

## **International Academy of Astronautics**

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### **Minutes of Meeting**

#### **IAA Commission IV**

#### **Space Systems Operations and Utilization**

September 28, 2008

Location : SECC, Glasgow, Scotland UK

## **1. Welcome and general information**

### **1.1 List of Participants**

See Attachment 1

### **1.2 Minutes of March meeting**

Minutes of the meeting held on March 26, 2008 in Paris have been approved.

## **2. Study Groups activities**

### **2.1 Overview**

Commission 4 has three on-going Study Groups : Knowledge Management, Hitch-hiking to the Moon, and Quality considerations for space programmes, and two new study group are in the process of formal proposal to IAA, Integrated Applications and Space Systems Cross Compatibility.

### **2.2 SG 4.1 - Knowledge Management (J. Holm)**

Study group report is given in Attachment 2.

J. Holm made a presentation of the Study Group activities. Several actions have been fulfilled since last year. Main points are :

- 2<sup>nd</sup> Southern California and International Aerospace Conference on Knowledge Management for Aerospace (Sept 9-11, 2008)
- 4-6 face-to-face meetings of a consortium of US aerospace industry, academia, and government space organizations
- initiative on "International Taxonomy<sup>1</sup> for Aerospace" : starting 2<sup>nd</sup> half 2008, it is aiming at testing and validating the taxonomy end 2009
- initiative "Creating an Ontology<sup>2</sup> for Space", to share knowledge across space organizations

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<sup>1</sup> Taxonomy = practice and science of classification

<sup>2</sup> Ontology = formal representation of a set of concepts within a domain and the relationships between those concepts

The Study Group position paper is behind schedule, but there are a lot of on-going concrete actions through networking.

The position paper will address the best approaches of knowledge management for aerospace organizations, with a focus on the initiative for International Taxonomy.

M.Grimard proposes to discuss with SAC how to consider other deliverables than a formal Position Paper to demonstrate activities of the SG. Symposium proceedings should be considered.

J.Holm will deliver a draft about the work on ontology as a first step towards the IAA position paper.

A meeting of the study group is planned on Wednesday October 1<sup>st</sup>, 13:00-14:00, room Katryne.

### **2.3 SG 4.5 - Hitch-hiking to the Moon (B. Foing)**

R. Chern has retired from NSPO and has not the information to give a report. He is now less involved. He will be replaced in the study group by A.M. Wu.

R.Sandau recommends to ask R. Laufer to take over the secretariat of the Study Group. (Action : L.Paxton and A.Ginati to propose the position to R.Laufer).

B.Foing joined the Commission meeting later and gave a short report. Several workshops have been held in the frame of the ILEWG, for small satellites and hitch-hiking opportunities. A large spectrum of small satellites are considered : Artemis, Grale, ILN, ESMO (European student), ASMO (US Student). The plan is to organise the work of the Study Group around a set of events (e.g. ILEWG end of October). The deliverables will be : a position paper and reports on these events. An Intermediate report will be issued in Fall 2009 (draft Summer 2009).

A meeting of the study group is planned on Wednesday October 1<sup>st</sup>, 13:00-14:00, room Morar.

### **2.4 SG 4.6 Quality considerations for space programmes**

M. Hernandez was not able to attend the IAC Glasgow, and M. Grimard reported about the information received concerning the status of the study group : "M. Hernandez was only able to review a number of failures and close calls reports and made some notes. He never received any reports or comments from any of the members of the study group. His time lately has not been such to allow him to put the needed dedication to the study. For this reason and not knowing how things will develop, M. Hernandez proposes the cancellation of the study."

This is the second time that a Study Group on Quality is failing. M. Grimard asks about the real added value of having a Study Group and deliver IAA papers, for communities which are very active in other frames. Today the concrete influence of IAA is not sufficient to justify the additional work requested by a Position Paper. IAA is asking for position papers, but what's the interest for people issuing them, what does IAA do with these papers ? IAA is not really promoting these papers.

IAA should demonstrate its added value for the professional space community. Today IAA (mainly through IAC) is an international platform enabling networking on a topic. But IAA shall think about its real influence in the aerospace community and beyond.

The results of Study Group activities are not be only the delivery of position papers delivery, but also organising stand alone workshops and conferences, with associated proceedings. This should be recognized as specific achievements by the IAA.

## **2.5 Integrated Applications (A. Ginati, M. Grimard)**

A.Ginati explains the creation of IAP within ESA, and how it has been promoted through 9 workshops in various countries/regions of Europe. A.Ginati presented this program in the UN workshop on disaster management before the IAC. Topical workshops (international) will be organised once a year with user communities, to address how space could help to answer the demands (e.g. space and energy). The IAA/IAF support could help to promote this action beyond the boundaries of the ESA IAP programme, in particular towards developing countries.

The Study Group workplan and proposal form (Attachment 3) have been reviewed after the March meeting of Commission 4.

Next October 1<sup>st</sup>, 13:00-14:00, room Etive, there will be a joint meeting with the new IAF Integrated Applications Technical Committee, co-chaired by A. Ginati and C. Haigneré. This committee has already implemented a Symposium (coordinated by A. Ginati and M. Grimard) for Daejon, which shall support the activities of the IAA Study Group.

M.Grimard and A.Ginati recommend to postpone to March or October 2009 the formal implementation of the Study Group, in order to be able to staff the group thanks to the real start of ESA IAP early 2009 on one hand, and to the results of the call for papers for the symposium in Daejon on the other hand.

As a consequence of the implementation of the new symposium about Integrated Applications, the focus of session B4.4 on Small satellites for Integrated Applications should be changed (action : R.Hornstein and A.Ginati).

## **2.6 Space Systems Cross Compatibility**

Nobody was attending to report. A written report has been sent by Mr Jesper (Attachment.4).

A meeting of the study group is planned on Wednesday October 1<sup>st</sup>, 13:00-14:00, room Katryne jointly with Knowledge Management SG

## **3. Programme Committees**

### **3.1 D5 Safety and Quality (J. Holm)**

Status for IAC 2008 is good : the 6 planned papers of session 1 have been uploaded papers, session 2 has 7 uploaded papers, 3 missing, and 1 withdrawn, for session 3 only 4 papers among 8 accepted have been uploaded.

For IAC 2009, three sessions have been proposed as properly reflected in the Call for papers : session 1 is "From Parts to Systems : Contribution of Tests on Performance Prediction and Assessment", Session 2 is "Quality and Knowledge Management in Aerospace Companies", Session 3 is "Preventing Spacecraft Failure From Space Environment Effects".

### **3.2 B4 Small Satellite Missions (R. Hornstein)**

Status for IAC 2008 is very good :

Session 1 : 9 papers uploaded, 2 missing

Session 2 : 11 papers uploaded, 2 missing, paper n° 6 withdrawn

Session 3 : 11 papers uploaded, 1 missing, paper n° 13 withdrawn

Session 4A : 9 papers uploaded, 3 missing

Session 4B : 11 papers uploaded, 1 missing

Session 5 : 11 papers uploaded, 1 missing

Session 6A : 10 papers uploaded, 1 missing, papers n° 5, 6 withdrawn

Session 6B : 10 papers uploaded, 2 missing

Session 7 : 10 papers uploaded, 2 missing, paper n° 7 withdrawn

Session 8 : 8 papers uploaded, 2 missing, paper n° 8 withdrawn

It should be recalled that this symposium has received ~10% of all abstracts received by IAF, thus demonstrating that small satellites is a very popular topic.

For IAC 2009 all 8 proposed sessions have been accepted as shown in the Call for Papers (Attachment 5).

The meeting of the Small Satellites Committee will be held on September 30<sup>th</sup>, 13:00-14:00, room Katryne.

### **3.3 Berlin symposium (R. Sandau)**

The next stand alone Berlin symposium will be held on May 4-8, 2009. The topic will be "Small Satellites for Earth Observation". It will be sponsored by DLR, and Dr Wörner should open the symposium. Details about the planned programme can be found on the website. Abstract deadline is October 21<sup>st</sup>.

## **4. Organisation**

IAF President J. Zimmerman is proposing the creation of 3 new IAF Technical Committees, which have a close relationship with the activities of Commission 4 : Space operations, Commercial Space flight Safety, Small Satellites.

R.Hornstein explains that the IAF committee on Small Satellites (see Attachment 6) will focus on advancing the state of practices, and creating opportunities for small missions, as complementary topics to the activities of the IAA committee. The IAF committee will not propose new sessions conflicting with the present B4 symposium.

Following a similar principle, IAA shall clearly warn the IAC organization that any proposal of new sessions about Commercial Space Flight Safety should be accommodated in the frame of the present D5 symposium on Safety and quality, for the purpose of global coherence of the IAC programme.

An other organization topic which has been discussed is the membership of Commission 4 and associated Study Groups. We shall foster new participants to join the activities of the Commission 4. An "unofficial list" beyond the official member list should be established, comprising all participants to Study Groups. We should ask people to join Study Groups, where they do not need to be IAA Corresponding Members or Members. Based on their work in the Study Groups they could be proposed as new Corresponding Members to the IAA.

A. Ginati proposes that any Commission member which has not been attending Commission 4 meetings for two times, without excusing, should be excluded.

## **5. Report to the Scientific Activities Committee**

L. Paxton will report to the SAC, on the basis of the Study Groups and Programme Committees reporting and associated discussions of this meeting.

## **6. Co-Editor of Acta Astronautica for Commission 4**

In 2007 R. Chern had been assigned by R. Sandau to be the Commission 4 Corresponding Editor of the Acta Astronautica (AA). In February 2008, the new editorial board of AA has been organized by the IAA Vice-President Publications and Communication Prof. Stanislav Konyukhov. It consists of the Editor-in-Chief R. Gerzer, the 7 Co-Editors from the 6 Commissions of IAA, and the IAA Publication Committee Members. J.-P. Marec has become the Honorary Editor-in-Chief of AA.

In early this year, R. Chern has reviewed 3 papers from the 58th IAC. However, up to now in this year, there are only 6 papers submitted to AA which are categorized to Commission 4 and forwarded from the Editor-in-Chief to R. Chern for review processing. Therefore, it seems that IAC is the major source of AA papers.

During the 2008 Spring Meeting in Paris, the Editor-in-Chief has held an editorial board meeting. It has been decided that all papers selected and recommended to AA by the session chairs in the 59th IAC shall be forwarded from the IAF Vice-President Technical Activities A.-M. Mainguy, to the Editor-in-Chief for peer review. All Co-Editors need to process these papers as soon as possible.

## **7. Next meeting**

Next meeting of Commission 4 will take place during the IAC IPC meeting in March 2009 in Paris.

## Attachment 1 : Participants list

Name	Organisation	Email
Larry Paxton	APL	<a href="mailto:larry.paxton@jhuapl.edu">larry.paxton@jhuapl.edu</a>
Amnon Ginati	ESA	<a href="mailto:amnon.ginati@esa.int">amnon.ginati@esa.int</a>
Rainer Sandau	DLR (Germany)	<a href="mailto:rainer.sandau@dlr.de">rainer.sandau@dlr.de</a>
Max Grimard	Astrium (France)	<a href="mailto:max.grimard@eads.net">max.grimard@eads.net</a>
Rhoda Hornstein	NASA Headquarters	<a href="mailto:rhoda.hornstein@hq.nasa.gov">rhoda.hornstein@hq.nasa.gov</a>
Jeanne Holm	NASA JPL (USA)	<a href="mailto:jholm@jpl.nasa.gov">jholm@jpl.nasa.gov</a>
Jeng Shing Chern	China Institute of Technology	<a href="mailto:jschern@cc.hc.chit.edu.tw">jschern@cc.hc.chit.edu.tw</a>
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Arnoldo Valenzuela	Media Lario Int	<a href="mailto:arnoldo_valenzuela@hotmail.com">arnoldo_valenzuela@hotmail.com</a>
An Ming Wu	NSPO Taiwan	<a href="mailto:amwu@nspo.org.tw">amwu@nspo.org.tw</a>
Karel Wakker	SRON Netherland Institute for space research	<a href="mailto:k.f.wakker@sron.nl">k.f.wakker@sron.nl</a>
Charlotte Mathieu	ESPI	<a href="mailto:Charlotte.mathieu@espi.or.at">Charlotte.mathieu@espi.or.at</a>
Manola Romero	ONERA	
Bernard Foing (part time)	ESA	

## **Attachment 2 : Study Group report**

### **SG.4.1. Knowledge Management of Space Systems**

#### **Short Study Description**

- Define the organizational and inter-organizational issues that support or inhibit knowledge sharing amongst aerospace organizations (including capturing knowledge of our key experts and aging workforce)
- Identify and recommend standards for knowledge management activities and initiatives to promote interoperability of key systems (such as lessons learned or publications)
- Create, through consensus, a position on the recommended approaches for an aerospace organization to investigate to excel at knowledge management

#### **Website Study Information up to date?**

- Information will be given to secretary for inclusion on web site

#### **Issues requiring resolution?**

- Formal acceptance of charter occurred in Spring 2008.

#### **Progress and Product Deliveries on Schedule?**

- **Plan:** Support a better understanding among member and aerospace organizations of the ways in which they can share knowledge
  - **Action:** Co-chair, Roberta Mugellesi Dow from ESOC is attending this IAC in her new role.
  - **Action:** Held second *Southern California and International Aerospace Conference on Knowledge Management for Aerospace* at Pepperdine University, Malibu, California, September 9-11, 2008. Papers were solicited from government, academia, and industry. Board representation is international (U.S., Canada, Australia). Last year, there were 85 attendees, this year 125. More at <http://bschool.pepperdine.edu/newsevents/kmforum/>
  - **Action:** Proposed international ontology for aerospace with a consortium of government space agencies, academia, and industry. Proposal was given to *International Conference on KM for Aerospace* in (above) and at Dublin Core Metadata Conference in Berlin (September 25). ESA, NASA, US Air Force, US Missile Defense Agency, Boeing, Pratt Whitney, Northrup Grumman, Aerospace Corporation, and others participating so far.
  - **Action:** Continue to co-lead a consortium of US aerospace industry, academia, and government space organization meetings on knowledge management. Team meets face-to-face 4-6 times a year. Participants include Northrup Grumman, The Aerospace Corporation, Boeing, Pratt Whitney Rocketdyne, Lockheed Martin, Raytheon, Computer Sciences Corporation, University of California at Irvine, Pepperdine University, California State University at Northridge, and NASA.
  - **Action:** ESA and NASA coordination on organized collaboration between KM strategic plans.
- **Plan:** Ensure that there is a set of related papers from workshop participants at the 2008 IAF conference that exemplifies excellent knowledge management practices at aerospace organizations.
  - **Action:** Continue to have combined Knowledge Management and Quality Management tracks.

- **Action:** 16 papers submitted for the KM track for the Glasgow, the following were accepted:
  1. **Status of Working Group on Knowledge Management for Space Missions**, Mrs. Jeanne Holm, NASA/Jet Propulsion Laboratory, Pasadena, CA, United States.
  2. **Enabling Innovation and Collaboration Across Geography and Culture: A Case Study of NASA's Systems Engineering Community of Practice**, Daria Topousis and Keri Murphy, California Institute of Technology, Pasadena, CA, United States
  3. **Knowledge Management for ESA's Rosetta Mission**, Gerald Schwerm (ESAC, Madrid) and Joe Zender (ESTEC, The Netherlands)
  4. **Applying Knowledge Management to an Organization Transformation**, Shannon Potter, Kennedy Space Center, NASA, Titusville, Florida, United States.
  5. **Knowledge Management and Innovation at Pratt-Whitney Rocketdyne**, Kiho Sohn, Pratt-Whitney Rocketdyne, Woodland Hills, CA, USA
  6. **Experience In Making An Analysis Of Safety and Fail-Safety Of "Proton" Launcher During Satellite Orbital Injection**, Dr. Sergey Lysyy, Space Systems Research Institute - Branch of Khrunichev Space Center
  7. **Information modeling of spacecraft failure diagnosis system based on integrated space-ground conception**, Dr. Xiaoning Du, Xi'an Jiaotong University
  8. **The Management and Principle Model of Software Engineering in Auto-Control System for Space Launch**, Prof. Mengyuan Li, China
  9. **Studying the role of narrative across aerospace knowledge management systems**, Mr. Nathan Eng, University of Cambridge Engineering Design Centre, UK
  10. **Software Dependability and Safety**, Mr. Bart Roeloffs, LogicaCMG, UK and Netherlands
  11. **Safeguarding space systems against counterfeit electronic parts**, Mr. Stan Purwin, The John Hopkins University Applied Physics Laboratory, USA
  12. **International Knowledge Transfer - an engineering perspective**, Patrick Hambloch, Niederrhein University of Applied Science, Germany
  13. **Knowledge Management in ESA and ESOC**, R. Mugellesi Dow, ESOC, Germany
  14. **Semantic Web as an Aide to Space Exploration**, S. Decker et al. DERI, Ireland
  15. **Critical Success Factors Required for Knowledge Management and Collaboration**, Sasi Pillary, Glenn Research Center, NASA
  16. **Simplicity: A pragmatic approach for knowledge management**, Siegmar Pallaschke, Germany
- **Plan:** Ensure that there is a set of related papers from workshop participants at the 2009 IAF conference that exemplifies excellent knowledge management practices at aerospace organizations.
  - **Action:** Continue to combine Quality and Knowledge Management Track will be submitted for Korea. Track has been accepted.
- **Plan:** Information will be posted on a web site for each of communication and status reference.
  - **Action:** Group has an online collaboration workspace and discussion forums.
  - **Action:** Expanded online community to 128 members.



- **Plan:** Coordination with other key working groups such as the OMG standards committee for knowledge-based engineering and the W3C committees for interoperability.
  - **Action:** NASA has formalized an Information and Data Management Program that will support the coordination of knowledge management standards and interfaces with other space organizations. Study Group Chair leads that area of the new program.
  - **Action:** U.S. Federal Knowledge Management Working Group has broadened it's membership to include those interested in government issues for knowledge sharing globally. Joint partnership with Canadian government and CSA has been formalized. This group will be identifying emerging standards in the KM area and best practices in the field, with a focus area on space-related organizations. These will be brought up as part of the IAA group discussions for any potential applicability. Study Group Chair was elected to lead this group for next two years.
  
- **Plan:** A position paper on the recommended approaches for an aerospace organization to follow in knowledge management that would promote knowledge sharing and interoperability with other organizations
  - **Action:** Discussions have begun, paper has been outlined for draft review. This week's KM Study Group workshop will focus on how to complete draft.

#### **Study Team Member Changes?**

- New co-chair—Roberta Mugellesi-Dow, ESOC
- Formulated online community to supplement working group—128 members.

#### **Name of Person Providing Study Group Status**

- Jeanne Holm, Chief Knowledge Architect, NASA, Jet Propulsion Laboratory

#### **Status Report Date**

- 28 September 2008

## **Attachment 4**

### **SG.4.7. Space Systems Cross compatibility**

#### **OUTLINE**

#### **Synopsis**

Common systems and standardization have been referred to as “key words” in reducing space mission costs. NASA has experimented with these concepts for at least 35 years and implemented approaches for modular, standard components and interfaces with varying degrees of success. Interface definitions today have evolved considerably, and present a unique opportunity to effect cost reductions, in particular through the application of “plug-and-play” (PnP) principles. The IAA is launching a study group on “Space System Cross-Compatibility” that leverages PnP interfaces, modularity and other concepts in reducing mission costs. Among the numerous possibilities, systems that leverage these ideas promise to find application in Science, Exploration, Commerce, and other areas requiring cost reduction through fast system design, build, integration, test and flight. Subjects to be explored by the study group are contained within both Space and Ground Segments, and include electrical, mechanical, and data systems (space), and ground systems and networks.

#### **Proposed Outline**

1. Introduction and Motivation
  - a. Historical Drivers of System Variety (Steve Greenland)
    - i. Obstacles to Overcome
  - b. Global Cooperation versus/and Competition (Susan McKenna-Lawlor)
    - i. Globalization and Competition Model
  - c. Alliance with Existing Efforts (Jaime Esper)
  - d. Search for Reduction in System Complexity / Non-Complicated Systems (Peter Mendham)
    - i. Understanding Complexity (Complication) Drivers
    - ii. Interface Simplicity
  - e. Systems for the Benefit of Humanity (Humanosphere) – Guy Pignolet Contributor
    - i. Economic Benefits (Paul Walker)
    - ii. Availability / Repeatability Benefits
    - iii. Programmatic Benefits (Paul Williams/GW)
2. Cross-compatibility (Marco Derrico)
  - a. Definition
  - b. Needs
3. Space Mission Life Cycle Effectiveness (Rhoda Hornstein / Linda Herrell Contributors)
  - a. Feasibility
  - b. Design
  - c. Fabrication
  - d. Integration and Test
  - e. Flight and Operations
  - f. Returning / Re-Application
4. Needs and Requirements for System Compatibility
5. Architectures Enabling Space System Cross-Compatibility
  - a. Modular, Adaptive Reconfigurable Systems
  - b. Other Architectures
6. Common Elements Among Several Architectures
7. Detail Features for Space Segment
  - a. Mechanical Systems
  - b. Electrical Systems

- c. Software Systems
- 8. Detail Features for Ground Segment
  - a. Hardware Components
  - b. Software Systems
- 9. Applications and Examples
  - a. Science
  - b. Exploration
  - c. Commerce
- 10. Conclusions

## MEMBERSHIP

Responsibility	First Name	Last Name	Organization	Country
	Paul	Williams		
	Kobayashi	Chisato	Astro Technology/SHOLA	Japan
Co-Chair	Marco	D'errico	Seconta Universita di Napoli	Italy
Chair	Jaime	Esper	NASA GSFC	USA
	Steve	Greenland	SHOLA, University of Tokyo	Japan
Co-Chair	Linda	Herrell	NASA JPL	USA
	Rhoda	Hornstein	NASA HQ	USA
	Erin	Kahn	American Institute of Aeronautics and Astronautics	USA
	Ruediger	Koppe	Astrium	Germany
	Susan	McKenna-Lawlor	STIL	Ireland
Secretary	Peter	Mendham	Star Dundee & University of Dundee	UK
	Pierre	Molette		France
	Guy	Pignolet	Consultant	France
	Rainer	Sandau	DLR	Germany
	Fred	Slane	Space Infrastructure Foundation, Inc.	USA
	Paul	Walker	4Links	UK
	Ray	Williamson	The George Washington University	USA
	Markus	Landgraf	ESA	Germany

## Attachment 3

### Proposal for Forming an IAA Study Group

**Title of Study: Integrated Applications**

**Proposer(s): A. Ginati**

**Primary IAA Commission Preference : Commission 4**

*(From Commission 1 to Commission 6)*

**Secondary IAA Commission Interests : Commission 5**

*(From Commission 1 to Commission 6)*

### Members of Study Team

**Chairs:** TBD

**Secretary:** A. Gaubert (TBC)

**Other Members:**

A. Ginati  
C. Haignerée  
J. Holm  
L. Paxton  
R. Sandau

### ***Short Description of Scope of Study***

**Overall Goal:**

Promote Space as a key element to provide Integrated Applications Services for the benefit of Earth citizens.

**Intermediate Goals:**

Define the concept of Integrated Applications  
Assess the benefits of Integrated Applications development for Space activities  
Identify the challenges of Integrated Applications development  
Make recommendations to foster Integrated Applications development

**Methodology:**

- Define a Working roadmap, which will give the architecture of the Study Report
- Use the Symposium organized by IAF Integrated Applications Technical Committee, as a forum to exchange ideas, get data and analyses to feed the IAA Study Group
- Organize ad-hoc Workshops on specific key topics (e.g. Private investment for Integrated Applications development, Role of space agencies to foster Integrated Applications development, Interoperability issues and solutions, etc.)

**Time Line:**

Get agreement for SG at IAA SAC meeting September 08  
Finalize SG membership, organization and workplan at IAC 08 Glasgow  
Interim report after IAC 09, based on IAF Integrated Applications symposium  
Final report after IAC 10

**Final Product (Report, Publication, etc.):**

Report on SG activity  
Position Paper for promotion of Space and Integrated Applications

**Target Community:**

People working in downstream services  
User communities  
International organizations : UNCOPUOS, WHO, GEOSS, FAO, etc.

**Support Needed:****Potential Sponsors:**

*To be returned to IAA Secretariat Paris fax: 33 1 47 23 82 16 email: sgeneral@iaanet.org*

**Date:**

**Signature:**

**For IAA Use Only:**

## **Attachment 4**

### **SG.4.7. Space Systems Cross compatibility**

#### **OUTLINE**

#### **Synopsis**

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	Steve	Greenland	SHOLA, University of Tokyo	Japan
Co-Chair	Linda	Herrell	NASA JPL	USA
	Rhoda	Hornstein	NASA HQ	USA
	Erin	Kahn	American Institute of Aeronautics and Astronautics	USA
	Ruediger	Koppe	Astrium	Germany
	Susan	McKenna-Lawlor	STIL	Ireland
Secretary	Peter	Mendham	Star Dundee & University of Dundee	UK
	Pierre	Molette		France
	Guy	Pignolet	Consultant	France
	Rainer	Sandau	DLR	Germany
	Fred	Slane	Space Infrastructure Foundation, Inc.	USA
	Paul	Walker	4Links	UK
	Ray	Williamson	The George Washington University	USA
	Markus	Landgraf	ESA	Germany

**Attachment 5**  
**Daejon Symposium B4 Small Satellite Missions**

**CATEGORY: B**  
**SYMPOSIUM NUMBER: B4.**  
**SYMPOSIUM TITLE: SMALL SATELLITE MISSIONS**

**SCOPE:**

This Symposium addresses Small Satellite programmes for Commerce and Science & Technology, encompassing space science, earth observation, and exploration missions; and focusing on results achieved, as well as plans for new missions. The Symposium also addresses five areas across the entire spectrum of small satellite missions – design and technology, cross-platform compatibility, planning for and executing cost-effective operations, affordable and reliable space access, and implementing small satellite programmes in developing countries.

**Coordinators:**

NAME: Rhoda Shaller Hornstein	NAME: Alex da Silva Curiel
Company: National Aeronautics and Space Administration (NASA) - USA	Company: Surrey Satellite Technology Ltd. – UK
E-mail: <a href="mailto:rhoda.s.hornstein@nasa.gov">rhoda.s.hornstein@nasa.gov</a>	E-mail: <a href="mailto:a.da-silva-curiel@sstl.co.uk">a.da-silva-curiel@sstl.co.uk</a>

**1.**

**TITLE & SCOPE:**

**B4.1. 10th UN/IAA Workshop on Small Satellite Programmes at the Service of Developing Countries**

This workshop is organized jointly by the United Nations Office for Outer Space Affairs (UN/OOSA) and the International Academy of Astronautics (IAA). It shall review the needs that could be satisfied and results achieved by developing nations through using small satellites.

**Chairs:**

NAME: Sias Mostert	NAME: Sergei Chernikov
Company: Space Commercial Services Holdings (Pty) Ltd. - SOUTH AFRICA	Company: United Nations Office of Vienna-AUSTRIA
E-mail: <a href="mailto:sias.mostert@spacecommercialservices.com">sias.mostert@spacecommercialservices.com</a>	E-mail: <a href="mailto:sergei.chernikov@unvienna.org">sergei.chernikov@unvienna.org</a>

**Rapporteurs:**

NAME: Petr Lala	NAME: Pierre Molette
Company: Czech Space Office - CZECH REP.	Company:
E-mail: <a href="mailto:petr@lala-web.cz">petr@lala-web.cz</a>	E-mail: <a href="mailto:pierre.molette@centraliens.net">pierre.molette@centraliens.net</a>

**2.**

**TITLE & SCOPE:**

**B4.2. Small Space Science Missions**



This session will address the current and near-term approved small missions whose objective is to achieve scientific returns in the fields of Earth science, solar, interplanetary, planetary, astronomy/astrophysics observations, and fundamental physics. Emphasis will be given to results achieved, new technologies such as formation flying, and novel management techniques

**Chairs:**

NAME: Stamatios M. Krimigis	NAME: Denis Moura
Company: The Johns Hopkins University - USA	Company: CNES - FRANCE
E-mail: <a href="mailto:tom.krimigis@jhuapl.edu">tom.krimigis@jhuapl.edu</a>	E-mail: <a href="mailto:denis.moura@cnes.fr">denis.moura@cnes.fr</a>

**3.**

**TITLE & SCOPE:**

**B4.3. Small Satellite Operations**

This session covers the planning for, and execution of, cost-effective approaches for Small Satellite Operations, with emphasis on new missions with new models of operation. Papers addressing innovation, an entrepreneurial approach to new business opportunities, novel finance and business models, management techniques, and international cooperation in support of Small Satellite Operations are particularly encouraged. Papers that discuss the application of novel technology to mission operations, such as automation and autonomy, constraint resolution, and timeline planning, as well as reports on missions recently accomplished and lessons learned, are also welcomed.

**Chairs:**

NAME: Peter Allan	NAME: Karen McBride
Company: Rutherford Appleton Laboratory – UK	Company: National Aeronautics and Space Administration (NASA) - USA
E-mail: <a href="mailto:p.m.allan@rl.ac.uk">p.m.allan@rl.ac.uk</a>	E-mail: <a href="mailto:kmcbride@nasa.gov">kmcbride@nasa.gov</a>

**4.**

**TITLE & SCOPE:**

**B4.4. Small Satellites Potential for Future Integrated Applications and Services**

Small satellite missions in the different disciplines and with new partnership models including earth observations are enabling services that are now a familiar part of the commercial and government sector.

Data from space missions are collected and distributed through space and ground-based systems. The goal of an integrated system is to provide the right information at the right place and at the right time in a cost-effective manner. Including a space-based element in an integrated application may enable that application or provide a unique and powerful enhancement to the services provided. This session seeks contributions that address new satellite missions, instruments, lessons learned, or plans for future small satellites, instruments, or missions. Contributions that address the need to go beyond the traditional mission oriented (or vertical) organization and provide a service that integrates information from ground and space-based sources (the horizontal or distributed domain) are particularly encouraged.

**Chairs:**

NAME: Larry Paxton	NAME: Amnon Ginati
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Company: The Johns Hopkins University – USA	Company: ESA/ESTEC – NETHERLANDS
E-mail: <a href="mailto:larry.paxton@jhuapl.edu">larry.paxton@jhuapl.edu</a>	E-mail: <a href="mailto:amnon.qinati@esa.int">amnon.qinati@esa.int</a>

**Rapporteurs:**

NAME: Klaus Briess	NAME:
Company: Institut für Luft-und Raumfahrt - GERMANY	Company:
E-mail: <a href="mailto:klaus.briess@ilr.tu-berlin.de">klaus.briess@ilr.tu-berlin.de</a>	E-mail:

**5.**

**TITLE & SCOPE:**

**B4.5. Small Spacecraft Launch, Injection, and Orbit Transfer Systems**

A key challenge facing the viability and growth of the small satellite community is affordable and reliable space access. This is achieved through small launchers, ride-shares, piggyback launches, and spacecraft propulsion technologies to reach final operational orbit. Topics of interest for this session include existing and conceptual launch platforms for small spacecraft; launcher and small spacecraft component and sub-system development that will enable efficient small spacecraft access to orbit and orbit change (e.g., propulsion systems, separation and dispenser systems, upper stages); and lessons learned from users on technical and programmatic approaches.

**Chairs:**

NAME: Alex da Silva Curiel	NAME: Jeffery L. Emdee
Company: Surrey Satellite Technology Ltd. – UK	Company: The Aerospace Corporation - USA
E-mail: <a href="mailto:a.da-silva-curiel@sstl.co.uk">a.da-silva-curiel@sstl.co.uk</a>	E-mail: <a href="mailto:jeffery.l.emdee@aero.org">jeffery.l.emdee@aero.org</a>

**6.**

**TITLE & SCOPE:**

**B4.6. Design and Technology for Small Satellites**

This session covers the design and technology required and developed for small satellites and small satellite systems, including micro and nano-satellites. Real-life examples are particularly encouraged.

**Chairs:**

NAME: Richard Holdaway	NAME: Phil Davies
Company: Rutherford Appleton Laboratory – UK	Company: Surrey Satellite Technology Ltd. – UK
E-mail: <a href="mailto:r.holdaway@rl.ac.uk">r.holdaway@rl.ac.uk</a>	E-mail: <a href="mailto:p.davies@sstl.co.uk">p.davies@sstl.co.uk</a>

**7.**

**TITLE & SCOPE:**

**B4.7. Space Systems and Architectures Featuring Cross-Platform Compatibility**

Ideas are solicited for Modular, Reconfigurable, Adaptable systems (spacecraft, ground systems and networks) that feature cross-platform compatibility. Applications are sought in Science, Exploration, Commerce, and other areas requiring fast system design, build, integration, test and flight. System-enabling plug-and-play interface definitions (mechanical,

electrical, software and fluids) are particularly desirable.

**Chairs:**

NAME: Jaime Esper	NAME: Marco D'Errico
Company: NASA Goddard Space Flight Center – USA	Company: Dipartimento di Ingegneria Aerospaziale e Meccanica Seconda Università di Napoli – ITALY
E-mail: <a href="mailto:jaime.esper@nasa.gov">jaime.esper@nasa.gov</a>	E-mail: <a href="mailto:marco.derrico@unina2.it">marco.derrico@unina2.it</a>

**8.**

**TITLE & SCOPE:**

**B4.8 Hitchhiking to the Moon**

The next few decades involve a dramatically increased interest in lunar exploration for the purpose of developing a permanent human and robotic presence on the Moon, both for science and space exploration objectives. This renewed interest is broad and international, involving space agencies from the USA, Europe, China, India, Japan, Russia, Germany, UK, and others. Recently, ISRO's Chandrayaan spacecraft offered its platform as an opportunity to fly international instruments to the Moon; NASA's Lunar Reconnaissance Orbiter (LRO) spacecraft provided an opportunity for a secondary payload to the Moon, in the form of the LCROSS lunar impactor mission. In the future, it is expected that there will be more opportunities for ride-sharing or secondary or tertiary payload opportunities to be flown to the Moon. This session provides a forum for the exchange of ideas for such small payloads to be demonstrated at the Moon, by 'Hitch-hiking a ride' to the Moon. Examples of such payloads or missions include: micro-spacecraft orbiters, CubeSats, small probes, penetrators, micro-landers, hard-landers, micro-rovers, secondary payload surface science instruments, distributed network landers, and many more. The focus of this session is on mission concepts, technology readiness and ride-sharing requirements.

**Chairs:**

NAME: Leon Alkalai	NAME: Rock Jeng-Shing Chern
Company: NASA Jet Propulsion Laboratory-USA	Company: China Institute of Technology-Taiwan
E-mail: <a href="mailto:leon.alkalai@jpl.nasa.gov">leon.alkalai@jpl.nasa.gov</a>	E-mail: <a href="mailto:jschern@cc.hc.chit.edu.tw">jschern@cc.hc.chit.edu.tw</a>

## Attachment 6

### International Astronautical Federation Committee : Small Satellites Unlimited (draft)

- **Committee Charter**

The Committee shall address small satellite triumphs and challenges in a collaborative environment to leverage experience and expertise (1) to advance the state-of-the-practice for conceiving, developing, and operating small satellites and (2) to create opportunities for small satellite missions to be integrated within the traditional government, industry, and academia space programs. The areas of emphasis will include Science, Exploration, and Technology programs, as well as Commercial and Business applications. Cross-cutting themes such as cross-platform compatibility and affordable and reliable space access will also be included. The specific focus areas will be identified and prioritized by the Committee Members. It is important to state that the goal of the Committee is to exchange information among international players that could be used to positively influence the decision-makers of space organizations.

The Committee shall collaborate and cooperate as appropriate with the following IAF committees, IAA study groups, and various others on an as needed basis.

- Space Operations Committee
- Space Exploration Committee
- Space Systems Committee
- Space Transportation Committee
- Integrated Applications Committee
- Hitchhiking to the Moon Study Group
- Space Systems Cross-Compatibility Study Group Meeting

Committee size is expected to be fifteen to twenty persons.

- **Committee Composition**

- **Leadership**

- **Chair:** Ms. Rhoda Shaller Hornstein, NASA, USA
- **Vice-Chair:** Alex da Silva Curiel, Surrey Satellite Technology Ltd, UK

- **Members**

Membership will be drawn from IAF and IAA member organizations, and will include senior managers and professionals with significant small satellite backgrounds and with current involvement in space planning and execution activities.

The Committee organizers expect that the membership will recommend and solicit the appropriate organizations and individuals to participate in the new committee. Additional suggestions on membership in the Small Satellites Committee would be welcome.

- **Initial Meeting – on the margins of the IAC in Glasgow, UK**

Recommend an initial meeting with co-chairs and potential participants in the timeframe surrounding the 2008 IAC. Discuss the following:

- Committee Focus
- Identify additional members
- Activities for 2009