

Spacecraft Anomalies and Failures (SCAF) Workshop(s)

*Evolving Over Five Years
Co-sponsored by NSASA and NRO*

SCAF held in Chantilly, VA (USA) Fall/Winter (date TBD)

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Spacecraft Anomalies and Failures Workshop

Operational Motivation

- Presidential Policy Directive – 4
 - National Space Policy, 2010

• ***“Improve, develop, and demonstrate, in cooperation with relevant departments and agencies and commercial and foreign entities, the ability to rapidly detect, warn, characterize, and attribute natural and man-made disturbances to space systems of US interest.”***

- **Disturbances on spacecraft** – understand physics
- **Cooperative across multiple agencies** – who to talk to
- **ID triggers and effects** – what questions to ask

Lessons Learned on Utility of Anomalies Databases

- Simple data inconsistency is big issue
 - Different launch dates
 - Different names
 - Palapa 1C <-> HGS3 <-> Anatolia <-> PaK
- Poor traceability of more complicated data
 - Between: mission effects, system status, subsystem status, and component status
- There are information sharing limitations
 - Open Source - authoritative source?
 - Commercial - proprietary restrictions
 - Military/IC - security limitations
- **Indeed, symptoms not specific to lowest possible hardware level and definitely not time-sequenced**
 - **Observables ≠ symptoms**
- **Need to draft “how to deal with satellite anomalies” as a best practice white paper or standard - STARTED**
- **A definition is needed for “anomalies.”**
 - Functional perturbation to a satellite component, subsystem, or system
 - can be traced to a manmade or natural trigger.
 - Even if the ‘anomaly’ was expected, it is still an anomaly to the operations of that part of the satellite
- Determining root cause of these events aid in...
 - anomaly attribution,
 - model validation,
 - design/parts refinement,
 - component/system vulnerability assessments, and
 - clarifying insights for geo-political.

SEAF – “International SCAF”

- Sponsored by IAASS and held in Toulouse in October 2017
 - 18 people representing ten organizations from six countries.
 - Lack of knowledge of space physics, detailed understanding of spacecraft on-orbit, and the nominal effect of each trigger has a significant amount of uncertainty which combine to complicate anomaly attribution.
 - A follow-on workshop would be useful and the goal is continuing to include more presentations related to operational data anecdotes.
 - The diversity of the workshop participants and presenters contributed to the utility of the gathering.
- SEAF 2019 to be held in conjunction with IAASS Space Safety Conference
 - Los Angeles
 - May 2019

