International Academy of Astronautics

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Commission III

Dates: Sept 29, 30 2012

Venue: IAC Congress Center, Naples

Report on the Meeting

Attendance:

1.Giuseppe Reibaldi, IAA, Chairman	giuseppe.reibaldi@gmail.com
2. Lu Yu, CAST, Co-Chair	luy@spacechina.com
3.Roger Lenard, LPS, Member,, Secretary (Acting)	rxlenard@gmail.com
4. Art Dula, Heinlein Prize Trust	art@dula.com
5. Hans E.W. Hoffmann, IAF honorary Secretary	Hans.E.W.Hoffmann@t-online.de
6 .Peter Swan, Cosmic Study Lead	dr-swan@cox.net
7. Seishiro, KIBE, JAXA	kibe.seishiro@jaxa.jp
8.Junjiro ONODA, Member, JAXA,	onoda.junjiro@jaxa.jp
9.Perino Maria Antonietta, TAS-I	marioantonietta.perino@thelesaleniaspace.com
10. Giancarlo Genta	Giancarlo.genta@polilo.it
11. Xiaohui Cao, CALT	buaaac@gmail.com
12. David Finkleman, AIAA	dfinkleman@agi.com
13. Giorgio Saccoccia, Cosmic Study Lead	Giorgio.saccoccia@esa.int
14. Ken Davidian, FAA, AST	ken.davidian@faa.gov

15. Nicolas Berend	Nicolas.berend@onera.fr
16.Hiroki Matsuo	vpresident-hm@iaamail.org
17.Jacques Gigou, ESA	Jacques.gigou@esa.int
18. Victor Khartov	vorontsov@lasface.ru
19. Valeriy Romanov	vorontsov@lasface.ru
20. Olga Zaydseva	kolt@lasface.ru
21. Jerome Pearson	jp@start-tech-inc.com
22. Andreas Rettweger	andreas.rittweger@astrium.eads.net
23.Christophe Bonnal, Member, CNES	christophe.bonnal@cnes.fr
24.Roman Kezerashvili	kezerashvili@citytech.cuny.edu
25. Mihara Shoichiro	mihara-shoichiro@jspacesystems.or.jp
26. Horst Rauck	horst.rauck@gmx.de
27. Anna Guerman	anna@rebi.pt

Approval of the Report on Last Meeting

The minutes of the previous meeting held in Paris on 12th March 2012 were approved as distributed.

Adoption of the Agenda

The agenda for the meeting was approved without objection, see below.

1. IAA Commission III - Introduction
2. Commission Proceedings
3. On- going Studies, Status Presentations:
   - # SG 3.10 Interstellar Precursor Missions - Technologies
   - # SG 3.9 Private Human Access to Space, Vol. I Suborbital
   - # SG 3.13 Space Elevators

4. New Studies, Status Presentations:
    - SG3.14 Private Human Access to Space, Vol. II Orbital
    - SG3.15 Space Propellant Depot
    - SG3.16 Global Human Missions to Mars
    - New Proposal on Space Mineral Resources
5. Symposia Status – IAC 2012/IAC 2013
6. Scientific activities 2012/14
7. Commission Composition
8. Increase support to Commission activities
9. Future Trends
10. Report to SAC from Commission III
11. Study Process Improvement – Task Force conclusions
12. AoB

1) **Introduction**:

The Chair introduced the meetings using the presentation in Annex-1

2) **Commission Proceedings**:

- Two meetings were held on the 29 and 30 September, these minutes includes the main outcomes of both.

- IAA in general and Commissions in particular are not well known by the IAC participants, a paper was presented, (reference IAC-12-D3.1.1) explaining what Commission III activities are and how to participate.

3) On-going studies Status:

- SG3.10, "Technologies for Near Interstellar studies". The Peer Review at Academy level has been completed. All Commission members received the Peer Review (6) results and the updated Report taking into account most of the comments.
  - Action, All Commission Members to provide concurrence to the final text of the Report, due date 4th October

  The Chairman will than forward the Report for publication to the to SAC and to the Secretariat.

- SG3.9, "Private Human Access to Space, Vol I: Sub-orbital" . The status of the Study, presented by Christophe Bonnal, is included in Annex 2. The report has a delay of about 6 months and it should now be completed by March 2013.
- SG 3.13, "Assessment of the Technology Feasibility and Challenges of the Space Elevator concept". The status of the Study, presented by Peter Swann, is included in Annex 3. Today it exists a draft–draft – of 400 pages double-sided however there are no conclusion yet, it is confirmed that the main problem of feasibility is related to the availability of the required material.
  The draft of the report should be available by March 2013.

4) New Studies Status :

- SG3.14,"Private Human Space Access to Space, Vol II: Orbital". The status of the Study, presented by Ken Davidian, is included in Annex 4.
  The Study is just being initiated, the first meeting took place during this IAC. The Study will discuss prospects for new markets, not only launcher, for getting beyond Earth Orbit. The Study team is not yet completed and skilled professionals are invited to join.

- Action, All Commission Members and participants to suggest new professionals for inclusion in the Study Team

The draft of the Study is expected to be available for September 2013, however the final report by 2014.

- SG3.15, "Long Term Space Propellant Depot". The status of the Study was presented by Giorgio Saccoccia. The Study will focus on specific technology for propellant depot, in partcular: Cryogenic tanks, Thermal protections; Fluid loop management technology. The first meeting of the Study took place on the 30th September and the Minutes are included in Annex 5
  The Study team has several Chinese members, however it needs new members from other countries that can bring their own perspective. Professionals, not only academicians are invited to join this study.
  - Action, All Commission Members and participants to suggest new professionals for inclusion in the Study Team

- SG3.16, "Global Human Mars Reference Mission and Technologies**"**. The status of the Study, presented by Prof. Giancarlo Genta, its status is presented in Annex 6a. For information, In Annex 6, the minutes of the first meeting of the Study held on October 2nd are included.
  There is a need for a co-chair, as well as rapresentatives of the legal community.

- NEW Study Proposal, "Space Minerals Resources – challenges and opportunities**"**
  Mr. Art, Dula, explained the proposal. The Study will deal with technological, economical and political aspects of use of Space Mineral Resources.
  Following an interesting discussion on the topic, the Commission recommended to produce a Study Group Proposal and forward this to the SAC for final approval.
  - Action, A.Dula to generate the Study Group Proposal, due date 15 October
  - Action, Chair to circulate the SG proposal to the Commission Members for endorsement, due date 31 October
  - Action, Chair to forward the Proposal to SAC and Secretariat for final approval, due date 3 November
  -

5) Symposia Status

See Annex 1

The Symposia organized by the Commission are:

- A5: Human Exploration of Moon and Mars
- C3.1 Space Based Solar Power Architecture
- D3 Building Block for future space exploration
- D4 Vision and strategies for the Far Future.

The proposed modification to the Symposia for IAC 2013 were discussed and approved by the Commission

6) Scientific Activity Plan 2012/4

See Annex 1.

7) Commission Composition

See Annex 1.

Following a discussion, it was agreed to remove Members of the Commissions that were not active

- Action, Chair, to make a proposal for Commission Composition modification by March 2013, for the 2013-15 period

8) Increase Support to Commission activities,

See Annex 1 for the proposal presented.

The Commission would like to get as many professionals as possible participating to its activities. Not everyone can travel and the Commission will try to arrange Virtual Forum to participate in the activities.
There is also the need to attract Young Professionals with at least 4-5 years of experience. It was suggested to contact the Space Generation Advisory Council to inform them of this possibility.

- Action, Chair, to approach the Space Generation Council and discuss concrete means to attract young professionals in participating in Commission III activities. Action closed during IAC, contact with the Executive Director of the Council established

9) Future Trend

The Commission, with the IAA Secretariat, will try to organize Virtual forum to progress work of the Study Groups with a dedicated website. IAF is already having virtual sessions. and the Commission will try to Include possibility of having virtual Commission attendance using also Webex.

10) Commission Report to SAC

See Annex 7.

During the SAC meeting, held on the 29th September, the Commission was praised by the Chair as being an example for all other Commissions.

11) Study Process Improvement – Task Force Conclusions

See Annex 8

The Chair presented the conclusions

12) Any Other Business

Concerns were raised, by several participants, concerning the Commission meetings held on the Saturday. While the meetings on Sunday may improve relations between IAA Commissions, it creates problems of relation between the IAA and the IAF, since on Saturdays many IAF Technical meetings take place.

IAA COMMISSION III

NAPLES, 29 SEPTEMBER 2012

AGENDA

- Commission Proceedings
- Status of On-going Studies
- New Studies
- Symposia organized by the Commission
- Scientific Activity Plan 2012/14
- Commission Composition
- Increase support to Commission activities
- Future Trends
- AOB
- Commission Report to SAC
- Study Process Improvement – Task Force Conclusions

Commission Proceedings

- 2 Commission meetings to be held:
  -> on the 29 September (Room: M3, Hall 4)
  -> on the 30 September (Room: Panarea, Palacongressi)
- The Commission Leadership (Chair, Co-Chair, Secretary, Past Chair) held teleconferences every 2 months to monitor progress and take required actions.
- Commission supported the creation of the Global Space Solar Power Working Group, in March 2012 and is following up its activities
- Outreach Activities:
  - To foster the understanding and seek for technical support to the Commission activities, a paper written by the Commission Leadership, will be presented at IAC12 in the Symposium D3. The paper is: IAC-12-D3.1 "**IAA Commission III Activities in Support of Space Exploration and Development**".

Status of On-going Studies (1/3)

- **SG 3.10 "Technologies for Interstellar Precursor Missions"**

  -> Commission conducted Peer Review, Oct./Dec. 2011

  -> Final Draft to Commission, April 2012;

  -> VC Study Review, August/Sep. 2012

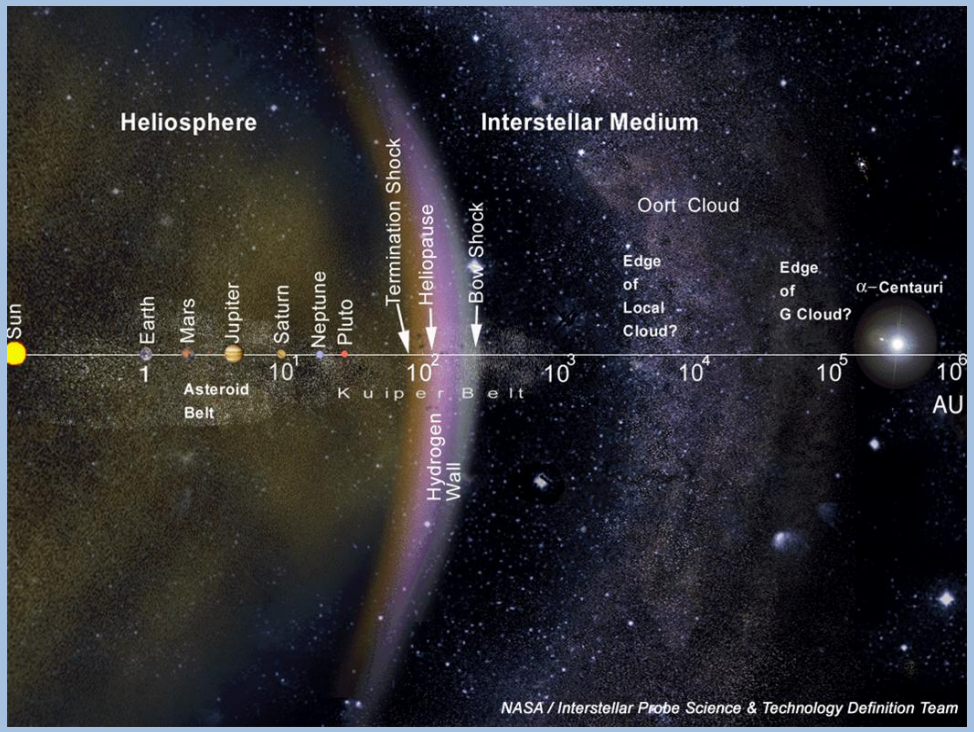
  -> Final Commission III review, 4th October

  -> SAC/BoT Approval, October 2012

  -> Publication by IAA, Dec 2012

Interstellar Distances and Destinations

Kuiper belt: 30-50 ; Heliopause: 90-100 ; Focal point of Sun's Gravitational lens:550; Oorts'Cloud: 700-1000 AU;



Status of On-going Studies (2/3)

- **SG 3.9 "Private Human Access, Vol I: Sub-Orbital"**
  -> Two IAA Symposia organized 2008,2011
  (proceedings published in Acta Astronautica)
  -> Draft to be completed, February 2013, TBC
  -> VC Study Review, April/May 2013
  -> SAC/BoT Approval, July 2013
  -> Publication by IAA, Oct./Nov. 2013

Status of On-going Studies (3/3)

- **SG 3.13 "Assessment of the Technology Feasibility and Challenges of the Space Elevator Concept"**
  -> Final Draft to the Commission, March 2013
  -> VC Study Review, April 2013
  -> SAC/BoT Approval, Sep. 2013
  -> Publication by IAA, Dec. 2013

- The Last Meeting of the Space Elevator Cosmic Study will be held on:

  -Thursday 4 October 2012
  -1pm to 3pm
  -Room : MR3, Hall 4

New Study (1/3)

- **SG3.14 "Private Human Access to Space – Vol. 2: Orbital"**
  - Subject: Assess the prospects for new commercial markets in 2020-30 timeframe

-> Study Approved, August 2012

-> Present Team Composition:

- Chair: Di Pippo, Secretary: Dupas; Members:Davidian, Berthe, Russo, Villa, Eckert, Spudis, Bond

-> Team Leadership/Participants to be completed

-> First Draft available for next HoA Summit, End 2013

-> Publication, 2014/15

- > Participants from Other Commissions solicited

- The first meeting of this Cosmic Study will take place on:
  - Tuesday, 2nd October
  - 3 pm to 4 pm
  - Room MR5, Hall 4

New Study (2/3)

- **SG3.15 "Long Term Space Propellant Depot"**
  - Subject: Assess the required technologies for long term on-orbit storage.

  -> Study Approved, August 20 12

  -> Present Team Composition:

  Chair: Saccoccia, Secretary: Xiaowei; Members: Yu, Lin, Wei, Zhaohui

  -> Team Leadership/Participants to be completed

  -> First Draft available for next HoA Summit, End 2013

  -> Publication, 2015

  -> Participants from Other Commissions solicited

  - The first meeting of this Cosmic Study will take place on:
    - Sunday, 30th September
    - 4 pm to 6 pm
    - Room MR6, Hall 4

New Study (3/3)

- **SG3.16 "Global Human Mars Reference Mission and Technologies"**
  - ◆ Subject: First world-wide assessment of Human missions to the Mars system
  - -> Study Approved, August 2012
  - -> Team Leadership/Participants to be completed
  - -> First Draft available for next HoA Summit, End 2013
  - -> Completion, 2014/15
  - -> Co-Chair Position vacant

  - ❑ The first meeting of this Cosmic Study will take place on:
    - Tuesday, 2nd October
    - 6 pm to 8 pm
    - Room: MR5, Hall 4

- New Subject to be consolidated in Study Proposal:

  - ➢ **Space Mineral Resources – Challenges and Opportunities**

Symposia organized by the Commission
IAC 2012

- Commission III responsible, within IAC12, for the following Symposia:

-> A5 “Human Exploration of the Moon and Mars”(4 Sessions)

-> C3.1 “Space Based Solar Power Architecture..” (1 Session)

-> D3 “Building Blocks for Future Space Exploration..”(4 Sessions)

-> D4 “Vision and Strategies for the Far Future” (4 Sessions)

- Average is 8 papers for 13 sessions to be presented

Symposia organized by the Commission
IAC 2013 - General

- New Criteria and rule for Commission Membership applied
- Change of Coordinators/Session Chairs implemented, if required
- Symposia consolidated to be complementary to past/future Studies carried out by the Commission
- Main Changes to be confirmed after Commission meetings:
  - A5 focused on Human Mars Mission and Cislunar Space
  - D4 focused on G SSG WG activities + Advanced missions (eg. Interstellar)
  - D3 not changed with emphasis on Nuclear Propulsion
  - C3.1 not changed

IAC 2013
Specific (1/2)

- A5 “Human Exploration of the Moon and Mars”

  Coordinators: C.Sallaberger, W.Mendell (To be replaced, TBC)

  - A5.1 “Near Term Strategies for Cislunar/ Lunar Surface Infrastructures” (Change)

  - A5.2 “Human Mission to Mars, Reference mission/ technologies” (NEW)

  - A5.3 Joint session on Human and Robotic Partnership (No Change)

  - A5.4 “Going Beyond the Cislunar System:Libration Point, NEOs (Change)

IAC 2013
Specific (2/2)

- C3.1 “Space Based Solar Power Architecture…” (No change)

- D3”Building Blocks for Future Space Exploration and development” (No change)
- D4”Visions and Strategies for the far future”
  - D4.1 “Novel Concept and Technologies including IPM” (change)
  - D4.2” Solar Power Satellite working Group and/or Space Mineral Resources status” (new)
  - D4.3 ‘’Space Elevator Feasibility and Technologies” (No change)
  - D4.4 ‘”Contribution of Space Activities to Solving Global Societal Challenges” (No change)

Scientific Activity Plan 2012/14

- Cosmic Studies to be published:
  - SG3.10, 2012
  - SG3.13, 2013
  - SG3.9, 2013
  - SG 3.14, SG3.16, 2014
  - SG 3.15, 2015
- New Study Group will be proposed, by Oct.2012
- Symposia within IAC will be organized with changing emphasis complementary to the SGs
- Thematic Symposia will be proposed for 2013/14, after discussion within the Commission, e.g.. Interstellar Technologies

Commission Composition (2011-13)

- Chair: Giuseppe Reibaldi (Italy)
- Co-Chair: LU Yu (China)
- Secretary: S. Ramakrishnan (India)
- Past-Chair: J.Mankins (USA)
- Member: Claudio Bruno (Italy)
- Member: Junjiro Onoda (Japan)
- Member: Roger Lenard (USA)
- Member: Christoph Bonnal (France)
- Member: Valery Korepanov (Ukraine)
- Member: B. Rabiu (Member)

Increased support to Commission Activities

- Participation to the activities is open to all technical professional world wide especially for the Study Groups just initiated.
- Young Professionals are welcome since there is a need of fresh “blood” to bring new ideas to the Studies and prepare the future Academicians.
- Beside the 10 official Members of the Commission, the position of Expert should be created, by IAA, for internationally recognized professionals participating in the Commission activities but not yet appointed Academician.

Future Trends

- Commission III is planning to create new opportunity for Members, Experts and Young professionals by the creation of virtual forum.
- The virtual forum would be created, first, at the level of the Study Groups just initiated in order to allow interaction of the participants during all year.
- The possibility to join the Commission face--to-face meetings, in a virtual fashion, will be also investigated

ANNEX 2
to Minutes of Commission III, 29/30 Sep.2012
IAA Study Group Status Report

Responsible Commission: III

Study Number and Title: SG 3.9 "Private Human Access to Space"

Short Study Description (repeat from Study Group Proposal):

Identify and quantify the key topics associated to Manned Private Access to Space for both Orbital and Sub-orbital missions.

- Technical aspects
- Legal and regulatory aspects, safety aspects
- Financial aspects, market analyses, associated business plans
- Motivations of potential customers
- Physiological and Psychological requirements, ergonomic constraints

IAA Situation Report giving the keys to the topic and potentially including recommendations.
Subdivision of the study into key chapters, with one "book captain" per chapter ; 7 or 8 members per chapter covering a wide range of origins (countries, agencies, industrials, searchers, operators…)

Progress in past six months:

- Preparation of the Special Issue of Acta Astronautica on Private Huma Access to Space following the IAA Conference in Arcachon 2011
- Minor progress in the technical content of the Situation Report in the following topics:
  - System aspects
  - Technical (sub-systems, propulsion)
  - Market analysis, motivations
- Current status of completion: roughly 50%

Website Study Information up to date? (Study Group Membership, Study Plan and Schedule):
Yes, including all previous status reports

Issues requiring resolution? (recommend approach):
Problem to motivate the team considering the very low progress made on the developments (Virgin Galactic, XCor, RocketPlane, Astrium SP…) since 2004.

Product Deliveries on Schedule? (If modified explain rationale):
No, 6 months delay due to insufficient work within the team, starting by the chairman

Study Team Member Changes? (List any Study Team Members that you wish to discontinue, and provide names plus contact coordinates of any Members you wish to add on the second page of this Study Update form.) Note: Complete contact information including email, tel. and fax must be provided for all additions. Only Members with complete contact information will be listed and receive formal appointment letters from the IAA Secretariat.)
None identified so far.

Name of person providing Study Group Status (Study Group Chair or Co-Chair):
Christophe BONNAL

Status Report Date:
Sept.29, 2012

ANNEX 4
IAA SG3.14:
Public/Private Human Access to Space
–
Volume 2: Earth Orbit and Beyond

Simonetta Di Pippo, ASI
Ken Davidian, FAA AST

Goals of Public/Private Orbital Space Report

- This study group will create a report that assesses the cultural, economic and political environments affecting the creation and sustainability of global public and private orbital space activities and beyond.
- Two primary activities:
  - A collection of past works.
  - A series of separate but coordinated activities, including research studies, participant workshops and academic forums.

Results of Public/Private Orbital Space Report

- Initial Results
  - Form the basis of discussion at the next Heads of Agency Summit scheduled end 2013/beginning 2014.
  - Constrains the initial timeline.
- Subsequent Results
  - Will require two to three years.
  - Report depth of complexity and breadth of scope will likely require subsequent bi-annual updates to reflect changes in emerging or temporal subject-matter facets.

Proposed Membership

- Confirmed Members
  - Simonetta Di Pippo (ASI, Chair)
  - Ken Davidian (FAA, Deputy-Chair)
  - Alain Dupas (secretary)
  - Philippe Berthe (ESA)
  - Gennaro Russo (CIRA)
  - Marco Villa (SpaceX)
- Not Yet Confirmed Members
  - Paul Spudis
  - Alan Bond
  - Claire Jolly (OECD)
  - Molly McColley (RFF)
  - Mary Lynne Dittmar (Independent)

Draft Table of Contents

IAA Study Group 3.15
Long Term Space Propellant Depot

1st Meeting, 30-9-2012, Naples

The 1st meeting of the study team took place 16:00 to 18:00

Chairman: G.Saccoccia (ESA, Europe)

Members Present:
Lu YU (CALT, China) – accompanied by Xiaohui Cao, Jim Keravala (Shackleton Energy, USA), H.Ellerbroek representing G.Laengel (Astrium-ST, D), Christophe Bonhomme (CNES), Andreas Rittweger (Astrium Les Mureaux)

Excused:
Davina Di Cara (ESA, Europe), James Free (NASA, USA), Dallas Bienhoff (Boeing, USA),

Agenda:

1) Welcome / Approval of the Agenda
2) Study Introduction
3) Introduction of each member and discussion on possible additional members.
4) Appointment of Vice-chairs
5) First round tables on ideas for the study
6) Preliminary discussion on study content outline
7) Proposed way forward
8) Next meeting
9) A.O.B

1) Welcome / Approval of the Agenda

The proposed Agenda has been approved

2) Study Introduction

The study origin, scope and intent has been recalled by G.Saccoccia. In particular, the expected timeline has been summarised for the benefit of the participants:

Draft outline of report: November 2013 First draft of report: December 2014 Final report: December 2015

3) Introduction of each member and discussion on possible additional members.

Each participant introduced himself and the possible contribution he can provide to the study.

The following additional study members were proposed:

- TBD (from Air Liquide), name to be proposed by C.Bonhomme
- SHEN Lin, to be contacted by LU Yu
- Maxim Martinov (Lavotchin), to be contacted by H.Ellerbrock
- Kevin Miller (Ball Aerospace), name proposed by W.Smith of Aerojet
- Robert Mueller (NASA-KSC), name proposed by J.Keravala for his recent involvement in the ISU Oasis study

4) Appointment of Vice-chairs

As previously anticipated, J.Free and LU Yu have been appointed as study vice chairs J.Keravala will act as study Secretary. A study editor to coordinate individual parts and compile a coherent study report will be proposed/appointed at a later stage.

5) First round tables on ideas for the study

An initial brainstorming of ideas took place among the participants about specific subjects of interests for the study and areas to be included.
In particular it has been clarified that the study, at least in its first version, will only address in-orbit depots and not surface infrastructures.

6) Preliminary discussion on study content outline

A possible “macro”structure for the study has been discussed among the participants and the following 3 blocks have been identified (each of them might include several chapters):

I) Missions, “business cases, architectures, etc.: Why these concepts?
II) Technologies: background (previous missions addressing some of the challenges), needs, status, challenges, schedules and costs
III) Implementation: private vs. institutional initiatives, International collaboration, etc.

7) Proposed way forward

- Build a study team by proposing new members and contacting them. Deadline: End 2012
- Definition of the Study Structure: each member should reflect on the 3 blocks above and propose a chapter structure with a few lines of content per each chapter. Deadline End January 2013. Consolidation by G.Saccoccia by mid February. Last iteration and study structure completed by March 2013.

8) Next meeting

The next meeting of the study team will take place during the IAF Spring Meeting, in March 2013. G.Saccoccia will send in advance a convocation and additional details.

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SG MEMBERS

Mauro Augelli
Andrew Aldrin
Giovanni Bignami
Christofe Bonnal
Claudio Bruno
John B. Charles
Gabriel G. De la Torre
Alain Dupas
Giancarlo Genta
Nadeem Ghafoor
Richard Heidmann
Les Johnson
Nick Kanas
David Kendall
John Logsdon
Chris McKay
Ernst Messerschmid
Gian Gabriele Ori
Maria Antonietta Perino
Guiseppe Reibaldi
Andreas Rittweger
Christian Sallaberger
Jean Mark Salotti
Klaus Schilling
Carol R.Stoker

ANNEX 5

SG 3.16 - **Global Human Mars System Missions Exploration - Goals, Requirements and Technologies**

DEADLINE

A draft is scheduled to be available for October 2013, or for the next Heads of Space Agencies Summit

GOAL

Identify, assess and synthesize a global set of goals with its related criteria requirements for future human exploration of the Mars system and establish technology opportunities and roadmaps in the context of promising cooperative exploration scenarios. The Study should aim to identify means to minimize the risks at global level

Chair

Giancarlo Genta

Co-chair

TBD

Secretary

TBD

http://iaaweb.org/content/view/517/688

IAA COMMISSION III

REPORT TO SAC

NAPLES, 29 SEPTEMBER 2012

Content List

- Commission Proceedings
- Status of On-going Studies
- New Studies
- Symposia organized by the Commission
- Scientific Activity Plan 2012/14
- Increase support to Commission activities
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- Annex I

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- Commission supported the creation of the Global Space Solar Power Working Group, in March 2012 and is following up its activities
- Outreach Activities:
  - To foster the understanding and seek for technical support to the Commission activities, a paper written by the Commission Leadership, will be presented at IAC12 in the Symposium D3. The paper is: IAC-12-D3.1 "**IAA Commission III Activities in Support of Space Exploration and Development**".

Status of On-going Studies (1/2)

- **SG 3.10 "Technologies for Interstellar Precursor Missions"**
  -> Commission conducted Peer Review, Oct./Dec. 2011
  -> Final Draft to Commission, April 2012;
  -> VC Study Review, August/Sep. 2012
  -> SAC/BoT Approval, October 2012
  -> Publication by IAA, Dec 2012
- **SG 3.9 "Private Human Access, Vol I: Sub-Orbital"**
  -> Two IAA Symposia organized 2008,2011
  (proceedings published in Acta Astronautica)
  -> Draft to be completed, February 2013, TBC
  -> VC Study Review, April/May 2013
  -> SAC/BoT Approval, July 2013
  -> Publication by IAA, Oct./Nov. 2013

Status of On-going Studies (2/2)

- **SG 3.13 "Assessment of the Technology Feasibility and Challenges of the Space Elevator Concept"**
  -> Final Draft to the Commission, March 2013
  -> VC Study Review, April 2013
  -> SAC/BoT Approval, Sep. 2013
  -> Publication by IAA, Dec. 2013

- The Last Meeting of the Space Elevator Cosmic Study will be held on:

  -Thursday 4 October 2012
  -1pm to 3pm
  -Room : MR3, Hall 4

New Study (1/3)

- **SG3.14 "Private Human Access to Space – Vol. 2: Orbital"**
  - Subject: Assess the prospects for new commercial markets in 2020-30 timeframe

-> Study Approved, August 2012
-> Team Leadership/Participants to be completed
-> First Meeting will be held in Naples
-> First Draft available for next HoA Summit, End 2013
-> Publication, 2014/15
- > Participants from Other Commissions solicited

- The first meeting of this Cosmic Study will take place on:
  - Tuesday, 2nd October
  - 3 pm to 4 pm
  - Room MR5, Hall 4

New Study (2/3)

- **SG3.15 "Long Term Space Propellant Depot"**
  - Subject: Assess the required technologies for long term on-orbit storage.

  -> Study Approved, August 2012

  -> Team Leadership/Participants to be completed

  -> First Draft available for next HoA Summit, End 2013

  -> Publication, 2015

  -> Participants from Other Commissions solicited

  ❑ The first meeting of this Cosmic Study will take place on:
  - Sunday, 30th September
  - 4 pm to 6 pm
  - Room MR6, Hall 4

New Study (3/3)

- **SG3.16 "Global Human Mars Reference Mission and Technologies"**
  - Subject: First world-wide assessment of Human missions to the Mars system

-> Study Approved, August 2012
-> Team Leadership/Participants to be completed
-> First Draft available for next HoA Summit, End 2013
-> Completion, 2014/15
-> Co-Chair Position vacant

- The first meeting of this Cosmic Study will take place on:
  - Tuesday, 2nd October
  - 6 pm to 8 pm
  - Room: MR5, Hall 4

- New Subject to be consolidated in Study Proposal:

  - **Space Mineral Resources – Challenges and Opportunities**

Symposia organized by the Commission
IAC 2012

- Commission III responsible, within IAC12, for the following Symposia:

-> A5 “Human Exploration of the Moon and Mars”(4 Sessions)

-> C3.1 “Space Based Solar Power Architecture..” (1 Session)

-> D3 “Building Blocks for Future Space Exploration..”(4 Sessions)

-> D4 “Vision and Strategies for the Far Future” (4 Sessions)

- Average is 8 papers for 13 sessions to be presented

Symposia organized by the Commission
IAC 2013

- New Criteria and rule for Commission Membership applied
- Change of Coordinators/Session Chairs implemented, if required
- Symposia consolidated to be complementary to past/future Studies carried out by the Commission
- Main Changes to be confirmed after Commission meetings:
  - A5 focused on Human Mars Mission and Cislunar Space
  - D4 focused on G SSG WG activities + Advanced missions (e.g.. Interstellar)
  - D3 not changed with emphasis on Nuclear Propulsion
  - C3.1 not changed
- Details of the 2013 Symposia are in Annex 1

Scientific Activity Plan 2012/14

- Cosmic Studies to be published:
  - SG3.10, 2012
  - SG3.13, 2013
  - SG3.9, 2013
  - SG 3.14, SG3.16, 2014
  - SG 3.15, 2015
- New Study Group will be proposed, by Oct.2012
- Symposia within IAC will be organized with changing emphasis complementary to the SGs
- Thematic Symposia will be proposed for 2013/14, after discussion within the Commission, e.g.. Interstellar Technologies

Increased support to Commission Activities

- Participation to the activities is open to all technical professional world wide especially for the Study Groups just initiated.
- Young Professionals are welcome since there is a need of fresh “blood” to bring new ideas to the Studies and prepare the future Academicians.
- Beside the 10 official Members of the Commission, the position of Expert should be created, by IAA, for internationally recognized professionals participating in the Commission activities but not yet appointed Academician.

Future Trends

- Commission III is planning to create new opportunity for Members, Experts and Young professionals by the creation of virtual forum.
- The virtual forum would be created, first, at the level of the Study Groups just initiated in order to allow interaction of the participants during all year.
- The possibility to join the Commission face--to-face meetings, in a virtual fashion, will be also investigated

Annex I (1/2)
IAC 2013 Symposia

- A5 “Human Exploration of the Moon and Mars”

  Coordinators: C.Sallaberger, W.Mendell (To be replaced)

  - A5.1 “Near Term Strategies for Cislunar/ Lunar Surface Infrastructures” (Change)

  - A5.2 “Human Mission to Mars, Reference mission/ technologies” (NEW)

  - A5.3 Joint session on Human and Robotic Partnership (No Change)

  - A5.4 “Going Beyond the Cislunar System:Libration Point, NEOs (Change)

Annex I (2/2)
IAC 2013

- C3.1 “Space Based Solar Power Architecture…” (No change)

- D3”Building Blocks for Future Space Exploration and development” (No change)
- D4”Visions and Strategies for the far future”
  - D4.1 “Novel Concept and Technologies” (No change)
  - D4.2” Solar Power Satellite working Group status” (new)
  - D4.3 ‘’Space Elevator Feasibility and Technologies” (No change)
  - D4.4 ‘”Contribution of Space Activities to Solving Global Societal Challenges” (No change)

IAA TASK FORCE ON
STUDY GROUP PROCESS IMPROVEMENT

FINAL REPORT

By G.Reibaldi/M.Grimard

TABLE OF CONTENTS

INTRODUCTION

- 52 Studies produced by IAA, but in the last few years several studies were cancelled by the BoT
- BoT requested revision of Study rules and guidelines
- Secretary General created a Task Force on Study Group Process Improvement
- Task Force goals:
  - → Carry out a Study Survey involving Study/Commissions Leadership of last 5 years to gather feedback
  - → Consolidate existing Study Group Forms/Procedure, Peer Review Process
  - → Identify recommendations to the SAC to improve Study Group processes based on the Survey results and the Task Force experience

TASK FORCE

- COMPOSITION:

  Co-Chairs: Giuseppe Reibaldi (C3)
  Max Grimard (C5)

  Members: Susan McKenna-Lawlor (C1)
  Gerhard Schwehm (C1)
  Peter Graef (C2)
  John Mankins (C3)
  Filippo Graziani (C4)
  Michael Ovchinikov (C4)
  Corinne Jorgenson (C5)
  Peter Swan (C6)

  Ex officio: Jean-Michel Contant

- SCHEDULE:

  Kick-off Teleconference: 1st December 2011

  Final Report : 27 February 2012

  Updates by SAC Chair and SG : 6 September 2012

STUDY GROUP SURVEY

- Questionnaire sent to 136 Academicians either in the Study or in the Commission Leadership

- 21 replies were received, i.e. 15% of the poll, with a better statistics for the Commission Leadership

- Questionnaire organised in the following categories:

  → Generalities on the Process, feedback on the Study Form

  → Study initiation and team building

  → Study Management, Communication and Reporting

  → Study Approval, Editing and Publication

MAIN RECOMMENDATIONS (1)

- Flexibility for the content of an Academy Study : might be different from that of a classical technical or scientific report, and could rely on other tools for its implementation (e.g. surveys, market analyses)

- Reaffirm the role of the Commissions, … and remind the duties of Commission leadership :
  - foster ideas for new Studies
  - ensure a robust and skilled Study Group team
  - support and coach the Study leaders for the implementation of new Studies
  - report on Study progress, and provide visibility to Academy Members of the status of ongoing studies.
  - speed up the approval steps, both at Commission and Peer Review levels
  - guarantee the quality of the reports from its initiation thru its development and ending with the implementation of the findings of the Academy Peer review process

MAIN RECOMMENDATIONS (2)

- Optimize interaction and communication between Study leaders, the Commissions, the SAC VC for Studies and the IAA Secretariat :
  - efficient and transparent
  - minimize the duration of the steps involving administrative decision and/or report approval
  - define who is responsible to implement and follow up the action, and who shall be informed
- Academy Secretariat :
  - single entry/exit point for Study Group and Commission leaderships for administrative and logistic matters
  - should establish a capacity for “group phone call” allowing Study Groups and Commissions virtual meetings
- Reinforce means to “advertise” and give visibility to the results of a Study after its approval by the Academy (via space community networks, the web, press releases, press conferences, conferences and symposia, leaflets, paid advertising in specialized and general media , outreach, …), in compliance with the overall communication policy of the Academy, which requires consolidation

CONCLUSIONS

- Task Force has concluded its activities within schedule and with the support of Academicians providing feedback to the questionnaire created
- Processes Guidelines and Forms have been consolidated and confirmed by SAC Chair and Secretary General
- The main conclusions are :
  - → Commission Leadership need to be more proactive in all steps of the Study such as : start-up, implementation, communication, reviews
  - → Active SAC VC Studies shall coordinate and harmonize the end-to-end process of the Study Groups
  - → Communication between Study and Commission Leadership, Academy Secretariat and the SAC VC needs improvement especially for approval phase
  - → Use of the web should be generalized to improve the information flow :
    - i) towards Study Leadership (concrete guidelines to implement/manage Study)
    - ii) within the Study Groups (shared working environment to progress the Study)
    - iii) towards the Academy (information on study progress and results)
  - → IAA Communication policy for the Study needs consolidation

BACK UP

DETAILED RECOMMENDATIONS (1)

Approval processes are too long	1) Improve coordination between the SAC and the Commissions, hold regular teleconferences, delegate BoT approval responsibility to SAC VC 2) Set clear notifications, with identified actionees and deadlines for approval steps	IAA Secretariat, Commissions, SAC VC, Study Leadership
IAA proposal for forming study group	3) Add one page of guidelines including schedule information (see Annex 5)	IAA Secretariat
Study format	4) Need for more flexibility from SAC and BoT regarding the format of a Study (might come from a Survey, might be a comprehensive review of the situation of a domain, etc.)	SAC, BoT
Criticality of Study Staffing	5) Ensure a robust Study team from the onset Possible three stages for staffing: - Stage 1 = initial leaders and team members, part of the submitted study proposal - Stage 2 = edits to Stage 1, plus additional team members (including members suggested by the VC for studies or a Commission) - Stage 3 = edits to Stage 2, plus any additional team members, through call for volunteers from the Academy	Commission/Study leadership, SAC VC

DETAILED RECOMMENDATIONS (2)

Difficulty in recruiting young professionals	6) Exploit the IAA Young Professionals Databases (young Academy members, young participants to IAA stand alone conferences, sources from sister organizations in the world)	IAA Secretariat to create a database with Young Professionals Commission/Study leadership
IAA Study Group Survey not used	7) Continue the survey with IAA new Members 8) Ensure that Commission leadership obtains the survey results and uses it	IAA Secretariat, Commissions Leadership
Weak Role of Commission Leadership	9) Make the commission leadership accountable for study performance, and define guidelines to run a Commission (see Annex 4)	SAC VC, SAC
	10) Commission Chairs send study Status Report to IAA Secretariat	Commission Chairs
Low participation in Commission review	11) Make the active participation a mandatory condition to stay in the Commission	IAA Secretariat, Commission Leadership, SAC

DETAILED RECOMMENDATIONS (3)

Poor communication on Study Status	12) A global communication policy of the Academy shall be defined, in particular regarding the information on Studies progress and publication, with three levels : protected (internal exchanges within the Study Group), restricted to IAA, public (IAA position)	BoT, IAA Secretariat
	13) Improve the IAA Study Group dedicated Webpage, with restricted (e.g. documents sharing) and public (e.g. meetings, vacancies, planning…) parts	IAA Secretariat, Commission/ Study leadership, SAC
	14) Report status at IAA biannual meetings	Commission/Study leadership
	15) Set up a yearly IAA Study Information session, within the SAC or Commission Members restricted meetings to explain status of the Study	IAA Secretariat, Commission/ Study leadership
	16) Exploit the existing IAA sponsored Symposia to present the status of the Study Groups	Study leadership
Peer review too long with findings difficult to implement	17) Coordinate the implementation of the Review findings and negotiate with reviewers, if required	Commission/Study Leadership, SAC VC

DETAILED RECOMMENDATIONS (4)

Poor communication on reports distribution	18) IAA should keep the name of Cosmic Study for all the final reports of the Study Groups, as the recognized Academy branding in the World	IAA Secretariat
	19) Improve the dissemination process, including press conferences, press releases (provided by Study leaders), and provide feedback to Commissions and Study Groups	IAA Secretariat, Study leadership
	20) Quarterly IAA Newsletter, status reports presented as papers at International Conferences	IAA Secretariat, Study leadership
	21) Carry out a publication impact assessment of IAA Studies	IAA Secretariat
Role of IAA China Studies Centre	22) Review biographies of Academicians and propose candidates for studies, Support study group web pages creation and maintenance, Prepare for Editing / publication	IAA Secretariat

IAA STUDIES PROCESS (1/3)

1. The Commission Chair receives a proposal [see proposal form].
2. The Commission Chair informs the other Commissions, asking for their potential interest (30 days deadline)
3. The Commission Chair organizes a review of the proposal amongst Commission members and Commission Leaders and decides on the type of activity and its acceptance. The Commission may decide to change the proposed “Primary IAA Commission Preference”. The Commission Chair may add or change the “Secondary IAA Commission Interests”. The Commission Leadership ensures in particular that the Study Team has the necessary staff and skills to carry out the work. The Commission Chair will ensure that a formal notification is made to the secondary IAA Commission(s) and solicit from them additional multidisciplinary representation. The Commission Chair forwards the proposal to the SAC Vice Chair for Studies (SAC VC) with copy to the IAA Office.
4. The SAC VC reviews the proposal and presents it to the IAA VP Scientific Activity and the SAC for acceptance.
5. The SAC VC informs the IAA Office to open a call for staffing on the IAA website
6. The SAC VC submits the formal study approval form to IAA Office which sends out documentation confirming the formal appointment of Study Leaders and study group members, within 60 days from Study acceptance.

IAA STUDIES PROCESS (2/3)

7. Upon initiation of a Study, a dedicated IAA Study web site is created, including a public section for general information and a restricted part for posting study drafts
8. The Study Leaders submit a 1st Draft to the Commission Chair (the Commission Chair keeps in regular contact with study leaders and forwards status changes to the IAA Office for updating the IAA studies status Chart).
9. The Study Leaders submit the final draft to the Commission Chair, who organizes a pre-review by the Commission Members. This pre-review includes a compliance check with IAA rules and guidelines for studies and sending preliminary information to the IAA Office in anticipation of publication. This pre-review should not last more than 30 days. Following this step, the Commission Chairs submit the final draft to the SAC VC.
10. The SAC VC organizes an Academy Peer Review through the IAA restricted website (four reviewers minimum, representing the four Academy Sections with as many different nationalities as possible and a minimum of 4 nationalities). This review should not last more than 30 days.
11. The SAC VC submits the peer review results to the Commission Chairs, who supervise the revision by the Study Leaders.

IAA STUDIES PROCESS (3/3)

12. The Study Leaders submit the final version to the Commission Chairs, who – following Commission approval – submit it to the SAC VC. In case of conflict between the Study Leaders and the Commission Chair, the SAC makes the final decision at their meeting.

13. Following his/her review, the SAC VC submits the final version to the IAA VP Scientific Activity and the SAC for approval.

14. Following SAC approval, the Secretary General submits a ballot acceptance form to the Board of Trustees in view of official Academy acceptation, and transmits the results to the SAC VC. In the event of a negative response the process returns to paragraph 9 of this document.

15. The printing is organized by the Secretary General who manages the support of sponsors (the Study Leader and the Commission Chair as well as the SAC VC review proofs before printing). The Commission Chair is responsible to inform the Study Leaders that they are not authorized to contract independently with a publisher neither receive personal copyright nor financial compensation. However, Study Leaders are welcome to suggest printing sponsorship opportunities.

GUIDELINES ON HOW TO FORM AND IMPLEMENT AN IAA STUDY (1/3)

Timeline	Action
Preamble	The overall duration of the whole study process should not exceed 3 years
Gestation	Academicians define a proposal with a robust team and study leadership. A Study Proposal form is filled out.
Start +30 days	The Proposal is presented to a Commission Leadership
	The Commission Chair informs the other Commissions asking for their potential interest
	The Commission approves the Study Proposal
	The Commission Chair sends the Study Proposal to the SAC VC and the IAA Office with copy to VP Scientific Activities
	The VP Scientific Activities approves the study and the SAC VC informs the Commission and the IAA Office
	The IAA Office establishes a website for use by the study group.

GUIDELINES ON HOW TO FORM AND IMPLEMENT AN IAA STUDY (2/3)

Timeline	Action
Feb-Sept yearly	The Commission Chair provides in mid-February and early September a status report to the SAC VC and IAA Office in addition to the meeting* minutes posted on the IAA Study Webpage. Any messages to the IAA Office related to the "On-Going Study Table" changes/modifications must be sent by the Commission Chair in a specific and separate message as embedded information/message in meeting minutes is not the proper way to communicate with IAA Office.
Continuous	The Study Group leadership ensures the implementation of the work with IAA Office support: Web site support, Teleconferences, pre-publishing and possible meetings support.
Final draft	Study Leaders send to Commission Leadership [30 days for Commission review with returned comments] After completion of the commission pre-review, the study is recommended or not for Peer Review If successful it is sent to the SAC VC with copy to IAA Office The SAC VC arranges independent Peer Review and may request assistance from the commission chairs.

GUIDELINES ON HOW TO FORM AND IMPLEMENT AN IAA STUDY (3/3)

Timeline	Action
Peer Review	Selection and appointment of Peer Reviewers by SAC VC [up to 15 days]
	Send Study Report to Peer Reviewers [up to 30 days response to Study lead]
	Peer review result sent to the Study chairs and to the Commission chairs
	The Study group has up to 30 days to incorporate the requested changes or recommend other changes to the Commission Chair
Final	The Commission Chair sends out the study, gains the approval of the 10 members of the Commission and then sends it to the SAC with recommendation for publication (copy to IAA Office)
	In view of study acceptation the Secretary General organises the Board of Trustees voting process [up to 30 days response]
Publishing	The printing is organized by the Secretary General who manages the support of sponsors. The Commission Chair is responsible to inform the Study Leaders that they are not authorized to contract independently with a publisher neither receive personal copyright nor financial compensation. However, study leaders are welcome to suggest printing sponsorship opportunities. The possible options to publish the study are discussed between the Secretary General, the VP Publications and the commissions leaders no later than when the pre-review is initiated. The final decision for publication must be made by the VP Publication no later than when the Peer review starts.

Meeting of the IAA study group 3.16 on "Global Human Mars System Missions Exploration – Goals, Requirements and Technologies"

Date: Tuesday, October 2, 18:00 to 20:00

Chairman: Giancarlo Genta

Present: Andrew Aldrin, Christophe Bonnal, Alain Dupas, Giancarlo Genta, Richard Heidmann, Nick Kanas, Maria Antonietta Perino, Andreas Rittweger, Jean-Marc Salotti, Klaus Shilling, Susan McKenna, Lin Wei, Cao Xiaohui

Chair: Giancarlo Genta

Meeting Co-chair: Christophe Bonnal

Meeting Secretary: Jean-Marc Salotti:

1. **Introduction**

This study has been approved in August and is assigned to Commission 3 of the IAA. The result will be a 70 pages book. There should be no technical details in the main report. Technical details may eventually be added in long appendices. References to appendices can be inserted in the main text to support the correctness of the statements.

Timeframe: a draft version of the study is due for November 2013, before the meeting of the head of agencies. If it is postponed, the dead-line will be extended accordingly.

Question: why is the dead-line of this academic study linked to the agenda of the space agencies?

Answer: The draft version might help the deciders, who would like to be informed in time. The dead-line for the final document is in 3 years from now.

International: The team is international. It is important to involve people from different countries and to design a mission based on an international cooperation.

Question: what makes this study different from the previous ones?

Different opinions are presented. List of arguments:

- We should be open-minded. The cost should not prevent us to propose innovative solutions. We can identify key elements and intermediate goals.
- Money is a concern. The proposed mission should be affordable.
- A fantastic mission will never be implemented. The cost is an issue.

Final argument: the roadmap and financial efforts should be sustainable, e.g. acceptable for the deciders at a reasonable cost per year.

2. **SG 3.16 Composition.**

The composition of the SG is updated.

3. **Designation of co-chair and secretary.**

The co-chair is still to be defined. Dr. Hideto Yamazaki was asked to serve as co-chair and he will confirm later whether he accepts or not.

Jean-Marc Salotti is asked to act as a secretary for this meeting and provisionally for the study group. Jean-Marc Salotti accepts the task.

4. **Table of contents**

A table of contents is proposed by Gancarlo Genta.

The subsections are discussed. The final table of contents is:

I- Mission rationale
  - a- definition of goals with related criteria: Political, Scientific, Economical, Cultural
  - b- Relevant options
  - c- Heritage of past space experience

II Lessons learned from the past projects for Human Mars Exploration

III The environment
  - a space environment beyond LEO
  - b Mars environment
  - c The environment on Mars Satellites

IV The human issues
  - a Radiation
  - b Physiological health
  - c Psychological and interpersonal issues
  - d Cultural issues
  - e Physical and mental efficiency

V The space transportation system
  - a. General mission architecture
  - b. The launch vehicle
  - c. The interplanetary vehicle
  - d. The Mars lander
  - e. The Earth return vehicle

VI The planetary infrastructure and vehicles
  - a. Habitats
  - b. Power systems
  - c. ISRU
  - d. Rovers

VII The ground sector

VIII Roadmap for the implementation of the mission
  - a. Questions to be answered with the relevant time frame
  - b. Global set of requirements
  - c. Enabling Technologies required with the required time frame
  - d. Sustainability
  - e. Outreach aspects

f. Cooperative Framework
g. Decision Roadmap
h. Recommendations

IX Conclusions

5. Organization of work:

In order to work efficiently, everyone has to identify the section(s) and subsection(s) in which he will bring his contribution(s). In addition, a leadership has to be found for each section. After discussion, here is the preliminary list of attributions:++

I	Mission rationale:	Richard Heidmann
II	Lessons learned from the past projects for Human Mars Exploration	Andrew Aldrin
III	The environment	Giancarlo Genta
IV	The human issues	Nick Kanas
V	The space transportation system	Andreas Rittweger
VI	The planetary infrastructure and vehicles	Maria Antonietta Perino
VII	The ground sector	TBD
VIII	Roadmap for the implementation of the mission	Alain Dupas
IX	Conclusions	TBD

All leaders are in charge of the redaction of their section, after collecting all contributions from people involved. They are free to adapt the length and relevance of each subsection.

In order to quickly understand where we are going, a first draft of each section is due for next January 15, 2013. About 10 pages per section.

The documents have to be sent to the chair. It is possible to centralize the documents on the server of the IAA. However, it is suggested that only the leaders of each section will use it.

The next steps will be feedback and homogenization.

6. Miscellaneous

- We should take into consideration the heritage and experience of past space missions (=> creation of specific subsection, see list of contents)

- Several persons have already worked on some aspects of the mission, for instance the effects of radiations. They suggested integrating their results in the study.

- Place of human factors
  Question: Human factors have an impact on many parameters. Where to address the problem of the number of astronauts for instance?
  Answer: In the mission architecture subsection and in the human factors section.

- Roadmap:

There was a debate on the content of the roadmap. An important issue is to take into consideration international collaboration.

- Costs:
  Is a cost subsection missing?
  The cost is clearly an important issue for several persons. It should be developed in the report. The "cost" question may be addressed in the "sustainable" subsection of the "roadmap" section.

- Nuclear propulsion :
  Can we make the hypothesis that nuclear propulsion will be used?
  It is suggested that several scenarios will be examined with and without nuclear propulsion. If the trade-off is hard, several scenarios can be proposed and assessed. The best scenario may depend on the choice of the criteria.

Assessment of the Technological Feasibility and Challenges of the Space Elevator Concept [IAA 3-13]
Status of Study

7 Sept 2012

1 – Summary: All principle chapters have submitted drafts for a total of over 400 pages. The current status is draft-draft with feedback from the editors to the chapter captains with instructions to smooth out text and ensure consistency of approach. The final version, ready for peer review, should be available by 15 April 2013.

2 – Next Meeting: ***4 October 2012, IAC Naples*** The meeting is scheduled to follow the D4.3 session [space elevators] at the Naples IAC, probably in Hall 2. The minutes will summarize the progress, but this note is to explain the status prior to the start of the meeting for activities surrounding the Cosmic Study # 3-13.

3 – Schedule: The study seems to be slightly behind schedule; however, effort is being focused to complete the study and address the items that are behind. Here is the current schedule agreed upon by the authors:

25 August	Workshop in Seattle [1/2 day] [completed & very helpful]
20 Aug	Chapters completed in draft-draft form
5 Sept	Comments returned to chapter captains
15 Sept	Papers due for IAF session [being submitted now]
4 October	Paper presentations in Naples [Hall 2 1300 hrs]
4 October	Final Cosmic Study mtg in Naples [Hall 2 1300 hrs]
20 Dec	Final Chapters in draft to editors
1 Feb 2013	Final Cosmic Study to Commission III review
15 Mar	Comments incorporated in Final Cosmic Study version
15 Apr	to Peer Review Panel
1 July	comments incorporated into final publishable version
15 July	to SAC and BoT
15 Aug	to publishers

4 – Table of Contents: see below TOC, which has not changed since March.

5 – Terminology: The editors are in the process of developing a series of terms that will be standardize across the book for consistency. This will ensure the various chapters are speaking the same language: [list to be expanded as we proceed]

> ***Tether*** [not ribbon] the material stretching from Apex Anchor to base station.
> ***Climber*** [not rider] to represent the physical "spacecraft" that attaches to the tether. This would consist of subsystem such as structure, electrical [solar arrays, cables, batteries, microprocessors, etc], motor, wheels, payload bay [structure, power & comm's for customer], communications and then customer payload.
> ***20 Metric Ton Tether Climber*** [6 MT structure, 14 MT payload]
> ***30 MYuri Tether*** [with 5 Taper Ratio – could fall back to 25/7]

Principle Power is Solar [Start at daylight at 30+ km altitude]
Concept of Operations [see chart prior to outline]
Maritime Node is baseline [with floating platforms for operations, on the High Seas, on the equator]
Tether Climber Power is Solar and starts at 30+ km [Laser power is an option, but not baseline as there are so many complications – at the present time there are four options on how to start at daylight at 30+ km to include High Stage One as preferred approach after prototype demonstration]
Multiple Space Elevators [baseline is at least two operational space elevators to never be confined to the Earth's gravity well again.]
Apex Anchor [not counterweight]
US dollars [$ will be standard].
MKS [units will be standard.]

6 – Standard Format: As we are approaching the due dates for the chapters, the editorial team has provided a "Word" format document and an example chapter, Dr. Knapman's chapter five.

7 – Chapter Content: As the draft – draft chapters are into the editors and the chapter teams are trying to incorporate feedback at this time, there is hope that the final drafts of the chapters will be accomplished late this fall. Three items are being emphasized by the editors;

TRL level [technology readiness levels by NASA]
Consequence vs. Likelihood matrix [see word page with sample]
Findings and Conclusions

When these items are completed for each chapter, the conclusions and recommendation chapters can be written. The real emphasis will be on the technological feasibility of the space elevator as a system and then its individual systems of systems.

8 – Next Meeting [Naples, 4 Oct, Hall 2, 1300 hrs]: We have made great progress in Seattle [1/2 day, scheduled in parallel with the ISEC Space Elevator Conference]. The editors invite all authors to attend the meeting for each chapter presentation and observe the other chapters to ensure consistency across the Cosmic Study. I will send out the final meeting information as we get confirmed locations and times.

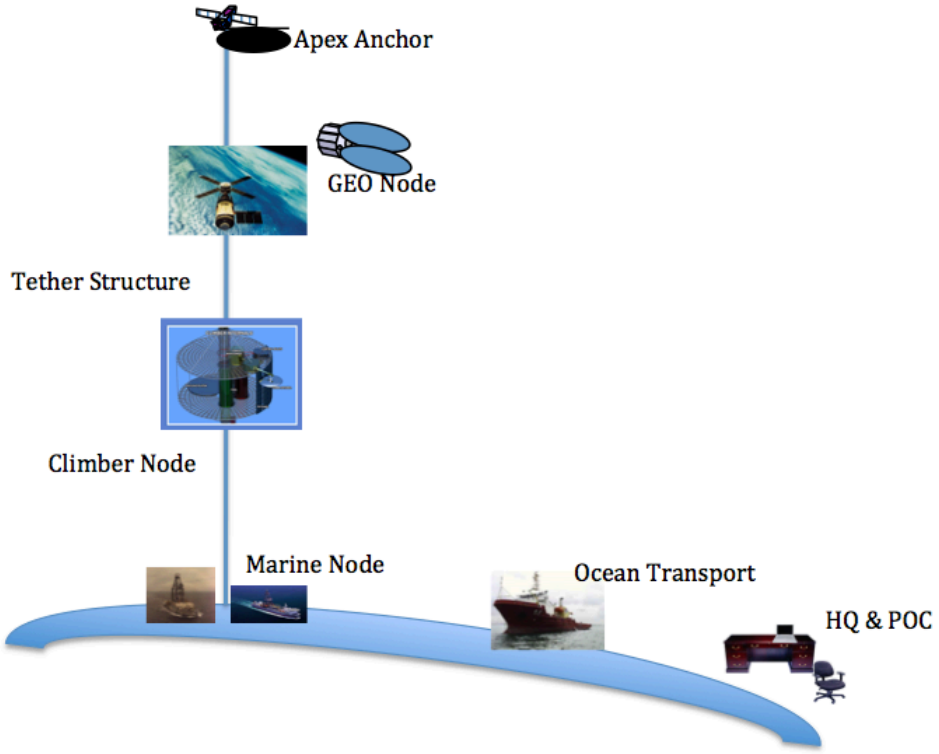
9 – Paper Submission: I was very pleased with the abstracts submitted for the Naples IAC. During the October Naples IAC, the cosmic study should be in its final stages of editor review with a meeting to resolve any conflicts between concepts or words. The session inside the IAC should be exciting and enjoyable.

10 – Summary: I want to thank all of you who have worked so hard on these items inside the chapters. David, Skip, Pete, and Cathy [the editor team] are really excited about the challenge of "helping" to fit your chapter into this monumental work. It is clear that when our work is finished, the space elevator community will have spoken – We

CAN do this in a reasonable time at a reasonable cost and acceptable risk! However, the impact of our work could be no less than "improving the human condition."

Peter Swan, Ph. D.
Cosmic Study lead Editor

Operations	***Location***
Enterprise Operations Center	HQ&POC
Transportation Operations Center	HQ&POC
Marine Node Operations Center	Marine Node
Climber Launch Operations Center	Marine Node for first 30 km,
Tether Climber Operations Center	HQ for Solar Operations
Payload [satellite] Operations Center	HQ&POC
Tether Operations Center	HQ&POC
GEO Node Operations Center	HQ&POC
TT&C Operations Center	HQ&POC



Assessment of the Technological Feasibility and Challenges of the Space Elevator Concept

A Cosmic Study for the International Academy of Astronautics
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