| Nav Green Book Vol 1 Version 3.5 COMMENT RESOLUTION MATRIXMarch 2014 | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | |
|  | | | | | | |
| **Reference** | | | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition of Comment** | **Final Disposition**  **(Do Not Fill In)** |
| **Page** | **Section** | **Line** |
| 2-12 | 2.3.2.1 | paragraph 2 | Paragraph 2 is completely redundant with material that has already been discussed. | David Berry / NASA | Remove the entire paragraph. | **No longer relevant:** Removed the section that described the scope of navigation and the functions within the field of flight dynamics in version 3.6 of the NAV Green Book vol.1. |
| 2-14 | 2.3.2.4 | all paragraphs except the last | The material on the "Flight Dynamics Center (FDC)" is overly agency specific. | David Berry / NASA | Remove all paragraphs but the last. Change the title to "Conclusion". The section will contain a single paragraph, i.e., the last paragraph in the current 2.3.2.4; it leads well into the next section. | **No longer relevant:** Removed the section that described the scope of navigation and the functions within the field of flight dynamics in version 3.6 of the NAV Green Book vol.1. |
| 3-14 | 3.3.2.5 |  | Add examples as a subsection or in the same section based on the viewgraphs presented by Juerguen Fertig. | Juan Carlos Raymond / NASA GSFC | Add examples as a subsection or in the same section based on the viewgraphs presented by Juerguen Fertig. | **Pending.** To be discussed at the CCSDS Fall 2012 NWG meetings. |
| 1-2 | 1.5 | 2, Item 1 | The Procedures Manual for the Committee for Space Data System is now a silver book | Juan Carlos Raymond/NASA GSFC | Should we make it a silver book? | **Accepted:**  Updated the reference with the proper yellow book and added three other references for the CCSDS Publications Manual, SANA Role, Responsibilities, Policies, and Procedures, and CCSDS Implementation Conformance Statements yellow books. |
| 1-1 | 1-2 | 1 | (see 3.3 [note it may be a little]) | David Berry/ NASA |  | **Accepted:** even thoughthe implementation of this comment was pending in version 3.5 from the review of version 3.4 and needed further explanation, section 1.2 was modified based on comments from the review of versions 3.5 and 3.6 of the Nav Green Book. |
| 2-6 | 2.3.2 | Figure 2-4 | [I'm not sure that this diagram will be popular given its focus on the NASA tracking networks. I would remove the text and leave the pictures. | David Berry/ NASA |  | **Not implemented** |
| 3-10 | 3.3.2.1 | First paragraph, first and 4th lines | Typos. “use” should be “used” and missing “s” in “missions” | David Berry/ NASA |  | **Accepted.** |
| 3-13 | 3.3.2.2 | 2nd paragraph | Check with Dave Finkleman... I think the Space Data Association is using OEM's and I think that Satellite Toolkit can read/write some of the ODMs too. | David Berry/ NASA |  | **Pending.** |
| 3-15 | 3.3.2.3 | Last paragraph before section 3.3.2.4 | check with Alain and Juergen... may also be in use at CNES and ESOC | David Berry/ NASA |  | **Pending.** |
| 3-16 | 3.3.2.5 | Last paragraph before section 3.3.2.6 | Section on TDRSS is nice |  |  | **Pending.** |
| 2-7 | 2.3.2.1 | 3rd paragraph, first line | This is general: I may be wrong but I think telemetry (from the spacecraft to the ground antenna) is treated using separate CCSDS standards. If this is true then we should make clear that any information we input from the spacecraft is after initial ground processing (Level 0 processing). | Joseph Hashmall/NASA GSFC/a.i. Solutions |  | **Pending.** Didn’t find the comment relevant to this paragraph in version 3.5. |
| 3-9 | 3.3.2 | Figure 3-5 | Do you think it would be worthwhile to mention somewhere in this section that standards are reviewed (and possibly updated) every 5 years? | Joseph Hashmall/NASA GSFC/a.i. Solutions |  | **Accepted:** Incorporated in version 3.5 of the NAV Green Book vol. 1. |
| 2-1 | 2.2.2 | 4 to10 | The first and third sentences seem redundant. Would it be worthwhile to say that the orbit should be “stable” (whatever stable means)? | NASA/GSFC (JAH) | Reword paragraph | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-1 | 2.2.2 | 19 | Is it worth mentioning that the pointing direction of a spin-stabilized spacecraft is stable (varies slowly) but the phase varies rapidly which is why these parameters are separated in this way? In contrast, for three axis stabilized spacecraft, all of the parameters that define the attitude vary at similar rates. | NASA/GSFC (JAH) | Reword paragraph | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-2 | 2.2.2 | First paragraph | In the start of the paragraph orbit and attitude “dynamics” are correctly defined as having to do with changes of position and orientation. However the term Flight “Dynamics” includes the determination of the instantaneous position and orientation. Should a sentence be included to state that in order to study the “translational and rotational motion” of an object, determination of its instantaneous state must be included? [What I’m concerned with her is that we are emphasizing dynamics and not even mentioning the instantaneous solution that is necessary. | NASA/GSFC (JAH) | Add something including attitude and orbit determination. | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-2 | 2.2.2 | 21 | The term “propulsion system” is not in bold type while “Attitude Control System” and “Attitude Determination and Control System” are. They are used in a parallel manner and should be formatted the same way | NASA/GSFC (JAH) | Change “propulsion system” to “**Propulsion System**” | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-2 | 2.2.2 | 22-23 | The last sentence phrasing seems awkward. A modification of the previous phrasing might be better. Suggest: “The propulsion system is used for orbit modification and may also be used for attitude control.” | NASA/GSFC (JAH) | Change sentence | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-2 | 2.3 | Title | Should we be using the terms “Flight Dynamics”, “GN&C”, “ACS”, etc. less and use the term “Navigation” or “Spacecraft Navigation” more? The other terms are all parts of Navigation (as defined above) and we are, after all, the “Navigation Working Group” and this document is “Navigation Data definitions and Conventions.” | NASA/GSFC (JAH) | Suggest changing the name of the section to “FUNCTIONS WITHIN THE FIELD OF SPACECRAFT NAVIGATION” | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-2 | 2.3 | First Paragraph | Same as above | NASA/GSFC (JAH) | Change “Flight Dynamics” to “Spacecraft Navigation” and add somewhere (in the previous section) that “Flight Dynamics” as used is synonymous with “Spacecraft Navigation” | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-4 | 2.3.1 | Item 4) | It is not clear that the change of the future state is a planned maneuver and that it may be desirable but not necessary. | NASA/GSFC (JAH) | Suggest the following sentence: “The future state may be altered by including in the model planned modifications of the state that are necessary or desirable to meet mission objectives.” | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-6 | 2.3.1 | Figure 2-3 | It would be clearer if the area with Sun, Stars, and planets was designated something like “targets.” I’m not sure what the appropriate word would be but in the present diagram they are just sitting out there with no apparent connection to the rest of the figure. | NASA/GSFC (JAH) | Add wording. | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-6 | 2.3.1 | Figure 2-3 | The box that says “Sensors (measurements)” would be clearer if “measurements” was replaced by something like: “angle, vector, rates, etc.” | NASA/GSFC (JAH) | Add wording | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-6 | 2.3.1 | Figure 2-3 | The box that says “Spacecraft Rotational Dynamics Model” is only appropriate for spin-stabilized spacecraft. | NASA/GSFC (JAH) | Change box to say “Spacecraft Rotational Dynamics Model or Measured Rotation Rates” | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-7 | 2.3.1 |  | Figure 2-4 overlaps text and should be reformatted. | NASA/GSFC (JAH) | Reformat | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-8 | 2.3.2 |  | The entire heading of Section 2.3.2 “Physical Assets Of Concern Of Flight Dynamics” is missing. | NASA/GSFC (JAH) | Add section heading and a sentence or two explaining what is in the section. | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-8 to 2-9 | 2.3.2.1 |  | Question: Is it important to state that the telemetry formatting for transmission to and from the spacecraft is not within the scope of our messages? This section discusses the importance of transmitting navigation data to and from the spacecraft but I don’t think that the actual transmissions use the message formats that are mentioned. At least for transmissions from the spacecraft a packet format is used that is the purview of another working group. | NASA/GSFC (JAH) | Clarify. | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 2-10 | 2.3.2.3.1 | 1 | Should be “An OC” rather than “A OC” | NASA/GSFC (JAH) | change | **No longer relevant:** Section 2 describing the scope of spacecraft navigation was removed in NAV Green Book vol. 1 version 3.6. |
| 3-2 | 3.2 | 1 | Are Navigation messages actually sent to the spacecraft as navigation messages? I had thought that they were only sent to ground entities which then send the data to spacecraft in a different format. Flight to Ground and Flight to Flight were included in previous Green Books but are they really applicable? | NASA/GSFC (JAH) | Clarify | **Accepted:** I think you meant section 3.3. Changed the wording to specify the exchange of navigation messages and intent of CCSDS standards. |
| 3-4 | 3.2 | Figure 3-3 | Same as above: Spacecraft to Spacecraft transmissions (note that no spacecraft to spacecraft messages are included in Figure 3.5 and Section 3.3.2 has no mention of them) | NASA/GSFC (JAH) |  | **Accepted:** updated section 3.3 to list the navigation data exchange scenarios, and those that are within the domain of CCSDS. |
| 1-1 | 1.1 | 1-2 | Make first line simpler. Right now mentions CCSDS Agencies, but other data exchanges would apply too (e.g., JSpOC => a commercial entity). | David Berry / NASA/JPL | remove phrase "between Consultative Committee for Space Data Systems (CCSDS) Member Agencies". This leaves the sentence "Spacecraft navigation data is exchanged during cross support of space missions." | **Accepted:** updated. |
| 1-1 | 1.1 | paragraph2, line1 | Typo: "For purposes of this document;" | David Berry / NASA/JPL | Change semicolon to comma. | **Accepted:** updated. |
| 1-1 | 1.2 | first part | The cases of flight-to-ground, ground-to-flight, etc. have not yet been introduced. | David Berry / NASA/JPL | Remove the first sentence: This document applies... flight-to-flight.". The terms will be introduced later. | **Accepted:** updated. |
| 1-2 | 1.2 | second sentence | word choices: Change "compatible, inter-Agency" to just "international". Simpler and more general. Also questionable what "compatible" means here. | David Berry / NASA/JPL | See Comment/Rationale. | **Accepted:** updated. |
| 1-2 | 1.5 | [1] | Update the name and publication information of the CCSDS procedures guide... a new document has taken the place of the current reference [1]. | David Berry / NASA/JPL | Change reference info to "Organization and Processes for the Consultative Committee for Space Data Systems. CCSDS A02.1-Y-3. Yellow Book. Issue 3. Washington, D.C.: CCSDS, July 2011. | **Accepted:**  Updated the reference with the proper yellow book and added three other references for the CCSDS Publications Manual, SANA Role, Responsibilities, Policies, and Procedures, and CCSDS Implementation Conformance Statements yellow books. |
| 1-3 | 1.5 | [14] | I would update the Conjunction Data Message, since we are so close. | David Berry / NASA/JPL | Change "Proposed" to "Recommendation", change 508.0-R-1 to 508.0-B-1, change "Red" to "Blue", change "March 2012" to "June 2013". Note that "June" is a guess, but probably a pretty good one. | **Accepted:** It was included as a yellow book in the list of references. Updated to show the blue book released in June of 2013. |
| 1-3 | 1.5 | [15] | I would recommend deleting the SPM since it is not certain it will ever be published. | David Berry / NASA/JPL | Remove reference [15]. You can either (a) renumber all references after [14] (big job), or (b) move reference [18] to [15] and [19] to [18], or (c) leave the number [15] in there and just say "Reference document no longer applicable." | **Accepted:** removed the reference to the SPM. |
| 2-2 | 2.3 | 2, 3 | I would re-write the first part of the second sentence a little. | David Berry / NASA/JPL | Suggest: "The terms 'GN&C' and 'ACS' defined in the previous section could be used to describe subsystems...". | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-2 | 2.3 | paragraph 1, last sentence | "The most relevant function ... is the definition and testing of navigation data formats..." | David Berry / NASA/JPL | Suggest extending a bit: "The most relevant function... is the definition, testing, and implementation of navigation data formats..." | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-6 | 2.3.1 | Figure 2-3 | As drawn, the "Compare" step doesn't have any thing to compare with the "Observations Model". The actual observations do not appear to enter into the "Compare" step. | David Berry / NASA/JPL | Contrast with Figure 2-2. It is probably necessary to re-draw the figure slightly. | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-6 | 2.3.1 | Figure 2-3 | The label "Attitude Determination" should perhaps be BOLD text and moved outside the rectangular box and into the larger, bold bordered box with the rounded corners. As drawn, it looks like a procedure step that has no bounding box when it is the name of the entire process. | David Berry / NASA/JPL | See "Comment/Rationale". | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-7 | 2.3.2 | 5,6 | The sentence about naming of facilities is irrelevant. "However, the facilities that provide... are named differently..." | David Berry / NASA/JPL | Remove the sentence. It is not necessary. | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-7 | 2.3.2 | Figure 2-5 | The box showing TT&C Networks has a list of NASA assets. | David Berry / NASA/JPL | Remove the NASA-specific list (DSN, GN, NEN, ...). We don't need to to list the names of the networks. Someone will feel left out. | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-7 | 2.3.2 | Figure 2-5 | The line that shows "Tracking Data" going to a FDC and then to FDOA is overly specific and may reflect a particular organization. | David Berry / NASA/JPL | Just have the "Tracking Data" line go from TT&C Network to Flight Dynamics Operations. Remove the "FDC" box and associated arrows. | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-9 | 2.3.2.1 | line 2 at top of page | The second sentence is not complete... there are some missing verbs in the list of actions that attitude maneuvers are designed to perform. | David Berry / NASA/JPL | Add the appropriate verbs, e.g., "perform attitude sensor calibration", or "calibrate attitude sensors and science instruments" or something like that. | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 2-2 thru 2-10 | 2.3 | entire | This section still feels a bit too wordy, but I have only offered a few specifics above. | David Berry / NASA/JPL | I recommend a thorough read of this section to remove any redundancies, any agency specific assumptions, and any details not relevant to the communiation of navigation data from one party to another. | **Obsolete:** The recommendation and agreement made at previous semiannual CCSDS technical meetings were to remove the section concerning the scope of navigation. Section 2 was removed in version 3.6. |
| 3-3 | 3.3.1.1 | 1 | Reference [45] doesn't appear in Section 1.5 | David Berry / NASA/JPL | Renumber [45] as [13] | **Accepted:** updated. |
| 3-3 | 3.3.1.1 | entire paragraph | This paragraph seems a bit out of place. The section may not be necessary in this document. | David Berry / NASA/JPL | Consider renumbering the current 3.3.1.2 as section 3.3.1, and removing the section currently numbered 3.3.1 and 3.3.1.1. | **Accepted:** updated. |
| 3-3 | 3.3.1.2 | 1 | Word choice: "This Report describes a framework..." | David Berry / NASA/JPL | Rewrite: "This section describes a framework..." | **Accepted:** updated. |
| 3-5 | 3.3.2 | Title | Current Section title should be more specific | David Berry / NASA/JPL | Suggest changing "Navigation Messages" to "CCSDS Navigation Data Messages" | **Accepted:** updated. |
| 3-5 | 3.3.2 | 1 | Word choice: "The definition of navigation data formats..." | David Berry / NASA/JPL | Maybe re-word as "The selection of navigation data formats...", since most of the time data formats are not re-defined. They are often selected from a pre-defined set. | **Accepted:** updated. |
| 3-5 | 3.3.2 | 6 | Awkward: "... facilitates and benefits interoperability..." | David Berry / NASA/JPL | Remove "and benefits"... just say "facilitates". | **Accepted:** updated. |
| 3-5 | 3.3.2 | paragraph 2, line 1 | Change "three (3)" to "four (4)" given that the CDM will be done by the time this book is released. | David Berry / NASA/JPL | See "Comment/Rationale". | **Accepted:** updated. |
| 3-5 | 3.3.2 | paragraph 2 | Move the CDM from the "standards under development" part of the paragraphto the "published standards" part of the paragraph and adjust text as necessary. | David Berry / NASA/JPL | See "Comment/Rationale" | **Accepted:** updated. |
| 3-5 | 3.3.2 | paragraph 2, last line | Add reference to sentence. | David Berry / NASA/JPL | Suggest: "The published standards are reviewed and possibly updated every 5 years according to CCSDS processes [1]." | **Accepted:** updated. |
| 3-5 | 3.3.2 | paragraph 3, line 3 | Sentence refers to "... output data for orbit, attitude and tracking processes". | David Berry / NASA/JPL | Suggest replacing with "... common flight dynamics processes." | **Accepted:** updated. |
| 3-6 | 3.3.2 | 1 | Awkward: "... to enable the generation and ingest of input and output products of navigation processes in an automated manner." | David Berry / NASA/JPL | Suggest: "... to enable the generation and ingest of navigation data products in an automated manner." | **Accepted:** updated. |
| 3-6 | 3.3.2 | paragraph 2, line 1 | From: "Figure 3-5 illustrates how all the messages are intended to be utilized..." | David Berry / NASA/JPL | To: "Figure 3-5 illustrates how all the messages could be utilized..." | **Accepted:** updated. |
| 3-6 | 3.3.2 | paragraph 2, line 2, 3 | I would re-write these sentences significantly. From: "Although this document applies... (TT&C) system. As seen in the figure... to support mission operations." | David Berry / NASA/JPL | To: "The figure illustrates the navigation data exchange and the direction of the data flow between the various functions that make up typical navigation operations. These functions may reside within one agency/organization or may be distributed across two or more agencies/organzations." | **Accepted:** updated. |
| 3-8 | 3.3.2.2 | first 2 sentences | I think the order of these two sentences should be reversed. | David Berry / NASA/JPL | Consider switching the order of the sentences. | **Accepted:** updated. |
| 3-8 | 3.3.2.2 | 5, 6 | Superfluous words: "Even though the OPM and OMM could be used..." | David Berry / NASA/JPL | Rewrite: "The OPM and OMM could be used..." | **Accepted:** updated. |
| 3-8 | 3.3.2.2 | 7 | "... human interaction, the OEM..." | David Berry / NASA/JPL | "... human interaction, however, the OEM..." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | first full paragraph, last line | "... modeling, as opposed to the OEM." | David Berry / NASA/JPL | Suggest: "... modeling, whereas the OEM does." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | second full paragraph, line 4 | "Neither the OPM or OMM require higher fidelity..." | David Berry / NASA/JPL | Suggest: "Neither the OPM nor OMM is designed for higher fidelity..." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | second full paragraph, last sentence | I think this should be re-worded a bit | David Berry / NASA/JPL | Suggest: "However, the OPM is the only ODM allows the user to specify parameters related to finite and instantaneous maneuvers, solar radiation pressure, and atmospheric drag. | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | third full paragraph, last sentence | From: "The OEM is the only ODM that required higher level of fidelity..." | David Berry / NASA/JPL | To: "The OEM is the only ODM that supports a higher level of fidelity..." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | last paragraph | The acronym "ESOC" appears without being spelled out in the first instance; it is spelled out on the second instance. | David Berry / NASA/JPL | Move the definition of "ESOC" from the second instance to the first instance. | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | 3rd full paragraph | Awkward (extra "both"): "Both ADMs provide the proper parameters for both spin-stabilized and three-axis stabilized spacecraft." | David Berry / NASA/JPL | Suggest: "Both ADMs provide the proper parameters for spin-stabilized and three-axis stabilized spacecraft." | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | last paragraph, line 3 | word choice: From: "...within the span of the ephemeris and different from the tabular epochs" | David Berry / NASA/JPL | To: "...within the span of the ephemeris but different from the tabular epochs" | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | line 1 | From: "The CDM (reference [14]) will specify..." | David Berry / NASA/JPL | From: "The CDM (reference [14]) specifies..." | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | line 2 | From: "...between data providers of conjunction assessments..." | David Berry / NASA/JPL | To: "... between providers of conjunction assessments..." | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | paragraph 2, line 1 | From: "... the identity of the affected object..." | David Berry / NASA/JPL | To: "... the identity of the affected objects..." (plural) | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | entire | The discussion seems a little slim. You could mention figure 2-4, maybe provide just a bit more detail. Could mention that the CDM is intended to provide spacecraft owner/operators with information they can use to assess the risk of collision and design collision avoidance maneuvers if necessary, etc. | David Berry / NASA/JPL | Consider... | **Pending.** |
| 3-11 | 3.3.2.5 | line 1 | Rewrite... from: "The PRM (reference [16]) will allow the exchange of information related to pointing requests of a spacecraft..." | David Berry / NASA/JPL | Suggest... To: "The PRM (reference [16]) will allow the analysis of requests to point a spacecraft ..." | **Accepted:** updated. |
| 3-11 | 3.3.2.5 | last line on the page | Missing word: "...such that the antenna beam passes the planet's atmosphere..." | David Berry / NASA/JPL | Suggest: "...such that the antenna beam passes through the planet's atmosphere..." | **Accepted:** updated. |
| 3-11 | 3.3.2.5 | Somewhere | It would be desirable to capture somewhere in this description the idea that the requestor doesn't know the spacecraft attitude or the operational constraints in detail. They just want to point the spacecraft, and describe their desire in the PRM. Processing of the message taking into account the trajectory, attitude, and desired target will determine whether or not the pointing is feasible. | David Berry / NASA/JPL | Consider... | **Pending.** |
| 3-13 | 3.3.2.8 | first bullet | Awkward: "beginning and end time of when a spacecraft enters and/or leaves..." | David Berry / NASA/JPL | Suggest: "times when a spacecraft enters and/or leaves..." | **Obsolete:** The Event Messages (EVMs) were removed from the Nav Green Book and considered out of the NWG domain at previous semiannual CCSDS technical meetings. |
| 3-14 | 3.3.2.10 | second paragraph | Makes a reference to [19] that should actually be a reference to [19, 13]. | David Berry / NASA/JPL | Make the change, also find any other locations in the document that refer to [19] and change them to [19, 13]. This is due to the unique nature of the way we are putting the Green Book into 2 volumes for the next version while the existing book temporarily acts as volume 2. | **Accepted:** Added all the references to volume 2 of the Nav Green Book (ref. 13) to all the references made to the current version of the Green Book (ref. 19). |
| B-1 | Annex B |  | Terms to add to acronym list: ADCS, SFTP, TT&C, MOC (or OC... pick one not both MOC and OC). | David Berry / NASA/JPL | Add terms to acronym list that are used in the document | **Pending.** |
| B-1 | Annex B |  | Term "ACS" is out of alphabetical order, so is "NASA" | David Berry / NASA/JPL | Ensure all terms in the list are in alphabetical order. | **Accepted:** updated. |
| B-1 | Annex B | POC | Typo: Collition | David Berry / NASA/JPL | Correct: Collision | **Accepted:** updated. |

| COMMENT RESOLUTION MATRIX: Green Book Volume 1, Version 3.625-Sep-2014 | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | |
|  | | | | | | | | | |
| **Pg** | **Sec** | **Para** | **Line** | **Type** | **Comment/ Rationale** | **Reviewer (Name/Agency)** | **Suggested Disposition** | **Final Disposition**  **(Do Not Fill In)** |
| Cover | N/A | N/A | N/A | ge | The cover states it is "Version 3.5" from September 2012, but it's really Version 3.6 from March 2014. Page footers have the same incorrect information. | David Berry / NASA/JPL | Be sure to update the cover and page footers each version so people are certain which version they have. | **Accepted:** updated. |
| ii | Foreword | 1 | 1 | ed | Rewrite first sentence of Foreword | David Berry / NASA/JPL | From: existing text  To: This CCSDS Report, *Navigation Data - Definitions and Conventions*, contains background and explanatory material... generated by CCSDS Member Agencies. It has been divided into two separate volumes. | **Accepted:** updated. |
| 1-1 | 1.2 | 1 | 1-5 | ed, te | I think it's too early to introduce the notion of "flight-to-ground", etc. The reader has no context for understanding what is meant at this point in the document. | David Berry / NASA/JPL | Remove first paragraph in its entirety. Leave only the second paragraph ("This document serves as a guideline..."). It's sufficient. | **Accepted:** updated. |
| 1-2 | 1.5 | Ref [1] | all | ed, te | The document cited as reference [1] has been replaced by a new document. | David Berry / NASA/JPL | Change existing text of reference [1] to "*Organization and Processes for the Consultative Committee for Space Data Systems".* CCSDS A02.1-4. Yellow Book. Issue 4. Washington, D.C.: CCSDS, April 2014. | **Accepted:** already updated based on a previous comment from Juan C. Raymond. Added other applicable CCSDS documents to the list of references: CCSDS Publications Manual, SANA Role, Responsibilities, Policies, and Procedures, and CCSDS Implementation Conformance Statements yellow books. |
| 1-3 | 1.5 | Ref [14] | all | ed, te | The reference cites the Red Book... it should cite the Blue Book | David Berry / NASA/JPL | Update the reference to refer to the Blue Book. "Recommendation for Space Data System Standards, CCSDS 508.0-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, June 2013. | **Accepted:** already updated based on a previous comment. |
| 1-3 | 1.5 | Ref [15] | all | ed, te | The reference should be removed at this point since it won't be worked on for at least a couple of years, if that. | David Berry / NASA/JPL | Remove reference from reference list. | **Accepted:** already updated based on a previous comment. |
| 1-3, 1-4 | 1.5 | Ref [16], [17], [18] | category for white books | ed, te | Category of documents is wrong in the reference citation. | David Berry / NASA/JPL | From: "Proposed for Space Data System Standards"  To: "Proposed Draft Recommended Standard". | **Accepted:** updated. |
| 1-4 | 1.5 | Ref [19] | all | ed | We should put the Green Books together as contiguous references, i.e., instead of [13] and [19], either [13]/[14], or [14]/[15], or [18]/[19], or some other contiguous set. | David Berry / NASA/JPL | Consider. | **Partially Accepted:** updated. Needs to update the numbering and cross-references within the document. |
| 1-4 | 1.5 | N/A | N/A | ed | We should add a reference to the CCSDS web site | David Berry / NASA/JPL | Add [20] www.ccsds.org/publications (but note that since we should delete [15], you could make the website [15] with no perturbation. | **Accepted:** updated. |
| 2-1 | 2.2.2 | 2 (Orbit) | 4 | ed, te | Uses the word "orbiting" in the definition of "orbit". Generally it is best not to use the word being defined in the definition. | David Berry / NASA/JPL | From: "...orbiting the large central body"  To: "...around the large central body" | **No longer relevant or applicable:** section 2.2.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-1 | 2.2.2 | 2 (Orbit) | 7 | ed, te | Word choice. | David Berry / NASA/JPL | From: "gravity pull"  To: "gravitational influences" | **No longer relevant or applicable:** section 2.2.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-1 | 2.2.2 | 3 (Attitude) | 7 | ed | Plural used where singular should be used. | David Berry / NASA/JPL | From: "...references axes..."  To: "...reference axes..." | **No longer relevant or applicable:** section 2.2.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-1 or 2-2 | 2.2.2 | N/A | N/A | te | Missing definitions. | David Berry / NASA/JPL | Because in section 1.1 it states that navigation includes "...orbit, attitude, maneuver, and conjunction assessment...", it might be a good idea to add BRIEF definitions of "maneuver" and "conjunction" here. | **No longer relevant or applicable:** section 2.2.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-2 | 2.2.2 | 1 | 3 | ed | word order | David Berry / NASA/JPL | From: "... the flight dynamics term could be used..."  To: "...the term 'flight dynamics' could be used..." | **No longer relevant or applicable:** section 2.2.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-2 | 2.2.2 | 2 | 1 | ed | capitalizes "Navigation" when it is probably not necessary. | David Berry / NASA/JPL | From: "within Navigation"  To: "within navigation" | **No longer relevant or applicable:** section 2.2.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-2 | 2.3 | 1 | 5 | ed | Unnecessary text should be removed. | David Berry / NASA/JPL | From: "Depending on the different ways an organization provides Flight Dynamics support, it can include..."  To: "Flight Dynamics support can include..." | **No longer relevant or applicable:** section 2.3 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-2 | 2.3 | 2, 3 | 1 | ed | Most of the material in these 2 paragraphs is unnecessary and should be deleted. Portions could be combined with the text in the preceding paragraph to make it more condensed, streamlined, and genericized. | David Berry / NASA/JPL | Add to the list of flight dynamics support in paragraph one, the "precise determination of a spacecraft's orbit and attitude, maneuver planning, sensor calibration, and development of acquisition predicts for tracking stations." The last sentence in paragraph 2 is OK too, the one about uploading to the spacecraft. | **No longer relevant or applicable:** section 2.3 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-3 | 2.3.1 | 1 | 3 | ed | Unnecessary qualification. | David Berry / NASA/JPL | From: "...in drag models..."  To: "...in models..." | **No longer relevant or applicable:** section 2.3.1 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-3 | 2.3.1 | 4 | All | ed | Paragraph is unnecessary | David Berry / NASA/JPL | Remove paragraph 4. The last sentence ("This model can be made more accurate..." might conceivably be combined at the end of paragraph 3). | **No longer relevant or applicable:** section 2.3.1 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-4 | 2.3.1 | last | 1,2 | ed | "Conjunction Assessment" is capitalized, but need not be ("orbit" and "attitude" which precede it are not capitalized) | David Berry / NASA/JPL | From: "... Conjunction Assessment (CA)..."  To: "... conjunction assessment (CA)..." | **No longer relevant or applicable:** section 2.3.1 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-6 | 2.3.1 | Fig 2-3 | N/A | te | The diagram doesn't have any predicted observations or measurements entering the "Compare" process. | David Berry / NASA/JPL | Revise diagram | **Pending** (if diagram is reused in other sections of version 3.7). |
| 2-6 | 2.3.1 | Fig 2-4 | N/A | ed, te | The figure refers to "OEMs" and "CDMs", but these haven't been defined yet. It also uses the term "Maneuver Ephemeris" as if it were different from a "Satellite Ephemeris". If you have the original figure I think it should be modified. | David Berry / NASA/JPL | If possible, change from "Satellite Ephemeris" to "Satellite State", from "Maneuver Ephemeris" to "Maneuver Plan", from "OEMs" to "Satellite Ephemeris ", from "CDMs" to "conjunction warnings" | **Pending** (if diagram is reused in other sections of version 3.7). |
| 2-6 | 2.3.1 | Fig 2-4 | N/A | ed, te | The figure shows that "Plan Collision Avoidance Maneuver" is the only result of "Risk Assessment". | David Berry / NASA/JPL | The figure should have "Risk Assessment" shown as a decision box with "No Maneuver Needed" (or something like that) as one of the outputs. | **Pending** (if diagram is reused in other sections of version 3.7). |
| 2-7 | 2.3.2 | 1 | Most | ed, te | Most of this paragraph is not necessary. | David Berry / NASA/JPL | I would change the first sentence to "The principal physical assets of concern for flight dynamics are the spacecraft, tracking stations, and agency centers." I would delete the rest of the paragraph as unnecessary to the purpose of this document. The reduced scope is also consistent with material later in the document. | **No longer relevant or applicable:** section 2.3.2 that provided definitions of spacecraft navigation terms was removed in version 3.6 of the Nav Green Book. |
| 2-7 | 2.3.2 | Fig 2-5 | Figure | ed | The figure is way too NASA-centric, and really may not be necessary. | David Berry / NASA/JPL | Delete figure. | **Accepted:** updated. |
| 2-7 | 2.3.2.1 | 1 | 4 | ed, te | The material starting with "The spacecraft design..." is not necessary to the purpose of this document. | David Berry / NASA/JPL | Starting with "The spacecraft design..." and extending through the end of the paragraph, remove the text. | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 1 | 1 | ed | Combine this sentence with the shortened previous paragraph. | David Berry / NASA/JPL | Consider. | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 2 | 1 | ed, te | Word choice for consistency with the heading of section 2.3.2.1 | David Berry / NASA/JPL | From: "The flight trajectory..."  To: "The spacecraft trajectory..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 2 | 1 | te | Mention TDM during discussion of trajectory determination. | David Berry / NASA/JPL | From: "...using tracking measurements. It can..."  To: "...using tracking measurements, which can be represented in the CCSDS Tracking Data Message (TDM, reference [8]). The trajectory so determined can..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 3 | 1 | ed | Word choice for consistency with the heading of section 2.3.2.1 | David Berry / NASA/JPL | From: "The attitude, which covers both spacecraft orientation and body rates..."  To: "The spacecraft attitude, which covers both orientation and body rates..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 3 | 8-9 | te | statement needs qualification | David Berry / NASA/JPL | From: "...navigate autonomously once in orbit..."  To: "...navigate autonomously once in Earth orbit..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 3 | 10-11 | ed, te | Try not to describe what organization performs functions | David Berry / NASA/JPL | From: "... attitude determination process is performed on the ground by flight dynamics to improve..."  To: "... attitude determination process is performed on the ground to improve..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 3 | 11-12 | ed, te | Try not to describe what organization performs functions | David Berry / NASA/JPL | From: "Flight dynamics also responsible performs ground calibration of the sensors to improve..."  To: "Calibration of the sensors is also performed on the ground to improve..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-8 | 2.3.2.1 | 3 | 13-15 | ed, te | Text unnecessary to the purpose of this document (too detailed and too specific) | David Berry / NASA/JPL | Starting with "On rare occasions..." delete to the end of the paragraph. | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.1 | 1 | 1 | ed, te | First sentence is unnecessary. | David Berry / NASA/JPL | Delete first sentence. Start the paragraph with "Attitude maneuvers are designed..." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.1 | 1 | 2,3 | ed | Awkward sentence | David Berry / NASA/JPL | From: existing text  To: "Attitude maneuvers are designed for many purposes, for example, to point payload instruments at desired targets, calibrate attitude sensors, calibrate science instruments, support orbit maneuver goals, and maintain the sun angle." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.1 | 2 | N/A | ed, te | Might consider mentioning PRM too. | David Berry / NASA/JPL | The second paragraph mentions SMM, as it should. Perhaps also add that "Attitude maneuvers may also be designed to accommodate pointing requests submitted via the CCSDS Pointing Request Message (PRM, section 3.3.2.5 or reference [16])." | **No longer relevant or applicable:** section 2.3.2.1 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | title | N/A | ed, te | Shorten the title to be consistent with the assertion of principal assets. | David Berry / NASA/JPL | From: "Ground Stations and Space Networks"  To: "Tracking Stations" | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | 1 | 1 | ed, te | Shorten first sentence | David Berry / NASA/JPL | From: "Ground stations and space networks..."  To: "Tracking stations..." | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | 1 | 1-3 | ed | Unnecessary sentence | David Berry / NASA/JPL | Remove "Both space and ground stations... between the spacecraft and the ground." | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | 1 | 3-4 | ed, te | Add space network assets | David Berry / NASA/JPL | From: "... a network of fixed ground stations located around the world."  To: "... networks of fixed ground stations located around the world and strategically placed geosynchronous relay satellites." | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | 1 | 5 | ed, te | Change "ground" to "tracking" | David Berry / NASA/JPL | From: "Whenever an orbiting spacecraft passes across the field of coverage of a ground station..."  To: "Whenever an orbiting spacecraft passes across the field of coverage of a tracking station..." | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | 1 | last 2 | ed | The last 2 lines ("Spacecraft are sometimes equipped...") are not necessary to the purpose of this document. | David Berry / NASA/JPL | Remove. | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9 | 2.3.2.2 | 1 | N/A | te | Mention TDM. | David Berry / NASA/JPL | Add a sentence at the end something like "The measurements collected via tracking networks can be represented in the CCSDS Tracking Data Message (TDM, reference [8])." Could substitute "TDM" for "Tracking Data Message" since the acronym was previously defined. | **No longer relevant or applicable:** section 2.3.2.2 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-9  2-10 | 2.3.2.3 | All | All | ed | The material in these sections (2.3.2.3, 2.3.2.3.1, 2.3.2.3.2) is much, much more detailed than is necessary given the purpose of this document. Consider that the first version of the Green Book only had the material that is now in Section 3.2 of this version of the document. It was very brief, and probably sufficient to the task. | David Berry / NASA/JPL | The entire section 2.3.2.3 should be written much more succinctly. I think 2.3.2.3.1 can be entirely deleted and so can most of 2.3.2.3.2. It really is sufficient to state that the recipients and users of navigation data messages perform flight dynamics functions in agency centers that may be called "Mission Operations Centers" or "Flight Dynamics Centers". We don't need exhaustive list of functions or duties (they were already defined at the beginning of section 2.3. The last sentence of 2.3.2.3.2 may be salvageable (see next comment). | **No longer relevant or applicable:** section 2.3.2.3 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 2-10 | 2.3.2.3.2 | 2 | 1 | ed, te | Refer to the main purpose of the navigation working group. | David Berry / NASA/JPL | From: "...of the CCSDS, navigation data and a common format..."  To: "... of the CCSDS, standards for the representation navigation data and a common format..." | **No longer relevant or applicable:** section 2.3.2.3 that provided material for the spacecraft asset within flight dynamics was removed in version 3.6 of the Nav Green Book. |
| 3-1 | 3.1 | 1 | 2-4 | ed | I think the "Navigation Message Exchange Framework" should stand alone in Section 3, and that a Section 4 should be added for the "... current and envisioned Navigation Data Messages" | David Berry / NASA/JPL | In Section 3.1, leave just the first existing sentence. Create a new | **Accepted:** updated. |
| 3-1 | 3.2 | Navigation Data | 3 | ed, te | Add clarifying text. | David Berry / NASA/JPL | From: "... and ancillary information."  To: "... and ancillary information related to navigation." | **Accepted:** updated. |
| 3-1 | 3.2 | Navigation Message | 1 | ed, te | Over time, we have been referring to "Navigation Data Messages" (and there are a number of instances of this phrase in the book)... but there is also the term "Navigation Message" in this book (and earlier versions of the green book). | David Berry / NASA/JPL | Consider whether or not we should change "Navigation Message" (21 instances) to "Navigation Data Message" (10 instances), or vice versa. Should we be consistent? Either choice ... both phrases occur many times in the document. For discussion at London? or on a telecon? | **Accepted:** use navigation data message throughout the document. |
| 3-2 | 3.2 | Agency Center | 2 | ed | The acronyms "MOC" appears (here and elsewhere) but it is not listed in the acronym list. | David Berry / NASA/JPL | Add "MOC" to the acronym list. | **Accepted:** MOC replaced with “Operations Center (OC)”. |
| 3-3 | 3.3.1.1 | 1 | 1 | ed | During transition phase, list both references to Green Book. | David Berry / NASA/JPL | From: [45]  To: [13], [19] | **Pending.** |
| 3-3 | 3.3.1.1 | 1 | 2-4 | ed | Obsolete text... the table to which it refers was removed. | David Berry / NASA/JPL | Remove text from "For current and future..." until the end of the paragraph. | **No longer relevant or applicable:** section 3.3.1.1 was removed in version 3.6 of the Nav Green Book. |
| 3-3 | 3.3.1, 3.3.1.1, 3.3.1.2 | 1  1  1 | All | ed | I recommend combining these three sections into a common section numbered 3.3.1. The paragraphs are short, and are not distinct enough to require 3 separate numbered paragraphs. | David Berry / NASA/JPL | Combine 3.3.1, 3.3.1.1, 3.3.1.2 into a new 3.3.1 | **Accepted:** section 3.3.1 and 3.3.1.1 were removed. Section 3.3.2.1 is the only section left in this version of the Nav Green Book. |
| 3-5 | 3.3.2 | 1 | All and ff | ed, te | I recommend that the remainder of the document (up until Annex A) become a separate section 4 entitled "CCSDS Navigation Data Messages". This section 4 should be divided into sections as follows:  4.1 General  4.2 Completed Navigation Data Messages  4.3 Planned Navigation Data Messages | David Berry / NASA/JPL | Consider... I think it divides the "theoretical" of Section 3 from the practical considerations of actual messages. | **Partially Accepted:** Section of Navigation Data Messages was made a separate section 3 entitled CCSDS Navigation Data Messages, but did not divided it into Completed and Planned Navigation Data Messages sections as of yet. |
| 3-5 | 3.3.2 | all | all | ed | Renumber 4.1 and title it "General" | David Berry / NASA/JPL | Consider | **Accepted:** updated. |
| 3-5 | 3.3.2 | N/A | N/A | te | We shoud indicate that this section reflects an application of the Navigation Message Exchange Framework described in Section 3. | David Berry / NASA/JPL | Somewhere in the text, probably early, indicate that this section reflects an application of the Navigation Message Exchange Framework described in Section 3. | **Pending.** |
| 3-5 | 3.3.2 | 1 | 7 | ed | The phrase "flight dynamics or navigation functions" is potentially awkward given the many opportunities to use it in such a document. | David Berry / NASA/JPL | Pick one... "flight dynamics" or "navigation". In this book we have (for better or for worse) more or less made the terms identical in meaning. | **Accepted:** removed flight dynamics and left only navigation. |
| 3-5 | 3.3.2 | 1 | 10 | ed | Word choice | David Berry / NASA/JPL | From: "...potentially enable..."  To: "...facilitate..." | **Accepted:** updated. |
| 3-5 | 3.3.2 | 2 | 1 | ed, te | The section doesn't reflect publication of the CDM. Written number and symbolic number redundancy is not necessary. | David Berry / NASA/JPL | From: "... currently three (3) published standards..."  To: "... currently four published standards..." | **Accepted:** recommendation already incorporated into version 3.7 based on a previous comment. |
| 3-5 | 3.3.2 | 2 | 2 | ed | Typo "The" (doesn't need to be capitalized). | David Berry / NASA/JPL | From: "...The...  To: "... the..." | **Accepted:** updated. |
| 3-5 | 3.3.2 | 2 | 4 | ed, te | CDM is not in the list of published standards. | David Berry / NASA/JPL | From: "ADM, ODM and TDM"  To: "ADM, ODM, TDM, and CDM" | **Accepted:** updated based on a previous comment. |
| 3-5 | 3.3.2 | 2 | 4 | ed, te | CDM is not in the list of references | David Berry / NASA/JPL | From: "[6], [7] and [8], respectively"  To: "[6], [7], [8], and [14], respectively" | **Accepted:** updated based on a previous comment. |
| 3-5 | 3.3.2 | 2 | 6-7 | ed, te | Redundant text | David Berry / NASA/JPL | From: "... other flight dynamics functions within the navigation process."  To: "... other flight dynamics functions."  OR: "... other navigation functions." | **Accepted:** updated. |
| 3-5 | 3.3.2 | 2 | 7-8 | ed, te | CDM is in the list of standards under development. | David Berry / NASA/JPL | Remove CDM from the list of standards under development. | **Accepted:** updated based on a previous comment. |
| 3-5 | 3.3.2 | 2 | 9 | ed | Add conjunction before last element in list | David Berry / NASA/JPL | From: "..., Spacecraft Maneuver Message..."  To: "..., and Spacecraft Maneuver Message..." | **Accepted:** updated based on a previous comment. |
| 3-5 | 3.3.2 | 2 | 10-11 | ed, te | Rewrite last sentence... not complete, has no reference. | David Berry / NASA/JPL | From: existing text  To: "The three actions to be considered in the five year review are 'reconfirm', 'retire', or 'revise', as applicable (see reference [1])." | **Accepted:** updated. |
| 3-6 | 3.3.2 | 1 | 2-3 | ed | Simplify sentence and make it clearer. | David Berry / NASA/JPL | From: "... to enable the generation and ingest of input and output products of navigation processes in an automated manner."  To: "... to enable automation of navigation processes." | **Accepted:** updated. |
| 3-6 | 3.3.2 | 1 | 6 | ed | Simplify sentence and make it clearer. | David Berry / NASA/JPL | From: "... specified in ICDs or by following a CCSDS standard on transmission."  To: "... specified in ICDs." | **Accepted:**  updated. |
| 3-6 | 3.3.2 | 1 | 7 | ed | Typo | David Berry / NASA/JPL | From: "...filed based..."  To: "... file based..." | **Accepted:** updated. |
| 3-6 | 3.3.2 | 1 | 10 | ed | Add reference at end of sentence. | David Berry / NASA/JPL | From: "... available free of charge at the CCSDS website."  To: "...available free of charge at the CCSDS website (reference [20])." | **Accepted:** updated. |
| 3-6 | 3.3.2 | 2 | 1 | ed | Clarifying text | David Berry / NASA/JPL | From: "Figure 3-5 illustrates how all the messages are intended to be utilized..."  To: "Figure 3-5 illustrates an example of how all the messages could be utilized..." | **Accepted:** updated. |
| 3-6 | 3.3.2 | N/A | N/A | ed, te | I think an additional short paragraph could help. | David Berry / NASA/JPL | Add a short paragraph: "The remainder of this document provides an overview of the CCSDS flight dynamics standards that have been published (see 4.2) and are under development (see 4.3)." | **Accepted:** partial implementation. Did not add the references to sections 4.2 and 4.3 because the section was not divided into current and planned navigation data messages. Will add them if the two sections get added to the document. |
| 3-7 | Figure 3-5 | N/A | N/A | ed | Suggestions for caption... I would add the word "Example" and remove the note about Flight-to-flight. | David Berry / NASA/JPL | From: existing  To: "Figure 3-5: Example NDM Exchange and Information Flow in a Mission Operations Environment" | **Accepted:** updated. |
| 3-7 | After Figure 3-5 | N/A | N/A | ed | Add a section 4.2 with title "Flight Dynamics Standards Published" | David Berry / NASA/JPL | Consider. | **Pending:** if necessary. |
| 3-7 | 3.3.2.1 | Title | 1 | ed | Renumber TDM section | David Berry / NASA/JPL | From: 3.3.2.1  To: 4.2.1 | **Accepted:** updated. |
| 3-7 | 3.3.2.1 | 1 | 4 | ed | Minor typo | David Berry / NASA/JPL | From: "mission"  To: "missions" | **Accepted:** updated based on a previous comment. |
| 3-8 | 3.3.2.1 | 3 | 4 | ed | word choice | David Berry / NASA/JPL | From: "... various agencies, a TDM could be supplemented..."  To: "... various agencies, a TDM should be supplemented..." | **Accepted:** updated. |
| 3-8 | 3.3.2.2 | Title | 1 | ed | Renumber ODM section | David Berry / NASA/JPL | From: 3.3.2.2  To: 4.2.2 | **Accepted:** updated. |
| 3-8 | 3.3.2.2 | Title | 1 | ed, te | Typo in title ("message" is plural for the ODM because there are 3 of them: OPM, OEM, OMM). | David Berry / NASA/JPL | From: "Orbit Data Message (ODM)"  To: "Orbit Data Messages (ODM)" | **Accepted:** updated. |
| 3-8 | 3.3.2.2 | 1 | 3 | ed | Re-order sentences. | David Berry / NASA/JPL | Move 3rd sentence ("The ODM standard specifies...") to be the first sentence. Add the "(reference [7])" after "standard". | **Accepted:** updated based on a previous comment. |
| 3-8 | 3.3.2.2 | 1 | 1 | ed | Remove reference and augment sentence. Correct typo "The Orbit Parameter Message"... "The" need not be capitalized. | David Berry / NASA/JPL | From: "The ODM (reference [7]) is divided into three separate messages: The Orbit Parameter Message, ..."  To: "The ODM is divided into three separate messages that serve different purposes: the Orbit Parameter Message, ..." | **Accepted:** updated based on a previous comment and augmented the sentence with the correction to the typo. |
| 3-8 | 3.3.2.2 | 1 | 4 | ed | Remove unnecessary article | David Berry / NASA/JPL | From: "...transferring the orbit information..."  To: "...transferring orbit information..." | **Accepted:** updated based on a previous comment and removed “the”. |
| 3-9 | 3.3.2.2 | 1 | All | ed | Move paragraph to improve the flow of this section | David Berry / NASA/JPL | Move the entire paragraph that starts "Multiple OPM, OMM, or OEM..." to be just before paragraph 6 on the page, the paragraph that starts "The ODM has been assimilated..." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | 2 | 4 | te | word choice and grammar | David Berry / NASA/JPL | From: "Neither the OPM or OMM require higher fidelity dynamic modeling."  To: "Neither the OPM nor OMM is designed to provide higher fidelity dynamic modeling." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | 2 | 6 | ed, te | word choice | David Berry / NASA/JPL | From: "...instantaneous maneuvers and allows modeling of..."  To: "...instantaneous maneuvers and provides simple parameters for modeling of..." | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | 3 | 6 | ed | word choice and grammar | David Berry / NASA/JPL | From: "The OEM is the only ODM that required higher level of fidelity..."  To: "The OEM is the only ODM that accommodates higher level fidelity..." | **Accepted:** used the verb support as supposed to accommodate based on a previous comment. |
| 3-9 | 3.3.2.2 | 4 | 3 | ed | missing closing parenthesis | David Berry / NASA/JPL | From: "...(see reference [10].  To: "...(see reference [10]). | **Accepted:** updated. |
| 3-9 | 3.3.2.2 | 6 | 1-2 | ed | Add a sentence... | David Berry / NASA/JPL | From: "... the CCSDS Member Agencies. The OEM..."  To: "... the CCSDS Member Agencies. A partial list of implementations follows. The OEM..." | **Accepted:** updated. |
| 3-10 | 3.3.2.2 | 1 | 3 | ed, te | Add a sentence at end of partial paragraph. | David Berry / NASA/JPL | Add: "OEMs are also used for owner/operator ephemerides in conjunction assesment by NASA/GSFC for the Collision Avoidance Risk Assessment (CARA) process and by the Joint Space Operations Center (JSpOC). | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | Title | 1 | ed | Renumber ADM section | David Berry / NASA/JPL | From: 3.3.2.3  To: 4.2.3 | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | Title | 1 | ed, te | Typo in title ("message" is plural for the ADM because there are 2 of them: APM, AEM). | David Berry / NASA/JPL | From: "Attitude Data Message (ADM)"  To: "Attitude Data Messages (ADM)" | **Accepted:** updated. Also, fixed the title for the previous section, Orbit Data Messages (ODM), based on this comment. |
| 3-10 | 3.3.2.3 | 1 | 1 | ed | Word choice | David Berry / NASA/JPL | From: "The intent of the ADM..."  To: "The purpose of the ADM..." | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | 1 | 1-2 | ed, te | CCSDS standards are not supposed to "discuss", rather they specify. | David Berry / NASA/JPL | From: "... is to discuss how... for proper interpretation and delineate a format and keywords..."  To: "... is to delineate a format and keywords..." | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | 3 | 3-6 | ed | Sentence location. | David Berry / NASA/JPL | Move to page 3-11 after "respectively" the sentence in line 3 that starts with "Multiple APM or AEM..." and ends with "... multiple AP or AEM files must be used." | **Accepted:** updated. |
| 3-10 | 3.3.2.3 | 3 | 9 | ed | Move the sentence that starts with "Full details..." | David Berry / NASA/JPL | Move the sentence "(Full details on the ADM can be found in reference [6].) so that it appears on page 3-11 just after the "Multiple APM or AEM..." paragraph. | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | Title | 1 | ed | Renumber CDM section | David Berry / NASA/JPL | From: 3.3.2.4  To: 4.2.4 | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | 1 | 1 | ed | Verb tense error | David Berry / NASA/JPL | From: "The CDM (reference [14]) will specify the format..."  To: "The CDM (reference [14]) specifies the format..." | **Accepted:** alreadyupdated based on a previous comment. |
| 3-11 | 3.3.2.4 | 1 | 1 | ed | Verb tense error | David Berry / NASA/JPL | From: "The CDM (reference [14]) will specify the format..."  To: "The CDM (reference [14]) specifies the format..." | **Accepted:** alreadyupdated based on a previous comment. (duplicate) |
| 3-11 | 3.3.2.4 | 1 | 4 | ed | word choice | David Berry / NASA/JPL | From: "... possible conjunctions between objects in space..."  To: "... possible conjunctions with another space object..." | **Accepted:** updated. |
| 3-11 | 3.3.2.4 | 2 | 1 | ed | grammar/verb subject agreement | David Berry / NASA/JPL | From: "...the identity of the affected object, miss distance, ..."  From: "...the identity of the affected objects, miss distance, ..." | **Accepted:** alreadyupdated based on a previous comment. |
| 3-11 | Between 3.3.2.4 and 3.3.2.5 | N/A | N/A | ed | Add a section 4.3 with title "Flight Dynamics Standards in Development" | David Berry / NASA/JPL | Consider. | **Pending:** if necessary. |
| 3-11 | 3.3.2.5 | Title | 1 | ed | Renumber PRM section | David Berry / NASA/JPL | From: 3.3.2.5  To: 4.3.1 | **Accepted:** updated. |
| 3-11 | 3.3.2.5 | 2 | 5 | ed | word choice | David Berry / NASA/JPL | From: "...transmitted between scientists..."  To: "...transmitted from scientists..." | **Accepted:** updated. |
| 3-12 | 3.3.2.5 | 1 | 3 | ed | grammar/verb-subject agreement (add an "s" on "follow") | David Berry / NASA/JPL | From: "... such pointing requests are as follow:"  To: "... such pointing requests are as follows:" | **Accepted:** updated. (is this true if the sentence started with “Examples” in plural?) |
| 3-12 | 3.3.2.6 | Title | 1 | ed | Renumber NHM section | David Berry / NASA/JPL | From: 3.3.2.6  To: 4.3.2 | **Accepted:** updated. |
| 3-12 | 3.3.2.7 | Title | 1 | ed | Renumber SMM section | David Berry / NASA/JPL | From: 3.3.2.7  To: 4.3.3 | **Accepted:** updated. |
| 3-13 | 3.3.2.8 | Title | 1 | ed | Renumber "Navigation Data Message Formats" section | David Berry / NASA/JPL | From: 3.3.2.8  To: 4.4 | **Accepted:** updated. |
| 3-13 | 3.3.2.8 | 1 | 7 | te | KVN and XML are both ASCII formats | David Berry / NASA/JPL | From: "...instead of using the ASCII text files can..."  To: "...instead of using the KVN text files can..." | **Accepted:** updated. |
| A-1 | Agency Center | 1 | 1 | ed | grammar | David Berry / NASA/JPL | From: "spacecraft, as well as monitoring telemetry..."  To: "spacecraft; and monitoring telemetry... | **Accepted:** updated. |
| A-1 | Apoapsis | 1 | 1 | ed | It is observed that "Periapsis" appears to have been removed from the glossary. If this is true, then apoapsis and other terms related to key characteristics of an orbit should also be removed (e.g., Eccentricity, Inclination, Frame origin, Right ascension of ascending node, etc.). Alternatively, add Periapsis back. | David Berry /  NASA/JPL | Consider. | **Accepted:** updated. |
| A-1 | Attitude Equipment | 1 | N/A | ed | Term is not used in this volume. | David Berry / NASA/JPL | Remove term from Glossary. | **Accepted:** updated. |
| A-1 | Bias | 1 | 1 | ed | change the preposition | David Berry / NASA/JPL | From: "A fixed-offset error of the 'true' value."  To: "A fixed-offset error with respect to the 'true' value." | **Accepted:** updated. |
| A-1 | Doppler | 1 | 1 | ed, te | Change term to "Doppler shift"... it more accurately goes with the provided definition. | David Berry / NASA/JPL | The "Mix" and | **Accepted:** updated. Didn’t understand the suggested disposition. |
| A-1 | Ephemeris | 1 | 1 | ed | An ephemeris doesn't have to be "accurate" (though results are better if they are) | David Berry / NASA/JPL | From: "A list of (accurate) positions and velocitis | **Accepted:** removed “(accurate)”. |
| A-1 | Frame origin | 1 | 1 | ed | Term is not used in this volume. | David Berry / NASA/JPL | Remove term from Glossary. | **Accepted:** updated. |
| A-2 | Global Positioning System | 1 | 1 | ed | unnecessary punctuation | David Berry / NASA/JPL | From: "accurate, global"  To: "accurate global" | **Accepted:** updated. |
| A-2 | N/A | N/A | N/A | ed | Between "In situ assets" and "Measurements" there is a big gap | David Berry / NASA/JPL | close the gap | **Accepted:** updated. |
| A-2 | Navigation Session | 1 | 1 | te | Definition doesn't use the term just defined. | David Berry / NASA/JPL | From: "The interchange of data between..."  To: "The interchange of navigation messages between..."  OR  To: "The interchange of navigation data messages between..." | **Accepted:** updated. |
| A-3 | Quaternion | 1 | 2 | te | qualifying phrase | David Berry / NASA/JPL | From: "...convenient mathematical properties but not..."  To: "...convenient mathematical properties for navigation but not..." | **Accepted:** updated. |
| A-3 | Missing Term | N/A | N/A | te | Add "Range" (the "Range Rate" is present, and references the "range", but "Range" is not in the Glossary. | David Berry / NASA/JPL | Add a definition for "range", e.g., "a measured or calculated distance between an observer and a spacecraft" | **Accepted:** updated. |
| A-3 | RINEX | 1 | 1 | ed | Term is not used in this volume. | David Berry / NASA/JPL | Remove term from Glossary. | **Accepted:** updated. |
| A-3 | Tracking Station | 1 | 1 | te | Doesn't allow for space based tracking network. | David Berry / NASA/JPL | From: "Ground-based facility..."  To: "Space or ground-based facility..." | **Accepted:** updated. |
| A-3 | Tracking Station | 1 | 1 | te | Correct the function of the station | David Berry / NASA/JPL | From: "monitor the location of"  To: "communicate with" | **Accepted:** updated. |