INTERAGENCY OPERATIONS ADVISORY GROUP

IOAG-15 Meeting

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Prepared by: Barbara Adde, IOAG Secretariat (IOAG-16)

Date: 6-8 December 2011

IOAG-15 Meeting
Toulouse, France
6-8 December 2011

MINUTES

Attendance:

Chair: Jean-Marc Soula
Secretariat: Barbara Adde, Stephanie Wan (telecon)

Members:
CNES: Jean-Marc Soula, Gérard Galet (part), Jean-Luc Issler (part)
DLR: Martin Pilgram, Rolf Kozlowski
ESA: Michael Schmidt, Gian-Paolo Calzolari, Klaus-Jurgen Schulz
JAXA: Hiroshi Inoue, Yuta Kimura
NASA: Phil Liebrecht, Les Deutsch, Wallace Tai, Madeline Butler, Nate Wright, Ken Perko

Observers:
KARI: Sangil Ahn
UKSA: Peter Allan (telecon)

Liaison:
CCSDS: Mike Kearney, Nestor Peccia, Adrian Hooke (telecon)
ICG: James Miller

Agenda:
See Attachment 1. The agenda is also available on the IOAG website (www.ioag.org).

DAY 1 – TUESDAY, 6 DECEMBER, 2011

1.   Welcome, Opening Remarks:
The Chair opened the meeting and welcomed the IOAG delegations to Toulouse and noted this meeting will help prepare for the third Interoperability Plenary (IOP-3) meeting. He reviewed the logistics and noted that the museum is open to all attendees during the duration of the meeting.

2.   Introduction of Delegates:
Each of the delegates provided a brief introduction.

3. Meeting Introduction:
The Chair appointed the Secretariat and Ms. Butler to serve as the drafting committee. He then reviewed the agenda with the delegates and noted that agency reports would begin with UKSA. All the delegations approved the agenda.

4) **Chairman's Report:**

4.1 Status of Work Plan**:**
The Chairman provided a status of the IOAG 2011 Work Plan, the core tasks, the tasks in collaboration with other organizations, improvement of IOAG internal processes and reporting, as well as the IOAG 2012 Work Plan. He also stated that the IOAG is delayed on providing a response to the SFCG on mission models. The Chairman asked for input from all delegations on the next Annual Report and Work Plan and will circulate drafts to the heads of delegation for review.

At the Chairman's suggestion, it was agreed that Work Plan actions would be removed from the IOAG website, as the meeting actions are more specific and accurate.

AI 15-01: Secretariat to remove Work Plan Actions from the IOAG website. [Assigned to: Secretariat; Due date: 31 January, 2012]

AI 15-02: Chair to prepare draft Annual Report for 2011 and draft Work Plan for 2012 and circulate to heads of delegation for review, comment and approval. Agencies are invited to provide input to the Chair for the preparation of these documents. Annual report will include list of agreed top priorities. [Assigned to: Chairman; Due date: 16 January, 2012]

5) **Secretariat's Report**
The Secretariat provided a report on the summary of e-votes, open action items, documentation status, and the reference table status. The IOAG-14d minutes were then approved.

6) **IOAG Reference Tables**
The Chair noted that the plan was to decide on the process to establish the IOAG reference tables. He provided a summary of the current reference tables, and proposed modifications. He asked to have input for the four reference tables from all members. He recommended that each agency provide updated input for all tables in one file using the same format at each annual meeting. He also reminded the participants that each agency must only provide input for their own missions or their own assets, as the information should come from the owners of the data only. The Secretariat will then provide the final aggregated tables with inputs from all agencies.

There was a proposal to extend the process to the priority table to two priorities, for the top IOAG and for development of new standards. The Secretariat will then create updated tables for each annual meeting.

The Chair stated he has received input from SSC, KSAT, and SANSA for the Commercial Communication Assets table, which will be maintained on the internal IOAG website. The Chair suggested increasing the list with other providers.

AI 15-03: All member and observer agencies to identify additional non-member provider contact information, for the Chairman to contact, for inclusion of their inputs in commercial/non-member assets table. [Assigned to: All agencies and Chairman; Due date: 31 January, 2012]

The Chair commented that the IOAG Communication Assets should be updated once a year, unless there are major changes. He then asked if IOAG should reflect cross support with other organizations that are not members, such as CSA. It was agreed that the IOAG might consider motivating other agencies to join at some point, so it should be included. It is also important to communicate with commercial suppliers so that they can meet standards agreed on by the international community.

AI 15-04: All member and observer agencies to include non-member providers in cross support table for their own missions only. [Assigned to: All agencies; Due date: Before IOAG-15b – end of May, 2012]

The Chair commented that it is still IOAG's mission to report on other service providers, but not to include their missions in the IOAG models. He noted that these service providers can be invited to join the IOAG and report their missions. Mr. Kearney sought more information on details for antennas or other functions, such as mission operations support. The Chair responded that this information can only be in those areas in IOAG's charter at this time -- the communications domain -- not mission operations.

The Chair then summarized the IOAG reference tables and noted that all attending agencies have provided their input. Several other agencies are late on providing their information. The Chair overviewed the interest of the IOAG reference tables and noted that SFCG requested mission models. There is also interest in other communities, including CCSDS, on IOAG priorities and plans. Infusion plans are also of interest to organizations such as ISECG so they can see what is available now and in the future. He further asked whether the green items that are currently available only on the private website should be open to the public. It was suggested to revisit this issue at the summary.

The Chair commented that he never received any input from CNSA. He was also still missing most information from ISRO as their information is quite old. Furthermore, he commented that the RFSA input is incomplete and also quite old now.
He indicated that he has sent letters and emails to these three agencies, but has not yet received a response. ISRO and RFSA are members, and have an obligation as members to provide this information. This is an issue.

Mr. Liebrecht commented that some of the tables and formats have been evolving and that it is good to finalize a format. The question was raised on how to avoid duplication of input for projects in cooperation, and a definition is needed for who is the owner. The Chairman noted that out of date mission models on the public website may affect IOAG credibility issue with regards to membership.

The Chair proposed to keep missions as they are declared, but have the Secretariat identify any duplicates and provide a good alignment of inputs. She should work with the agencies to fix the data if needed. Mr. Liebrecht commented that good instructions to complete the templates are needed.

AI 15-05: Secretariat to coordinate with relevant agencies any duplicate entries in tables and confirm accuracy and consistency of data for those entries. [Assigned to: Secretariat; Due date: 31 January, 2012]

AI 15-06: Secretariat and Chair to develop a guide with procedures and instructions on the utilization of the templates by the delegates and the production of the IOAG reference tables by the Secretariat. [Assigned to: Secretariat and Chair; Due date: 31 March, 2012]

AI 15-07: Chair and Secretariat to create a top level, aggregated IOAG infusion plan report for the public website, to be approved by the delegates by e-vote. [Assigned to: Chair and Secretariat; Due date: 28 February, 2012]

AI 15-08: Secretariat to add two new tables to the report template for IOAG top priorities and IOAG priorities for development of new standards. [Assigned to: Secretariat; Due date: 31 March, 2012]

AI 15-09: Secretariat to delete data that is more than 2 years old from mission tables for public website; for the private website, the old data will be included but will be highlighted. Communication assets are exempted. [Assigned to: Secretariat; Due date: Ongoing]

7) **Agency Reports:**

DLR
Mr. Martin Pilgrim provided a presentation on DLR agency updates, noting a new organization chart. Some key DLR events include the signing of a contract for the European relay satellite ground operations at the end of this year, for the implementation and operation of a ground network located in Weilheim, Germany; Redu, Belgium; and Harwell, United Kingdom, which will keep them busy for the next two years. In regards to communication assets, DLR has tracking assets at the German Space Operations Center (GSOC) and German Remote Sensing Data Center (DFD).

DLR noted that there has been an improvement in IOAG due to the teleconferences in between the annual meeting. Furthermore, the product agreement between IOAG and CCSDS, as well as fostering relationships with other international groups are good initiatives. DLR also noted its participation in the Optical Link Study Group (OLSG).

ESA
Mr. Schmidt provided a status report on ESA and noted that there had been a major reorganization in ESA, including the regrouping of directorates. The Human Spaceflight and Operations (HSO) Group is now merged with the operations directorate at the European Space

Operations Center (ESOC). This merger is due to Human Spaceflight moving into operations phase. Some infrastructure responsibilities have moved to the HFI group. Mr. Manfred Warhaut is the HSO department head.

Mr. Schmidt noted that Rosetta is currently in a hibernation state, with plans to be reactivated in the future. He also stated that ESA was able to receive a connection to Phobos-Grunt, in support of the Russian Space Flight Agency; however, it wasn't a consistent signal. He stated that ESA and CNSA have signed a legal framework that establishes cross support concerning network and operations. In regards to communication assets, the Deep Space Station 3 should be ready in October 2012 and the evolution of the 15 meter network is still planned for 2015. In regards to upcoming activities, there is an ATV3 launch in March, as well as MetOp-B and MSG-3. There is backup capability at ESOC, so ESA can support double launches now. There will also be a Galileo IOV2 launch in Sept 2012, and the FOC-1 will launch in Nov 2012.

JAXA
Mr. Hiroshi provided a report on JAXA activities. He stated that while there were no changes in the organization chart, some functions have changed; the mission data downlink transferred from space application mission directorate to network systems division. In regards to communication assets, the operation sharing ground station construction was completed in June 2011. Future JAXA missions include GCOM-w1 (2012) and ALOS2 (2013). Mr. Liebrecht asked whether ALOS 2 will have ka-band with DRTS. JAXA responded it will have ka-band capability. Mr. Schulz asked whether JAXA plans to have new tracking stations for the ka-band. JAXA noted that the Usuda Deep Space Center could implement ka-band for deep space communication.

Mr. Tai asked whether SELENE 2 would be the same as SELENE 1, and would it be a lunar or interferometry mission. Mr. Hiroshi responded that SELENE 2 has a proposed start design but not a date. It will be a similar mission to SELENE1.

NASA
Mr. Philip Liebrecht presented NASA's status and activities. He discussed the merger of the Space Operations Mission Directorate and Exploration Systems Mission Directorate into the Human Exploration and Operations Mission Directorate. There have been many accomplishments in the past year, including the final shuttle mission and the closing of the Merritt Island Launch Annex. He discussed NASA's new Space Launch System (SLS) and the Multi-Purpose Crew Vehicle (MPCV). NASA will also rely more on the commercial space industry, with SpaceX to carry cargo and eventually crew up to the International Space Station (ISS). Recently launched missions include JUNO, GRAIL, NPOESS, and the Mars Science Laboratory (MSL), which will arrive at Mars in August. Future science missions include MAVEN, which will launch to Mars in November 2013.

Mr. Liebrecht stated that the Space Communication and Navigation (SCaN) Program received approval to build Tracking and Data Relay Satellite (TDRS)-M, which is a copy of TDRS-K and -L, and will be s-, Ka-, and Ku-band capable. The first one is in thermal vacuum testing. SCaN is also building two new 34 meter antennas in Canberra; the first one has just started construction. He also indicated that the SCaN Testbed project, containing three software-defined radios, will

be launched on JAXA's HTV-3 this summer. The testbed will be placed on the ISS for testing and demonstration for about 5 years. One of the software radios has GPS capability using the L5 signal. In regards to optical communications, the Laser Communication Relay Demonstration (LCRD) was just approved for a 2016 launch.

KARI

Dr. Ahn presented KARI's status. He noted that there have been no major organization changes. The ground station name changed to the Satellite Information Research Center. Currently there are two operating satellites, KOMPSAT 2 in LEO, and COMS in GEO. Frequency bands of tracking assets were modified due to interference with domestic mobile phone systems. In regards to ongoing and future missions, KOMPSAT 5 was supposed to launch this year, but due to some difficulties, they will launch next year.

UKSA

Mr. Allan presented on UKSA's status, noting the newly created agency wants to be recognized by the public similar to NASA some day. The International Space Innovation Centre (ISIC) is a public-private partnership that was created on 1 April, 2011. There are ten organizational partnerships that do the work. In regards to ISIC facilities, there is an Earth Observation (EO) Hub with several antennae that links to other antennae; the EO Hub System controls the spacecraft. There are two UK missions: TechDemoSat and UKube-1. TechDemoSat is the first of eight payloads that is a technology demonstration. It will be launched next year and currently is in launch negotiations. UKube1 is a nanosat program with a range of organizations involved.

CNES

Mr. Soula presented the CNES status report. He noted that Mr. Philippe Goudy, who was the Deputy Director under Mr. Pircher, has moved to a position at ESA and has been replaced by Mr. Lionel Suchet. Mr. Suchet will most likely be the CNES representative at IOP-3. Mr. Bernard Cabrieres is the Assistant Director of Flight Operations, to which Mr. Soula's belongs. Some key events include new assets in Kiruna, Sweden and Inuvik, Canada. The Cormoran project is to be a replacement of the s- and x- band antennas in Kourou, French Guiana by 2014, Hartebeesthoek, South Africa by 2015, and Issus-Aussaguel station in Toulouse, France by 2017. CNES will have operation of the ESA ATV-2 (mission control and execution), and provide Ground Network cross support for Spirale and for the Chinese SZ-8 and TG-1.

Mr. Soula then presented on systems, where the PLEAIDES control center implements SLE on the user side. He noted that all future control centers will be SLE compliant, and there are plans to define and develop some generic ground segments to serve all projects, based on CCSDS standards including Mission Operations. CNES already has automated operations of ground stations for its multi-missions ground network. In regards to satellites in operation, CNES noted there are currently 14 satellites in operation at LEO orbit. In regards to missions, he said, five satellites will be launched in December 2011. CNES will have another project in 2012 with India, SARAL, which is focused on oceanography, and later on CFOSAT, which is a payload with China. IOV-2 for Galileo is another upcoming satellite LEOP to be executed from Toulouse. CNES will also conduct the operations of the ATV-3 launch to the ISS, on behalf of ESA, with the main control centre for the Edoardo Amaldi ATV mission in March 2012. The

Ground Network cross supports are in preparation. Other activities of IOAG interest, are: RF/PRISMA (formation flying system with Sweden), DVB-S2, Optical Link studies, and Mission Operations implementations.

8) IOAG Membership:
The Chair noted that IOAG member agencies form the next IOP; observer agencies will also be invited. He also indicated that the IOAG may also form subgroups. The Chair then showed an updated version of the IOAG organization chart for validation to be used on the website and for other uses. Mr. Pilgram asked the criteria for agencies that don't participate in activities. The Chair responded that IOAG members have obligations and should attend all meetings; failure to attend two consecutive meetings may lead to decision to downgrade to Observer status.

In regards to the attendance at meetings since IOP-2, CNSA has been contributing to CCSDS but has expressed no interest in IOAG. ISRO attended IOP-2, but a substitute attended IOAG-13 and -14, and ISRO did not attend IOAG-15. RFSA confirmed its interest in participating and has attempted to be here this week but finally couldn't attend. The Chair suggested trying to re-establish contact with RFSA and provide better coordination. He noted that ASI was unable attend the meeting this time due to budgetary reasons. It was agreed that CNSA and ISRO are to be sent warning letters in regards to their lack of participation, and RFSA will be sent a letter to re-establish contact and intensify coordination.

AI 15-10: Secretariat to prepare letters to CNSA head of delegation for the Chairman to ask confirmation of their observer status and to ISRO head of delegation for the Chairman to inquire on their willingness to remain a full member. Chair and Secretariat to work closely with RFSA's newly named head of delegation to ensure participation at future meetings and contribution to IOAG activities before further action is taken. [Assigned to: Secretariat and Chair; Due date: 31 December, 2011]

9) Liaison report: CCSDS:
Mr. Peccia presented the CCSDS liaison report. He noted that CCSDS top level status has 66 standards and practices. The next CCSDS meeting will be held in Darmstadt, Germany. He commented that the Systems Engineering Areas has three active working groups (Security, Delta DOR, SANA Operations) and three working groups that have been terminated due to lack of resources (Time Correlation & Synch BoF, Info Arch WG + ISA BoF).

In regards to the Mission Operations and Information Management area, relations with the International Astronautical Federation (IAF) are on-going through the Repositories Audit and Certification Working Group.

He noted that in the Cross Support Services Area the Cross Support Transfer Services (CSTS) needs a framework specification. The EFCLTU Orange book is now completed. The Service Management (SMWG) has identified a roadmap for the next generation Service Management production. Furthermore, he said, the Reference Architecture SIG has completed work on overlaps and is directed by CCSDS Management Council (CMC) resolution.

Mr. Peccia reported some significant concerns; CSTS has a major lack of resources and therefore was unable to satisfy IOAG requests. He recommended urgent action from CMC to bring the proposal to IOAG. SMWG also has a major lack of resources and need guidance on the revised objectives of the CSSM refactoring..

Mr. Hooke said that Service Management needs to be done all the time; it is currently done in a non-standard way right now. There was discussion between the delegates on receiving further clarification from CCSDS regarding the standardization of service management in the future. There needs to be intense interaction with the IOAG on the nature of the topic, complexity and the need date over the next two years.

Mr. Peccia asked whether a service management working group is possible. The Chair responded that it was a good idea to think about an IOAG action for service management and the right period to interact with CCSDS on the subject this year. The Chair noted the need to have a common set of objectives and require internal discussions later on in the meeting.

Such discussions were held on the next day but are summarized here for completeness on this subject :

Cross Support Services (Day 2):

Mr. Peccia discussed cross support services, where the service management may involve several lifecycle phases. In regards to the preliminary application of approach and resources considerations, a charter is being developed; he invited the IOAG to highlight its main priorities. Mr. Peccia reminded IOAG to not forget providing direction for the upcoming CMC and CESG meetings. He also requested input from the IOAG Chair in an IOAG document, with a need date by the end of the year.

AI 15-11: IOAG delegates to provide inputs on the development of the Service Management standard, commenting on the scope, the priorities and the schedule as presented by the CCSDS liaison at IOAG-15. [Assigned to: member and observer agency heads of delegation; Due date: 16 January, 2012]

AI 15-12: Secretariat to set up a teleconference between the IOAG delegates to analyze the contributions on the SM refactoring and to formulate a reply to CCSDS. [Assigned to: Secretariat; Due date: 31 January, 2012]

In terms of the Space Link Service, the Optical Coding and Modulation will have no fall meeting, but will meet in spring 2012 to consider inputs from the IOAG. In regards to the Spacecraft Onboard Interface Services (SOIS), the Application Services Working Group has excellent support from the Goddard Space Flight Center (GSFC) and United States Air Force Operationally Responsive Space Office (USAF ORS). The Wireless Working Group requires export and ITAR clearance for testbed cooperation.

In regards to the SSI Operations Concept, CCSDS made a request to IOAG that the SISG document becomes a CCSDS Green Book, which was adopted with assumptions and conditions; Mr. Peccia said that the CCSDS accepts those assumptions and conditions. The Chair noted that SISG is currently dormant, but still in place for the maintenance of documents to follow normal rules, and to be part of a normal review by agencies. Mr. Kearney advocated not developing

special procedures if it can be avoided. He suggested taking inputs from an agency or multiple agencies to be worked within the CCSDS. The Chair noted that the next step is to be consistent with the initial version and there were many ways to keep track and control.

Mr. Peccia said that the IOAG's 03 November, 2011 letter was discussed during the CCSDS's November meeting in Boulder, Colorado; CCSDS will wait until after IOAG-15, in order to confirm service catalog needs and priorities. After receipt of the approved priorities of IOAG Service Catalogues by the CMC, the CESG will begin to populate the CCSDS side of the IOAG-CCSDS Product Agreement database.

10) IOAG-CCSDS Product Agreement (ICPA) Database:
Mr. Calzolari and Mr. Peccia provided a summary of the ICPA status. They noted that the website has been implemented and populated with a best guess at valid content, the concept has been approved by the IOAG and the CCSDS, and the content is in work by a joint IOAG/CCSDS team. Currently the website is in a steady state of operations, where IOAG can revise priorities at any time, and an alert email will be sent to CESG co-chairs and IOAG Secretariat. At each meeting, IOAG and CCSDS should review changes to the database from the last meeting. However, a single need date must be established from multiple agencies inputs. The Chair responded that multiple dates may be available, but the IOAG liaison will be aware of the full set of dates that are in the IOAG infusion plans. The IOAG liaison may also contact the agencies to know the status and discuss actual requirements.

Mr. Kearney noted that if security and navigation are under IOAG cognizance, they are application level functions; therefore, it may be more appropriate for them to be part of Service Catalogue 3, if, in the future, IOAG starts looking at Mission Operations. Mr. Hooke responded that the strategy on security needs to be clear and nothing really exists at this time. The space data links are the highest priority for security and it is the primary vulnerability right now. Therefore, layer security should be linked as a priority, and then bundle layer security date can be pushed out.

The Chair noted that the first reaction heard on security was in the 2008 liaison statement, when security was not really part of the cross support models; this now has to be put in the context of SSI, and requires some work and alignment of the Service Catalogue to the Work Plan. Therefore, the first priority is to populate the ICPA, then update the Service Catalogue so everything is consistent.

To conclude, the Chair recommended going with the first revision of Service Catalogues to make correspondence between IOAG services and related standards on the CCSDS side straightforward and have the same terminology. This step should be quick after the first version of the ICPA is approved.

11. IOAG Priorities:
Priorities for the development of standards:
The Chair provided the current status of member inputs and showed the missing standards to support services in Service Catalogues 1and 2. He noted that Service Catalogue 1 is in good

agreement and consistency. There is also very good consistency on services from agencies about what would not be developed. This could confirm offline radiometric and CFXS as priority 1, and EDM and FSEF as priority 2 for Service Catalogue 1; all the rest are priority 3.

The Chair noted that there has been good discipline from agencies that abstained as they don't intend to implement Service Catalogue 2. The message is easier to interpret; but the drawback is with only three agencies actually voting, if they are not in agreement, there is a big deviation. Disruption Tolerant Networking (DTN) is the top priority, but not all agencies are proceeding at the same pace. If we just use inputs received up to now, then DTN-S is priority 1, then FF, DTN-M, SSI-CP as priority 2, and then all the rest. The Chair highlighted there may be the same rankings more or less, and the same categories. However, it is obvious that some agencies maybe should have a "no" vote if not interested, or everyone should put 3 rather than abstain.

In regards to the IOAG statement to CCSDS on priorities, there is good consistency on the order of priorities in Service Catalogues 1 and 2; however the values change based upon the voting membership. Members who didn't provide inputs could influence the priority results, and the Chair raised the question on whether IOAG should wait for their inputs.

Delegates agreed it was acceptable to do without input from the other agencies for now. Therefore, input to CCSDS was elaborated from available data:

- Priority 1 could include: CORS, CFXS, DTN-S (3)
- Priority 2 could include: EDM, DDORS, FSEF, DTN-M, FF, SSI-CP
- Priority 3 could include: all others missing standards in SC#1 and SC#2

Target dates for new standards:
The Chair then highlighted the current status of input on IOAG Infusion Plans. The only message is that some data is missing. There was consideration to populate the ICPA with some target dates. KARI noted that the agency has plans to implement some data format and some in-house translating from conventional data tracking.

The Chair noted that dates were provided, for instance by NASA, but there was no real implementation plan in the short term from other agencies. There is priority on DTN from JAXA but not in the infusion plan. He asked JAXA whether there was a target date to deploy DTN. JAXA noted that the agency is ground testing on DTN with NASA and will then try to develop the infusion table.

In regards to the IOAG statement to CCSDS, the Chair noted that the consistency between priorities and infusion plans are not always obvious. There are not enough inputs on infusion plans of future standards and not enough target dates. He asked whether there is a need for a new round of table updates. He further suggested the need to confirm that the indicated dates are for when the standard should become available to start developments.

Top priorities:

The Chair then summarized the current status of input on IOAG top priorities ; based on those, they would be:

- Conjunction data message, then there is a standard in preparation for CCSDS
- LPDC codes (3 mission models) standards are available and in preparation at CCSDS
- Mission Ops core services standards are available and in preparation at CCSDS
- Delta DOR standards are available and in preparation at CCSDS
- Service Management standards are available and "under revision" at CCSDS
- CFDP standard is available and the implementation of standards is in CCSDS discussion
- Space data link security is a standard in preparation at CCSDS

Note : This list was approved on the last day for transmission to CCSDS and to the Agencies' Management.

He proposed that the list be added to the 2011 IOAG annual report.

The Chair adjourned the meeting for the day.

DAY 2 – WEDNESDAY, 7 DECEMBER, 2011

The Chair opened the second day with a review of the Agenda with changes.

12) Liaison Report: SFCG:
The Chair commented that the Secretariat has aggregated the chart that can be viewed later. He noted that Mr. Vassallo has been given access to the website so he can get the information he needs. In the Excel file, the Secretariat noted a problem with the date convention.

AI 15-13: Secretariat to confirm all dates in the Mission Model chart for consistency of European /US conventions. [Assigned to: Secretariat; Due date: January 31, 2012]

There was a question of a possible e-poll in regards to the public web site whenever the table is completely revised after each meeting for each delegate to verify their inputs. The Chair commented that the SFCG input needs to be verified, and noted that the file could be quite large. An e-poll for the graphical model might be needed.

AI 15-14: All agencies are to confirm their data and that of related agencies from the same country as identified in SFCG tables, and also determine the level of data that should be included in the Mission Model table (ie., primary links only or also secondary). [Assigned to: Heads of delegation; Due date: 16 January, 2012]

AI 15-15: Secretariat to update and provide new mission model and e-poll for validation of table and graphical model. [Assigned to: Secretariat; Due date: 28 February, 2012]

The Chair indicated that each agency should consider if the information for secondary payloads related to their agencies should be maintained in the IOAG tables. There was a question on whether the group should just consider main links or be exhaustive with all links for IOAG. Mr. Schmidt commented that SFCG is waiting for feedback from IOAG.

Mr. Liebrecht noted that he was at the recent SFCG meeting and noted there was good congruence on Ka-Band uplink. He suggested requesting Mr. Vassallo provide a report, as it would be good to have in preparation for the upcoming World Radiocommunication Conference.

AI 15-16: Secretariat to prepare letter for Chairman to provide status of SFCG-related discussion and actions from IOAG-15 to SFCG liaison, as well as to request an SFCG report for the next IOAG meeting [Assigned to: Chairman; Due date: 28 February, 2012]

13) Liaison Report: ICG:
Mr. Miller presented the International Committee on Global Navigation Satellite Systems (ICG) liaison activities through the teleconference while attending the Asia Pacific Regional Space Agency Forum (APRSAF). He said that there is need to promote better coordination between IOAG and ICG. Some items can be focused on immediately, such as the Space Service Volume (SSV). During the past ICG-6 meeting in Tokyo, Japan, the ICG adopted SSV as a major element. As the ICG-IOAG liaison, Mr. Miller requested a formal response to IOAG's request for observer status to the ICG. The request was formally approved, and IOAG has observer status with right to a delegation and seat at the table.

The ICG-7 meeting will be held in Beijing from 4-9 November, 2012. It is strongly recommended that IOAG leaders attend at least the opening sessions of the conference to establish a presence and build on the synergies identified. Very senior space agencies representatives participate, and this provides good interaction to develop a mutual work plan. It is a powerful opportunity to capitalize on, and participate as a delegation.

Mr. Miller provided an overview of NASA missions that will use Global Navigation Satellite Systems (GNSS) and said that NASA can enable greater autonomy for spacecrafts with Global Positioning System (GPS) as it saves money and bandwidth. He then noted that templates with specifications to support GPS/GNSS SSV users were provided for IOAG agencies.

In conclusion, he summarized that space agency stakeholders need to provide user requirements to GNSS service providers now, before the performance standards and interface specifications are finalized. IOAG space agencies are positioned to help GNSS service providers plan for provisions of positioning, navigation and timing (PNT) signals to support space users out to GEO altitudes.

Mr. Miller commented that once IOAG attends the ICG, there can be more discussions to work at the engineering level. The Chair asked whether there is a liaison relationship between ICG and CCSDS. Mr. Miller responded that ICG, which resides under the United Nation, does not have a direct relationship with the CCSDS; however, it is more appropriate for IOAG to work together with CCSDS on technical details.

Mr. John Rush noted that all GNSS systems are owned by members of the IOAG; therefore, it may be good to have briefings by each of the provider agencies to elaborate the terms of their space coverage, and provisions to have space users access their systems. This should be understood from a system-by-system basis. Mr. Liebrecht commented that GNSS providers should advocate for space applications for their respective GNSS system. Many of these systems are using GNSS for space applications, and need to specify using it for some minimal level.

AI 15-17: Each head of delegation to interact with his agency's ICG representative to ensure that the mission model of the Agency including the GNSS services is established and communicated to the ICG representative and IOAG Secretariat. [Assigned to: Member and observer heads of delegation; Due date: 31 March, 2012]

The Chair asked for the ICG liaison's recommendation whether there should be a special role in each of the respective organizations to work towards a user community and improve contribution of the user community directly to ICG. He noted that having observer status is different from the intent of having liaison relationship. Mr. Miller commented that the observer status was mainly given based upon the ICG terms of reference, which did not establish a liaison role. Mr. Liebrecht said that there are strategic needs in the global space community, and suggested that they could aggregate the international information on which space missions are planning to use SSV for their missions.

The Chair stated that the next step for each agency in the mission model should be the utilization of navigation services. In response to a query, Mr. Miller indicated that the next ICG meeting will be held in Munich for its Working Group B in the February/March 2012 timeframe. The Chair commented that the IOAG needs to plan for the ICG-7 December 2012 meeting.

AI 15-18: IOAG Secretariat to provide an aggregated status on space-based GNSS applications for ICG liaison in preparation for ICG-7. [Assigned to: Secretariat; Due date: 31 May, 2012]

14) **ISECG Discussion**
The Chair, Mr. Schmidt, and Mr. Liebrecht initiated the ISECG discussion. The Chair noted that there was a teleconference in October 2010 with Ms. Kathy Laurini on space communication. Afterwards, a roadmap was published with a two mission scenario – Moon and asteroid – but there was no pathway finalized within ISECG. A new version has recently been released with more inputs to the roadmap expected. The IOAG is invited to provide feedback to ISECG through the Secretariat on how to improve the Global Exploration Roadmap content and framework, and possibly suggest specific actions which could be pursued by the IOAG.

The Chair noted Action Item 14d-04: "Delegations to look at ISECG roadmap and see how IOAG can provide further contributions." It was discussed that there was little progress in communications and it was an opportunity for IOAG to share visions with ISECG and influence choices. The Chair noted he has provided the Service Catalogues to Ms. Laurini so her working group is aware of IOAG's activities.

The Chair then highlighted the objectives of building an IOAG-ISECG convergence before IOP-3. It was agreed to hold a teleconference in the January-February timeframe to provide feedback from IOAG-15 and propose next steps. Possible opportunities include the Global Exploration Conference in Washington, DC in May, which may provide an opportunity for a contribution from IOAG; an ISECG senior management meeting in September; and the possibility of an ISECG invitation to an IOAG teleconference.

Mr. Schmidt inquired about a status update on their communications working group. The Chair responded that it was currently not a major issue for them so they haven't started yet. He noted the opportunity for them to delegate communication issues directly to IOAG and CCSDS. There would be opportunities for joint and direct interfaces next year. Mr. Schmidt noted that there are currently several places in the roadmap where the ISECG is inviting advice in the area of communications. He further noted that there was another issue in regards to the mission operations monitoring and control service; he offered to study the roadmap for potential opportunities to explore this kind of service in the context of the ISECG roadmap. It could be very helpful to have the requirements for space communication standards.

Mr. Pilgram suggested an active IOAG role in the ISECG roadmap as it currently has very little regarding space communications. The Chair said the ISECG is still an open opportunity where IOAG can provide help and offered to speak with Ms. Laurini regarding the opportunity to discuss the right level of contribution. He suggested that perhaps IOAG could do a presentation in the April workshop and make sure the IOAG inputs are at the right level of their expectation.

Mr. Kearney indicated that CCSDS has some areas of interest to IOAG such as SOIS. This may be pertinent to ISECG; the CCSDS should interface with ISECG as a peer organization. He believed there should be direct CCSDS interaction with that activity. The Chair noted that it may be a bit premature for ISECG. Mr. Kearney suggested a joint presentation; the ground system interfaces/control center interfaces issue needs to be resolved.

There was a proposal of an IOAG presentation on the concepts of future communications at the Global Exploration Conference. NASA has drafted a paper that requires the contribution and endorsement of other IOAG members; it would be helpful for the ISECG to understand what IOAG is doing and how it engages other organizations. Mr. Schmidt highlighted that resources should be available prior to embarking on additional work. The Chair responded that IOAG should adjust their work with ISECG's expectations, as the ISECG may have more requirements.

AI 15-19: Chair and Secretariat to set up a teleconference with ISECG representative regarding level of input required from IOAG for their upcoming Workshop in January 2012. Other representatives, including CCSDS Secretariat, will be invited to participate. [Assigned to: Chair and Secretariat; Due date: 16 December, 2011]

15) Optical Links Study Group (OLSG):
Mr. Schulz reported that the OLSG has analyzed the key operational scenarios where cross support may be of benefit, and provided several recommendations:

- Request a six month extension for Phase 2
- Add the Optical Communication Topic to the IOP-3 agenda
- Consider opportunities for early demonstration of optical communications cross support
- CCSDS to develop interoperability standards; however, that should not be done until the OLSG has finalized its report (including Phase 2).

He noted that ASI, CNES, DLR, ESA, JAXA, KARI and NASA were participants of the OLSG. The group held 15 videoconferences and one face to face meeting to develop the business case. In building the business case, the group completed a preliminary analysis that is favorable to cross support for a routine phase payload data return. In regards to mission scenarios, the group has not looked at Moon or Mars relays and would require a large re-scope if needed, he said. There were three major challenges: the uplink beacon, weather, and cost. Furthermore, operational constraints might occur from required coordination with civil aviation authorities and this has not been resolved. This could lead to cost optimization for all agencies.

Mr. Rush presented the L2 scenario. The OLSG tried to base the studies on existing missions as much as possible. It was modeled based on the EUCLID mission, where the operations were always at night and assumed the ability to transfer data rates at a factor of ten that of radio frequency and receive 7.5 Tb worth of data down to Earth each day. He suggested using an existing system to demonstrate better power/mass with optical communication. He recommended three possible ground stations – Tenerife, Ascension, Hartebeesthoek, and paired stations due to clouding issues.

There were extensive discussions on the L2 scenario analysis results. Tenerife is good for the scenario (96.29 percent of data return), and there is potential for high availability there and since it is moving a lot of data from the spacecraft.

The L1 scenario was based on the SOHO mission since there are always operations during the day. The L1 scenario concluded that Tenerife held a 92.17 percent data return; combined with Ascension, it would be 98.87 percent.

Lunar scenario models are based on the LADEE LLCD terminal but with LRO orbit parameters. There are an array of 4 telescopes and transmit telescopes for the beacon. There are 4 ground terminals: Haleakala, Tenerife, Table Mountain, and Hartebeesthoek. The Lunar Scenario results show that Haleakala held an 81 percent data return, and with all four terminals together a 99.6 percent data return.

The Deep Space scenario was based on the Deep Space Optical Terminal concept being developed at the Jet Propulsion Laboratory (JPL) for a mission to Mars that would provide a demonstration of an optical trunk line. Nine ground terminals were used in a combination of ESA, JAXA and NASA stations to provide a global capability.

In summary, Mr. Rush stated that there is a business case with the main driver for payload data return and routine mission support with the TTC system based on RF communications system. Cross support would be needed but costs were high. Therefore, an economical introduction of

optical space communications requires the sharing of ground terminal assets among the IOAG agencies. In order to accomplish this, a set of detailed technology standard for cross-support are needed and do not exist today.

Mr. Schulz noted that there was a need to work closely with civil aviation organizations. Mr. Liebrecht commented that there is a need to consider having these devices on board with humans as a cursory look at least of a laser device on a vehicle with humans in regards to safety concerns. Mr. Schulz and Mr. Rush noted that this was taken into consideration.

The Chair thanked the team for the hard work and recognized the very helpful report. He noted it was an action to OLSG to look at the legal aspects, mission models, and to further investigate re-using terminals as part of the final report. Mr. Schmidt asked how much resource was required for the work to continue for six months. The Chair responded that it would be the same contributions from agencies and invited all agencies to participate.

The first and second recommendations were accepted by the IOAG. Regarding the third recommendation, Mr. Liebrecht suggested that the OLSG participants have most of what they need to identify the opportunities. He recommended cataloging the opportunities in the report that may be exploited. The Chair asked for OLSG to provide examples for opportunities they saw for demonstrations in the final report. In regards to the fourth recommendation, Mr. Peccia suggested waiting until October to provide a more elaborate proposal for the IOAG. Mr. Calzolari suggested a six month extension, as April would still be preliminary. Mr. Kearney noted that there are no scheduled drivers for the effort; CCSDS can adapt. However, a new set of requirements with no new resources requires discussion.

Mr. Liebrecht noted that CCSDS is already tremendously oversubscribed, and recommended no schedule driver. He agreed with Mr. Kearney to wait until IOAG receives the best guidance possible from the OLSG team. The Chair noted it was an opportunity to define new assets for the medium and long term. The OLSG report should provide sufficient input to CCSDS.

AI 15-20: IOAG members and observers to provide written comments to interim OLSG report. [Assigned to: member and observer heads of delegation; Due date: 31 January, 2012]

It was then agreed that the presentation o the next version o the OLSG report would be in June 2012 on the occasion of mini IOAG 15b.

16) Mission Operations Services:
Mr. Kearney proposed an approach for addressing Mission Operations at the upcoming IOP-3. He suggested that starting five months prior to the meeting, the IOAG restarts the Mission Operations Strategic Coordination Group (MOSCG) to develop a proposal which the IOAG would send to IOP-3. NASA volunteered to co-chair the MOSCG again, if the IOAG should request. Mr. Schmidt suggested providing a small IOP-3 roadmap. Mr. Kearney suggested that the quickest approach to re-establishing the group would be to continue with the same participants as the earlier MOSCG, unless agencies want to provide changes, starting

approximately five months before the IOP-3. The MOSCG co-chairs will contact the SM&C working group to see what is needed.

The Chair suggested having an agreement on applications, as it is enough work for the group to begin implementing the main standards that still need to be validated. He further suggested a resolution or a plan and a reminder to resume discussions in due time to prepare for IOP3 and continue discussion through liaisons, if questions arise.

17) Ka-Band:
NASA:
Dr. Les Deutsch provided a presentation on NASA's Ka-Band. He highlighted that all of NASA's communication networks have Ka-Band. He then presented on NASA's Ka-band flight demonstrations, and the agency's operational Ka-Band missions. NASA is planning additional Ka-Band capabilities as a requirement for all three NASA networks in a strategy to encourage missions to move to use of Ka-Band. NASA is committed to the use of Ka-band for high rate science links on future missions since Ka-band maximizes science data return and is a proven technology. Mr. Liebrecht commented that NASA has not experienced much outage at Ka-Band even in fairly high winds, and it is infrequent to see degradation. Dr. Deutsch followed up noting that, depending on where the antenna is, they have not needed to adjust the data rate.

CNES
Mr. Soula reported on CNES's Ka-Band studies in the context of HDR Data Return for LEO's. He highlighted the studies that have been conducted, such as the CNES Roadmap for High Data Rate Payload Telemetry, Studies of Technological Concepts for HDR-PLTM, and the Evaluation of New Technological Concepts for HDR-PLTM. He then presented on possible scenarios, and noted CNES still plans to utilize X-band soon to cover the requirements.

The Chair closed the topic by requesting that agency's include this topic in its reports for the next meetings, and noted no further coordination was needed.

18) IOP-3 Planning:
The Chair opened the IOP-3 planning discussions noting the need for a host, location, date, and objectives. IOP-1 had been hosted by ESA in Paris, and IOP-2 had been hosted by NASA in Geneva. Mr. Schmidt pointed out visa constraints should be under consideration. The Chair proposed an action for all delegates to consider hosting the meeting and propose a location.

Based on upcoming elections and planned ministerial meetings, early 2013 was considered as an ideal timeframe for the IOP-3. Mr. Schmidt noted that ESA's Council of Ministers meeting may slip by a couple of months to the spring of 2013; he will confirm the date. If it does slip, IOP-3 could be in late summer/early fall of 2013.

AI 15-21: ESA to confirm the date of their Council of Ministers meeting in order to plan IOP-3 several months following. [Assigned to: M. Schmidt/ESA; Due date: as early as possible]

AI 15-22: All member agencies to consider hosting IOP-3 in 2013 timeframe. [Assigned to: member agency heads of delegation; Due date: IOAG-15a]

The Chair presented the draft agenda for IOP-3, which was based upon IOP-2. Mr. Hooke noted that IOP-2 gave specific directions to the CCSDS to complete an operations concept and mature architecture. The CCSDS will have a fairly comprehensive package to present. Mr. Liebrecht stated that specific recommendations still need to be resolved. Perhaps it is good to present an overview to the IOP members, and then provide updates on each of the IOP-2 resolutions. This would include the actions taken, status, and what decisions are needed from them to move forward for each topic. This would help the senior management in leading to a decision on each issue. The Chair agreed with this approach. Agency representatives to the IOP-3 should include the decision-level manager, individuals who can support him/her, IOAG staff/heads of delegation, and support in the liaison/working groups.

The Chair asked whether invitations should be extended to other agencies. For example, CSA is in CCSDS. Perhaps invitations could lead to IOAG membership. He added that he hoped the attendance issue would be resolved; the doors are open for new participants and perhaps an invitation can be re-opened at the IOP for awareness.

Mr. Liebrecht asked whether IOP members convened in advance or whether the meeting was steered by the IOAG. The Chair commented that IOAG prepared the agenda that was approved by the IOP members. While the host does not need to Chair the IOP, the IOP will need to name its chairman. Mr. Liebrecht asked whether all the IOP issues have been considered, and raised the question whether this should be further discussed during the next teleconferences.

As an extension of the idea, the Chair suggested there is a need to think about formats for the ideas to show benefits of what IOAG is doing and how the group intends to take into account all challenges of the future. Mr. Liebrecht noted that in terms of plans and priorities, the CCSDS' tight budget causes plans to move slower than preferred; it would be valuable for the IOP to weigh in on this. The Chair offered to revise the draft agenda for further discussion at the next meeting.

AI 15-23: Chairman to revise the draft agenda of the IOP3 to reflect the discussions at IOAG-15 and to serve as a basis for further discussions on the preparation of the IOP3. [Assigned to: Chairman; Due date: IOAG-15a]

The Chair adjourned the meeting for the day.

DAY 3 -- THURSDAY, 8 DECEMBER, 2011

19) Any Other Business:

a) The Chair opened the third day of the IOAG meeting to discuss reviewing IOAG top priorities in order to reach a decision. He pointed out that part of the exercise is to elaborate on a message that will be shared with the management, community, users, ISECG, and others; items that are critical for the future and convey big changes in the domain of operations.

The Chair commented that the message should not focus on just IOAG identified top priorities, but it should also address the priorities in the area of infusion, such as CFDP deployment in the future. These items need to convey importance, due to needing new standards, some of which are game-changing, such as Disruption Tolerant Networking (DTN). He suggested agreeing on the list and asked Mr. Tai to help formulate such a message statement.

AI 15-24: Chairman and Mr. Tai to develop a draft message to introduce IOAG top priorities for user community and management to explain IOAG's challenges and options in the near future. [Assigned to: Chairman and W. Tai/NASA; Due date: IOAG-15a]

The main goal, the Chairman said, is to have a collective message, not messages from each individual agency. The message audience is the users and managers; the message should reflect IOAG's priorities on some short term development of standards in coordination with CCSDS.

Mr. Kearney noted the criticality of DTN to exploration missions and suggested putting an asterisk to note that for agencies with exploration missions, DTN is a top priority. The Chair responded that the IOAG-CCSDS Product Agreement (ICPA) is the first priority; a message can be formulated to reflect that. However, if an agency needs the standards in 2020-2025, they should abstain from voting within the ICPA. Mr. Liebrecht commented that for human exploration missions, a number of these standards are of highest priority, although they aren't the highest priority in this list.

The Chair explained that the message must be a joint IOAG position. Therefore, the impact may be different, but that is a plan of intention. Therefore, only those areas where there is common agreement among all interested agencies will be included. At minimum, it should identify the needs for development in cross support for some objectives to achieve together. He emphasized the message needs to show areas of agreement for future visions of operations with some variations on message depending on domain. He added that the IOAG will need to approach ISECG on this topic in its next teleconference with them, and show that we are proceeding together in one direction and share any changes with our management.

Mr. Kearney advocated addressing only developing standards. The Chair believed the message today is to develop the standards to completion in order to have a full set in the category. The message may be that IOAG needs to deploy or infuse. In formulation of this high level message, the Chair asked to take into account the infusion table. Mr. Kearney suggested keeping it as a development table, and not as a deployment table. This would show where limited resources can be used for development of standards.

Mr. Tai suggested adding optical links and DTN to this message since those are OLSG activities and would provide certain elements. However, Mr. Schmidt felt that not everything should be

added to the list. Mr. Tai noted that it is important to convey 'game changing' topics in the message to the community. The Chair agreed with to include OLSG in the IOAG message to IOP. He proposed to emphasize the list of 7 or 8 items, as well as Service Catalogue priority 1, and focus on items to consider that may become important in the future.

b) The IOAG moved on to discuss the SpaceOps papers and the next IOAG meetings. The Chair noted it was agreed during the last teleconference that there would be one or two presentations related to IOAG activities at the SpaceOps 2012 conference. He has uploaded a paper with a long list of IOAG co-authors to the IOAG website for comment.

AI 15-25: Chair to circulate abstract submitted to SpaceOps to all heads of delegation, with proposals on plan and contributions to the paper. OLSG co-chair to circulate abstracts submitted to SpaceOps to all heads of delegation. [Assigned to: Chairman and K-J. Schulz/ESA; Due date: 31 January, 2012]

c) The Chair then raised the issue about the Chairmanship, perhaps extending the term to IOP-3. This would assume the Chair stays in the position until 2013. Prior to IOAG-16, delegations should think about the overlap between the current chair and the successor. Therefore, it would beneficial to elect a new chair by the end of the year and have a six month overlap. The Chair suggested that all delegates should think about which agency and who within the agency would be a good candidate.

d) The Chair proposed to discuss the future IOAG meetings in 2012. He noted that the IOAG teleconferences or mini-IOAG meeting should be more than one month before the CCSDS spring meetings. They should also be about one month after the CCSDS spring meeting. A teleconference or mini-meeting can be held after the ISECG management meeting and more than one month before the CCSDS fall meetings. The annual IOAG meeting should be soon after.

Mr. Schmidt inquired about the ICG meeting. The Chair noted that there was still time to prepare, and the group should define the next steps at the upcoming teleconference. He commented that teleconferences have been long during the past year; in the future, the IOAG can have more focused discussions to minimize the time needed for each teleconference.

Some dates proposed for IOAG-15a teleconference included those around the SpaceOps TPC meeting in mid-February, IOAG-15b around June 11-15 as a mini-meeting during SpaceOps in Stockholm, IOAG-15c teleconference during the first week of September, and an optional IOAG-15d teleconference during the last week of October. The IOAG-16 can be held around the end of November or second week of December.

The Chair asked for volunteers to host IOAG-16. Mr. Schmidt commented that he was prepared to host in Darmstadt if there were no other volunteers. Mr. Liebrecht also considered offering to host, perhaps around the week of the 12th or 25th of November.

As all recent IOAG meetings were in Europe, the Chair asked ESA to explore options as backup. He then asked NASA to provide information soon on IOAG-16 in order to place it on the

calendar. Since NASA also organizes CCSDS events and IOAG, they should also cross check schedules.

AI 15-26: NASA to confirm organization of IOAG-16 in the last two months of 2012 and to indicate the proposed location and dates. [Assigned to: P. Liebrecht; Due date: IOAG-15a]

The Chair was not sure whether an IOAG-15d teleconference would be needed; it mainly depended on IOAG-16, and the CCSDS schedule. Perhaps it could be a quick teleconference to review actions sometime after the working group meetings and before IOAG-16, he suggested. It was agreed that IOAG-15a would be held during the week of Feb 27th, and for the Secretariat to propose dates for the teleconference.

AI 15-27: Chair and DLR to confirm the possibility of holding the mini-IOAG 15b in Stockholm on the occasion of the SpaceOps 2012 conference. [Assigned to: Chairman and Mr. Pilgram; Due date: 31 January, 2012]

20) Executive Summary/Drafting Committee Report:
The Chairman reviewed the 27 actions assigned during the meeting and plans for upcoming meetings.

Following closing statements and thanks to CNES for hosting the meeting, the Chairman adjourned the IOAG-15 meeting.

Attachment 1

IOAG-15 Agenda
6-8 December 2011
Toulouse, France

6 December 2011 (Tuesday)

Time	Topic	Speaker	Expected Outcome
08:30 –9:00	Welcome Coffee		
09:00 –9:10	1. Welcome, Opening Remarks	CNES	
09:10 –9:15	2. Introduction of delegates	All	
09:15 –9:25	3. Meeting Introduction	J-M. Soula	-Appointment of a drafting committee -Agenda approval
09:25 – 9:35	4. Chairman's Report 4.1 Status of work plan	J-M. Soula	
09:35 –10:00	5. Secretariat's Report 5.1 Approval of IOAG-14D minutes 5.2 Summary of e-votes 5.3 Open action item review 5.4 Documentation status 5.5 IOAG reference table status	B. Adde	
10:00 –10:30	6. IOAG Reference Tables	J-M. Soula	- Validated IOAG tables and guidelines for subsequent actions - Decision on commercial tables
10:30 –10:45	Coffee Break		
10:45 –12:30	**7.** Agency Reports	• ASI • CNES • DLR • ESA • ISRO • JAXA • NASA • RFSA • KARI • UKSA	- Brief oral presentations to support written reports submitted to website
12:30 –13:45	Lunch		
13:15 –14:15	8. IOAG Membership	J-M. Soula	–Decision on member status
14:15 –15:00	9. Liaison Report: CCSDS	N. Peccia	
15:00 –15:15	Break		
15:15 –15:45	10. Status of IOAG-CCSDS Product Agreement Database	G-P. Calzolari	–Approval of online database for use in place of liaison statements
15:45 –17:00	11. IOAG Priorities	J-M. Soula	–Decision on top 10 priorities for CCSDS –Decision on priorities for IOAG-CCSDS Product Agreement
17:00 –17:30	Adjourn Drafting Committee		
20:00 –23:00	Social Event: CNES Host		Meeting point is close to and in

	Dinner Cruise on the Canal du Midi		front of the central railways station. www.loccitania.fr

7 December 2011 (Wednesday)

Time	Topic	Speaker	Expected Outcome
08:30 –09:00	Welcome Coffee		
09:00 –09:30	12. SFCG Discussion	J-M. Soula	–Message to SFCG
09:30 –10:00	13. Liaison Report: ICG	JJ. Miller	–Way forward and actions
10:00 –10:30	14. Liaison Report: ISECG	J-M. Soula M. Schmidt	
10:30 –10:45	Coffee Break		
10:45 –12:30	15. Optical Links Study Group	K-J. Schulz J. Rush	–Approval of OLSG report and recommendations –Decision on IOP-3 presentation
12:30 –13:45	Lunch		
13:45 –14:15	16. Mission Operations Services	J-M. Soula M. Kearney	–Decision on IOP-3 presentation
14:15 –15:00	17. Ka-Band	J-M. Soula L. Deutsch	–Presentations and/or discussion
15:00 –15:15	Break		
15:15 –16:30	18. IOP-3 Planning	J-M. Soula	–Decision on host, location, date, agenda items, participating agencies for IOP-3
16:30 –17:00	Adjourn Drafting Committee Meeting		

8 December 2011 (Thursday)

Time	Topic	Speaker	Expected Outcome
08:30 –9:00	Welcome Coffee		
09:00 –10:00	19. Any Other Business • SpaceOps papers • Membership • Chairmanship	Delegates	
10:00 –10:30	20. Executive Summary	J-M. Soula	
10:30 –10:45	Coffee Break		
10:45 –12:30	21. Drafting Committee Report	B. Adde	–Approval of actions and resolutions
12:30 –13:45	Lunch		
13:45 –14:15	22. Planning for Next Meetings	J-M. Soula	
14:15-14:00	23. Other Topics		
16:00 –17:00	Tour of Space Museum		–Access all afternoon till 05:00 PM (including Planetarium at 14:30 and IMAX at 15:00)

Attachment 2

IOAG-15
ACTION ITEMS

AI 15-01: Secretariat to remove Work Plan Actions from the IOAG website. [Assigned to: Secretariat; Due date: 31 January, 2012]

AI 15-02: Chair to prepare draft Annual Report for 2011 and draft Work Plan for 2012 and circulate to heads of delegation for review, comment and approval. Agencies are invited to provide input to the Chair for the preparation of these documents. Annual report will include list of agreed top priorities. [Assigned to: Chairman; Due date: 16 January, 2012]

AI 15-03: All member and observer agencies to identify additional non-member provider contact information, for the Chairman to contact, for inclusion of their inputs in commercial/non-member assets table. [Assigned to: All agencies and Chairman; Due date: 31 January, 2012]

AI 15-04: All member and observer agencies to include non-member providers in cross support table for their own missions only. [Assigned to: All agencies; Due date: Before IOAG-15b – end of May, 2012]

AI 15-05: Secretariat to coordinate with relevant agencies any duplicate entries in tables and confirm accuracy and consistency of data for those entries. [Assigned to: Secretariat; Due date: 31 January, 2012]

AI 15-06: Secretariat and Chair to develop a guide with procedures and instructions on the utilization of the templates by the delegates and the production of the IOAG reference tables by the Secretariat. [Assigned to: Secretariat and Chair; Due date: 31 March, 2012]

AI 15-07: Chair and Secretariat to create a top level, aggregated IOAG infusion plan report for the public website, to be approved by the delegates by e-vote. [Assigned to: Chair and Secretariat; Due date: 28 February, 2012]

AI 15-08: Secretariat to add two new tables to report template for IOAG top priorities and IOAG priorities for development of new standards. [Assigned to: Secretariat; Due date: 31 March, 2012]

AI 15-09: Secretariat to delete data that is more than 2 years old from mission tables for public website; for the private website, the old data will be included but will be highlighted. Communication assets are exempted. [Assigned to: Secretariat; Due date: Ongoing]

AI 15-10: Secretariat to prepare letters to CNSA head of delegation for the Chairman to ask confirmation of their observer status and to ISRO head of delegation for the Chairman to inquire on their willingness to remain a full member. Chair and Secretariat to work closely with RFSA's

newly named head of delegation to ensure participation at future meetings and contribution to IOAG activities before further action is taken. [Assigned to: Secretariat and Chair; Due date: 31 December, 2011]

AI 15-11: IOAG delegates to provide inputs on the development of the Service Management standard, commenting on the scope, the priorities and the schedule as presented by the CCSDS liaison at IOAG-15 (pages 4 and 7). [Assigned to: member and observer agency heads of delegation; Due date: 16 January, 2012]

AI 15-12: Secretariat to set up a teleconference between the IOAG delegates to analyze the contributions on the SM refactoring and to formulate a reply to CCSDS. [Assigned to: Secretariat; Due date: 31 January, 2012]

AI 15-13: Secretariat to confirm all dates in the Mission Model chart for consistency of European /US conventions. [Assigned to: Secretariat; Due date: January 31, 2012]

AI 15-14: All agencies are to confirm their data and that of related agencies from the same country as identified in SFCG tables, and also determine the level of data that should be included in the Mission Model table (ie., primary links only or also secondary). [Assigned to: Heads of delegation; Due date: 16 January, 2012]

AI 15-15: Secretariat to update and provide new mission model and e-poll for validation of table and graphical model. [Assigned to: Secretariat; Due date: 28 February, 2012]

AI 15-16: Secretariat to prepare letter for Chairman to provide status of SFCG-related discussion and actions from IOAG-15 to SFCG liaison, as well as to request an SFCG report for the next IOAG meeting [Assigned to: Chairman; Due date: 28 February, 2012]

AI 15-17: Each head of delegation to interact with his agency's ICG representative to ensure that the mission model of the Agency including the GNSS services is established and communicated to the ICG representative and IOAG Secretariat. [Assigned to: Member and observer heads of delegation; Due date: 31 March, 2012]

AI 15-18: IOAG Secretariat to provide an aggregated status on space-based GNSS applications for ICG liaison in preparation for ICG-7. [Assigned to: Secretariat; Due date: 31 May, 2012]

AI 15-19: Chair and Secretariat to set up a teleconference with ISECG representative regarding level of input required from IOAG for their upcoming Workshop in January 2012. Other representatives, including CCSDS Secretariat, will be invited to participate. [Assigned to: Chair and Secretariat; Due date: 16 December, 2011]

AI 15-20: IOAG members and observers to provide written comments to interim OLSG report. [Assigned to: member and observer heads of delegation; Due date: 31 January, 2012]

AI 15-21: ESA to confirm the date of their Council of Ministers meeting in order to plan IOP-3 several months following. [Assigned to: M. Schmidt/ESA; Due date: as early as possible]

AI 15-22: All member agencies to consider hosting IOP-3 in 2013 timeframe. [Assigned to: member agency heads of delegation; Due date: IOAG-15a]

AI 15-23: Chairman to revise the draft agenda of the IOP3 to reflect the discussions at IOAG-15 and to serve as a basis for further discussions on the preparation of the IOP3. [Assigned to: Chairman; Due date: IOAG-15a]

AI 15-24: Chairman and Mr. Tai to develop a draft message to introduce IOAG top priorities for user community and management to explain IOAG's challenges and options in the near future. [Assigned to: Chairman and W. Tai/NASA; Due date: IOAG-15a]

AI 15-25: Chair to circulate abstract submitted to SpaceOps to all heads of delegation, with proposals on plan and contributions to the paper. OLSG co-chair to circulate abstracts submitted to SpaceOps to all heads of delegation. [Assigned to: Chairman and K-J. Schulz/ESA; Due date: 31 January, 2012]

AI 15-26: NASA to confirm organization of IOAG-16 in the last two months of 2012 and to indicate the proposed location and dates. [Assigned to: P. Liebrecht; Due date: IOAG-15a]

AI 15-27: Chair and DLR to confirm the possibility of holding the mini-IOAG 15b in Stockholm on the occasion of the SpaceOps 2012 conference. [Assigned to: Chairman and Mr. Pilgram; Due date: 31 January, 2012]