTP-051 (Logic devices)
MIL-DTL-23659 (Qualification tests for electric initiators)	JOTP-052 (Fuze safety qualification test program)
MIL-STD-1901 (Launch ignition system safety design)	JOTP-053 (Electrical stress test)
MIL-STD-1911 (Hand-emplaced ordnance design safety)	JOTP-054 (Low Voltage Command Arm)
MIL-HDBK-145 (US Fuze catalog)	JOTP-055 (Criteria for Submunition Advanced Features to Meet the 2017 DOD Policy on Cluster Munitions)
MIL-HDBK-504 Guidance on Safety Criteria for Initiation Systems	JOTP-056 (In-line Initiator Qualification) - (NEW)
MIL-HDBK-777 Fuze Catalog Procurement Standard and Development Fuze Explosive Components	JOTP-057 (Safety Design Criteria for Remotely Controlled Fuzing Systems used in Munitions) - (NEW)
	JOTP-05x (Fault Tree Analysis)

Basis for independent reviews by the service review boards and the ***Joint Services - Fuze and Ignition System Safety Authorities (JS-FISSA)***

DEFINITIONS

FUZE



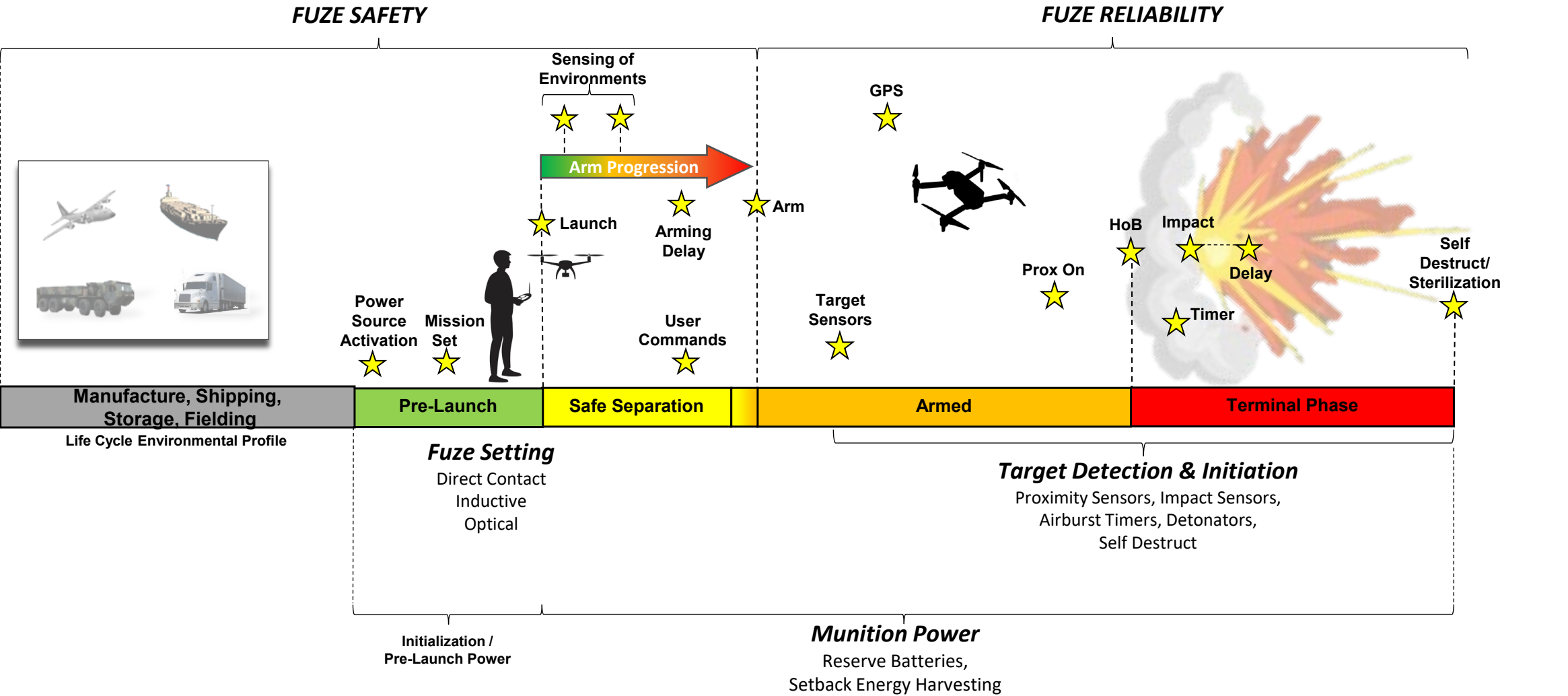
A device designed to control the initiation of a main charge.

INITIATION SYSTEM



A physical system to initiate an explosive train or component in a munition.

FUZE TIMELINE



Elements of a Fuze Required For the Entire Munition Engagement Timeline

FUZES + INITIATION SYSTEMS PROVIDE



Safety

- Ensures safety of munitions throughout their entire lifecycle, encompassing assembly, handling, storage, transportation, deployment, potential recovery, and ultimate disposal

Enables arming

- Preforms the critical role of safety and arming, specifically preventing the initiation of the munition's explosive train, component or munition's warhead until the desired time or position is reached

Target Detection & Functioning (Fuze only)

- Senses the point in space or time at which initiation is to occur and effecting munition's warhead initiation



Various munition commodities adds to the complexity

FESWG IMPACT TO LETHALITY



- To inform the fuze community of **advancements to fuze and initiation systems standards** due to impact of:
 - **DoW Policy / SECWAR Memos**
 - Army Transformation and Acquisition Reform
 - Unleashing U.S. Military Drone Dominance
 - **Technology advancements:**
 - Hypersonic
 - Artificial Intelligence / Machine Learning (AI/ML)
 - New Logic Device Technologies
 - Unmanned Munition Systems

Standards are well positioned to support DoW priorities.

UNMANNED SYSTEMS PRECEDENCE



Secretary of War Memo, April 30, 2025: “*Army Transformation and Acquisition Reform*”

- Field Unmanned Systems (UMS) and Ground/Air launched effects in every Division by the end of 2026.
- Expand the use of Other Transaction Authority (OTA) agreements to enable faster prototyping and fielding of critical technologies

Secretary of War Memo, July 10, 2025: “Unleashing U.S. Military Drone Dominance”

-every squad will have low-cost, expendable drones
-must accelerate, streamline, and standardize safe weaponization of UAS for scale.
- Weapons Boards shall respond to small UAS arming requests within 30 days.

....Unmanned Systems...faster fielding....low cost...streamline...standardize safe weaponization

GUIDING STANDARDS FOR UNMANNED SYSTEMS



MIL-STD-1316, Fuze Design, Safety Criteria For

- Establishes specific design safety criteria for fuzes for use with munitions
- Specifies the mandatory fundamental elements of design, engineering, production, and procurement of fuzes

MIL-STD-1911, Hand-Emplaced Ordnance Design, Safety Criteria For

- Established the general design principles and design safety criteria for hand-emplaced ordnance (HEO)
- Addresses the unique attributes of HEO: safety of manual operations

Joint Ordnance Test Procedure (JOTP) – 056, In-line Initiator and In-line Energetic Materials Qualification

- Establishes the qualification criteria for ILIs used in safety critical, non-interrupted energetic materials train

JOTP – 057, Guidelines for Safety Design Criteria for Remotely Controlled Fuzing Systems Used in Munitions

- Provides fuze safety criteria guidance and requirements to develop, test, evaluate and deliver safe and recoverable remotely controlled fuzing systems for lethal UAS

NEW - In discussions to resolve Users increasing demand for weaponized UxS with front-line modular, platform agnostic payloads and the ability to service a wide range of CONOPs

Streamline
&
Standardize
Safety

Fuze Safety
Requirements

(Mandatory)

UAS
Guidance

(Optional based
on applicability)

Low-Cost

Standardize
Safe
munitions

STATUS OF FUZE / INITIATION SYSTEMS STANDARDS



DEPARTMENT OF WAR STANDARDS	ACCOMPLISHMENTS	PROGRESS
MIL-STD-1316 (Fuze safety design requirements)	Revision F published on 18 Aug 2017	<i>Revision G started</i>
MIL-STD-331 (Fuze safety test procedures)	Revision D published on 31 May 2017	<i>Revision E in process</i>
MIL-DTL-23659 (Qualification tests for electric initiators)	Revision F published on 10 June 2010	<i>NEW JOTP-056</i>
MIL-STD-1901 (Launch ignition system safety design)	Revision A published on 6 June 2002	<i>Revision B in process</i>
MIL-STD-1911 (Hand-emplaced ordnance design safety)	Revision A published on 10 July 1998	<i>Revision B started</i>
MIL-HDBK-145 (US Fuze catalog)	Revision D published on 9 June 2015	<i>Continuously updated - Revision E in process</i>
MIL-HDBK-504 Guidance on Safety Criteria for Initiation Systems	Published on 10 February 2004	--
MIL-HDBK-777 Fuze Catalog Procurement Standard and Development Fuze Explosive Components	Published on 1 October 1985	<i>Continuously updated</i>

Technology advancements and impacts of:

- Hypersonic Applications
- AI/ML
- Complex Logic Device Technologies
- Unmanned Munition Systems

STATUS OF FUZE / INITIATION SYSTEMS STANDARDS



JOINT ORDNANCE TEST PROCEDURE (JOTP)	ACCOMPLISHMENTS	PROGRESS
JOTP-050 (Active Hazard Mitigation Device)	Revision A published on 24 June 2019	--
JOTP-051 (Logic devices)	Published on 10 Feb 2012	<i>Revision A in process</i>
JOTP-052 (Fuze safety qualification test program)	Published on 17 March 2012	<i>Revision A in process</i>
JOTP-053 (Electrical stress test)	Published on 03 Nov 2015	--
JOTP-054 (Low Voltage Command Arm)	Published on 17 Oct 2019	--
JOTP-055 (Criteria for Submunition Advanced Features to Meet the 2017 DOD Policy on Cluster Munitions)	Published on 26 Jan 2023	--
JOTP-056 (In-line Initiator Qualification)	<i>New</i>	<i>Ratification in process</i>
JOTP-057 (Guidelines for Safety Design Criteria for Remotely Controlled Fuzing Systems used in Munitions)	<i>New</i>	<i>NEW</i>
JOTP-05x (Fault Tree Analysis)		<i>New in process</i>

Recent accomplishments

- JOTP-056, “Inline Initiator Qualification”
- JOTP-057, “Guidelines for Remotely Controlled Fuzing Systems used in Munitions”

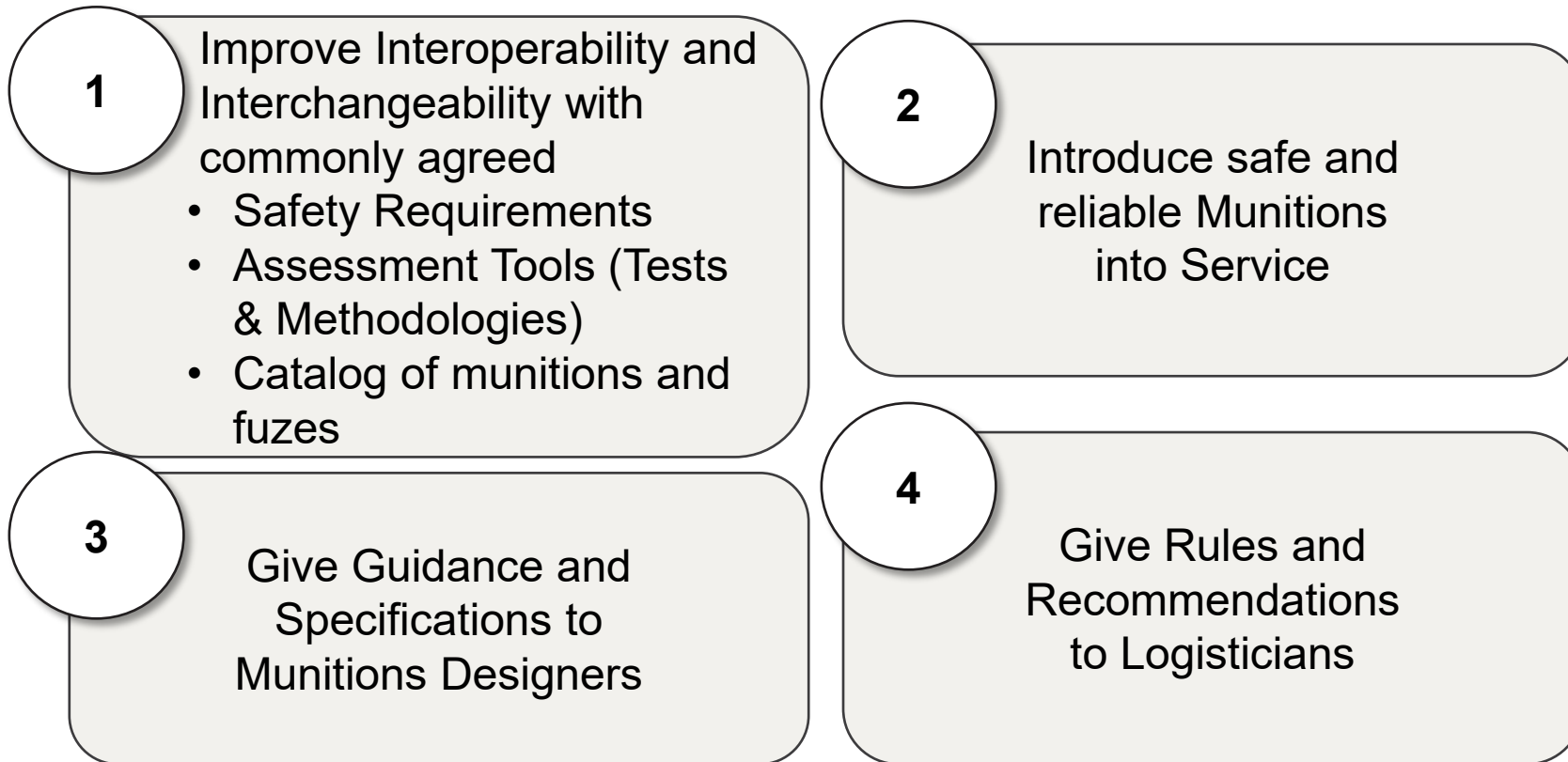
NATO AC326 SG/A INITIATION SYSTEMS TEAM (IST)

AC/326 CASG STANDARDIZATION

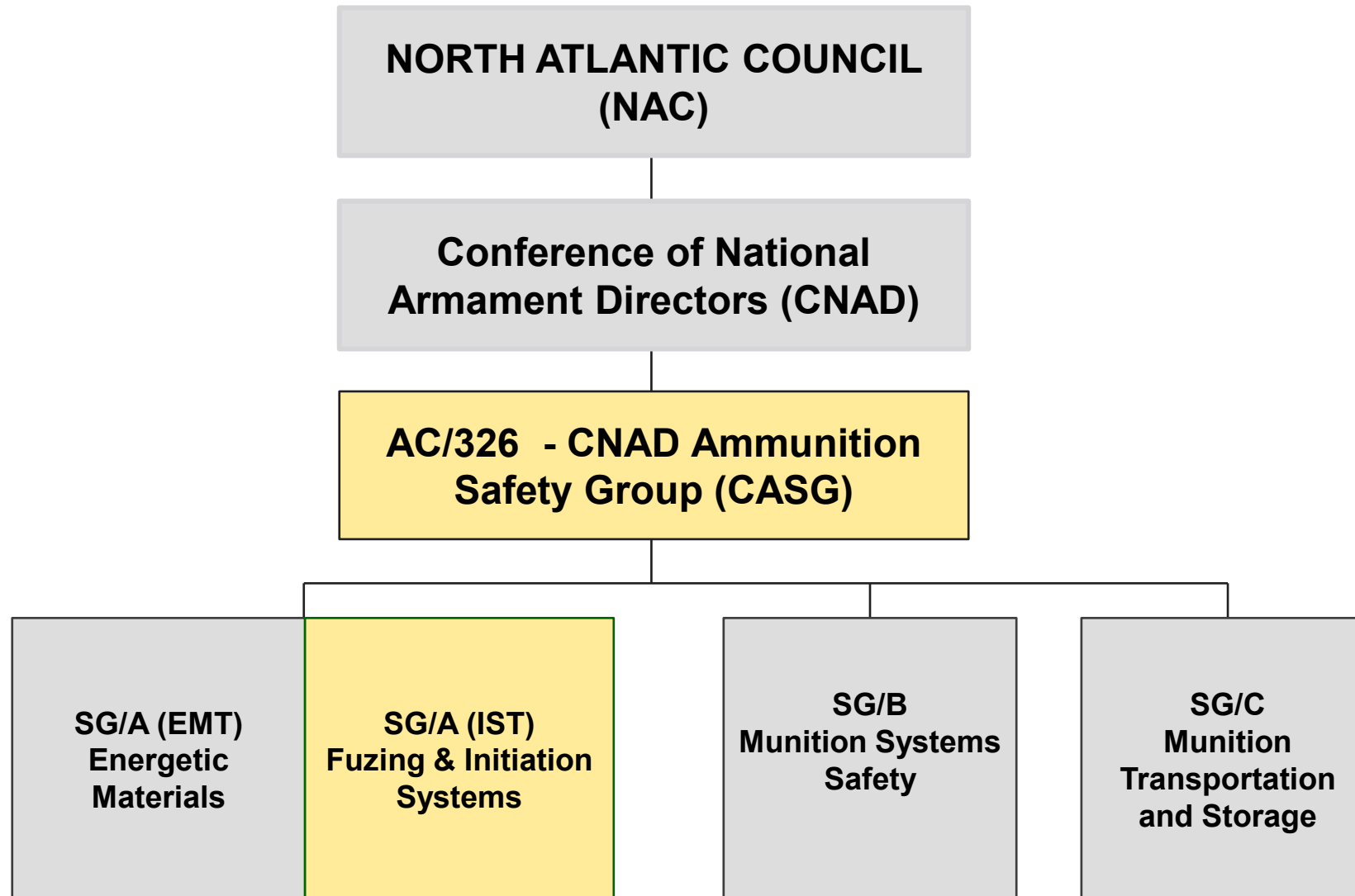


OBJECTIVES

In support of NATO deployed missions and operations for the complete Munitions Life Cycle



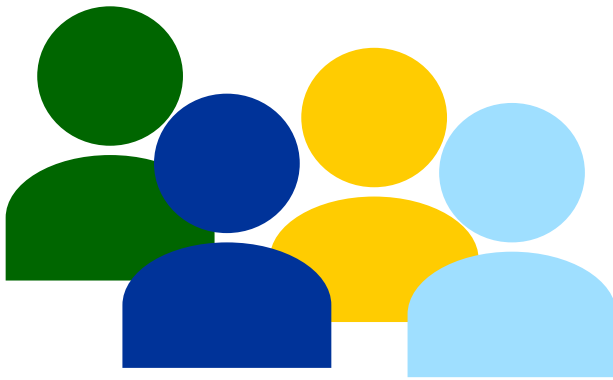
NATO STANDARDIZATION



NATO STANDARDIZATION

SG/A Co-Chair Arrangement:

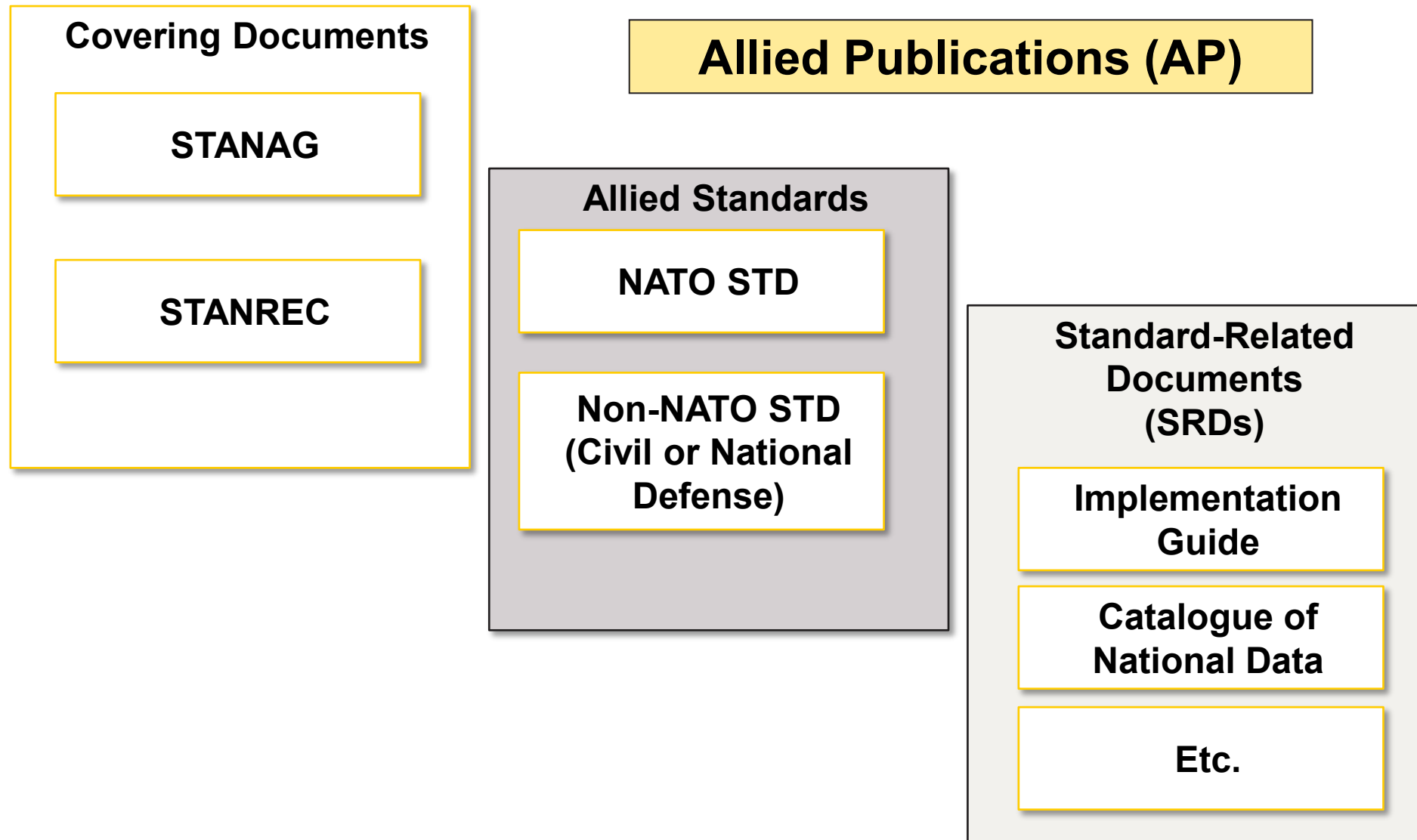
- Chair for Energetic Materials Team (**Chaired by UK MOD**)
- Chair for Initiation Systems Team (*Co-Chaired by FESWG*)



Two Meetings Each Year

- Each group meets separately

NATO DOCUMENT STRUCTURE



SG/A (IST) – RECENT ACCOMPLISHMENTS AND CURRENT WORK



STANAG	ACCOMPLISHMENTS	PROGRESS
STANAG 4187 – Safety Design Requirements for Fuze Systems	<i>Promulgated in June 2022.</i>	--
STANAG 4368- Ignition Systems for Rocket and Guided Missile Motors. Safety Design Requirements	In progress	<i>Ratification in Sept 2026</i>
STANAG 2916 - Nose Fuze Contours for Artillery and Mortar Projectiles	Published in 2024	--
STANAG 4873 - Aircraft expendable countermeasures – Safety design requirements	<i>New</i>	<i>Ratification in Sept 2026</i>
STANAG 4809 - Safety Design Requirements for Remotely Controlled SAF Systems.	<i>New</i>	<i>Ratification in Sept 2026</i>
STANAG 2818 - Demolition Materiel, Design Principles	In progress	<i>Ratification in Sept 2026</i>
STANAG 4157 -Test Requirements for the Assessment of Safety and Suitability for Service	<i>In progress</i>	<i>Ratification in Sept 2026</i>
STANAG 4547 Design Requirements for Inductive Setting of Medium Calibre	<i>Cancelled</i>	<i>Cancelled</i>

September 13-19 Meeting to be held in Stockholm, Sweden

**Program of Work is reviewed and approved by the CASG yearly
Subgroups A, B and C report their work progress to CASG twice per year.**

LINKING NATO & DOW STANDARDS



NATO	DoW FESWG
STANAG 4187 & AOP-4187	MIL-STD-1316 (Fuze safety design requirements)
STANAGS 4157, AOP-4157 & AOP-20	MIL-STD-331 (Fuze safety test procedures)
STANAG 4560 & AOP-43 Characterization tests	MIL-DTL-23659 (Qualification tests for EEDs)
STANAG 4368	MIL-STD-1901 (Launch ignition system safety design)
STANAG 4497	MIL-STD-1911 (Hand-emplaced ordnance design safety)
STANAG 4797 and AOP-4797	JOTP-050 (Active Hazard Mitigation Device)
Incorporated into STANAG 4187	JOTP-051 (Logic devices)
Incorporated into STANAG 4157	JOTP-052 (Fuze safety qualification test program)
Incorporated into AOP-20	JOTP-053 (Electrical stress test)
<i>No NATO Document</i>	JOTP-056 (In-line Initiator Qualification) – In process
STANAG 4809 / AOP-67 Safety Design Requirements for Remotely Controlled SAF Systems - In process	JOTP-057 (Guidelines for Safety Design Criteria for Remotely Controlled Fuzing Systems used in Munitions) – New
<i>No NATO Document</i>	JOTP-05x Fault Tree Analysis – In process
STANAG 4369 & AOP-22 Inductive setting for large caliber	<i>No US document – Use NATO Standard</i>
STANAG 4547 Inductive setting for medium caliber	<i>No US document – Use NATO Standard</i>
STANAG 4593 & AOP-60 Inductive setting for guided large caliber projectile	<i>No US document – Use NATO Standard</i>
STANAG 2916	<i>No Active US document – Use NATO Standard</i>
STANAG 4326 & AOP-8 NATO Fuze catalog	MIL-HDBK-145 (US Fuze catalog)
<i>No NATO Document</i>	MIL-HDBK-504 Guidance on Safety Criteria for Initiation Systems
<i>No NATO Document</i>	MIL-HDBK-777 Fuze Catalog Procurement Standard & Development Fuze Explosive Comp.
STANAG 2818 & AOP-31 Demolition Materiel Design	<i>No US document – US uses own process</i>
STANAGS 4363 & AOP-21 Testing for Assessing Detonating Explosive Components	<i>No US document – US uses own process</i>
STANAG 4873 / AOP-4873 Safety Design Requirements for Aircraft Pyrotechnic Countermeasure Devices – In process	<i>No US document – Use NATO Standard</i>

NATO & DoW Fuze & Initiation Systems Standards are closely linked through the work of the FESWG

SUMMARY



- Joint Standardization Board for Fuze / Initiation Systems represented by DoW FESWG is proactive in recognizing and addressing the impact of technology advancements to Fuze / Initiation Systems standards.
- Standards are well positioned to support DoW priorities.
- Standards are well positioned to support the foundation for military readiness, operational efficiency, innovation, and allied interoperability.
- Development of U.S. Standards is being closely coordinated with NATO counterparts.

For questions to the DoW FESWG please send an email to:
usarmy.pica.devcom-ac.mbx.afsrb@army.mil

QUESTIONS?