



MILITARY ENGINEERING
CENTRE OF EXCELLENCE

ENGINEER MANOEUVERING CAPABILITIES IN EUROPE

OF-5 (DEU-A) – Thorsten LUDWIG
Director MILENG COE

“Interoperability is a Question of Attitude”

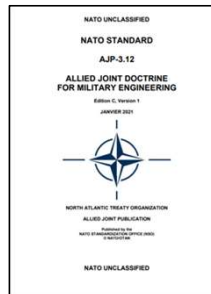
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MILENG COE MISSION

“MILENG COE provides NATO and its partners a MILENG knowledge hub through education & training, subject matter expertise and development of policy, concepts and doctrine to enhance the effective interoperability of military engineering capabilities into NATO operations and exercises. We are committed to building and maintaining a network of partners, experts, and stakeholders in military engineering in support of the Alliance’s strategic objectives.”

17 Sponsoring Nations



Being the focus for **NATO MILENG Doctrine** development and assisting NATO in **Concept and Policy** development



Providing a hub for **MILENG** information and lessons exchange



Coordinating multi-national MILENG **projects** and **experimentation** on behalf of NATO



Facilitating MILENG engagement within NATO



Delivering individual MILENG interoperability **training** to NATO staff and nations



AGENDA

TERRAIN SHAPING CHALLENGES IN EUROPE

COUNTER MOBILITY CAPABILITIES AND OPPORTUNITIES

INTEROPERABILITY WITHIN THE ALLIANCE

SUMMARY



05/03/2024



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TERRAIN SHAPING CHALLENGES



05/03/2024

TERRAIN SHAPING CHALLENGES



SCHUTTER DITCH



05/03/2024

INFRASTRUCTURE



5 March 2024

GEO SUPPORT



Hintergrundkarten: © Bundesamt für Kartographie und Geodäsie 2024 Datenquellen



05/03/2024

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TERRAIN SHAPING CHALLENGES IN EUROPE

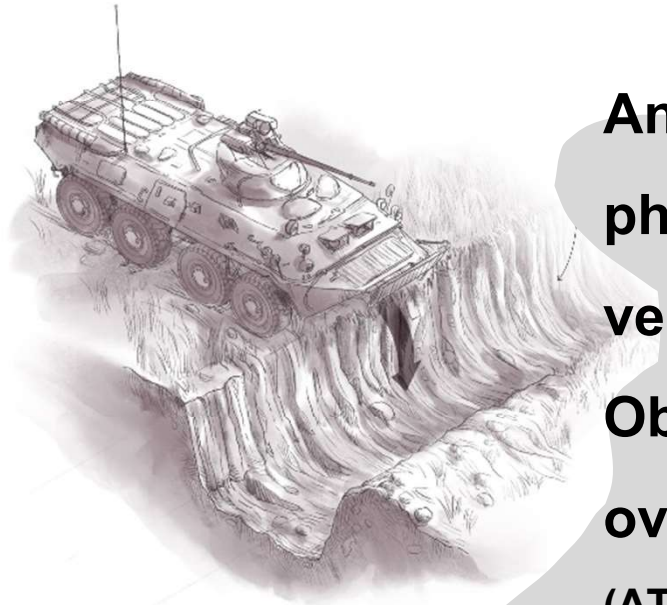
COUNTER MOBILITY CAPABILITIES AND OPPORTUNITIES

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SUMMARY



MOBILITY / COUNTER MOBILITY



An obstacle is a natural or man-made object that creates a physical impediment to or hazard for the movement of vehicles, personnel or formations.

Obstacles usually requires the dedication of resources to overcome.

(ATP 3.12.1, NATO-agreed term 25659)

COUNTER MOBILITY ↔
MOBILITY



MOBILITY / COUNTER MOBILITY

Wide Wet Gap Crossing



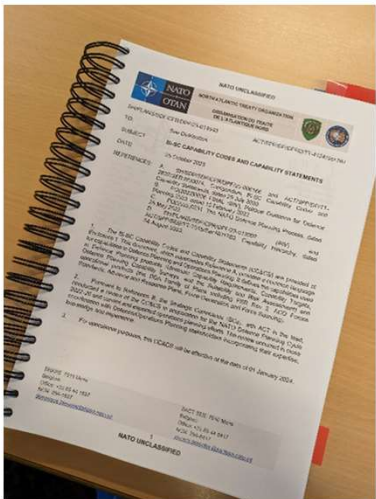
Counter Mobility

24th February 2022



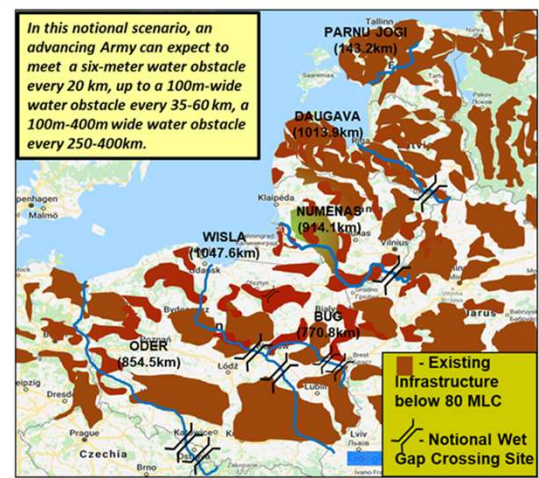
MINIMUM REQUIREMENT:

- 150 mtr
- MLC 80



Capability Gap: Insufficient NATO float bridge systems in Europe with sufficient Military Load Classification (MLC) capability, system interoperability or quantity to bridge required wide wet gaps in support of US/UK/GE Main Battle Tank or heavy sustainment loads.

- **Estimated MBT Combat Loaded Weight (MLC):**
 - Leopard II – 80 MLC
 - Challenger 2 – 95 MLC
 - M1A2 SEPv3 – 91 MLC
 - **NATO bridge systems are not interoperable**
 - **Only M3 and IRB can support the above weights. All Others (EFA, PFM F2) are only at 70MLC.**
- **River / Obstacle Overview (Germany to Estonia):**
 - POL, LTU, LAV, EST have over 4500 bridges; over 1800 of which are > 100m.
 - If just 1% of total bridges in Poland are degraded, 5,500m of military bridging is needed.
 - 6 major rivers with **Average gap widths over 300m** in Multinational Corps NE: Oder, Wisla, Bug, Nemunas, Daugava, Parnu Jogi.



Planning Factors for Crossing Sites for Wisla River:

- US/UK Armor Division = 4 crossing sites (1600 m).
- US/UK Armor Brigade = 2 crossing sites (800 m).

Estimated MBT Combat Loaded Weight (MLC):

- Leopard II ~ 80 MLC
- Challenger 2 ~ 95 MLC
- M1A2 SEPv3 ~ 91MLC

NATO float bridge capability in Europe > 70 MLC:

	Available:	Stored:	Total:
Improved Ribbon Bridge: [80 MLC]:	US - 0	213 m	363 m
	GE ~ 150m	0	
M3 Amphibious Bridge: [85 MLC]	UK ~ 100m	300 m	700 m
	GE ~ 200m	100 m	

Even with the combined effort of all NATO bridging, not enough capacity available to emplace one doctrinal crossing of the Vistula by a US, UK or German Armored Brigade



MOBILITY / COUNTER MOBILITY



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ENCLOSURE TO

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A.3 One-page summary for Publication

The study "Solutions for NATO's current and future gap crossing capability" was conducted in order to analyse the existing gap crossing capability and shortfalls, and recommend potential enhancements and solutions for the future. The work was structured in four parts and executed by dedicated teams: (A) Current & Future Military Systems; (B) Dual Use & Civilian Bridging Capacity; (C) New Technologies for Bridging Systems; (D) Interoperability.

The study concludes that there is a critical equipment shortfall in Wide Wet Gap Crossing Capability (WWGCC) against the NATO Capability Codes and Capability Statement of (Military Load Classification) MLC 90 (T). As a key point, the study recommends to revise STANAG 2021 which defines the method of calculating the MLC. Currently, in the view of the study, it gives unrealistically high MLC for heavy tracked vehicles and takes in unnecessary cost and risk into equipment procurements. This drives the capacities of military bridges to their physical and economical edges. It is proposed that with a revised STANAG, a maximum capability of MLC 90 (T) for WWGCC can be applied and mandated for new equipment procurement enabling the crossing of all current NATO vehicles. For future main battle tanks, it is suggested that NATO should align and constrain their weight growth to correspond to the above maximum MLC level of MLC 90 (T). This would be a prudent balance of investment decision, in line with specific approaches of other NATO members, such as UK.

Line of Communication Bridges (LOCB) have also been analysed as a viable solution. An effort needs to be made in order for NATO nations to contract for and share new capacity in this field. The study concludes that NATO members should combine and consolidate their LOCB needs and request a joint-procurement of LOCB by NATO through NSPA, which already executes similar projects with great success.

Concerning new technologies, the study recommends funding the industrialization of new material and manufacturing technologies, such as Higher Strength Corrosion Resistant Aluminum Alloys, High Strength Steels, Structural Composites, Friction Stir Welding Technology, and Additive Manufacturing. The study also concludes that it is essential to implement Health and Usage Monitoring Systems (HUMS) on WWGCC structures in future nations' procurement. Among many advantages, HUMS enable nations to monitor real crossings, thus reducing lifecycle costs of bridges and increasing their availability. Furthermore, development should foster semi-autonomous and automation technologies, especially semi-autonomous bank and river bed reconnaissance technologies, semi-autonomous driving for bridge vehicle convoys, and automatized systems for bridge assembly and operations.

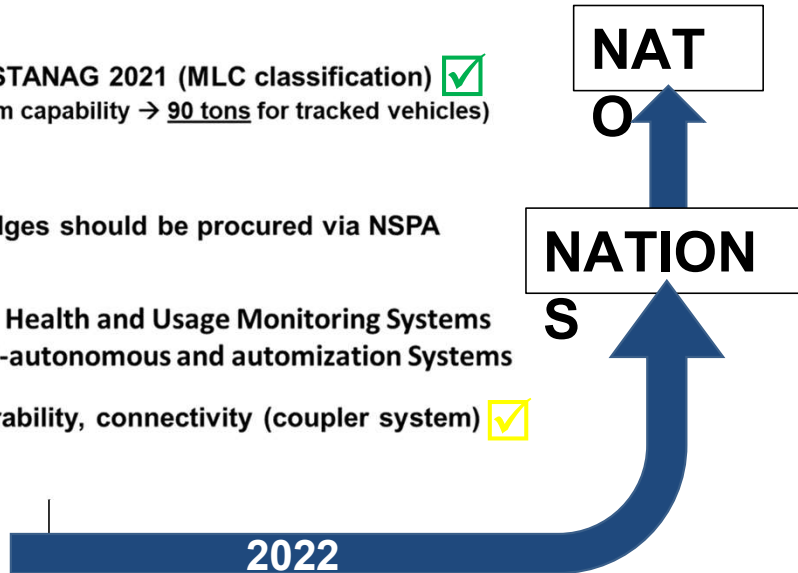
To ensure interoperability and build multinational WWGCC capacity, the different systems need to physically connect to each other. The study recommends the founding of an Interface Control Dataset (ICD) enabling each equipment manufacturer to develop their own compatible connector without restrictions. The study also concludes that there is another way to develop interoperability via a pooling and sharing of LOCB capacity through NSPA. NATO members should develop partnerships with industry to provide both equipment, expertise, and a deployable storage capacity, and thus free-up the limited military resources.

The work described in this report was carried out under the provisions of the NIAG Study Order for Study Group 269.

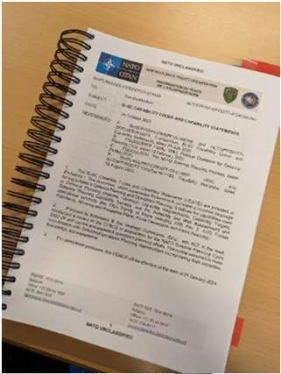
Disclosure, utilization, publication or reproduction of this report by industry is subject to pre-approval by NATO until such time as NATO may have released such work to the public.

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- Review STANAG 2021 (MLC classification) ✓ (maximum capability → 90 tons for tracked vehicles)
- LOC Bridges should be procured via NSPA
- Need for Health and Usage Monitoring Systems and semi-autonomous and automation Systems
- Interoperability, connectivity (coupler system) ✓



MOBILITY / COUNTER MOBILITY



MILENG COE Information Exchange Seminar
2022
COUNTER MOBILITY
Food for Thought Paper

05/03/2024

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Releasable to Interoperability Platform

07 July 2022

**NAAG-MCLSB MILITARY ENGINEERING WORKING GROUP
NIAG STUDY PROPOSAL**

1. Title of the Proposed Study:
Identify solutions to fulfil NATO MILENG capability targets on counter-mobility (CMob) requirements, by the provision of CMob assets and by the development of innovative CMob solutions.

2. Brief Description of Proposed Study:
Conduct a study to identify best solutions to:

- a. Improve multinational interoperability of current and future CMob technologies and equipment.
- b. Rapidly upgrade already existing CMob assets within NATO such as making them reusable, cost effective, autonomous, non-manpower consuming, more effective in terms of deterrence.
- c. Investigate innovative CMob solutions, both lethal and non-lethal.
- d. Discover potential industrial technologies with a balance between efficiency and cost effectiveness.
- e. Enhance understanding of the physical environment (geomatics) to posture the CMob efforts.
- f. Recommendations to improve doctrinal preparation and execution of CMob.

3. Background:
NATO is currently facing capability gaps. One of those gaps is the capability to fulfil the NATO targets with respect to CMob in terms of quality, quantity and rapid deployability. The challenges of NATO regarding CMob are as follows:

- a. **Lack of Assets.** This shortage is due to different reasons such as:
(1) Widespread budgetary constraints and frequent delays in upgrading and replacing existing systems.
(2) The removal of anti-personnel mines from service combined with the decreasing use of anti-tank mines by many NATO nations in accordance with national and international law and policy. This represents a significant reduction in NATO's ability in Force Protection (FP) and CMob. NATO currently lacks the combined capability to achieve a decisive barrier to enable a credible deterrent.
- b. **Reduced Land Forces.** Most NATO Nations have seen continued downscaling of Land Forces. This negatively effects the ability for preparation and execution of CMob.

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SG285



NATION
S

INDUSTRY

2023

2024

STUDY REPORT

MOBILITY / COUNTER MOBILITY

Conduct a study to identify best solutions to:

- a) **Improve multinational interoperability** of current and future CMob technologies and equipment.
- b) Rapidly **upgrade already existing CMob assets** within NATO, such as making them reusable, cost effective, autonomous, non-manpower consuming, more effective in terms of deterrence.
- c) **Investigate innovative CMob solutions**, both lethal and non-lethal.
- d) Discover **potential industrial technologies** with a balance between efficiency and cost effectiveness.
- e) **Enhance understanding of the physical environment (geomatics)** to posture the CMob efforts.
- f) Recommendations to **improve doctrinal preparation and execution of CMob**

SG285



NATION

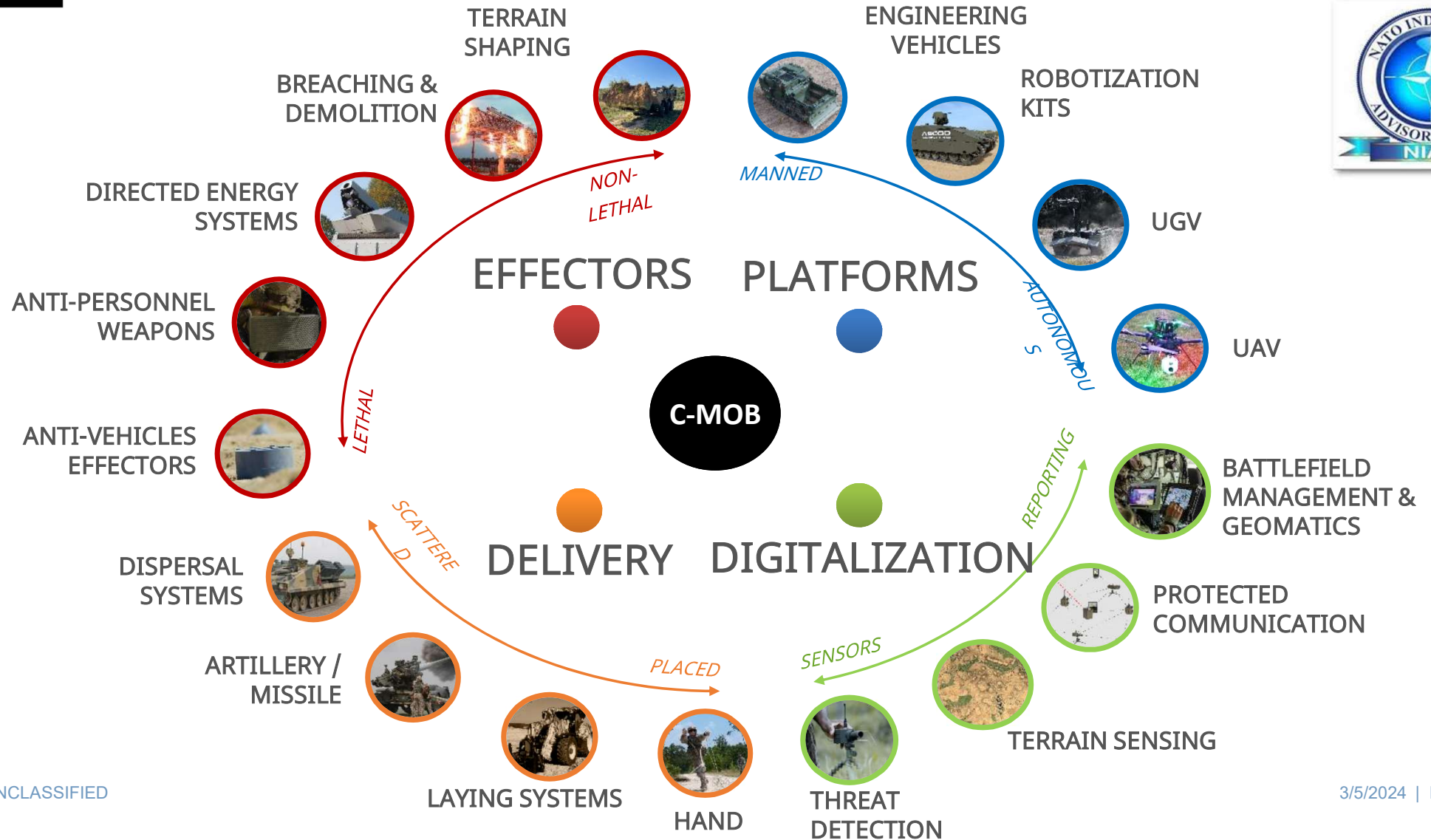
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INDUSTRY



STUDY REPORT





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INTEROPERABILITY IN NATO



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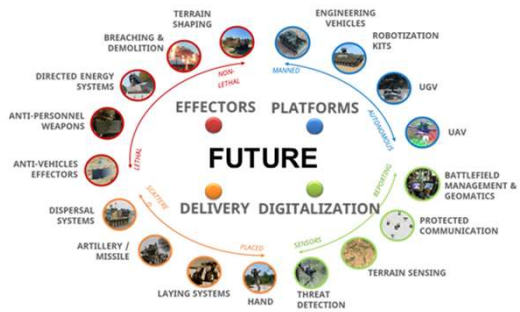
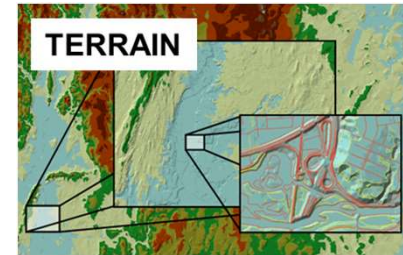
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CNAD HIGH VISIBILITY PROJECTS

(Mobility/Counter mobility/Engineer Vehicles)

Military Bridging	Countermobility	Military Engineering Vehicles/Systems
Joint procurement of logistic bridges	Establishing a multinational framework for the enduring provision of counter-mobility materiel	Joint procurement of breaching vehicles/systems
Pooling or outsourcing logistic bridges	Joint development of innovative lethal counter-mobility assets	Joint procurement of unmanned/ autonomous MILENG vehicles/system
Joint development of a floating bridge adapter	Joint procurement of innovative lethal counter-mobility assets	

1400 – Advancing NATO’s three Military Engineering High Visibility Projects (HVP)

- Setting the direction of the ‘Gap Crossing’, ‘Counter-mobility’ and ‘Vehicles/systems’ HVPs following LOI
- Future development and procurement
- How the new HVPs will deliver real-world outputs in a timely fashion

Endre Agocs, Multinational Capability Cooperation – Defence Investment, NATO HQ



SUMMARY



QUESTIONS



Pionierkaserne auf der Schanz
Manchinger Strasse 1
85053 Ingolstadt
GERMANY

Office: + 49 841 88 660 5000
Mobile: + 49 151 72 143 990
www@milengcoe.org



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