International Academy of Astronautics

IAA Space Debris Committee

Bremen, September 29th, 2018

International Academy of Astronautics

Agenda

1. IAC
   - 1.1. IAA Space Debris Committee
   - 1.2. Lessons learned from Adelaide 2017
   - 1.3. Status of Space Debris Symposium for Bremen 2018
   - 1.4. Preparation of Space Debris Symposium for Washington 2019

2. Exchanges
   - 2.1. Past events: workshops, conferences, congresses, …
   - 2.2. On the Agenda
   - 2.3. New achievements
   - 2.4. Round table – Open discussion

3. IAA Study Groups
   - 3.1 SG 5.14 IAA Situation Report on Space Debris – 2016
   - 3.2 SG 5.10 Orbital Debris Removal: Policy, Legal, Political and Economic Considerations
   - 3.3 SG 4.23 Practical Solutions for Post Mission Deorbit for Micro/Nano/Pico Satellites in Low Earth Orbit
   - 3.4 SG 5.15 Space Traffic Management
   - 3.5 SG 5.17 IAA Situation Report on Space Debris – 2019

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Agenda

1. IAC
   - 1.1. IAA Space Debris Committee
   - 1.2. Lessons learned from Adelaide 2017
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1.1 IAA Space Debris Committee

General frame:

- Officially created within IAA in 2012
  - Independent Committee
  - Permanent Committee
  - Attachment to Commission V. Could be independent if it would present any interest

- Actions of the Committee:
  - Position Paper on Orbital Debris in 1993, revised in 2000
  - Position Paper SG 5.1 on Space Debris Mitigation in 2006
  - Position Paper SG 5.5 on Space Debris Remediation in 2013
  - Participation to SG 5.10 on Orbital Debris Removal: Policy, Legal, Political and Economic considerations
  - Participation to SG 4.23 on Post-Mission Disposal for Micro and Smaller Satellites: Concepts and Trade Studies
  - Review of the SG 5.15 on Space Traffic Management
  - Situation Report Paper 2016 SG 5.14 finished and distributed
  - Situation Report Paper 2019 SG 5.17 on going
  - Numerous presentations (UNCOPUOS, …)

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1.1 IAA Space Debris Committee

Terms of reference (recall):

- The IAA Permanent Committee on Space Debris is in charge of the coordination of all activities related to Space Debris within the Academy, covering the complete span of related topics including but not limited to: measurements, modeling, risk assessment in space and on the ground, reentry, hypervelocity impacts and protection, mitigation and standards, legal and policy, Active Debris Removal and Space Surveillance.

  As such, its main tasks are:
  - Organization of the IAA Symposium on Space Debris A6 for the International Astronautical Congress, mainly identification of the proposed sessions including scope, chairs and rapporteurs, proposals for joint sessions with other symposia, proposals for Keynote Lectures within the A6 Symposium, or Highlight Lectures in the more general IAC frame,

  - Organization of any stand-alone conference on Space Debris on behalf the Academy, including nomination of the Program Committee,

  - Coordination of the Academy sponsoring, participation and contribution to selected conferences dedicated to Space Debris, such as for instance the ESA Conference on Space Debris in Darmstadt,

J.C., do you want to mention IOC-Houston here? Answer is Yes, need to update the ToR

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1.1 IAA Space Debris Committee

Terms of reference ctd. (recall):

- Coordination of the Space Debris contribution in conferences not dedicated to Space Debris, but where some sessions may be devoted to the topic, sponsored by the Academy,

- Identification of potential studies on Space Debris within Commission V or coordinated with any other Academy Commissions, proposals of associated Cosmic Studies and proposals for the corresponding Study Group Memberships,

- Dissemination of information among the members of the Committee, mainly during regular meetings taking place twice a year, before the IAC and during the IAA March meetings in Paris.

  During these meetings, general information concerning past activities at international level on Space Debris shall be shared among the members, including debriefings from past conferences and major related actions (for instance IADC, COSPAR…).
  Practical aspects of the preparation of the upcoming Conferences, Symposia, Sessions are also dealt with during these meetings.

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1.1 IAA Space Debris Committee

Membership:

No need to be member of IAA !

- Members of the IAA A6 Symposium Program Committee (chairs & rapporteurs)
- Members of the Program Committee of other IAA sponsored conferences with Space Debris concerns
- Members of Space Debris related working groups (IADC, UNCOPUOS, COSPAR, ISO …)
- Academics, Labs, Universities, Industrials… working on the topic

However, it is requested to be somehow “active”:

- Participation to the meetings
- Debriefing of activities during the meetings
- Cross information with other members
- Contribution to studies and reports
- To see the work which is done, visit our web page http://iaaweb.org/content/view/487/655/

Two meetings per year:

- One during IAC ⇨ Includes the status of the sessions, workshops, round tables… of the week
- One during IAC March Meeting ⇨ Includes the pre-selection of the abstracts for the following IAC

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1.1 IAA Space Debris Committee

Current official membership (as per web site):

Agapov Vladimir
Aglietti Guglielmo
Ailor William
Alby Fernand
Anselmo Luciano
Anz-Meador Philip
Berend Nicolas
Brachet Gerard
Christiansen Eric L
Crowther Richard
Dolado Perez Juan-Carlos
Faucher Pascal
Finkleman David
Fitz-Coy Norman G.
Flohrer Tim
Flury Walter
Francesconi Alessandro
Francillout Laurent
Gong Zizheng
Hanada Toshiya
Hyde James
Jah Moriba K.
Kaliapin Mykhailo
Kelso T. S.
Kibe Seishiro
Kitazawa Yukihito
Krag Holger
Le May Samantha
Masson-Zwaan Tanja L.
McKnight Darren S.
Metz Manuel
Nassisi Annamaria
Oltrogge Daniel L.
Omaly Pierre
Pardini Carmen
Piergentili Fabrizio
Rossettini Luca L.
Santoni Fabio
Schaefer Frank
Schildknecht Thomas
Shen Lin
Singh Balbir
Somma Gian Luigi
Sorge Marlon E.
Spencer David B.
Stokes Hedley
Usovik Igor
Wiedemann Carsten

Not members yet*:

~~Akahoshi Yasuhiro~~
~~Anilkumar A.K.~~
Kim Hae-Dong
~~Lewis Hugh~~
~~Matney Mark~~
Traineau Jean-Claude
Yasaka Tetsuo

~~NNNNNN~~: no news : not to be reinvited

Inducted today:

See following page

To be removed: None

Attendance list today:

See Appendix 1

Synthesis:

48 members + 3 + 8 New – 0 Removed

**** You didn't answer to the invitations from IAA office***

It is reminded that Program Committee (Chairs + Rapporteurs) is selected among members only

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1.1 IAA Space Debris Committee

New members inducted today:

Mark Skinner	mark.a.skinner@aero.org
Emma Kerr	emelkerr@gmail.com
Patrick Seitzer	pseitzer@umich.edu
Satomi Kawamoto	kawamoto.satomi@jaxa.jp
Noelia Sanchez-Ortiz	noelia.sanchez@deimos-space.com
Marko Jankovic	marko.jankovic@dfki.de
Upsana Dasgupta	upasana.dasgupta@mail.mcgill.ca
Roberto Opromolla	roberto.opromolla@unina.it

It is reminded that Program Committee (Chairs + Rapporteurs) is selected among members only

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1.2 Feedback from Adelaide IAC 2017

GENERAL STATISTICS	IAC 2017 – Adelaide	
Abstracts submitted	3440	
Abstracts rejected	911	26% of submitted
Papers accepted	2529	74% of submitted
Including accepted Interactive Presentations	531	
Papers confirmed	1810	72% of accepted
Papers withdrawn	562	22% of accepted
Papers with manuscript	1644	91% of confirmed 65% of accepted
Papers presented	1360	75% of confirmed 54% of accepted 40% of submitted
Including presented as Interactive Presentations	278	
Total number of attendees	4472	

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1.2 Feedback from Adelaide IAC 2017

Sessions	2012	2013	2014	2015	2016	2017
	Naples	Beijing	Toronto	Jerusalem	Guadalajara	Adelaide
Number of abstracts submitted	3212	3657	3584	2669	2775	3440
Number of papers selected	2184	2320	2392	2130	2199	2529
Number of papers confirmed	1600	1640	1558	1448	1523	1810
Number of papers presented	1374	1304	1256	1149	1167	1360
Ratio Presented / Submitted	43%	36%	35%	43%	42%	40%
Ratio Paper Not Presented/ papers selected	37%	43%	47%	46%	47%	46%

- Globally only 40% of the submissions are finally presented
- But half of the papers selected are not presented: we need to be cautious in our selection

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#1 on criteria "Symposium minimal attendance"

1.2 Feedback from Adelaide IAC 2017

TECHNICAL SESSIONS	Min Att	Max Att	Avg Att	Number Sessions	Avg Att per session	Papers Sched	Papers Pres	Notified withdrawn	No Show	% Papers Present.	% Notified Withdrawn	% No Show
A1. SPACE LIFE SCIENCES	261	411	336	8	42	93	56	23	14	60%	25%	16%
A2. MICROGRAVITY SCIENCES AND PROCESSES	162	270	216	7	31	66	45	17	4	68%	25%	6%
A3. SPACE EXPLORATION	438	**791**	**615**	9	68	76	55	17	4	72%	22%	5%
A4. SETI	28	40	34	2	17	8	7	1	0	88%	12%	0%
A5. HUMAN EXPLORATION OF THE SOLAR SYSTEM	160	476	318	4	**80**	42	35	7	0	84%	16%	0%
A6. SPACE DEBRIS	**505**	698	602	10	60	105	82	19	5	78%	18%	4%
A7. TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOM	88	145	117	3	39	33	26	7	0	80%	20%	0%
B1. EARTH OBSERVATION	221	339	280	6	47	56	44	7	5	80%	12%	8%
B2. SPACE COMMUNICATIONS AND NAVIGATION	194	277	236	8	29	83	60	15	8	73%	18%	10%
B3. HUMAN SPACE ENDEAVOURS	260	425	343	9	38	81	63	13	5	77%	16%	5%
B4. SMALL SATELLITE MISSIONS	373	663	518	12	43	**181**	**108**	33	9	60%	18%	5%
B5. INTEGRATED APPLICATIONS	40	50	45	2	23	24	12	6	5	50%	25%	21%
B6. SPACE OPERATIONS	112	142	127	4	32	49	36	7	5	74%	14%	12%
C1. ASTRODYNAMICS	342	538	440	9	49	108	85	22	1	79%	20%	1%
C2. MATERIALS AND STRUCTURES	251	417	334	9	37	115	78	20	8	68%	17%	7%
C3. SPACE POWER	109	163	136	5	27	45	30	13	2	68%	28%	4%
C4. SPACE PROPULSION	330	533	432	10	43	123	82	33	7	67%	27%	5%
D1. SPACE SYSTEMS	176	281	229	7	33	75	51	22	2	69%	29%	2%
D2. SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS	371	541	456	9	51	87	58	24	5	66%	29%	6%
D3. BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELO	87	154	121	4	30	40	25	13	2	62%	33%	8%
D4. VISIONS AND STRATEGIES FOR THE FAR FUTURE	119	228	174	5	35	65	53	8	4	79%	13%	8%
D5. SAFETY AND QUALITY IN SPACE ACTIVITIES	54	88	71	4	18	33	22	10	1	65%	32%	3%
D6. COMMERCIAL SPACEFLIGHT SAFETY ISSUES	59	95	77	3	26	24	14	9	1	58%	38%	4%
E1. SPACE EDUCATION AND OUTREACH	253	389	321	9	36	105	74	23	8	70%	24%	8%
E2. STUDENT CONFERENCE	69	119	94	4	24	44	34	9	1	78%	20%	3%
E3. SPACE POLICY, REGULATIONS AND ECONOMICS	79	142	111	6	18	55	40	12	3	74%	21%	7%
E4. HISTORY OF ASTRONAUTICS	80	134	107	4	27	25	18	6	1	71%	23%	6%
E5. SPACE ACTIVITY AND SOCIETY	76	141	109	5	22	54	33	18	3	61%	32%	8%
E6. BUSINESS INNOVATION	54	110	82	3	27	37	25	12	0	68%	32%	0%
E7. LAW OF OUTER SPACE	178	327	253	7	36	67	47	19	1	71%	29%	2%
E8. MULTILINGUAL ASTRONAUTICAL TERMINOLOGY	15	15	15	1	15	5	3	1	1	60%	20%	20%

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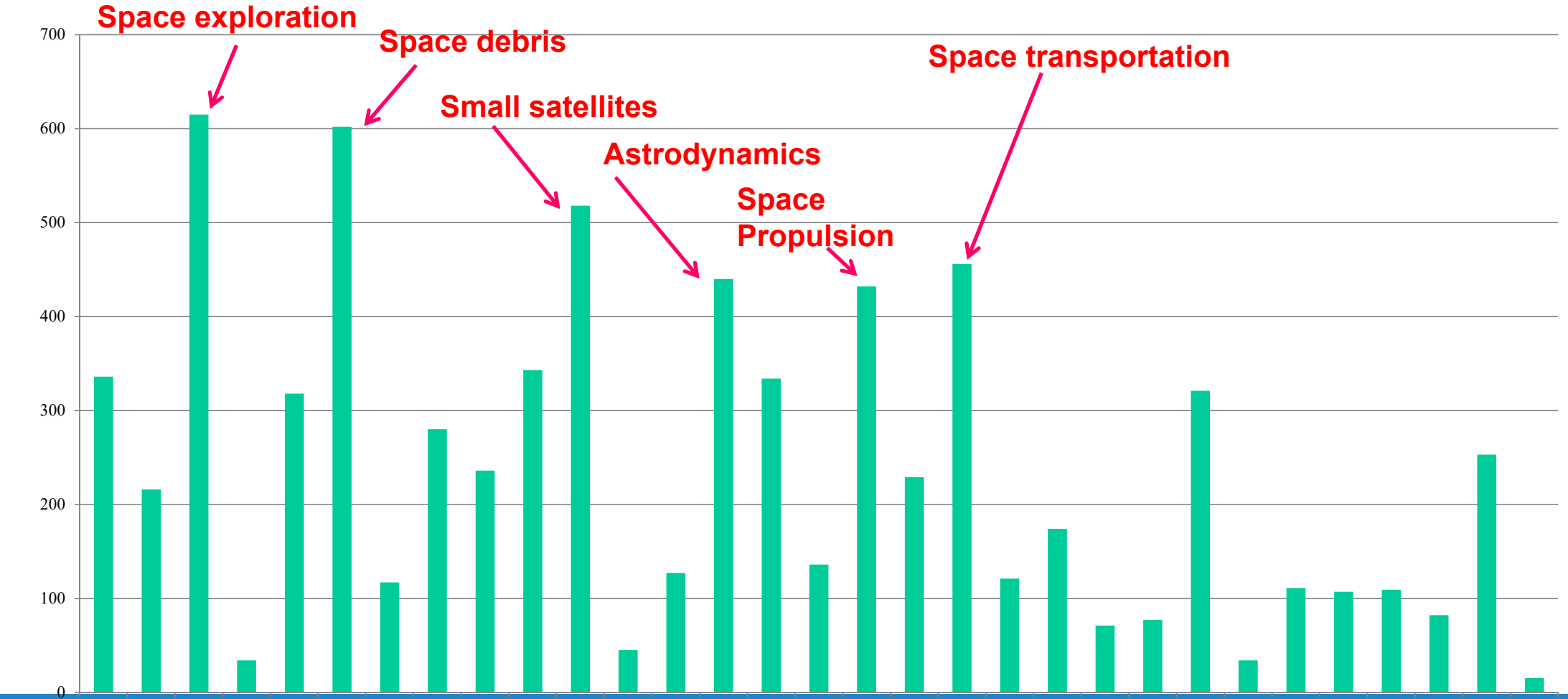
1.2 Feedback from Adelaide IAC 2017

Symposium attendance - average



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1.2 Feedback from Adelaide IAC 2017

SESSION ID	TECHNICAL SESSIONS	Min Att	Max Att	Avg Att	Avg per Session	Papers Subm	Papers Sched	Papers Pres	Notified Withdraw	No Show	% Papers Selected	% Papers Present.	% Notified Withdrawn	% No Show
2017	A6. SPACE DEBRIS													
A6.1.	Measurements	58	61	60		25	10	8	2	0	40%	80%	20%	0%
A6.2.	Modeling and Risk Analysis	65	95	80		19	11	10	1	0	58%	91%	9%	0%
A6.3.	Hypervelocity Impacts and Protection	28	32	30		12	11	5	4	2	92%	45%	36%	18%
A6.4.	Mitigation and Standards	50	71	62		15	10	9	0	1	67%	90%	0%	10%
A6.5.	Space Debris Removal Technologies	55	70	63		11	11	10	1	0	100%	91%	9%	0%
A6.6.	Space Debris Removal Concepts	70	120	95		25	10	9	1	0	40%	90%	10%	0%
A6.7	Operations in Space Debris Environment, Situational Awareness	57	65	61		17	9	8	1	0	53%	89%	11%	0%
A6.8	(Joint Session with Space Security Committee): Policy, Legal, Institutional and Economic Aspects of Space Debris Detection, Mitigation and Removal	35	55	45		7	10	6	3	1	143%	60%	30%	10%
A6.9	Modelling and Orbit Determination	48	57	53		18	11	8	3		61%	73%	27%	0%
A6.10-B4.10	Joint Small Satellite/Space Debris Session to promote the long-term sustainability of space	39	72	55		11	12	9	3	0	109%	75%	25%	0%
	TOTAL	505	698	601,5	66,8	160	105	82	19	4	66%	78%	18%	4%

- Rather well equilibrated among sessions
- Good attendance with low variability. A6.3 a bit weak
- Average attendance per session: 70 (max), 60 (avg), 50 (min)
- Highest score of the complete congress for min, among the 3 best for max and avg
- 78% papers presented wrt selected: good figure compared to IAC level (54%)

Technical Programme Status

- Abstracts in total: 4353
- Abstracts accepted: 2769

2185 Oral Presentations
583 Interactive Presentations

- Abstracts rejected: 1462

- Papers uploaded: 1975

1733 Oral Papers
242 Interactive Papers

- Interactive Presentations submitted: 340+

- Confirmed presentations: 2256
- Withdrawn presentations: 445
- Unconfirmed: 68

Thank you Myriam ☺

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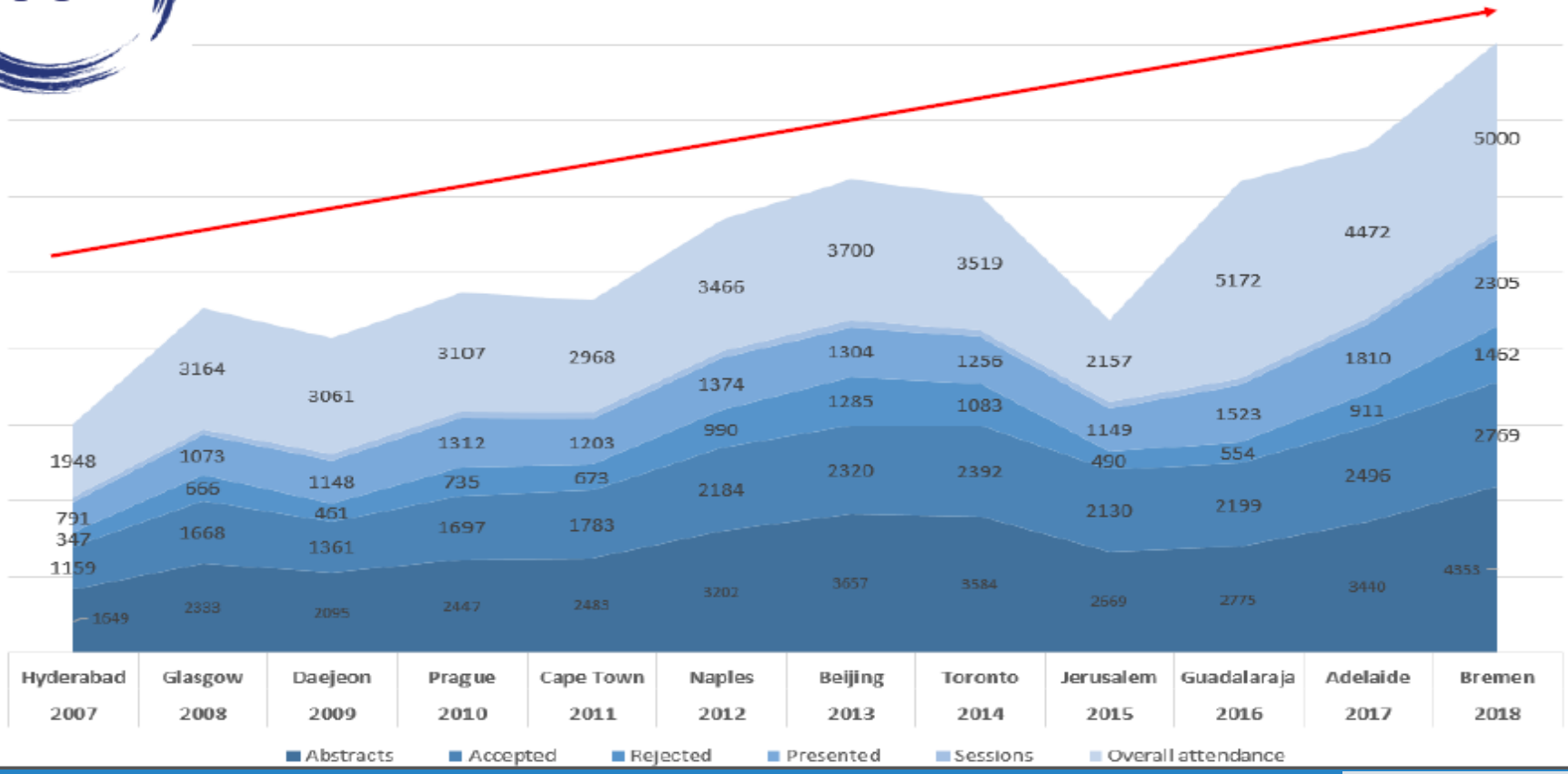
1.3 Bremen IAC 2018

Technical Programme Evolution



Thank you Myriam ☺

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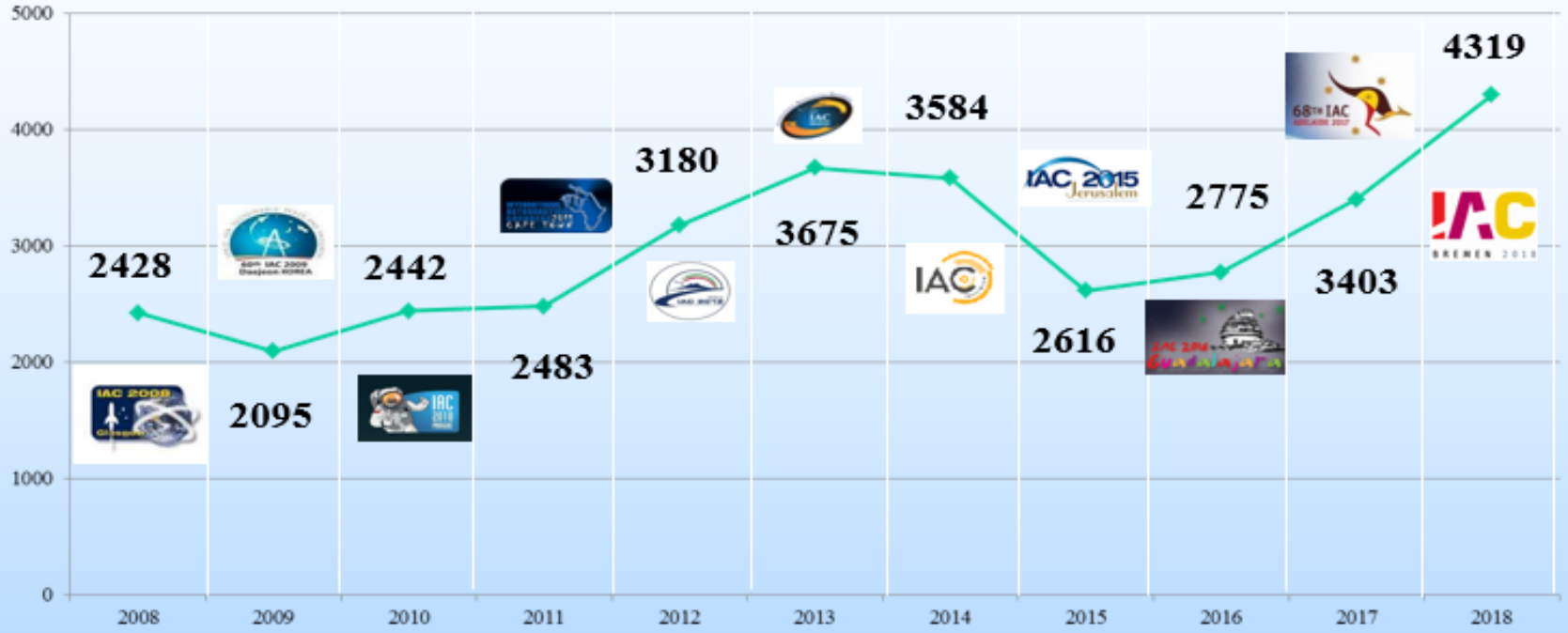
1.3 Bremen IAC 2018

Number of IAC abstracts since 2008



4319 abstracts (on March 27th) = Record breaking score this year! (average over 10 years = 3055)

Including 206 requests for Interactive Presentations

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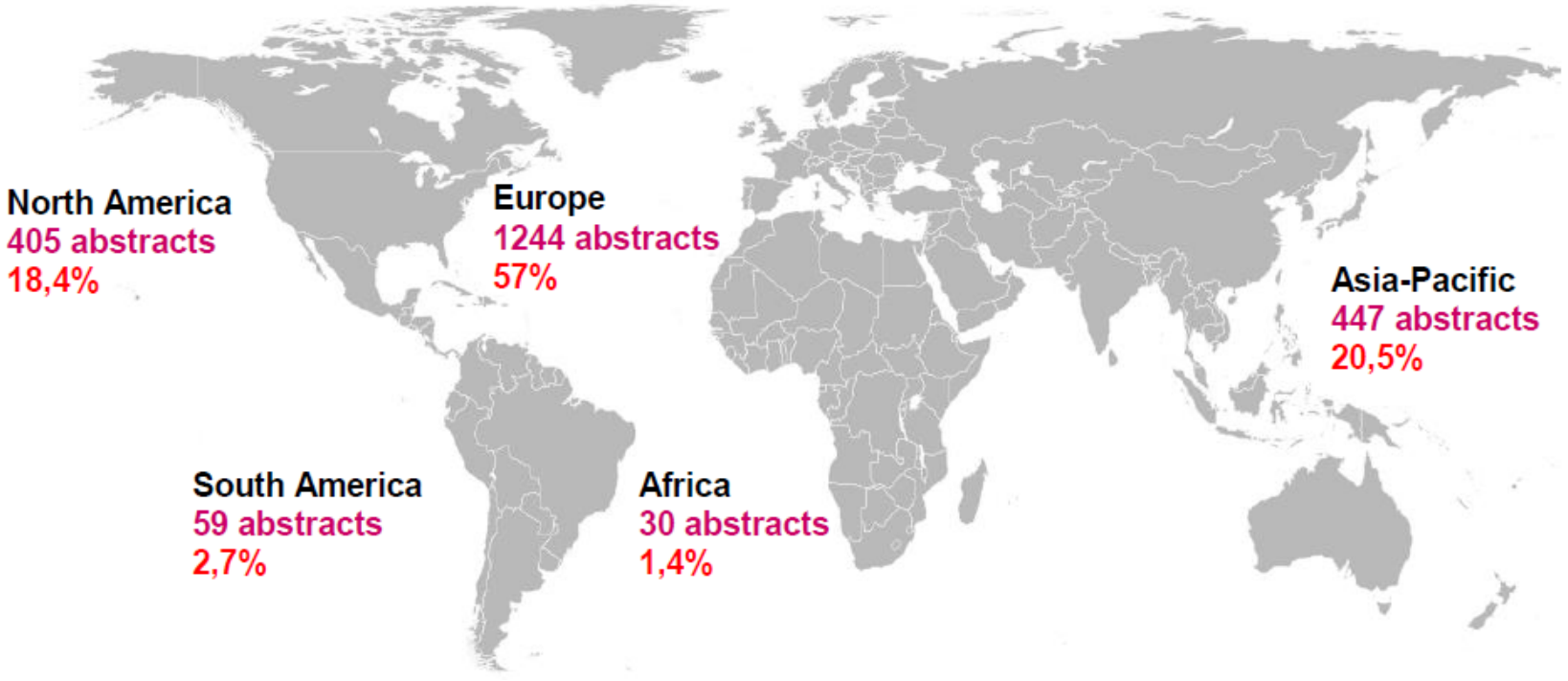
1.3 Bremen IAC 2018

TS

Accepted Oral Presentations by Regional Groups



Thank you Myriam ☺

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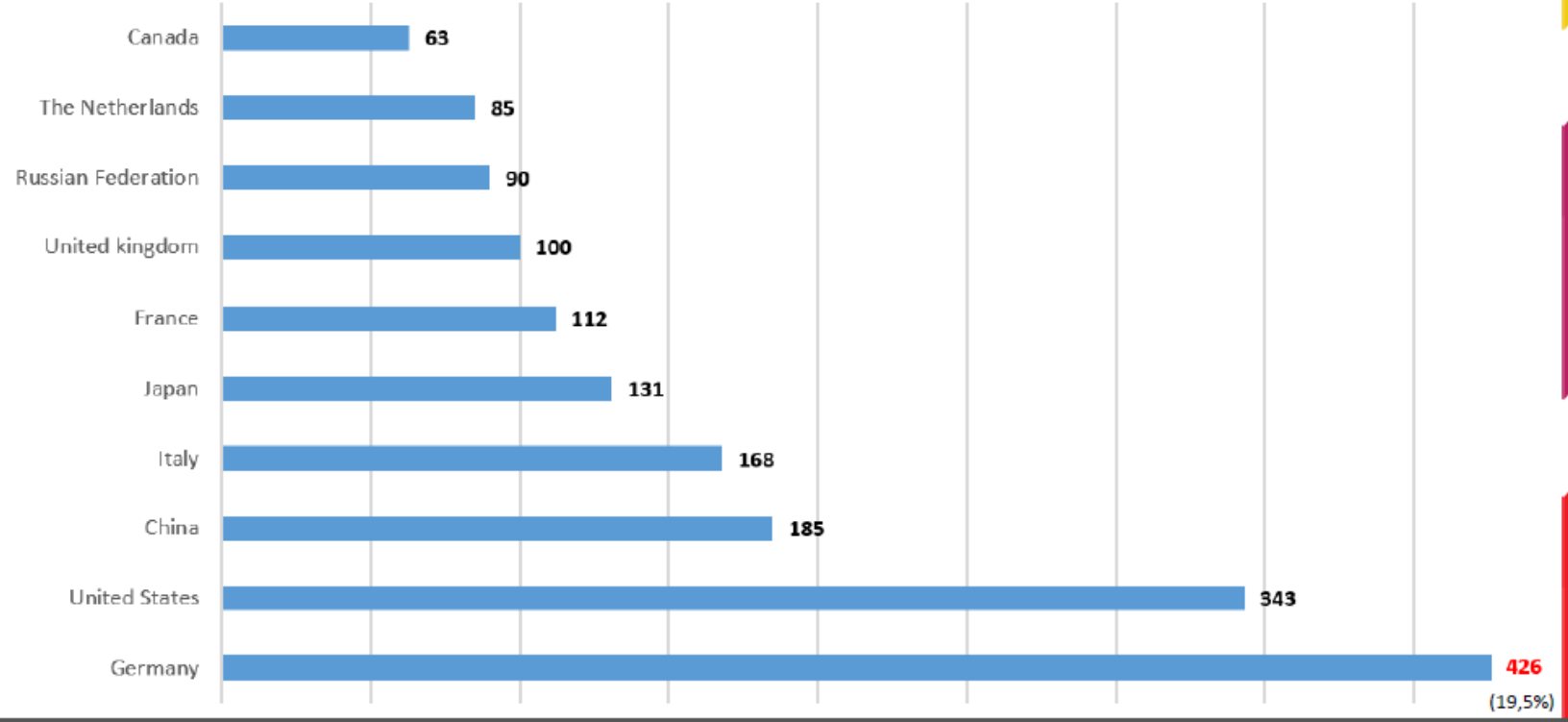
1.3 Bremen IAC 2018

TS

Accepted Oral Presentations by Country (Top 10)

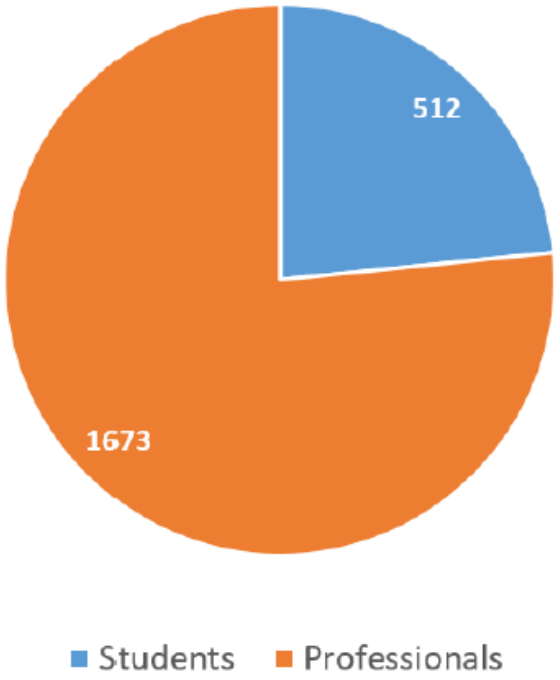


Thank you Myriam ☺

1.3 Bremen IAC 2018

TS

Accepted Oral Presentations Students vs Professionals



Thank you Myriam ☺

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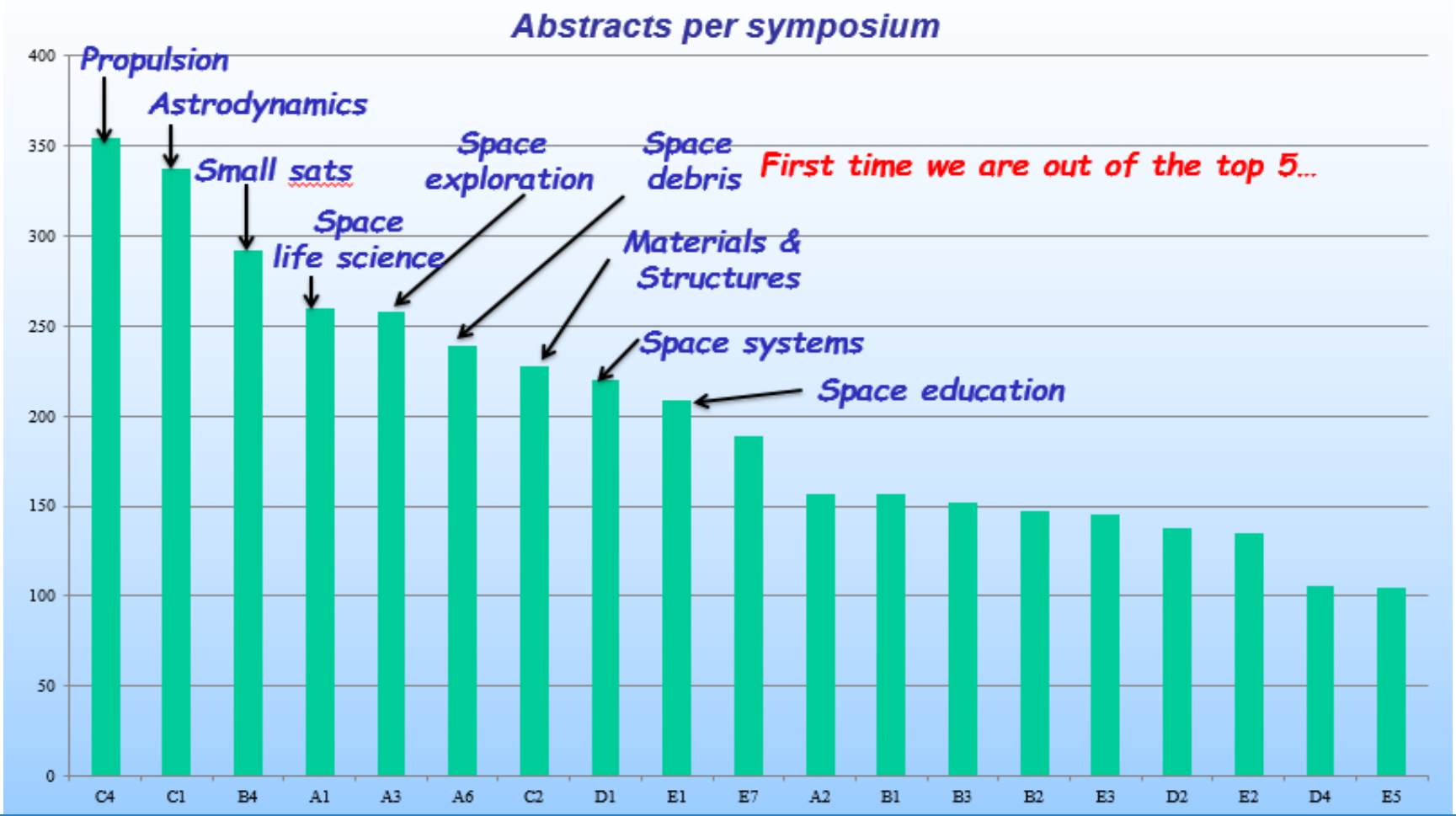
1.3 Bremen IAC 2018



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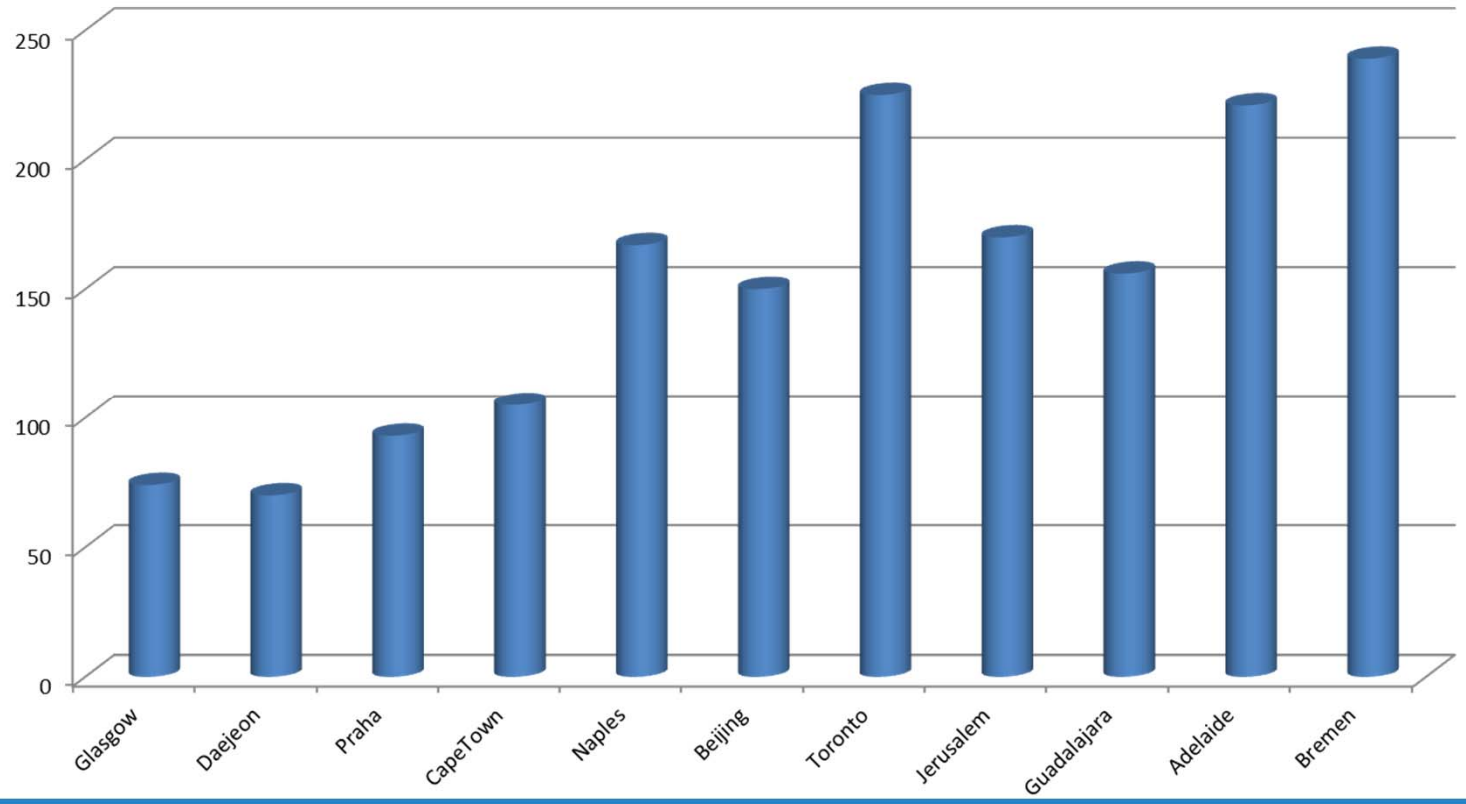
1.3 Bremen IAC 2018

Number of abstracts, Space Debris Symposium, since 2008



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1.3 Bremen IAC 2018

Number of Oral sessions, Space Debris Symposium, since 2000 + Interactive Presentation session,

IAC	Year	Location	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9	Session 10
51st	2000	Rio de Janeiro										
52nd	2001	Toulouse										
53rd	2002	Houston										
54th	2003	Bremen										
55th	2004	Vancouver										
56th	2005	Fukuoka										
57th	2006	Valencia										
58th	2007	Hyderabad										
59th	2008	Glasgow										
60th	2009	Daejeon										
61st	2010	Praha										
62nd	2011	Capetown										
63rd	2012	Naples						*Joint*				
64th	2013	Beijing										
65th	2014	Toronto								*Joint*		
66th	2015	Jerusalem								*Joint*		*Joint*
67th	2016	Guadalajara								*Joint*		
68th	2017	Adelaide								*Joint*		*Joint*
69th	2018	Bremen								*Joint*		*Joint*

- 11 sessions including IP
- 2 joint sessions with Space Security and Astrodynamics

A6: Space Debris Symposium: Liou – Bonnal

The Symposium will address the complete spectrum of technical issues of space debris: measurements, modelling, risk assessment in space and on the ground, re-entry, hypervelocity impacts and protection, mitigation and standards, post-mission disposal, debris removal, Space Surveillance, collision avoidance as well as non-technical topics.

A6.1: Space Debris Detection, Tracking and Characterization: Skinner - Schildknecht – Agapov

This session will address advanced ground and space-based measurement techniques, relating processing methods, and results of space debris characterization.

A6.2: Modelling and Risk Analysis: Anselmo – Oltrogge – Sorge

This session will address the characterization of the current and future debris population and methods for in-orbit and on-ground risk assessments. The in-orbit analysis will cover collision risk estimates based on statistical population models and deterministic catalogues, and active avoidance.

A6.3: Impact-Induced Mission Effects and Risk Assessments: Traineau – Fitz-Koy – McKnight

This session addresses disruptions of spacecraft operations induced by hypervelocity impacts including spacecraft anomalies, perturbation of operations, and component failures up to mission loss. It includes risk assessments for impact vulnerability studies and corresponding system tools. Further topics are spacecraft impact protection and shielding studies, laboratory impact experiments, numerical simulations, and on-board diagnostics to characterize impacts such as impact sensors, accelerometers, etc.

A6.4: Mitigation and Standards: Krag – Omaly – Letizia

This session will focus on the definition and implementation of debris prevention and reduction measures and vehicle passive protection at system level including end of life strategy and earth return with associated risks. The session will also address space debris mitigation guidelines and standards that exist already or are in preparation at the national or international level.

A6.5: Post Mission Disposal and Space Debris Removal 1: Opromolla – Kawamoto – Santoni

This session will address post-mission disposal and active removal techniques "ground and space based", review potential solutions and Identify implementation difficulties.

A6.6: Post Mission Disposal and Space Debris Removal 2: Berend – Singh – Rossettini

This session will address post-mission disposal and active removal techniques "ground and space based", review potential solutions and identify implementation difficulties.

A6.7: Operations in Space Debris Environment, Situational Awareness: Wiedemann – Kelso – Dolado-Perez

This session will address the multiple aspects associated to safe operations in Space dealing with Space Debris, including operational observations, orbit determination, catalogue build-up and maintenance, data aggregation from different sources, relevant data exchanges standards and conjunction analyses.

A6.8 (joint with Space Security Committee): Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal

From SDC: Spencer – Le May *From SSC: Plattard – Soucek*

This session will deal with the non-technical aspect of space debris mitigation and removal. Political, legal and institutional aspects includes role of IADC and UNCOPUOS and other multilateral bodies. Economic issues including insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation in addressing these issues will be considered

A6.9: Orbit Determination and Propagation

Kerr – Nassisi – Klinkrad

This session will address aspects of space debris orbit determination related to assessment of raw and derived data accuracy, optical measurements processing and modelling and risk analysis of space debris

A.6.10 /C1.7: Joint Symposium Astrodynamics/Space Debris "Orbital Safety and Optimal Operations in an Increasingly Congested Environment"

From A6: Jah – Jankovic *From C1: Scheeres - Anilkumar*

This joint session will concern itself with the technical challenges driven by salient problems in space debris and space traffic that can be well informed by contributions from the field of astrodynamics (the science that studies the motion of objects in space). Specific issues regarding long-term population assessments and predictions, safely operating NextGen (large) Constellations, determining the data and modeling requirements to uniquely identify and predict the motion of objects in space (e.g. class specific), discovering and developing improved methods of debris mitigation and remediation founded upon forces and torques, development of semi-analytical theories relevant to specific classes and types of orbital debris, etc. are of relevance to this joint session.

A6.IP: Interactive Presentations, Yasaka – McKnight – Bonnal

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1.3 Bremen IAC 2018

A6: Space Debris Symposium Number of Abstracts

Selected – Rejected – Withdrawn – Uploaded

A6.1: Space Debris Detection, Tracking and Characterization: 9 – 17 – 2 – 6

A6.2: Modelling and Risk Analysis: 12 – 5 – 3 – 9

A6.3: Impact-Induced Mission Effects and Risk Assessments: 10 – 2 – 0 – 10

A6.4: Mitigation and Standards: 10 – 0 – 1 – 9

A6.5: Post Mission Disposal and Space Debris Removal 1: 10 – 0 – 0 – 10

A6.6: Post Mission Disposal and Space Debris Removal 2: 10 – 5 – 1 – 9

A6.7: Operations in Space Debris Environment, Situational Awareness: 9 – 1 – 0 – 9

A6.8 (joint with Space Security Committee) Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal: 13 – 5 – 3 – 10

A6.9: Orbit Determination and Propagation: 10 – 2 – 0 – 10

A6.10-C1.7: (joint with Astrodynamics) Orbital Safety and Optimal Operations in an Increasingly Congested Environment: 12 – 0 – 0 – 12

A6.IP: Interactive Presentations: 46 – 6 – 11 – 32

Total without IP: 105 – 37 – 10 – 94 ***or*** 100% - 35% - 10% - 90%

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1.3 Bremen IAC 2018

Recall of a few basic rules

- **No paper, no show:**
  - **Check that the paper is effectively loaded before the session**
- **No show, no paper:**
  - **If the author doesn't present, the paper will be removed from proceedings**

- **Status of the presenters:**
  - **Are we sure the authors will show up ?**
  - **Do we have their short bios ?**
  - **Try to contact them and ask to come 15' in advance to check that everything is OK, Powerpoint, Videos…**

- **Timing may be critical !**
  - **Please, do not overpass the standard 3 hours, except if there is nothing after**
  - **Have clear rules explained to speakers in advance**
  - **Keep time for Q&A**
    - **What do we do in case of a hole in the session: decision of the chairs and rapporteur**

- **The synthesis session sheets shall be given back to IAF secretariat, but please keep a copy and send it to JC, Heiner and me, or just hand them directly to me**

Guidelines for Chairs and Rapporteurs
of Technical Sessions

GENERAL GUIDELINES

- Session Chairs and Rapporteurs are members of the International Programme Committee and must register to attend the IAC.
- Session Chairs and Rapporteurs are responsible for contacting presenting authors prior to the congress, managing session time, introducing speakers, limiting presentations to the allotted time, and allowing time for questions and answers.
- Traditional Technical Sessions are 180 minutes in length and involve oral presentations focused on specific topics and are designed to share information with Q&A.
- Technical Sessions have audiovisual equipment available, consisting of a laptop computer, LCD panel, screen, and the appropriate sound equipment for room size.
- Technical Sessions do not have telephone conferencing equipment, telephone lines, or internet lines available.

IMPORTANT DATES

Paper submission: **17 September**
Presentation submission: **24 September**

QUESTIONS

Contact the IAF Secretariat at support@iafastro.org if you have questions that are not addressed in the guidelines or the IAF website.

PRESENTATION TIME

In order to respect presenters and the audience, all presentations must not exceed their allotted timeframes.

Presenting author presentation times will vary depending on the session. Presentation times can be accessed through the IAF App and the IAF Restricted Area.

BEFORE THE CONGRESS

Review. Access your IAF Restricted Area to review the session details, including presentation titles, presenting authors, and abstract information.

Confirm. Approximately three to four weeks prior to the congress, moderators need to contact presenting authors to discuss the session and coordinate presentations. If a presenting author cannot attend, inform the IAF Secretariat staff immediately.

Remind. Presenting authors must upload presentation slides online at www.iafastro.net by the advance on 24 September, by 11:59 PM. After the advance deadline, presentations may only be uploaded or updated onsite in the speaker preparation room no later than 15 minutes prior to the start of your session.

BEFORE THE SESSION STARTS

- Session Chairs and Rapporteurs need to pick up their Session Folder at the IAF Secretariat office. The Session folder contains guidelines, paper scoring sheet, attendance sheet, Acta Astronautica Form and other helpful information.
- Arrive at your designated session room 15 minutes prior to the scheduled session to meet presenting authors.
- The computer in your room will be preloaded with presentations submitted online by the advance deadline and all presentations uploaded or updated in the speaker preparation room 15 minutes before the start of your session.
- Encourage presenting authors to sit at the front of the room for quick transitions.
- Ask the technical to show you how to use the timer device with presenting authors that will indicate a presentation should conclude.
- Prepare emergency questions. If there are no questions from the audience, most speakers will appreciate if the chair asks a question. You can also ask the speakers directly if there are any questions that they would like to receive after their talk.
- If you need a technician onsite, you can seek assistance at the speaker preparation room

DURING THE SESSION

Start the session on time. This is extremely important to ensure each presenting author has time for the presentation as well as questions and answers with the audience.

Encourage attendees to fill in seating and ask that cell phones are silenced.

Presenting authors should present in the order listed in the agenda. If a presenter is a no-show readjust the order accordingly and allow other presenting authors more time or promote discussion at the end of the presentations.

Keep presenting authors on time. If a presenter author is going over time, then stand next to the person as yet another visual cue. If this doesn't work, it is perfectly acceptable and respectful to other presenting authors, to interrupt the presenting author. You may say something to the effect that you hate to cut such an interesting presentation short, but in fairness to the other presenting authors, you must.

If an attendee is being disruptive, ask that questions/comments be held until the end so that the session does not fall behind time.

End the session on time. Close the session by thanking presenting authors and encouraging attendees to complete a session evaluation on the IAF App.

REGISTRATION & WITHDRAWALS

- All Session Chairs and Rapporteurs are expected to register for the congress and pay related fees.
- If you can no longer moderate a session, then contact your Symposium Coordinators immediately so we can find a replacement. Technical Session information can be found online and on the IAF App. Any attempts to locate a replacement moderator will be greatly appreciated.

AFTER THE SESSION

Verbally Thank Presenting Authors.

Share Feedback about the session with your Symposium Coordinators.

Complete the Session Folder and leave it at the IAF Secretariat Office.

IAA Rapporteur Guidelines

The rapporteur should report the main concepts and results given by the speakers, and keep track of the questions and answers of the symposium / conference.

The rapporteur report is a short synthesis report (typically 1 page) with the most significant conclusions of the session, in terms of ideas, concepts, results, scientific questions and problems, debates, etc.

The rapporteur should read the papers before the day of the conference / session. During each presentation, the rapporteur should extract the most significant information, and should look carefully at information which is given during the presentation but which was not written in the paper. This occurs frequently, as new results have been obtained by the authors between the time they wrote the paper for the conference proceedings and the time of the presentation.

The report should be based on the papers, on the presentations and on the track of the questions and answers, but should focus only on the main elements, and not report all details. The aim of the report is to highlight and consider the main themes, issues and discussion points rather than to just summarize the proceedings.

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1.3 Bremen IAC 2018

A session report must be prepared within one or two weeks after the event. The report should include:

1. Title of the session or conference, dates and venue
2. Names of the chairs attending the event
3. Agenda / program of the event
4. Main scientific questions and problems (key issues, significant new data and results, new knowledge, new contributions, possible conflicts between data, doubts, interpretation, etc.)
5. Priorities and recommendations (the rapporteur may add some personal conclusions but they shall clearly appear as such).

Reports to be sent to Heiner (copy me) who will do the concatenation of all sessions

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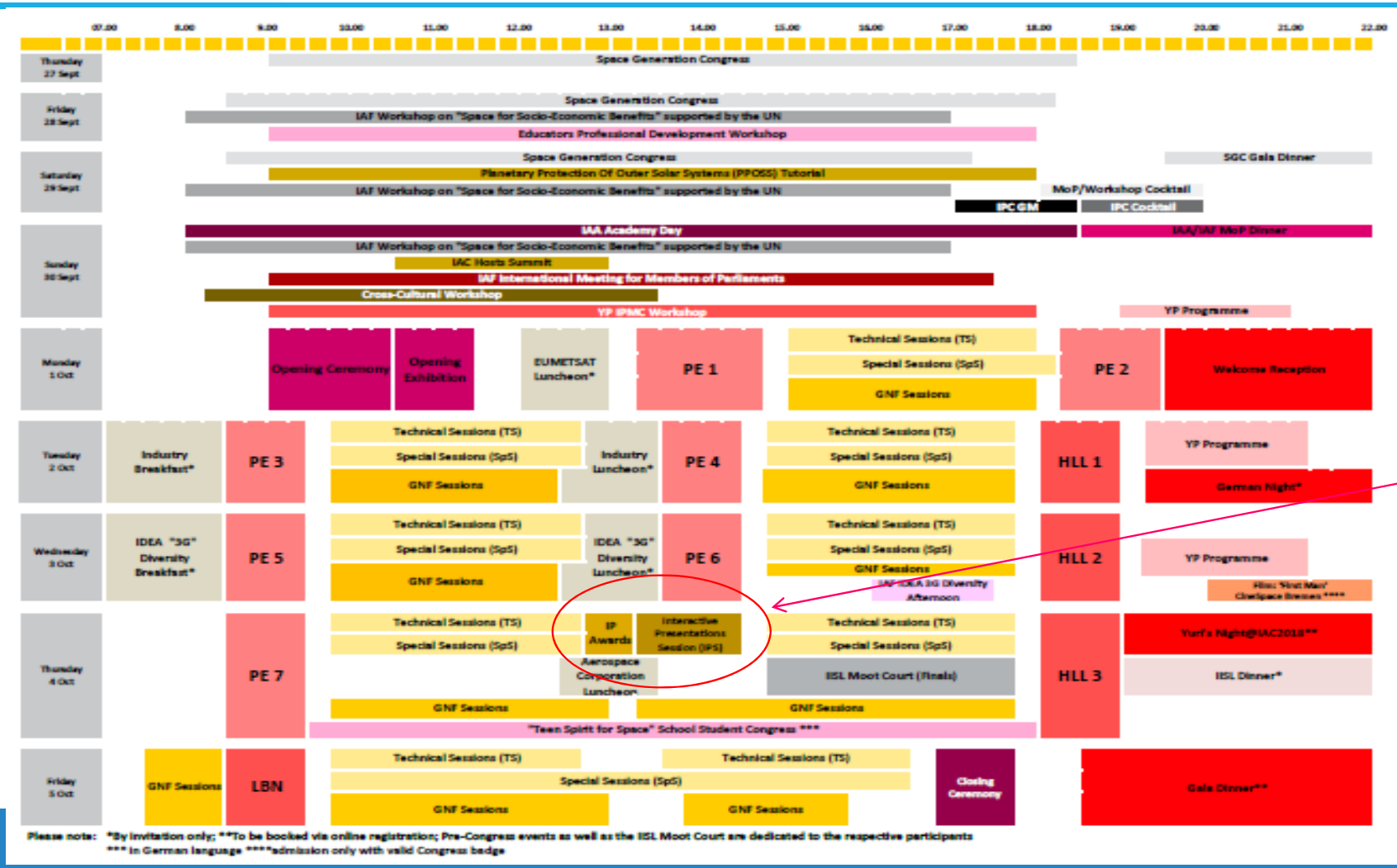
1.3 Bremen IAC 2018



Don't miss the IP award, session and cocktail

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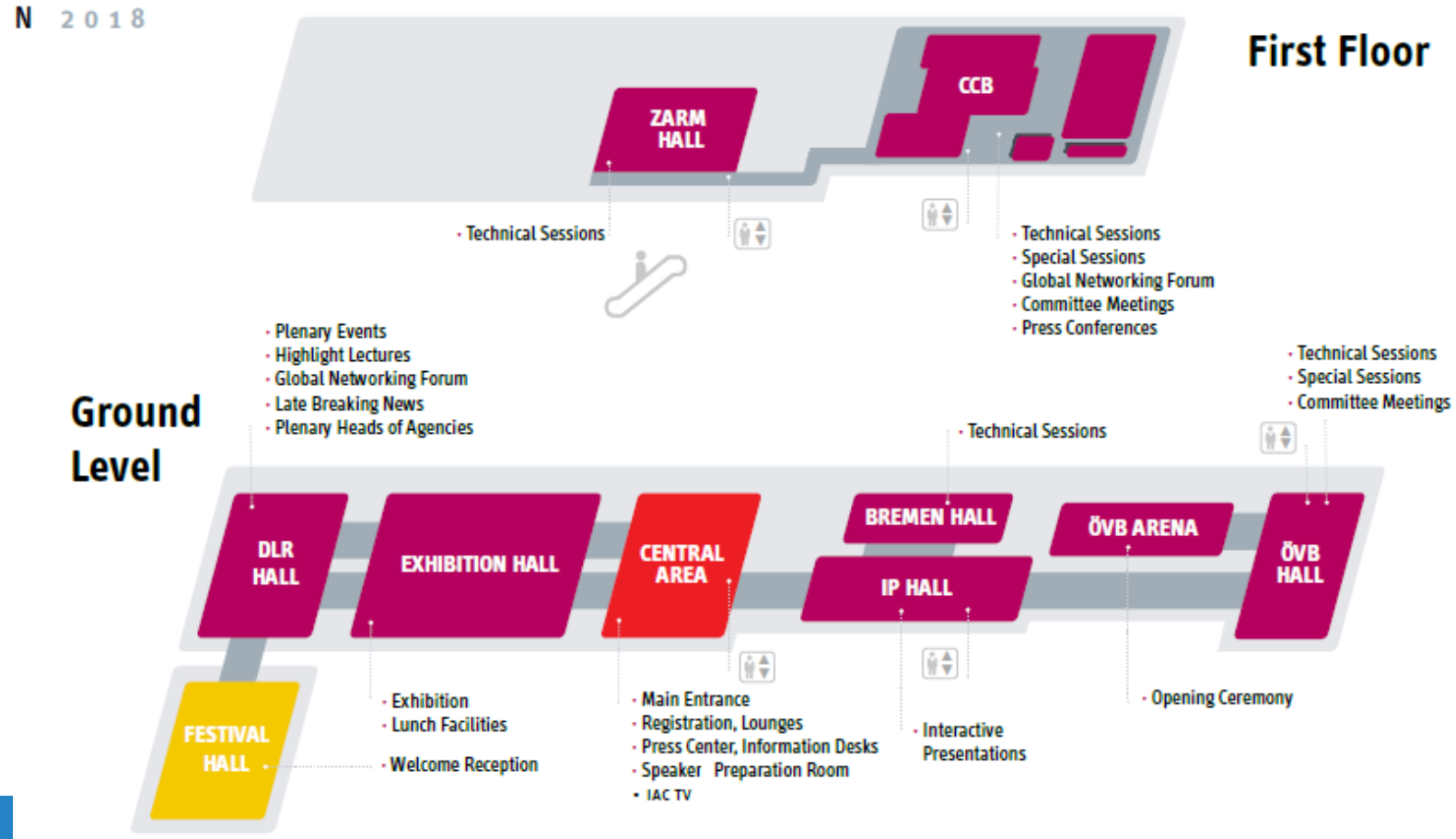
1.3 Bremen IAC 2018

We are in room ZARM 1, except A6.10 CCB Borgward



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1.3 Bremen IAC 2018

01/10/2018	02/10/2018	02/10/2018	03/10/2018	03/10/2018	04/10/2018	04/10/2018	05/10/2018	05/10/2018
15:00-18:00	09:45-12:45	14:45-17:45	09:45-12:45	14:45-17:45	09:45-12:45	14:45-17:45	09:45-12:45	13:30-16:30
A3.1	A3.2A	A3.2B	A3.3A	A3.3B	A3.4A	A3.5	A3.2C	A3.4B
D2.1	D2.2	D2.7	D2.3	D2.4	D2.5	D2.6	D2.8/A5.4	D6.2/D2.9
C1.1	C1.2	C1.3	C1.4	C1.5	C1.6	C1.7/A6.10	C1.8	C1.9
A6.1	A6.2	A6.4	A6.3	A6.9	A6.5	A6.6	A6.7	A6.8
B4.2	B4.1	B4.3	B4.4	B4.5	B4.6A	B4.6B	B4.8	B4.7
B1.1	B1.2	B1.3	A5.2	A5.1	B1.5	D5.3	B1.4	D5.4
B3.1	B3.2	B3.3	B3.4/B6.4	C3.3	B3.5	B3.6/A5.3	B3.7	B3.8/E7.7
C4.1	C4.2	C4.9	C4.3	C4.4	C4.5	C4.6	C4.7/C3.5	C4.8/B4.5A
C2.1	C2.2	C2.3	C2.4	C2.5	C2.6	C2.7	C2.8	C2.9
C3.1	C3.2	E5.1	E5.3	E5.2	E5.4	E5.5	B6.2	
A1.1	A1.2	A1.3	A1.4	A1.5	A1.6	C3.4	A1.7	A1.8
E1.6	E1.3	E1.4	E1.8	E1.5	E1.7	E1.9	E1.1	E1.2
D3.1	D4.1	D3.2	D4.2	D3.3	D4.3	D3.4	D4.4	D4.5
B5.1	E7.1	E7.2	E7.3	E7.4	B5.2	B5.3	E7.5	C4.10
B2.1	B2.2	A4.1	B2.3	B2.4	B2.5	B2.6	B2.7	A4.2
B6.3	E3.1	E3.2	E3.3	E3.4	E3.5/E7.6	B6.1	E3.6	
A2.1	A2.2	D5.1	D5.2	A2.3	A2.4	A2.5	A2.6	A2.7
A7.1	E6.1	E4.1	A7.2	E6.2	E4.2	A7.3	E6.3	E4.3A/E4.3B
D1.1	D1.2	D1.3	E2.2	E2.4	D1.4A	D1.4B	D1.5	D1.6
E2.3/GTS.4	E2.1	B2.8/GTS.3	D6.1	B3.9/GTS.2	D6.3	B1.6/GTS.1	E8.1	B4.9/GTS.5

Category A: Science & Exploration A1--> A7

Category C: Technology C1--> C4

Category E: Space & Society E1--> E8

Category B: Applications & Operations B1--> B6

Category D: Infrastructure D1--> D6

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1.4. Space Debris Symposium for Washington 2019

IAC	Year	Location	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9	Session 10	Posters
63rd	2012	Naples	P. Seitzer [C]	L. Anselmo [C]	J. Hyde [C]	F. Alby [C]	H. Klinkrad [C]	M. Yakovlev [C]	N. Johnson [C]				
			V. Agapov [C]	C Wiedemann [C]	A. Francesconi [C]	J. Hussey [C]	D. McKnight [C]	*K. Suzuki [C]*	C. Bonnal [C]				
			T. Schildknecht [R]	T. Hanada [R]	F. Schaefer [R]	F. Piergentili [R]	S. Kibe [R]	*C. Mathieu [R]*	M. Rudolph [R]				
64th	2013	Beijing	T. Schildknecht [C]	C. Pardini [C]	D. McKnight [C]	F. Alby [C]	V. Adimurthy [C]	P. Anz-Meador [C]	D. Finkleman [C]	*K. Suzuki [C]*			D. McKnight
			V. Agapov [C]	P. Krisko [C]	A. Francesconi [C]	H. Klinkrad [C]	J. Hussey [C]	S. Kibe [C]	D. McKnight [C]	P. Krisko [C]			C. Bonnal
			P. Seitzer [R]	C Wiedemann [R]	M. Rudolph [R]	M. Yakovlev [R]	F. Santoni [R]	M. Rudolph [R]	H. Krag [R]	*C. Mathieu [R]*			
65th	2014	Toronto	T. Schildknecht [C]	L. Anselmo [C]	A. Francesconi [C]	C. Cazaux [C]	VIP. Prasad [C]	F. Di Pentino [C]	T.S. Kelso [C]	*B. Biddington [C]*	M. Jah [C]		C. Bonnal
			V. Agapov [C]	J-C. Liou [C]	Sen Liu [C]	H. Klinkrad [C]	F. Piergentili [C]	S. Kibe [C]	D. Finkleman [C]	D. McKnight [C]	S. Flegel [C]		
			J. Carroll [R]	T. Hanada [R]	F. Schaefer [R]	M. Yakovlev [R]	N. Berend [R]	C. Bonnal [R]	JC. Dolado-Perez [R	*C. Mathieu [R]*	H. Lewis [R]		
66th	2015	Jerusalem	F. DiPentino [C]	C. Pardini [C]	N. Fitz Coy [C]	H. Krag [C]	MYS. Prasad [C]	N. Berend [C]	T.S. Kelso [C]	*B. Biddington [C]*	M. Jah [C]	C. Mathhieu [C]	T. Yasaka
			T. Schildknecht [C]	M. Sorge [C]	F. Schaefer [C]	C. Cazaux [C]	F. Piergentili [C]	S. Kibe [C]	J-C. Dolald-Perez [C	D. McKnight [C]	H. Klinkrad [C]	*K. Stube [C]*	D. McKnight
			V. Agapov [R]	S. Flegel [R]	A. Francesconi [R]	A. Kato [R]	F. Santoni [R]	JC. Liou [R]	D. Finkleman [R]	*C. Mathieu [R]*	H. Lewis [R]	C. Bonnal [R]	C. Bonnal
67th	2016	Guadalajara	D. Oltrogge [C]	C. Pardini [C]	N. Fitz Coy [C]	H. Krag [C]	S. Kibe [C]	N. Berend [C]	T.S. Kelso [C]	*S. Flattard [C]*	M. Jah [C]		T. Yasaka
			T. Schildknecht [C]	M. Sorge [C]	F. Schaefer [C]	C. Cazaux [C]	F. Piergentili [C]	L. Innocenti [C]	J-C. Dolald-Perez [C]		H. Klinkrad [C]		D. McKnight
			V. Agapov [R]	B. Bastida-Virgili [R	A. Francesconi [R]		F. Santoni [R]	G. Haussmann [R]	C Wiedemann [R]	D. Finkleman [R]			C. Bonnal
68th	2017	Adelaide	F. DiPentino [C]	C. Pardini [C]	F. Schaefer [C]	C. Cazaux [C]	B. Bastida-Virgili [C]	N. Berend [C]	T.S. Kelso [C]	D. McKnight [C]	H. Klinkrad [C]	D. Oltrogge [C]	T. Yasaka
			T. Schildknecht [C]	D. Oltrogge [C]	N. Fitz Coy [C]	D. Finkleman [C]	F. Santoni [C]	L. Innocenti [C]	J-C. Dolald-Perez [C	*S. Flattard [C]*	M. Jah [C]	L. Rossettini [C]	D. McKnight
			V. Agapov [R]	M. Sorge [R]	A. Francesconi [R]	H. Krag [R]	F. Piergentili [R]	B. Singh [R]	C Wiedemann [R]	A. Soucek [R]	H. Lewis [R]	C. Cazaux [R]	C. Bonnal
69th	2018	Bremen	F. DiPentino [C]	L. Anselmo [C]	N. Fitz Coy [C]	H. Krag [C]	F. Piergentili [C]	N. Berend [C]	C Wiedemann [C]	D. Spencer [C]	S. Kibe [C]	M. Jah [C]	T. Yasaka
			T. Schildknecht [C]	D. Oltrogge [C]	F. Schaefer [C]	P. Omaly [C]	B. Bastida-Virgili [C]	B. Singh [C]	T.S. Kelso [C]	S. Lemay [R]	H. Lewis [C]	Anilkumar [C]	D. McKnight
			V. Agapov [R]	M. Sorge [R]	D. McKnight [R]	Y. Usovik [R]	F. Santoni [R]	L. Rossettini [R]	J-C. Dolald-Perez [R]		H. Klinkrad [R]	Kitazawa [R]	C. Bonnal

- Need to rotate a bit, and to find “fresh blood”: Priority to new members
- Basic rule proposed: at least one experienced IPC member per session, then potentially open, but need to find key experts who will effectively attend and will effectively work…☺

A6: Space Debris Symposium: Liou – Bonnal

The Symposium will address the complete spectrum of technical issues of space debris: measurements, modelling, risk assessment in space and on the ground, re-entry, hypervelocity impacts and protection, mitigation and standards, post-mission disposal, debris removal, Space Surveillance, collision avoidance as well as non-technical topics.

A6.1: Space Debris Detection, Tracking and Characterization: Skinner - Schildknecht – Agapov

This session will address advanced ground and space-based measurement techniques, relating processing methods, and results of space debris characterization.

A6.2: Modelling and Risk Analysis: Pardini – Sorge – Oltrogge

This session will address the characterization of the current and future debris population and methods for in-orbit and on-ground risk assessments. The in-orbit analysis will cover collision risk estimates based on statistical population models and deterministic catalogues, and active avoidance.

A6.3: Impact-Induced Mission Effects and Risk Assessments: Traineau – Jah – Fitz-Coy

This session addresses disruptions of spacecraft operations induced by hypervelocity impacts including spacecraft anomalies, perturbation of operations, and component failures up to mission loss. It includes risk assessments for impact vulnerability studies and corresponding system tools. Further topics are spacecraft impact protection and shielding studies, laboratory impact experiments, numerical simulations, and on-board diagnostics to characterize impacts such as impact sensors, accelerometers, etc.

A6.4: Mitigation - Tools, Techniques and Challenges: Krag – Kawamoto – Omaly

This session will focus on the implementation of debris prevention and reduction measures and vehicle passive protection at system level including end of life strategies and tools to verify the efficiency of the implemented measures. The session will also address practical experiences in the planning and verification of measures and issues and lessons learnt in the actual execution of mitigation actions.

A6.5: Post Mission Disposal and Space Debris Removal 1: Santoni – Nassisi – Francillout

This session will address post-mission disposal and active removal techniques "ground and space based", review potential solutions and Identify implementation difficulties.

A6.6: Post Mission Disposal and Space Debris Removal 2: Kerr – Rossettini – Berend

This session will address post-mission disposal and active removal techniques "ground and space based", review potential solutions and identify implementation difficulties.

A6.7: Operations in Space Debris Environment, Situational Awareness: Wiedemann – Sanchez-Ortiz – Kelso

This session will address the multiple aspects associated to safe operations in Space dealing with Space Debris, including operational observations, orbit determination, catalogue build-up and maintenance, data aggregation from different sources, relevant data exchanges standards and conjunction analyses.

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1.4. Space Debris Symposium for Washington 2019

A6.8 (joint with Space Security Committee): Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal

From SDC: Le May – Spencer *From SSC: Plattard – Soucek*

This session will deal with the non-technical aspect of space debris mitigation and removal. Political, legal and institutional aspects includes role of IADC and UNCOPUOS and other multilateral bodies. Economic issues including insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation in addressing these issues will be considered

A6.9: Orbit Determination and Propagation

Dolado-Perez – Klinkrad – Piergentili

This session will address aspects of space debris orbit determination related to assessment of raw and derived data accuracy, optical measurements processing and modelling and risk analysis of space debris

A6.10 /B4.10: Joint Small Satellite/Space Debris Session to promote the long-term sustainability of space

From A6: Dasgupta – Usovik *From B4: ? - ?*

This session facilitates bilateral discussions between Small Satellite and Space Debris communities for shared understanding of the challenges/issues and to promote practical small satellite solutions for the long-term sustainability of space. It will include topics such as: - Orbital debris mitigation solutions for small satellites and mega constellations - Small satellite orbital debris mitigation lessons learned, best practices and expected norms of behavior (including minimization of post-mission orbit lifetime, trackability) - Orbital debris mitigation compliance statistics and monitoring methods (for both small and large satellites) - Stakeholder education (bilateral) - Collision and warning risk assessment techniques and resulting estimates - Mitigation of risks to other operational spacecraft (ISS, etc.) - Small satellite propulsive requirements, methods and technology - Small satellite orbit regulation concepts - Small satellite deorbit technologies and lessons learned - Small satellite mission assurance, reliability and lessons learned - Small satellite deployment best practices and lessons learned - Tracking organization and small satellite operator interplay - Orbit, maneuver, and scenario data exchange.

A6.IP: Interactive Presentations, Yasaka – McKnight – Bonnal

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1.4. Space Debris Symposium for Washington 2019

- ***Any ideas for Washington 2019?***
  - Joint Session with Small-sats B4 is confirmed
  - Space operations – Space Traffic Management? Not selected this time
  - In orbit servicing and space debris removal; Not selected this time
  - ↳ **Joint A6.10 - B4.10 confirmed**
- ***Other ideas?***
  - Keynote lecture (Joe Loftus Keynote Lecture) at the beginning of one of our sessions
  - **Principle is decided; action to check legal acceptability**

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Agenda

2. Exchanges
    - 2.1. Past events: workshops, conferences, congresses, …
    - 2.2. On the Agenda
    - 2.3. New achievements
    - 2.4. Round table – Open discussion

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2. Exchanges

- OneWeb Large Constellation (Maclay) ⇨ *not included here. Please refer to* **OneWeb Perspectives on Responsible Design and Operational Practices for Large-Scale Activities in Low-Earth-Orbit**
Military Space Situational Awareness Conference, London, UK, 25-26 April 2018
- Global VSAT Forum (GVF) debris-related activities (Oltrogge) ⇨ *Appendix 2*
- Space debris activities at KARI and in Korea (Kim) ⇨ *Appendix 3*
- A recent GTO fragmentation event (Agapov) ⇨ *Appendix 4*
- Remove DEBRIS (Oral discussion + video https://www.facebook.com/dukey/videos/10103244631306648/)
- 2018 CNES modeling/Remediation Workshop (Bonnal) ⇨ *Appendix 5*
- 2018 ISO meeting in Helsinki (Omaly) ⇨ *Appendix 6*
- 2018 COSPAR (Schildknecht) ⇨ *Appendix 7*
- 2018 AMOS (Schildknecht) ⇨ *Appendix 8*
- 2018 Spacecraft Anomalies and Failures Workshop (McKnight) ⇨ *Appendix 9*
- 2018 JAXA Space Debris Workshop (Kawamoto) ⇨ *Appendix 10*
- KePASSA conference (Dolado Perez) ⇨ *Appendix 11*
- 2019 ESA NEO and Debris Conference (Krag) ⇨ *Appendix 12*
- 2019 IAASS (McKnight) ⇨ *Appendix 13*
- 2019 EUCASS (Bonnal) ⇨ *Appendix 14*
- 2019 IOC (Liou) ⇨ *Appendix 15*
- Coder Workshop http://coder.umd.edu/coder2018

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Agenda

3. IAA Study Groups
    - 3.1 SG 5.14 IAA Situation Report on Space Debris – 2016
    - 3.2 SG 5.10 Orbital Debris Removal: Policy, Legal, Political and Economic Considerations
    - 3.3 SG 4.23 Practical Solutions for Post Mission Deorbit for Micro/Nano/Pico Satellites in Low Earth Orbit
    - 3.4 SG 5.15 Space Traffic Management
    - 3.5 SG 5.17 IAA Situation Report on Space Debris – 2019

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3. IAA Study Groups

SG No	IAA Study Groups as of Sept. 25, 2018 ongoing IAA Studies	Chair/Co-Chair/Secretary	1 Proposal	2 Com. ok	3 SAC ok	4 Appoint.	5 1st Draft	6 Final Draft	7 Peer Review	8 Final Report	9 SAC ok	10 BOT ok	11 Edition	12 Publication	Comments
	Commission 1														
1.6	Protected Antipode Circle on Lunar Farside	Maccone/Shuch													09- BOT approval
1.9	Satellite remote sensing of aerosols in the Earth atmospher	Yatskiv/Milinevsky													09- Status report online
1.11	Comparative Climatology - Studying Planetary Climate to U	Ramachandran/Ocampo													09- Status report online
1.13	Planetary Science Enabled by the New Generation of Small	Baker/Vane/Bousquet													09- Final report expected
1.14	Integrated Precursor Distinguish in Multi-Geophysical Fields	ao Weimin/Contant/Kuznetsov/Zhang													09- Status report online
1.15	International Cooperation on Space Weather	McKenna-Lawlor													09- Status report online
1.16	Expanding Options for Implementing Planetary Protection d	Conley/Race													09- Closing for new study
	Commission 2														
2.12	Effectiveness of different physiological countermeasures to	Charles/Kozlovskaya/Norsk													09- Status report online
2.14	Medical Support for an International Human Expedition to M	Orlov/Doarn/Kussmaul													09-
2.15	Immersion Model: Importance for Space Life Sciences Stud	Mano/Tomilovskaya													09- Status report online
2.17	Dynamic Assessment and Management of Astronauts' Phys	Haignere / Prunariu													09-New proposal
2.18	Sleeping Brain in Space and Analog Environments	Kourtidou/Bamidis													09-New proposal
	Commission 3														
3.18	Possible International Protocol to handle Crisis/Emergency	Ramakrishnan/Unnikrishnan Nair													09- Publication process
3.19	Feasibility study of Standardized Career Dose Limits in LEC	Mckenna-Lawlor													09- Status report online
3.21	Space Disposal of Radioactive Waste	Degtyarev													09- Commission pre-review?
3.22	Next-Generation Space System Development Basing on Or	Razoumny/Agrawal/Ji Simei													09-
3.24	Road to Space Elevator Era	Tsuchida/Raitt/Swan/Takahashi													09-
3.25	The Maintainability and Supportability of Deep Space Mann	Yang Hong/Zhang Dapeng													09- Status report online
3.26	Space Mineral Resources #2	Dula/Zhang Z./Lenard													09-
3.27	Towards the utilization of the Moon, Preparing for Mars Exp	Genta/Ventskovsky													09- Status report online
3.28	Strategy of Low Cost and Large Scale Access to Space in F	Lu Yu/Reibaldi													09- Status report online
3.29	Strategy and Feasibility Assessment of Collision Protection	Bao Weimin													09- Status report online
3.30	Space and its Utility in Forecasting Climate Change	Lenard													09-
3.31	Solar Energy from Space: a Decadal Revisit to the first Inte	Mankins													09-Membership list TBC

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3. IAA Study Groups

	IAA Study Groups as of Sept. 25, 2018		1	2	3	4	5	6	7	8	9	10	11	12	
SG No	ongoing IAA Studies	Chair/Co-Chair/Secretary	Proposal	Com. ok	SAC ok	Appoint.	1st Draft	Final Draft	Peer Review	Final Report	SAC ok	BOT ok	Edition	Publication	Comments
	Commission 4														
4.8	Space Systems Cross-Compatibility	Esper/D'errico/Herrel/Mendham													09- Study format
4.16	The Applications of Micro-Satellites and Cube-Sats to Plane	Alkalai/Graziani/Bousquet/Laufer													03-Cancellation TBC
4.17	Space Systems for Biomedical Research	Cappelletti/Graziani/Massimiani													09- Status report online
4.19	Promoting Global Space Knowledge & Expertise in Develop	Horikawa/Coradini													09-
4.20	Space Information Application in Earthquake Emergency Re	Bao Weimin/Contant													09- Status report online
4.21	Distributed, Networked, Smart, Cooperating Small Satellite	Belokonov/Schilling													09-
4.22	Through Optimization of Aerospace Trajectories	Teofilatto/Filatyev													09- Status report online
4.23	Post-Mission Disposal for Micro and Smaller Satellites: Con	McKnight/Hanada/da Silva/Martinez													09-
4.24	Knowledge Management for Space Applications	Mugellesi-Dow													09- Status report online
	Commission 5														
5.10	Orbital Debris Removal: Policy, Legal, Political and Econom	Williamson/Smith LJ													09-report expected / SR online
5.12	Dynamics of Space Exploration Strategies and Future Outlo	Ehrenfreund/Plattard/Peter													03- Pending
5.13	Space Systems as Critical Infrastructure	Piso/Jivanescu/Neagu													09- Final report received
5.16	International Legal and Policy Regimes for Space Natural R	Liu Jizhong / Impallomeni													09- Status report online
5.17	Space Debris Situation Report - 2019	Bonnal/McKnight													09-membership TBC
	Commission 6														
6.16	STEM/STEAM for Space - Grand Challenges	Regel/Harris													09- Status report online
6.17	Multicultural foundations and influences of human space ex	Arnould/Laidet													09-New proposal

3.1 SG 5.14 IAA Situation Report on Space Debris – 2016

- ***SG 5.14*** **http://iaaweb.org/content/view/569/755/**

IAA Situation Report on Space Debris – 2016

- **Finished, printed and distributed**
- **Freely downloadable from IAA Space Debris web page**

http://www.iaaweb.org/iaa/Scientific%20Activity/sg514finalreport.pdf

- **I have plenty of paper copies of the report. If you wish to have one, just send me your address**

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3.2 SG 5.10 Orbital Debris Removal: Policy, Legal, Political and Economic Considerations

- ***SG 5.10*** ***(for information)*** **http://iaaweb.org/content/view/446/607/**

Orbital Debris Removal: Policy, Legal, Political and Economic Considerations

- **Current Status?**
- **Presentation foreseen during the Academy Day, but current version not distributed**

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3.3 SG 4.23 Practical Solutions for Post Mission Deorbit for Micro/Nano/Pico Satellites in Low Earth Orbit

- ***SG 4.23*** ***(for information)*** **http://iaaweb.org/content/view/742/975/**

Post-Mission Disposal for Micro and Smaller Satellites: Concepts and Trade Studies

- **Very dynamic group ongoing**
- **Next meeting monday**

Short Description of Scope of Study

Overall Goal: Provide framework for a practical implementation to assure compliance with Space Debris Mitigation guidelines for micro and smaller satellites.

Motivation is to provide easy to use design tradeoff information to small satellite community including university satellite community. The final report will be disseminated through the UNISEC-Global network and other small satellite communities and networks.

Summary

-Explain that mitigation guidelines, the technologies, and space system operations will all evolve over time to apply this document as a framework to continue to assess how your satellite may act responsibly and efficiently to minimize risks to other satellites from your operations.

Co-Chair: da Silva Curiel Alex
Co-Chair: Hanada Toshiya
Co-Chair: Martinez Peter
Co-Chair: McKnight Darren
Secretary: Kawashima Rei

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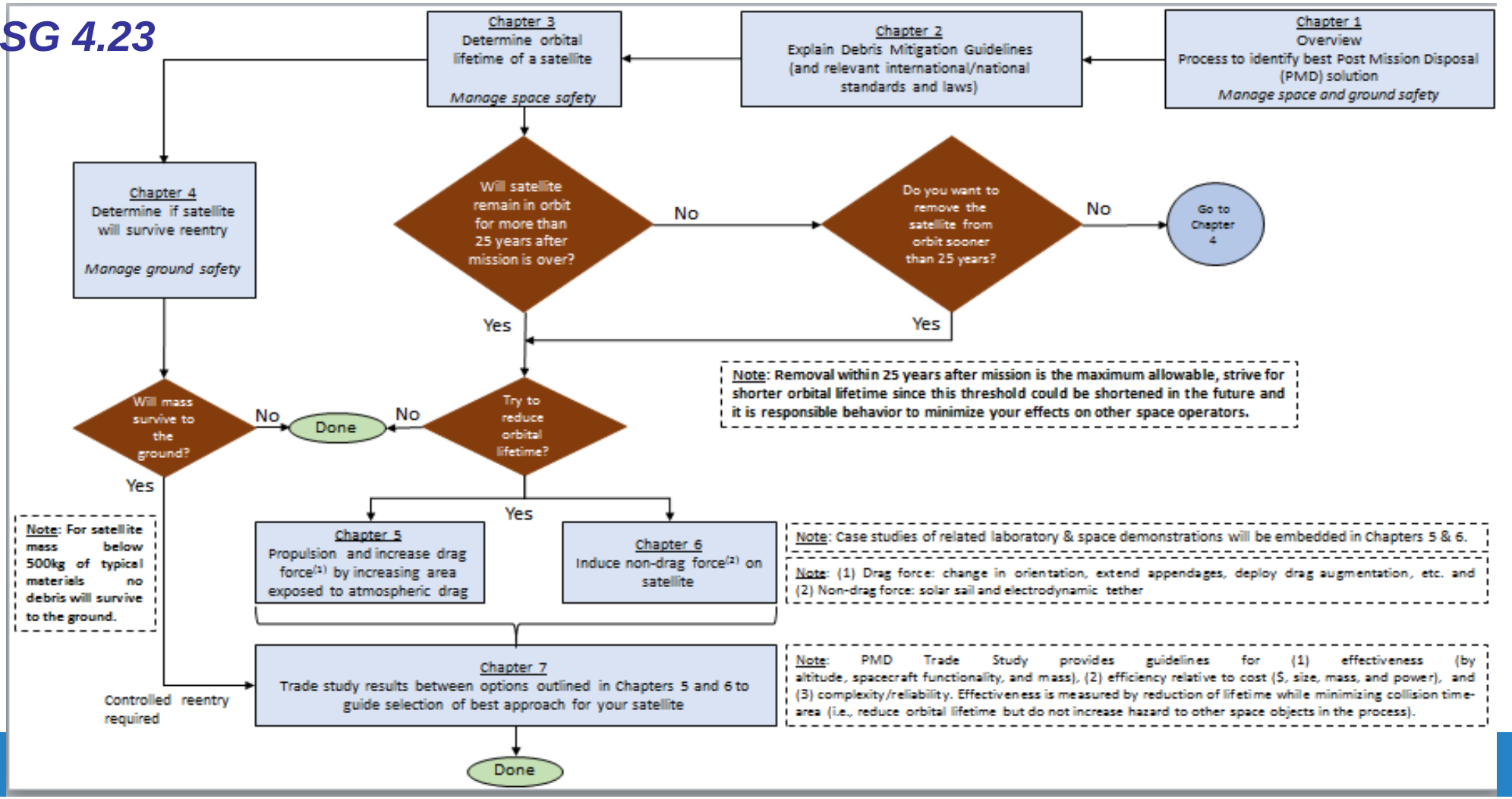
3.3 SG 4.23 Practical Solutions for Post Mission Deorbit for Micro/Nano/Pico Satellites in Low Earth Orbit

- **SG 4.23**



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3.4 SG 5.15 Space Traffic Management

- ***SG 5.15*** *(for information)* **http://iaaweb.org/content/view/615/809/**

Space Traffic Management - Towards a Roadmap for Implementation

- **Published, available on the IAA web-site**

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3.5 SG 5.17 IAA Situation Report on Space Debris – 2019

- ***SG 5.17*** **http://iaaweb.org/content/view/710/935/**

IAA Situation Report on Space Debris – 2019

- Proposal to change the title to 2020, no real hurry
- Need to identify the reference list of contributors
- Need for new contributors (Chinese, Indian, Ukrainian, Korean, more Russians…)

Current list of contributors (tentative) :

- Shall include new countries: China, Ukraine, India, Korea
- Need for a continuity in the initial authors, but
- Need for new blood also
- Avoid too many authors as we work by consensus
- Avoid too many from same countries
- Agreed so far (random order…): Tanja Masson-Zwaan, Manuel Metz, Mykhailo Kaliapin, Holger Krag, Shen Lin, Moriba Jah, Eric Christiansen, Juan-Carlos Dolado-Perez, Frank Schäfer, Carmen Pardini, Dave Finkleman, Marlon Sorge, Dan Oltrogge, Nicolas Bérend, Samantha Le May, Hae-Dong Kim, Igor Usovik, Zizheng Gong, Michel Doyon, Balbir Singh, Thomas, Vladimir, Roberto Opromolla (sorry if I forgot someone…)

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3.5 SG 5.17 IAA Situation Report on Space Debris – 2019

- ***SG 5.17 Proposed Table of contents:***

- Basis is the IAA Report 2016, of course
- Excellent report ☺, but highly improvable, at the table of contents level and in terms of completeness
- See list of open actions in Appendix 18
- Current table of contents and contributors recalled in Appendix 19
- First draft sent by Darren, see following page

Three principles:

- Update
- Correct (following list of comments from reviewers)
- Slightly modify the structure

Please, if interested, send a mail to Darren and I

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3.5 SG 5.17 IAA Situation Report on Space Debris – 2019

- ***SG 5.17 Proposed Table of contents:***

1.Sources of Space Debris

Include counts, mass, types, breakup events, deterioration of surfaces, etc

⇨ Current §2 – to be updated

2.Monitoring Space Debris

Optical, radar, in-situ, and returned samples

⇨ Current §3 – to be updated and optical systems to be placed in Appendix

SST-SSA capabilities exhaustively described in Appendix

⇨ Current §4 – to be updated and extended, and placed in Appendix

3.Risks from Space Debris *(Not sure to agree with the proposed structure… To be discussed)*

Ground casualties from reentry

⇨ Current §7 – to be updated

Disrupt satellite operations

Destruction of objects (which creates more debris that disrupt satellite operations)

⇨ HVI Current §3 – to be updated and optical systems to be placed in Appendix

⇨ Current §6.2 – to be adapted

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3.5 SG 5.17 IAA Situation Report on Space Debris – 2019

4.Debris Population Evolution

Key parameters: launch rates, fragmentations (explosions and collisions), longevity without mitigation, etc - just a baseline of the past and extrapolate to future

⇨ Current §8 – to be updated

Special issues: satellite servicing, constellations, and cubesats

⇨ New and important

5.Debris Risk Management

Debris mitigation

⇨ Current §9 – to be updated

Shielding and design

⇨ Largest part of Current §6 – to be updated

Debris remediation

⇨ Current §10 – to be updated and completed

Space Traffic Management (STM) <Discuss current SDA ops and future STM concepts

⇨ New

6.Legal, Policy, and Regulatory Issues and Opportunities

⇨ Current §11 & 12 – to be updated

7. Synthesis and further references

⇨ Current §13 – to be updated