



The Open Group SOSA™

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The SOSA Approach in a Nutshell*



- The SOSA Consortium is a C4ISR-focused technical and business collaborative effort...
- Who: The Air Force, Navy, Army, Other Government Agencies (OGA), Industry(Primes, Second, Third tier, as well as Small Business suppliers) and Academia
- What: To develop a unified technical Open Systems Architecture standard for RADAR, EO/IR, SIGINT, EW, and Communications – and the supporting business models
- Why: To improve sub-system and system affordability, re-configurability, upgradability, and hardware/software/firmware re-use – and to shorten modification cycle times to counter emerging threats
- How: By developing an OSA via modular decomposition (defining functions and behaviors) and associated interfaces (including physical, protocol, and data structure) between the modules

* Based on "Sensor Open System Architecture (SOSA) Evolution for Collaborative Standards Development," SPIE Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2017

SOSA Development Strategy



- *COST Sharing: DoD and Industry Share Costs of Developing SOSA*
 - ***Skin in the Game*** Critical for Industry Buy In (See A lot Benefits for Participation)
 - ***Crowd Sourcing***
 - ***Long Term Savings***
- *Development Method: Incrementally develop and demonstrate SOSA components via Snapshots to full version(s)*
- *Series of prototype activities, in-step with intra/inter-service actions*
 - Execution Objective: Validate/verify SOSA specs via synchronized efforts w/ other organizations' efforts
 - Reduce risk for adopting programs by development → test → demonstration
 - Methodology mitigates effort's non-traditional/non-routine scope (i.e. requirement, funding, resources)

Why Sensor Open Systems Architecture (SOSA)?



SOSA Benefits Government & the DoD



Requirements

SOSA promotes procurement efficiency through provision of consistent guidance for system requirements and use of standardized contracting language.

Acquisition

SOSA shortens acquisition timelines for standards-based capabilities that maximize component re-use, limit NRE (non-recurring engineering), reduce development costs.

Sustainment

SOSA systems feature increased commonality that enables more efficient maintenance using readily interchangeable components.

Interoperability

SOSA sensors allow for dramatically improved systems interoperability, enabling composable mission capabilities & novel multi-domain solutions.

SOSA Benefits Industry



Risk

Mature, predictable procurement requirements allow for nimbler industry response with reduced risk.

Development Cost

Vendors can leverage proven modular decomposition, known interface definitions, standard tooling, and component re-use to minimize NRE, lower costs.

Product Families

Vendors can create functional product families based on the SOSA reference architecture, leveraging the inherent composable ability of the modular standard to focus on innovative solutions.

Strategic Sourcing

SOSA can broaden the sensor systems industrial base by promoting COTS component vendors, creating a sensor ecosystem that lowers the bar to entry for creative small & non-traditional businesses

SOSA Consortium Members

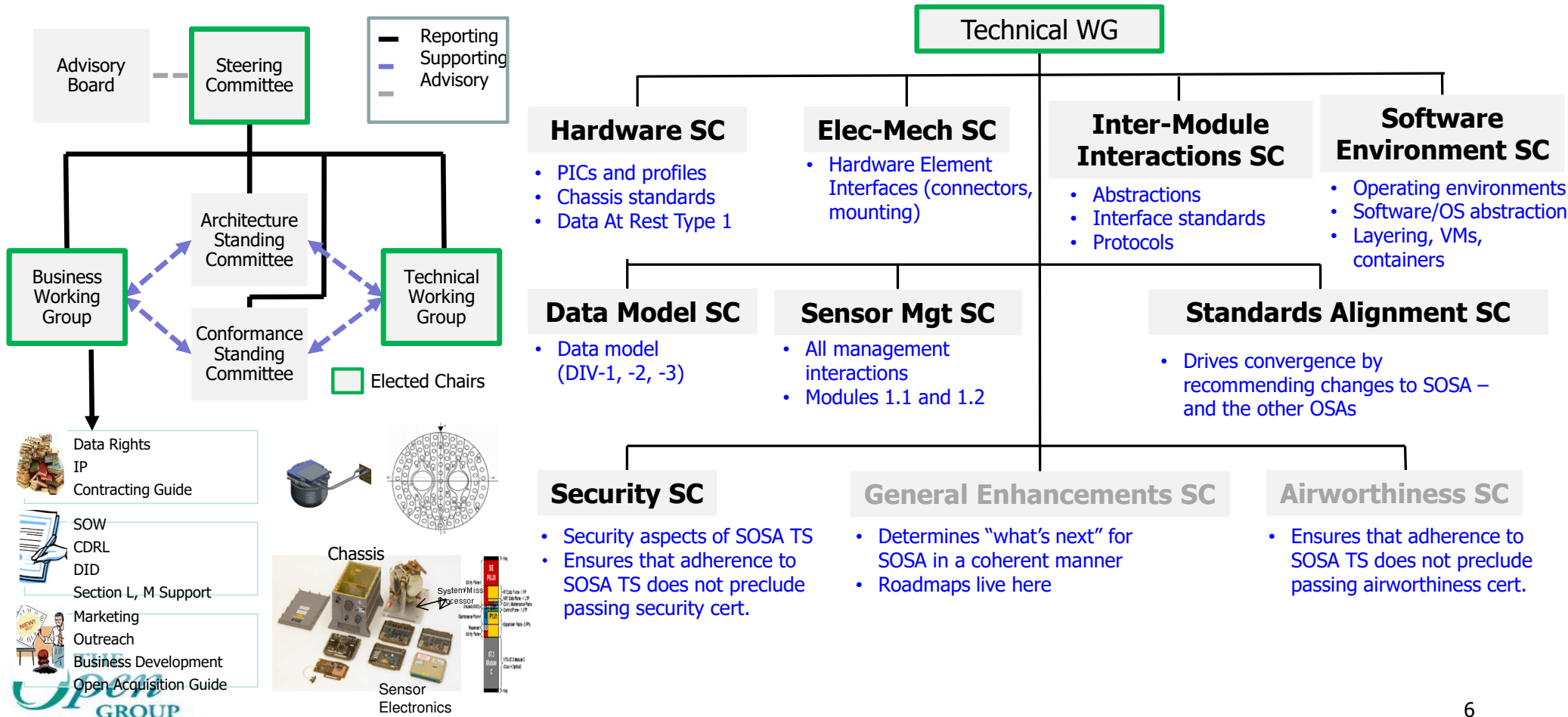


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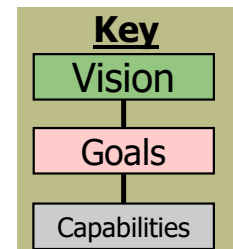
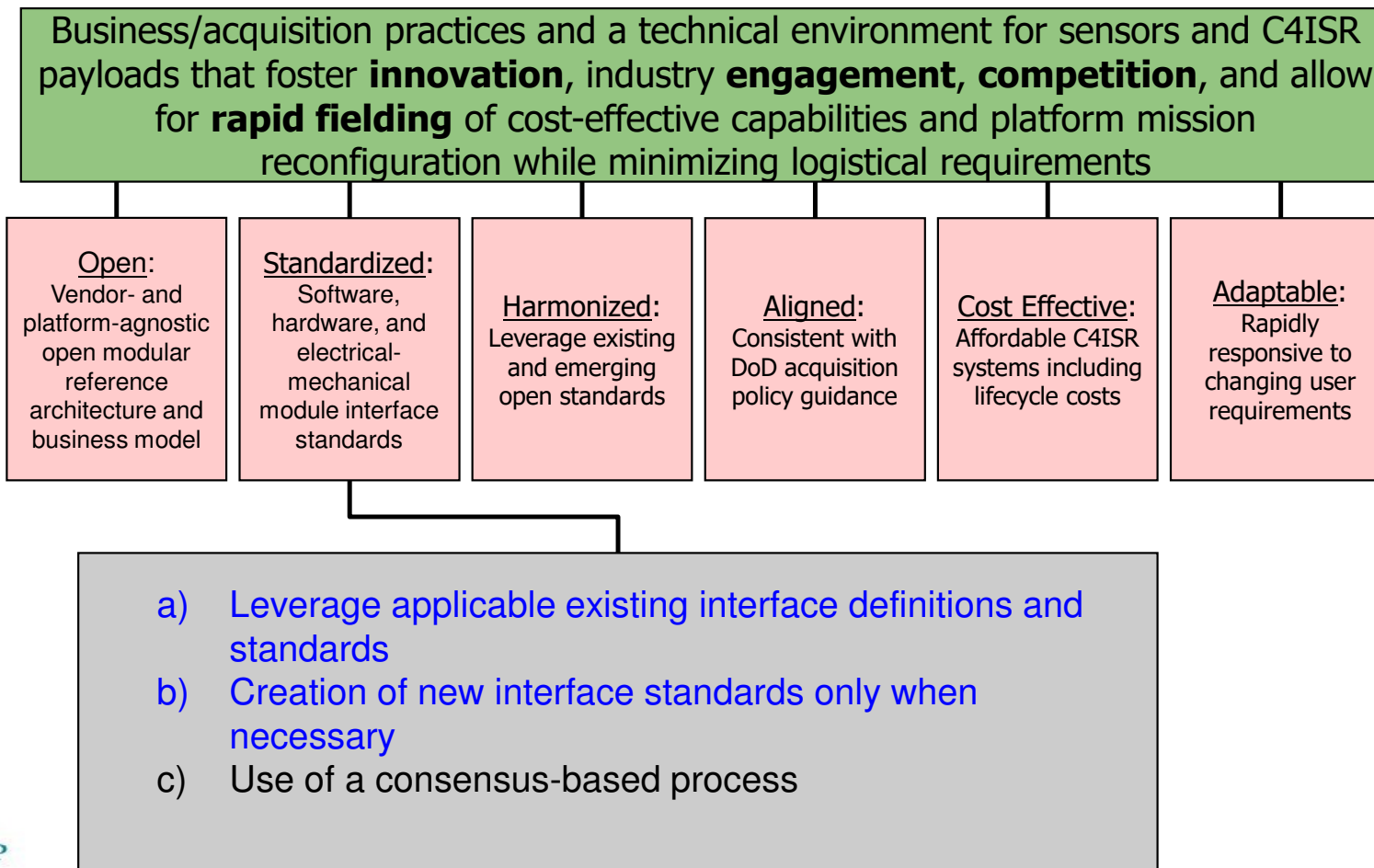


The SOSA Standard represents both governmental and industry organizations with 93+ members

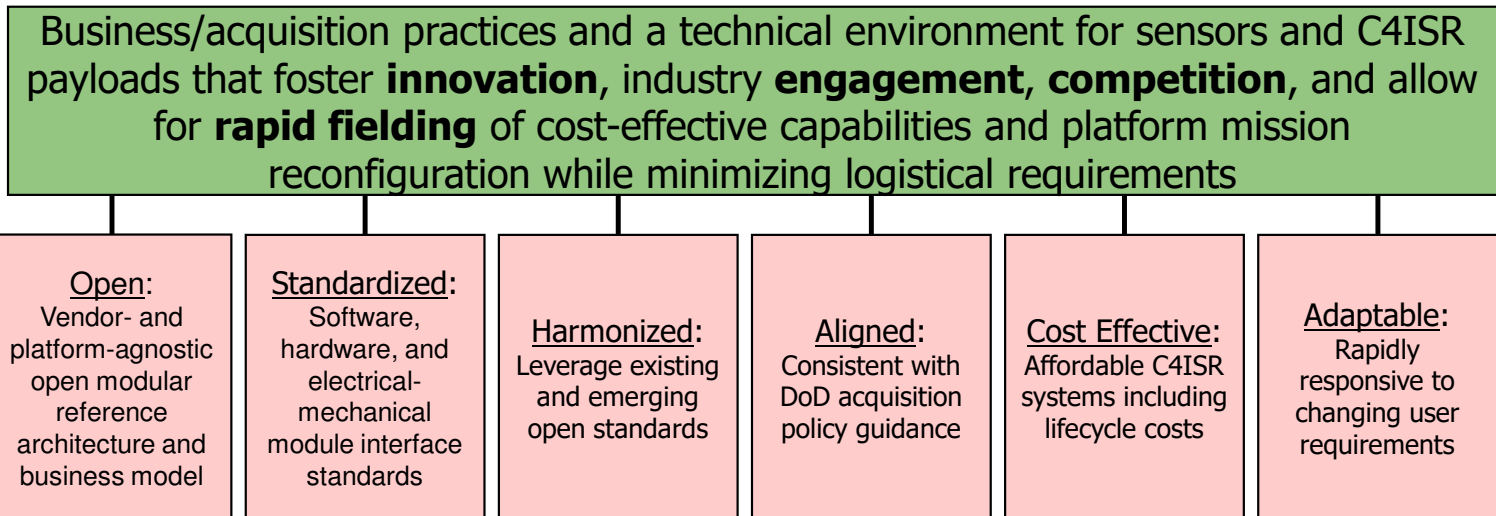
SOSA Working Groups and Sub-Committees



CV-1 for the SOSA Consortium: Part 2 of 6



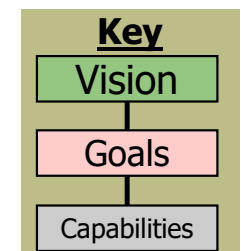
CV-1 for the SOSA Consortium: Part 3 of 6



KEY OSA's Leveraged:

- CMOSS/MORA
- FACE
- HOST
- OMS/UCI
- REDHAWK/TOA
- COARPS
- SAE 6169/29
- VICTORY

- a) Selection of subsets of applicable DoD-oriented open standards
- b) Selection of subsets of applicable industry/commercial open standards
- c) Deconfliction and adaptation of incorporated open standards



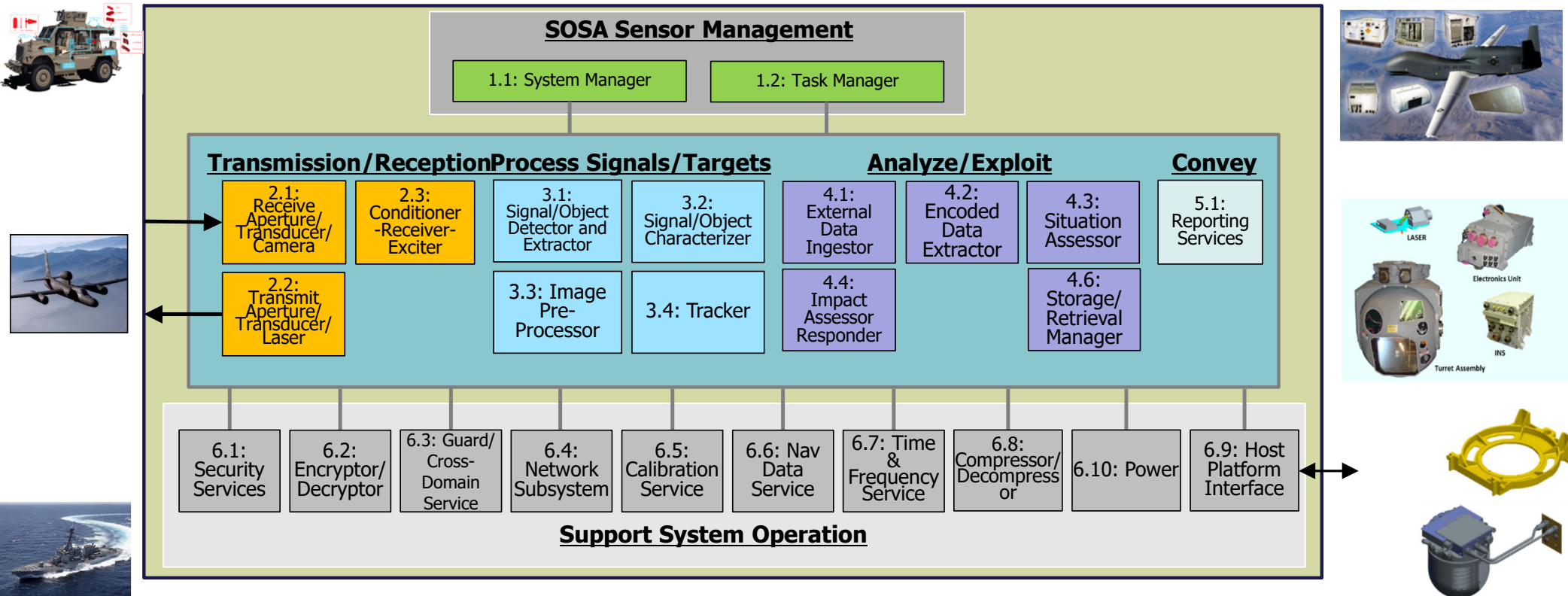
AF SOSA Program



- AFLCMC promoting SOSA hardware standard maturation and adoption
- Near term to host current software open architectures:
 - COARPS
 - REDHAWK/TOA
- Next to host emerging software open architectures
 - BIG IRON
 - MI-COARPS
 - OCS

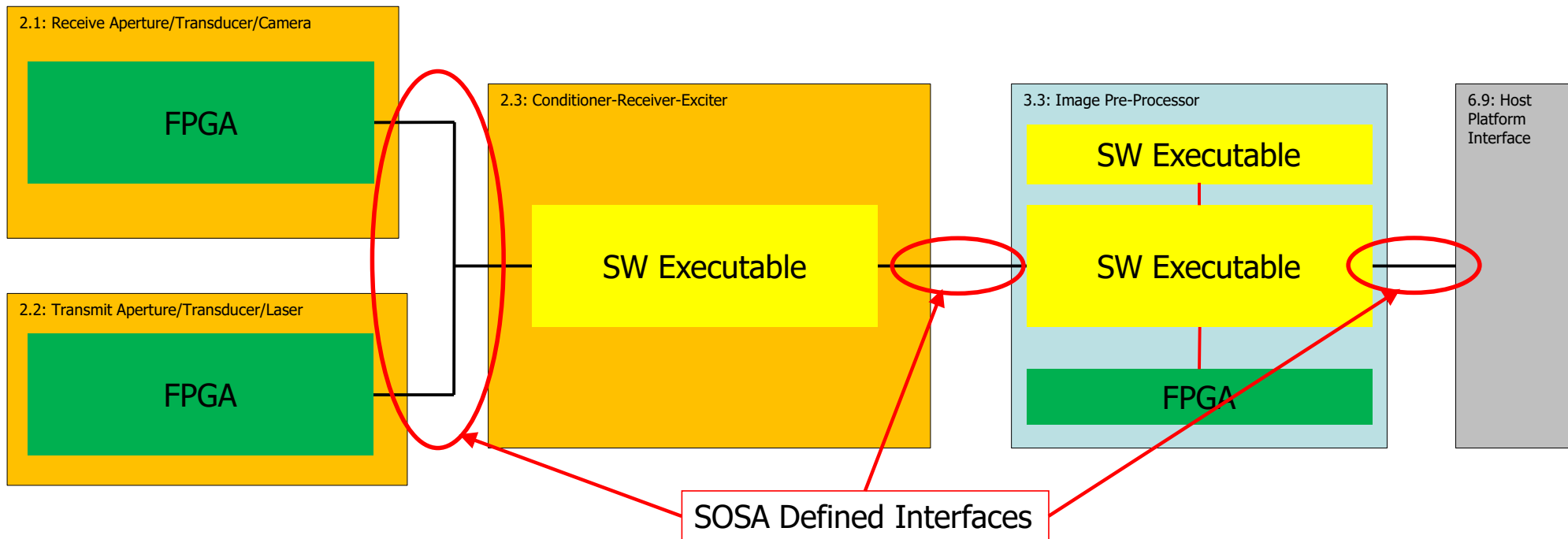
Leverage Existing Software Open Architectures on SOSA Hardware Instances

SOSA Architecture

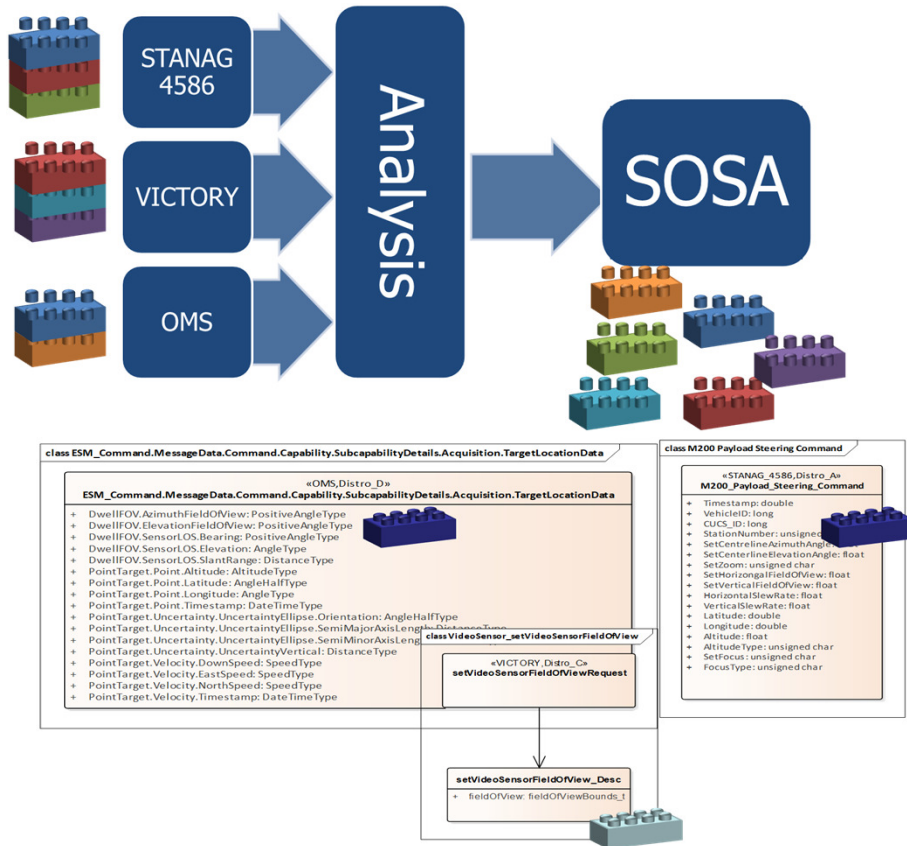


Each Module is Designed to be Competitively Procurable and Translatable to Selected OSA's

Generalized Inter-Module Interfaces (Independent of the Method of Instantiation)



MBSE Development SOSA Sensors C2 & Data Model for Digital Engineering



DATA MODEL Properties

IMPLICIT

- Asserts equivalence of information across the system(s)
- Transforms and manipulates data to be fit-for-purpose
- Encode, transmit, share, and exchange the data of a variety of mediums
- Addresses implications of data exchange behavior

- Traditional, non-scalable approach
- Saves money up front
- Yields Point-to-Point Integrations
- Results from Design
- Drives Complexity

EXPLICIT

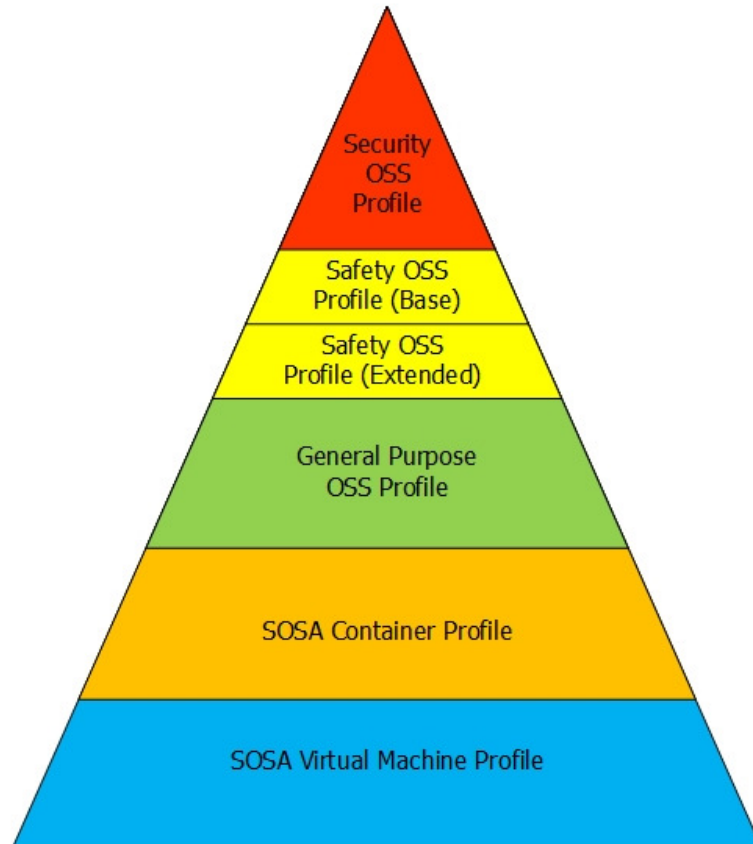
- Innovative, Scalable Approach
- Requires up front effort
- Yields Point-to-Multipoint Integrations
- Informs Design
- Manages Complexity

Leverages FACE Data Model

SOSA is building an EXPLICIT Data Model

SOSA Will Be the First MBSE Driven/Released Technical Standard

SOSA Software Runtime Environment Interface: Based on FACE™ Technical Architecture

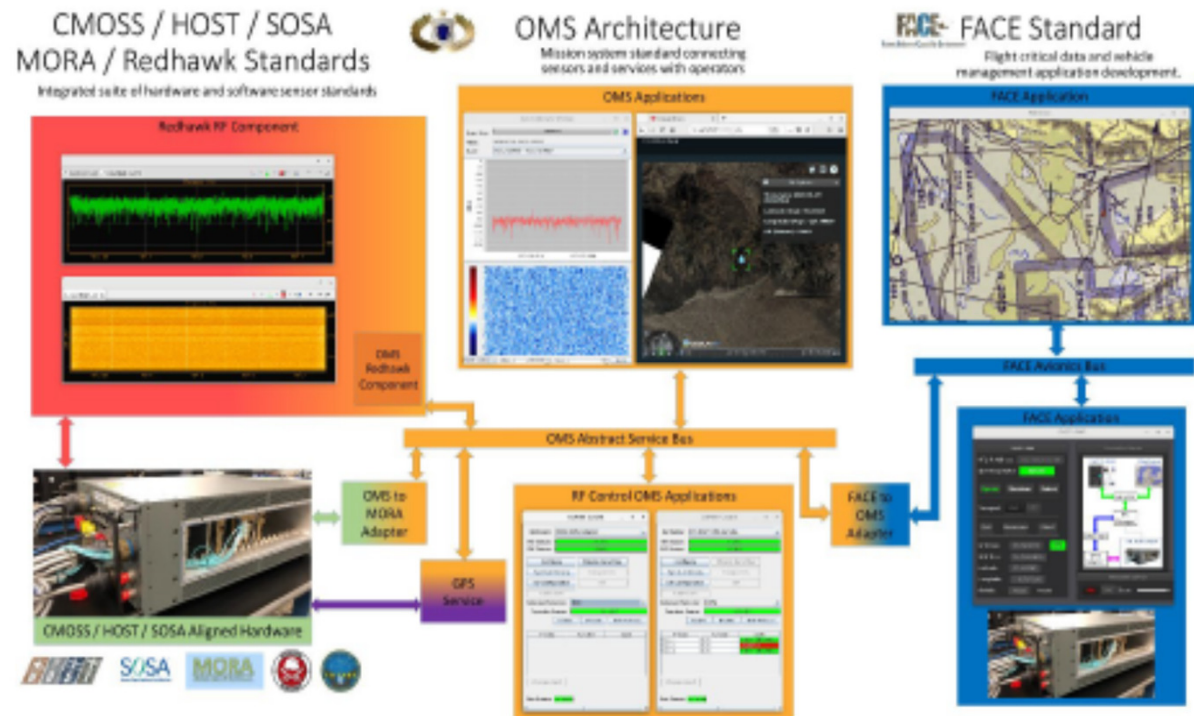


SOSA Software Runtime Environment Interface (REI) consists of SOSA application software interface to host system for language run time and calls to operating system services as defined by **FACE OSS interface**

REI does not mandate a particular runtime environment, although there are recommended solutions to promote open standards-based interoperability

TSOA Demo

- As demonstrated at T-SOA
 - Systems are heterogeneous
 - SOSA hardware can be integrated seamlessly with:
OMS/FACE/VICTORY/CMOSS/HOST/REDHAWK/TOA based mission systems
 - OMS-based mission systems can be seamlessly integrated with flight critical avionics
- Multiple Standards
- Multiple Interface Integration point governed by data models



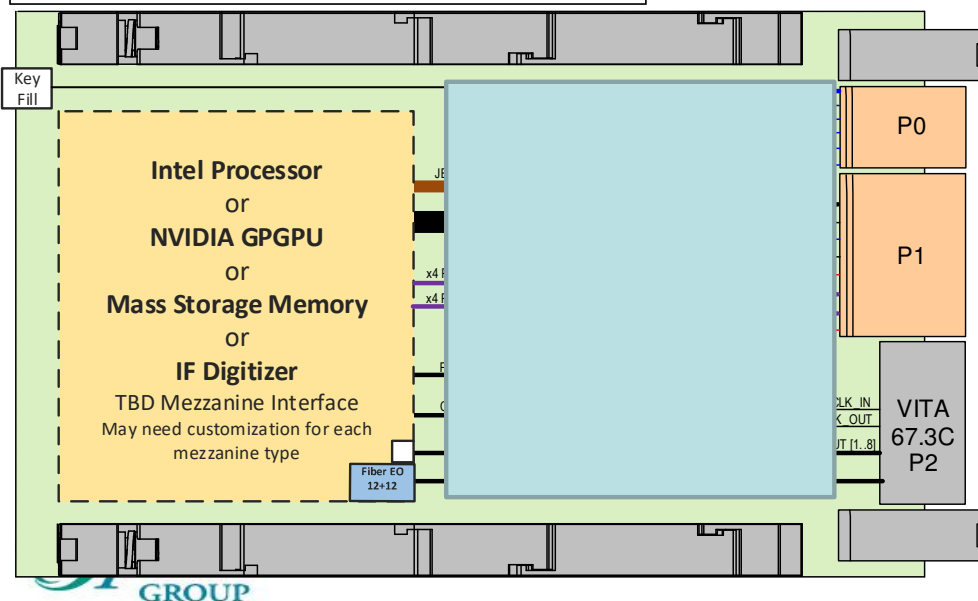
– SOSA is building an EXPLICIT Data Model – Addresses Complexity at the Points of Integration Within OSA's

SOSA Common C⁵ISR Processor Chassis CMOSS/HOST/SOSA

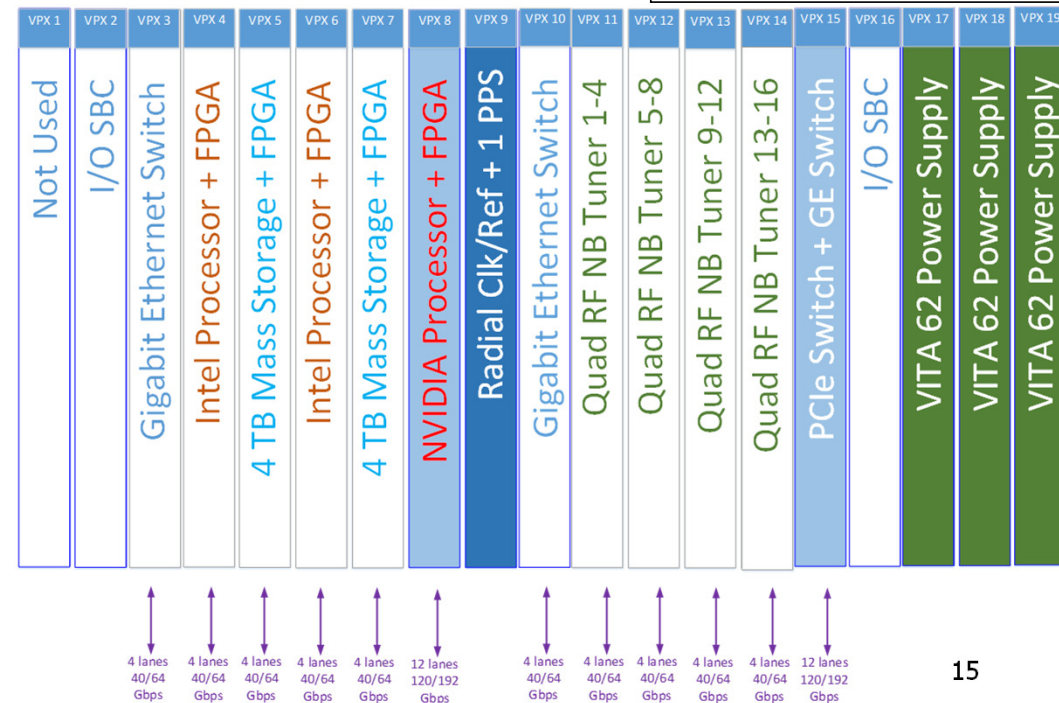


- In Practice: Uses SOSA backplane connectors natively (i.e AgilePod®)
- Implements standardized, generic interfaces to enable capability growth

Flat view of RF digital processing card

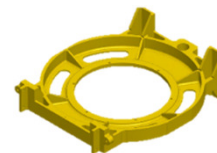
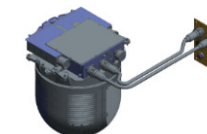
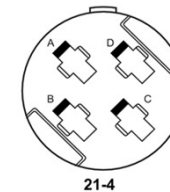


Spine view of slot profiles

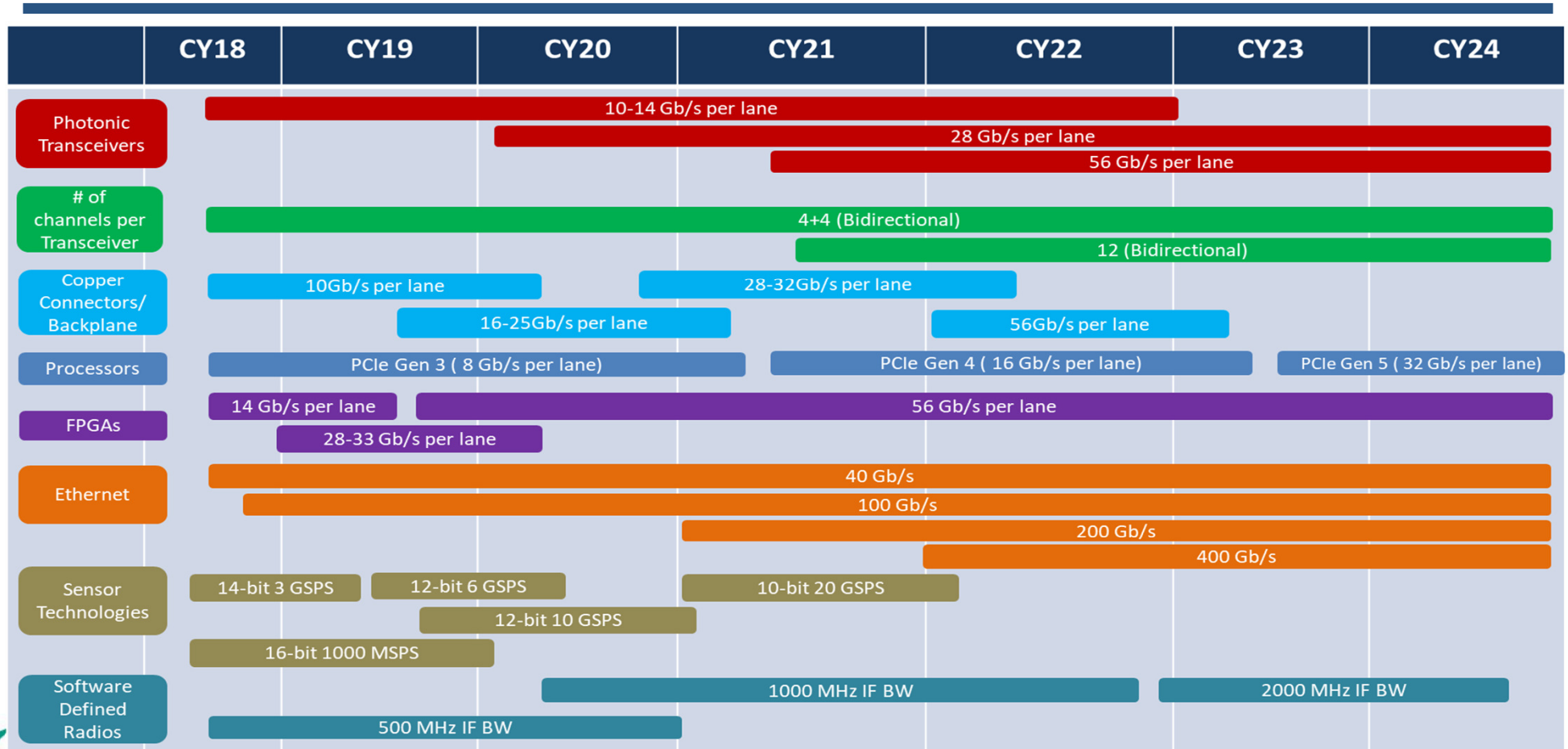


Electrical/Mechanical Interfaces

- SOSA specifications for Common Sensor Interconnects were successfully tested with AFRL AgilePod®
 - Performed first ever flight of AgilePod® with 8 different sensors
- Working on Next Generation High density performance Non Proprietary Fiber connectors for **ISR Digital Backbone** 100-GigE Network (threshold) 400-GigE (objective growth)
- Planning to add 5 inch Gimbal connector standardization for small UAS systems



SOSA Driving Commercial Activities for HW Roadmap



Support Future Programs and Planning Activities with Known COTS Upgrade Cycle

Considerations

- OSA for different sensor modalities (RADAR, SIGINT, EO/IR, COMMS, EW) requires careful thinking from technical and business perspectives for what makes sense for decomposition
- Key to OSA longevity is to think long term sustainment upfront in support of realistic acquisition timelines and schedules
- The SOSA Consortium is focused on leveraging existing standards in order to create open system reference architectures that are applicable to military and commercial sensor systems and a business model that balances all stakeholders' interests
- SOSA is geared toward fielding support for programs of record requirements to support near term within 2 years and long term within 10 years

Key Take-Aways



- The SOSA Consortium is developing a unified modular open reference architecture – and associated business model
 - Following MOSA principles, gray box model to protect IP and encourage innovation
 - Structured, top-down approach: Quality Attributes, Architecture Principles, using DoDAF
- Using a consensus standards-body approach to balance interests of all parties
- Products include the SOSA Technical Standard and the Business Guide
 - Initial “Snapshots” have been released for both
 - Conformance model is under active development

**Industry Pays More Attention to Tri-Service Collaboration Activities
(Volume is Key)**