

MOSA Basics

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Understanding MOSA is critical for fielding and upgrading civil and military vertical flight aircraft and other complex systems. This series provides insights into MOSA from a US defense perspective. Learn more at www.vtol.org/mosa.

A Modular Open Systems Approach (MOSA) is a technical and business strategy for designing an affordable and adaptable system. Despite its simplicity, organizations often make MOSA overly complicated. To prevent MOSA from becoming convoluted and difficult to integrate into acquisitions, it's essential to return to the basics of modularity and openness. By establishing a fundamental understanding of these concepts, MOSA can be consistently and easily described, especially for request for information (RFI) and request for proposal (RFP) documents.

Modularity

Modularity decisions are the cornerstone of a program's MOSA. It is where the "tailoring" aspect of MOSA begins. Deriving modularity decisions doesn't need to be overly theoretical. Past program experiences serve as valuable tools. The first step is to identify key components within a product or platform. There are often several very easy modularity decisions that a government program office can and should immediately identify. The program should start with known or projected government furnished equipment (GFE). Then identify modules associated with high-touch points. For example, if a vehicle owner desires to customize the stereo system, define the "stereo system" as a modularity decision, clearly outlining what it includes and excludes.

Next, leverage past experiences where the end products are generally known. For products heavily driven by the commercial sector, such as computing components, avoid lengthy systems engineering decompositions. Identify the modularity decision quickly and move forward. It is also important to consider past negative experiences, especially with frequently changing components or sub-components. For instance, a minor software change in navigation parameters might cause significant delays and costs if the code base lacks adequate separation of concerns; so, define the navigation module and maybe a few modules below it as well.

These basic steps provide a solid foundation for modularity decisions. There is no excuse for programs to have zero modules identified, even if they are simply draft considerations. Refinement can and should be achieved through RFIs with industry and teaming with vendors.

Openness

Openness in MOSA is often misunderstood. Openness does not mean open to everyone. It also does not mean that vendors give


up all their rights. Openness decisions require careful tailoring to avoid over-reaching for data rights and increasing program costs. There are three primary categories to consider relative to openness. First is standards and specifications. These play a crucial role in openness decisions. US Code Title 10, which outlines the legal basis for the US armed forces, now mandates leveraging widely used, consensus-based standards. However, simply calling out a standard is insufficient. It is essential to define critical aspects of the standard and down-select profiles, if necessary. Specifications with industrial base buy-in should also be leveraged.

Next is data rights. These should be driven by MOSA scenarios or use cases and tailored to specific program needs. Merely having government purpose rights (GPR) on everything is completely insufficient. For interfaces, GPR is the minimum expectation. For each component, the rights should be based on its associated MOSA scenario. For example: if a third-party modification is required for 10 of 15 software components, then expect at least GPR or maybe consider specially negotiated license rights (SNLR) for those 10 components to accomplish that scenario. For the other five, giving the government restricted rights may be perfectly fine as long as the interfaces are fully exposed and come with GPR.

Lastly, the technical data package (TDP) should be driven by MOSA scenarios and qualification needs. For third-party modifications, ensure a complete set of artifacts for each component — not just the entire system — to enable a third party to make modifications and the artifacts to be updated for just the component versus being tied to the entire system. Key artifacts, tools and critical design processes should be included. Interface data is captured as part of the required TDP. Interfaces are crucial but are not modularity decisions themselves. They help define modularity decisions but do not contain capabilities. Interfaces facilitate how modules relate to each other and should be considered when defining modularity.

With these three categories defining openness, it is very easy to communicate a program office's tailored desires for openness.

Conclusion

Returning to the basics of modularity and openness simplifies the MOSA process and lowers the perceived barrier to entry to move towards MOSA-centric programs. These basics can also be easily scaled for more "graduate-level" MOSA tailoring and definition. By leveraging past experiences, defining clear standards and tailoring data rights, organizations can effectively implement MOSA in their acquisition strategies. This foundational understanding ensures MOSA remains practical and achievable, avoiding unnecessary complexity. 

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