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| **EXECUTIVE SUMMARY**The Data Archive Interoperability (DAI) Working Group (WG) held a very productive four day meeting including a number of physically present members who were supported by electronic participation by several off-site participants. They met with the System Engineering Area (SEA) Chair and the MOIMS Chair and Deputy Chair.It was agreed that the name of Data Archive Ingest WG should be changed, replacing “Ingest” by “Interoperability”, and the DAI charter adjusted so that it properly reflects the future work of the Working Group which has been agreed by the CCSDS Management Council (CMC).A significant part of the meeting was devoted to work on the 5 year updates of the DAI WG’s two most significant standards - - The *Reference Model for an Open Archival Information System (OAIS)* standard and the Audit and Certification of Trustworthy Digital Repositories (ISO 16363). We resolved 26 of the changes suggested for OAIS. We are deferring most ISO 16363 discussions till after we complete the majority of the OAIS changes.The DAI WG was also informed that there is now an auditing body, PTAB that has been internationally accredited to conduct audits to ISO 16363 (CCSDS 652.0-M-1) Audit and Certification of Trustworthy Digital Repositories (a DAI WG standard) using the ISO 16919 (CCSDS 652.1-M-2) Guidelines for Bodies Performing Audit and Certification of Candidate Trustworthy Digital Repositories (another DAI WG Standard). There is also an expectation that one or more archives may have completed an internationally recognized certification as a Trustworthy Digital Repository. Certifications to this standard should encourage better adherence to archival best practices that are outgrowths of the OAIS work. International certifications tied to these CCSDS standards should continue to enhance the image of CCSDS outside the Space community.The WG agreed to make adjustments to the Information Preparation Enabling Long Term Use (IPELTU) document to address comments from the MOIMS Area (AD) and Deputy Area Director (D to ) and also from ESA. These adjustments were to include Annexes covering Operational, Payload and Digital Library data with more complete examples with guidelines on what data should be prepared for preservation. The IPELTU project is addressing high-level preservation considerations from data creation through archiving, exploitation and possible eventual disposal.The Data Archive Architecture Description Document (DAADD) was discussed and plans made for advancing the development of the document. Besides documenting a high-level generic digital archives architecture, this standard will also set the stage for future standards that will address protocols for Producers, Consumers and Managers interacting with such archives.Overall, the DAI WG progress and prospects are good. The WG has a large number of relevant projects planned using resources from not only participating agencies, but also from other external resources (ISO community, etc.). The current participation level will allow the WG to address the projects at a slow, steady pace. If more resources are identified, the group can apply them to more quickly address the most critical projects. We continue to solicit new members to help with these new projects.The next DAI WG face to face technical meeting will be held 9-13 April 2018 in the Washington, DC area. Please plan on attending or sending a representative to continue contributing to the DAI WG progress.  |

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| **Subject:** Minutes of the DAI Working Group |
| **Editor:** John Garrett |
| **Meeting Date:** 6-9 November 2017 | **Place:** Marriot, The Hague, Netherlands |
| Present: | Copies To: |
| **CNES** | Brigitte Behal | BB | **CNES** |  |  |
| **DLR** | Matthias Hemmje | MLH | **DLR** | Felix Engel | FE |
| **ESA** | Mario MerriRosemarie Leone | MM2RL | **ESA** |  |  |
| **NARA** | Mark Conrad \* | MC |  |  |  |
| **NASA** | Andy DowenRobert Downs \*(John) Steven HughesMichael McAuleyCostin RedalscuPeter Shames | ADRDSHMM3CRPS | **NASA** |  |  |
| **Netherlands** | Barbara Siernan | BS | **Netherlands** |  |  |
| **UKSA** | David Giaretta | DG | **UKSA** |  |  |
| **USA** | Bruce Ambacher \*John GarrettMike KearneyTerry Longstreth \*Helen Tibbo | BAJGGMKTLHT | **USA** |  |  |
|  |  |  | **DAI WG** | Mailing list |  |
|  |  |  |  |  |  |

Participation in individual sessions is noted in the minutes

\* Attendance via Webex

NOTE: Offsite participation throughout the meeting was available via the normal Webex meeting that is used for the DAI WG’s weekly Tuesday meetings. An exception was Tuesday afternoon when the host experienced repeated errors while attempting to start the meeting and if the meeting was started, then the Webex meeting would drop out shortly thereafter. Audio and video are normally shared and screens were shared as necessary.

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# Monday 11/06

## DAI Administrative Items

Participation on site by AD, JGG, DG, SH, MK, RL, MM3, and CR

### Notable items from the CCSDS and MOIMS Plenary

(Reported by Mike Kearney and John Garrett)

**Future CCSDS Meetings**

CCSDS Technical Meetings

 **Meeting Dates Sponsor – Location**

 2018 spring 09-13 April 2018 NASA NIST, Gaithersburg, (near Washington, DC)

 2018 fall 15-19 October 2018 DLR Berlin, Germany

 2019 spring TBD NASA USA

 2019 fall TBD ESA ESA - ESOC

Nestor Peccia (CESG Chair) is expected to retire before the next CCSDS meeting.

### Agenda Approval

The Draft Agenda was approved for this meeting. There are currently no planned meetings with other WGs. Later in the week, we will re-evaluate the need to meet with Space Assigned Numbers Authority (SANA) staff.

### Project Status Review

There are 5 active DAI projects

* OAIS and ISO 16363 5-year update projects are slightly behind schedule. If we assume the first draft is the working draft that documents that indicate where suggested changed changes were proposed, then we are roughly on schedule. However, we have a number of Suggested Changes left to address. Also the Secretariat processing times seem to be unrealistically short. We propose to update the schedules to provide another 6 months to complete processing the current Suggested Changes and to extend the times for Secretariat processing.
* IPELTU – A draft was delivered to the MOIMS Area Director for publication, but has been returned to the DAI WG for update. To be discussed this week.
* DEDSL – This document waiting publication by CCSDS. Project will be closed once document is published.
* DAADD – Our newest project is currently on schedule

**Action:** John Garrett update OAIS and ISO 16363 projects in CCSDS project framework.

It has been noted that there are a large number of DAI documents that will be up for their 5 year reviews at the next CCSDS meeting.

### Agency Reports

There were no prepared agency reports for this meeting.

From brief discussions, it appears as if support for DAI WG will remain level, following the addition (within the last year) of NASA JPL and ESA resources.

* NASA/JPL is providing support for Digital Archive Architecture project. There is also support for DAI efforts in general from NASA affiliated projects.
* CNES still expects active monitoring from a single participant.
* DLR and/or ESA are providing support for DAI efforts through a university affiliated individual.
* UKSA is supportive of David Giaretta’ volunteer effort.
* NARA is providing active participant for DAI in general USA support is expected to continue. There are also several experienced US participants volunteering their time. Another participant is receiving travel support from Google to participate in DAI efforts and other related digital preservation efforts.

### Reports on DAI WG Outreach

Mike Kearney attended the RDA meeting in Montreal and gave a presentation to two different RDA working groups, the Data Fabric Interest Group, and the Preservation Tools, Techniques and Policies Interest Group. In summary, additionally, he attended quite a few other groups, and twice gave a short 3-5 minute report to those groups, at their request. In each of those RDA groups, we accomplished the objective of socializing our direction with external groups to help avoid divergent approaches, and to garner future support at the appropriate time of architecture development. Nobody expressed any concern or criticism for the approach. There was much Q&A after each presentation. Several individuals commented that they might be interested in development of the “plug-in” modules when the time is right. One area that came up repeatedly was encouragement to have the new DAI architecture accommodate advanced technology like restful interfaces or HTML5. There were also questions about whether there would be open source products available, which of course could not be answered at this stage.

Since our last meeting, the Primary Trustworthy Digital Repository (TDR) Authorization Body, LLC (PTAB) has been accredited to conduct ISO 16363 audit of candidate Trustworthy Digital Repositories by the National Accreditation Board for Certification Bodies (NABCB). Through the Multi-Lateral Agreements that govern ISO management system reviews, these accreditations are internationally recognized as are the certifications granted by the accredited auditors.

There is also an expectation that by the next CCSDS meeting, one or more archives will undergo audits to ensure they comply with OAIS and ISO 16363 (a DAI WG standard) using the ISO 16919 process (another DAI WG standard).

Hopefully one or more will be certified as compliant with ISO 16363 and will be internationally recognized as a certified Trustworthy Digital Repository.

### DEDSL XML Schema

The status of the DEDSL – XML Schema document was briefly discussed. It remains at the top of CCSDS Editor’s Queue. During recent contract discussions and changes, little progress has been made advancing through items on the list. Hopefully this Orange Book (Experimental Standard) will finally be published by CCSDS. CNES continues to use this standard in operational use.

## OAIS review

Participation on site by AD, JGG, DG, SH, MK, RL, MM3, CR, and via Webex by BA, MC, RD, TL and HT

A quick review of the status of and plans for the OAIS and the ISO 16363 updates was presented.

Drafts of OAIS and ISO 16363 that have been marked up with the SCs have been distributed to the DAI WG. Comments for each SC have been attached to the Word document. SCs that were rejected have been backed out. The actual text of SCs that were Resolved with changes have the agreed text shown as updates. SCs that have not yet been agreed have an indication of the suggested text change. If these drafts were considered to be the first drafts referenced in the project schedule, then we are roughly on schedule.

After the quick review, the DAI WG decided that it seems appropriate to continue addressing the proposed OAIS changes first and address ISO 16363 proposed changes after the OAIS updates are completed. If we identify any ISO 16363 change that is unusually closely related to an OAIS update or if someone has a strong desire to address an ISO 16363 suggested change, we are free to address those items before OAIS suggested changes are complete. Following completion of OAIS updates, someone should take another pass through ISO 16363 to identify any possible rip effect changes to ISO 16363 resulting from any OAIS updates.

No new issues with OAIS or ISO 16363 were identified at this time. If individuals identify needed changes, they should enter the new issue into the suggested change tracking system at <http://review.oais.info/>

This week we will attempt to identify SCs to address first by identifying SCs that are of special interest to the participants present and addressing those. Next we will browse through the remaining SCs and attempt to identify SCs where there may be a quick consensus on solutions. Finally, we will try to identify some tougher items/issues where the in person discussions may help to identify ways forward to consensus.

Suggested Changes (SCs) were discussed. See <http://review.oais.info/> for significant comments from the discussion or to see the text agreed to resolve the SC. You may go directly to a specific Suggested Change (for example for SC#116 see <http://review.oais.info/show_bug.cgi?id=116>),

SC #137, 140, 143, 144, 145, 146 and 147 were resolved with changes agreed. A rectangle (instead of an octagon) was chosen to represent functional entities in figures throughout the document.

SC#142 was resolved with no change to text, i.e. the suggestion to return color to Figure A-1 was not accepted. Those present thought that retaining the non-colorized figure was the only form that would obtain approval from all CESG voters that need to approve of the updated document.

SC#115 was discussed, but consensus was not reached on resolution of the SC.

**Action:** DAI WG address OAIS SC#115

# Tuesday 11/07

## Administrative

Participation on site by BB, AD, JGG, DG, MLH, SH, MK, RL, MM2, MM3, and CR

As discussed while reviewing project statuses yesterday, OAIS and ISO 16363 5-year update projects schedules are being adjusted to take into account the required delays for processing and reviewing documents. We are also extending the time to complete addressing the OAIS SCs. We expect to complete that task by the next CCSDS meeting. Completion of ISO 16363 milestones will follow the OAIS by six months to allow for any impacts from OAIS updates to be reflected in ISO 16363 updates.

The charter was discussed and it was agreed that the name of the WG should be changed to “Data Archive Interoperability” – this would maintain the acronym. A number of changes in the wording of the charter were suggested and David Giaretta and John Garrett would integrate these off-line and circulate the results.

**Action:** David Giaretta and John Garrett complete update of charter and circulate for approval of WG

**Action:** Matthias Hemmje and Rosemarie Leone provide feedback on potential H2020 collaborations they would see feeding into the DAI charter.

We also discussed DAI project timelines and individual architecture project schedules. For most of these projects we expect to have concurrent CCSDS and ISO reviews as agreed by CCSDS Management Council. The inclusion of the ISO reviews speeds up the overall project length, but it does spread out time needed to get to the CCSDS Standard. Due to this it looks like the projects take a relatively long time. In reality, the DAI WG’s portion of the work is normally completed in 2 years. The publication and review processes add another 2-3 years.

## IPELTU

Participation on site by BB, AD, JGG, DG, MLH, SH, MK, RL, MM2, MM3, and CR

There had been concerns raised by the MOIMS Area Director (AD) (Mario Merri) and Deputy Area Director (DAD) (Brigitte Behal) about the use to be made of IPELTU. We were able to discuss these concerns directly with them during this session. In addition Rosemarie Leone emphasized the need to provide guidance not only about “Additional Information” but also which data should be prepared for preservation. Since it would not be practical to cover all possible types of data sources in the document it was agreed to include Annexes about:

* Operational data such as telemetry
* Payload data, specifically science data collected
* Digital Library data

The document itself will have appropriate “hooks” to support additional extensions as separate documents.

**Action:** David Giaretta update IPELTU main text to hook in planned annexes.

**Action:** Michael McAuley provide text for IPELTU operational data annex

**Action:** Steve Hughes, Costin Redalscu, Rosemarie Leone provide text for IPELTU science payload data annex

**Action:** Matthias Hemmje and Rosemarie Leone, provide text for IPELTU Digital Library data annex

## SANA Registries

Participation on site by BB, AD, JGG, DG, MLH, SH, MK, RL, MM2, MM3, CR, and via Webex by BA, MC, RD, and TL.

During the discussion of OAIS suggested changes, a suggestion was made about removing the Roadmap section of OAIS and moving it to a separate website. One possibility would be to put the information in the Space Assigned Numbers Authority (SANA) Registry. Another option was to put an HTML file on the MOIMS-DAI public folders

Alternatively the DAI WG would be able to set up a registry of digital archiving standards/important publications/etc. that could be hosted at SANA. DAI WG will need to define what fields are needed for the registry and what the criteria is for who can add/revise/delete entries from it. After defining the fields, DAI WG would probably like to allow the public to propose new items and updates, but know that some kind of moderation/approval will be needed. Other registries have had approval required by the WG, or WG management, or WG appointed experts. The DAI WG will have to decide how to handle the approvals. Once the DAI WG defines the registry, it can be set up as a candidate registry and we can play with it a while until we get it correct. Once it is working as we would like, the DAI WG can petition to have it converted to an approved registry.

Currently the WG is leaning towards a simple web page that would be similar to the current OAIS Roadmap section.

**Action:** David Giaretta to set up a draft of the OAIS Roadmap/Important Standards web page.

## OAIS

Participation on site by JGG, DG, MLH, SH, MK, RL, MM3, and CR. Webex did not work properly, but we believe that BA, MC, RD, TL and HT were briefly on and may have monitored parts of the session.

Suggested Changes (SCs) were discussed. See <http://review.oais.info/> for significant comments from the discussion or to see the text agreed to resolve the SC.

Also note the discussion just above in regard to replacing Section 1.5 Roadmap for Development of OAIS Related Standards.

In completion of an action from the previous CCSDS meeting, Matthias Hemmje presented material regarding distributed archives that also addressed SC#135. The addition of this new section will resolve SC#135.

SC #018, 062, 064, 066, 067, 068, 134, and 135 were resolved with change agreed. Usually text was altered from that originally suggested. See SC page for the actual text agreed.

SC#063 was resolved with no change to text, i.e. the suggestion to make Section 4.x discussions of OAIS Functional Entities match the definition in the Terminology section 1.7.2 was not accepted. Those present agreed the Terminology Section 1.7.2 should have a short definition and Section 4 should be consistent with, but expand the definition. Note that there were several other similar SCs for other Functional Entities, but other changes were made to those and those were noted above.

SC#014 was resolved with no change, i.e. ISO 16363 will not be added as policy example in the Mandatory Requirements section.

SC#222 was discussed and a portion of the individual updates were approved. Since there are more than 200 uses of “Content Information” in the document, it was agreed that John Garrett should use his discretion to apply the changes throughout the document, then close the SC. Any issues with individual changes can be caught in review of the completed draft.

**Action:** John Garrett – Apply SC#222 related changes throughout the document.

There was also agreement from the WG that it would be desirable to eliminate examples from the terminology. Terminology should include a short definition w/o example or lengthy explanations. Later sections (primarily Section 4) should include the examples. If any examples remain in the terminology section, they should be separated from the definition and put in Notes: that follow the definition.

**Action:** John Garrett – Add new SC to request removal of all examples from terminology section.

[Editor’s Note: SC#225 was added with proposed updated text, but was not discussed during the remainder of this meeting.]

SC#024 was discussed, but consensus was not reached on resolution of the SC.

**Action:** David Giaretta – Provide rewrite of Section 5 and also note any additional changes needed to address SC#024

**Action:** Matthias Hemmje – Once David Giaretta has completed his action, develop any remaining changes needed to address SC#024.

SC#221 was discussed, but consensus was not reached on resolution of the SC. When originally written “data model” was intended to be a general term and not intended to be a reference to any specific technology. Suggested updates are often too specialized. We will need to review and modify suggestions.

**Action:** DAI WG - Provide alternate replacement text for SC#221

# Wednesday 11/08

## Data Archive Architecture Design Document (DAADD)

Participation on site by JGG, DG, MLH, SH, MK, RL, MM3, NP, CR, and PS.

Steve Hughes presented his updated UML diagram and led initial discussions of what could be included in the standard. He had distributed his presentation to the DAI mailing list and it was made available on the CWE folder for this meeting. Rosemarie Leone expressed interest in the work and initiated a discussion of the relation of IPELTU and this work.

The DAAD UML diagram was produced after gathering system and information requirements from almost 20 individuals, and nine project and reference documents. These requirements were captured in an ontology modeling framework and used to generate a data dictionary, specification document, and the UML diagram. The UML diagram was reviewed by UML experts prior to the DAI meeting and resulted in several changes to the UML diagram and by implication the information requirements.

The DAAD UML diagram represents a general overview of the architecture. Each functional area is represented with an Application class that maps to an OAIS functional entity, for example the OAIS Archival Storage Functional Entity is represented by the UML class Archival\_StorageApplication. High level system services from the gathered system requirements are also modeled and included in the appropriate functional class. Several high level informational elements, for example the Archival\_Information\_Package from the OAIS RM were also included.

In general the review was positive but with a request for further development. Now that we have a more formal notional foundational architecture, the functional and informational elements will be further developed. Of special interest is the set of functional elements developed for the SCIence Data Infrastructure for Preservation with focus on Earth Science (SCIDIP-ES) project, led by D. Giaretta. Other action items and areas of interest include the Persistent Identifier (PID) (M. Hemmje), Discoverability (M. Hemmje), and further development of the “active archive” aspect of the architecture. (Suggested by R. Leone).

Future plans including providing more detail for the system and informational elements and producing a draft magenta book for the Summer CCSDS 2018 meeting. Following this review, a more mature book will be presented for review at the Winter CCSDS 2018 meeting. Two prototypes are planned and it is expect that the CCSDS review cycle will take two years after a stable Magenta book is released after the Winter CCSDS 2018 meeting.

Peter Shames (Systems Engineering Area Director) attended the meeting and provided input to the requirements based on diagrams derived from one of the nine documents used as sources for the requirements, DAI Architecture Analysis, SEA System Architecture WG, Alternative Standardized Archive System Architecture Deployment Option (3), May 2017. This input is reflected in the requirements.

## OAIS

Participation on site by JGG, DG, SH, MK, RL, MM3, CR, BS and via Webex by RD, and others

Suggested Changes (SCs) were discussed. See <http://review.oais.info/> for significant comments from the discussion or to see the text agreed to resolve the SC.

SC #081, 082, 086, 087, 096, 108 and 116 were resolved with change agreed. Usually text was altered from that originally suggested. See SC page for the actual text agreed.

SC#085 was resolved with no change to text, i.e. the suggestion to provide an example of the Producer as the source of updated material was not accepted. Although the example is probably valid, there is no real need to have an example, there are other examples that would be better and which would more often be used.

SC#120 was discussed and agreed to in principle. Actual text to be inserted is needed before this can formally be closed.

**Action:** Barbara Siernan – by 20171114 - Provide text for SC#120

SC#090 was discussed, but there were no specific updates suggested. We asked reporter to provide suggested text.

Overall good progress was made addressing OAIS SCs. We will continue to work through the remaining unresolved OAIS and ISO 16363 SCs during our weekly DAI WG WebEx meetings. Hopefully, we will be able to address most of them before the next CCSDS meeting so we can finalize a draft to submit for wide review by then.

# Thursday 11/09 AM

Participation on site by JGG, DG, MLH, SH, MK, RL, MM3, and CR

## Preparation for the MOIMS Plenary

The MOIMS DAI WG Report presentation was created using the report format as requested by NP (CESG Chair) via Mario Merri (MOIMS Area Director).

Work continued to complete Minutes of the Meeting.

The Action Items created at this meeting were reviewed and verified with those present.

# Action Items

The status of action items from the previous meeting is as noted in the table below.

Status values: O=Open, C=Closed, D=Deleted, R=Replaced

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Action ID** | **Action** | **Assignee** | **Due Date** | **Status** | **Comment** |
| 1 | Work with CCSDS Secretariat staff to set up the new DAI-info mailing list | JGG | ASAP | In Progress |  |
| 2 | Make identified updates to the draft DAADD project | JGG | ASAP | Closed |  |
| 3 | Take action to convert DAADD from draft to approved project. | JGG | when draft project proposals are completed | Closed |  |
| 4 | Begin work on initial draft of Digital Archive Architecture Design Document. | SHMM3CR | Following approval of DAADD project | In Progress |  |
| 5 | Generate text to resolve OAIS SC#21 | MLH(& FE) |  | Closed |  |
| 6 | Generate updated distributed archives text and figures for OAIS update | MLH(& FE) |  | Closed |  |
| 7 | Identify and make all needed changes of “functional area” to “functional entity” (OAIS SC#216 related). | JGG |  | Closed |  |
| 8 | DG to decide how to label SC#217 diagram arrows and generate new diagrams to reflect his decision and for review and agreement. | DG |  | Open |  |
| 9 | Send DEDSL-XML Schema OB to AD with request for a resolution to publish as an OB | JGG | In time for CMC meeting | Closed |  |
| 10 | Review of current IPELTU draft | DAI WG | ASAP | Closed |  |
| 11 | Send IPELTU draft to AD with request for a resolution to publish as a RB for CCSDS Agency Review (w/o concurrent ISO review). | DG or JGG | After completion of final DAI review | Closed |  |
| 12 | Enter the notional set of documents as draft projects in CCSDS CWE | JGG |  | In Progress |  |
|  |  |  |  |  |  |

The status of the new action items assigned at this meeting is as noted in the table below.

Status values: O=Open, C=Closed, D=Deleted, R=Replaced

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| --- | --- | --- | --- | --- | --- |
| **Action ID** | **Action** | **Assignee** | **Due Date** | **Status** | **Comment** |
| 1 | JGG update OAIS and ISO 16363 projects in CCSDS project framework | JGG | ASAP | Closed |  |
| 2 | Address OAIS SC#115 | DAI WG | 2018-01-31 | Open |  |
| 3 | Complete update of charter and circulate for approval of WG | DGJGG | ASAP | Closed |  |
| 4 | Provide feedback on potential H2020 collaborations they would see feeding into the DAI charter | MLHRL | 2018-01-31 | Open |  |
| 5 | Update IPELTU main text to hook in planned annexes. | DG | 2018-01-31 | Open |  |
| 6 | Provide text for IPELTU operational data annex | MM3 | 2018-01-31 | Open |  |
| 7 | Provide text for IPELTU science payload data annex  | SHCRRL | 2018-01-31 | Open |  |
| 8 | Provide text for IPELTU Digital Library data annex | MLHRL | 2018-01-31 | Open |  |
| 9 | Set up a draft of the OAIS Roadmap/Important Standards web page | DG |  | Closed |  |
| 10 | Apply SC#222 related changes throughout the document | JGG | 2017-12-31 | In Progress |  |
| 11 | Add new SC to request removal of all examples from terminology section. | JGG | ASAP | Closed | SC#225 |
| 12 | Provide rewrite of Section 5 and also note any additional changes needed to address SC#024 | DG | 2018-01-31 | Open |  |
| 13 | Develop any remaining changes needed to address SC#. | MLH | Following completion of AI#12 | Open |  |
| 14 | Provide alternate replacement text for SC#221 | DAI WG | 2018-01-31 | Open |  |
| 15 | Provide text for SC#120 | BS | 2017-11-14 | Open |  |
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