A6 Symposium Retrospective Analysis

Report on Abstract Submissions and Topics

V.2 25.03.2025

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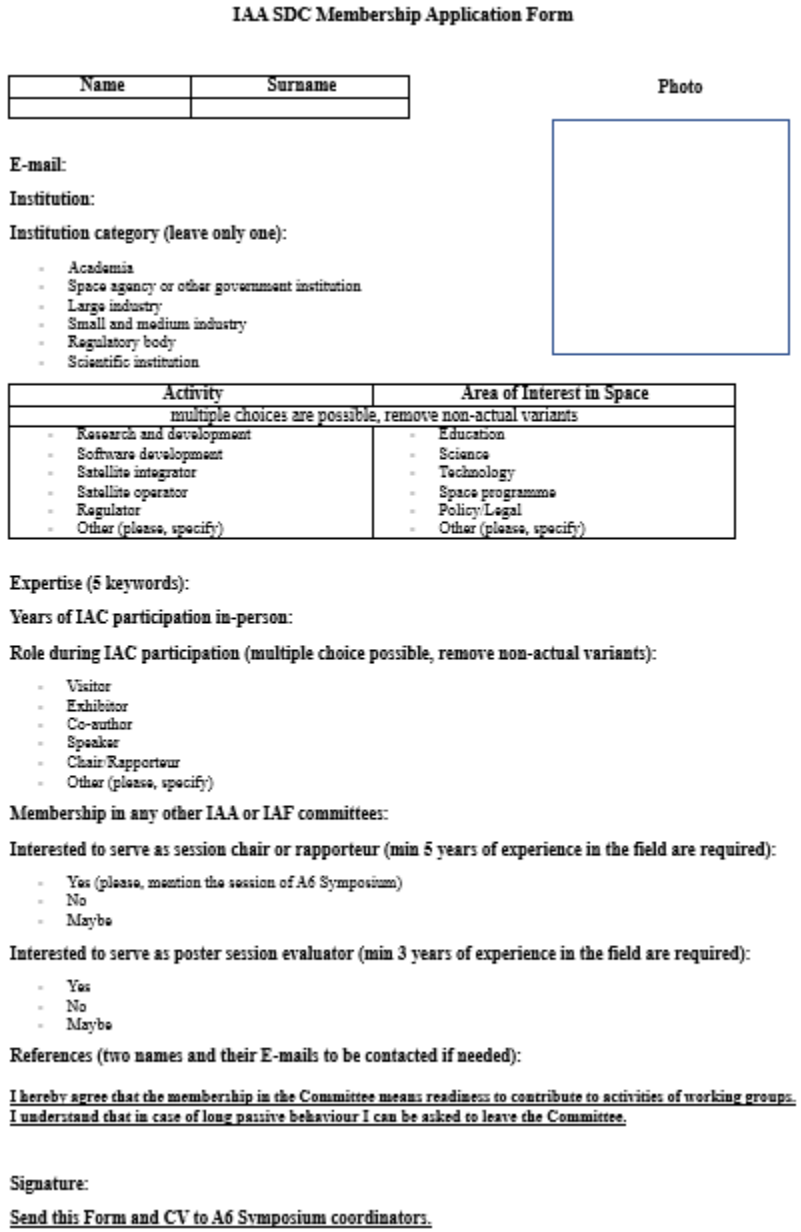
Content

IAA SDC Application Form (AF)

- The AF was proposed taking into account the good experience of IAF STM Committee (the united file “Who is Who?”);
- The AF is required to collect the array of competences of the Committee and to simplify professional communications among members;
- The AF does not contain any personal or sensitive information;
- The AF is required to evaluate the level of education and professional experience of a candidate, especially fixing the ongoing increase of IAC participants;
- The IAF is intended to formalize the procedure of new members acceptation.



IAA SDC Membership Application Form

Name	Surname

Photo

E-mail:

Institution:

Institution category (leave only one):

- Academia
- Space agency or other government institution
- Large industry
- Small and medium industry
- Regulatory body
- Scientific institution

Activity	Area of Interest in Space
multiple choices are possible, remove non-actual variants	
Research and development Software development Satellite integrator Satellite operator Regulator Other (please, specify)	Education Science Technology Space programme Policy/Legal Other (please, specify)

Expertise (5 keywords):

Years of IAC participation in-person:

Role during IAC participation (multiple choice possible, remove non-actual variants):

- Visitor
- Exhibitor
- Co-author
- Speaker
- Chair/Rapporteur
- Other (please, specify)

Membership in any other IAA or IAF committees:

Interested to serve as session chair or rapporteur (min 5 years of experience in the field are required):

- Yes (please, mention the session of A6 Symposium)
- No
- Maybe

Interested to serve as poster session evaluator (min 3 years of experience in the field are required):

- Yes
- No
- Maybe

References (two names and their E-mails to be contacted if needed):

I hereby agree that the membership in the Committee means readiness to contribute to activities of working groups. I understand that in case of long passive behaviour I can be asked to leave the Committee.

Signature:

Send this Form and CV to A6 Symposium coordinators.

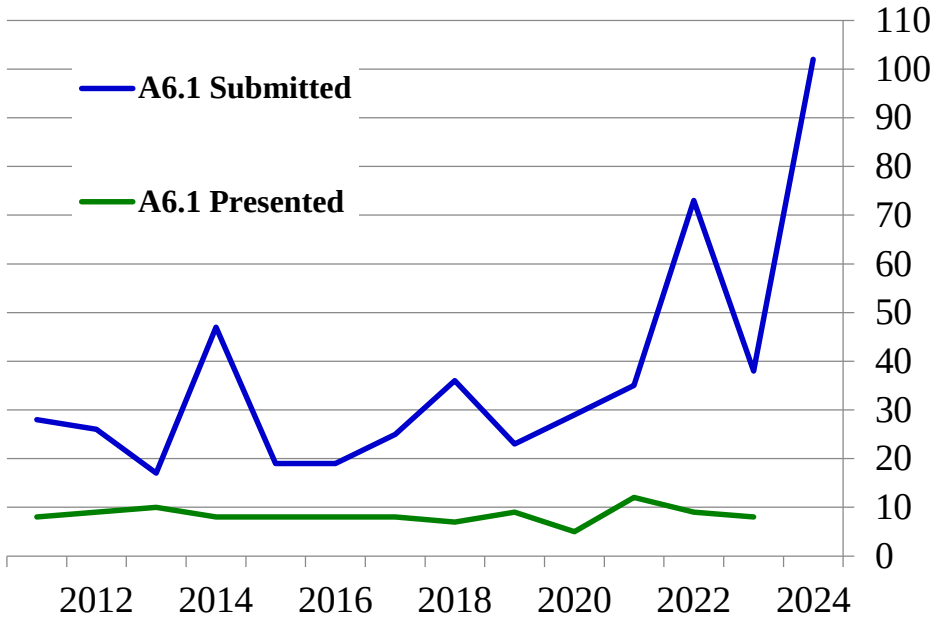
Current structure of A6 Symposium and 10-year analysis

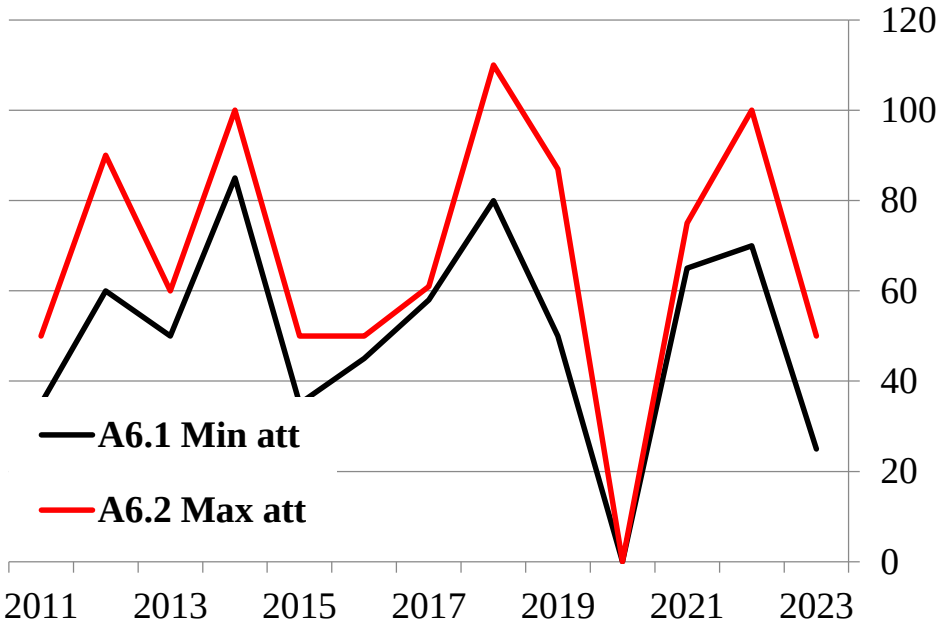
- **A6.1, A6.11 Space Debris Detection, Tracking and Characterization – SST**
- **A6.2 Modeling and Risk Analysis**
- **A6.3 Impact-Induced Mission Effects and Risk Assessments**
- **A6.4 Mitigation - Tools, Techniques and Challenges – SEM**
- **A6.5, A6.6 Post Mission Disposal and Space Debris Removal – SEM**
- **A6.7 Operations in Space Debris Environment, Situational Awareness – SSA**
- **A6.8-E9.1 Policy, Legal, Institutional, Economic and Security Aspects of Debris Mitigation, Debris Remediation and STM**
- **A6.9 Orbit Determination and Propagation – SST**
- **A6.10-E9.4 Space carrying capacity assessment and allocation (new)**

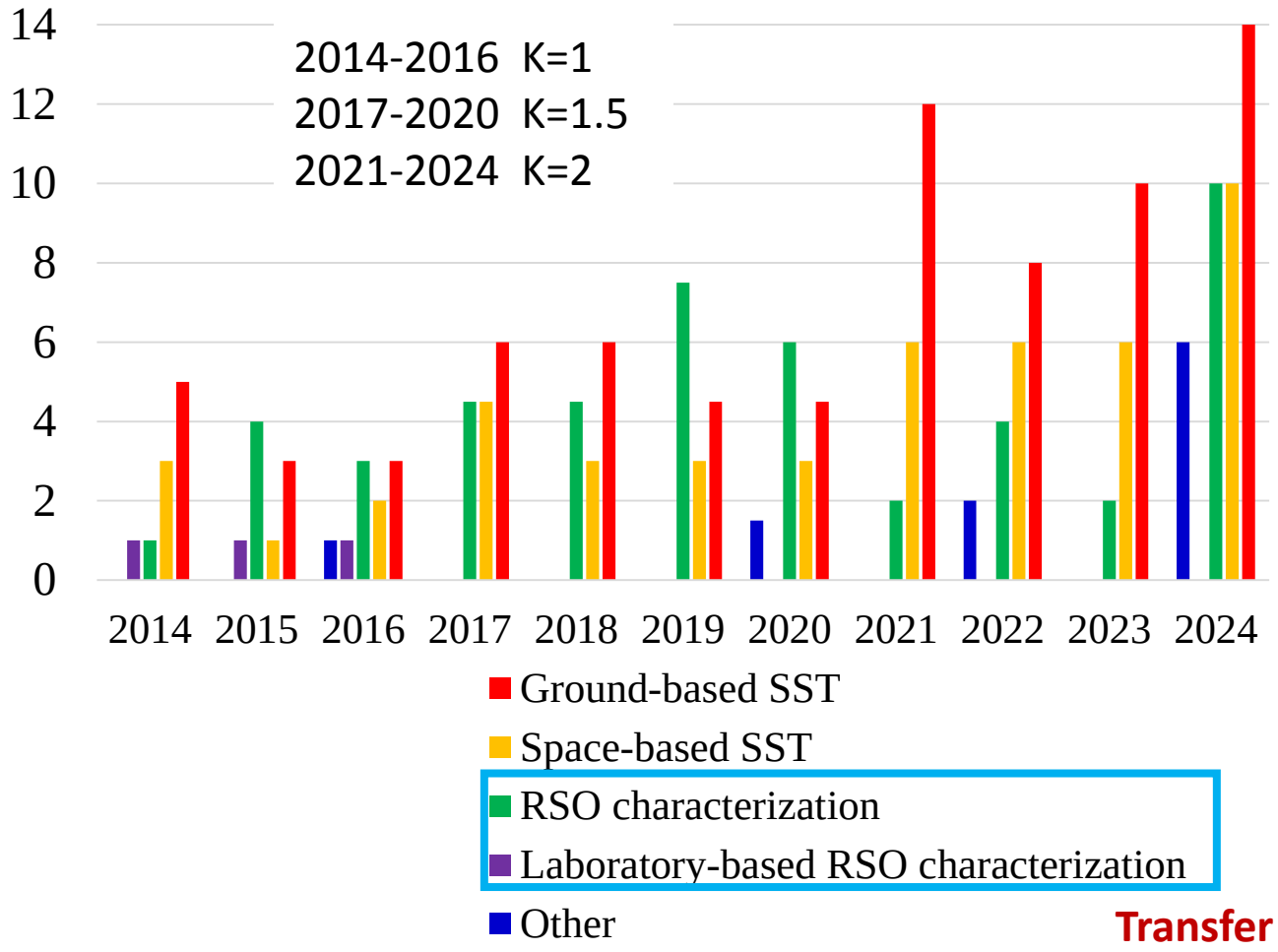
Problems

- **11 sessions**
  GOAL: 9 non-parallel slots
  +1 as a reserve
- **Different submission / slot ratio**
  GOAL: $3 \leq R \leq 5$
- **Different session attendance**
  GOAL: $50 \leq A \leq 100$
- **Non-uniform topics distribution**
  GOAL: 3-5 topics max

A6.1, A6.11 Space Debris Detection, Tracking and Characterization – SST



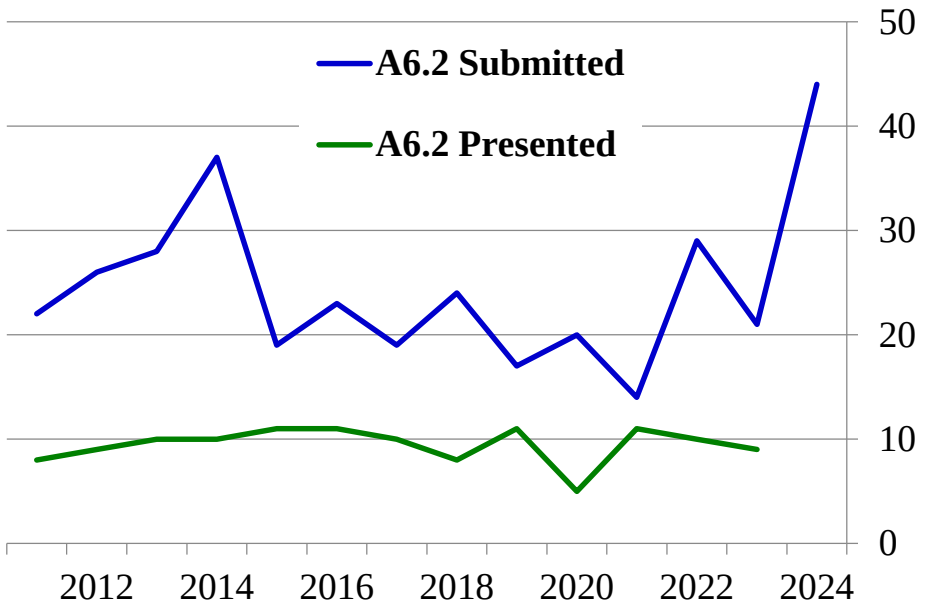


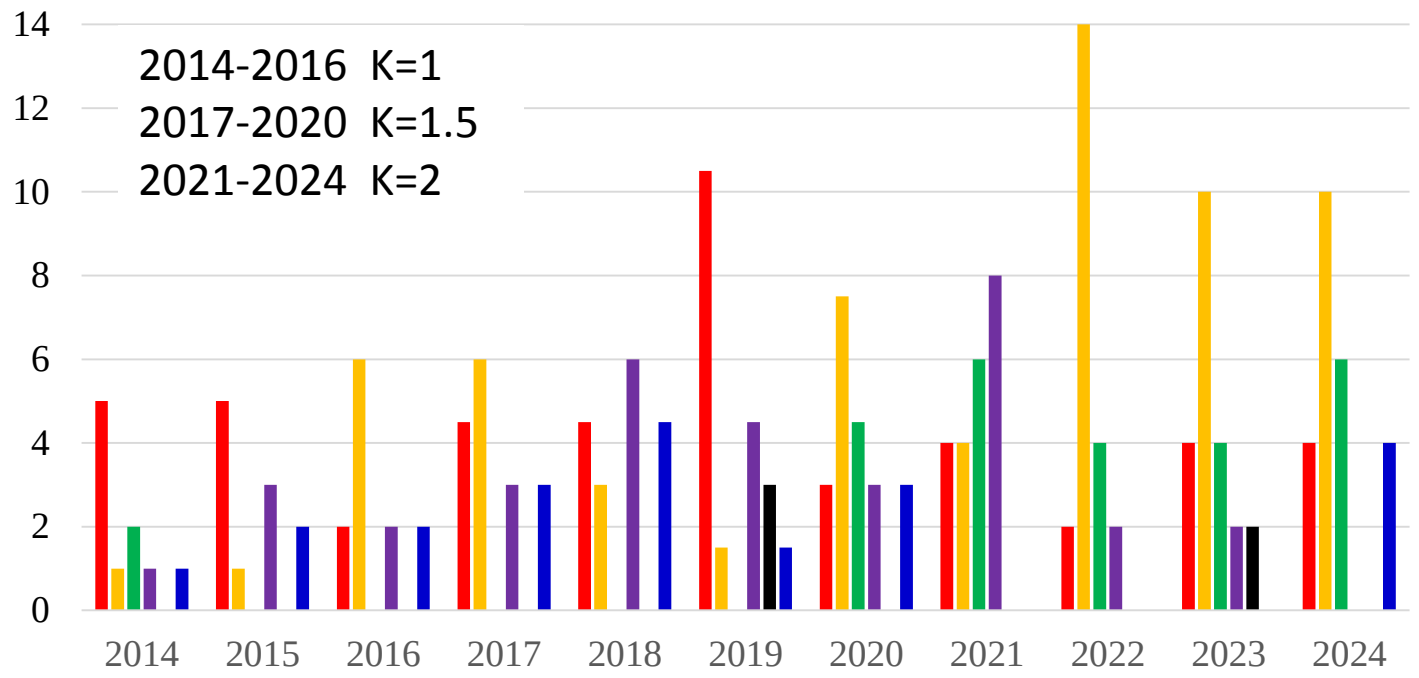


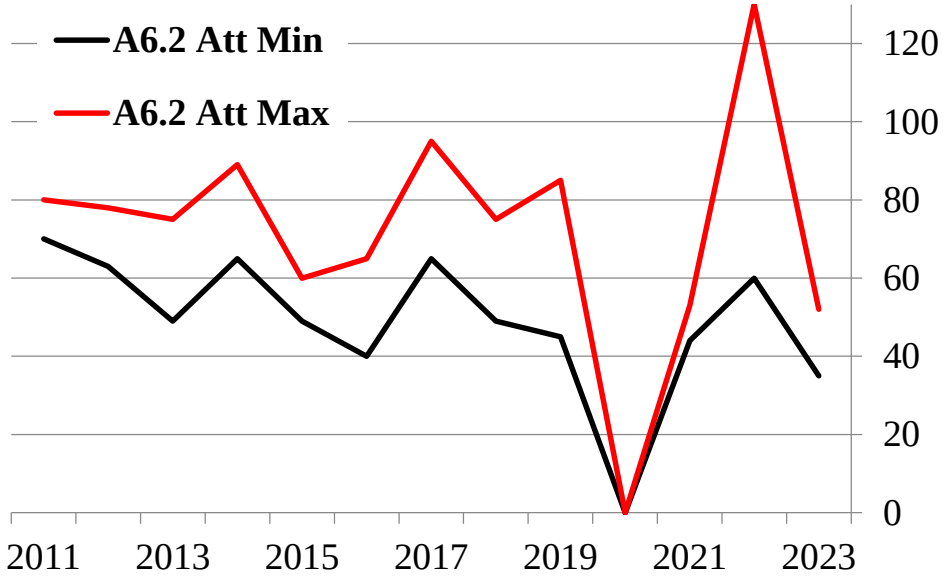
Transfer

- From 3 to 10 sub/slot, increasing
- Stable high attendance

A6.2 Modeling and Risk Analysis





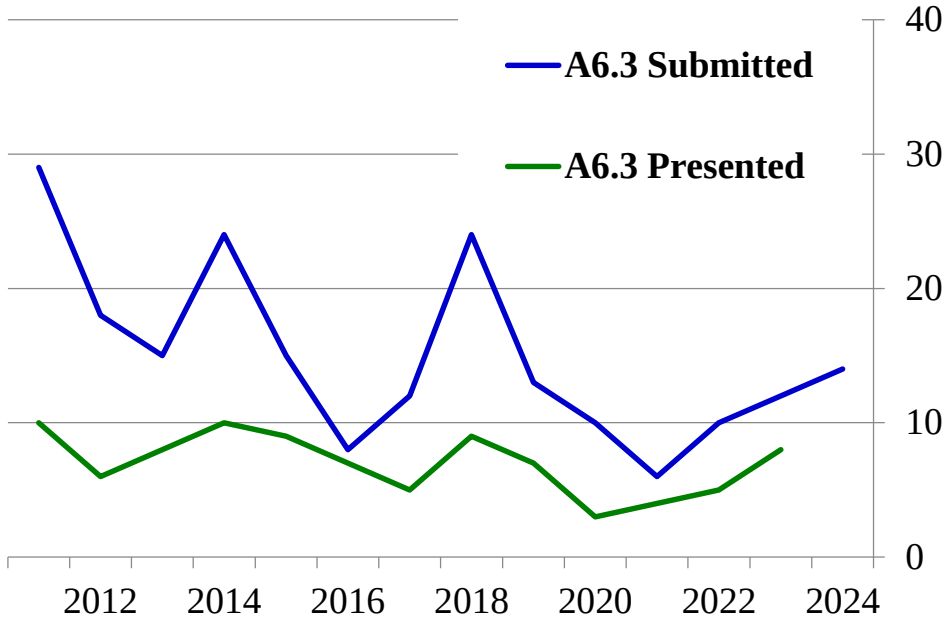


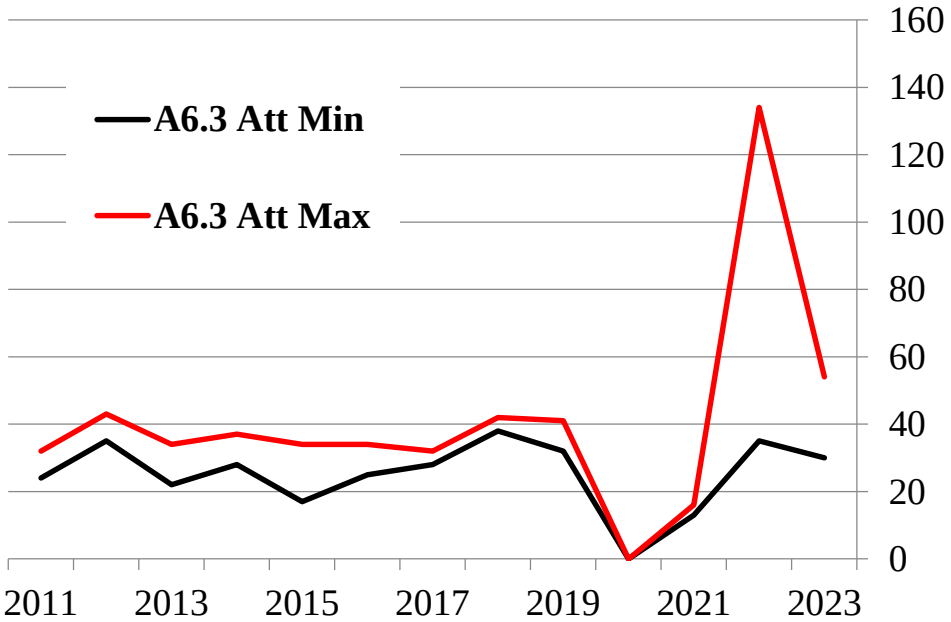
- Space debris environment modelling, validation and analyses
- Collision risk computation and analyses
- Object criticality ranking
- Breakup modelling and validation (also at re-entry)
- Collision avoidance manoeuvre design
- Other

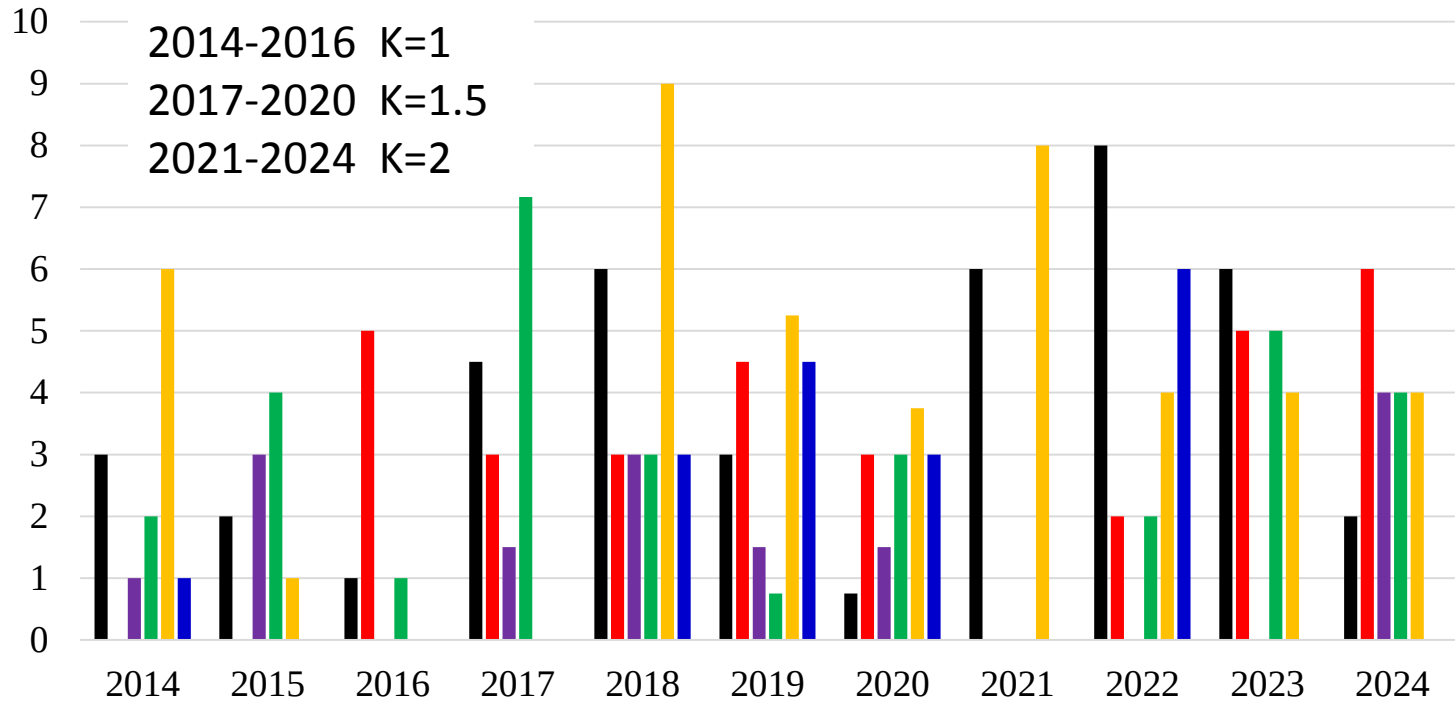
Transfer

- **2-3 sub/slot, stable**
- **Stable average attendance**

A6.3 Impact-Induced Mission Effects and Risk Assessments



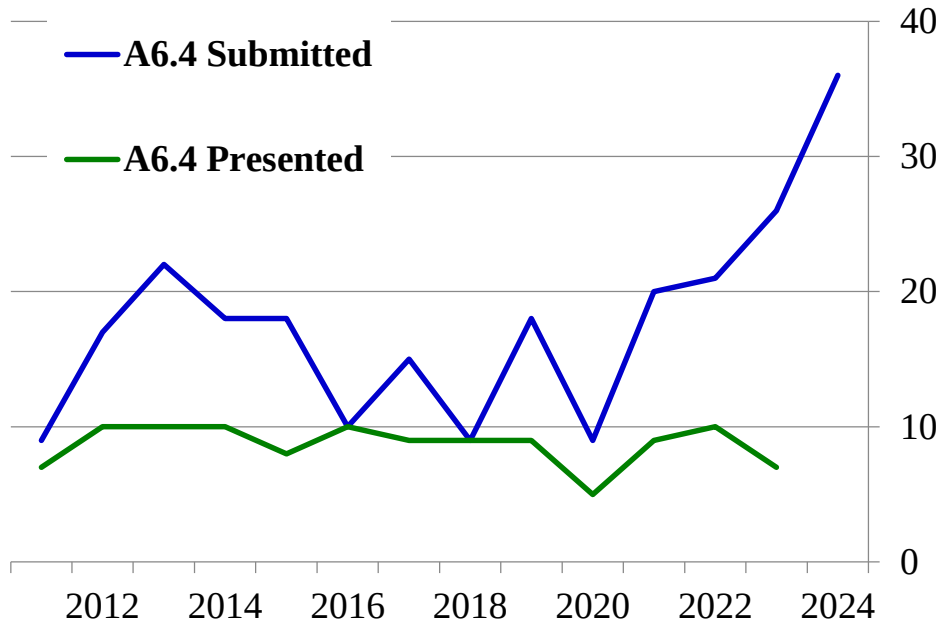


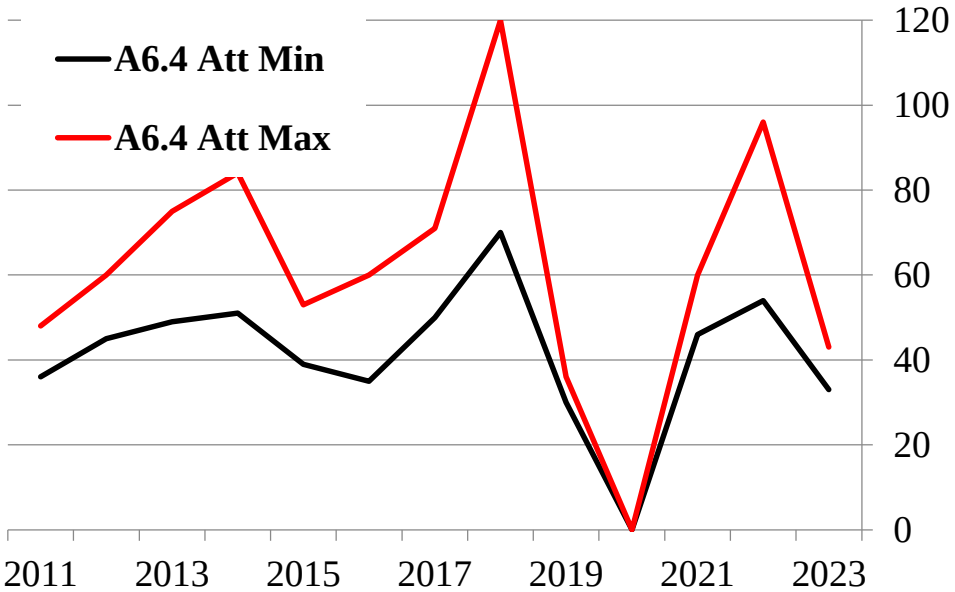


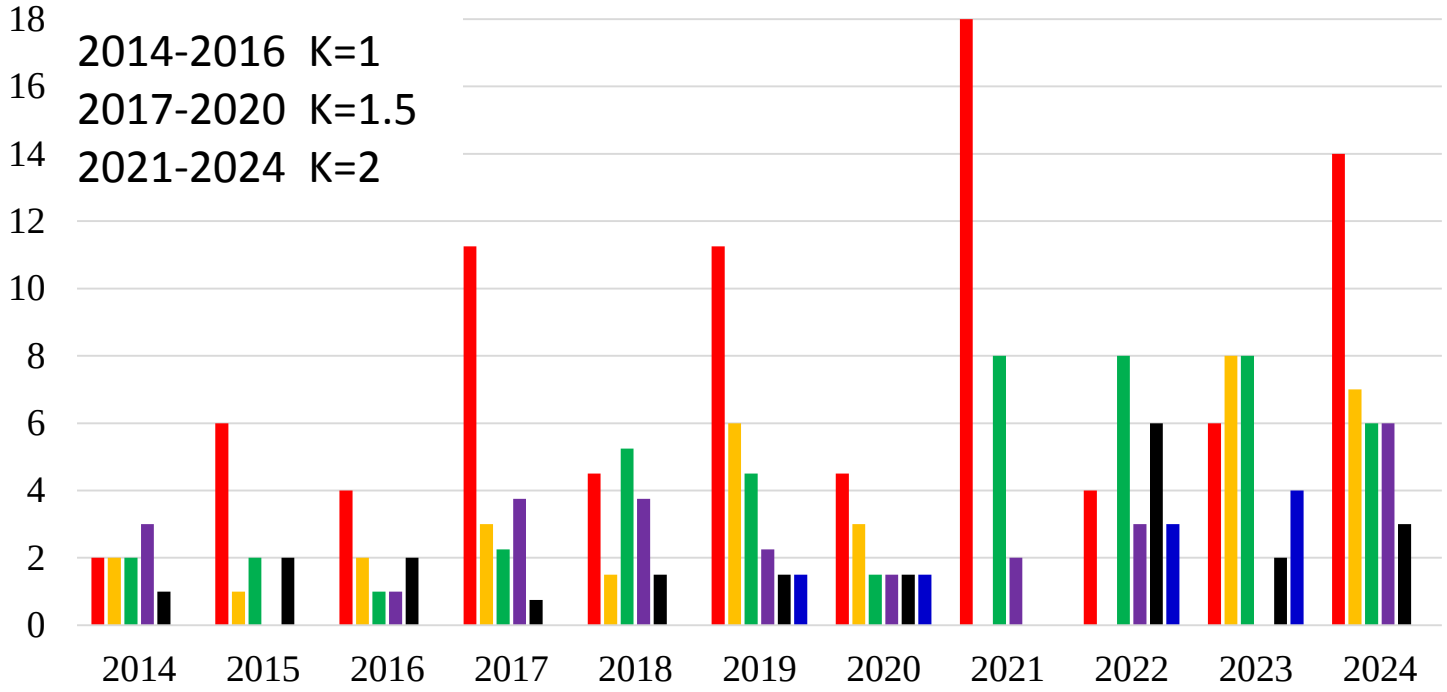
- New shield def/characterization/performance
- Influence of impactors characteristics, environment and ejectas characteristics
- Dev. of Exp. facilities and measurement techniques
- Num and exp analysis of impact damage
- Modelling impact and its consequences
- Other

- **2-1 sub/slot, decreasing**
- **Stable LOW attendance**

A6.4 Mitigation - Tools, Techniques and Challenges – SEM



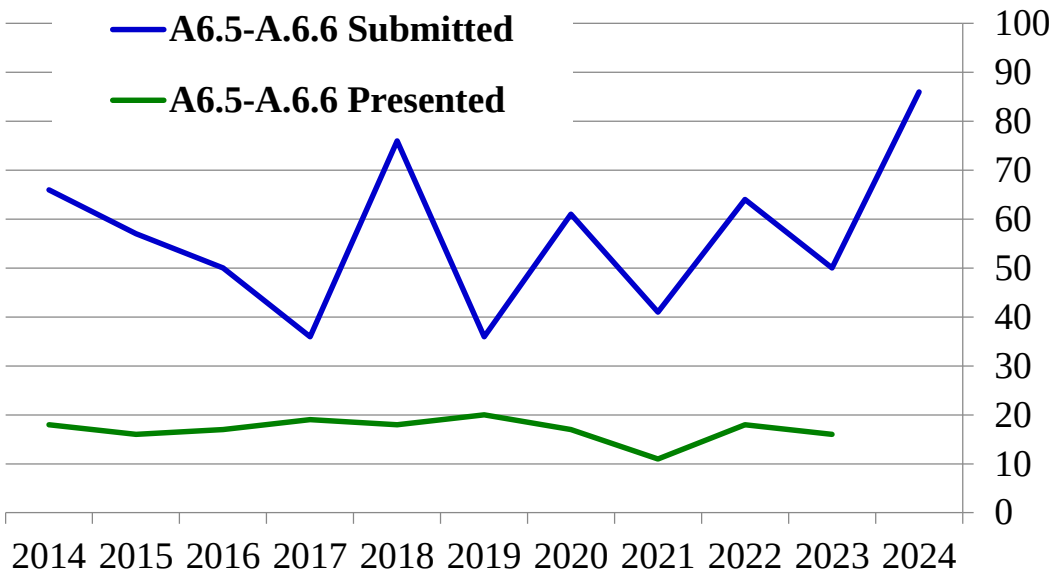


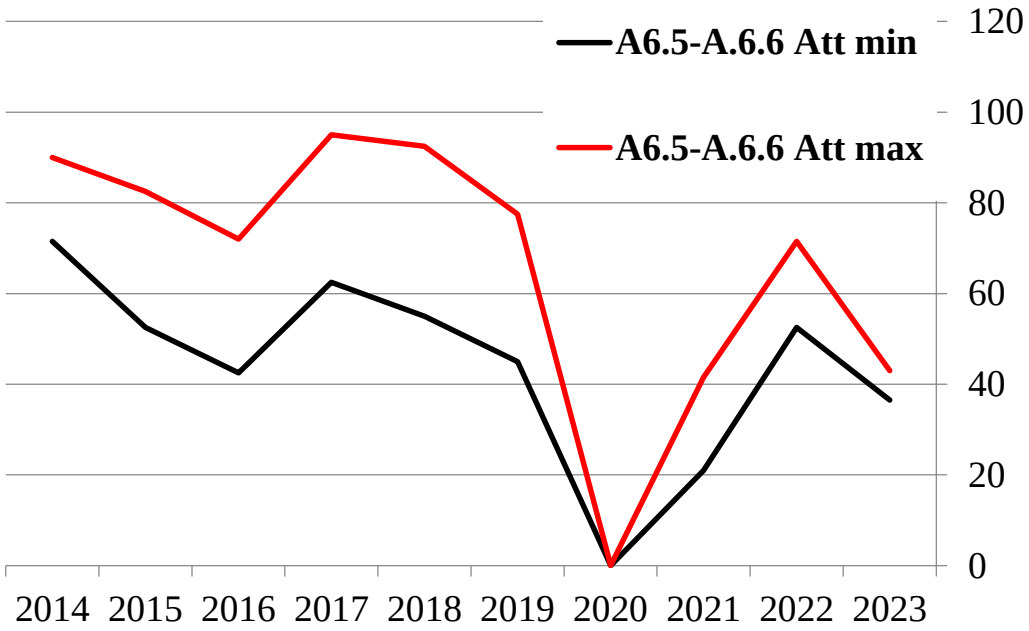


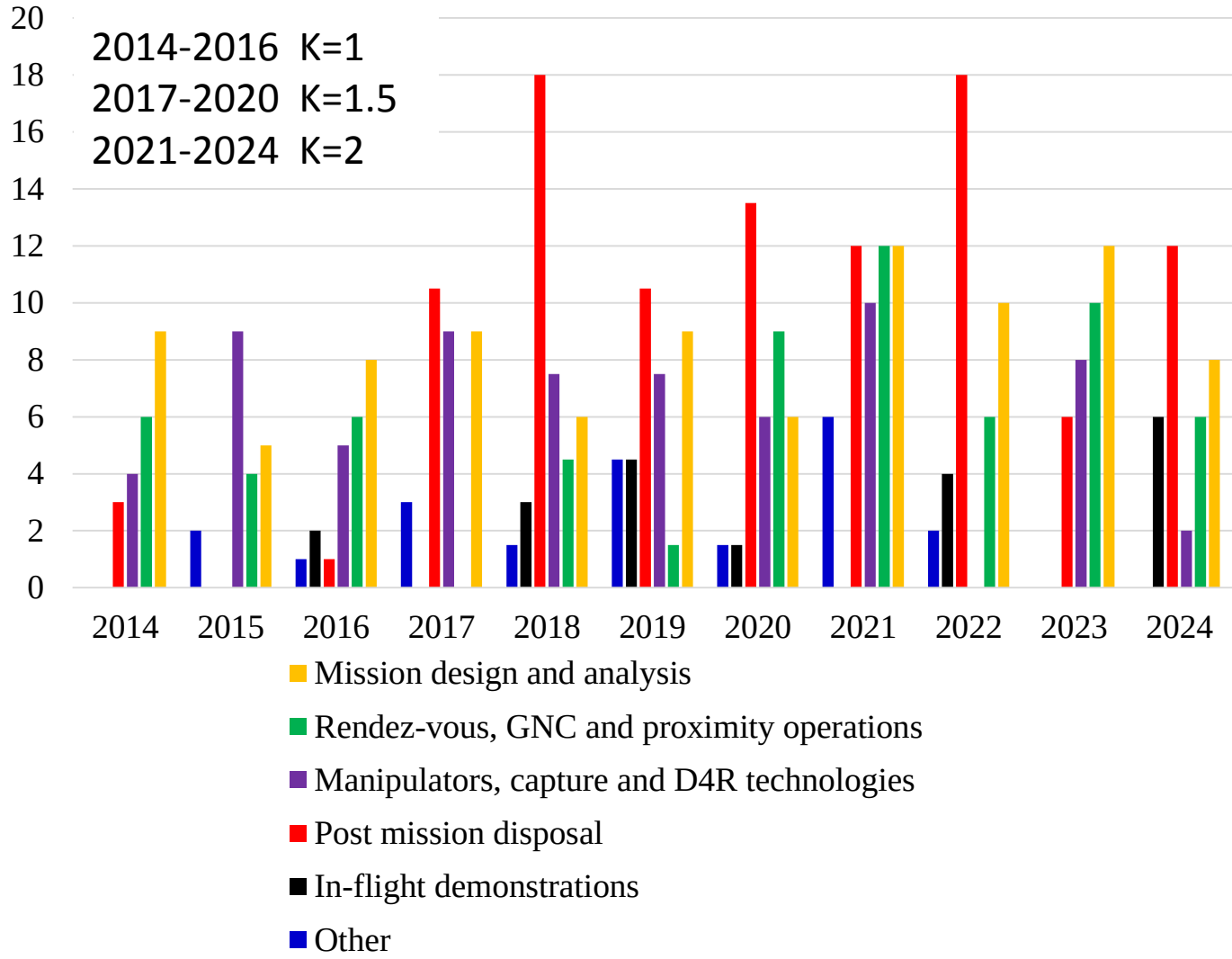
- Active and passive debris removal techniques, D4D, etc. — **current A6.5**
- Models and tools for mitigation analysis
- Evolution of orbital env. (orbit prediction, tracking system, etc.) and risk assessment — **current A6.2**
- Mitigation measures and verification of compliance mitigation guidelines
- Lesson learnt, impact of current measures, improve of current recommendations
- Other

- **1-2 sub/slot, increasing**
- **Stable average attendance**

A6.5, A6.6 Post Mission Disposal and Space Debris Removal

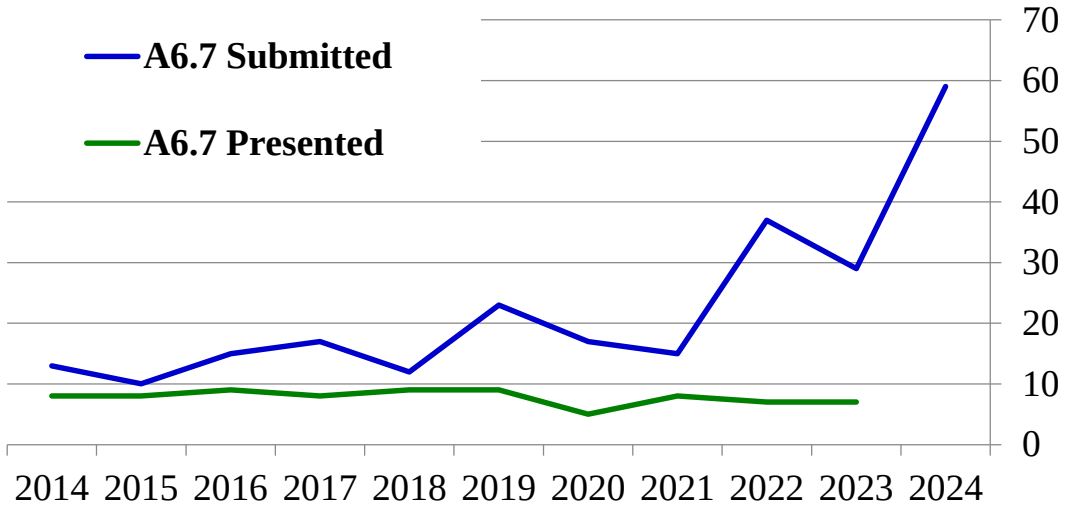


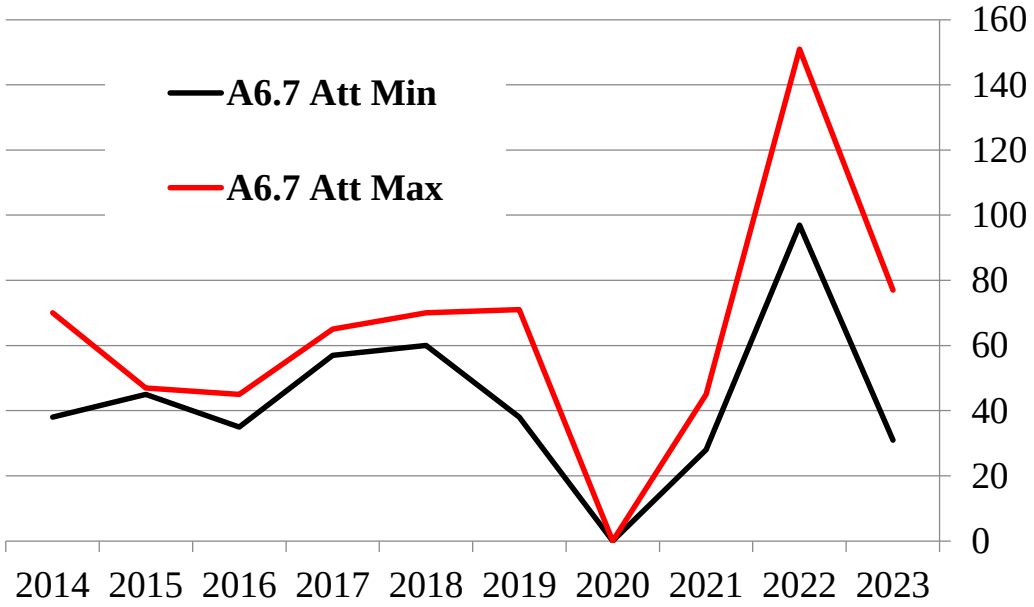


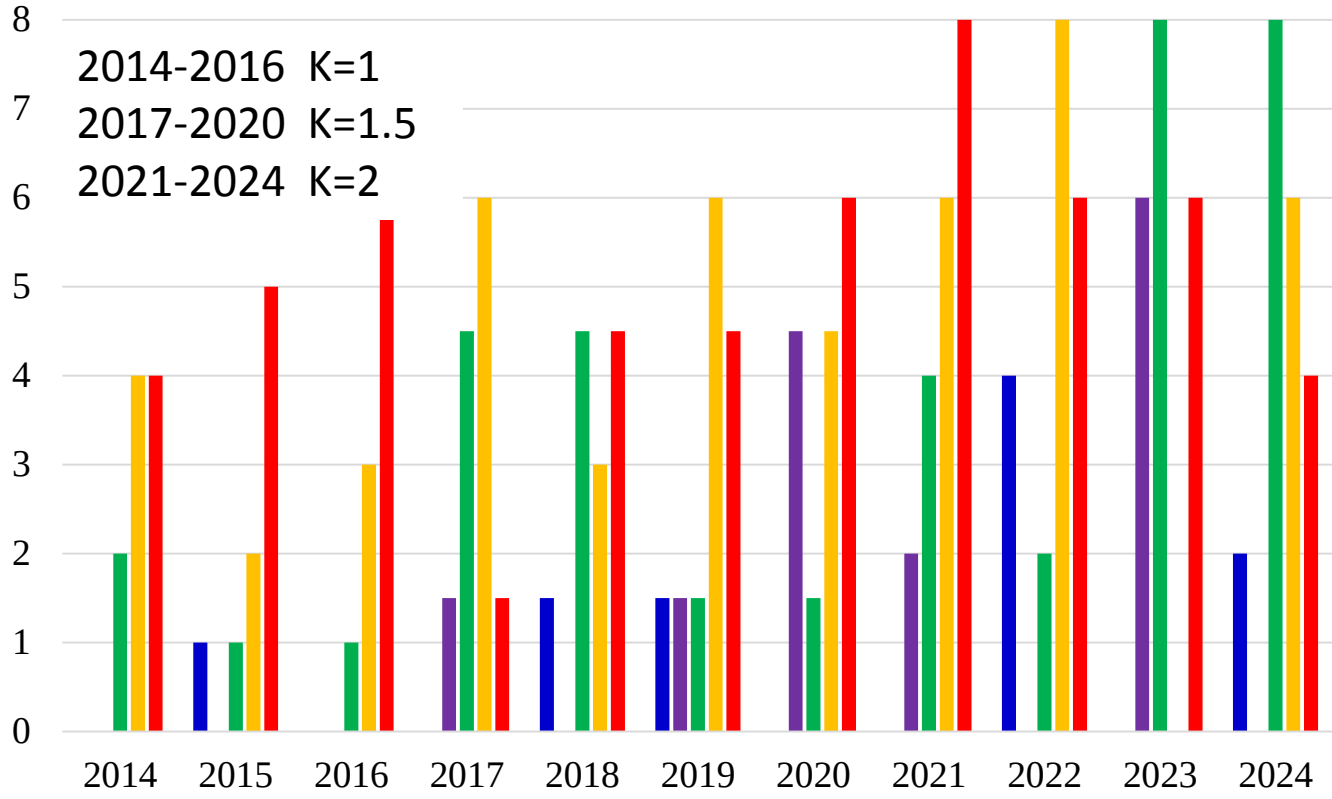


- **5-6 sub/slot if united, stable**
- **Decreasing average attendance**

A6.7 Operations in Space Debris Environment, Situational Awareness – SSA





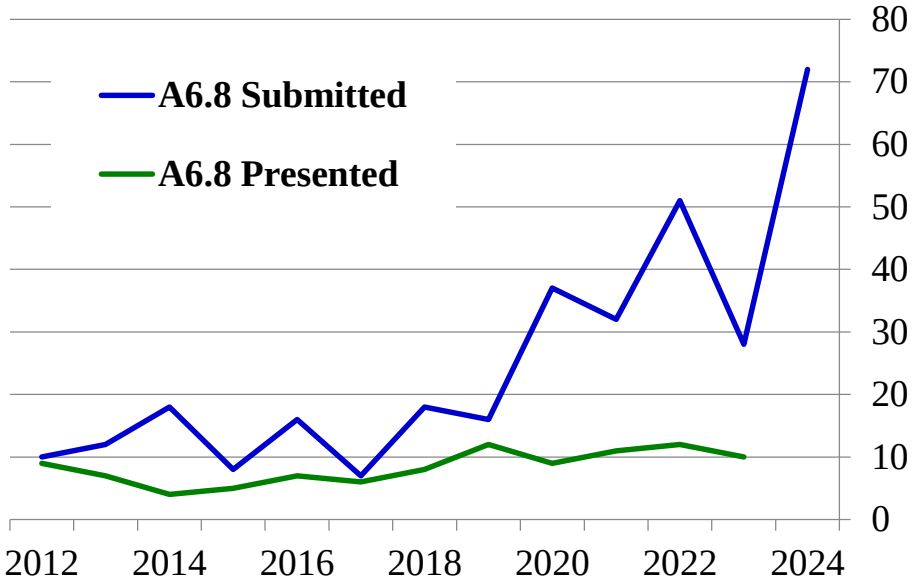


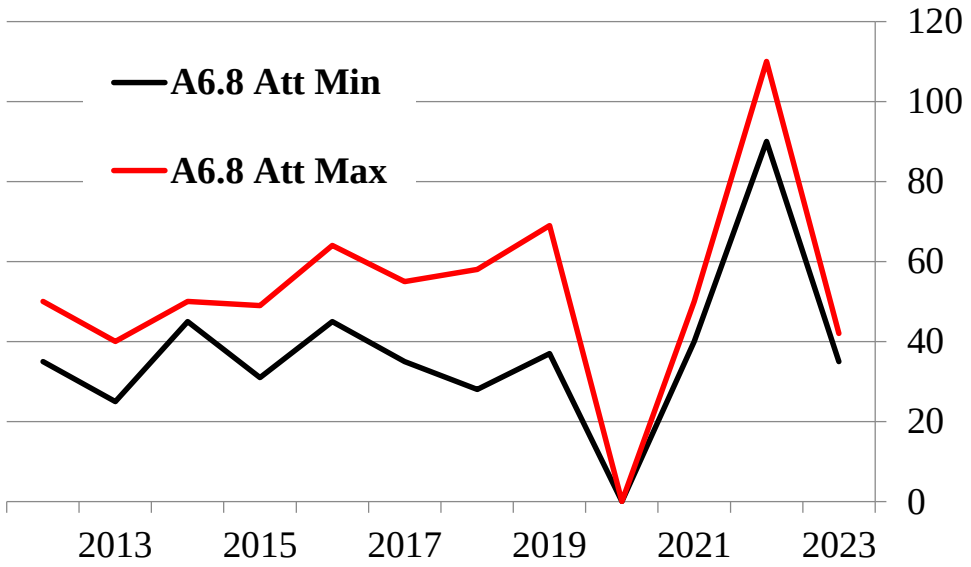
- Satellite operations and systems design
- Ground-based sensors design and operations
- Operational strategies and optimizations and modelling
- Artificial Intelligence applications to operations
- Other

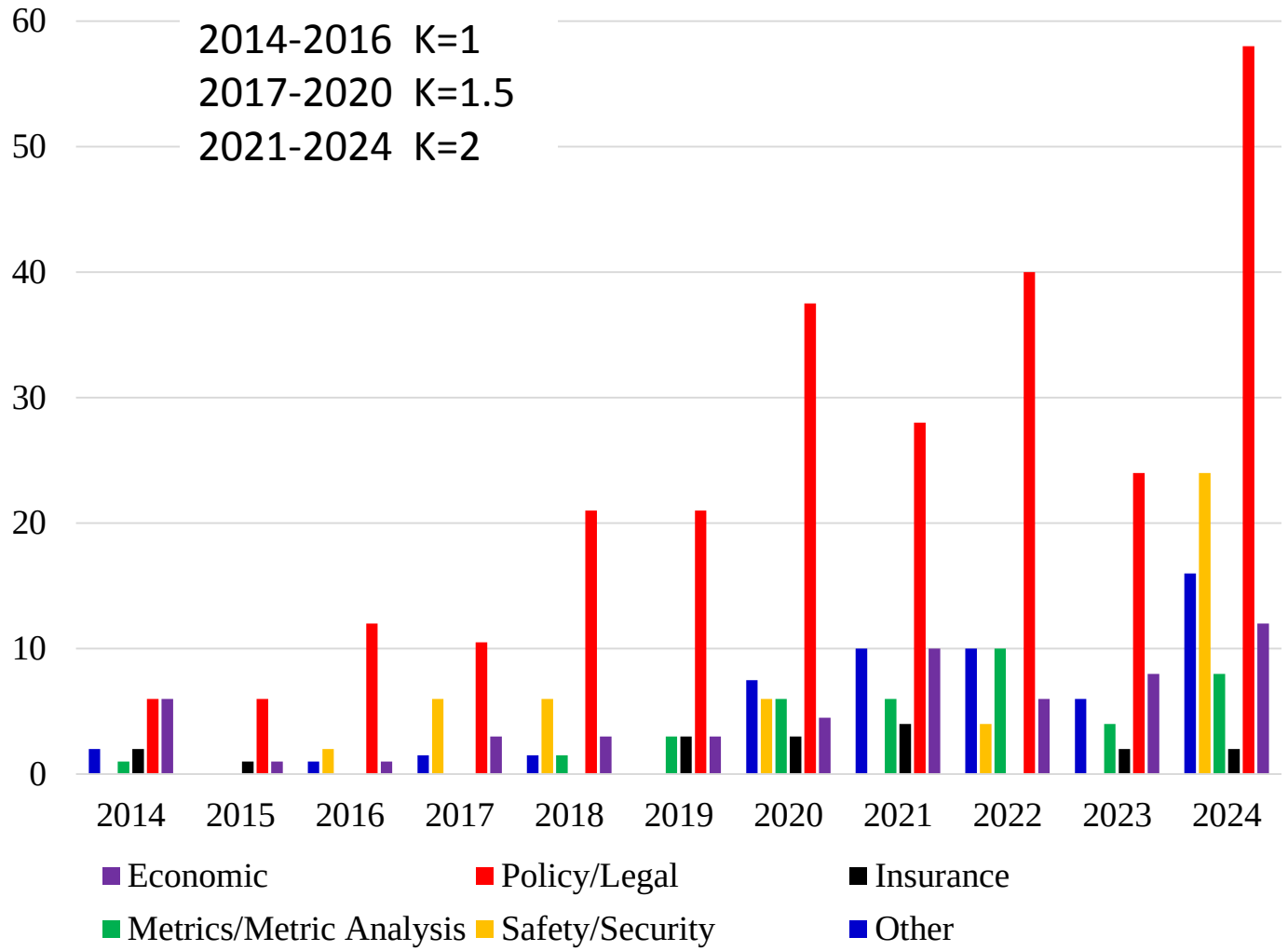
current A6.1

- **2-3 sub/slot, increasing**
- **Stable average attendance**

A6.8 Policy, Legal, Institutional, Economic and Security Aspects of D Mitigation, D Remediation and STM

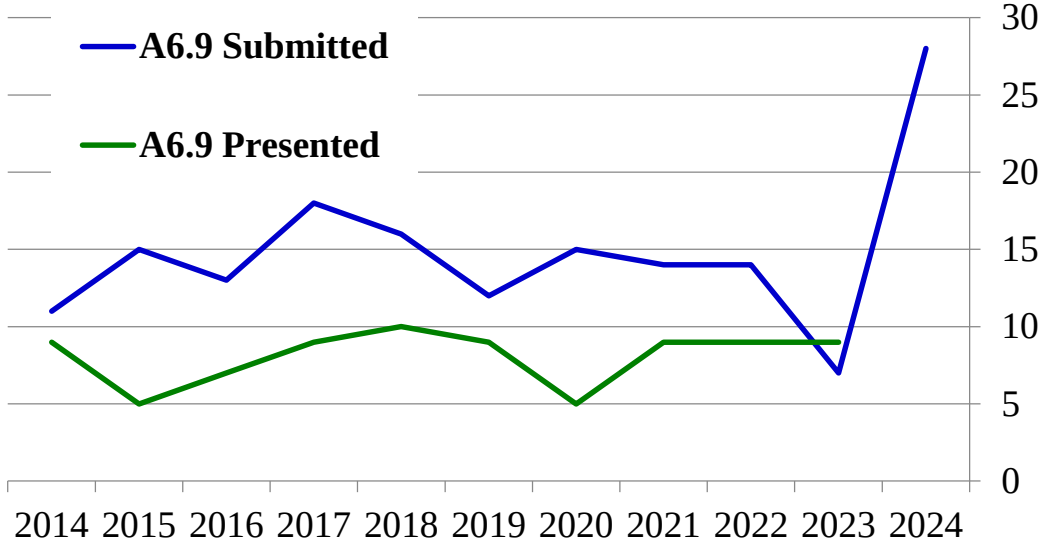


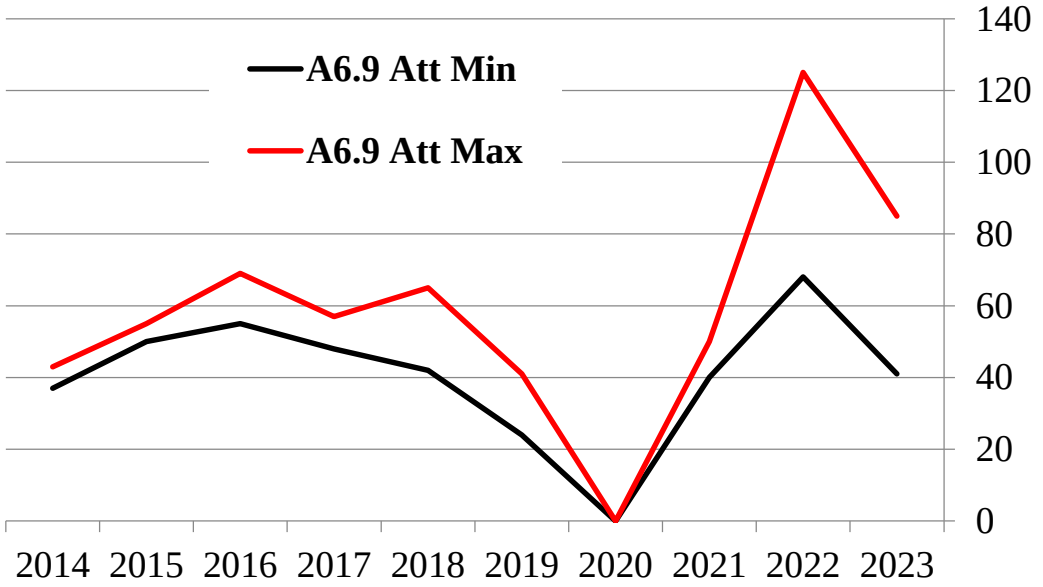


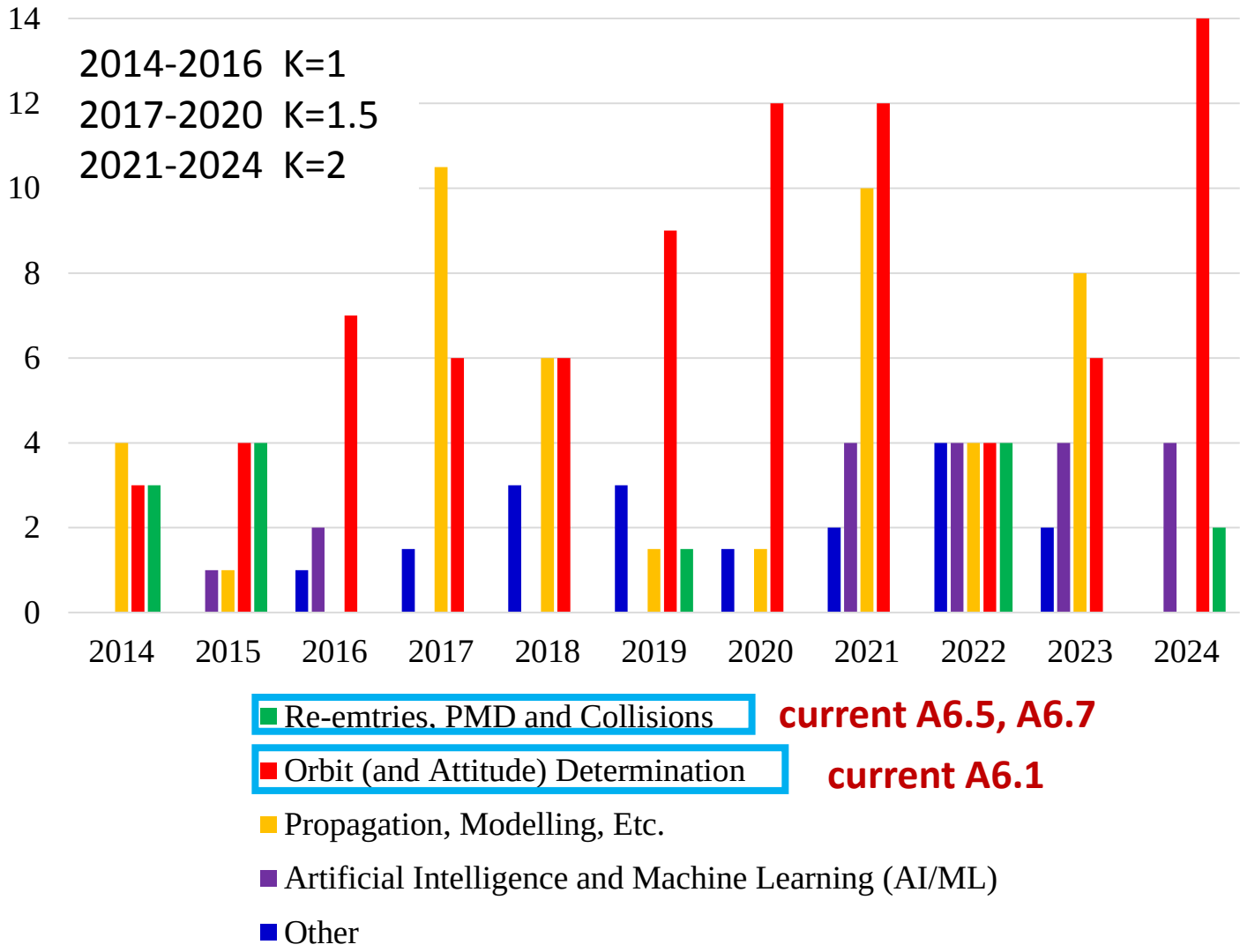


- **2-4 sub/slot, increasing**
- **Stable average attendance**

A6.9 Orbit Determination and Propagation – SST







current A6.5, A6.7

current A6.1

- 1.5 sub/slot, stable
- UnStable average attendance

Proposal A

- **A6.1 Space Debris Detection, Tracking and Characterization – SST-1**
- **A6.2 Space Debris Detection, Tracking and Characterization – SST-2**

One session with two parts

- **A6.3 Modelling and Risk Analysis & Impact-Induced Mission Effects and Risk Assessments (Including re-entry)**
- **A6.4 Operations in Space Debris Environment, Situational Awareness – SSA**
- **A6.5 Mitigation - Tools, Techniques and Challenges – SEM + Post Mission Disposal**
- **A6.6 Remediation – SEM**
- **A6.7-E9.4 Space carrying capacity assessment and allocation (new)**
- **A6.8-E9.1 Policy, Legal, Institutional, Economic and Security Aspects of Debris Mitigation, Debris Remediation and STM**
- **A6.9 Orbit Determination and Propagation – SST**
- **Reserve TBD**

Comparison with current structure

- ✓ **Two sessions for overloaded "Measurements" direction**
- ✓ **Current A6.2+A.6.3 are merged, enforced by underlined re-entry related topics**
- ✓ **Mitigation is enriched by PMD, while Remediation becomes less filled (≈76-25 this year)**

Proposal B

Where are they?

- **A6.1 Space Debris Measurements and Orbit Determination– SST**
  - **Ground-based measurements**
  - **Space-based measurements**
  - **Orbit determination and objects identification**

Who are they?

- **A6.2 Residual Space Objects Characterisation and High Velocity Impacts**
  - **RSO characterization**
  - **RSO angular motion (estimation, simulation, experiments)**
  - **Hyper-velocity impacts, shielding and consequences**

What are the Risks?

- **A6.3 Environment Modelling and Risks Assessment**
  - **Environment modelling**
  - **Collision risk analysis**
  - **RSO break-ups analysis and reconstruction**

How to live with?

- **A6.4 Operations in Situational Awareness and Space Traffic Management – SSA**
  - **Satellite operational strategies and systems design**
  - **Artificial Intelligence application in SSA**
  - **Collision avoidance manoeuvres,**
  - **Operations in Mega-constellations**

Transfers

RSO characterization (ground-based and space-based)

Break-ups analysis and simulation

CA maneuvers

Proposal B (part 2)

What to do?

- **A6.5 Post Mission Disposal and Space Debris Removal – SEM**
  - **Passive end-of-life disposal modelling and operations**
  - **D4R technologies**
  - **ADR missions design, analysis and in-flight demonstration**
  - **Rendezvous and proximity operations (including GNC and robotics)**

Does it work?

- **A6.6 Orbit Propagation and Mitigation Assessment – SST**
  - **Orbital dynamics of RSO**
  - **Propagation technics**
  - **Long-term simulations and mitigation effectiveness assessment**

How much we pollute?

- **A6.7 Re-entry Modelling and Interaction with Atmosphere (new)**
  - **Re-entry modelling, safety and prediction**
  - **Atmospheric break-up (mechanic and thermal) models and testing**
  - **Effect on re-entry on the atmosphere (pollution)**
  - **Impact of re-entry objects on air traffic control**

Proposal B (part 3)

Should we try?

- **A6.8-E9.1 Policy, Legal, Institutional, Economic and Security Aspects of Debris Mitigation, Debris Remediation and STM**
  - **Policy / legal issues**
  - **Insurance / economics**
  - **Security / safety issues**

Where is the limit?

- **A6.9-E9.4 Space Orbital Capacity Assessment and Dynamic Allocation (new)**
  - **Debris risk indicator and object ranking**
  - **Orbital slots, Space capacity modelling and allocation**
  - **Effect of debris mitigation guideline on the whole space debris models (space debris population control)**

Reserve

- **A6.10 TBD**

Comparison with current structure

- ✓ **The structure is based on the key questions related to space debris**
- ✓ **No direct thematic intersections between sessions**
- ✓ **Seems to be rather revolutionary, but it is better to get ahead of the curve and act to ensure long-term sustainability of the Symposium.**

General Recommendations

1. **Approve prepared A6 Application Form.**

2. **Make web-site description of each session more precise to avoid intersection of the thematic between sessions.**

3. **3 session chairs + 1 rapporteur OR 2 + 2 in order to keep the representation of session during IAC and SM.**

4. **Decide if we establish the Trainee group to grow future chairs and rapporteurs. Decide if we need A6 Guidelines, especially focusing on the internal functioning of the Symposium.**

5. **Decide on A6 Symposium structure.**