



# **Safety of Spaceflight:**

**Looking back at the past decade,  
looking ahead at the next five years**

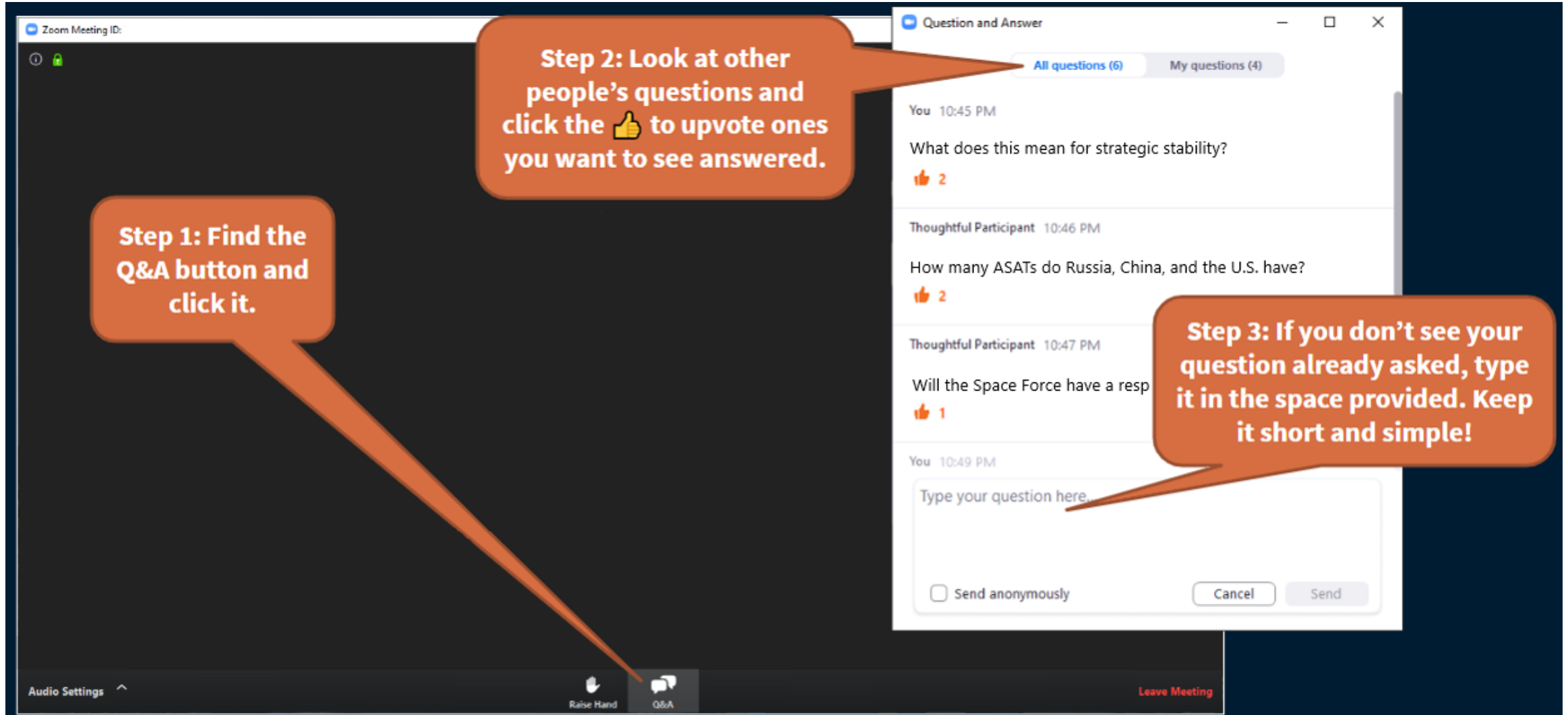
**WEBINAR**  
**July 29, 2020**



# SWF – A Quick Primer

- Secure World Foundation (SWF) is a private operating foundation that promotes cooperative solutions for space sustainability
- Our vision: The secure, sustainable, and peaceful uses of outer space that contribute to global stability on Earth
- Our mission: Secure World Foundation works with governments, industry, international organizations, and civil society to develop and promote ideas and actions to achieve the secure, sustainable, and peaceful uses of outer space benefiting Earth and all its people
- Secure World Foundation is dedicated to the establishment of effective and efficient systems of governance for outer space and for improving the safety of operations in Earth orbit

# How to Ask Questions



The image shows a Zoom meeting interface with a 'Question and Answer' panel on the right. Three orange callout boxes provide instructions:

- Step 1:** Find the Q&A button and click it. (Points to the Q&A icon in the bottom toolbar)
- Step 2:** Look at other people's questions and click the thumbs up icon to upvote ones you want to see answered. (Points to the thumbs up icon next to a question)
- Step 3:** If you don't see your question already asked, type it in the space provided. Keep it short and simple! (Points to the text input field in the Q&A panel)

The Q&A panel shows a list of questions:

- You 10:45 PM: What does this mean for strategic stability? (2 upvotes)
- Thoughtful Participant 10:46 PM: How many ASATs do Russia, China, and the U.S. have? (2 upvotes)
- Thoughtful Participant 10:47 PM: Will the Space Force have a resp... (1 upvote)
- You 10:49 PM: Type your question here. (Input field with 'Send anonymously' checkbox, 'Cancel', and 'Send' buttons)



## Keynote Presentation



**Pascal Wauthier**, Senior Vice President, Space Operations, SES, and Chairperson, Space Data Association



**SPACE DATA**  
ASSOCIATION

# The Space Data Association: Ten Years of Flight Safety Services

29 July 2020

P. Wauthier

*SWF Webinar: Safety of Flight:  
Looking back at the past decade,  
looking ahead at the next five years.*







- “Since 2005, the number of satellites launched into space has been increasing regularly year-on-year. Last year, MIT Technology Review predicted that the number of satellites orbiting Earth could quintuple in the next decade ...”
- Tracking these satellites will become extremely complex, emphasizing the importance of continuing to feed and share accurate, actionable data via independent repositories like the **Space Data Center (SDC) which celebrates this year its 10 years of flight safety services.**



## ➤ **What triggered the creation of the SDA and SDC?**

- Quote from TS Kelso when he presented a “Look Back on STM from 2029” in a “looking back” panel at the AMOS conference in 2019:
  - “That started in 2008 with pioneers like Intelsat, Inmarsat, SES, and Telesat, doing something that in 2019 might be called crowd sourcing.
  - We realized that STM--unlike ATC--is not geographically limited and that any accidents would affect the global space commons. That meant STM was an international issue and an international organization (SDA) was formed to manage data collection, quality control, analysis, and reporting.
  - And satellite operators realized that STM was truly a collaborative effort and that individual operators or countries could not do it alone. “



- **Back in 2010, the existing products and services for flight safety didn't meet satellite operator needs. Why not, what were the gaps?**
  - Only few operators had the capability to monitor close approaches using publicly available SpaceTracks information or had a separate agreement with JSpOC.
  - Why did the operators not trust these close approach notices? Here are two main reasons:
    1. SSA products and services were unnecessarily degraded by simplifications, faulty assumptions, and lack of quality control.
    2. SSA products failed to incorporate spacecraft operator data.





## ➤ **What the SDA and SDC do provide?**

- Formed in 2009, the Space Data Association (SDA) is a formal, non profit association of civil, commercial and military spacecraft operators that supports the controlled, reliable and efficient sharing of data that is critical to the safety and integrity of satellite operations
- SDA has a legal structure and agreements that provide protections and enforcement mechanisms to ensure data is only used for intended purposes
- Another key purpose of the SDA is to promote responsible behaviours from operators in all orbital domains to ensure the protection of key assets and the space environment. SDA works also with all interested entities to help define the next generation of STM systems and capabilities

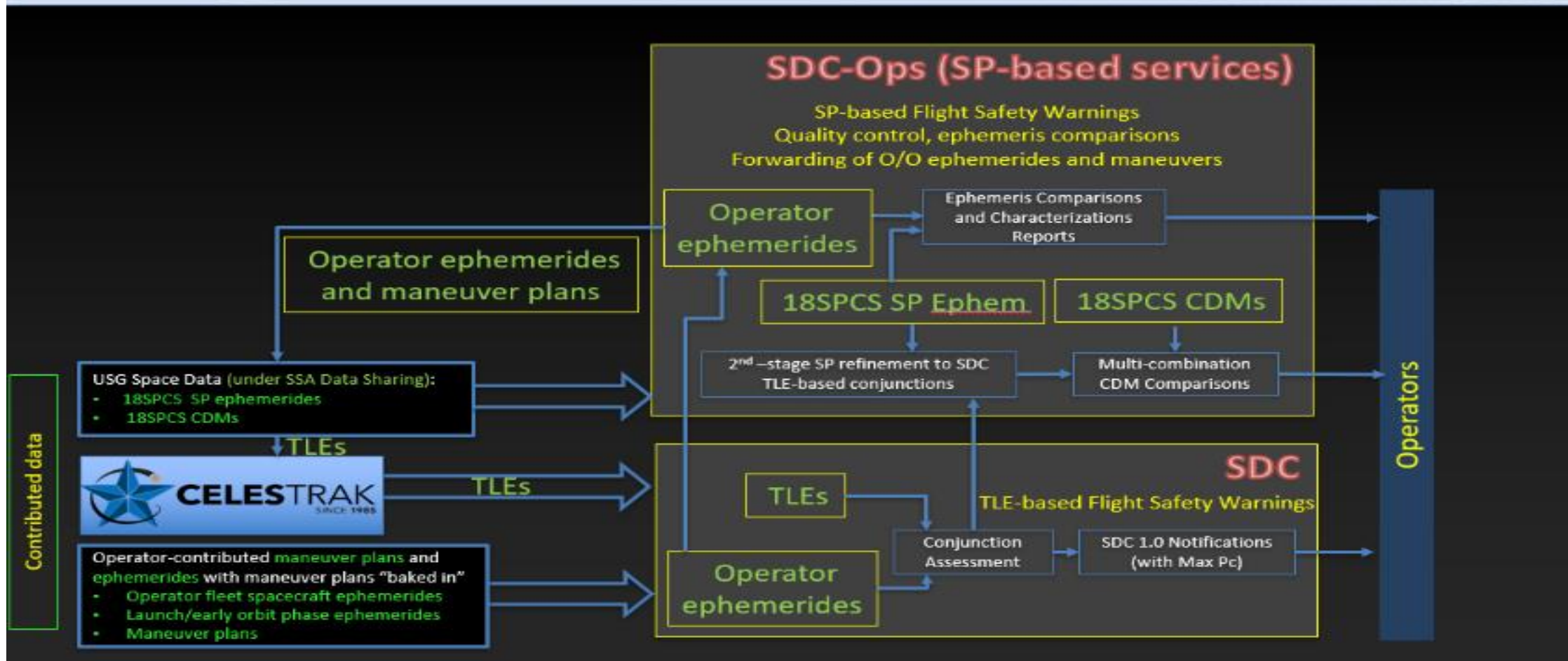


## ➤ **Who are the users of the SDC system?**

- The Space Data Association relies on the Space Data Center (SDC) operated by AGI for flight safety data exchange and processing
- The SDC system provides services to 30 global operators of spacecraft spanning all orbital regimes, form factors and mission types.
- The SDC system performs safety-of-Flight analyses for 786 spacecraft (513 spacecraft in LEO and MEO, and 273 spacecraft in GEO).



# SDC 1.0 functional diagram







## ➤ **How did the SDA and SDC change SSA?**

- Two main contributions of SDA:
  - ✓ SDA has been providing effective Conjunction Assessment capabilities to a large number of operators.
  - ✓ During the last 10 years, the SDC and AGI experts have demonstrated that effective SSA (Space Situational Awareness) relies on using the best available data to manage Close Approaches.



## ➤ **How did the SDA & SDC change SSA? (Cont'd)**

- Three key elements of the SDC services:
  - ✓ SDC was upfront on Data exchange technology.
  - ✓ The SDC system benefits from AGI experts who are closely monitoring the data quality by comparing information from different sources.
  - ✓ Through the SDC services, the SDA has significantly contributed to improve SSA capabilities (e.g. encouraging JSpOC to publish CDM with covariance matrix )





## ➤ **How did the SDA & SDC change SSA? (Cont'd)**

- Quotes from 2 SDA Directors colleagues and Dan Oltrogge from AGI/CCSI (Cont'd)
  - ✓ “The SDA/SDC showed operators that it was possible to screen all-on-all objects and have a strong legal framework. It also fostered co-operation between operators even though they were competitors in the same space market.”
  - ✓ “It filled a need to have a commercial solution that is independent on a given nation’s desire to provide a free, non optimum service”. “It underpinned the need of a shared approach for the utilization of near-Earth space (which is a finite resource).”
  - ✓ “It leapfrogged the institutional services by providing more reliable conjunction warnings.”



- **The true question is: how do we achieve true Long-Term Sustainability (LTS) of space activities?**
  - 3 elements of answer based on SDA/SDC lessons learned during the last 10 years
    1. Flight safety derives from the comprehensive aggregation of massive amounts of observations, data, environment, statistics, and risk assessment, and advanced analytics.
    2. Importance of data exchange, becoming increasingly important as the number of operational spacecraft dominate the known debris population.
    3. Government SSA and STM initiatives should learn about the SDC system and its operational concept



- **What changes would SDA like to see in SSA in the coming 10 years?**
1. Support a safe and sustainable operating environment, realized by globally-relevant, readily available safety of flight services that espouse and incorporate space data exchange, commercial SSA and STM services that pair new sensor technologies with advanced data fusion algorithms to dramatically improve SSA solutions and predictions.
  2. Flight safety policies are not yet equipped to accommodate the rapid change associated with (1) New Space's large constellations; and (2) improved SSA sensors and enlarged space catalog.
    - They will overwhelm the operator with conjunction alarms, perhaps by a factor of fifty or even a hundred. How to avoid and manage that situation? Greatly improving SSA accuracy, completeness, timeliness and transparency, to limit alarms to those requiring an action.



## ➤ **What changes would SDA like to see in SSA in the coming 10 years (Cont'd)?**

3. SDA vision is to promote and support the application of advanced SSA analytics and sensor types through commercial SSA services, crowdsourcing on a global scale, sensor-agnostic data fusion, in new government SSA and STM initiatives.
  - In particular, we want to support the US Department of Commerce initiative to provide Space Traffic Coordination and Management (STCM) services, as well as other government initiatives like the European Space Surveillance and Tracking system (EU SST).





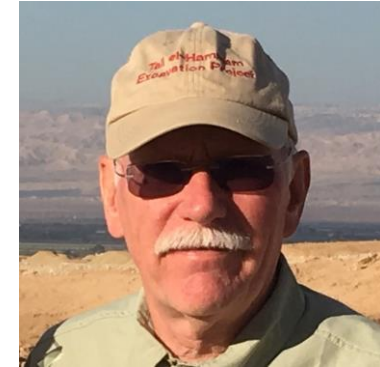
# Panelists



**Mrunalini Deshpande**, Researcher



**Mark Dickinson**, Space Data Association Executive Director and Deputy CTO, VP Space Segment – Inmarsat



**Mark Mulholland**, retired USAF and retired NOAA; currently a consultant to the Director, Office of Space Commerce



**Daniel L. Oltrogge**, Space Safety Coalition and SDC Program Mgr.



**Regina Peldszus**, Senior Policy Officer, DLR, and co-chair, EU SST

## Moderator



**Victoria Samson**, Washington Office Director, SWF





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