Future European Land Systems -The Challenge of Standardizing Interfaces

Dr. Claudia Urbanovsky
Rheinmetall Waffe Munition GmbH
Germany

© Rheinmetall Defence 2013

Although the last years have seen a development of system standards in many domains relevant to military organisations worldwide, there is today no real solution for the system and network integration challenges of land (combat) vehicles.

Control units of gunner and commander of AIFV PUMA

Digital turret concept MBT Revolution

© Rheinmetall Defence 2013

Oupps…that‘s all Europe!

No…sorry…just some of it! But they still have to get their „act“ together……..

© Rheinmetall Defence 2013

The Challenge Part 1 – Overall Assumption

We – the EDA pMS stakeholders community - are to develop mechanism for systems integration and interoperability to ensure coherency for military units for training and operations.

At this point, we shall consider that a military units (e.g. a combat logistic patrol) consist of 3 different basic platforms :

- **the soldiers,**
- **the vehicles and**
- **their headquarters/ bases**

In order to enable maximum effectiveness in complex missions , all three platforms need to be interoperable

This key challenge has been underlined in the "Future Land Systems" study-report, a study contracted by EDA following an open tender to a consortium of 17 European Land defense industries under the umbrella of the ELDIG

This presentation concerns itself with the second basic platform of the "Land Systems Troika", the Land Vehicle System (LVS)

© Rheinmetall Defence 2013

The Challenge Part 2 – Open Architecture and Standardisation Concepts as Tools for the Harmonization of Requirements

Our key aim as EDA pMS Land Systems Stakeholders Community The key aims must be the establishment of common Open Architecture Concepts for Land Systems and common Interoperability Standards Frameworks.

The outcome will be enhanced/better use of existing capabilities through harmonized/standardized requirements .

The Land Vehicle System is a good example to outline the challenges aims and potentially beneficial outcomes of standardization and harmonization at the largest, European level possible.

The most convenient means is –from my point of view - a Common Set of European Best Practice Standards for a Common European Land Vehicles Approach

The EDSTAR –already operational and containing the standards for Armoured Land Vehicles Technology, identified* by EG 9 in the framework of the CEN WS 10 "European Handbook"- can be a vehicle for good accessibility to such a common set of Best Practice Standards for all stakeholders and thus make it a set of "Open Standards".

© Rheinmetall Defence 2013

The Challenge Part 2 – Open Architecture and Standardisation Concepts as Tools for the Harmonization of Requirements

It is possible to build upon already existing work of EG 9 and enlarge the subject-matter area.

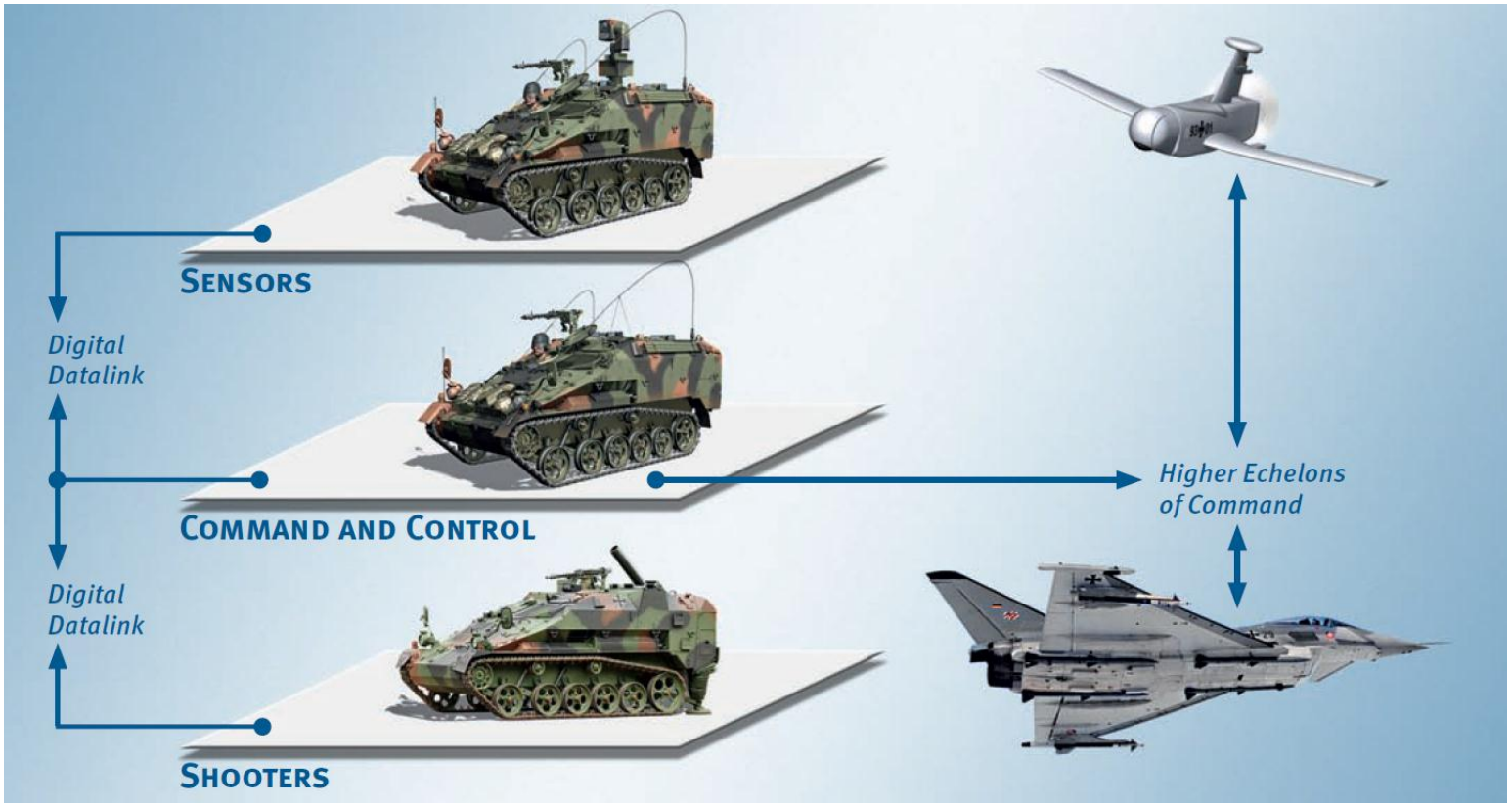
It is important that a common set of Best Practice Standards are developed by all stakeholders together, MoDs and the industries involved, defense companies, suppliers etc. Today, it is industry who has the best view of open standards and technical and commercial limitations (e.g. Intellectual Property Rights (IPR)) on implementation.

The "open" standards can be applied for relevant projects. They ought to standardize interfaces between platform, infrastructure, power, supply and data. "Open" standards will be important to anyone wishing to build future sub-system, to ensure that these sub-systems will be compatible with the infrastructure etc. Based upon "open" standards sub-systems can be quickly and easily added to the platform.

With user needs and technology advancing faster than projects can deliver or changed or upgraded as needed, this flexibility from "open" standards will also provide a factor of improved operational effectiveness and enhanced cost effectiveness.

© Rheinmetall Defence 2013

Land Vehicles Systems – Overview on Hotspots for Interfaces and System and Network Integration Requirements



Advanced mortar system, Lightweight armoured mortar, Command and control vehicle, Fully integrated C4ISTAR&FC systems

© Rheinmetall Defence 2013

Key Observations from the Future Land Systems Study

The key operational issue is Mobility in a Battle Space

The key problem is that procurement of new capabilities will be limited due to many factors (e.g. economic problems, lowering budgets, aging of personnel etc.)

The key fact is that technological advances (especially civilian ones), will drive capability developments

THEREFORE

FLS puts an emphasis on making better use of existing capabilities

FLS shows clearly key enablers : Requirement harmonization and standardization

FLS champions overall greater standardization of soldier, vehicle and base architectures

FLS champions improved networking ('joining up the dots') at all levels between stakeholders

© Rheinmetall Defence 2013

Key Observations on Land Vehicle Systems – Part 1

- **Land vehicle systems are a key element in a wide range of scenarios and situations.**
- **Traditionally they have been designed and built for specific missions.**
- **This required that – as missions evolved - various add-on solutions with a range of proprietary interfaces had to be integrated into one vehicle platform.**
- **This approach is not only costly, but often difficult from a technical point of view and it requires time.**
- **It is a handicap in a world, were situations and missions evolve rapidly and require rapid reaction from the Armed Forces of the EDA pMS.**

© Rheinmetall Defence 2013

Key Observations on Land Vehicle Systems – Part 2

Today, in our actual threat environment and considering the future – based upon experiences from Afghanistan, Lybia, Mali etc., there is a increasing need for better situational awareness, meaning networked information technology in military land vehicles, enabling faster reaction and more efficient and precise effects during missions.

The recently delivered "Future Land Systems" study and various other EDA efforts (e.g. LAVOSAR – Land Vehicle with Open Systems Architecture) underline this requirement.

© Rheinmetall Defence 2013

The Common European Land Vehicles Approach – Minimum Approach

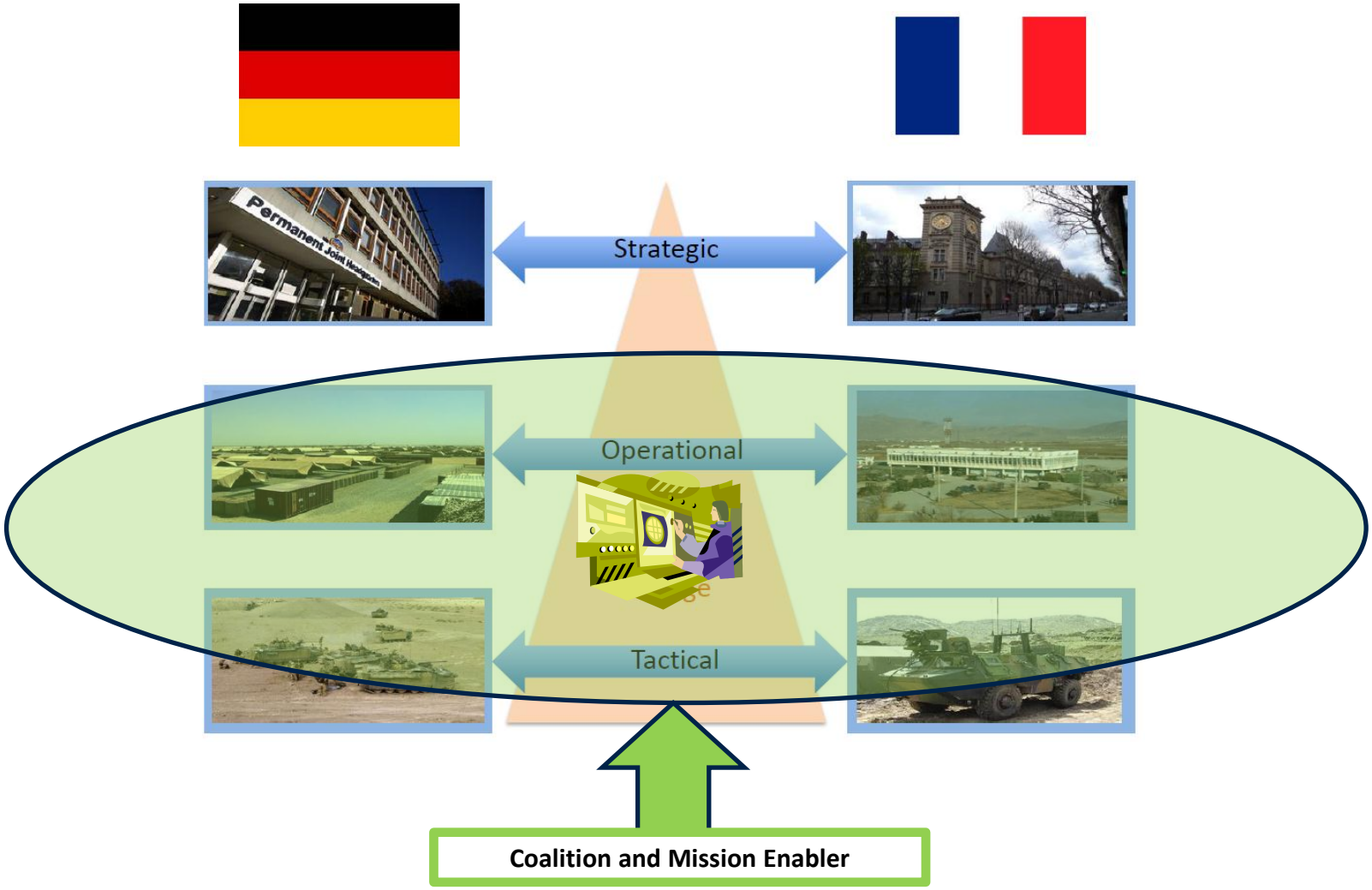
Devices inside the vehicle shall be able to exchange information with one another

Devices shall be easier to integrate

Devices shall have the ability to update/upgrade in line with the technological progress

© Rheinmetall Defence 2013

The Minimum Required Outreach of Best Practice Standards for Land Vehicle Systems



© Rheinmetall Defence 2013

The Common European Land Vehicle Approach requires a „Open“ Common European Set of Best Practice Standards and this independently from a „minimum“ or a „maximum“ approach to the issue

© Rheinmetall Defence 2013

A Common Set of European Best Practice Standards for Land Vehicle Systems:

- improves operational effectiveness
- reduces ownership costs
- allows for the use of open, non-proprietary interfaces
- supports greater competition
- improved ability to redefine vehicles through the insertion of new technology as it becomes available
- Enlarges vehicles missions spectrum through adaptability and scalable/modular architecture
- facilitates the pooling&sharing of equipment during (international) missions
- decreasing overall costs including integration, verification and validation costs and
- enabling overall greater land systems innovation

© Rheinmetall Defence 2013

Historical Background on Land Vehicle Systems Standardisation 1

EG 9 "Armoured Land Vehicle Technology" limited its scope to locate, evaluate and propose best practice standards, as well as identify gaps in the standards, primarily related to the test and evaluation of future Armoured Fighting Vehicles, building upon work initiated by NATO in 2003, taken on by ITESC in 2005 and continued by Germany in 2006 to update the AVTPs and ITOPs.

EG 9 was unable to obtain permission to review the most up-to-date AVTPs and ITOPs and therefore unable to progress the agreed scope of work. Nonetheless standards from 9 different AFVs program were collected, together with AVTP listings, ITOP listings, and EU Type Approval Directives. These standards and standard-like documents provide a baseline for future work and are now contained in the EDSTAR.

In April 2008, EG 9 recommended that its' scope should be resurrected when the most up-to-date AVTPs and ITOPs are available for review.

Furthermore the EG recommended to make the Best Practice Standards references available to Governments and Industry as a listing of possible standards applicable to AFVs.

© Rheinmetall Defence 2013

Historical Background on Land Vehicle Systems Standardisation 2

A recent screening of the Best Practice Standards chosen by EG 9 made it clear (to me), that a majority of the documents date from the 1990ies. They were initiated and developed before the latest evolutions in scenarios and missions. They do not consider the latest technological evolutions which require the Open Architecture approach.

More recent standards/standards-like documents* applicable to Land Vehicle Systems are national or proprietor and/or restricted to a specific subject matter area.

None of these more recent documents have been "endorsed" at a transnational/European level by the LVS stakeholders community or are considered by them as a possible "Best Practice" for all.

They also address only specific problems/inefficiencies, not the full range/concept.

But they may serve as inspiration for the European Common Set of Best Practice for Land Vehicle systems.

It is possible that clarification on this question and these standards' aptitudes will come from the EDA LAVOSAR study, which is now under way.

I believe that building upon the recommendations of former CEN WS 10 EG 9 (from 2008) and on the newer findings and recommendations of the FLS study, it is desirable to revive this experts community in order to progress the overall subject of Best Practice Standards for Land Vehicles Systems, as outlined in this presentation.

Upcoming results from the ongoing LAVOSAR study(12.R&T.OP.336) can then be integrated when they are available.

*** for example the VICTORY(Vehicle Integration for C4ISR/EW interoperability) standard of the US, the GVA (Generic Vehicle Architecture) of the UK MoD. GVA is strictly speaking not a standard, but a standardised integration approach.**

© Rheinmetall Defence 2013

The Civilian Environment and its Impact/Influence

It is important to engage on this way for military applications as soon as possible, considering the fact that huge progress is made in the civilian environment.

Under the label "Vehicular Networking" civilian work is speeding forward.

Vehicular networking serves as one of the most important enabling technologies required to implement a myriad of applications related to vehicles, vehicle traffic, drivers, passengers and pedestrians.

These applications are no longer novelties or far-fetched goals from groups of researchers. They are reality: Intelligent Transportation Systems (ITS) that aim to streamline the operation of vehicles, manage vehicle traffic, assist drivers with safety and other information, along with provisioning of convenience applications for passengers are no longer confined to laboratories and test facilities of companies.

A lot of this civilian (standardization) work takes place in international SDOs. Many of these SDOs are geolocated in the US; IEEE, SAE, RTCA etc.

If the EDA pMS wish to avoid a replication of the situation with UAVs, where standardization is dominated by US-based organisations with civilian vocations, action -as soon as possible- is necessary.

Such standardization activity can be recommended by the Material Standardization Group (MSG) and take place under the aegis of the CEN Gruppe das Stakeholder Forum for Defence Procurement Standardization (SFDPS).

A MSG recommendation for standardization activity can also be based upon the outcome of the LAVOSAR study (12.R6T.OP.336) whose aim is –beyond the Open Architecture – to give also recommendations for a LVS standard which would prove attractive on a global scale.

© Rheinmetall Defence 2013

OUPPS…Lots of Bolt-On Sub-Systems!!!!

© Rheinmetall Defence 2013

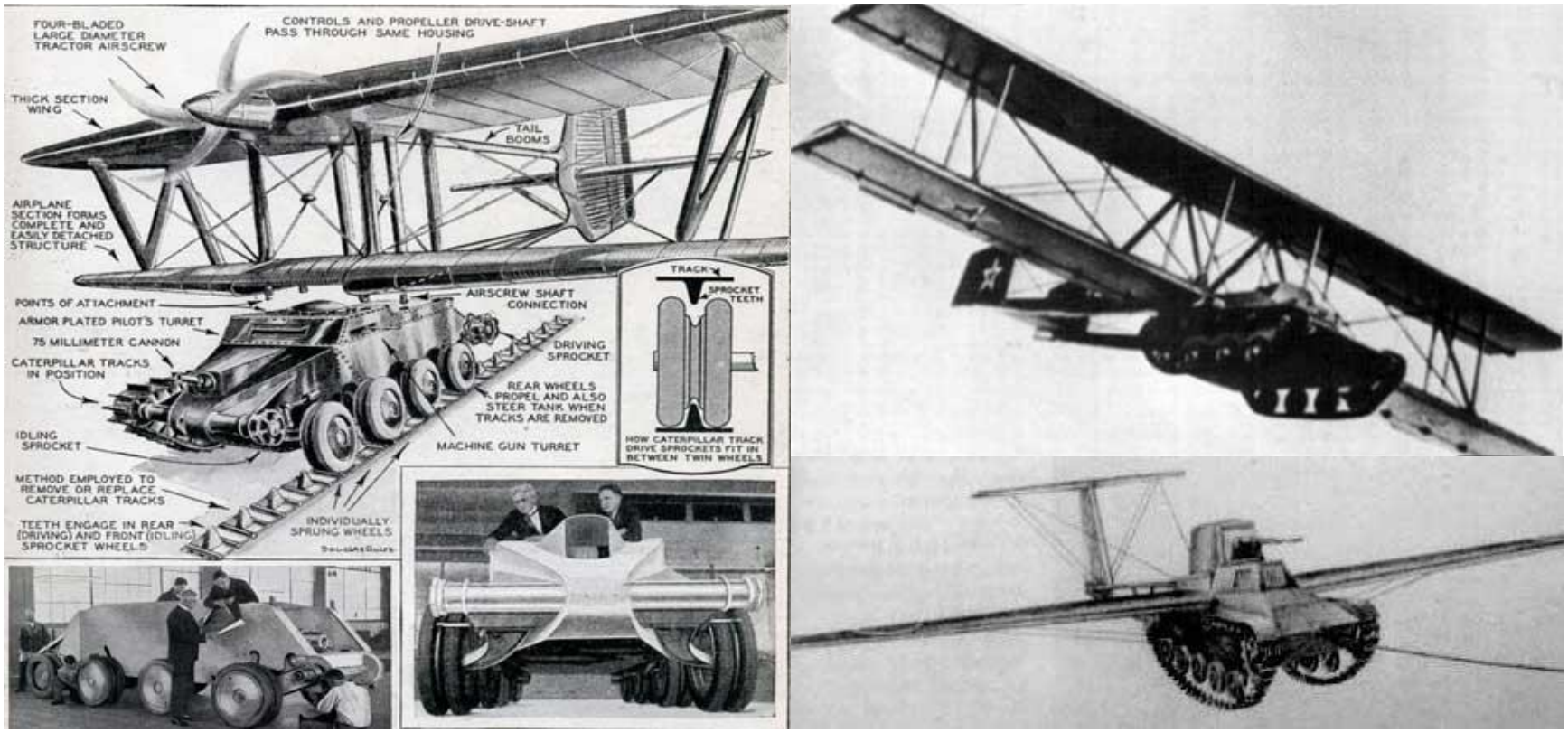
Conclusions

When Land Vehicles get smarter, they are also getting more complex, taking on the names of „Land Vehicle Systems“. It is apparent, that the addition of more intelligent hardware and software onto Land Vehicles makes even the most basic transport vehicle a pretty complicate collection of disparate systems that must be managed, monitored and maintained together.

The best way to handle this complexity is by means of some solid „Best Practice Standards“ which are agreed upon at the European level and thus empower the entire stakeholders community to eliminate together operating inefficiencies in land vehicles, while at the same time – saving time and money in upgrading and supporting better pooling &sharing between EDA pMS

© Rheinmetall Defence 2013

A bit of Open Architecture gone wild



This must not happen to you: Get yourself an EDSTAR Best Practice Standard ☺

© Rheinmetall Defence 2013

References

VICTORY 101 – An Introduction, August 2011

VICTORY Specification 1.1 , 2012

US MIL-STD-38999

Generic Vehicle Architecture (GVA) , UK Defence Standard 23-09 Issue 1, Publication Date 20 August 2010

The VICTORY architecture drives COTS-based interoperability on combat vehicles by Steve Edwards, in Military Embedded Systems April 18, 2012

EDA "Roadmap and Implementation Plan study on Future Land Systems"

© Rheinmetall Defence 2013

Thank you for your attention!

Question

© Rheinmetall Defence 2013