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**AES VISION
2020**

**Technical Operations – SMART Objectives Review
and Appendix
George Schmidt**

**October 18-19, 2019
Cologne, Germany**

Technical Operations 3-Year Goals

1. Review all technical panels for relevance, activity and leadership. Seek revitalization of those technical panels that may be dormant or lacking, and drop those whose relevance or currency has expired. Seek to expand the portfolios of each panel, as well as, its membership.
2. Identify topics and potential leaders for new areas within our fields-of-interest where technical activities should be pursued.
3. Implement guidance in the form of best panel practices from initial proposal of the panel through on-going operations and recognize outstanding technical panels achieving their goals.
4. In collaboration with Conferences, identify and recruit AESS members from technical panels and elsewhere to participate in organizing AESS conferences.
5. In collaboration with Education, promote interaction between technical panels and local AESS chapters by increasing the number of DLs on panels.
6. In collaboration with Publications, have each panel produce an annual technical contribution to Systems, and contribute to the QEB.

2019 Technical Operations Objective

S – Reorganize the Avionics Systems Panel (ASP)

M- January- Complete solicitation of new members

February- Election of Chair and Vice Chair. Kickoff “meeting” prior to ICNS

April- Work with new chair in organizing the new ASP according to new Panel, Policies, and Best Practices.

A – Assigned to: Schmidt

R – Relevant to which goal(s) and how? #1, 2, 3

T – Time period for performance: Jan-Oct 2019

ASP

■ The Avionics Systems Panel (ASP) leadership was elected in February, 2019:

- Chair: Alope Roy
- Vice Chair: Roberto Sabatini
- Initial members of the Panel: George Andrew, Erik Blasch, David Brown, Christopher Camargo, Giancarmine Fasano, Omar Garciacrespillo; Kathleen Kramer, Irfan Majid

■ PURPOSE:

- To promote and support collaborative research initiatives in the domain of Avionics;
- To promote and support high-quality IEEE publications in the domain of Avionics;
- To promote and support educational activities in the domain of Avionics;
- To sustain and oversee the programs of the IEEE/AIAA Digital Avionics Systems Conference (DASC), the Integrated Communications Navigation and Surveillance Conference (ICNS); and create new conferences or partnerships;
- To establish a liaison and joint work program with the Cyber Security Panel;
- **To take the AESS lead in unmanned and intelligent systems (The AESS UAV Panel was terminated in August for lack of developing any program in the UAV field)**
- To manage the nomination and selection of candidates for IEEE Awards in the domain of Avionics;
- To encourage the submission of nominations for IEEE Fellows and Senior Members in the domain of Avionics;
- To recommend and support new IEEE Standards or revisions of existing IEEE standards pertaining to the domain of Avionics;

Summary of ASP Activities

- Sponsored Digital Avionics Systems Conference (DASC) jointly with AIAA at San Diego, CA from September 10-12, 2019
 - One of the best attended avionics conference over the last ten years (335 attendees from more than 25 countries presented over 200 technical papers)
 - Offered two full days of tutorials prior to conference start. Approximately 140 tutorial attendee registrations – highest for any DASC in the last twenty-five years
 - Held first outreach event for Young Professionals and Women in Engineering at a Digital Avionics Conference
 - Panel members presented a paper on Avionics System Panel roles and objectives at a technical session
 - **The DASC conference will be the launchpad to establish strong ties for ASP in UAM/UAS/UTM space by collaborating with the industry leaders who participated as keynote and panel speakers**

- Sponsored Integrated Communication, Navigation and Surveillance (ICNS) Conference with AIAA during April 9 to 11, 2019 at Washington Dulles, Virginia.

- AESS Magazine article outlining ASP objectives, goals and technology priorities is under development. Expect the article to be ready for publication by end of 2019

- Meetings
 - Face to face meeting of ASP and Cyber Panel members with DASC attendees on September 12, 2019 at San Diego, CA
 - Monthly teleconferences are held for ASP members

2019 Technical Operations Objective

S – Use the GAP analysis relative to DLs and Panels and work with Education to include Panel recommendations for DLs and for DLs to become members of Panels

M – At the end of the year, compare the number and distribution of DLs with technical interests associated with each Panel or on each Panel. (+2 new DLs from Panels 1/19:UAV and NSP, 8/19 minus UAV))

A – Assigned to: Schmidt

R – Relevant to which goal(s) and how? #5

T – Time period for performance: 2019

2019 Technical Operations Objective

- S** – Have Panels produce an annual article for Systems and improve inputs to QEB
- M** – All relevant Panels contributing to both'
- A** – Assigned to: Schmidt and Panel Chairs
- R** – Relevant to which goal(s)? #6
- T** – Time period for performance: Ongoing. Panel Chair selection of Systems authors June 1.

Panel Volunteers for 2019 Systems Articles

Assigned AESS Panel	Authors
Glue Technologies for Space Systems	Claudio Sacchi
Navigation Systems	Jindrich Dunik
Radar Systems	Jacyna & Mokole (MITRE), Adventures in Spectrum
Avionics Systems	Rob Sabatini
Cyber Security	Kathleen Kramer and Erik Blasch (Special Issue Organizers)- In Process

10/31/2019

2019 Technical Operations Objective

S – Determine topics and potential leaders for Future Directions

M – By April BoG Mtg: PPT Status Presentation
For Oct BoG Mtg: PPT Summary on “The Way Forward”

A – Assigned to: Lead Ruggieri, Entire Committee

R – Relevant to which goal(s)? #1, 2

T – Time period for performance: Feb 2019- Dec 2019

2019 Tech Ops Committee: Organization, Activities & Future Directions

Marina Ruggieri, *Chair*
Tech Ops Future Directions Committee

October, 2019

Tech Ops Committee – Composition

- **Composition:** Michael Braasch
Michael Cardinale
Stefano Coraluppi
Mark Davis
Yonina Eldar
Hugh Griffiths
Marina Ruggieri (Chair)
George Schmidt (VP, TechOps)

Tech Ops Committee – Organization & Activities

▣ Assignment to Panels (February 28, 2019):

NSP - *Michael Braasch*

UAV - *Mark Davis*

RSP - *Hugh Griffiths*

CyberSec – *Kathleen Kramer*

SSP* - *Marina Ruggieri*

ASP* - *George Schmidt***

* **shut-down & re-start** **no assignment for GAP and ACGSP (George takes care of)

Tech Ops Committee – Organization & Activities

▣ Vitality of Panels in terms of Future Directions:

ACGSP – to be explored

ASP - promising

CyberSec - promising+

GAP – flat (that means OK for the topic)

GlueTech - promising+

NSP – margin to improvement

RSP – promising+

UAV (*closed – migration of topics on ASP*)

Tech Ops Committee – Organization & Activities

▣ **Vitality parameters for Future Directions:**

- * **New Topics**
- * **New Events**
- * **New Courses**
- * **New partnership**

In some of the Panel reports (in Appendix) a great potential for Future Directions is either explicitly or implicitly included.

Tech Ops Panel Reports-- Appendix

- Aerospace Control and Guidance**
- Avionics Systems**
- Cyber Security**
- Glue Technology for Space Systems**
- Gyro & Accelerometer**
- Radar Systems**

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Aerospace Control & Guidance Panel

Chair: Marge Draper-Donley

October 2019

AEROSPACE CONTROL and GUIDANCE

- Annual 1-day short course
- Competitive award lecture for young engineers
- Meeting locations to facilitate relevant tours when possible
- Continued dissemination of semi-annual meetings info within AESS/on-going Panel interaction

- Invited talks across gov't, industry, universities
- Recent aerospace activity on Panel Topics of interest

- Aircraft and surface vehicles
- Missiles and Space
- Avionics and Systems
- Dynamics and Analysis
- Flight, Propulsion, Autonomous Control

- 3/27-29/10 Santa Fe, NM
- 10/16-18/19 Williamsburg, VA

Initiatives Updates

- One day Short Course presented 3/26/19 prior to Mtg 123
 - Topic: Aircraft System Identification in the Frequency Domain
 - Taught by Dr. Eugene Morelli, NASA Langley
 - 12 attendees, including 2 international
- Young professional lecture award (Dave Ward Memorial Award) winner selected-
 - Award to be presented during Meeting 124, Oct 16-18 2019
 - Winner expenses paid to attend Fall meeting and give lecture: “Game-Theoretic Control Strategies in Adversarial Environments”
 - Next award cycle nominations expected to open June 2020 online at www.acgsc.org

Upcoming Meeting Plans

- Meeting124, Oct 16-18 in Williamsburg, VA
- Will have 3 days of committee short and full briefings within the indicated panel topic areas
 - Will include presentation of young professional Dave Ward Award and lecture by our winner
- Meeting 125 still **TBD**
 - targeting March 25-27, 2020 San Diego, CA
 - Will include 1 day short course (TBD)



Avionics Systems Panel (ASP)

Chair: Alope Roy

October 2019

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Cyber Security Technical Panel

Kathleen Kramer, Panel

October 2019

Cyber Security – Future Directions Opportunities and Issues

- **AESS Technical Interests and Cyber**
 - Goal: More coverage (DLs, articles, meetings, resource center) and to build more clarity of topics specific to AESS technical operations vs Cyber security as a general topic.
 - There is an overlap of 3 with the Avionics TechOps panel which helps support expertise and AESS fields of interest in cyber.
 - **FD Opportunities and issues**
 - Cyber Security Engineering – which panel chair helped draft approved accreditation criteria for was the theme of April 11-12 ABET Symposium (sold out). Significant interest and visibility. Cyber criteria approved for 1st reading July 2018 and expected to be approved July 2019.
 - ICCST is a “security” conference – so it’s very strong on “security” not necessarily cyber or related to AESS interests, and has few AESS involved, but does certainly include such and has tracks that are in interests of panel. Update: ICCST has established regular panel meeting at end of conference and is pursuing their own special issue.
 - DASC is an Avionics and Air Traffic Management conference – covering both air and space, so there is a Cyber track and a Cyber tutorial, but it does not constitute the majority of the conference.

Cyber Security – Future Directions

Opportunities and Issues

- Committee Membership (7+10)
- Goal: Stronger, more effective panel
 - FD opportunities and issues
 - Kramer (Chair) - 16 others, including these 6 (2 BoG, 2 DASC TPCs, 2 ICCST chairs) and submitters to special issue from conference.
 - New member: Joe Dauncey - Chief Information Security Officer for the UK National Air Traffic Services
 - Membership is “open” – this allows interested members, particularly conference track and tutorial leaders in niche to be involved but also brings “volunteers” whose interest is self- and center- promotion and provides little organizing support.
 - Chairs of both DASC and ICCST are involved in the panel
 - Two of the members are DLs and third is chair of Avionics panel. They’re the 3 most involved with the Cyber panel. This is both a blessing and a curse as the Avionics panel is rebooted, given the pulls on all involved.
 - Update: had first web meeting in July 2019, ahead of DASC and ICCST.

Cyber Security – Future Directions Opportunities and Issues

- Meetings:
- Goal: Better distributed meetings. Plan to add a web meeting in June 2019.
 - [FD Opportunities and issues](#)
 - Both involved conferences are late in the year. This leads to overweighting of effort in September and October and little communication and opportunity for activities in first half of year.
 - Successful in having panel meetings at both conferences
 - Distribution over two conferences and lack of commitment from individuals to both the panel and the conferences means **members are not necessarily at either conference** and little/no overlap in meeting attendance.
 - Update: Held joint panel meeting at DASC in San Diego in September w/ VPTechOps in attendance. DASC2020 will be in San Antonio. Joint panel paper (Cyber Awareness Trends in Avionics @ DASC 2019)

Cyber Security Report (Technical Operations Panel) – From Fall 2019

- **Significant Accomplishments**
- “Cyber Security Engineering” Criteria have been approved by the ABET Engineering Accreditation Commission with panel chair (Kramer) on subcommittee from IEEE to work with INCOSE and CSAB. (provided)
 - Aerospace Systems for SYSTEMS Magazine
 - Article joint with Avionics
 - SI form ICCST interests (Security rather than Cyber Security) went separate.
 - 2-part Special Issue November 2017 and March 2017 was a major/first accomplishment of panel. Thanks for Greco, Walsh, Thienissen. Drew from DASC and ICCST.
- **Objectives**
 - Four panel meetings per year incorporated into program of DASC and ICCST
 - Special Issue and or Articles
 - Add to Resource Center and DLs
- **Notes**
 - Increase of panel meetings per year a success for 2019
 - Article and conference paper with Avionics

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**Glue Technologies for Space Systems
(GlueTech)**

Claudio Sacchi, Chair

October 2019

Current picture of the panel membership

- So far the panel accounts **21 members**: 2 coordinator members (Claudio Sacchi, Marina Ruggieri), 10 founder members and 9 (new) adjunct members:

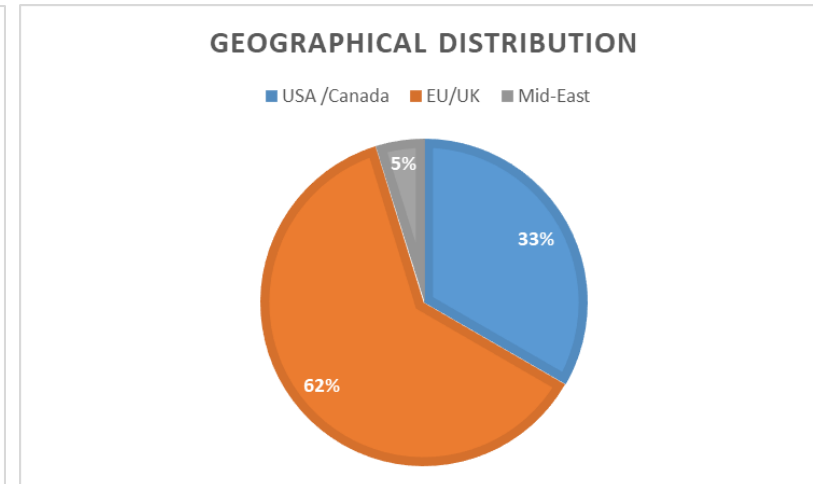
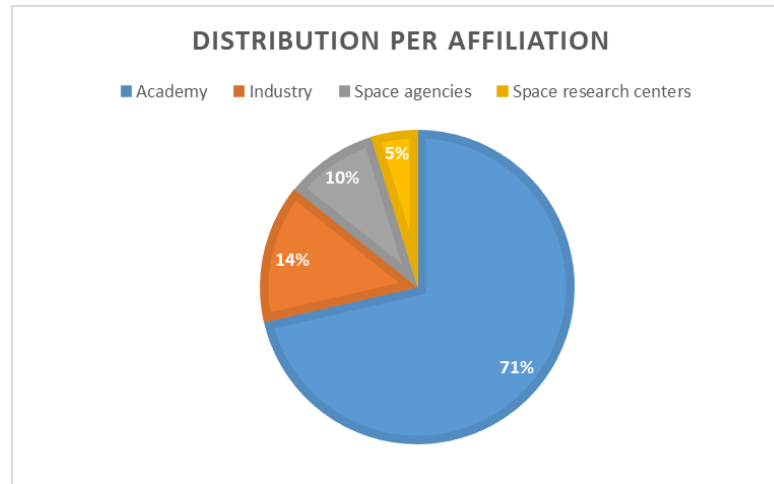
Panel founder members:

1. Kar-Ming Cheung
2. Mario Marchese
3. Fabrizio Granelli
4. Vlad Popescu
5. Michael Rice
6. Maurizio Murrone
7. Nicola Conci
8. Christian Schlegel
9. Tommaso Rossi
10. Michael Noble

New (adjunct) members

11. Mohammed-Slim Alouini
12. Michael Devetsikiotis
13. Giorgia Parca
14. Giuseppe Codispoti

15. Paolo Tortora
16. Barry Evans
17. Eugene Grayver
18. Simone Morosi
19. Sean Malek



Meetings

Recent Meetings

Dates	Location	Host	Attendance
23 September 2019 (KO meeting)	Rome, I	Italian Space Agency (ASI)	13

Future Meetings

Dates	Location	Host
March 2020	Big Sky, MT	IEEE Aerospace Conference

Activities

■ Planned activities:

- Writing of the panel description paper to be published by IEEE AES Magazine (October 2019);
- Organization of special sessions on panel topics, organized in the framework of the European Wireless Conference 2020, held in Verona;
- Proposal for a short course on Softwarization and Virtualization for satellite communications (to be submitted on October 2019);
- Organization of a Summer School focused on panel topics (Summer 2020);
- Submission of a proposal for an industrial panel on Glue Technologies for Space Systems to be organized in the framework of IEEE ICC Conference 2020 in Dublin;
- Inclusion of the working groups on Polar Engineering in the Panel Membership (asap).



Gyro and Accelerometer Panel (GAP)

Randall Curey, Chair

October 2019

Standards Activity

- The revision of IEEE Std 528, "**IEEE Standard for Inertial Sensor Terminology**," is in the hands of the IEEE editors. The proofs have already been reviewed and comments were sent back to the editors.
- The revision of IEEE Std 952, "**IEEE Standard Specification Format Guide and Test Procedure for Single-Axis Interferometric Fiber Optic Gyros**," is in progress. The balloting pool has been formed and Mandatory Editorial Coordination (MEC) has been completed, although the GAP is still working on resolving the comments from the MEC.
- A project authorization request (PAR) has been submitted to revise IEEE Std 1559, "**IEEE Standard for Inertial Systems Terminology**." About 50 new definitions and acronyms have been added to the existing 262.

Meetings

Recent Meetings

Dates	Location	Host	Attendance
11/12 March 2019	Phoenix, AZ	Honeywell Aerospace	16
6/7 May 2019	Heath, OH	Boeing IDS	13
15/16 July 2019	Redmond, WA	Honeywell Aerospace	11
16/17 September 2019	Tucson, AZ	Raytheon Missile Systems	9

Future Meetings

Dates	Location	Host
November 2019	Alamogordo, NM	Alamogordo IEEE Chapter
January 2020	San Antonio, TX	Southwest Research Institute

Radar Systems Panel (RSP)

Tech Ops Future Directions

Panel Chair: **Shannon Blunt**

Future Directions – Panel Operations

- Ad hoc committee exploring the prospect of a Transactions on Radar journal (want to link to strong, sustained growth in the Radar Conference series)
- Moved the Student Papers Awards out of being run by the Radar Conference and now overseen by a dedicated committee within the RSP (ensure global perspective and consistent operation)
- Discussing ways in which to increase/sustain industry participation within the Radar Conference series and the IEEE radar community
- Continuing to work to expand the footprint of AESS into the civilian radar community
- Determining the best path ensure long-term sustainment of the Radar Summer School

Future Directions – Radar Technology

- mm-wave / THz sensing and applications thereof
- expanding civil applications in automotive safety, wearables, and variety of autonomous vehicles
- software-defined radar capabilities
- Radar spectrum sharing (with 5G & beyond) and multi-function systems (RF convergence)
- continued expansion of waveform diversity capabilities and applications
- increasing decision autonomy in sensor systems (cognitive RF)
- quantum radar (though somewhat controversial)

Future Directions – Radar Technology

- Electromagnetic spectrum maneuver
- integrated multi-modality systems (acoustics, optical, EO, IR, RF, etc.)
- Distributed/networked sensing
- “system-on-chip” radars
- Integration of passive and active sensing
- “extreme fidelity” systems (ultra-stable clocks, digitization at higher bandwidths, higher bit depths for dynamic range)
- Advances in metamaterials for dynamically reconfigurable operating modes