The Department of Defense (DoD) established the Modular Open Systems Approach (MOSA) for procuring new systems and upgrading existing systems. This approach is designed to reduce acquisition and sustainment costs without sacrificing capability and is mandatory* for all DoD efforts. The Space Dynamics Laboratory (SDL) has the experience and the services to help your agency integrate complex modular open systems.

*http://www.acq.osd.mil/se/initiatives/init_osa.html

SDL SERVICES:
SDL is one of 14 University Affiliated Research Centers (UARC)**, which provides:
- Independence and objectivity
- Current operational experience
- Freedom from real and/or perceived conflicts of interest

As a trusted government partner, SDL has had great success in facilitating and integrating MOSA in such programs as Space Plug-and-play Architecture and Modular Open Network ARCHitecture (SPA/MONARCH), Standard Network Adapter for Payloads (SNAP), Modular Space Vehicle (MSV), Operationally Responsive Space 2 (ORS2), Flexible Weapons (FLEX), and Distributed Common Ground System (DCGS).

**Engagement Guide Department of Defense University Affiliated Research Centers (UARCs), April 2013, OSD Studies and FFRDC Management Office

MOSA COST SAVINGS
By decoupling system components, MOSA provides cost savings in the following ways:
- Reduces interface definition and design effort by using standard interfaces
- Facilitates parallel development of hardware and software
- Reduces testing effort by consolidating changes
- Reduces system integration effort by allowing for individual component verification

MOSA’S MODULAR DESIGN
SAVES TIME AND MONEY

<table>
<thead>
<tr>
<th></th>
<th>TRADITIONAL IMPLEMENTATION</th>
<th>MOSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Cost</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>Integration Cost</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>Follow-on Cost</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>Reuse</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>Vendor-lock</td>
<td>▼</td>
<td>▼</td>
</tr>
<tr>
<td>Flexibility</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

100% Re-tested
Higher Cost

80% software reused with modification

20% New

100% Re-tested
Lower Cost

80% software reused

100% New

20% Re-test

20% New

100% Reused

100% Reused

100% Reused

100% Reused

100% Reused
Using packet encapsulation minimizes change propagation. The carrier can change, but the packet remains the same.

**Layered Architecture**
- Network conceptual model uses layered architecture
- Layers are developed independently
- Individual layers improve maintainability and enable layer modification with minimal impact
- Layer boundaries provide ideal testability
- Simple architecture for ease of use

**Net-Centric Implementation**
- System of systems
  - Communicates across heterogeneous network media via packet encapsulation
  - Abstracts complex interfaces into simple network accessible services
  - Enables communication between systems not originally designed to interoperate
  - Uses logical address to ignore physical location of components
  - Enables dynamic discovery of available network services

**Hardware Independent**
- Portable Operating System Interface constructs (POSIX and POSIX-like)
- Platform Abstraction Layer (PAL)
  - Provides standardized application programming interface (API) to the operating system and hardware
  - Localizes hardware-dependent code in a single layer
  - Allows for hardware and OS modifications without impacting the application code
  - Enables quick and easy code development for multiple software or hardware platforms

**Open Standards**
- Available to everyone
- Still interoperable with proprietary solutions
- Developed and maintained by the community
- Provider or implementation agnostic
- Allow for strong competitive solutions
- Open to improvement through a well-managed process