



Project Summary Information

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Companies Involved:	Fraunhofer Institute for Communications, Information Processing and Ergonomy (Germany) BAE Systems Bofors (Sweden) Nexter Systems (France) Patria Land Systems (Finland) Rheinmetall Defence Electronics (Germany) Rheinmetall Land Systems (Germany) Selex ES (United Kingdom) Vectronics Research Centre (United Kingdom)

Background

The motivation of this initiative is to enable European member states to increase mission efficiency and, at the same time, save cost when procuring or upgrading military land vehicles.

The progress in information technology applicable to land vehicle mission systems is substantial and offers the power to provide better situational awareness and faster, more efficient and precise military effects. The complexity that enables such potential to be realised must be managed through the standardisation of architectural approaches relevant to defence objectives.

The first EDA LAVOSAR study (Land Vehicles with Open System Architecture, 12.R&T.OP.336) stated that a comprehensive standardised Open Reference Architecture for missions systems of military land vehicles will be key to:

- cost-efficient acquisition and through-life management and

- more efficient and flexible use of equipment, including provision for future innovative improvements to mission capabilities.

Such an Open Reference Architecture is anticipated to form the common basis from which new mission or vehicle-specific system solutions could be derived, thus sharing a greater number of compatible elements in an extensible infrastructure.

The first study was based upon relatively high-level operational views and it identified concepts and technologies applicable to the on-board vehicle system, without specifying a full and precise set of standards to be adopted as a reference. Interfaces with different innovation speeds, tactical and ad-hoc local area network communications and logistics and maintenance aspects of a future architecture were all recognised as requiring further investigation.

Furthermore, during the course of the first LAVOSAR study, the Generic Vehicle Architecture standardisation initiative for NATO was endorsed; leading to the recognition by joint stakeholders that future evolution of mission system architecture by EDA and NATO will need to be aligned.

Against this background the motivation of the proposed LAVOSAR II project is to address the above identified gaps and establish a more mature suite of architectural standardisation materials complementary to NGVA.

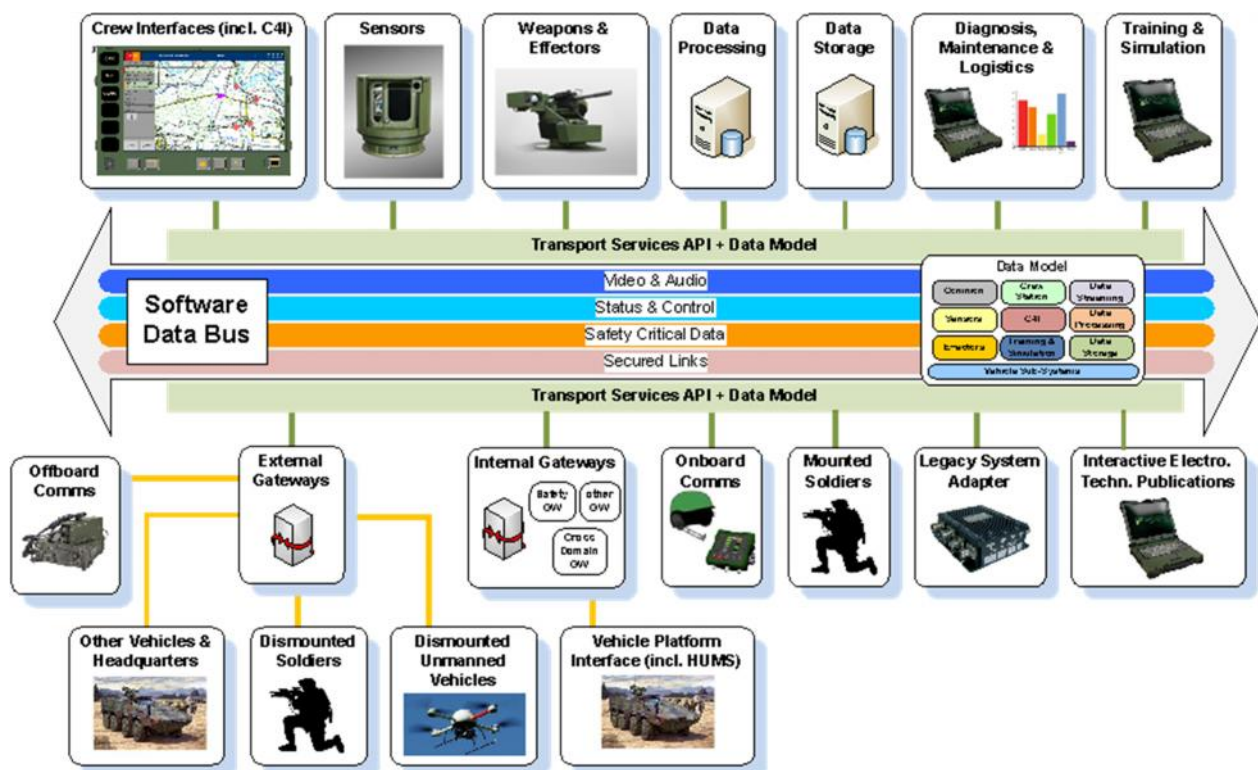


Figure 1 – Open Architecture View: Data Bus Centric Mission System Approach

Aim

The LAVOSAR II project shall follow up on the results of the first LAVOSAR study.

- Definition of architectural domain such that a European approach covers a currently needed gap and thus complements or contributes to other current activities in the area. This architectural domain shall then be clearly related the domain of the other activities.

- Therefore, a background material analysis which includes results from LAVOSAR I, NATO Generic Vehicle Architecture (NGVA), UK DefStan 23-09, Victory, Scorpion, FACE and other national programmes is required.
- The need of additional architectural layers to the LAVOSAR I architecture shall be identified and defined.
- The benefits to be gained and the cost of implementing shall be estimated.
- Updates required to the Open Reference Architecture Standards of LAVOSAR I shall be investigated based on specific European requirements. Especially:
 - Open Interface requirements that exist between disciplines of different innovation speeds (mechanical, electrical and software),
 - Extensions of the NGVA Data model for data exchange to cover European standards,
 - Gateways for external communications,
 - Generic Data exchange between vehicles, typically of different type,
 - Suggestion of further international open standards needed.
- Update of the defined operational workflows of the LAVOSAR I study
- Update of the logistic procedures of the LAVOSAR I study.
- A roadmap shall be developed to harmonise along the different vehicle types in the European Countries the data exchange procedures on Modification, Maintenance, Repair and Overhaul with military and civilian facilities.
- A roadmap shall be developed that shows future development of NGVA and how LAVOSAR II activities can contribute to that development.

Results of the above stated work shall be formalized in an architectural form and data such that it is possible to contribute the developed views to the EDA Architectural Repository. For this reason, technical support by the EDA Chief Architect will be acquired and needed.

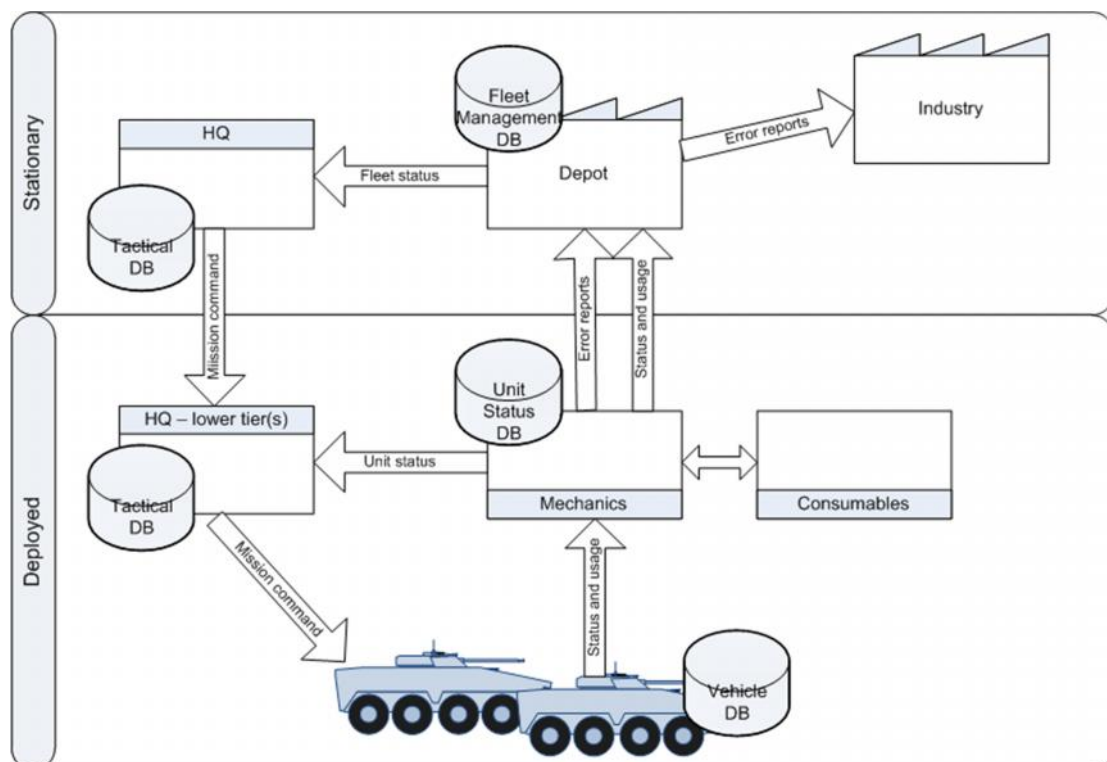


Figure 2 – Open Architecture View: Logistic Use-Case Example



Figure 3 – Open Architecture View: Logistic Procedures

Approach

In *Work Package 1*, “Architectural Domain Analysis and Requirements” clearly defines the Domain for a European Open Reference Architecture for Military Land Vehicles and the benefits which can be achieved. Therefore, other relevant programmes and activities are analysed and the borderlines will be defined such that European nations can benefit from such an European Architecture. If necessary, additional layers to the first LAVOSAR architecture will be identified and defined. Further benefits to be gained will be evaluated and the cost for implementation estimated. This Work Package builds the base for all other Work Packages because it clearly defines the scope.

In *Work Package 2*, “Open Reference Architecture Standards Update”, requirements specific to Europe and the applicability of standards in the relevant architectural views are investigated. Especially, disciplines of different innovation speeds, NGVA Data Model complementation, and off vehicle communications are included and gaps are identified where insufficient standardization exists. The standard lists from the first LAVOSAR study will be updated and specific recommendations developed such that an input to the EDSTAR portal will be possible. Wherever possible, the standards will be assigned to the elements of the architectural views in order to illustrate where the standard applies. WP 2 will run in parallel and share information with linked activities of WP 3 and WP4.

Work Package 3 addresses “Workflows and Procedure Updates” and is subdivided in the Operational Workflows and Logistics Workflows. The Operational Workflows refine the Use Cases of the first

LAVOSAR study (incl. logistic aspects) and extend them for Groupware aspects for different roles and also different vehicle types.. Logistic Workflows shall be developed and refined based on the logistics domain which has been introduced in the first LAVOSAR study. Different logistic levels (incl. on-board diagnosis, maintenance, repair, overhaul, and storage) will be specified and actors with their use cases developed.

Work Package 4 “Through Life Capability” defines technical views for the logistic procedures (and use cases) from WP3. Especially, different aspects of data exchange procedures are analysed and recommendations for harmonisation given. Specifics for military and civil actors will be evaluated and considered. Issues such as data exchange procedures, data models, and connectors will be analysed concluding with a roadmap for development and implementation.

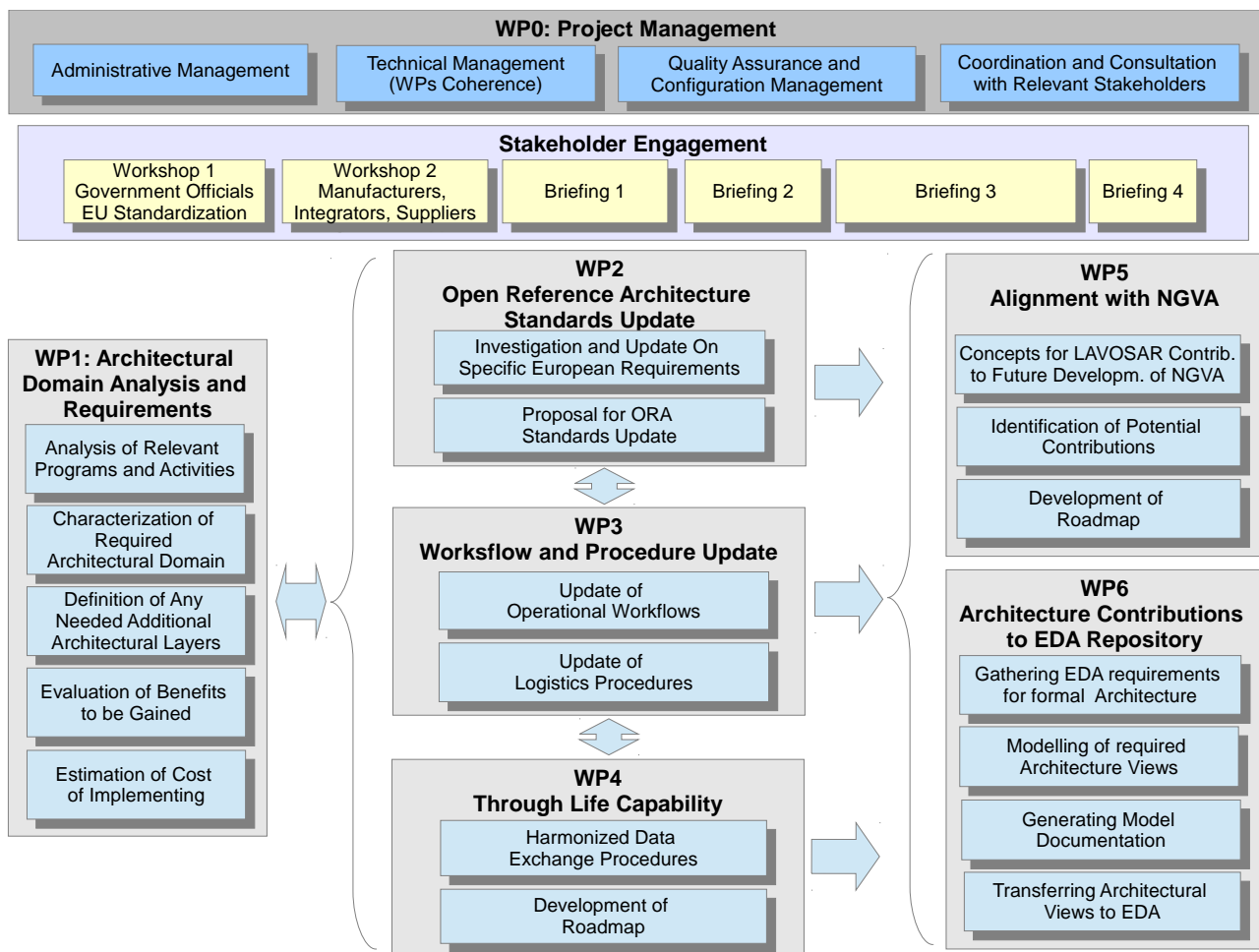


Figure 4 - Information Flow between Work Packages

All the results of the above described Work Packages will be used in Work Package 5 and Work Package 6. As the intent for the LAVOSAR Architecture is not to offer a competing alternative to NGVA but rather to contribute to, or to complement NGVA, **Work Package 5 “Alignment with NGVA”** develops such a concept, identifies from the achieved results in LAVOSAR II potential contributions and develops a roadmap based on the architectural domain from WP1. This considers current developments on NGVA but may also include future developments, e.g. new editions of the Standard.

Work Package 6 “Architecture Contributions to EDA Repository” is a Work Package which accompanies all other Work Packages and formulates results in a format such that they can contribute to the EDA Architectural Repository. First, information and support from the EDA Chief Architect will be requested and the requirements for such architecture will be analysed. Then, architectural views will be transformed as they are developed. At the end documentation will be generated and the architecture will be handed over to EDA.

Tight involvement of the major stakeholders is intended by organising the required workshops and briefings. As in the first LAVOSAR study, a Government Workshop will be organised during the first phase and a second Industry Workshop after some more results are already available. The government Workshop will serve for the acquisition of requirements whereas the Industry Workshop is to inform other industry and get feedback. Several briefings will be given to a selected audience as agreed with the EDA Project Officer during the course of the study.