

# CCSDS Mission Planning & Scheduling WG

## Spring Meeting 2023

### Attendants:

Peter van der Plas (ESA), chair  
Christoph Lenzen (DLR)  
Cesar Coelho (ESA)  
Clement Hubin-Andrieu (CNES)  
David Frew (ESA)  
Dominik Marszk (ESA)  
Geoffrey Lochmaier (NASA)  
Guillermo Buenadicha (ESA)  
Maria Wörle (DLR)  
Marvin Wittschen (DLR)  
Olly Page (UKSA)  
Veniamin Zlobin (ESA)

### Agenda

Date	Time	WG	Topics
Mon 8 May	08:45 – 09:45 CDT	CCSDS	CCSDS Opening Plenary
Mon 8 May	09:45 – 10:45 CDT	MOIMS	MOIMS Area Plenary
Mon 8 May	09:45 – 12:30 CDT	CCSDS	Technical Editor Bootcamp (Peter, ...)
Mon 8 May	13:30 – 17:30 CDT	MP&S	<u>WG day #1 afternoon session</u> <ul style="list-style-type: none"><li>- Welcome and agenda</li><li>- Blue Book status: agencies review, XML service specification, SANA registry</li><li>- Blue Book technical discussion: internal comments, open issues</li></ul>
Tue 9 May	08:45 – 12:30 CDT	MP&S	<u>WG day #2 morning session</u> <ul style="list-style-type: none"><li>- Blue Book technical discussion continued (for remote participants)</li><li>- Participation to SM&amp;C session on MAL updates and BB review (Peter, ...)</li></ul>
Tue 9 May	13:30 – 17:30 CDT	MP&S	<u>WG day #2 afternoon session</u> <ul style="list-style-type: none"><li>- MP&amp;S extensions: configuration data distribution service look-ahead</li><li>- Blue Book validation: other missions and use cases (TBD)</li><li>- Optional: SM&amp;C session on MAL (Peter...)</li></ul>
Wed 10 May	08:45 – 12:30 CDT	MP&S	<u>WG day #3 morning session</u>

			<ul style="list-style-type: none"> <li>- Prototyping: status and technical discussion, next steps</li> <li>- Prototyping: Yellow Book discussion, including hands-on session (Guillermo)</li> </ul>
Wed 10 May	13:30 – 17:30 CDT	MP&S	<u>WG day #3 afternoon session</u> <ul style="list-style-type: none"> <li>- Prototyping: hands-on session on XML file formats (plan file)</li> </ul>
Thu 11 May	08:45 – 12:30 CDT	MP&S SM&C	<u>WG day #4 morning session</u> <ul style="list-style-type: none"> <li>- Joint session with SM&amp;C group on Automation (room TBD)</li> </ul>
Thu 11 May	13:30 – 17:30 CDT	MP&S SM&C	<u>WG day #4 afternoon session</u> <ul style="list-style-type: none"> <li>- Joint session with SM&amp;C group on Automation (room TBD)</li> </ul>
Fri 12 May	08:45 – 12:00 CDT	MP&S	<u>WG day #5 morning session</u> <ul style="list-style-type: none"> <li>- Look-ahead: adoption of the MP&amp;S standard, further validation activities, MP&amp;S extensions</li> <li>- Next steps, planning, actions</li> <li>- Next WG meeting</li> <li>- Reporting to MOIMS</li> </ul>
Fri 12 May	12:00 – 12:30 CDT	MP&S SANA	Meeting with SANA technical team (Peter)
Fri 12 May	16:00 – 17:30 CDT	MOIMS	MOIMS Area Plenary

## MoM

Session #1: Monday 8<sup>th</sup> May 2023, 13:30 to 17:30

Agenda: Welcome and agenda  
Blue Book status  
Blue Book technical discussion

### Minutes

Peter attended the technical editors bootcamp. Some potential issues were noted:

- The CESG explained that the Blue Book PICS table should be leading for the prototyping, such that all features listed in the PICS table are fully covered in the prototype. In our current testing approach, the complete coverage is missing for our information model, where some of the data structures and some of the attributes are not covered.
- The Secretariat explained that once the Blue Book draft (White Book) is submitted to the Secretariat for Agencies Review, the configuration control of the document will be with them. This means that the WG should not do parallel editing of the book during this period.  
The Secretariat will modify the documents, in terms of styles and format, and in

terms of wording. The use of terse style text and the clear separation of normative and informative text will be scrutinized.

The currently MP&S Blue Book contains macros for the automatic generation of the XML Service Specification. Once the BB is submitted for Agencies Review, a request to the Secretariat shall be provided to keep the macros in the book.

- The Secretariat reminded that all pictures in the document shall be in vector graphics, with the exception of photographic material. This probably invalidates the Enterprise Architect diagrams, which are currently exported as bitmap graphics due to a limitation of the EA software/license.

The current Blue Book status was presented. The draft Blue Book was already provided to the MOIMS-AD for submission to Agencies Review. Over the week, it was decided in the WG to keep the current submission on hold and to resubmit an updated issue of the Blue Book by the end of May.

The SANA Registry artefacts of the MP&S standard, being the XML Schemas for the File Formats and the XML Service Specification for the MAL, have been made available on the SANA beta-Registry (<https://beta.sanaregistry.org/r/mpsfileschemas/> and <https://beta.sanaregistry.org/r/moschemas/>).

The XML Service Specification was generated from the Blue Book and was tested successfully with the latest MAL implementation.

Session #2: Tuesday 9<sup>th</sup> May 2023, 08:45 to 17:30

Agenda:       Blue Book technical discussion continued  
                  Participation to SM&C session on MAL updates and BB review  
                  MP&S extensions: configuration data distribution service look-ahead

### Minutes

The WG discussed feedback on the current Blue Book, from both the Prototyping and other feedback. The agreed comments on the Blue Book are included in issue H5 as located on the GDrive. Some more comments may arise from the discussion on the Yellow Book on Wednesday, Guillermo will inform Roger in this case.

Peter and Olly participated to the MAL RID discussion in the SM&C session. There were many RIDs received (100+), mainly from the Agencies involved in the MAL (ESA, CNES, DLR). Most of the RIDs were deemed to be minor, however a couple of them may have an impact on the MP&S standard:

- There was a discussion on Nullable elements of the standard. This seems to be clear for nullable attributes in composites, but not for nullable elements in headers, service operations arguments and in the List element.
- The final agreement on how to deal with nullable List elements was not clear and needs further clarification with SM&C.

- Regarding the ObjectIdentity, it was proposed to remove the area and type, as these are redundant in the MOObject, being the only location where the ObjectIdentity is used.
- The ObjectReference was discussed as well, but we did not really understand the technical details, to be discussed with SM&C.
- There was a detailed technical discussion on the implementation of polymorphism and in particular with polymorphic lists, but it seemed that there was no negative impact on our Blue Book.
- The SM&C group indicated that the update of the MAL BB will be available by the end of May.

Regarding potential extensions to the Blue Book after its envisaged publication by the end of 2023, the following ideas were discussed:

1. To provide services to support the exchange of mission planning Configuration Data. The configuration data is already included in the MP&S Information Model. Additional data structures (related to input and output to a planning system) could be considered here.
2. To define the interface to a Planning Function as a service. This could be providing the capability to request specific information from a Planning Function to be used in another Planning Function.
3. The capability to monitor and control another Planning Function.
4. Conditional based branching and loop in Plans and Plan Execution.

The WG was reminded on the SpaceOps Conference paper where 3 mission (EnMAP, ExoMarsTGO and OpsSat) were evaluated with respect to the current Blue Book. Additional validation of existing missions at the different Agencies could be performed. Peter to check with NASA JPL (Steve) if there would be scope of validation using an existing JPL mission.

Session #3: Wednesday 10<sup>th</sup> May 2022, 08:45 to 17:30

Agenda:            Prototyping: status and technical discussion, next steps  
                      Prototyping: Yellow Book discussion, including hands-on session  
                      Prototyping: hands-on session on XML file formats

### Minutes

Both the ESOC and DLR prototypes are well advancing with the implementation of the services. The integration of the MAL updates is ongoing. Removal of work-arounds will have to take place, once the MAL v2 updates are available.

Some of the test cases will have to be extended:

1. To be aligned with the Blue Book issue H5;
2. DLR found some inconsistencies and typos, to be corrected;

3. The test cases have to be extended to cover the Nullable attributes;

As part of the updates, some feedback on the Blue Book H5 may be expected. Guillermo to update the Yellow Book and Table targeted for next week.

In addition to the current prototyping and the specified test cases, the WG identified that parts of the Blue Book (as per PICS table) are not fully covered:

- The XML File Formats. This was already discussed previously (Toulouse meeting).
- The data types not yet covered in the current prototype, being the Constraints (minus TimeConstraints, TimeWindowConstraints, DurationConstraints and ArgumentConstraints).

The WG agreed to update the Yellow Book to:

1. Include the BB PICS table as a starting point (test objectives) for the testing.
2. To separate the testing of the services from the testing of either the XML file formats and the Information Model. Part of the Information Model is already covered by the current prototyping, however as per above, the data types currently not covered should be included in the testing.

The way forward on the XML file formats and the missing parts of the Information Model is to cover this by XML based testing. As a starting point, the test specification shall be defined. ESA will take an action to perform this task.

The WG agreed that the testing approach shall be based on taking the test specification as an input by two Agencies, to create the XML files and then to compare the results. The test specification shall be defined in a way that no detailed technical knowledge of the standard is a prerequisite.

ESA is committed to support this additional prototyping. For DLR, a decision to support this is open and will depend on the effort and expertise need to perform the testing. This will be decided as soon as the test specification is available.

The target for completing all the testing is by the end of 2023, with the completion of the current prototyping possibly earlier (in principle as soon as possible, but depending on the MAL implementation).

Session #4: Thursday 11<sup>th</sup> May 2023, 08:45 to 12:30

Agenda: Joint session with SM&C group on Automation

### Minutes

Presentation of Automation at the different Agencies were provided.

The joint conclusion was that at the moment Automation is considered low priority, mainly because no clear interoperability use cases could be identified. Potentially, there could standardization regarding automation languages, but this may need the involvement of a larger community (e.g. with Industry).

Session #5: Friday 12<sup>th</sup> May 2023, 08:45 to 12:30

Agenda:        Look-ahead  
                  Next steps, planning, actions  
                  Next WG meeting  
                  Reporting to MOIMS  
                  Meeting with SANA technical team

### Minutes

The minutes of the MP&S sessions during the week were prepared by the WG. Some take-aways:

- The current submission of the Blue Book to the MOIMS-AD was withdrawn and a new issue shall be made, to include the latest feedback from the WG and to align with the MAL book after AR RID disposition, to be submitted to the MOIMS-AD by the end of May or early June.
- The current prototyping shall be completed in the near future, depending however on the completion of the MAL implementation by Cesar. The Yellow Book specification is complete, pending some updates to be made by Guillermo in the near term.
- Additional XML based prototyping will be required to cover all aspects of the MP&S standard as per BB PICS table. The Yellow Book shall be extended to include the additional test cases specification. The implementation shall be performed by ESA and another agency TBD.

The presentation to the MOIMS-AD was prepared by the WG.

A short meeting with the SANA technical team was held. The SANA team is considering updates to the SANA Registry for supporting files and versioning. The way the MP&S WG intends to use the SANA Registry was explained, including its need for versioning of the files and the need for accessing previous versions. The SANA team will consider this for their envisaged update to the system later this year.

### Summary of actions:

- Peter to contact NASA (Steve) for possible validation use cases.
- Roger to update the Blue Book with new feedback from the WG and with the updates to the MAL book resulting from the RID dispositions.

- Peter to submit the updated Blue Book to the MOIMS-AD for Agencies Review by the end of May or early June.
- Peter to ensure that the manpower will be available from ESA side for the specification and execution of the additional XML test cases in the Yellow Book.

### Next meeting:

Next WG meeting will be TENTIVELY on Wednesday **7 June 2023**, 16:00 – 18:00, also to be confirmed by Roger.

Next Prototyping splinter will be TBD.

### Attachments:

None.