**PIDs & Proposed Resolutions from CESG-P-2024-10-005 Approval to publish CCSDS 311.0-M-2, Reference Architecture for Space Data Systems (Magenta Book, Issue 2)**

**CSS AD Vote re CESG-P-2024-10-005:**

1. Section 1.3, re the text "...can, and have, been directly adopted for use with the UML and SysML representations that are provided by typical Model Based Systems Engineering (MBSE) tools" can references regarding the "directly adopted for use" be provided? Perhaps as a footnote?
   1. Added forward reference to Annex C in Sec 1.3.
2. Figure 2-4 -- can this be cleaned up? At least get the text to fit in the boxes (Metamodel, Environment), and not have the arrows slice through the text (e.g. it says "Offers" from Function to Service but it is not really clear). It should be possible to move the text or arrows sufficiently so that all is clear.
   1. Accepted. Figure 2-4 has been cleaned up.
3. Figure 2-4 -- what is meant by "prop" in Component Node, Connector (Link)?
   1. Accepted. Lazy fingers. “Prop” = Propulsion. Fixed.
4. Figure 3-1 -- Are the textual element for the "Logical Link between Elements" required for this icon? (these are "Service Consumer, Data, Service Provider") -- it seems this is an example application of the icon, not the icon "definition"? I will note that the box with "Data" tends to make sense as part of the icon definition. Perhaps "Service Consumer" and "Service Provider" should read Object A and Object B?
   1. Rejected. The intent is that the Service Provider end is the one with the “provided interface”, so yes, all of these aspects are intended to be part of the icon definition.
5. Figure 3-4 -- consider changing the term "Main Object” to just simply " Object". rationale: this more readily supports the composition of an object by other objects as opposed to a composition of a main object by other main objects and I think is more in line with what the diagram is showing. (Does RASDS distinguish between "main object” and "object"?) I think the change will make this figure more consistent with Figure 6-2 (which does not have a "main component", but just components)
   1. Accepted. Figure 3-4 has been cleaned up. Changed “main” to “functional”.
6. Figure 4-6 -- could use some cleaning (reference comment on figure 2-4 -- also, the little cartoon figures with thought and speech bubbles -- are these part of RASDS? If not does RASDS recommend these kinds of embellishments? ( to be clear, they do help, but I'm just trying to sort out what is actually RASDS versus what is not)
   1. Accepted. Will check figs in sec 4 (and elsewhere) for clarity. Also, will add note below fig 3-1 that other graphical elements may be added as needed, with ref to fig 4-4 & 8-5.
7. Annex C-- I am not sure that this add anything very useful. Reading through it, it appears more to be a tutorial on SYSML than actually showing anything on RASDS. Perhaps what could make this more useful is to show the RASDS equivalent for the SYSML diagrams shown . Presumably the RASDS diagrams would be more succinct? As is, I don't really see that this adds anything to elucidate or otherwise define RASDS -- perhaps remove?
   1. PID #1 asked about “can references regarding the "directly adopted for use" be provided? Perhaps as a footnote?”. This Annex provides those references, and does so in context.
   2. RASDS is a systems architecture methodology. We offer a simple, drawing-based, representation in the body of the document. And we offer, in this Annex, examples of mapping this method into a more rigorous representation using MBSE tools. MBSE tools, out of the box, do not provide the very useful set of viewpoints and ontological models that RASDS defines. SysML just says “you can have viewpoints.” But doesn’t provide any.
   3. Accept with mods. Retain Annex C as it is, but edit labels to the diagrams to more clearly tie them to RASDS viewpoints.
8. Figure C-4 – comments/TODO list regarding review with Mike Anderson may not be the most appropriate for a formal CCSDS document publication?
   1. Accepted. Remove that “todo”.

**SLS AD Vote re CESG-P-2024-10-005 Approval to publish CCSDS 311.0-M-2, Reference Architecture for Space Data Systems (Magenta Book, Issue 2):**

After a more detailed reading of the document, I am revising my vote. There are a few points that in my opinion would need to be addressed before publication.

1. In section 1.4, page 1-3, three additional viewpoints are introduced with respect to the previous version of the document. Since the more viewpoints, the more complex the architecture description, it is in my view crucial to explain why additional viewpoints are needed. In this respect, it is stated that they are there to support the needs of ISO TC20/SC14. A search for related definitions in ISO OBP indicated that only the Physical Viewpoint is defined by ISO, which begs the question about the origin of the other two viewpoints (Services, Operational). Where are they coming from?
   1. We established an agreement to form a liaison relationship in ISO TC20 with our ”sister” organization based on their desire to leverage what was already present in the five initial RASDS viewpoints. They produce a number of standards that are also in the space domain, but focus more on operational, management, and structural aspects of space systems. They specifically asked for these added viewpoints and that led to the current set. As it turns out, there are uses in CCSDS for the Operational and Services viewpoints as well, we had already defined and used them in the MOIMS / SOIS Application and Support Layer (ASL) architecture document, CCSDS 371.0-G-1. So in reality the only new concept we had to develop was the generalization of the physical aspects of the Connectivity Viewpoint.
   2. As for the comment “the more viewpoints, the more complex the architecture description”, that was never the intent. As is stated in Sec 1.3, “Only those viewpoints that are required for a given purpose need to be used. In many instances, only the Functional and Connectivity Viewpoints may be needed.” In Sec 1.3 we have added a new reference to Sec 2.4 that provides more specific guidance. The user only needs to adopt those few viewpoints that are useful for their purpose.
2. In section 2.3.2, the derivation of the Connectivity and Structural Viewpoints from the new Physical Viewpoint is introduced. However, it is not explained why they were needed.
   1. In sec 2.3.2, Physical Viewpoint, we stated “This viewpoint ‘owns’ the physical elements, but different aspects may be analyzed in derived viewpoints, such as Connectivity and Structural.” In the original RASDS we defined the Connectivity Viewpoint to “own” the physical elements and to operate within the physical environment. In working up how to handle the need for a Physical and structural viewpoint we realized that the purely Physical aspects could be owned by the new Physical Viewpoint, and that other, related, physical viewpoints could be derived from them, thus addressing structures, communications, and other aspects of the physical viewpoints like energy (thermal, gravitational, electrostatic, propulsion, …).
   2. We did not describe the process of how we arrived at this formulation, just the result of it, which we believe is quite clear. Can you agree?
3. The current definition of "viewpoint" in 3.2.5, page 3-5 is recursive, citing the term to be defined in the definition. A search on ISO OBP, even filtering for the relevant technical domain, provided way too many hits to be able to propose a solid definition. In some of those hits, the "architecture viewpoint" is equated to "viewpoint".
   1. Accepted. The definition did repeat the use of “viewpoint” as opposed to “view. It is now. …
   2. “A **viewpoint** is set of conventions, achieved using a selected set of architectural concepts and structuring rules, for the creation, interpretation, and use of an architecture **view** to frame one or more particular concerns within a space system.”
   3. The corresponding definition for “viewpoint” from ISO 42010, the meta-metamodel for RASDS, is this …
   4. “architecture viewpoint: set of conventions for the creation, interpretation and use of an architecture view to frame one or more concerns”

**SEA SAWG edits to CESG-P-2024-10-005 Approval to publish CCSDS 311.0-M-2, Reference Architecture for Space Data Systems (Magenta Book, Issue 2):**

**Issues identified during PID disposition:**

Sec 1.3, discussion about selecting among the several viewpoints and relationship to SysML.

Sec 3.3, after Fig 3-1: new text describing use of optional icons

Sec 6, 7, 8: clean up to diagrams where words like “hardw are” snuck into the figures

Sec 9 & 11: clean up of use of “Layer N” vs “Layer n” in text and diagrams. ISO uses “Layer N”

Annex C: minor edits to figure titles to emphasize RASDS utilization. Minor update to Fig C-4.

List of changed figures from file “SEA SAWG RASDS Figures CESG PID fixes 22Nov24”

Fig 2-4, 3-4, 4-6, 5-6, 6-2, 6-5, 7-2, 8-1, 9-1, 9-3, 10-5, 11-3

List of changed figures from file “SCaN Trade Space Architecture Model SO12-1275283 25Nov24”

Fig C-4