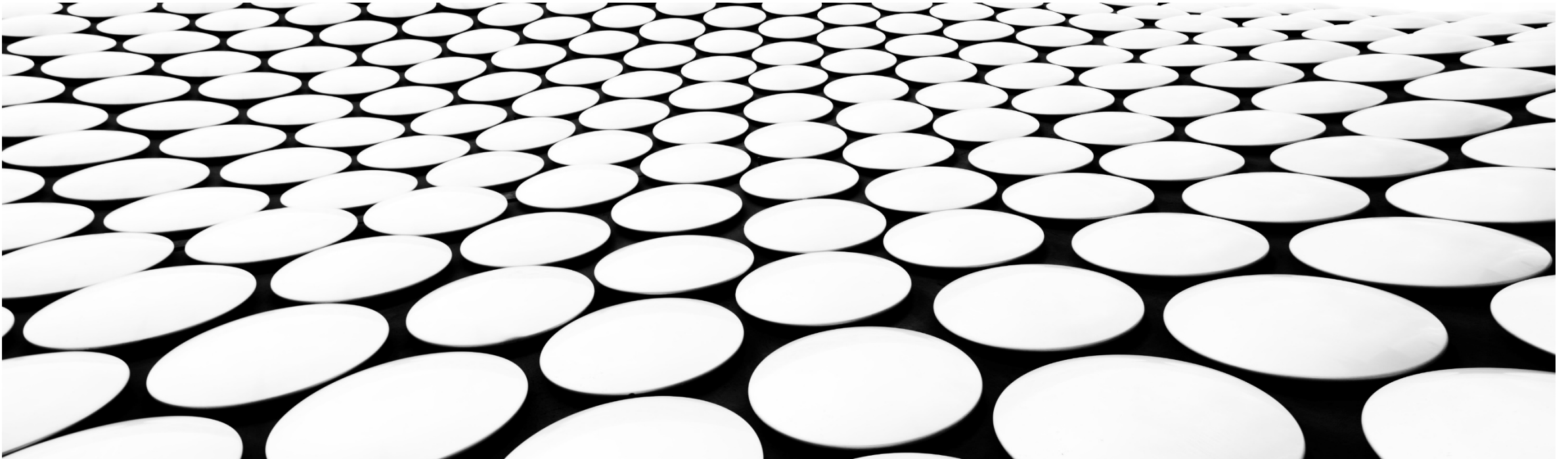


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# A POLL OF THE ARCHITECTURE STANDING COMMITTEE

04/23/2020



# POLL QUESTIONS

Here are the questions, again (for reference):

- Why are we here?
- What is the current situation that brought this group together?
- Why does OASIS exist?
- What current problem will OASIS solve?
- How will OASIS solve that problem?
- What is the value of OASIS?

## Numbers

- We received answers from six respondents



## SUMMARY OF KNOWLEDGE GAINED FROM THIS POLL?

- Need for Industry and Government collaboratively develop the architecture, the interfaces, and the functions.
- Current business and technical practices focus on program specific goals and program specific solutions
- Inferred: The notion of product lines and product line architectures (based on a reference architecture) are not present.
- The benefit of the open standards and open architectures allows for and maximizes reuse.
- Inferred: There is a need to understand and develop a set of key business drivers and attributes that encompass the effort. An example of this: lower integration cost, decrease integration time, and maximization of reuse.

# QUESTION 1: WHY ARE WE HERE?

- Answer: Provide a common set of language and definitions to inform COTS hardware manufacturers on interface requirements between COTS subassemblies, assemblies, and subsystems.
- Answer: Agencies and companies develop and implement their own or preferred system architecture. Parts' support pool stretches by availability and environments compatibility. Parts manufacturers drop non-profitable unique parts. Even ground support equipment becomes unique.
- Answer: To set a common but yet modular power architecture that is applicable to multiple space applications and spacecrafts. The architecture should include, but not limited to, the definition and implementation of health monitoring, fault handling/response, communication protocol, etc.
- Answer: To explore the possibility that developing standards for spacecraft power systems and components could lead to lower costs, faster development, and interoperable hardware from different vendors. It isn't yet obvious to me that this can be done, so it would be useful to explore some example use cases and see where standards would make sense, and where they don't.
- Answer: Technical solutions for Space Power systems continue to follow the same acquisition and development paradigm where solutions are envisioned and created on a program by program basis. These technical solutions are proprietary with architectures that were never meant for reuse. There are cost and schedule impacts that affect the end user's ability to implement these solutions.

We are here because we recognize institutions have a similar approach to power architectures with the same basic interfaces and reliability goals.

## QUESTION 2: WHAT IS THE CURRENT SITUATION THAT BROUGHT THIS GROUP TOGETHER?

- Answer: Spacecraft power systems have historically been designed as one-offs or for a specific platform. This has resulted in a multitude of proprietary and incompatible voltage levels, protocols, and interfaces.
- Answer: The development time for space applications is decreasing and cost pressures are increasing. At the same time reliability is not reducing. Having a set architecture that is flexible will decrease the development time, decrease cost and still meet the reliability requirements
- Answer: Looking for a communication protocol, signal or power interface, protection scheme, packaging, physical interface, etc that can be promoted among various platforms to extend the availability of components and potentially extend compatibility among applications. However, it is understood that there might not be a one solution for all platforms as the power, voltage, size, environments and mission class differs among them.
- Answer: NASA, and others, have independently developed standards for various spacecraft missions (AMPS for manned vehicles, MUSTANG and SAVOIR for robotic, maybe there are others in industry?). Are there benefits to be realized by finding areas of commonality between these activities where agreed-upon standards would be a benefit to all?
- Answer: Spacecraft Power systems are developed program by program. The types of systems are discrete in nature without much thought to technology updates in terms of integrated components, managed systems, and networked systems.

The current situation presents a trend of independently looking into reusable modularity yet not collectively.

## QUESTION 3: WHY DOES SPC EXIST?

- Answer: To define the architecture and to ensure its feasible to implement.
- Answer: Because there is interest in exploring commonality. In specific commonality of interfaces to promote compatibility of components and manufacturers interest in components and EEE parts development.
- Answer: To help bring government and industry stakeholders together to agree on standards to be used by all.
- Answer: The vision is Spacecraft power system reference architecture creation. To define a set of interfaces and functions that are present in any spacecraft power system. Maybe not all of them at once, but a combination of them depending on the use.

SPC exists because we recognize potential in a reusable modular power architecture applicable to multiple power applications. The architecture should include guidelines and standards for power management, distribution and interfaces.

## QUESTION 4: WHAT IS THE CURRENT PROBLEM SPC WILL SOLVE?

- Answer: Enable standardized connectors, interconnections, and protocols.
- Answer: Investigate existing standards, compare use cases to determine common needs, and come to a consensus on if and what specifications for the interfaces should be.
- Answer: The development time for space applications is decreasing and cost pressures are increasing. At the same time reliability is not reducing. Having a set architecture that is flexible will decrease the development time, decrease cost and still meet the reliability requirements (2a)
- Answer: Increase compatibility among vendors and agencies components. Close even further the time-gap between concept, development and implementation.
- Answer: Creation of a reference architecture that maximizes interoperability, defines a correct level of modularity, and compatibility among suppliers. The set of interfaces lowers integration and life cycle cost.

SPC will address how to propose the mentioned architecture thru guidelines and standards while retaining reliability, flexibility and the capability to evolve based on future new technology.

## QUESTION 5: WHAT IS THE VALUE OF SPC?

- Answer: **When?** Provide a common set of interoperability standards prior to the projected disaggregated small satellite industry market. **Who?** The small satellite industry drives the requirements of the standard.
- Answer: By bringing together leading aerospace companies and agencies, OASIS can provide an unbiased platform for contributors to work together.
- Answer: It is an inclusive group that defines this architecture. Users, government and suppliers working together to define the architecture. Sometimes a government only driven specification has gaps because the users can't implement it due to cost/time or suppliers can't/don't develop the function in their ICs.
- Answer: Expanding the available pool of components and parts for EPS applications. Potential growth in manufacturer's investment in new parts and components, Potential growth of environment hard components.
- Answer: What does success look like? New industry consensus standards that are used and referenced by AMPS, MUSTANG, SAVOIR, etc. to enable them to use common EEE parts, interfaces, and software/firmware. This will allow them to lower development costs and schedule, and perhaps provide opportunities for interoperability. I know I'm dating myself, but we want to enable a "VHS Economy" and not a "BetaMax Economy". For those too young to remember, VHS was an open video tape standard that allowed many manufacturers to build units that all worked with the same video tapes. Whereas, Sony had a proprietary standard that only worked with their hardware. Within just a few years, VHS dominated the marketplace, even though the quality was slightly worse than BetaMax.
- Answer: A standards organization that uses consensus to achieve its goals. The standard provides an overarching reference architecture with a set of open and key interfaces and functions. These interfaces and functions were created from existing standards. This creates a set of business drivers and attributes the ecosystem uses to verify adherence to the architecture and its standard.

SPC's value is the ability to gather these standards from current users and providers allowing for an understanding of the critical elements that will contribute to make this effort to be a success and accepted. These elements include project and system planning, parts availability, physical implementation, circuit compatibility, design reliability, etc.