

# Minutes of the CCSDS Spacecraft Monitoring & Control WG

Meeting: SM&C WG Workshop 22  
 Location: London, UK  
 Date of Meeting: 10Nov14-14Nov14  
 Date of Minutes: 18Nov14  
 Issue: 1.0

## Participation

Name/Agency	Mon AM	Mon PM	Tue AM	Tue PM	Wed AM	Wed PM	Thu AM	Thu PM
Afarin, James (NASA)				x				
Allard, Francois (ESA)		x						
Amundsen, Mike (NASA)	x	x	x	x				
Antonov, Ivan (FSA)	x							
Behal, Brigitte (CNES)	x	x	x	x	x	x	x	x
Blommestijn, Robert (ESA)	x	x	x	x		x	x	
Champsavoire, Nicolas (CNES)	x	x	x	x	x	x	x	x
Coelho, Cesar (ESA)	x	x	x	x	x	x	x	x
Cooper, Sam (ESA)	x	x	x		x	x	x	x
de Cola, Tomaso (DLR)								x
Duhaze, Marc (CNES)	x	x	x	x	x	x	x	x
Fatig, Curtis (NASA)	x	x	x	x	x	x	x	x
Fowell, Stuart (UKSA)						x		
Gartner, Stefan (DLR)	x	x	x	x	x	x	x	x
Grubbs, Rodney (NASA)		x						
Harrison, Ian (ESA)	x	x	x	x	x	x		
Higgins, Hayley Jane (ESA)							x	
James, Steven (UKSA)		x	x	x				
Jones, Ronald (NASA)	x	x	x	x	x			
Kearney, Mike (NASA)	x	x						
Lord, Ken (CSA)	x	x						
Merri, Mario (ESA)	x	x	x	x	x	x	x	x
Miyano, Yoshikazu (JAXA)	x	x	x	x	x	x	x	x
Newhouse, Marilyn (NASA)	x	x	x	x	x	x	x	x
Nogueira, Tiago (ESA)	x	x	x	x	x	x	x	x
Peccia, Nestor (ESA)		x	x	x	x	x	x	x
Poupart, Erwann (CNES)	x	x	x	x	x	x	x	x
Sarkarati, Mehran (ESA)	x	x	x	x	x	x	x	x
Smith, Dan (NASA)	x	x	x	x	x	x	x	x
Suzuki, Kiyohisa (JAXA)								x
Taylor, Chris (ESA)						x		
Thompson, Roger (UKSA)	x	x			x	x	x	x
Tsuchiya, Heinrich (JAXA)								x
Valera, Serge (ESA)					x			
Wendler, Michael (DLR)	x	x	x	x	x	x	x	x
Zundo, Michele (ESA)	x	x	x	x	x	x	x	
<b>Totals</b>	<b>24</b>	<b>27</b>	<b>22</b>	<b>22</b>	<b>21</b>	<b>22</b>	<b>20</b>	<b>20</b>

## Agenda

The agenda was reviewed and updated in the course of the workshop. The final agenda is provided in attachment [A01].

## Review of Open Actions

The open actions were disposed as follows.

ID	Action	Due	Actionee	Status
111102-01	SC and Stuart to update the SM&C-SOIS MoU with the material in the TN. Final version (w/o change bars need to be distributed).	01Nov14	SC	OPEN. Postponed to 31Dec14 and assign it only to SC. SC confirmed that the MoU requires updates and that a meeting with the SOIS group needs to be organised, mainly on the potential strong relation between the MAL and the EDS.
130416-03	IH to draft a document that explains how MO service could fit to the current ESA operational concept.	01Nov14	IH	OPEN. Postponed to 31Dec14.
131029-	SC to establish a public repository of known issues	01Nov14	SC	OPEN. Postponed to 31Dec14. SC confirmed

ID	Action	Due	Actionee	Status
04	on published books and distribute instructions on how to consult the repository and on how to submit new issues.			that he prototyped a shared repository on GitHub and he is waiting CNES's comments to make it available to the WG.
131031-04	MM to identify way of collecting information on activities relevant to MO services (e.g. lists of studies, developments, prototypes, OSS, ...), maybe using the CCSDS Wiki).	01Nov14	MM	OPEN. Postponed 31Dec14
140204-01	Following the response to Action 131029-05 (see MoM of WebEx #071), DS to validate if the MO data model for the parameter service fits with XTCE using a side-by-side table.	01Nov14	DS	OPEN. This action is kept open and postponed to 31Dec14. Following the presentation [A10], it was agreed that the mapping is yet to be performed. SC will provide RJ/KR information on which M&C Service table to look at in order to do the matching with XTCE. See Action 141111-10.
140331-02	SC to agree with PS and document 2 or 3 scenarios where the SCCS-ARD charts could be extended to include MO services/MO Stack.	01Nov14	SC	OPEN. Postponed 31Dec14
140401-03	ALL to review at high level the Common Service BB to identify macroscopic errors or missing material.	01Nov14	ALL	CLOSED.
140401-04	NC to distribute to the WG the Common Service specifications defined by the ISIS contractors.	10Nov14	NC	CLOSED. It was agreed that NC will provide the CNES experience by commenting on the updated Common Services.
140402-04	MM to use the TRL to document the status of the MO services and its roadmap.	01Nov14	MM	CLOSED. See presentation later on.
140402-05	SC to put the MO Services GB and the Reference Model MB on GoogleDocs and to inform the WG members by providing basic instructions/conventions on how to review the documents.	01Nov14	SC	CLOSED. Following Action 141110-01, GoogleDocs is a good tool for fine tuning. The "major" editorial revision foreseen implies that the changes to the GB will be done first offline and later on put on GoogleDocs.
140819-01	ALL Agencies via their nominated representatives to confirm or otherwise the criteria and the weights suggested by SJ for the selection of the best ground-to-ground technology bindings.	01Nov14	N.Champsavoire (CNES) M.Sarkarati (ESA) S.Gartner (DLR) S.James (UKSA) L.Martinez (NASA) L. Kudrin (FSA) M.Yoshikazu (JAXA) J.Su (CNSA)	CLOSED. See presentation later on.
140819-03	SC to establish a repository for changes to published documents to be implemented in future issues. Also define a strategy to accommodate both changes that have been already agreed the WG and changes that are proposed by the OSS community.	01Nov14	SC	CLOSED with action 131029-04.
141020-01	MM to raise the matter of overlapping between SM&C and CSS with the CESG chair in view of a possible management meeting in London	ASAP	MM	CLOSED.

## 10Nov14 AM

### CCSDS Plenary

- The WG attended the CCSDS plenary.

### MOIMS Plenary

- The WG attended the MOIMS plenary.

### SM&C WG Plenary

- MM delivered the presentation [A02].

**Action 141110-01**      **MZu to redline the MO Services GB (issue 3) in order to align it to current status of SM&C, and make it more readable and user friendlier. Due 28Feb15.**

**Action 141110-02** *SG to check if the MO Service tutorial is up-to-date, in particular on how to use the GitHub, and make it available via the MO Service Wiki on GitHub. Due 31Dec14.*

- MM delivered the presentation [A03] with his proposed answer to the NASA position on the M&C book. The WG agreed with his position.
  - Following discussion with the NASA representatives, James Afarin and Dan Smith, it was concluded that the plan for the production of technology bindings presented in [A03] was considered meeting the NASA conditions with the clarification provided by MM (which will also be included in the final version of the M&C BB) that once the service is cast in a given technology binding it will provide an on-the-wire interoperable interface. Based on this agreement, NASA will not block the publication of the M&C Services as a BB book.
  - Regarding the clarification requested by the SM&C (what is actually meant with the "service behavior specifications"), DS confirm that the service behaviour is covered in the specifications.
- MM delivered the presentation [A04]. This present the ESA position on the issue of overlap between SM&C and CSS. This position will be discussed during the dedicated splinter meetings organised by the CESH.

## 10Nov14 PM

### MOSSG

- MK delivered the presentation [A05].
- The presentation was very welcomed by the SM&C WG.
- The preliminary MOSSG priority 1 for MO Services are:
  - Archive Service
  - File Management
  - Navigation Service
  - NEW Security Service
  - M&C
  - Planning Service.
- The following topics were identified as needed some clarification from the SM&C WG:
  - Automatic Configuration of Services: it was explained that a configuration service is already included into the Common Services. However, this service has currently only one operations to "activate" a given configuration. MOSSG will be invited to review the draft standard to verify that their needs are fully covered. On this topic, see also Action 141111-05.
  - Security Service: The need for this service, currently not available, was questioned by the MOSSG. For the time being, no action is to be taken, however, if this will be tackled in the future it should be done in cooperation with the Security WG.
  - Service discovery: It was explained to the MOSSG that the Directory Service in the MO Common services provides the means for service discovery. In an ideal use case, the MOSSG explained that a client will first discover who offers a given service. It will then download the configuration from the service provider to be able to access the service with minimal out-of-band agreement. This will be covered in Action 141111-05.
  - Coherently with the point above, the MOSSG would like to minimise the amount of additional information that is required to be negotiated between parties that agreed to use MO Services.
  - It was agreed that the following will be done: based on the analysis of the JSC-DLR prototype ICD, all the items that need to be agreed between the two parties outside the standard will be listed. The resulting list will document the out-of-band agreement needed to run the service, which needs to be captured in the standard. A possibility, could be to put this list of items as an appendix of the each service BB. In addition, it shall be identified which of this data could be automatically configured via the configuration service.
  - Archive Service: A similar exercise shall be done for the Archive Service: what additional information needs to be specified in an ICD in order to access and understand an archive?

**Action 141110-03** *SC, SG and IH to check the ICD of the JSC-DLR prototype and to confirm, in case MO M&C Services are used, which parts are still needed and which parts are now redundant and can be removed. The list of all the items that need to be agreed between the two parties outside the standard will be produced and a recommendation shall be provided on how to document it in the standards.*

*Make also a similar exercise for the COM Archive Service both for data retrieval from the Archive and data inclusion into the Archive. Due 31Dec14.*

### **CESG Meeting on Overlap - Session 1**

- See notes and conclusions by CESG.

## **11Nov14 AM**

### **Common Services**

- SC delivered the presentation [A06]. The following services were discussed:
- Access Control Service. This service is currently not in the book. The basic idea of the service is to manage the access to functions. This service is also considered as a way to match the new PUS-C feature to manage compound checking functions. After some discussion, it was not clear if this requirement is needed at all.

*Action 141111-01 ALL to provide SC with use cases that justify the need for the Access Control Service. Due 10Dec14.*

*Action 141111-02 SC and CC to investigate how to support PUS-C functional monitoring feature in the M&C Check service. Due 01Dec14.*

- Directory Service: It was agreed to verify other directory services already available (e.g. UDDI) and compare them with the MO Directory Service for completeness or need.

*Action 141111-03 CC to compare the MO Directory Service with other similar services (e.g. UDDI) for completeness or even need. Due 30Nov14.*

- Configuration Service: Currently the service contains only 1 operation to activate a given configuration. It was discussed if the service should be expanded to include also other capabilities, for instance the ability to ingest/deliver a specific configuration. Also, the availability of a standard (file) format to hold the configuration could be useful: in this way the service provider and consumer could be automatically configure their ends.

*Action 141111-04 ALL, including the MOSSG, to provide SC with use cases for the Configuration Service. Due 10Dec14.*

*Action 141111-05 SC to draft a TN with the proposed expansion of the Access Control Service and Configuration Service to meet the submitted (and implicit) use cases. Due 31Jan15.*

## **11Nov14 PM**

### **OPS-SAT**

- SC delivered the presentation [A07].

### **Best Technology mappings for ground-based MO services**

- SJ showed the spreadsheet with his proposed template to identify the best technology mappings for ground-based MO services that should be developed with priority [A08].
- So far only DLR responded.
- It was agreed that we should capitalise on the encodings/transporters that have been already implemented in prototypes (JMS, RMI and TCP-IP).

*Action 141111-06 SJ 1) to rework the template for technology mappings in order to isolate standards, implementation and encoding aspects, and 2) to map the encodings/transporters that have been already implemented in prototypes (JMS, RMI and TCP-IP). Due 31Dec14.*

*Action 141111-07 MW to check within DLR if there is the possibility to support, possibly also by means of students and/or trainees, the production of a technology binding BB. Due 31Dec14.*

## **SPP Status + Prototype**

- SG delivered the presentation [A09].

**Action 141111-08** *BB to check if all CNES OSS could be put on GitHub (currently only the testbed is). Due 31Dec14.*

## **XTCE**

- RJ delivered the presentation [A10].
- The BB will be published by OMG in March 2015.
- It will be checked if the approved BB by OMG could be directly approved by CCSDS without Agency Review, but with an updated YB.

**Action 141111-09** *MM to check if the EGC-CC ICD based on XTCE could be published as it may be done for NASA/GovSat (i.e. directly in SANA). Due 31Dec14.*

**Action 141111-10** *SC to provide RJ/KR information on which M&C Service table to look at in order to do the matching with XTCE. Due 01Dec14.*

- DS discussed with T. Gannet that, upon approval by the OMG, the updated XTCE document will be submitted by the SM&C WG chair for the normal Agency review. However, the review will be accompanied by a note stating that agencies are supposed to respond with either a Yes or No vote. Also, T. Gannet recommended that prototype should be waived on the basis of the testing already done in the context of the OMG approval.

## **12Nov14 AM**

### **M&C Service Wash up**

Discussed BB issue #20 on GitHub: the issue raised by BB was agreed. There will be 2 approaches: the check will be true if 1) the number of consecutive violations exceeds a given maximum or 2) the number of violations (non-consecutive) exceeds a given maximum in a given time

- Discussed BB issue #21 on GitHub: The specs will be changed to cope with the divide by zero situation.
- Discussed BB issue #38 on GitHub: The issue is that on some fields it is possible to use the update operation which will update the value of the field without keeping the persistence. In other cases, the update operation is refused. SC will provide a list of modifiable fields for the WG to check.

**Action 141112-01** *SC to provide the list of M&C Services fields on which the Update operations is enabled. Due 01Dec14.*

- File Based Operations: Splinter during lunch.
- NASA issues: There are no problematic issue and the received comments will be used to update the document before publication.

### **Status of C++ Language API**

- DS reported that NASA/JSC has been working on this, but unfortunately, due the absence of LM, he does not have direct updates. DS also confirmed the NASA commitment to produce the document.

**Action 141112-02** *DS to provide an update on the status of the C++ Language API. Due 30Nov14.*

### **PUS/MO Services Comparison**

- CC delivered the presentation [A11].

### **Concept for MO Navigation services**

- TN delivered the presentation [A12].

## **12Nov14 PM**

### **Joint mtg with SOIS**

- Possible relation between MAL and the Software Electronic Data Sheet (EDS).
- It was acknowledge that there is the potential for overlapping as SW EDS will use services. However, SW EDS are only planned work at this time. It was agreed that the representatives of the SM&C WG will be invited once the topic will be more concretely discussed in the SOIS.

- It was agreed that SC will draft an update of the SOIS-MO MoU. There is already an action open (Action 111102-01) to this effect.

### **MO Service TRL**

- MM presented the draft document [A13].
- Revise the table with “DONE” and “PLANNED”
- Consider grouping framework
- Consider splitting Space and Ground
- Consider adding the reference implementation
- Add also implementations

### **MO Graphical Editor**

- MSa gave a demonstration of the XML editors that had been defined by ESA. The editors will be soon available as open source software.

### **MO Service Schedule**

- The document production schedule of the SM&C WG was updated as in [A14].

*Action 141112-03      ALL agencies to identify whether they can support the second prototype for the ZeroMQ binding. Due 22Mar15.*

*Action 141112-04      DS to confirm the schedule for the C++ MAL API binding. Due 30Nov14.*

### **Questions from the CMC**

- The WG addressed the following questions from the CMC:
- “Mid-term objectives (2017-2018) only for MO services; they are linked to the standards on technology mapping and binding. The resources needed for this work should be assessed. SM&C WG response required”  
Response: The WG Charter foresees the development of
  - Several MO services:
    - M&C Services and Common Services: See agreed resources/dates
    - Planning Service: start 2016 + 3y (done by Planning WG, if established)
    - File Management Service: start 2016 + 3y
    - Navigation Service: start 2017 + 3y
    - Scheduling Service: start 2017 + 3y
    - Software Management Service: start 2018 + 3y
    - Time Service: start 2018 + 3y
    - Automation Service: start 2019 + 3y
    - Remote Buffer Management Service: start 2019 + 3y
    - Note: the final MOSSG priority might change the above dates. Resources committed for up to M&C Services and Common Services
  - Technology Bindings:
    - Space Packet Protocol Binding: See agreed resources/dates
    - ZeroMQ Binding: a new project shall be created in CWE. CNES committed to BB production and prototype1. See agreed resources/dates
  - Language API:
    - C++ Language API: a new project shall be created in CWE. NASA/JSC committed to MB production. See agreed resources/dates
  - Books that are due for 5y review:
    - RM (start Jul 15)
    - GB (Dec 15).
- “Most of the MO services BB’s in the CWE are not started and/or are behind schedule. What is the strategy proposed to progress these projects? Will the IOAG / MOSSG inputs on service priorities be considered to reschedule the parallel tasks”?
  - Response: See above.

## **13Nov14 AM**

### **ESA Open Source Software**

- SC delivered the presentation [A15].
- Question to MOIMS: who owns the XTM documents (e.g. the M&C XML)? What type of copyright do they have?

**Action 141113-01** SC to add a README file in the root of GitHub repositories pointing to the MO Wiki and to add relevant material from the OSS presentation in to the Wiki. Due 01Dec14.

**Action 141113-02** CC to devise a high level tutorial and place it on the MO Wiki on GitHub. Due 31Dec14.

**SM&C wrap-up**

- The report to MOIMS AD [A16] was prepared.

**13Nov14 PM**

**Joint mtg with SIS-DTN**

- Keith Scott delivered the presentation [A17].
- There is an interest from SIS-DTN in using M&C services for DTN network management provided it can be done in a way that only brings along the services that are required to do network management.
- NASA has already the implementation of M&C over DTN done by JSC, which could be used, however it most likely use a very old version of the M&C service.
- KS would like in the future to have access on a more modern implementation. ESA will see how to make the implementation done for Meteron open Source.
- MM confirmed that the SM&C WG is available to support the SIS-DTN if they require so.

**Joint mtg with CSS**

- The meeting was cancelled as duplicating the CESG session later on.

**CESG Meeting on Overlap - Session 2**

- See notes and conclusions by CESG.

**14Nov14 AM**

**Mission Planning BOF**

- See notes and conclusions by Mission Planning BOF.

**14Nov14 PM**

**MOIMS Plenary**

MM delivered the presentation [A16].

**Summary of Open Actions**

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111102-01	SC to update the SM&C-SOIS MoU with the material in the TN. Final version (w/o change bars need to be distributed).	31Dec14	SC	OPEN.
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131031-04	MM to identify way of collecting information on activities relevant to MO services (e.g. lists of studies, developments, prototypes, OSS, ...), maybe using the CCSDS Wiki).	31Dec14	MM	OPEN.
140204-01	Following the response to Action 131029-05 (see MoM of WebEx #071), DS to validate if the MO data model for the parameter service fits with XTCE using a side-by-side table.	31Dec14	DS	OPEN.
140331-02	SC to agree with PS and document 2 or 3 scenarios where the SCCS-ARD charts could be extended to include MO services/MO Stack.	31Dec14	SC	OPEN.
141110-01	MZu to redline the MO Services GB (issue 3) in order to align it to current status of SM&C, and make it more readable and user friendlier.	28Feb15	MZu	
141110-02	SG to check if the MO Service tutorial is up-to-date, in particular on how to use the GitHub, and make it available via the MO Service Wiki on GitHub.	31Dec14	SG	
141110-03	SC, SG and IH to check the ICD of the JSC-DLR prototype and to confirm, in case MO M&C Services are used, which parts are still needed and which parts are now redundant and can be removed. The list of all the items that need to be agreed between the two parties outside the standard will be produced and a recommendation shall be provided on	31Dec14	SC, SG, IH	

ID	Action	Due	Actionee	Status
	how to document it in the standards. Make also a similar exercise for the COM Archive Service both for data retrieval from the Archive and data inclusion into the Archive.			
141111-01	ALL to provide SC with use cases that justify the need for the Access Control Service.	10Dec14	ALL	
141111-02	SC and CC to investigate how to support PUS-C functional monitoring feature in the M&C Check service.	01Dec14	SC, CC	
141111-03	CC to compare the MO Directory Service with other similar services (e.g. UDDI) for completeness or even need.	30Nov14	CC	
141111-04	ALL, including the MOSSG, to provide SC with use cases for the Configuration Service.	10Dec14	ALL, MOSSG	
141111-05	SC to draft a TN with the proposed expansion of the Access Control Service and Configuration Service to meet the submitted (and implicit) use cases.	31Jan15	SC	
141111-06	SJ 1) to rework the template for technology mappings in order to isolate standards, implementation and encoding aspects, and 2) to map the encodings/transporters that have been already implemented in prototypes (JMS, RMI and TCP-IP).	31Dec14	SJ	
141111-07	MW to check within DLR if there is the possibility to support, possibly also by means of students and/or trainees, the production of a technology binding BB.	31Dec14	MW	
141111-08	BB to check if all CNES OSS could be put on GitHub (currently only the testbed is).	31Dec14	BB	
141111-09	MM to check if the EGC-CC ICD based on XTCE could be published as it may be done for NASA/GovSat (i.e. directly in SANA).	31Dec14	MM	
141111-10	SC to provide RJ/KR information on which M&C Service table to look at in order to do the matching with XTCE.	01Dec14	SC	
141112-01	SC to provide the list of M&C Services fields on which the Update operations is enabled.	01Dec14	SC	
141112-02	DS to provide an update on the status of the C++ Language API.	30Nov14	DS	
141112-03	ALL agencies to identify whether they can support the second prototype for the ZeroMQ binding.	22Mar15	ALL	
141112-04	DS to confirm the schedule for the C++ MAL API binding.	30Nov14	DS	
141113-01	SC to add a README file in the root of GitHub repositories pointing to the MO Wiki and to add relevant material from the OSS presentation in to the Wiki.	01Dec14	SC	
141113-02	CC to devise a high level tutorial and place it on the MO Wiki on GitHub.	31Dec14	CC	

## List of Attachments

- A01 Agenda
- A02 SM&C Plenary
- A03 NASA Position on CCSDS 522.1-R-3
- A04 Overlap CSTS-MO v3
- A05 MOSSG Preliminary Priorities for CCSDS SM&C
- A06 MO Common service discussion points
- A07 OPS-SAT and MO
- A08 CCSDS - Transport Evaluation template v2
- A09 Status of MAL-SPP Binding
- A10 Status XTCE
- A11 MO-PUS Comparison
- A12 MO NAV Services
- A13 MO Services Mapping with TRL
- A14 SM&C Dates and Resources
- A15 ESA MO Open Source Software
- A16 SM&C WG Report MOIMS AD
- A17 DTN Network Management for SM&C