MINUTES OF NAVIGATION WORKING GROUP SPRING 2021 WORKSHOP   28-May-2021
David S. Berry / Chair

The CCSDS Spring 2021 Navigation Working Group Meetings were conducted "virtually" via audio/videoconferencing during the period of 10-May-2021 through 14-May-2021 and 24-May-2021 through 26-May-2021, with a MOIMS Closing Plenary on 28-May-2021. Nominally NASA hosted the meetings, which were to have been held at Huntsville, Alabama, USA, 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.

ON-SITE PARTICIPANTS

Not applicable.

TELECON PARTICIPANTS

David Berry (NASA/JPL), Julien Bernard (Viagenie/SANA), Guillaume Blanchet (Viagenie/SANA), Marc Blanchet (Viagenie/SANA), Vitali Braun (ESA/ESOC), Frank Dreger (ESA/ESOC), 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), Dan Oltrogge (NASA (AGI, 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/Spring/navwg-agenda-spring-202105.pdf . In the meeting proceedings below, the detailed agenda for each meeting day (as realized) is included in the minutes to provide context.

Dates	Time	Topic(s)	Presenter(s)
Mon 10-May-2021	1300-1430 UTC	1. Administrative "Opening"	David
	1430-1500 UTC	2. ODM	Dan
Wed 12-May-2021	1300-1500 UTC	ODM	Dan
Fri 14-May-2021	1300-1500 UTC	SANA Registry Topics	David, SANA Operator
Mon 24-May-2021	1300-1500 UTC	CDM	Brian, Dan
Wed 26-May-2021	1300-1440 UTC	1. ADM	Alain, Julie
	1440-1500 UTC	2. Final Report Prep	David
Fri 28-May-2021	1300-1500 UTC	MOIMS Area Closing Plenary	David (optional for all others)

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/Spring/navwg-action-items-202105.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 virtual meetings. NOTE: If action items have "TBD" dates, we will attempt to resolve at the first telecon. Some items were completed either (a) during the course of the meetings or (b) shortly after, prior to distribution of these minutes.

##	Action Item	Actionee	Status	Due Date (Original)	Date
05	Review ADM P1.11	All, as assigned	Open	30-Apr-2021	25-Jun-2021
08	Research ability to add number of elements to a SANA entry (e.g., element set, covariance matrix).	David	Open	15-May-2021	30-Jun-2021
13	Convert CDM annexes to new annex order	Brian	Open	15-Jun-2021	30-Jun-2021
14	Change name of "CCSDS Navigation Standards Normative Annexes" to remove word "Normative"	David	Open	30-Jun-2021	30-Jun-2021
53	Determine organization for Italian RDM Provider role	Elena	Open	26-Feb-2020	30-Jun-2021
90	Change entry "EIGVAL3EIGVEC3" to "SIGVAL3EIGVEC3" in SANA Registry	David	Open	31-Jan-2021	30-Jun-2021
91	Change entry "TEIGVAL3EIGVEC3" to "TSIGVAL3EIGVEC3" in SANA Registry	David	Open	31-Jan-2021	30-Jun-2021
92	Submit Revised Orbit Centers Registry data for SANA Registry	David	Open	17-Dec-2018	30-Jun-2021
93	Submit Corrigenda to SANA Registry Data	David	Open	07-Jan-2019	30-Jun-2021
09	Propose new Navigation Data Messages Overview project in Spring Meetings report.	David	Open	28-May-2021	15-Jul-2021
86	Add the PRM, NDM/XML, and CDM COLLISION_PROBABILITY_METHOD registries under the "CCSDS Navigation Standards Normative Annexes" registry upper-level hierarchy	David	Open	13-Jan-2021	15-Jul-2021
12	Convert ADM annexes to new annex order	Alain, Julie	Open	31-Jul-2021	31-Jul-2021
17	Update Navigation Terms in CCSDS Glossary (original + RDM terms)	Secretariat	Open	31-Aug-2019	31-Jul-2021
18	Produce ADM P1.12	Alain/Julie	Open	31-Jul-2021	31-Jul-2021
74	Prepare Navigation references for	David	Open	31-Oct-2018	31-Jul-2021

##	Action Item	Actionee	Status	Due Date (Original)	Date
	SANA Registry				
96	SANA implementation of Nav References	SANA	Open	31-Jan-2019	31-Jul-2021
98	Produce Navigation Events Message initial draft	Alain	Open	31-Jan-2018	31-Jul-2021
06	Produce CDM P1.0.2	Brian	Open	15-Jun-2021	15-Aug-2021
10	Create Nav WG standard Blue Book template with Nav WG approved Annex ordering	David	Open	28-Jul-2021	31-Aug-2021
79	Modify/clarify floating point number rules	Dan	Open	09-Dec-2020	30-Sep-2021
94	Library of referenced papers on CWE	David	Open	10-May-2021	30-Sep-2021
19	Produce TDM P2.0.1	Cheryl	Open	11-Oct-2021	11-Oct-2021
11	Convert ODM annexes to new annex order	Dan	Complete	31-May-2021	14-May-2021
15	Produce ODM P2.42	Dan	Complete	14-May-2021	14-May-2021
16	Technical/Proofreading review of ODM P2.42 changes	All	Complete	04-Jun-2021	15-Jun-2021

WORKSHOP PROCEEDINGS

CCSDS Opening Plenary / Schedule Details

Given the virtual meeting environment necessitated by COVID19, there was no CCSDS-wide Opening Plenary (though the Secretariat did distribute an informational presentation via email, available at https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Spring/S21-Opening-Plenary.pdf). All CCSDS Areas and Working Groups were empowered to set their own meeting schedules subject to a CESG ending deadline. Reports to the Secretariat were due no later than 31-May-2021 in order to support the CESG Meeting. The CCSDS Navigation WG elected to meet on six dates between 10-May-2021 and 28-May-2021. Due to the MOIMS Closing Plenary being scheduled for 28-May-2021, the Navigation WG meetings concluded on 26-May after five meetings.

Future Meetings (as Reported in the Spring 2021 Meetings CCSDS Opening Plenary Presentation)

The CCSDS is planning the following upcoming meetings:

a) Fall 2021 hosted by CNES at Toulouse, France, 18-22 October, 2021
b) Spring 2022 hosted by NASA at Huntsville, Alabama, USA, 09-13 May, 2022
c) Fall 2022 hosted by ESA at ESTEC, dates TBD
d) Spring 2023 hosted by NASA at TBD, dates TBD
e) Fall 2023 hosted by UKSA at TBD, dates TBD
f) Spring 2024 hosted by NASA at TBD, dates TBD
g) Fall 2024 hosted by ESA at TBD, dates TBD

MOIMS Opening Plenary

Given the virtual meeting environment necessitated by COVID19, there was no MOIMS Opening Plenary.

DAY 1, MONDAY 10-May-2021 (All Times UTC)

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

1300   1430   Administrative "Opening"

David welcomed the group and presented an abbreviated version of the "Introduction to Navigation WG" material focusing on progress since Fall 2020 and goals for the Spring 2021 Meetings. He took an action item to send out the presentation after the meeting. We also reviewed a few of the open action items remaining from Fall 2020. In particular, there was one action item for David based on an idea proposed by Jose Miguel Lozano to standardize the order of Annexes in the group's standards. Given that the ODM and ADM are in advanced development, it seemed timely to discuss this topic so if the proposed order was accepted, there would be time for the lead editors to implement it in their documents. This was by no means certain because it will be a major task to re-order all the annexes in these documents and fix all of the various intradocument links to them. David presented a proposed order based on a few criteria: (1) normative annexes and those required by CCSDS which appear in all standards, (2) informative annexes that appear in nearly every standard and help to understand it, (3) annexes that won't necessarily appear in every standard (e.g., list of changes from prior version). There were a few revisions to the proposed order based on suggestions from the group, and also the titles were modified slightly to be uniform. Cheryl inquired whether there was guidance from the CCSDS Lead Editor; David said he didn't think so because he sees all of the standards and never mentioned the annex ordering as an issue. There was a question as to whether a null annex could be used to maintain consistency if for some reason we had a document that didn't require one of the annexes. David didn't think the Lead Editor would support this idea. Discussion then turned to whether or not the group should take on this task; David suggested that the decision would be up to Dan, Alain, and Julie since they would be the first to have to modify their in-progress documents to conform to the new convention. Dan indicated that he supported the idea, but would only do the changes once due to the large amount of tedious work to make the changes. He wanted the group to commit in real time so the re-ordering could occur most expeditiously, as the ODM is the next WG document that will be submitted to the Secretariat for Agency Review. Patrick identified a potential issue with "reference" annexes that appear in the TDM and RDM; David suggested that these could be classified as types of examples, which is one of the categories of annex. After brief discussion the proposal to standardize the annex order and titles was adopted. Dan suggested that the WG could have a template with the all the Annexes set up for new documents. David took the action item to prepare it. Thanks to Jose Miguel for the idea, and to Dan for leading us to a decision.

1430   1500   Orbit Data Messages V.3

Much of the meeting time was consumed by the Administrative "Opening", but Dan wanted to present a few ideas with the remaining time. Mostly these related to issues brought up by the Cislunar Space

Situational Awareness Steering Group (CSSASG). There were topics related to the structure of the covariance matrices, addition of "orbit revolution at epoch" (similar to data in a TLE), energy dissipation rate, and documentation of leap seconds. Dan indicated that he had started on an ODM P2.42 that has some modifications in these areas and will also contain modifications from the ongoing proofreading review of the ODM P2.41. (Note that the date for that review was extended until 12-May-2021 in order to allow some members (including David) to complete their reviews.) We will continue discussion in the next meeting. Subsequent to this session, both Alain Lamy and Ralph Kahle sent emails to Dan, with copies to the WG, regarding the leap seconds topic.

DAY 2, WEDNESDAY 12-May-2021 (All Times UTC)

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

1300   1500   Orbit Data Messages V.3

Dan thanked the group for a very professional proofreading review of ODM P2.41.

There was discussion of how to handle the new P2.42 draft given that P2.41 was being prepared for Agency Review. After discussion we decided to perform a combined technical/proofreading review of only the new material in P2.42. After processing P2.42 comments, Dan will provide the final Pink Book Draft to David, who will submit to Mario Merri along with a request to submit a resolution requesting Agency Review of the ODM.

During this session we continued discussion of the Cislunar SSA Steering Group (CSSASG) requests. There was discussion of issues related to the complexity of maneuver uncertainty. We discussed the ambiguity of the notion of the requested ORB_REVNUM, and as a result a REVNUM_BASIS keyword was added. There was a fair amount of discussion of the CSSASG desire to have more leap second information in the standard (e.g., the desire to know if a leap second occurred, when, and how many leapt); several members felt this was unnecessary. Dan proposed adding "NEXT_LEAP_EPOCH = <date>, and NEXT_TAIMUTC = <number>. A few questions from the proofreading of P2.41 were resolved and documented in the ODM CRM. There was a historical discussion of the evolution of requirements for the "Spacecraft Parameters" section in the OPM given issues of backward compatibility. Ralph inquired about KVN=>XML converters; David answered that these have not been prepared by the Navigation WG. XML=>KVN converters have been provided for the CDM since they were expressly requested and there is a standard tool for such a conversion. No such generic tool for KVN=>XML exists.

Dan's ODM presentation is available on the CWE at https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Spring/presentation-ODM-20210510-v2.pdf .

DAY 3, FRIDAY 14-May-2021 (All Times UTC)

Attendance this day included: David Berry, Julien Bernard, Guillaume Blanchet, Marc Blanchet, Vitali Braun, Frank Dreger, Cheryl Gramling, Julie Halverson, Hideaki Hinagawa, Ralph Kahle, Jose Miguel Lozano, Dan Oltrogge, Vincent Schaeffer, Brian Swinburne.

1300   1330   SANA Registry Topics Preview

David had prepared a short list of topics to discuss with the SANA Operator Team. Given that they had informed that they would be able to join around 1330, David previewed the list of topics with the WG members and there was some preliminary discussion. The topics are shown in the list below, along with notes from the discussion.

1330   1448   SANA Registry Topics

We were joined by Marc Blanchet, Julien Bernard, and Guillaume Blanchet of the SANA Team to continue discussion of SANA related topics of importance or relevance to the Navigation WG.

What's Hot at SANA? What's New?
Marc explained that the team was in the last stages of the authorization framework which will allow the owners of some registries to modify registry entries (content, but not structure). The requirement for this capability was levied by the owners of the antenna registry. Marc explained that roughly most registries will be editable by owners (but there are some issues with shared resources, etc.). The SANA Team is continuing to improve main product. Previously the SANA files were in XML, but they have been migrated to a database. Rollout will be within a few months (by Fall Meetings) per Marc.

ODM Registries (New)
David indicated that for the upcoming Agency Review of the ODM Pink Book, the Nav WG would be submitting several new registries and some updates to existing registries. This was a heads up to the SANA Team.

Use of Beta
David described the issue that had arisen with the Navigation Data Messages XML Specification V.2 schemas... half of them were put in the "Approved Registries" section of the beta, and when the beta was moved to production, the updated schemas went into production early. The Navigation WG is hopeful that this won't occur in future releases. Jose Miguel indicated he has some ideas regarding schema versioning; David will discuss the ideas with him.

"Self-Edit Feature"
This was on David's list, but Marc covered it in the first topic ("What's Hot?"). The formal name of the feature is "Authorization Framework". See notes on "What's Hot" above.

Open Action Items
Registry updates... David had highlighted a few open action items that required interaction with the SANA operator, including adding a column for number of elements in the orbital elements and covariance matrix registries (this is OK to do per the SANA team), adding some existing Navigation WG registries to the hierarchy, and submission of a revised orbit centers registry. David inquired about making changes to definitions in the CCSDS Glossary; is this something that could be done by Working Groups under the authorization framework? The SANA team replied that the Secretariat, as the owner, would be the best group to do the updates. Regarding the name of the Navigation WG hierarchy entry, Dan suggested removing the word "Normative" given that some of the registries are normative while some may not be; David took the action item.

Plan for SC14/SC13 Terminology Harmonization
Dan noted the SC14/SC13 plan for harmonizing terminology using the SANA Registry as the repository

for definitive definitions. The plan calls for a working group to integrate terms from the 2 subcommittees that deal with space standards.

At the end of the session, the WG opted to end the meeting 12 minutes early since there was insufficient time for new topics, and it was Friday (near midnight in Tokyo).

DAY 4, MONDAY 24-May-2021 (All Times UTC)

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

1300   1500   Conjunction Data Message V.2

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.

In the course of the discussion, Brian noted some inconsistency in the uses of the SANA registry, and also a number of issues with the XML schemas (e.g., links in the CDM no longer work). Some of these are due to the fact that there are several outstanding action items relating to our SANA registries, and others are due to the "in progress" nature of the XML schemas on the SANA website (some of these may be resolved if Jose Miguel's schema versioning ideas can be implemented; sometimes the SANA is not able to accept our proposals). Ultimately the XML links will function properly when the CDM goes to Agency Review.

At the end of the 2 hour session, we still had quite a bit of material in the P1.0.1 CRM to go through. Brian suggested that we could continue reviewing the CRM and resolving the issues in monthly telecons. David agreed, and accordingly the first telecon will primarily be devoted to resolution of CDM comments. Additional future telecons may be necessary to complete the discussion.

As Brian was not able to conclude the P1.0.1 comment review, the completed CRM is not yet posted on the CWE; it will be uploaded to the CDM directory on the CWE when all issues have been effectively resolved.

DAY 5, WEDNSDAY 26-May-2021 (All Times UTC)

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

1300   1440   Attitude Data Messages

The session largely dealt with reviewer comments submitted as part of the ADM P1.11 internal review. Alain had prepared a presentation summarizing and grouping the comments into a few categories. He noted that there had been 90 comments received from 6 reviewers, and that there were still several reviewers to go.

Discussion addressed issues with REF_FRAME_* keywords and the source of values for those keywords. The special tables added to the ODM (for OPM and OMM) were mentioned, but those were added to avoid having to test the "legacy" messages in the ODM (i.e., OPM, OMM, OEM). The intent for the ADM is to use the SANA registry; the specific list in the SANA may need to be updated for the ADM.

There was discussion of the seeming contradiction of having keywords in the ODM marked as "mandatory", but having default values. Julie noted that there are not many defaults in the ACM, so it is not as much an issue for the ADM as it is for the ODM. In general there seemed to be agreement that if a keyword is marked as "mandatory", then the keyword should explicitly appear in the message (i.e., no default). Alain and Julie indicated that they would likely convert from the "Yes"/"No" responses for the "Mandatory?" column to the "M/O/C" notation (which includes the possibility of conditional values) to be used in the ODM V.3.

Several other relatively minor topics were also discussed and in several cases resolved (e.g., notation for fractional exponents such as **0.5, changes of section titles, comment placement, deleting references to obsolete technology such as FAX, versions to be used for testing, and conformance to conventions established in the OCM (ORIGINTOR_EMAIL, COV_BASIS, NEXT_LEAP_TAIMUTC, XML links that currently do not work, etc.). We made it through the entire presentation, but some of the later topics were quite rushed in order to leave time for the WG to review the draft of the Final Report, so some topics will likely be revisited in monthly telecons.

One issue raised by Alain was "the Consistency Issue"; he asked should all books be exactly the same? As this is something of a philosophical issue, there may be no definitive and correct answer. Suffice it to say that the group has grappled with issues of consistency for many years. Consistency is definitely a WG goal, but this does not imply that it is proper that all books be exactly the same. Divergences from consistency that have a solid justification are permissible.

Alain and Julie's ADM presentation is available on the CWE at https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Spring/presentation-ADM-20210526.pdf .

1440   1500   Final Report Preparation

David reviewed the draft Final Report with the WG members, and we worked through it making modifications as applicable. Two days later, Friday 28-May-2021, the report was presented at the MOIMS Final Plenary Meeting (see below).

The dates for monthly telecons were announced during the meeting and are listed at the end of these minutes. Meeting announcements will be sent in advance of each meeting. David proposed continuation of the meeting approach we have used since we have been conducting virtual Spring/Fall Meetings, i.e., one 2-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/Spring/

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).

<u>**DAY 6, FRIDAY 28-May-2021 (All Times UTC)**</u>

Attendance this day included: Mario Merri (MOIMS Area Director), Marc Duhaze (MOIMS Deputy Area Director), David Berry (Nav Chair), Frank Dreger (Nav Deputy Chair), John Garrett (DAI), David Giaretta (DAI Chair), Jose Miguel Lozano (Nav), Mehran Sarkarati (SM&C Chair), Peter van der Plas (MP&S Chair).

<u>**1300   1500   MOIMS Closing Plenary**</u>

Mario expressed hope that Spring 2021 is the last virtual meeting, given that the situation with COVID-19 is improving. That the meetings are much more productive when we are offsite, face-to-face, was expressed by every MOIMS Working Group.

After Mario's introductory remarks, the Working Group Chairs delivered their reports: David Giaretta for Digital Archive Ingest (DAI), Mehran Sarkarati for Spacecraft Monitor & Control (SM&C), 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.

<u>**NAVIGATION WORKING GROUP CLOSING REPORT for "VIRTUAL HUNTSVILLE"**</u>

<u>**NAV WG Executive Summary**</u>

<u>**Achievements for this Meeting Cycle**</u>
- Completed discussion of Orbit Data Messages Pink Book, resolution of new issues, and preparations for the Orbit Data Messages V.3 Agency Review
- Completed discussion of Attitude Data Messages Pink Book with focus on resolving issues from internal review of Pink Book P1.11
- Continued discussion of Conjunction Data Message V.2 Pink Book with focus on resolving issues from internal review of Pink Book P1.0.1

<u>**Working Group Status**</u>
- Active, "High Momentum" (some momentum loss with virtual format of last few semi-annual meetings)

<u>**Interaction with Other WGs**</u>
- Completed joint meeting w/SANA Operator regarding continued migration of material from Nav WG documents to SANA, with focus on material necessary for the upcoming Orbit Data Messages Agency Review. Discussed registry hierarchy, the authorization framework, promotion processes from beta to production site, other miscellaneous topics.

<u>**Problems and Issues**</u>
- 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!

Resolutions Agreed Upon this Meeting:
- NAV-1: Request to perform CESG Poll and CMC Poll to approve publication of Corrigenda to CDM, RDM, TDM related to Navigation Data Messages XML Specification Version 2 changes.

Further Resolutions Anticipated in the Next 6 Months:
- NAV-2: Request to perform CESG Poll and CMC Poll to approve Agency Review of the Orbit Data Messages Version 3

Planning (Only Approved Projects):

Area and WG name	CCSDS Ref Nr	Document Title	Status / Comments	Start and / or Target Publication Date	
MOIMS NAV	505.0	Navigation Data Messages XML Specification 5 Year Review Revision	Not discussed in these virtual meetings due to its having successfully completed CESG/CMC "approval to publish" polls 20-May-2021.	Start date	13-Jul-2016
				End date	31-May-2021
MOIMS NAV	502.0	Orbit Data Message (ODM) 5 Year Review Revision	Good progress. Document is being prepared for Secretariat Document Processing prior to Agency Review. One prototype is "complete", other in progress.	Start date	16-Apr-2015
				End date	31-Jan-2022
MOIMS NAV	504.0	Attitude Data Message (ADM) 5 Year Review Revision	Good progress. Completed discussion of comments received during Pink Book P1.11 internal draft review	Start date	16-Apr-2015
				End date	31-Mar-2022
MOIMS NAV	508.0	Conjunction Data Message 5 Year Revision	Good progress. Initiated resolution of issues raised during internal review of Pink Book P1.0.1 (to be completed in monthly telecons).	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 reduced meeting time. Document has lower priority than another document with same Lead Editor.	Start date	07-Nov-2017
				End date	30-Nov-2022

NAV WG Upcoming New Work Items

- None at this time... but we will likely have some new work item proposals between now and Fall 2021; we need to do the required work force planning.

1. Navigation Data Messages XML Specification V.3 (required based on ODM V.3 changes)
2. Navigation Data Messages Overview V.3
3. Fragmentation Data Message
4. Launch Data Message

NAV WG Issues for CESG / CMC

- It would be good if the "Abbreviation" column in the SANA Organizations Registry is more completely populated, since these abbreviations are more likely to be used than full organization names when determining provenance of an agency artifact. (It's not clear how to make this happen...)

NOTE: The final report shown above is also available on the Navigation WG CWE at https://cwe.ccsds.org/moims/docs/MOIMS-NAV/Meeting%20Materials/2021/Spring/navwg-report-202105.pdf .

NEXT TELECONS:

We will continue the previously set schedule inter-meeting telecons, a 2-hour telecon monthly (approximately 2 hours/month). If we are not making sufficient progress and the WG approves, we could entertain the idea of a few additional telecons.

- 30-Jun-2021 13:00-15:00 UTC
- 28-Jul-2021 13:00-15:00 UTC
- 08-Sep-2021 13:00-15:00 UTC
- 29-Sep-2021 13:00-15:00 UTC
- Fall 2021 Meetings 18-Oct-2021 through 22-Oct-2021 (nominal dates)

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... one member had no camera, some had to leave the meeting early. Not pictured are Cheryl Gramling, Julie Halverson, Hideaki Hinagawa (no camera), Ralph Kahle.