



NATO Army Armaments Group

Session: 17336

NATO Weapons & Sensors Working Group - Emerging Technologies Session

NDIA 2015 Armament Systems Forum

April 5, 2015



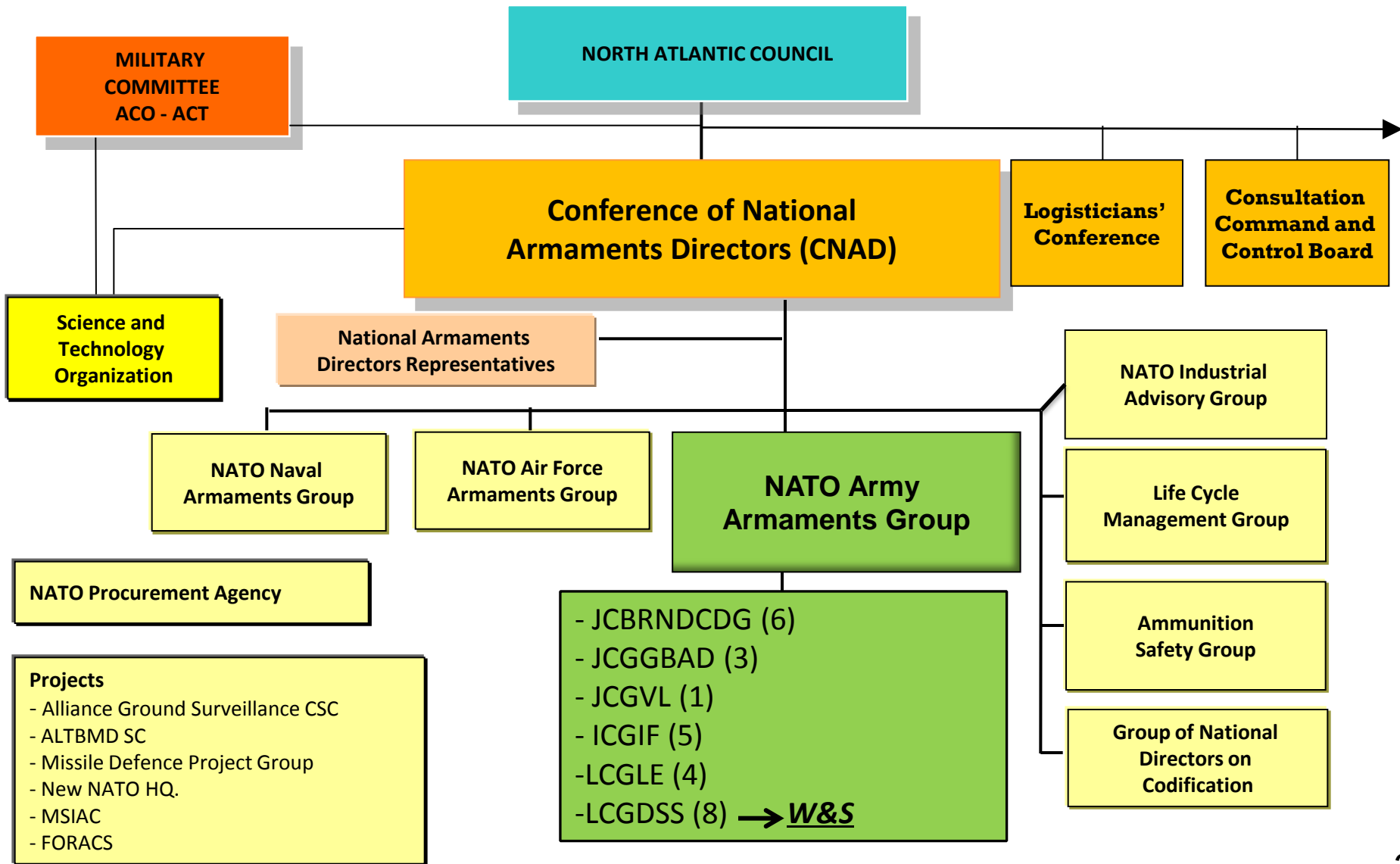
Barton H. Halpern, Ph.D.

Chairman, NATO LCG DSS W&S Sub Group



Agenda

1. NATO Organization
2. NATO Methods to achieve Standardization
3. W&S Structure/ Terms Of Reference
4. NATO D/7 "INFANTRY SMALL ARMS POST 2025" Rewrite
5. Path Forward/Conclusion



NATO organization, ToR and standardization process. For NATO: Interoperability is the issue

- Based on 2014 Deployments, 50 Nations have forces part of International Security Assistance Force (ISAF)
- 25 of these Nations are members of LCG DSS developing Dismounted Soldier capabilities.



International Security Assistance Force
Troop Contributing Nations

	Albania	22		Germany	1,599		Poland	304
	Armenia	121		Greece	9		Portugal	37
	Australia	273		Hungary	101		Romania	327
	Austria	3		Iceland	2		Slovakia	277
	Azerbaijan	94		Ireland	7		Slovenia	2
	Bahrain	0		Italy	1,411		Spain	181
	Belgium	160		Jordan	626		Sweden	13
	Bosnia & Herzegovina	8		Republic of Korea	50		The former Yugoslav Republic of Macedonia ¹	152
	Bulgaria	320		Latvia	11		Tonga	0
	Croatia	153		Lithuania	84		Turkey	393
	Czech Republic	227		Luxembourg	1		Ukraine	10
	Denmark	145		Malaysia	2		United Arab Emirates	35
	El Salvador	0		Mongolia	40		United Kingdom	3,906
	Estonia	4		Montenegro	25		United States	28,970
	Finland	88		Netherlands	30		Total	41,124
	France	88		New Zealand	1			
	Georgia	755		Norway	57			

Note on numbers: Numbers of troops should be taken as indicative as they change daily.

¹ Turkey recognises the Republic of Macedonia with its constitutional name

² In line with ISAF's planning and in coordination with NATO, Singapore has completed its contribution to ISAF on 22 June 2013, Canada on 31 March 2014.

Three Levels of Standardization

AAP-6

Standardization: The development and implementation of concepts, doctrines, procedures and designs in order to achieve and maintain the compatibility, interchangeability or commonality which are necessary to attain the required level of interoperability, or to optimise the use of resources, in the fields of operations, materiel and administration

Three Levels

- **Compatibility**: The suitability of products, processes or services for use together under specific conditions to fulfil relevant requirements without causing unacceptable interactions (04 Oct 2000).
- **Interchangeability**: The ability of one product, process or service to be used in place of another to fulfil the same requirements (04 Oct 2000).
- **Commonality**: The state achieved when the same doctrine, procedures or equipment are used (04 Oct 2000).

Goal

- **Interoperability**: is the ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives (03 Dec 09)



How is standardization done?

- At least 12 nations have to be interested.
- A ToE is formed.
- They will develop a draft STANAG.
- This will be presented to the main group.
- It will be approved under a "silence procedure" (SP).
- The STANAG will then be sent to the NATO **Standardization Agency (NSA)** for ratification and implementation by the nations.
- Currently there are approx 1400 STANAG's.



NATO Army Armaments Group

Weapon & Sensor Subgroup Structure



Australia**

Belgium

Canada

Czech Republic

Denmark

Estonia

France

Germany

Hungary

Italy

Netherlands

Norway

Poland

Portugal

Chairman: Dr. Barton Halpern (United States of America)

Vice-Chairman: Ulrich Merkelbach (Germany)

G/3 Team of Experts
Jens Tore Alfei (Norway)

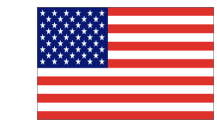
D/14 Team of Experts
Ulrich Merkelbach (Germany)

Suppressor Team of Experts
Scott Reeve (UK)

STANAG 4512 Team of Experts
Per Arvidsson (Sweden)

National Delegates and Supporting Subject Matter Experts

42 Member National Delegates Including PFP* and Contact Countries**



United States



United Kingdom



Ukraine*



Sweden*



Spain



Singapore**



Portugal



ToR for Weapons & Sensors WG

- The group is responsible for all issues related to dismountable soldier's weapon systems, grenades and shoulder launched and guided anti-tank weapons, as well as dedicated sensors (including, but not limited to day and night sights, laser designators, tactical lights and fire control systems).
- **The group is responsible for training equipment as associated with our ToR equipment**
- The weapon system includes the weapon itself, different types of ammunition and the dedicated accessories.
- The group is also responsible for the interface of the weapons and sensors with the various other parts of the soldier system.



Challenge: Rewrite NATO Document D/7: INFANTRY SMALL ARMS POST 2025

- The issue: To briefly describe the evolution of the technological developments that will affect the use of small arms in future conflicts and to provide a focus for further development of NATO small arms.
- Describe the possible applications of technology that can improve the ability of the infantry to survive future conflicts.
- Future requirements will be evaluated for infantry small arms (beyond the year 2025) identifying specific areas of technology with a potential for materiel standardization and interoperability

NATO D/7 Scope

– **Current draft includes future requirements for the:**

- PDW: Handgun, Submachine gun, Assault rifle
- Precision weapon: Medium range (<800m), Long range (>800m), Anti-materiel
- Machine gun: Light (5.56), Medium (7.62), Heavy (12.7)
- Grenade launcher: Shoulder fired, Automatic
- Shotgun
- **Weapon enablers:** Close combat sights, Telescopic sights, Range finders, Fire control systems, Image intensifiers (I²), Thermal weapon sights, Fused night vision sights, Weapon flashlights, Laser aiming and illuminators, Observer target acquisition system



NATO D/7 Scope

- **Current draft includes future requirements for the:**
 - **Weapon accessories:** Bayonets, Bipods, Suppressors, Shot counters, Slings
 - **Training accessories:** Blank firing adapters, Laser Training systems, Paint marking systems, Short range training systems
 - **Future technological approach chapter:** to be added to propose revolutionary new approaches and capability.

Issues:

1. Original D/7 Document based on solely on the 1990s USA Objective Individual Combat Weapon or OICW [Next-generation service rifle]
2. **Performance** versus **prescriptive specifications**. Many NATO members want to use the updated D/7 as a Prescriptive joint buying document. I.E.: If Industry is going to invest IR&D then this is what we want.



NATO Future Assault Rifle Example:

1. Caliber: 5.56x45mm NATO according to STANAG 4172.
2. Magazine: 30 rounds according to draft STANAG 4179.
3. Barrel length: 260, 350 and 508 mm, free floating.
4. Mass: <3.5 kg unloaded w/o sight.
5. Length: <1.0 m with 350 mm barrel.
6. Life expectancy: >10 000 rounds according to D/14.
7. Accuracy: Must be able to shoot 10 rounds within 0.6 mils at 100 meters with NATO reference ball ammunition.
8. Rate of fire: <750 rpm.
9. Adjustable butt stock, adjustable in length approx. 80 mm, with adjustable cheek rest.
10. Ambidextrous controls.
11. Rails according to STANAG 4694, on top of the upper receiver, and preferable around hand guard at 3, 6, 9 and 12 o'clock.
12. An option of powered rail according to STANAG 4740.
13. Flash hider: TBD.
14. Muzzle thread: M15 x 1 RH.
15. All weapons controls must be able to be manipulated with gloved hands.
16. Ambidextrous three point sling positions.
17. Automatic bolt catch.



NATO Future Assault Rifle Example:

18. Being able to withstand NBC decontamination agents.
19. Safe ejection for both right and left hand shooters.
20. Compatible with sound suppressors.
21. Able to use training ammunition.
22. Iron sights must be able to be adjusted without special tools.
23. Screws that the user needs to manipulate shall be metric and use the same tool.
24. Internal parts should not need lubrication.
25. Minimal movement at firing.
26. Ease dismantling and reassembly.
27. It shall not be possible to reassemble incorrectly.
28. No small parts that can be lost during cleaning.
29. It shall be possible to install an electronic shot counter.
30. No degradation of accuracy and/or point of impact for hot weapon.
31. It shall be possible to mount a grenade launcher and fire rifle grenades.
32. It shall be possible to mount a bayonet.
33. No degradation of function with devices (sight etc.) with a total weight of 3 kg.
34. Parts shall be interchangeable according D/14.
35. The weapon shall be safe for the operator according to D/14.



Issues:

3. Performance versus prescriptive specifications.... While others want a visionary/leap ahead performance document that include a re-baseline of what we consider “small arms” today.



Solution: Add a Future NATO Small Arms Weapons Chapter

1. We know that emerging technologies promise to radically change the nature of how we define the relationship between Soldiers and small arms.
2. The next 30 years will be defined by the emergence of technologies that will fundamentally change the way small arms are defined.
3. Many of the future concepts predict technologies that create direct interfaces between the Soldier and his/her small arms system. Concepts envisioned have Soldiers equipped with exoskeletons that could carry significantly more effects options while vastly improving the accuracy of small arms fire by providing enhanced targeting information through heads-up displays.
4. This information may be shared between soldiers on the battlefield through advanced networking systems in order to optimize movement and adapt strategy. Many envisioned concepts foresee offloading small arms onto robotic platforms of various types

Future Chapter Outline

Technologies that will impact Future NATO Small Arms Weapons

- **Energy Usage for Small Arms:**
 - NATO Power Rail
 - Solar
 - Mechanical
 - Chemical
 - Nano-Materials
 - Wireless
 - Heat
 - Charging Concepts and Recharging
- **Target Effectiveness:**
 - Virtual Reality Simulations
 - Thought (neurological) Fire Control
 - Nanite Technology
 - Robotic/UAV Specific Weapons
 - Precision Systems
 - Hovering Systems
 - Non-Traditional Defeat Mechanisms (HPM, Cyber, Acoustic etc.)
 - Recoilless Technology
 - Small Efficient Electric Motors

Future Chapter Outline

Technologies that will impact Future NATO Small Arms Weapons

- **Target Engagement**
 - Sensors
 - Communication
 - Sensor Fusion
 - Artificial Intelligence (AI)
 - Target identification, prioritization and sharing
 - High Processing Speed
 - Power Management
 - Innovative I/O Devices-User Friendly
 - Launch and Hovering Technology
 - Fire Control For BLOS and NLOS or Link to System
- **Non-Traditional Weapons and Effectiveness Capability**
 - EMP Systems (Size, Scalable, Power)
 - Laser Systems
 - Acoustic Technology (size limits)
 - Power and Power Management
 - Biometric Sensors
 - Holography (False Targets)
 - Chameleon Capability
 - Nano-Technology
 - Advanced Approved Chem and Bio Capability

Future Chapter Outline

Technologies that will impact Future NATO Small Arms Weapons

- **Evolving Revolutionary Small Arms Platform Systems Integration**
 - Miniature Sensors and Fusion
 - Power Management
 - Artificial Intelligence
 - Wireless Secure Broadband Network
 - Defeat Mechanism Scalability
 - I/O Simplicity and Flexibility
 - Target Processing
 - Soldier Biometric Monitoring and Impact Assessment

- **Emerging Future Enabling Technologies**
 - Nano-Materials
 - Nano-Energetics
 - Hybrid Materials
 - Millimeter Wave Sensors and Radar Systems
 - MMW Wideband Components and Antennas
 - Wireless Technology
 - Sensor Miniaturization
 - Sensor Fusion
 - High Speed Signal Processing



The Questions are :

1. Which one of those future concepts need “Standardization” to support the NATO goal **Interoperability** – “ the ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives”
2. How does Industry Play into the evolution and execution of the Visionary versus Prescriptive content of this document.
3. How does Industry and Government interact (Lead/follow) in the development of these concepts?

Path Forward/Conclusion :

1. NATO D/7 Document to be submitted for approval in the summer of 2015.
2. Anticipate Release as “NATO Unclassified” to NATO Members and Partners for Peace in 2015
3. Requesting release of Document for “Public disclosure” per AC/324-D(2014)0010
4. Need Industry to create the revolutionary

Questions ?

