

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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Subject: Cosmic Study Status Report March 2012

By Whom: Dr. Peter Swan, Co-Chair of Study

Major Topics: Overview, Outline, Schedule, Meetings Achieved, Near-term Meetings, General Summary, Individual Chapter Abstracts & Questions

Overview: The Space Elevator Community has made great progress in the last six months which is significantly assisting the IAA Cosmic Study. The big events that did contribute to individual chapters are:

- International Space Elevator Conference (Aug 2011, Redmond Washington, USA) – Focus day on carbon nano-tubes for tension strength. [yearly event with Cosmic study meetings held]
- International Space Elevator Consortium Study Report Published entitled; *“Space Elevator Survivability, Space Debris Mitigation,”* Lulu.com, Apr 2011.
- National Geographic Magazine [with over 100 million readers] featured two pages on Space Elevator in the July 2011 issue.
- International Space Elevator Consortium published first Journal entitled “CLIMB.” [Jan 2012]

Outline:

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|----------------|--|
| Chapter | Preface |
| 1 | Executive Summary Introduction |
| | Part I – Major Elements |
| 2 | Tether Material |
| 3 | Tether Riders |
| 4 | Power for the System |
| 5 | End Station Infrastructure (Base & Counter Weight) |
| | Part II – Systems Approach |
| 6 | Systems of Systems Design |
| 7 | Dynamics of Operation Tether |
| 8 | Tether Deployment Approaches |
| 9 | Systems Design for Environment |
| 10 | Systems Design for Space Debris |
| 11 | Space Elevator Developmental Roadmaps |
| 12 | Operations Concept |
| | Part III – Future Considerations |
| 13 | Legal Perspective |
| 14 | Financial Perspective |
| 15 | Study Conclusions |

Schedule: The study is on track for a Spring 2013 publishing date. The study schedule is as follows:

| <i>Date</i> | <i>Action</i> | <i>Type</i> | <i>Location</i> | <i>Host</i> |
|-------------|-------------------------------------|-------------|-----------------|-------------|
| Oct 10 | Study Approved by IAA | Written | Paris | IAA |
| Oct 10 | Kick off study | Mtg | Prague | IAA |
| Mar 11 | Outline Due | Mtg | Paris | IAA |
| Aug 11 | Annotated outline/major questions | Mtg | Seattle | ISEC |
| 9 Sept 11 | Draft Chapters Due [half submitted] | Written | To Website | team |
| Oct 11 | Discuss Chapter inputs [need more] | Mtg | Cape Town | IAA |
| 9 Jan 12 | Feedback Chapters + final of some | Written | On website | team |
| 9 Mar 12 | Draft Chapters resubmitted | Written | On website | team |
| 12Mar 12 | Chapters discussed in detail | Mtg | Paris | IAA |
| 9 July 12 | Final Chapters submitted | Written | On website | Team |
| Aug 12 | Chapter overlap review | Mtg | Seattle | ISEC |
| Oct 12 | Final review chapters/feedback | Mtg | Naples | IAA/ISEC |
| 1 Dec 12 | Final Chapters submitted | Written | On website | Team |
| Mar 13 | Peer Review 1 Dec – 15 March | Written | From website | Team |
| 9 Apr 13 | Corrections accomplished – final | Written | From website | Team |
| 9 Jun 13 | Final Approval from ISEC & IAA | Written | From website | Team |
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Meetings Achieved: The study group met in CapeTown in Oct 2011 to finalize inputs to chapters and to ensure the participants were “kicked-off.” Indeed the study has been aggressively initiated and the members are participating and contributing. Many good ideas surfaced and the summary has been sent to the participants.

Near-term Meetings: the next two meetings will be critical. The one in Paris will pull together the various chapter inputs and hopefully will have a good start at a report. After that, the Aug ISEC meeting will try to refine the chapters and pull together the various thrusts of the study into a common aiming point.

General Summary: the status of the study group is fine. We are progressing and hopefully making progress. The real indicator is the excellent set of chapter abstracts and basic questions for the study. They are shown in the following section. The study is on schedule and should make the April 2013 date.

Naples Abstracts: The key is that each chapter should submit a paper covering their chapter. The March meeting will ensure that the chapters are progressing.