

**MINUTES OF NAVIGATION WORKING GROUP FALL 2021 WORKSHOP**      **14-Nov-2021**  
**David S. Berry / Chair**

The CCSDS Fall 2021 Navigation Working Group Meetings were conducted "virtually" via audio/videoconferencing on several days during the period of 18-Oct-2021 through 04-Nov-2021, with a MOIMS Closing Plenary on 09-Nov-2021. Nominally CNES hosted the meetings, which were to have been held at Toulouse, France, but the responsibilities of "hosting" were more or less undefined in the virtual meeting situation. This is a summary of the activities of the Navigation Working Group (WG) during the Meetings. The Navigation WG is an element of the Mission Operations and Information Management Services (MOIMS) Area in the CCSDS organization. All CCSDS Areas and Working Groups were empowered to set their own meeting schedules subject to a CESC ending deadline. The Navigation WG elected to meet on six dates between 18-Oct-2021 and 04-Nov-2021.

**ON-SITE PARTICIPANTS**

Not applicable.

**TELECON PARTICIPANTS**

David Berry (NASA/JPL), Vitali Braun (ESA/ESOC), Frank Dreger (ESA/ESOC), Marc Duhaze (CNES, MOIMS Deputy AD), Cheryl Gramling (NASA/GSFC), Julie Halverson (NASA/GSFC), Hideaki Hinagawa (JAXA), Ralph Kahle (DLR/GSOC), Alain Lamy (CNES), Jose Miguel Lozano (GMV/ESA/ESOC), Mario Merri (ESA/ESOC, MOIMS AD), Dan Oltrogge (NASA (COMSPOC, SDC, ISO TC20/SC14)), Vincent Schaeffer (CNES), Brian Swinburne (Airbus/UKSA), Patrick Zimmerman (NASA/JSC).

**AGENDA**

The final agenda for the WG meetings is available on the Navigation WG CWE at: <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/navwg-agenda-fall-202110.pdf>.

<b>Date</b>	<b>Time</b>	<b>Topic(s)</b>	<b>Presenter(s)</b>
Mon 18-Oct-2021	1300-1500 UTC	Introductory Material, Action Items, Version Numbering, Notes from Secretariat	David
Wed 20-Oct-2021	1300-1500 UTC	Attitude Data Messages (ADM doc status/issues)	Alain, Julie
Thu 21-Oct-2021	1400-1600 UTC	CCSDS Fall Meeting Opening Plenary	Secretariat, CESC Chair, Area Directors
Mon 25-Oct-2021	1300-1500 UTC	Navigation Data Messages XML V.3 Preview	David
Wed 27-Oct-2021	1300-1500 UTC	Attitude Data Messages (prototype test planning)	Alain, Julie
Tue 02-Nov-2021	1300-1500 UTC	Conjunction Data Message	Brian, Dan
Thu 04-Nov-2021	1300-1500 UTC	Conjunction Data Message Orbit Data Messages Closing Report Group Picture	Brian, Dan Dan David David
Tue 09-Nov-2021	1500-1700 UTC	MOIMS Closing Plenary	MOIMS AD, Chairs

**CURRENT ACTION ITEMS**

The following action items were produced during the meetings, or carried forward from previous meetings if they had not yet been completed. They are also available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/navwg-action-items-202110.pdf> . The action items and due dates below reflect the status as of the end of the meetings; the list on the CWE will be updated periodically between the end of this meeting series and the beginning of the next meeting series. The list on the CWE will thus reflect relative completion progress and any new action items added after the meeting series.

If "Status" = "Open", then "Date" = "Target Date"  
 If "Status" = "Complete", then "Date" = "Completion Date"  
 If "Status" = "Cancelled", then "Date" = "Cancellation Date"  
 Sort by "Status" (Descending), "Date" (Ascending)  
**Highlighted** = Completed or cancelled since last telecon

##	Action Item	Actionee	Status	Due Date (Original)	Date
34	Let agency personnel know that ODM is in review	All	Open	04-Nov-2021	04-Nov-2021
18	Produce ADM P1.12	Alain/Julie	Open	31-Jul-2021	19-Nov-2021
13	Convert CDM annexes to new annex order	Brian	Open	15-Jun-2021	22-Nov-2021
35	Send ADM draft to Tom Gannett for pre-Document Processing review and comment	David	Open	22-Nov-2021	22-Nov-2021
17	Update Navigation Terms in CCSDS Glossary (original + RDM terms)	Secretariat	Open	31-Aug-2019	08-Dec-2021
19	Produce TDM P2.0.1	Cheryl	Open	11-Oct-2021	08-Dec-2021
28	Add new entries to "Conjunction Data Message CATALOG_NAME" SANA Registry	David	Open	08-Sep-2021	08-Dec-2021
33	Add "Unknown" to reference frames SANA	David	Open	29-Sep-2021	08-Dec-2021
53	Determine organization for Italian RDM Provider role	Elena	Open	26-Feb-2020	08-Dec-2021
92	Submit Revised Orbit Centers Registry data for SANA Registry	David	Open	17-Dec-2018	08-Dec-2021
37	Get ODM Pink Book 2.1 from Tom Gannett for RID resolution application	David	Open	15-Dec-2021	15-Dec-2021
06	Produce CDM P1.0.2	Brian	Open	15-Jun-2021	31-Dec-2021
38	Consolidate all Test Plans/Test Reports in single CWE directory	David	Open	31-Dec-2021	31-Dec-2021
96	SANA implementation of Nav References	SANA	Open	31-Jan-2019	31-Dec-2021
36	Send CDM draft to Tom Gannett for pre-Document Processing review and	David	Open	10-Jan-2022	10-Jan-2022

##	Action Item	Actionee	Status	Due Date (Original)	Date
	comment				
10	Create Nav WG standard Blue Book template with Nav WG approved Annex ordering	David	Open	28-Jul-2021	12-Jan-2022
74	Prepare Navigation references for SANA Registry	David	Open	31-Oct-2018	12-Jan-2022
94	Library of referenced papers on CWE	David	Open	10-May-2021	12-Jan-2022
98	Produce Navigation Events Message initial draft	Alain	Open	31-Jan-2018	15-Jan-2022
79	Modify/clarify floating point number rules	Dan	Open	09-Dec-2020	13-May-2022
39	Attend CCSDS Editor's Boot Camp for refresher	All	Open	13-May-2022	13-May-2022

## **WORKSHOP PROCEEDINGS**

### **THURSDAY 21-Oct-2021**

#### **CCSDS Opening Plenary / Schedule Details**

Despite the virtual meeting environment necessitated by COVID19, a CCSDS-wide Virtual Opening Plenary was conducted (unlike the three prior virtual CCSDS Meetings). Schedule-wise, the CCSDS Opening Plenary occurred 4 days into the nominal first meeting week. However, for "logical purposes", it is presented in these minutes as if it had occurred as the first meeting of the Fall Meetings, conforming to the traditional schedule.

Attendance at the Opening Plenary included: David Berry, Alain Lamy, Brian Swinburne, Hideaki Hinagawa. (Also one of our alumni, Alexandru Mancas!). The Opening Plenary covered a number of topics. Here are a few keynotes:

- After some general information was presented, the Area Directors each discussed the character and plans for their associated working groups. Mario characterized the Nav WG as "a very active group" having "a solid work plan".
- There was an emphasis on backward compatibility in Peter Shames comments.
- The availability and function of the CCSDS Glossary on the SANA Registry were highlighted by Shames.

The Secretariat also distributed an informational presentation via email, available at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/F21-Opening-Plenary.pdf>). The presentation included information about the following future meeting series:

- a) Spring 2022 hosted by NASA at Huntsville, Alabama, USA, 09-13 May, 2022. (at Westin Hotel )
- b) Fall 2022 hosted by CNES at Toulouse, France, dates TBD
- c) Spring 2023 hosted by NASA at TBD, dates TBD

- d) Fall 2023 hosted by ESA at ESTEC (Noordwijk?), dates TBD
- e) Spring 2024 hosted by NASA at TBD, dates TBD
- f) Fall 2024 hosted by UKSA at TBD, dates TBD

### **MOIMS Opening Plenary**

There was no separate MOIMS Opening Plenary.

### **MONDAY 18-Oct-2021**

Attendance this day included: David Berry, Vitali Braun, Frank Dreger, Cheryl Gramling, Julie Halverson, Hideaki Hinagawa, Ralph Kahle, Alain Lamy, Jose Miguel Lozano, Vincent Schaeffer, Brian Swinburne, Patrick Zimmerman.

### **Fall 2021 Meeting Introductory Matters**

David welcomed the group and presented an abbreviated version of the "Introduction to Navigation WG" material focusing on progress since Spring 2021 and goals for the Fall 2021 Meetings. He took an action item to send out the presentation after the meeting.

We also reviewed the open action items remaining from Spring 2021, and assigned new dates as applicable (depending upon meeting attendance and the assigned actionees).

We reviewed the upcoming schedule for the following 3 weeks. Frank inquired as to whether or not the last meeting should be lengthened given that the time allocated to the ODM discussion will be squeezed. While this was a potentially good idea, David suggested that such scheduling might be inconvenient for people that have meetings immediately after the Nav WG telecon. (Note: As it turned out, the ODM discussion was actually fairly brief, so there was ultimately no constraint on the time.)

David assigned an action item to all WG members, specifically, to make relevant personnel in their organizations and professional spheres aware that the ODM V.3 update is out for Agency review. David shared some comments from the Secretariat Lead Editor regarding the difficulties he encountered with the ODM draft; this was relevant because we have some additional documents in development (specifically ADM and CDM) that have incorporated some of the material that is present in the ODM. So it would be helpful to the Secretariat to not have to encounter the same difficulties. It is also recommended that when we finally resume in-person meetings that all WG members attend the "CCSDS Editor's Boot Camp" for a refresher.

We also had a brief discussion on draft document numbering. David contrasted the draft numbering used on the ODM (e.g., x.y) and the CDM (x.0.y). The "0" in the middle node of the document number in the CDM (also TDM and NDM/XML) is present to avoid a duplicate draft number. When a Pink Book goes out for Agency Review, the Secretariat will number it x.1 (i.e., the first pink book draft of document "x"). Without this extra zero, there will be two document Px.1 drafts (the very first rough draft and the Pink Book that is released for Agency Review. It was David's error to not recall this middle zero in the numbering of the ODM and ADM drafts.)

The introductory presentation is available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/navwg-intro-202110.pdf>.

## **WEDNESDAY 20-Oct-2021**

Attendance this day included: David Berry, Vitali Braun, Julie Halverson, Hideaki Hinagawa, Alain Lamy, Jose Miguel Lozano, Vincent Schaeffer, Brian Swinburne, Patrick Zimmerman.

### **Attitude Data Messages Status**

Alain indicated that most of the ADM P1.11 comments had been accepted, and that P1.12 should be available in about a month. Alain and Julie indicated that the order of the annexes had been set up in the ADM according to the WG plan. Various of the changes made to the text were reviewed and discussed. ADM changes highlighted:

- Spin data changes: previous keywords were retained, but some new keywords were added, specifically, MOMENTUM\_ALPHA, MOMENTUM\_DELTA, NUTATION\_VEL. The new keywords should better enable one of the intended purposes of the APM, i.e., propagating the attitude state into the future. Related to the spin keyword changes, an eighth option for the Attitude State line was added to the AEM.
- There were also some ADM changes to the ACM for OCM consistency. David noted that based on the new keywords and some other changes, the XML schemas just completed will need to be updated.

Alain inquired whether or not the Publications Manual had any rules about links in the PDFs being active. David indicated that this would be a responsibility of the Secretariat if indeed there is such a rule.

David showed "end game" schedules for the ODM and ADM, and showed how long it can take to finally publish a Blue Book once the document has been turned over to the Secretariat for document processing, Agency Review, etc.. Alain stated that based on the ADM schedule it looks like we will **not** have ADM RIDs for the Spring 2022 meetings.

In response to a question regarding test plans, David demonstrated how to find the test plans for other Nav WG documents (in the CWE "Archive" folder for each book).

Alain's ADM presentation is available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/presentation-ADM-status-202110.pdf>.

### **Miscellaneous Topics**

David will send the link to the CCSDS Fall Opening Plenary for those who are interested (meeting is optional). Hideaki asked if we were planning to do a group picture on the last day (yes). David reminded all about the ODM Agency Review action item.

## **MONDAY 25-Oct-2021**

Attendance this day included: David Berry, Frank Dreger, Cheryl Gramling, Hideaki Hinagawa, Ralph Kahle, Alain Lamy, Jose Miguel Lozano, Mario Merri, Vincent Schaeffer, Brian Swinburne, Patrick Zimmerman.

### **Navigation Data Messages XML Specification & "Super Message"**

The main topic of this meeting was the new project for an update of the Navigation Data Messages XML

Specification (NDM/XML V.3). This version of the XML specification will remove information as to how build instantiations of the OPM, OMM, and OEM from the standard since that information has been included in the ODM document itself (as has the similar information for building an instantiation of the OCM). During discussion, David indicated that based on the recent annex reorganization, the NDM/XML V.3 could have 3 "null annexes" (B = "Values for Selected Keywords", though some things could potentially be "forced" here; F = "Technical Material and Conventions", again some things could potentially be "forced" here; I = "Items for an ICD", which could potentially contain something about User Defined Keywords). David brought up an issue with the current schema structure and the SANA Registry, which relates to naming conventions for the schemas... there are conflicts between what the WG wants and what the SANA Operator wants. David and Jose Miguel have started to look at this topic to see if there is a workable resolution.

David also noted that the NDM/XML V.3 combined instantiation could be a bridge to the future "super message" given that its main purpose is to allow combinations of individual messages from different standards into a single message. Pursuant to this idea, David provided a brief presentation on the prospective "Super Message"; it was an update of material originally presented in the Fall 2020 Meetings. This raised the questions: "Will ODM V.3 be the last version of the ODM?" and "Will ADM V.2 be the last version of the ADM?" We don't know enough at this point to be able to answer these questions, so for now the answer is "Maybe".

The NDM/XML presentation is available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/presentation-ndmxml-V3-202110.pdf> .

The Super Message presentation is on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/presentation-super-message-202110.pdf> .

### **Miscellaneous Topics**

David reminded all about the ODM Agency Review action item. Based on additional analysis of the ADM "end game" schedule, David also stated that there COULD be ADM RIDs for Spring 2022 if everything goes perfect from here on and all target dates are met. In response to a question, David showed the group how to find the CWE and a bit about its structure. Mario Merri (MOIMS AD), who was in attendance, noted that CCSDS has ground-to-ground standards, and ground-to-space standards, but there seems to be not much in the way of space-to-space standards, which have been the subject of a Jonathan Wilmot criticism of the CCSDS standards (Wilmot is the Area Director of the Spacecraft Onboard Interface Services Area (SOIS)). David responded that the Nav WG standards tend to not be "center specific", so they could be used for lunar-to-spacecraft or Mars-to-spacecraft or spacecraft-to-spacecraft activity already.

### **WEDNESDAY 27-Oct-2021**

Attendance this day included: David Berry, Frank Dreger, Julie Halverson, Hideaki Hinagawa, Alain Lamy, Jose Miguel Lozano, Vincent Schaeffer, Brian Swinburne, Patrick Zimmerman.

### **Attitude Data Messages Prototype Testing Plans**

The principal topic of this day's discussions was ADM V.2 prototype testing. A summary of the yellow book testing requirement was provided. In a more philosophical approach, several questions were posed by Alain: "What should be tested? What is necessary? What constitutes a prototype?" Alain stated that for the ADM, there are changes to the APM and AEM, and the ACM is new. One question also implied was

"Is verification by analysis sufficient?" Alain indicated that this approach may be used to verify some of the ADM changes (e.g., by mapping ADM V.1 astrodynamics constructs to ADM V.2 constructs, and proving them equivalent, the need for actual testing may be reduced). David indicated that we haven't tried this approach previously with KVN versions of the standards, however, it is a principal concept of testing the XML versions. We don't know what the CESC will do with such a test plan. Alain noted that the AEM changes are less comprehensive, and may be verified via a combination of analysis plus demonstration. The ACM, being entirely new, will require a special prototype. During the discussion, David showed the ODM V.2 test plan and the TDM V.2 test plan, noting that the set of prototypes were comprehensive and covered new material in the standards, but they also illustrated the concept of "divide and conquer", i.e., different pairs of organizations (and WG members) tested parts of the whole standard. In closing, Alain indicated that the ADM P1.12 would be sent in a week to 10 days (after which we will commence our proofreading review in preparation for requesting the Agency Review). David took an action item to send test plan links to the WG members.

The ADM testing strategy presentation is available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/presentation-ADM-testing-strategy-202110.pdf>.

### **Miscellaneous Topics**

David noted that our CMC Polls for corrigenda to the RDM, CDM, and TDM V.2 were extended because they expired without a majority of agencies voting.

### **TUESDAY 02-Nov-2021**

Attendance this day included: David Berry, Frank Dreger, Marc Duhaze, Cheryl Gramling, Julie Halverson, Hideaki Hinagawa, Ralph Kahle, Alain Lamy, Jose Miguel Lozano, Dan Oltrogge, Vincent Schaeffer, Brian Swinburne, Patrick Zimmerman.

### **Conjunction Data Message P1.0.1 Comment Resolution**

The entire session involved discussion of comments and their dispositions from the Working Group's review of the CDM Pink Book P1.0.1. As items were discussed, Brian noted the resolutions to the comments in the CRM, so details are not recorded here.

Several comments were made on Annex F, inspiring some discussion of the purpose of Annex F. It should be explanatory, and expanding, not just repeating what is in the keyword tables in the document. It cannot use any "requirements language" (i.e., "shall", "should", "may").

At the end of the two hour session, we still had one remaining comment in the P1.0.1 CRM to go through, so it was agreed to start the final meeting on 04-Nov-2021 by resolving that topic. Once the CRM is complete (see 04-Nov-2021 notes below) it will be posted on the CWE.

### **Miscellaneous Topics**

David noted that our CMC Polls for corrigenda to the RDM, CDM, and TDM V.2 were approved over the weekend. Also, that the Plenary presentation from 21-Oct-2021 would be sent out later in the day (info on Spring 2022 Meetings is included).

## **THURSDAY 04-Nov-2021**

Attendance this day included: David Berry, Frank Dreger, Cheryl Gramling, Julie Halverson, Hideaki Hinagawa, Alain Lamy, Jose Miguel Lozano, Dan Oltrogge, Vincent Schaeffer, Brian Swinburne.

### **Conjunction Data Messages Comment Resolution**

The meeting started with group discussion and resolution of the one remaining review comment from the CDM P1.0.1 internal review. The CRM will be uploaded to the CDM directory on the CWE now that all issues have been effectively resolved. Brian's completed CRM is available on the CWE at

[https://cwe.ccsds.org/moims/docs/MOIMS-](https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Draft%20Documents/Conjunction%20Data%20Message%20(CDM)/CDM-P1.0.1-comment-resolution-matrix.pdf)

[NAV/Draft%20Documents/Conjunction%20Data%20Message%20\(CDM\)/CDM-P1.0.1-comment-resolution-matrix.pdf](https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Draft%20Documents/Conjunction%20Data%20Message%20(CDM)/CDM-P1.0.1-comment-resolution-matrix.pdf) .

A target date of 31-Dec-2021 was set for distribution of the CDM P1.0.2 draft including the decisions from the comment resolutions.

### **Orbit Data Messages Status**

Once discussion of the CDM was completed, Dan provided a status on the ODM that included information on the progress of the Agency Review that commenced 15-Oct-2021 and will conclude 14-Dec-2021. He made some observations regarding changes made by the Secretariat, e.g., rotating some sections from portrait to landscape formatting, likely due to the width of some of the OCM tables; provided some additional suggestions for minor changes to the document (essentially "internal RIDs" that we will discuss during RID resolution); provided a preview of a RID submitted for some OMM changes that arose during discussions by the Cislunar PNT WG; showed the group the several added SANA registries created in support of the ODM V.3; pointed out some issues with the XML materials (schemas not found); and gave a quick summary of the testing status (Orekit "ready", COMSPOC still in progress).

Also, David showed Dan the email sent by Tom Gannett (CCSDS Lead Editor) following some statements Tom made at the NASA Data Standards Working Group related to document formatting, images in the documents, etc. We may experience some more frustrations of the Lead Editor as we proceed through the upcoming ADM and CDM document processing given the incorporation of some of the ODM changes into these other in-progress documents, though it would be desirable to minimize this.

Dan inquired whether or not it was allowed to send announcement of the review to the ISO TC20/SC14; David said that yes, this is appropriate given the shared ownership of the document.

Alain inquired about the nature of the "checklist ICD" that was part of ODM V.2, but has been removed from ODM V.3. David explained the history of how that came about. Dan showed the content on the screen. Essentially the checklist ICD is now superfluous given the content of the OCM.

David took an action item to obtain the ODM Pink Book 2.1 from Tom so that the version reviewed is available for application of RID resolutions.

The ODM presentation is available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/presentation-ODM-202110.pdf> .

### **Final Report Preparation**

David reviewed the draft Final Report with the WG members, and we worked through it making modifications as applicable. There was one item in the report left as a "TBD", specifically, the target date



for the NEM. David indicated that this will be discussed in an upcoming telecon. The report will be presented at the MOIMS Final Plenary Meeting on 09-Nov-2021 (see below for the report contents).

The dates for monthly telecons are listed at the end of these minutes. Meeting announcements will be sent in advance of each meeting. David proposes reversion to the single 1-hour meeting per month, focused on one primary topic with administrative material kept to a minimum.

All materials from these meetings (agenda, introductory presentation, action items, report, document presentations, and these minutes) are available on the CWE at the following link:

<https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/>

Draft documents reviewed during the meetings are in their respective directories on the CCSDS CWE: <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Draft%20Documents/> (sort by "Name" for easier searching).

## **TUESDAY 09-Nov-2021**

Attendance this day included: Mario Merri (MOIMS Area Director), Marc Duhaze (MOIMS Deputy Area Director, MP&S Deputy Chair), David Berry (Nav Chair), Frank Dreger (Nav Deputy Chair), David Giaretta (DAI Chair), John Garrett (DAI Deputy Chair), Mehran Sarkarati (SM&C Chair), Peter van der Plas (MP&S Chair), Mike Kearney (DAI), Luke Dahl (DAI), Mark Conrad (DAI), Terry Longstreth (DAI).

### **1500 1700 MOIMS Closing Plenary**

Mario expressed hope that Fall 2021 is the last virtual meeting, given that the situation with COVID19 is improving. That the meetings are much more productive when we are offsite, face-to-face, was expressed by every MOIMS Working Group. Mario repeated his question/comment regarding ground-to-ground standards, ground-to-space standards, and space-to-space standards that he had posed during his visit to the Nav WG earlier in the meeting series.

After Mario's introductory remarks, the Working Group Chairs delivered their reports: Mehran Sarkarati for Spacecraft Monitor & Control (SM&C), David Giaretta for Digital Archive Ingest (DAI), Peter van der Plas for Mission Planning and Scheduling (MP&S), and David Berry for Navigation (Nav). The Navigation report immediately below was presented during the Plenary. The report is also available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/navwg-report-202110.pdf> . Mario's report to the CESA (which combines the reports prepared by all of the Working Groups) is available on the CWE at <https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Fall/F21-MOIMS-Report-to-CESA-v2.pdf> .

## **NAVIGATION WORKING GROUP CLOSING REPORT for "VIRTUAL TOULOUSE #2"**

### **NAV WG EXECUTIVE SUMMARY**

#### **Achievements for this Meeting Cycle**

- Completed discussion of Orbit Data Messages Pink Book status, confirmed SANA content, Orbit Data Messages V.3 Agency Review status, testing prep

- Completed discussion of Attitude Data Messages Pink Book with focus on preparations for internal proofreading review of Pink Book P1.12 in advance of Agency Review. Initiated discussion of prototyping and test planning issues.
- Continued discussion of Conjunction Data Message V.2 Pink Book, completed resolution of comments from internal review of Pink Book P1.0.1
- Initiated discussion of NDM/XML V.3 justification, content, and issues

**Working Group Status**

- Active, "High Momentum" (some momentum loss with virtual format of last few semi-annual meetings)

**Interaction with Other WGs**

- None this meeting series.

**Problems and Issues**

- Virtual meetings have allowed us to continue making some progress, but scheduling virtual meetings presents several issues... it will be good to get back to a full week of meetings in Spring 2022!

**Resolutions Agreed Upon this Meeting:**

- None

**Further Resolutions Anticipated in the Next 6 Months:**

- NAV-1: Request to issue resolution for CESG Poll and CMC Poll to approve Agency Review of the Attitude Data Messages Version 2

**Planning (Only Approved Projects):**

Area and WG name	CCSDS Ref Nr	Document Title	Status / Comments	Start and / or Target Publication Date
MOIMS NAV	500.2	Navigation Data Messages Overview	New project apparently approved 10/07/2021 (CMC-P-2021-09-007). Not yet started	Start date 17-Jan-2022 End date 01-Nov-2022
MOIMS NAV	505.0	Navigation Data Messages XML Specification Version 3 Revision	New project apparently approved 10/07/2021 (CMC-P-2021-09-007), but not yet added to project plan.	Start date 25-Oct-2021 End date 31-Aug-2022
MOIMS NAV	502.0	Orbit Data Message (ODM) 5 Year Review Revision	Good progress. Document is currently in Agency Review, ending 14-Dec-2021. One prototype is "complete" (pending any changes introduced during Agency Review), second in progress.	Start date 16-Apr-2015 End date 31-Aug-2022
MOIMS NAV	504.0	Attitude Data Message (ADM) 5 Year Review Revision	Good progress. Completed discussion of planned changes in Pink Book P1.12. Initiated plans for proofreading review prior to the Agency Review. Initiated prototype testing plans.	Start date 16-Apr-2015 End date 30-Jan-2023
MOIMS NAV	508.0	Conjunction Data Message 5 Year Revision	Good progress. Completed resolution of issues raised during internal review of Pink Book P1.0.1.	Start date 14-Jan-2019 End date 31-Dec-2022
MOIMS NAV	503.0	Tracking Data Message (TDM) Version 3 Revision	Not discussed in these virtual meetings due to reduced meeting time. Still in early stages of development, lower priority.	Start date 06-May-2019 End date 30-Nov-2024
MOIMS NAV	507.0	Navigation Events Message (NEM)	Not discussed in these virtual meetings due to document having lower priority than the ADM which has the same Lead Editor. End date to be revised based on telecon discussion prior to Spring 2022.	Start date 07-Nov-2017 End date TBD

**NAV WG UPCOMING NEW WORK ITEMS**

- None at this time... but we may have some new work item proposals between now and Spring 2022; we need to ensure that the resources are available and do the required work force planning.
- Fragmentation Data Message
- Launch Data Message

## NAV WG ISSUES FOR CESG / CMC

- None

### NEXT TELECONS:

We will continue inter-meeting telecons, but it is proposed to revert to a 1-hour telecon monthly. If we are not making sufficient progress and the WG approves, we could go back to the 2-hour/meeting schedule.

- 08-Dec-2021 14:00-15:00 UTC
- 12-Jan-2022 14:00-15:00 UTC
- 09-Feb-2022 14:00-15:00 UTC
- 09-Mar-2022 14:00-15:00 UTC
- 06-Apr-2022 13:00-14:00 UTC
- 27-Apr-2022 13:00-14:00 UTC (if necessary for final Spring Meeting prep)
- 09-May-2022 thru 13-May-2022 Spring 2022 Meetings (nominal dates) at Huntsville, Alabama, USA

### NOTES:

US Daylight Savings Time commences 13-Mar-2022

Europe Daylight Savings Time commences 27-Mar-2022

### GROUP PHOTOGRAPH:

At the end of the final WG meeting, attendees were asked to turn on their cameras for a photo. The results are below... unfortunately some members had no camera, some had other commitments and could not attend the meeting, some had to leave the meeting early. Not pictured are Vitali Braun, Frank Dreger, Cheryl Gramling, Ralph Kahle, Patrick Zimmerman.

