

Date: Thursday, September 28th, 2017

Time: 12:45 – 14:15

Place: Riverbank R3 located at Lower Level in Adelaide Convention Centre

Chair: Akira Tsuchida (M2), Co-chair: Peter Swan, Ph.D. (M4), David Raitt, Ph.D. (M4)

Secretary: Dr. Hatsumi Ishida (Back-up Mr. Yuto Suzuki (he will be there))

Agenda:

- |  |                |
|--|----------------|
| 1. Opening Remarks                                       | Akira Tsuchida |
| 2. Self-Introduction (if required)                       | All            |
| 3. IAA Commission III meeting (Sep 23) result            | Peter Swan     |
| 4. IAA Report Development Status and catch up schedule   | Akira Tsuchida |
| 5. Space Elevator Feasibility Prediction Index           | Peter Swan     |
| 6. IAA Report Chapter Five and Six contributor selection | Akira Tsuchida |
| 7. Next meeting schedule                                 |                |
| 8. Others  |                |

Minutes of Meeting:

- |  |                |
|--|----------------|
| 1. Opening Remarks   | Akira Tsuchida |
| Chair Tsuchida stated leadership of SG3.24 has a goal to conclude draft of IAA report by Christmas this year, so all members of this study group are requested to help them. |                |
| 2. Self-Introduction (if required)   | All            |
| 3. IAA Commission III meeting (Sep 23) result  | Peter Swan     |
| Co-chair Swan reported it went well. Also he stated “Heinlein Prize Trust” (in Houston, USA) committed to support to publish this IAA report. It is good news.               |                |

4. IAA Report Development Status and catch up schedule

Akira Tsuchida

Chair Tsuchida explained:

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As we reported at commission 3 meeting on Sep 23, our draft report status is as follows:

(Leadership team provided all study group members draft report on Sep 19 by Mr. Yuto Suzuki)

Chapter One – Introduction [drafted]

Chapter Two – Mission Definitions [drafted]

The Space Elevator Vision: Provide Low-Cost Access to Space

Missions: Provide Support Services, Construct Major Space Systems, Support Interplanetary Exploration, Support Space mining, Enable Manned Spaceflight, Launch Support for Colonization, Disposal of Nuclear Power Wastes, Provide Locations for Scientific Investigations, Collect Space Debris,

Chapter Three – Performance Needs [drafted]

Chapter Four – Technology Needs leading to Critical Technologies [drafted based on spider chart]

Chapter Five, Six – Risk Reduction [to be drafted]

Chapter Seven – Conclusions [will be done at the end]

Leadership Team (co-chairs, secretary) + several active members (ex. Dr. Yoji Ishikawa, Dr. John Knapman, Mr. Vadym Pasco) needs to focus finalizing this report by end of this year.

Catch-up schedule is shown below:

Target Date	Things to do	Status
Sep 28, 2017	Chapter 5/6 Contributor assignment	✓
Oct 31 (Tue)	Chapter 5/6 Contributor input due	
Dec 22 (Fri)	Leadership's draft due for editor's cleanup	
Jan 7, 2018	Editor's clean up due and submit for SG3.24 members review	
Jan 26 (Fri)	SG3.24 members review due	
Feb 25 (Sun)	Update for Final Draft and submit to commission 3 (commission 3 review requires 2-3 months)	
Mar 26 (Mon)	Notification of Final Draft review in commission 3 meeting, IAA Spring meeting in Paris	
May XX	(Option) as a part of commission 3 review, Mr. Vadym Pasko presents about sg3.24 presentation in IAA regional meeting in Ukraine	
May 25	Commission 3 review due	
June 29	Incorporate comments from commission 3 review And Formal request to commission 3 to endorse Final Report for peer review (one reviewer from each commission, 30 days)	
July 27 (Fri)	Cover page design due	
Aug 3 (Fri)	Submit SAC review (PDF with cover page)	
Sep 30 (Sun)	Get approval from SAC and BoT review (30days) Presentation at Academy day in Bremen	
Nov 2 (Sat)	Approval by BoT (Board of Trustees), submit to publisher	
Dec 21 (Fri)	Publish	
March 25, 2019	Distribute to IAA at Spring meeting in Paris	

5. Space Elevator Feasibility Prediction Index

Peter Swan

Co-chair Swan verbally explained current status and he mentioned it should be drafted when all IAA report drafted (by Christmas this year)

6. IAA Report Chapter Five and Six contributor selection

Akira Tsuchida

Chair Tsuchida walked through Drafted Study Report and explained used attachment-1. Contributor candidate who are listed in Attachment-1 are requested to communicate with chair Tsuchida to inform if they can help this effort off line.

7. Next meeting schedule

Next study group meeting will be held during IAA Spring Meeting on March 26, 2017.

8. Others

## Appendix- Material for Agenda item #6

Leadership Team (co-chairs, secretary) + several active members (ex. Dr. Yoji Ishikawa, Dr. John Knapman, Mr. Vadym Pasco) needs to focus finalizing this report by end of this year.

There are portions still need to have some help to update in chapter two through four, such as:

1.4.3 Enhancements to the Modern Day Architectures – Dr John Knapman for High Stage one part, Mr. Vadym Pasko for tether climber energy transfer method.

3.3.5 Tether Climber – need to have some specialist who knows space craft design, Mr. Vadym Pasco?

Chapter 4 Technology needs – compare with description (4.3 Technology Needs of the Space Elevator) to match to spider chart (on page 55) and vice versa, Dr Yoji Ishikawa?

## 1. Structure of Chapter 5 and 6

### “Chapter 5 Critical Technologies Risk Identification”

To show any high-risk items to accomplish technologies listed in section 4.3 Technology Needs of the Space Elevator, this section is not limited to focus technology but also including any non-technical issues which prevent advancement of these technologies.

Candidates sections

5.1 Definition of critical technologies with high-risk

5.2 Identified Critical Technology Risk

5.2.1 High-Risk items - Overall Space Elevator

5.2.2 High-Risk items - APEX Anchor

5.2.3 High-Risk items - GEO Node

5.2.4 High-Risk items - Tether Climber

5.2.5 High-Risk items - Tether

5.2.6 High-Risk items - Earth Port

5.2.7 High-Risk items – HQ/POC

5.3 Chapter conclusion

## **“Chapter 6 Proposed Experiments for Risk Reduction and Verification”**

To show risk mitigation plan including showing verification plan and expected schedule

Candidates sections

6.1 Introduction – summary of planned risk mitigation/verification activities

6.2 Detailed plan

6.2.1 Risk Mitigation Plan - Overall Space Elevator

6.2.2 Risk Mitigation Plan - APEX Anchor

6.2.3 Risk Mitigation Plan - GEO Node

6.2.4 Risk Mitigation Plan - Tether Climber

6.2.5 Risk Mitigation Plan - Tether

6.2.6 Risk Mitigation Plan - Earth Port

6.2.7 Risk Mitigation Plan – HQ/POC

6.3 Chapter conclusion

## 2. Proposal of contributors for chapter 5 and 6 (Chapter 5)

### Chapter 5 Critical Technologies Risk Identification

#### 5.1 Definition of critical technologies with high-risk

**Akira draft, Pete and Ishikawa to draft review (Akira (-10/15), Ishikawa/Pete (-10/31))**

#### 5.2 Identified Critical Technology Risk

**Yuto Suzuki (summarize all 5.2.1-5.2.7) (-11/12)**

##### 5.2.1 High-Risk items - Overall Space Elevator

**Yoshiki Yamagiwa/Akira Tsuchida (The technological and social-scientific R&D of hybrid space elevator,) (-10/31)**

##### 5.2.2 High-Risk items - APEX Anchor -1, -2

**-1 Kenji Nakashima (Reel-type tether deployment) (-10/31), -2 Pete Swan (Overall Apex anchor perspective) (-10/31)**

##### 5.2.3 High-Risk items - GEO Node -1, -2

**-1 Yoji Ishikawa (Obayashi/JAMSS's consideration) (-10/31), -2 Pete Swan (ISEC's consideration) (-10/31)**

##### 5.2.4 High-Risk items - Tether Climber -1, -2, -3, -4

**-1 Fumihiko Inoue (Heavy load payload) (-10/31), -2 Vadym Pasko (energy transfer) (-10/31),**

**-3 Tomohiro kakuta (Thermal) (-10/31), -4 Shun Yokota (Climber motion effect) (-10/31)**

##### 5.2.5 High-Risk items - Tether

TBD

##### 5.2.6 High-Risk items - Earth Port

**-1 Yoji Ishikawa (Obayashi/JAMSS's consideration) (-10/31), -2 Pete Swan (ISEC's consideration) (-10/31)**

##### 5.2.7 High-Risk items – HQ/POC

TBD

#### 5.3 Chapter conclusion

**Pete Swan (-11/12)**

### 3. Proposal of contributors for chapter 5 and 6 (Chapter 6)

#### Chapter 6 Proposed Experiments for Risk Reduction and Verification

6.1 Introduction – summary of planned risk mitigation/verification activities

**Akira draft, Pete and Ishikawa to draft review (Akira (-10/15), Ishikawa/Pete (-10/31))**

6.2 Detailed plan

**Yuto Suzuki (summarize all 5.2.1-5.2.7) (-11/12)**

6.2.1 Risk Mitigation Plan - Overall Space Elevator

**Yoshiki Yamagiwa/Akira Tsuchida (The technological and social-scientific R&D of hybrid space elevator,) (-10/31)**

6.2.2 Risk Mitigation Plan - APEX Anchor -1, -2

**-1 Kenji Nakashima (Reel-type tether deployment) (-10/31), -2 Pete Swan (Overall Apex anchor perspective) (-10/31)**

6.2.3 Risk Mitigation Plan - GEO Node -1, -2

**-1 Yoji Ishikawa (Obayashi/JAMSS's consideration) (-10/31), -2 Pete Swan (ISEC's consideration) (-10/31)**

6.2.4 Risk Mitigation Plan - Tether Climber -1, -2, -3, -4

**-1 Fumihiko Inoue (Heavy load payload) (-10/31), -2 Vadym Pasko (energy transfer) (-10/31),**

**-3 Tomohiro kakuta (Thermal) (-10/31), -4 Shun Yokota (Climber motion effect) (-10/31)**

6.2.5 Risk Mitigation Plan - Tether

Pete and Mark Haase

6.2.6 Risk Mitigation Plan - Earth Port

**-1 Yoji Ishikawa (Obayashi/JAMSS's consideration) (-10/31), -2 Pete Swan (ISEC's consideration) (-10/31)**

6.2.7 Risk Mitigation Plan – HQ/POC

TBD

6.3 Chapter conclusion

**Pete Swan (-11/12)**





#### 4. Due for contributor's input and sample

- (1) Due: Oct 31
- (2) Number of pages: approximately 3 pages
- (3) Example sample structure to input to SG3.24 leadership team:  
(Example of Yoji Ishikawa's "5.2.3 High-Risk items - GEO Node" and "6.2.3 Risk Mitigation Plan - GEO Node")

Contributor's Input for 5.2.3 and 6.2.3

Oct 31, 2017 Yoji Ishikawa

5.2.3 High-Risk items - GEO Node

Summarize your IAC2017 Paper to focus High Risk item to accomplish Space Elevator GEO Node

(Ref) your IAC paper 2017

6.2.3 Risk Mitigation Plan - GEO Node

Summarize your IAC2017 Paper to focus Risk Mitigation Plan to accomplish Space Elevator GEO Node

(Ref) your IAC paper 2017

Total pages are recommended less than 3 pages.

(You may have some early Sample by Akira or Dr. Ishikawa soon...)

Contact Information:

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International Academy of Astronautics (IAA)  
 Minutes of meeting - Study Group 3.24 "Road to Space Elevator Era"  
 10th meeting in Adelaide, Australia on September 28<sup>th</sup>, 2017



Appendix 2: List of Attendees

Name	E-mail	Country	Affiliation
Peter SWAN	dr-swain@cop.net		International Space Elevator Conc.
Roger Lerner			Commission III
Kwon Soonsu	17t1003@sit.shonan-it.ac.jp		Institute of Shonan Institute of Technology
Terata Momoe	17A1047@sit.shonan-it.ac.jp		shonan Institute of Technology
Yuto Suzuki	suzuki.yuto@jamss.co.jp		Secretary of IAA P&S.24
Vadym Pasko	keenon3d@gmail.com		Yuzhnoye State Design Office
Fumihiko Inoue	inoue@mech.shonan-it.ac.jp		Shonan Institute of Technology
Yoshiki Yamagiwa	tyyama@ipc.shizuoka.ac.jp		Shizuoka University
Minoru SATO	minoru@tokai-u.jp		Tokai Univ.
Yoji Ishikawa	ishikawa.yoji@obayashi.co.jp		Obayashi Corp.
Akira Tsuchida			
Arun Misra			

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Dr. Hatsumi Ishida [ishida.hatsumi@jamss.co.jp](mailto:ishida.hatsumi@jamss.co.jp) (Back up) Mr. Yuto Suzuki [suzuki.yuto@jamss.co.jp](mailto:suzuki.yuto@jamss.co.jp)