

ETICE

Essential Technical & Industrial Capabilities Expiry - Mapping the 2025 Firepower Technology Supply Chain

Contract 09-R&T-001



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Executive Summary

This document is the executive summary of the “Essential Technical and Industrial Capabilities Expiry - Mapping the 2025 Firepower Technology Supply Chain (ETICE 2025)” feasibility study sponsored by the EDA (contract 09-R&T-001). This study was carried out between June and December 2009 by a consortium of 8 partners:

- the French-German Research Institute of Saint-Louis (consortium leader),
- BAE Systems Bofors (Sweden),
- CMI Defence - part of Cockerill Maintenance & Ingénierie Group (Belgium),
- Nexter Systems (France),
- Oto Melara (Italy),
- QinetiQ (United Kingdom),
- Rheinmetall Waffe Munition (Germany),
- TNO (the Netherlands).

The purpose of the ETICE study is to show the operational necessity of large calibre multifunctional gun systems (MfGS), and to identify associated essential research and technology activities – at this stage aiming for a technology demonstration. Furthermore, the study aims at raising awareness of the defence industrial competencies within Europe to design, develop and manufacture such a weapon system, in order to:

- remain able to deliver to the national forces in Europe the firepower they need,
- help prevent the expiry of the necessary technical and manufacturing skills,
- help keep at least the core know-how, and relevant manufacturing capabilities and capacities on a European level (Section 1).

Operational Necessity of MfGS

Current operational trends have confirmed that the delivery of large calibre firepower from a well protected platform remains as valid in today’s operational setting as it has done in the past. Although no vital capability shortfall is currently identified, the end of the life time of the majority of European main battle tanks and self-propelled artillery fleets is anticipated in 10 to 15 years. The need to develop replacement heavy firepower systems beyond 2025 is therefore becoming a pressing requirement (Section 2).

Heavy firepower will continue to be an important factor for future land military operations and increasingly within the urban environment. Whereas in the past a clear differentiation was seen between direct fire (line-of-sight) and indirect (non-line-of-sight) artillery capabilities, changes in military environment, arising from the urban surroundings, the asymmetric threats and the need for agile and rapidly deployable expeditionary forces have led to changes in operational requirements (Section 2).



Firepower of large calibre gun systems with the capability to kill hard targets and penetrate bunkers on very short notice will still be required. Current tank and artillery systems are lacking increasingly tactical flexibility, precision and sustainability. Future gun systems will need scalability for specific military needs as well as flexibility of role. Many of these requirements could be met from a single platform by using appropriate ammunition. Therefore, it is prudent to pursue the development of a new multi-purpose weapon system together with its ammunition, noting the 10-15 years time frame for development and qualification of such a system (Section 6.3).

Key user requirements for a MfGS in the 2025 timeframe were identified by 8 European MoDs as: line of sight kill capability out to 4000m against hard targets and bunkers, and non-line-of-sight out to 25 kms in urban terrain against hard, soft and infrastructure targets, based on a total platform weight of no more than 35 tons together with the capability to fire at high angles (Sections 6.1 and 9.2).

In order to allow the development of a large calibre MfGS before 2025, engineering competencies will need to focus on a number of emerging technology areas affecting the design, manufacture and functioning of large calibre weapon systems (Section 7).

The key technology areas needed to develop a multifunctional gun demonstrator including the required ammunition have been assessed by the study as being: barrel and gun cradle design, recoil and breech systems, muzzle brake design and auto loading systems, together with further advances in kinetic energy penetrator, precision-guided munition (PGM) and scalable ammunition. Technology areas which are system-relevant but not key elements of the MfGS itself such as platforms, drives, protection subsystems, sensor suites or C4I would not be demonstrated (Sections 7.1 and 9.3). However the constraints they impose upon the MfGS will need to be identified and accommodated in the design of hardware.

Follow-on activities would undertake further assessments during a demonstrator phase, if approved, including options such as smooth bore or rifled barrel, manned or unmanned turrets, optimum weapon system calibre, and feasibility of associated munition technologies (Section 9.6).

Bringing these technology areas to maturity will require the involvement of Industry partners to ensure that the system can be effectively designed and manufactured at a realistic cost to the customer and to fulfil an identified role on the future battlefield, within a mass and volume that are compatible with medium weight platforms (Section 7).

European Large Calibre Competencies

The mature military-industrial polities at the heart of Europe possess a diminishing competency base for MfGS design, demonstration, manufacture, repair and overhaul and disposal operations for large calibre guns and projectiles. Countries such as the UK, Germany, France, Italy, Sweden and Belgium could, conceivably, embark upon a national demonstrator programme in 2010, but this ability will have withered by 2025 to the extent that a national or international collaborative programme would become unfeasible (Section 8.4).

Without the focus of a European MfGS development and sustainment programme, there is a risk that the competencies and skills that traditionally have resided in Europe and historically been utilised for large calibre gun and projectile military capability will be diminished by 2025.



Moreover, delays to the implementation of this programme, conceptually, could lead to the competence set ceasing to be viable as early as 2015 (Section 8.4).

The preservation of these essential technical and research capabilities will require private, government or joint intervention and investment, to enable the holders of key industrial and technological knowledge to sustain essential skills and assets (Section 8).

Conclusions and Way Ahead

The study makes a number of key recommendations (Section 10). That:

- A European Demonstrator Programme for a MfGS as an EDA Ad-Hoc Programme leading to a hardware demonstrator within a five-year time frame should be undertaken
- The following Technical Studies be initiated and aligned to the retention of the knowledge base:
 - effect-based munitions
 - weapon concept
 - turret design, ammunition flow and autoloader concept
- Technical concepts be developed with respect to:
 - a multifunctional direct/ indirect firing capable gun system
 - semi-automatic functions, unmanned turret
 - integration in existing platforms
 - enhanced ammunitions / PGM with high precision and modular charges

The study concludes (Section 11) that:

- The proposed Road Map for a MfGS Demonstrator Programme (Section 9.4) will close emerging crucial capability gaps for future operations.
- Future missions will require a weapon system which will combine direct and indirect firepower capabilities in order to provide the needed increase in flexibility and mobility
- These two capabilities will be in future operations more important than further optimization of penetration capabilities and range.
- This programme will sustain the technical competence and required skills to develop large calibre weapons in Europe.
- As mid-term or long-term requirements for new tank and/ or artillery systems arise, the essential technical know-how for the development of large calibre weapon systems in Europe will be in place.