



Promoting Cooperative Solutions for Space Sustainability

Space Traffic Management: It's Complicated

Brian Weeden, Ph.D.

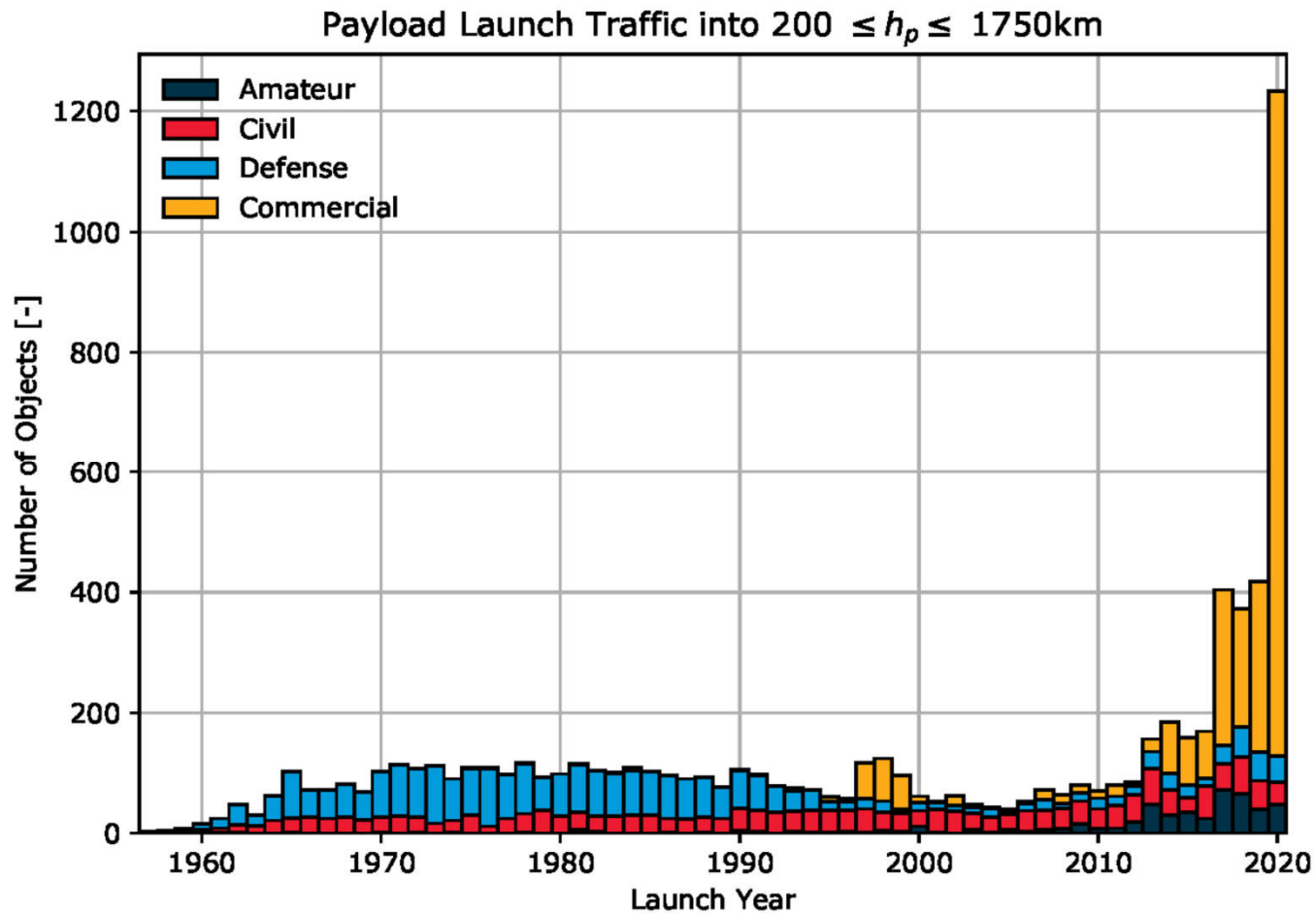
Director of Program Planning

Secure World Foundation



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Number of Payloads Launched Over Time



Source: [European Space Agency](#)

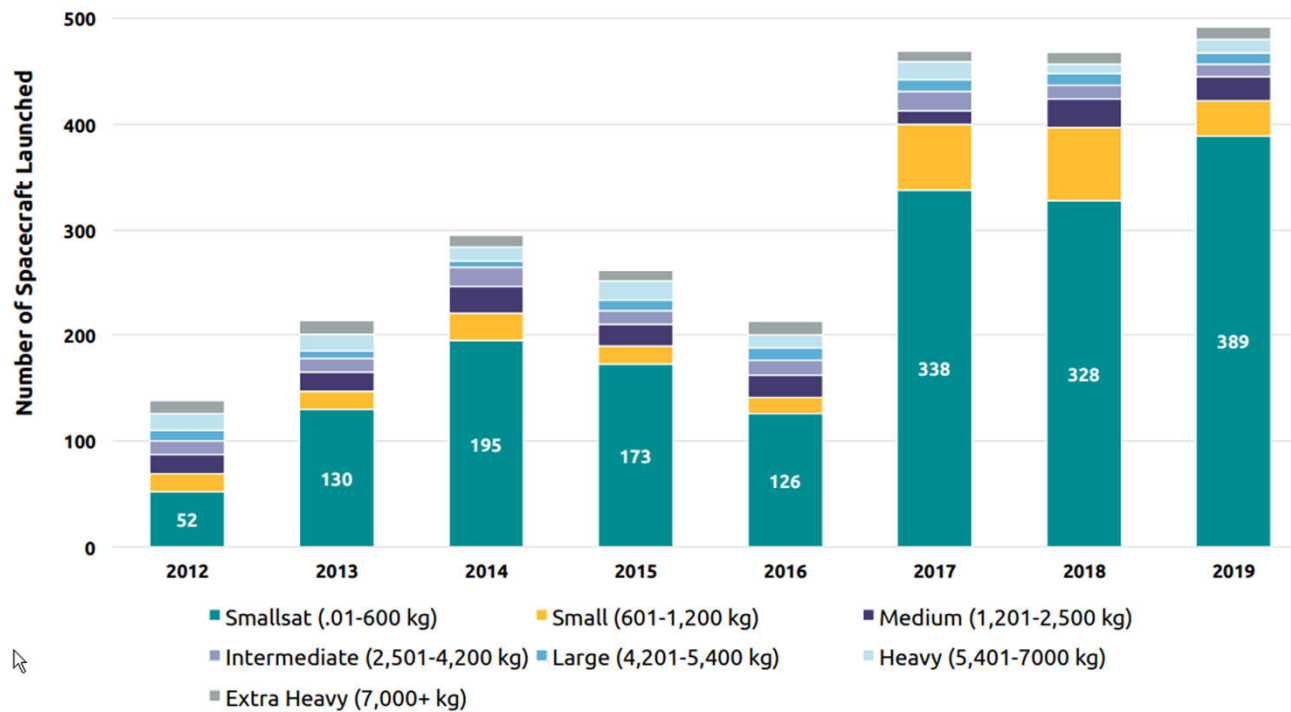


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Smallsat Launch Trends

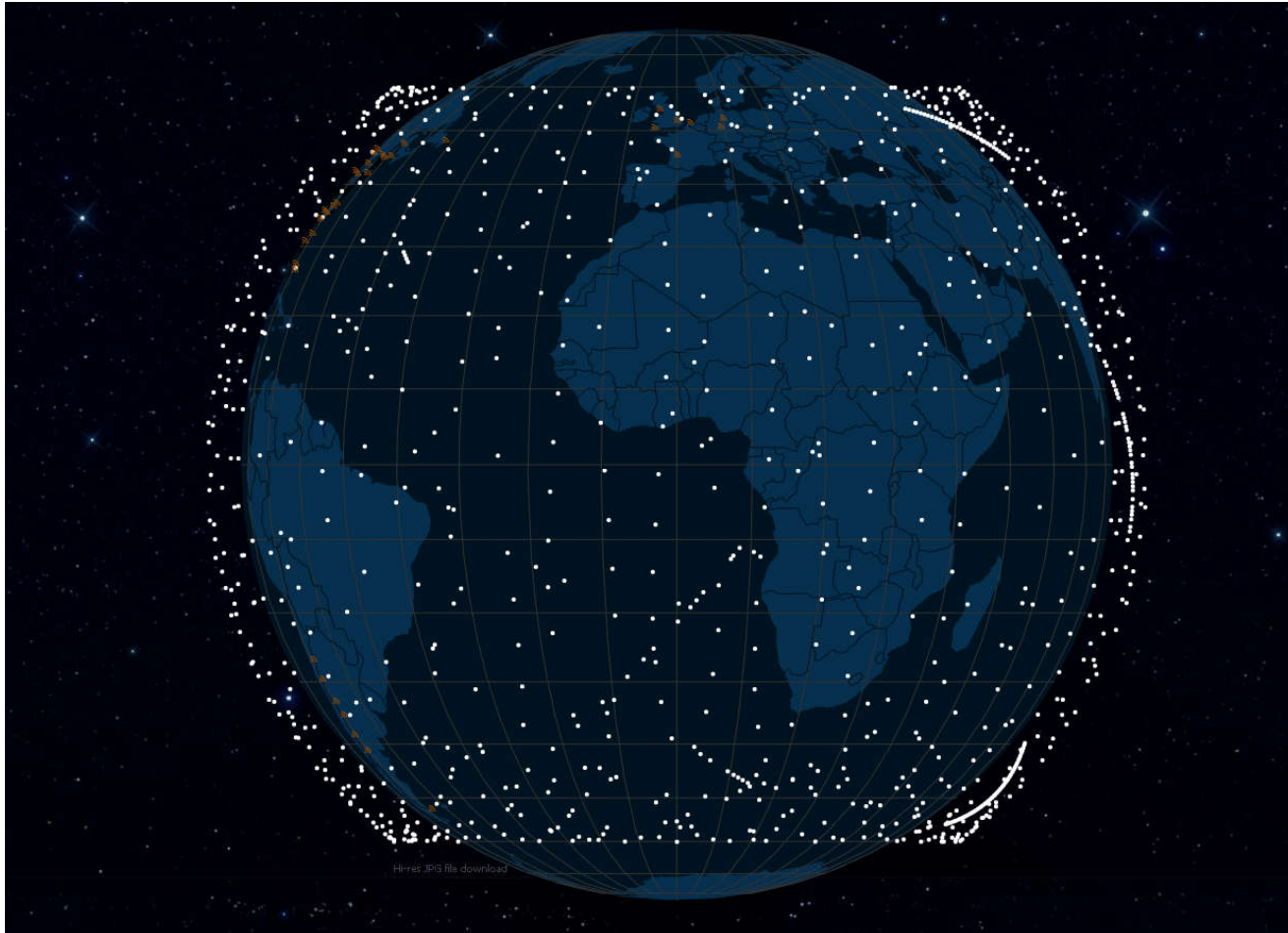
The Big Picture of Smallsats: Smallsats in Context

Smallsat Trends (2012 – 2019)



Source: [Bryce Space and Technology](#)

Current Starlink constellation



Source: [Satellitemap.space](https://satellitemap.space)



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Large Constellations

Constellation	Total Satellites	Altitude	Country	Status
OneWeb Gen1	6,372	1,200 km	UK	218 launched
OneWeb Gen2	47,800	1,200 km	UK	Planning
Starlink Gen1	4,408	540 – 570 km	US	1,737 launched (1,011 operational)
Starlink Gen2	30,000	328 – 614 km	US	Planning
Kuiper	3,326	590 – 630 km	US	First launch 2021/2022
Lightspeed	298	1,015 – 1,325 km	Canada	
GW	12,992	590 – 1145 km	China	Planning

Source: [Jonathan McDowell](#)

EU must 'move at speed' on space broadband network



Jonathan Amos
Science correspondent
[@BBCAmos](#)

Foundation for the Future 12 January
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Components of STM

- Air-space interface
 - Minimize the impact of space operations on aircraft operations during launch and re-entry
 - Co-operating spacecraft and aircraft (sub-orbital tourism, air-launch spacelift)
- Orbital congestion
 - Prevent collisions between space objects
 - Manage highly congested orbital altitudes
 - Active control of RPO with crewed space objects
- Oversight of private sector space activities
 - Article VI “authorization and continuing supervision” of private sector space activities
 - Link between regulation/licensing and monitoring of actual activities/verification



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Debate over definitions

**Space Traffic
Control?**

**Space Traffic
Management?**

**Space Traffic
Coordination?**

**Space Traffic
Coordination and
Management?**

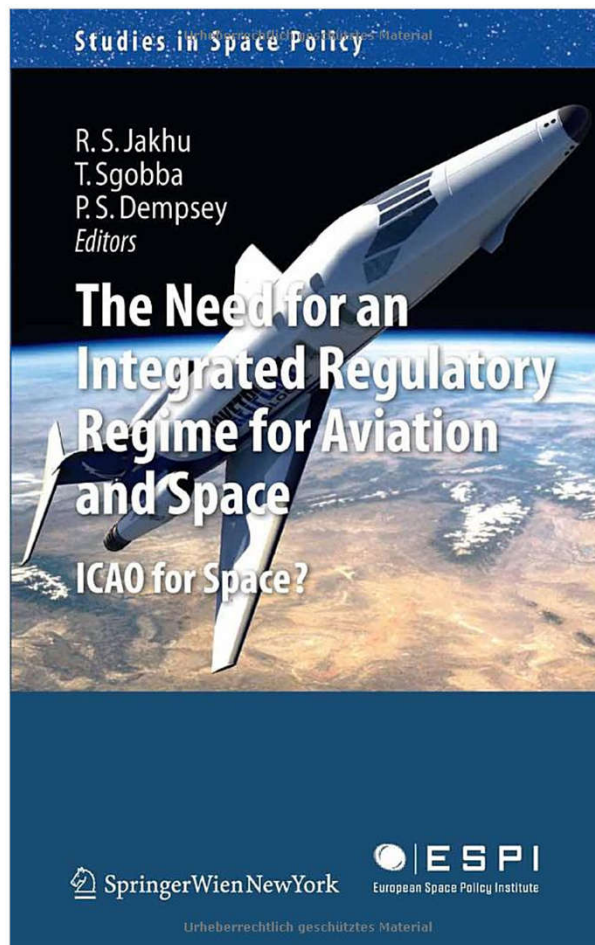


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Space vs air traffic management

- Space traffic operates at *much* higher velocities
 - Typical conjunction in LEO is in excess of 10 km/s (22,200 mph)
 - Visual flight rules (VFR) impossible (except for pre-planned rendezvous)
- Never a definitive “yes/no” answer for a conjunction in space
 - Decisions are made based on predictions several days into the future
 - Decisions are based on *probabilistic analysis and risk tolerance*
- Less than 5% of space traffic have any ability to maneuver (compared to 100% of air traffic)
- No “national airspace” in orbit
 - States have jurisdiction over their own objects, but no one has jurisdiction over orbital regions
- No international framework for harmonizing national regimes

ICAO for space?



- Global regulations for space traffic interaction with air traffic?
- Harmonization of space regulations between countries?
- International regulations?



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ICAO Space Working Group

ICAO - OACI - ICAO
INTERNATIONAL CIVIL AVIATION ORGANIZATION
A United Nations Specialized Agency

Space Transportation Preparing For The Future Being Connected For The Future Meetings SPOCKS

SPACE TRANSPORTATION

The future is not predictable, but it is clear: just beyond the horizon is a day when humankind will be travelling on a regular basis on commercially operated sub orbital flights. Although it is not possible yet to say how and when, it is becoming clearer every day what skills are needed and who is developing this work. So while we cannot train for the future yet, we can prepare for it.

This website is meant as a base-station for all those who are looking to catch up on the existing material and who want to be connected to those who, perhaps half-way across the globe, might hold the answer to the next step in this incredible journey.

ICAO
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European perspective on STM

- Since 2019, Europe has been critical of the US approach to STM
 - Prefer a multilateral-first approach
 - Skeptical of the “industry standards” baseline
 - Tied to broader Trump Admin hostility towards Europe?
- In 2021, the European Union launched studies under Horizon 2020 to examine this issue and provide recommendations
 - [Space Traffic Management for XXI Century Space Operations](#)
 - [European Ways Forward for Space Traffic Management \(SPACEWAYS\)](#)
- In addition, the European Commission’s Directorate General for Defence Industry and Space (DG DEFIS) launched an [EU Pilot Project for STM](#)

...But it's complicated

Space Traffic Management is gaining momentum and is now one of the most important topics in the space policy agenda worldwide. Although a very complex topic under the remit of multiple levels of competences from the multilateral United Nations, to the EU and national governments, it requires action at multiple dimensions, such as: *i)* research and technical activities including SSA capabilities development; *ii)* capacity building; *iii)* regulatory level including standardisation, *iv)* operational and *v)* security and need to involve multiple actors.

The Commission adopted in February 2021 a Communication on *An Action Plan on synergies between civil, defence and space industries*, which refers to a STM flagship project, giving continuation to two Coordination and Support Actions and a Pilot Project, to build an STM capability, on European industry competitiveness and economic sustainability, as well as on legal and economic analysis regarding STM. Intermediary results will be available in the second semester 2021 and the final results are expected mid-2022.

Source: [Council of the European Union](#)



- SPD-3, even if fully implemented in the United States, is only the first step
- Broader conversation over establishing *international norms and standards of behavior* that can then be implemented through national regulation
- If we adopt the ICAO model, then *every country with satellites* would need to implement their own national regime/administration
- Meanwhile, commercial space activities are *already ramping up*.



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Thank you. Questions?

bweeden@swfound.org