



# Office of the Chief Systems Engineer

# **Common Modular Open Architectures**



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# **Common Modular Open Architecture Overview**

The intent of Common Modular Open Architecture (CMOA) is to amplify the impact and benefits of Modular Open Systems Approach (MOSA) by maximizing utilization and commoditization of MOSA compliant systems/subsystems through reuse within the Army's product portfolio while reducing the reliance on proprietary vendor-sensitive solutions. The potential benefits are significant and will result in "plug and play" architecture development for future programs, reduced engineering cost and development time, and increased flexibility in physical prototyping.













Background



### **Genesis**:

Common Modular Open Architecture (CMOA) is an initiative that was first discussed at the Fall 2020 AUSA by Dr. Bruce Jette, former ASA(ALT). The concept is to enable systems to detect threat and automatically provide target information to like systems for immediate engagement. In order for that to happen, the systems must be enabled with machine-to-machine exchange of data in near-real-time, which will only be possible if all the vehicles and aircraft involved use compatible electronics.

### The Army's First Tranche – Ground Vehicles:

The Army already has many standards that vehicle manufacturers are required to follow when designing and manufacturing vehicles. While the existing standards provide some interface requirements, the integration of larger subsystems is usually left to the responding vendor to define, which often leads to unique interfaces for various vehicle platforms. Creating common design interface management standards and a common basic design for key commodities are the best way to create a fleet of vehicles with modular subsystems.



# Super & Sub-Systems Technology Insertion Approach



#### Enables

Greater Interoperability



• Minimum Government Owned Solutions & Unique Systems

An agreed upon open system architecture approach allows for more frequent technology insertion to achieve greater capability and field major weapons systems programs more frequently.



## **Common Modular Open Architectures '3' Rules**



#### Rule #1: CMOA Is a Concept Not a Thing

- Encompassing all disciplines, not information Technology specific
- Eventually CMOA will be documented
- CMOA will be an ever-evolving effort

#### Rule #2: Standards Precedence

- Commercial Standards First
- Military / Government standards when determined absolutely necessary (should be a derivative of a commercial standard)
- Proprietary Standards are a last resort, even if data on the interface is provided with Government Purpose or Unlimited Rights

#### Rule #3: The 'C' is not only Common, Represents Convergence Too

- CMOA will consider Standards usage, Intellectual Property rights, use of common commercial connectors, contracting language aimed at improving sustainment benefits.
- CMOA will have impacts across acquisition, logistics and will impact contracting sections L&M





Refine ASA(ALT)'s approach to CMOA development and implementation with the intent to share the approach with specific industry partners in March.

This approach seeks to leverage current PEO-led CMOA efforts, specifically those that are entering the RFP phase. This focus will carryover to a discussion with industry. Lessons learned and analysis from this initial focus area will inform subsequent CMOA development and implementation with other platforms/systems (AVN, CS & CSS systems, others approaching RFP). These subsequent discussions will commence soon after the initial discussions with industry.

"As we go to the new architecture, if you're truly an aggressive, innovative company, your marketplace explodes, because now you can expand across the fleet; If we keep the current method, you get a locked-in assurance of a very small marketplace."





# **Common Modular Open Architecture Strategic Plan**

CMOA implementation will require the development of a Strategic Commodities Plan initially focused on common subsystems within a given platform portfolio, interface management design standards and design packaging envelops for the strategicallyselected commodities. The intent would be to grow implementation to include common subsystems across portfolio and service boundaries.











# **OCSE Commodity Use Concept**



(Cross-Platform Strategic Commodity Example: Ground Vehicle Platforms)

### Determine "potential" common modular open systems/subsystems:

Powerpack (Engine, Transmission) Driveline (Transfer cases, Driveshafts / Halfshafts, Axles/Differentials, Wheels) Chassis bottom (Suspension, Brakes & Steering) Turret, Mounted weapon



### SMEs to determine minimal # of subsystem variants to "cover" platform portfolio

- Review of key identified subsystem specifications to develop range of existing or future products based on capability needs, architecture constraints and "tunable" bandwidth
- Focus on future capability needs (SPAR driven) and "futuring" assumptions based on available Intel to bound and define efforts

### Requires cross-PEO coordination for understanding Basic Design needs:

- Ensure proper "Packaging" needs are available
- Ensure interface management needs are met Requires Common Interface Standards for mating parts/subsystems/systems
- This knowledge base and skillset are crucial for defining design "enablers" for contract development

### Cross-Platform Strategic Commodity Planning + Understanding of Basic Design needs enables "Plug and Play" architecture development - resulting in:

- Reduced: engineering development timing/cost, investment/variable cost of subsystem assemblies
- Increased: reuse, quality and reliability and flexibility in prototyping









# **Common Commodities for Ground Vehicle Platforms**



#### • Preliminary Commodities List

- Powerpacks (i.e., engine and transmission combos)
- Drivetrain (i.e., driveshafts, adaptive all-wheel drive systems, front and rear axles (some multiple (e.g., Stryker, Caiman, etc.)
- Cooling Modules (e.g., engine/transmission heat exchangers, radiator, aux coolers and condenser for interior air management) – possibly pusher or puller fans
- Powertrain control modules (Engine Control Module (ECM) of Transmission Control Module (TCM) or combined PCM, interfaces including pin configurations/connector type with overall common design interfaces
- By-wire technology for safety critical subsystems (accelerator, steering, brake subsystems)

### Other critical efforts subsequent to the Strategic Commodity Plan

- Interface design specifications for mating commodities
- Volume (design) specifications
- In-vehicle Packaging requirements (i.e., max movement in the x, y and z direction)







# **Common Modular Open Architecture Way Forward**

For CMOA to be successful, will require strategic planning and creative implementation as well as a team effort across the ASA(ALT) and HQDA family. The PEOs, CTO and OCSE will work together to help define commodity plans, common design interface standards, and assist the acquisition teams in creating metrics to measure the commonality of future vehicles.



















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