INTERAGENCY OPERATIONS ADVISORY GROUP

Work Plan 2011

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1   Introduction

The overall scope of the Interagency Operations Advisory Group (IOAG) is to undertake activities to establish a multi-agency coordination related to space cross support and space communications. A specific IOAG goal is the achievement of full interoperability among member space agencies.

To achieve these goals, some permanent objectives are defined in the IOAG Terms of Reference. The Inter-Operability Plenary (IOP) has also assigned specific objectives, as described in Section 2.

The Work Plan details the IOAG work objectives for 2011 and defines an associated implementation plan. The higher-level objectives for the next several years are also identified to highlight the need for continuity in some tasks or new activities that need to be initiated. It is anticipated that the IOAG Work Plan will be updated on an annual basis to remain more current and provide more details on the medium-term objectives and implementation schedules.

The IOAG Work Plan 2011 responds to three overarching strategic objectives:

- Establish or enhance all elements of the IOAG organization required to achieve its role as the premier international focal point for matters related to cross support in the space communication and navigation domain.

- Continue effective and value added use of the IOAG in 2011 with achievements that further the goals of IOAG and are of mutual benefit to the participating Agencies and interfacing organizations.

- Increase the visibility of IOAG by communicating its existence and purpose to relevant international groups and organizations.

2   Objectives

The objectives of IOAG are defined in its Terms of Reference (TOR) and are also driven by the IOP-2 communiqué. Annex-1 includes a detailed description of the IOAG objectives...

The IOAG work for 2011 has been classified into four activity lines: (i) core tasks (section 3); (ii) tasks performed in collaborations with other existing international groups/organizations (section 4); (iii) improvement of IOAG internal processes (section 5); and (iv) reporting activities (section 6).

Annex-2 includes detailed definitions of the following: task; activity identification; implementation approach; expected outcomes for tasks for the year 2011; and, as applicable, continuation as follow-up tasks. Also identified are the connection between the core tasks and both the objectives assigned by the second IOP (IOP-2) and the objectives in the IOAG TOR.

Annex-3 includes a description of the resources assigned by the IOAG participating agencies.

3   Core Tasks

IOAG tasks are classified as core tasks if their implementation is primarily performed by IOAG (instead of working groups not related to the IOAG) and if they lead to clearly identified and concrete outcomes in 2011.

Five core tasks have been identified for 2011:

- Core 11.1 = Improvement of accuracy and visibility of the IOAG Mission Models, Communication Assets, Standards Infusion Status, and Plans

- Core 11.2 = Initial release of a multipoint Cross Support Service Catalog

- Core 11.3 = Draft definition of a Solar System Internetworking candidate Architecture (Internet Protocol and Delay Tolerant Network)

- Core 11.4 = Study on the utilization of optical links in the domain of cross supports.

- Core 11.5 = Preliminary evaluation of the Mission Operations domain of the Consultative Committee for Space Data Systems (CCSDS).

It is noted that since the IOAG TOR and Procedures Manual were revisited in 2009 there is no plan to update these documents in 2011.

Also note the endorsement of the IOAG Service Catalog # 1 in March 2010 since this achievement was a key objective assigned by the IOP-2.

4   Tasks in Collaboration with Other Organizations

The interface of IOAG with existing groups, as directed by the IOP-2, will be primarily to coordinate space communications and navigation aspects, and to ensure the consistency of the tasks conducted by the multiple communities.

Five strategic tasks have been identified for 2011:

- Liaison 11.1 = Continuation and improvement of the relationship with the International Space Exploration Coordination Group (ISECG) to collect their requirements in the domain of Space Communications and Navigation.

- Liaison 11.2 = Definition and implementation of a liaison with the International Lunar Network (ILN) to collect their requirements in the domain of Space Communications and Navigation.

- Liaison 11.3 = Continuation and improvement of the existing liaison with the CCSDS to convey the requirements from the IOAG and the users' communities in a timely manner relative to the domain of the standards for Space Communications and Navigation. Joint meeting, London, to clarify position and interfaces between IOAG and CCSDS.

- Liaison 11.4 = Continuation and improvement of the existing liaison with the Space Frequency Coordination Group (SFCG) to convey the requirements from the IOAG and the users' communities in a timely manner relative to the domain of the frequencies and spectrum for Space Communications and Navigation.

- Liaison 11.5 = Definition and implementation of a liaison with the International Committee on Global Navigation Satellite Systems (ICG) to exchange on both parties requirements in the domain of Space Communications and Navigation.

As a first activity for all of the tasks listed above, the identified organizations need to be approached to consolidate the task objectives and work to be performed. This consolidated list has to be verified to confirm the work that can be achieved in 2011.

5   Initiatives for Improvement of IOAG Processes

In many areas of IOAG activities, the flow of information within the IOAG with external organizations of interest and with the agencies or their partners is critical with respect to the overall outreach and efficiency of the organization. The special tasks assigned to the Secretariat for improvement of the tools and methods used in the various procedures of the IOAG and for better outreach on the IOAG achievements and recommendations are identified as "Process 11.1" in Annex-2.

6   Reporting Activities

The Chairman will develop, with support from the Secretariat, an Annual Report that will summarize the activities and achievements. The Annual Report will include inputs from all participating Agencies and a progress report on the implementation of activities in the 2011 Work Plan.

The Annual Report will be posted on the public IOAG website (https://www.**ioag**.org) no later than January 2012.

ANNEX-1: OBJECTIVES

According to the TOR, areas for consideration for the IOAG objectives and activities include:

ToR (a) Identifying the space and ground networks support capabilities needed by potential cooperative programs and projects to achieve their scientific objectives.

ToR (b) Maintaining a list of interoperable facilities and services operated by the space agencies.

ToR (c) Promoting the use of internationally recognized standards in the design and implementation of cooperative flight programs including: spacecraft, ground and space networks.

ToR (d) Monitoring the work of relevant standards organizations and assisting in the agreement, adoption and implementation of new standards by space agencies.

ToR (e) Identifying inconsistencies in the data transmission, capture, handling, and processing systems used by agencies. The IOAG should inform relevant standards organizations (such as the CCSDS or the SFCG) of these inconsistencies, using methods described in the IOAG Procedures Manuals, as well as IOP Members, inviting them to undertake the development of new international standards.

ToR (f) Establishing priorities for the implementation of systems and services needed to achieve full interoperability and enunciating policies furthering interoperability. Such priorities should be passed to relevant organizations and to the IOP Delegations.

ToR (g) Assessing the resources needed to implement these requirements and urging IOP Delegations to make these resources available within their agencies.

ToR (h) Defining and maintaining a reference architecture that will enable interoperability and cross support across space agencies (this could be the Space Internetworking Strategy Group (SISG) Operations Concept and Architecture document).

ToR (i) Encouraging the distribution of communication and navigation techniques to accelerate the deployment of interoperable solutions.

At the 2nd Inter-Operability Plenary meeting (IOP-2), held 8-10 December 2008 in Geneva, Switzerland, the objectives of the IOAG for the upcoming years were established. As the parent organization of the IOAG, the IOP-2 then adopted the following resolutions that task the IOAG on some additional and specific objectives:

IOP 2 (1). The IOP charges the IOAG to continue as the international focal point for fostering and leading interoperable space communications and navigation matters for cross-support of spaceflight missions, and approves the amended IOAG TOR dated June 2007. IOAG participating Agencies should strive to comply with the IOAG's strategic guidance.

IOP 2 (2). The IOP considers it as strongly beneficial for the IOAG to admit Membership of those Agencies having significant and relevant missions and assets respectively requiring and providing space communications and navigation cross-support The IOAG is encouraged to invite observers from other Agencies to participate in IOAG meetings as deemed necessary.

IOP 2 (3). Furthermore, IOAG organizational processes should be adapted to collect and process in a timely manner all the space communications and navigation requirements of other international space coordination groups (e.g., the International Space Exploration Coordination Group [ISECG], International Lunar Network [ILN], and international Mars exploration, inter alia), and to provide strategic guidance to the relevant standardization organizations. This includes the CCSDS and the Space Frequency Coordination Group (SFCG).

IOP 2 (4). The IOAG's ground-based Cross Support Service Catalog should be completed and agreed by all IOAG participants in order to establish a common basis across the Agencies for the consolidation of ground-based cross support by 2011. Agencies should agree to implement IOAG recommendations for missions, which may benefit from cross-support and/or

international cooperation. It is an IOAG goal to have a plurality of the participating Agencies capable of providing ground-based cross support of an agreed common IOAG Service catalog by the end of calendar year 2015.

IOP 2 (5).   In order to achieve an enhanced end-to-end cross support service catalog that will provide the platform of standardization for extending cross support into space, the IOAG should prioritize the requirements relevant to space communications interoperability and cross-support and should urge the CCSDS to adjust their work accordingly. In this regard, the IOP-2 endorses IOAG Resolution 12.9.1. IOP-2 recognizes the authority of the IOAG to prioritize future work as necessary.

IOP 2 (6).   The SISG should formalize a draft Solar System Internetwork (SSI) Operations Concept and candidate architectural definition in time for IOAG-13 and should prepare a mature architectural proposal for review and endorsement at the third Inter-Operability Plenary meeting (IOP-3). At that time, the IOAG is requested to present an enhanced service catalog for endorsement. The IOP Agencies should ensure representation from their programs and projects to work with SISG to identify potential missions that may benefit from adoption of the SSI-related standards, leading to a gradual build up of in-space and ground-based space internetworking infrastructure.

IOP 2 (7).   In the course of its deliberations, the IOP-2 was encouraged by the progress made to date, and stressed the importance of safeguarding the achievements made throughout the past years in cross-support and interoperability, in particular, maintaining compatibility with prior recommendations.

ANNEX-2: TASK DEFINITIONS

WP-Core-11.1: Improvement of accuracy and visibility of the IOAG Mission model, Communication Assets and Standards Infusion Status and Plans	
Definition:	The IOAG Mission Model, the IOAG Cross Support Mission Models and the Communication Assets list were improved in 2010 and need to be maintained up to date in 2011. There is a need to clearly point out the services and supporting standards agreed upon by the IOAG Member Agencies. Such services and standards must be known and their infusion status must be provided by all Member Agencies. This was initiated in 2010 based on the approved Service Catalog #1 that will again serve in 2011 as a reference for this activity; extension of this activity to the Service Catalog #2 may be envisaged once this document is approved.
Related Objectives:	TOR – (a), (b), (c) IOP-2 (1), (3), (7)
Activities :	1. Collect the inputs from the IOAG Members to fill the IOAG tables with information pertaining to assets and missions of their Agencies. 2. Collect the inputs from the IOAG Members to fill the table showing the infusion status of the recommended standards in their Agency. 3. Display the above elements in the public pages of the IOAG web site, for information of the agencies, the standard organizations or the user communities. 4. Keep the above elements up to date on the website.
Implementation:	The IOAG Secretariat is responsible for collecting the inputs from the Agencies. The Secretariat is also in charge of managing these elements and their subsequent updates on the website. This will be coordinated via email with the objective to have all information available on the website at IOAG-14a. The Heads of Delegations will ensure that the information required to fill these tables is provided in due time by their Agency. They will provide updates as required so that the information on the web pages is always current.
Expected Outcomes:	1. Current and complete IOAG mission model graphics, IOAG cross support mission model table, IOAG communication assets table available on the public website. 2. Current and complete IOAG mission model table available on the private website. 3. IOAG services and standard infusion tables collected from all Agencies available on the private website (referring to Service Catalog #1 initially and to Service Catalog #2 by late 2011). 4. A plan on how to display (later) a synthesis of such infusion tables on the website. 5. Coordination is with the CCSDS and includes a prioritization of the development of standards in support of the cross support services.
Next steps:	The cross support services are mainly those required by the current point-to-point and simple multipoint internetworking cross support scenarios, which will later be enhanced with the elaboration of the SSI Operations Concept and Architecture. Based on the IOAG Service Catalog # 2, IOAG may have to define new templates for the IOAG infusion tables.

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To keep the tables up to date is a collective permanent action of the IOAG delegates, under the coordination by the secretariat. It will be a pre-requisite for the new members to provide the information related to their agency before they are formally admitted to IOAG and for the members to maintain their membership status.

WP-Core-11.2: Initial release of a multipoint Cross Support Service Catalog

Definition	The multipoint internetworking Cross Support Service Catalog defines the cross support services for a communication scenario involving two or more spacecraft, still in a point-to-point configuration for the end-to-end communications.
	The two spacecraft scenario, also called relay scenario, involves typically a relay orbiter and a lander spacecraft. The Agency-A lander control center communicates to the Agency-B orbiter control center, which communicates to Agency- B orbiter, which communicates to Agency–A lander (ABBA scenario). This scenario exposes two cross support interfaces:
	1. Agency-A lander control center to Agency-B orbiter control center interface
	2. Agency-B orbiter to Agency-A lander (Relay Link Interface)
	The IOAG Service Catalog # 2 drafted in 2010 lists the services and protocols over the above interfaces to be used for a cross support.
	This is clearly a step towards a more complete catalog, to be called "multipoint internetworking Cross Support Service Catalog" that will also address those services required to extend the above configuration to several orbiters and landers with internetworking features.
Related Objectives	TOR (e), (f), (h).
	IOP-2 (5)
Activities	1. Finalize and approve the IOAG Service Catalog # 2.
	2. Submit the document to CCSDS with its associated standard infusion plan (see WP-Core 11.1) to identify the IOAG priorities in the development of new standards.
Implementation	The above activity (1) is to be conducted before February 2011.
	Status of activity (2) will be reviewed at IOAG-15 to check the consistency of CCSDS standard development plans.
Expected Outcomes	Approved Service Catalog # 2, covering the multipoint Cross Support scenario.
Next steps	The IOAG will identify candidate missions that could implement multipoint cross support and make sure that the IOAG inputs are available in due time for those.
	The scope of work of the CCSDS Cross Support Service Architecture Working Group has to be refined after delivery of the final SISG SSI Operations Concept in 2011.
	As a result of these activities, other services are likely to be added to the catalog at a later stage, as their definition becomes available.
	Endorsement of the final Service Catalog # 2 will be by the IOP-3 (not earlier than 2012).

WP-Core-11.3: Draft definition of the architectural elements of a Solar System Internetwork	
Definition	The IOP-2 has established the objective of an advanced proposal for a SSI at the IOP-3 (not earlier than 2012); this includes a mature architecture and an enhanced service catalog. As a first step in that direction, the SISG established a draft SSI Operations Concept at IOAG-14. Based on this document, the CCSDS has been asked to take care of defining an -SSI Architecture.
	This is clearly the step towards a final and complete IOAG catalog of services, to be called "multipoint internetworking Cross Support Service Catalog" that will extend the previously defined catalogs (two previous tasks) to cover missions requiring internetworking services.
Related Objectives	TOR (e), (f), (h).
	IOP-2 (6)
Activities	At IOAG-14 it has been decided to put the SISG in "dormant mode", pending the progress made by CCSDS in the subsequent tasks of :
	1. Document the SSI candidate architecture standards taking the draft SSI Operations Concept as an input.
	2. Elaborate on the next steps in terms of roadmap towards the IOP-3 and beyond.
	In this period, IOAG will prepare for the IOP-3 and will :
	1. Review and validate the produced documents at IOAG level.
	2. Identify potential missions that may serve as demonstrators for the SSI-related standards.
Implementation	At IOAG-14, a liaison statement has been issued to the CCSDS to ask them to develop the said SSI candidate architecture standards, and to report on the tasks (1) and (2).
	The activity (3) and (4) are expected to be conducted around IOAG-15; nevertheless, it is likely that mission opportunities need be continuously explored in the next years.
Expected Outcomes	Agreement of CCSDS to develop a candidate SSI architecture;
	Plans towards IOP-3.
Next steps	After the IOAG-15 and pending the resolutions and actions to be decided then, the following activities may be anticipated:
	1. Iterate with CCSDS on the definition of a SSI concept of operations and architecture to be reviewed at the next IOAG meetings before the IOP-3.
	2. Ensure that the lessons learned from the implementations will be injected in the process of definition of the services and architecture.
	For the longer term but as much in advance as possible, the IOAG will also identify potential missions that may benefit from adoption of SSI-related standards, in order to build up an internetworking architecture.
	The final product will be an enhanced IOAG service catalog, relying on a global operations concept, a mature architecture and a governance concept for the SSI.

WP-Core-11.4: Study on the utilization of optical links in the domain of cross supports.	
Definition	The "Optical Links Study Group" (OLSG) was formed with the objectives first to collect information from the member agencies on their plans and views, and later to assess the need for cross support in various mission scenarios and the required coordination to identify the technical aspects to be agreed upon to enable the interoperability of optical assets.
Related Objectives	TOR (e), (f), (h). IOP-2 (1), (5)
Activities	At the IOAG-14 it was decided to form the OLSG to:

1. Collect and summarize various agency strategic objectives for optical communications, in particular based on the CCSDS white book.
2. Collect information concerning existing or planned systems (flight systems and ground stations): technical characteristics (wavelength, acquisition scheme, etc), planned utilisation, locations of ground stations, locations of Earth relay satellites, contact points. Identify any unique characteristics of each domain (such as extremely weak signal from deep space, global coverage issue).
3. Identify commonalities between various systems and applications. Identify cases where cross-support would be beneficial (such as dealing with cloud obstruction). Identify necessary technical aspects for which harmonization and co-ordination are needed to allow interoperation.
4. Based on the data collected above, identify proposals for various application options, e.g. LEO to Earth, Space to Space, Moon to Earth, Mars to Earth, Deep Space. Identify areas where common standards are possible.
5. Identify other approaches for cross support when common standards are not possible.
   -Assess potential for co-operative missions to have identical wavelengths/ systems.
   -Assess need to exploit different ground terminals/ potential to exploit multi wavelength / systems terminals.

Implementation	The whole study will be conducted during 2011. The OLSG will report on its progress at each IOAG intermediate meeting
Expected Outcomes	The study will be completed with a report to be approved at IOAG-15 for information of CCSDS and SFCG, as appropriate.
Next steps	After the IOAG-15 and pending the resolutions and actions to be decided then, the following activities may be anticipated:

1. Iteration with CCSDS on the best practices and on the definition of the elements to be standardized in the domain of optical links, to enable cross supports.
2. Iteration with SFCG on the recommended practices for utilization of optical links.

For the longer term IOAG may need to adapt its reference tables to better address the optical assets and their associated services.

WP-Core-11.5: Preliminary evaluation of the Mission Operations domain of CCSDS

Definition	The "Mission Operations Services Coordination Group" was formed with the objective to investigate the status of the activities related to the Mission Operations domain of CCSDS and to propose strategic guidance to IOAG on the way forward. It is expected that this informal group will allow the IOAG to decide whether further IOAG-sponsored activity is appropriate and what could be the medium term objectives to be submitted, if necessary, to the decision of the IOP-3
Related Objectives	TOR (e), (f), (h). IOP-2 (1), (6)
Activities	At IOAG-14 it has been decided to form the MOSCG to : 1. Investigate the status of the activities related to the Mission Operations domain of CCSDS 2. propose strategic guidance to IOAG on the way forward. 3. Elaborate on the next steps in terms of roadmap towards the IOP-3 and beyond.
Implementation	At IOAG-14 it was decided that a first report on activities (1) and (2) will be submitted by the MOSCG at the IOAG-14a teleconference by the end of March 2011. Depending the findings and recommendations in this report the activities (2) and (3) may be further iterated and possibly consolidated throughout IOAG-15.
Expected Outcomes	Report and recommendations from the MOSCG; Plans towards IOP-3.
Next steps	Depending the actual involvement of IOAG in this domain, the ultimate outcome of this initiative could be a "Service Catalogue #3," still to be identified and consolidated.

WP-Liaison-11.1: Continuation and improvement of the relationship with the International Space Exploration Coordination Group (ISECG)

Definition	The IOP-2 has identified the International Space Exploration Coordination Group (ISECG) as a crucial organization to interface with the IOAG and to represent the user community of the Space Exploration missions. The requirements from this community, in the domain of the Space Communications and Navigation, should be collected by the IOAG and aggregated to the general context of the requirements the IOAG manages with its mission model.
	The associated scenarii, operations concept and elements of architecture will be of value for the work of the IOAG in the definition of its future cross support contexts.
Related Objectives	TOR (a), (b).
	IOP-2 (1), (3).
Activities	1. Identify mutual benefits expected in this cooperation, including the interfaces and the procedures that will enable the two organizations to exchange the information needed on both sides.
	2. Exchange information as required, in particular based on the IOAG service catalogs and SSI Ops Concept and on the first version of the ISECG roadmap.
	3. Contribute to each other's activities with liaison statements, documents, and presentations in meetings, as appropriate and according to opportunities.
Implementation	The activity (2) is to be conducted by the Chairmen, with the support of the two Secretariats. The exchanges of information should initially focus on the short-term needs of the organizations.
	For 2011, the activity (3) should be completed on the occasion of IOAG-15 or of an ISECG meeting before the end the year.
Expected Outcomes	An exchange of information on the activities of each organization that may be of short-term interest for the other organization.
Next steps	The interface with ISECG being potentially permanent, the activity (3) is expected to be continuous and the exchanges will be as frequent as required and the reporting to either organization will be made, at least once a year, on the occasion of an ISECG or an IOAG meeting (or videoconference).
	The two organizations may later wish to enter a more formal relationship and have a joint Memorandum of Understanding (MOU).

WP-Liaison-11.2: Definition and implementation of a liaison with the International Lunar Network (ILN)	
Definition	The IOP-2 has identified the International Lunar Network (ILN) as a crucial organization to interface with the IOAG and to represent a user community for the missions to the Moon. The requirements from this community, in the domain of Space Communications and Navigation, should be collected by the IOAG and aggregated to the general context of the requirements the IOAG manages with its Mission Model.
	The associated scenarii, operations concept, and elements of architecture will be of value for the works of the IOAG in the definition of its future cross support contexts.
	The ILN has a Communications working group (WG 2) that addresses these particular domains of interest of the IOAG and of the SISG in which ILN representatives were invited from 2009.
Related Objectives	TOR (a), (b).
	IOP-2 (1), (3).
Activities	1. Identify mutual benefits expected in this cooperation, including the interfaces and the procedures that will enable the two organizations to exchange the information needed on both sides.
	2. Exchange information as required, in particular based on the IOAG service catalogs and SSI Ops Concept and the ILN reports from their WG2 on Communications.
	3. Contribute to each other's activities with liaison statements, documents, and presentations in meetings, as appropriate and according to opportunities.
Implementation	The activity (2) had been initiated in the frame of the joint activities conducted in the SISG. The SISG was placed in "dormant mode" in 2011.
	The activity (3) should be completed on the occasion of IOAG-14 or of an ILN regular meeting before the end of 2011 (or latest, early 2012).
Expected Outcomes	An exchange of information on the activities of each organization that may be of short-term interest for the other organization.
Next steps	The interface with ILN being potentially permanent, the activity (3) is expected to be continuous and the exchanges will be as frequent as required and the reporting to either organization will be made, at least once a year, on the occasion of an ILN or an IOAG meeting (or videoconference).
	The two organizations may later wish to enter a more formal relationship and have a joint MOU.

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WP-Liaison-11.3: Continuation and improvement of the existing liaison with the Consultative Committee for Space Data Systems (CCSDS)

Definition	The IOAG has established since 2004 a permanent liaison with the CCSDS. From early 2006, the CCSDS Engineering Steering Group (CESG) co-chairs serve as liaison agents between the two organizations. In turn or depending on opportunities, they attend the IOAG meetings and report on the statements that they collect on the CCSDS side, during the CCSDS Management Council meetings. Also, they convey the IOAG messages back to CCSDS Committees.
Related Objectives	TOR (c), (d), (e), (f), (g). IOP-2 (1), (3).
Activities	1. Continue to use the existing liaison as the main support for the exchanges between the two organizations. Adrian Hooke (NASA) and Nestor Peccia (ESA) act as liaison officers between IOAG and CCSDS. In the short term, this activity will concentrate on the cross support services and the internetworking, as discussed on both sides. 2. Implement a means for the two organizations to formulate priorities on the development of standards (IOAG) and to report on the progress made to take such requests are taken into account (CCSDS) so as to identify any issue in this process and to concentrate on their resolution. 3. Hold intermediate meetings between IOAG annual plenary meetings, via tele/video conference, scheduled in a way that will allow to efficiently convey requests and report messages between the two organizations, via the liaison officers. 4. Iterate on the subjects of interest already identified in 2010 and related to the IOAG core activities number 2 (SC#2), 3 (SSI), 4 (Optical links) and 5 (Mission Operations). 5. Contribute to each other's activities with liaison statements, documents, and presentations in meetings, as appropriate.
Implementation	The activities (1) and (2) are under the responsibility of the nominated liaison officers. Activity (3) will be coordinated by the IOAG Secretariat together with the liaison officers . The liaison activities are expected to be summarized at the IOAG-15 in order to consolidate a way forward on the related subjects, as part of the plans to be presented at the IOP-3. The need and the opportunity of joint meetings at regular pace is not identified in the short term but an IOAG slot on the agenda of the CMC meetings will be planned as from 2011. This will be used to have focused discussions on the subjects of common critical interest.
Expected Outcomes	Improved coordination on the development of the standards needed by the projects. Elements of the roadmaps to be presented at IOP-3.
Next steps	The liaison with CCSDS being permanent, the activity (5) is expected to be continuous and the exchanges will be as frequent as required and the reporting to either organization will be made, at the minimum once a year, on the occasion of a CCSDS or an IOAG meeting (or videoconference).

WP-Liaison-11.4: Continuation and improvement of the existing liaison with the Space Frequency Coordination Group (SFCG)	

Definition	The IOAG has established since 2005 a permanent liaison with the Space Frequency Coordination Group (SFCG). From then, a member of each organization serves as liaison officer between them. The IOAG person in charge of this liaison or, when the need arises, both officers attend the IOAG or SFCG meetings and report on the statements that they collect on the other side. A drawback that has to be addressed in the interface is the rhythm of the meetings between the two organizations
Related Objectives	TOR (c), (d), (e), (f), (g). IOP-2 (1), (3).
Activities	1. Continue to use the existing liaison as the main support for the exchanges between the two organizations. Enrico Vassallo (ESA) acts as liaison officer between IOAG and SFCG. In the short term, this activity will concentrate on the frequency and spectrum utilization for inter-satellite links, for the Earth, Moon and Mars missions. A list of the issues to be addressed in the short, medium or long term, under this liaison, should be established and updated to support the reporting on both sides. 2. SFCG liaison participates to correctly interpret inputs and provide comments to the mission model. Contribution to the following IOAG meeting would be an update of the established Moon/Martian missions by e-mail. 3. Collect the suggestions of the SFCG for future improvements of the interface, in particular on the expectations of the SFCG on inputs to their works. 4. Contribute to each other's activities with liaison statements, documents, and presentations in meetings, as appropriate.
Implementation	The activities (1, 2, 3 and 4) are under the responsibility of the nominated liaison officer: Enrico Vassallo (ESA). The activities (3) and (4) will be conducted with the support of the IOAG Secretariat. The liaison activity will be summarized at the IOAG-15 in order to possibly establish the work plan for the next years.
Expected Outcomes	Improved processes and relationship between SFCG and IOAG.
Next steps	The liaison with SFCG being permanent, the activity (4) is expected to be continuous and the exchanges will be as frequent as required and the reporting to either organization will be made, at least once a year, on the occasion of a SFCG or an IOAG meeting (or videoconference).

WP-Liaison-11.5: Definition and implementation of a liaison with the International Committee on Global Navigation Satellite Systems (ICG)	

Definition	At IOAG-14 the idea of a new liaison with the International Committee on Global Navigation Satellite Systems (ICG) to exchange information on the user requirements and possible services in the domain of Positioning, Navigation and Timing (PNT), in particular for the GNSS Space Service volume, was approved.
Related Objectives	TOR (c), (d), (e), (f), (g). IOP-2 (1), (3).
Activities	1. The format of this liaison is to be defined based on an initial proposal to be issued by IOAG. 2. Exchanges on what may be the expectations from each other community in terms of areas of common interest and their associated requirements 3. Establish processes and organization within IOAG that enables the reception and processing of special requests from the ICG.
Implementation	The format of this liaison is to be defined in the first half of next year by the IOAG Chairman and Secretariat.
Expected Outcomes	Established processes and relationship between ICG and IOAG..
Next steps	The liaison with ICG being potentially permanent, the activities are expected to be continuous and the exchanges will be as frequent as required and the reporting to either organization will be made, at least once a year, on the occasion of an ICG or an IOAG meeting (or videoconference). Contribute to each other's activities with liaison statements, documents, and presentations in meetings, as appropriate. Joint meeting, London, to clarify position and interfaces between IOAG and CCSDS. Cross attendance to each other's meetings may be anticipated starting from the second half of 2011.

WP-Processes-11.1: Improvement of the IOAG internal processes

Definition	The IOAG Secretariat supports the organization in many of its areas of activities and plays a central role in the flow of information within the IOAG, with external organizations of interest and with the agencies or their partners. The tools utilized by IOAG and managed by the Secretariat need be kept as efficient as possible so as to facilitate the activities of all.
Related Objectives	IOP-2 (3).
Activities	1. Continue to improve the IOAG website on the public side, to reflect the role, activities and achievements of the IOAG. The final outcomes of the IOAG core tasks in the present Work Plan should be displayed on the public website of IOAG. 2. Continue to improve the IOAG website, on the secure side, to provide tools for the members to access the documentation related to each meeting (archives or in preparation) or to contact members or liaisons. Special areas of interest are the action items (lists, elements of progress or closure), the resolutions submitted for discussion, the documents submitted for review and comments, the schedules for next IOAG videoconferences or meetings. 3. Identify opportunities and propose ways to support the promotion of the services selected by the IOAG to support the cross support scenarios, through presentations at workshops or conferences. 4. Identify how to efficiently exchange information with the organizations having liaisons with IOAG: initially, ISECG, ILN, CCSDS, SFCG and ICG. Also, the schedules of the meetings of such organizations could be integrated into a global IOAG schedule (2 years horizon). 5. Identify and validate a compatible and reliable system that enables to hold videoconferences or teleconferences with all members.
Implementation	The Secretariat is in charge of all activities. The schedule of implementation of the different tasks is made by the Agency funding the Secretariat. The achievements may need an acceptance by the IOAG Chairman only or by the members, depending upon the cases.
Expected Outcomes	Improved website. Reliable tools and processes. Better knowledge of IOAG activities, achievements and recommendations, inside and outside the IOAG community.
Next steps	New objectives will be established every year so as to improve the outreach of IOAG and its internal efficiency.

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ANNEX-3: RESOURCES

X: Lead Function x: Participant	Secretariat	Chairman	ASI	CNES	DLR	ESA	ISRO	JAXA	NASA	RFSA	UKSA	KARI	CNSA
CORE TASKS													
Mission models, Communication Assets and Standards Infusion	X		x	x	x	x	x	x	x	x			
Multipoint Support Service Catalog				x	x	X		x	X				
Solar System Internetwork (SISG)				x	x	X		x	X		x		
Optical Links Study Group (OLSG)			TBD	x	x	X		x	X	TBD		x	
Mission Operations Services Coordination Group (MOSCG)				x	x	X		x	X			x	
COLLABORATIONS WITH OTHER ORGANIZATIONS													
Liaison with ISECG	x	X				x							
Liaison with ILN	x	X							x				
Liaison with CCSDS	x	x				X			X				
Liaison with SFCG	x	x				X							
Interface with ICG	x	X							x				
IMPROVEMENT OF IOAG TOOLS AND METHODS													
Improvement of tools and methods	X	x							x				

TBD: Pending responses to Action Item 14-16.