WELCHMAN KEEN

From Crowded Orbits to Sustainable Connectivity

Implications for the Caribbean

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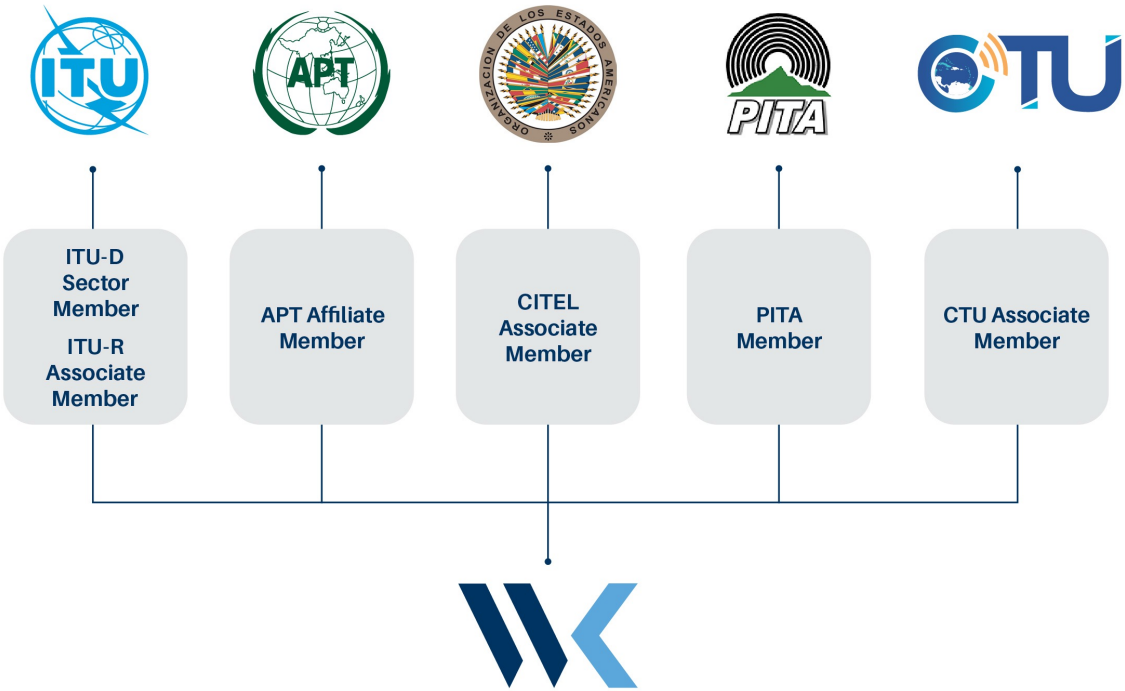
Global Expertise, Local Insight

- Facilitating global and equitable access to technology by:
  - Assisting companies in navigating regulatory landscapes and entering new markets
  - Supporting governments in policy development and capacity building for enhanced connectivity
- Diverse team of experts with extensive regulatory, policy, and advisory experience in telecommunications
- Extensive track record in market access, licensing, and regulatory compliance
- Committed to serving clients and communities through maximising potential and minimising risk

Global Networks, Global Recognition



Certified B Corporation

B Corp Certification in Singapore

Hall of Fame Silicon Slopes AWARDS

Purpose Driven Leadership Award

Importance of Space Sustainability

Why It Matters for the Caribbean

Space Sustainability for CTU

- **Digital Connectivity**
  Satellites provide broadband, mobile backhaul, and essential communications where terrestrial infrastructure is limited
- **Resilience**
  Space-based communications and data support emergency response, disaster risk reduction and service continuity
- **Socio-Economic Development**
  Satellite systems enable education, healthcare, finance, climate monitoring, and economic growth

Sustainable Orbits = Reliable Connectivity

- **Sustainable Orbits**
  Responsible management of orbital resources reduces collision and debris risk, preserving usable orbits for future operations
- **Reliable Connectivity**
  Predictable, sustainable use of orbital space supports uninterrupted communications
- **Spectrum Scarcity**
  Sustainable spectrum coordination prevents interference and ensures service quality

Global Sustainability Challenges

Space Debris and Orbital Congestion

- Rapid satellite proliferation
  → unprecedented orbital traffic
- Increased space debris
  → higher collision risk
- Uncertain future constellation deployments
  → scarce orbital slots, less equitable access

Environmental and Resource Impacts

- Resource scarcity and geopolitical risks
- Environmental footprint – mining, refining, launches
- Increase in satellite re-entries with potential atmospheric and magnetic-field effects

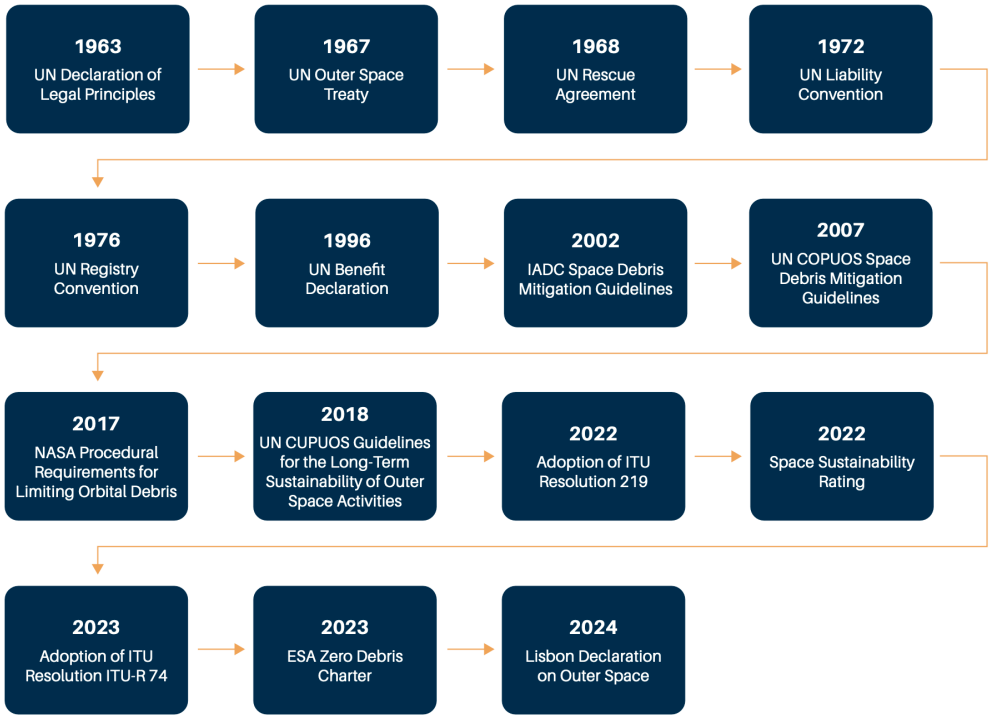
Enterprise	Constellation's Name	Planned Satellites	Launched Satellites	Investment	Country
Starlink	Starlink Gen 1	4408	4015		USA
Starlink	Starlink Gen 2	22488	0		USA
Starlink	Starlink Gen 2A	12500	2703		USA
Starlink	Starlink V2 Mini	N/F	1835		USA
Starlink	Starlink V2 Mini DTC	840	64		USA
OneWeb	OneWeb Gen 1	648	643	$550M[11]	UK
Amazon	Project Kuiper	3232	2	$10B[12]	USA
Xingwang	Chiangxin	966	15		China
ChinaSatNet	Guowang	12992	0		China
Galaxy Space	Yinhe	1000	8		China
Hanwha Systems	N/F	2000	0		South Korea
Lynk Global	N/F	2000	10		USA
Astra	N/F	13620	0		UK
Hughes Network System	N/F	1440	0		USA
Spin Launch	N/F	1190	0		UK
Global Star	GlobalStar	3080	0	$252M[13]	Germany
Hongqing Technology	Honghu-3	10000	0		China
E-Space	Semaphore-C	116640	0	$90M[14]	France
E-Space	Cinnamon-937	337323	3		Rwanda
Telesat	Lightspeed	198	3	$1.6B loan from Canadian government[15]	Canada

Source: Welchman Keen (2024), *Making Room in a Crowded Space: Solutions for Space Sustainability*

International Governance

Existing Frameworks

- **"Outer Space as a Common Resource"**
  - UN Outer Space Treaty (1967) and related treaties
- **Global Technical Guidance**
  - UN COPUOS guidelines
  - IADC 2002 debris mitigation recommendations
- **"Rational, Equitable Use of Spectrum and Orbital Resources"**
  - ITU resolutions – Resolution 219 (PP, Bucharest, 22) and ITU-R 74 (RA-23)
- **Industry Adoption of Responsible Practices**
  - Space Sustainability Rating (SSR)



Source: Welchman Keen (2024), *Making Room in a Crowded Space: Solutions for Space Sustainability*

International Governance

Limitations of Current Frameworks

Limited Legal Obligations

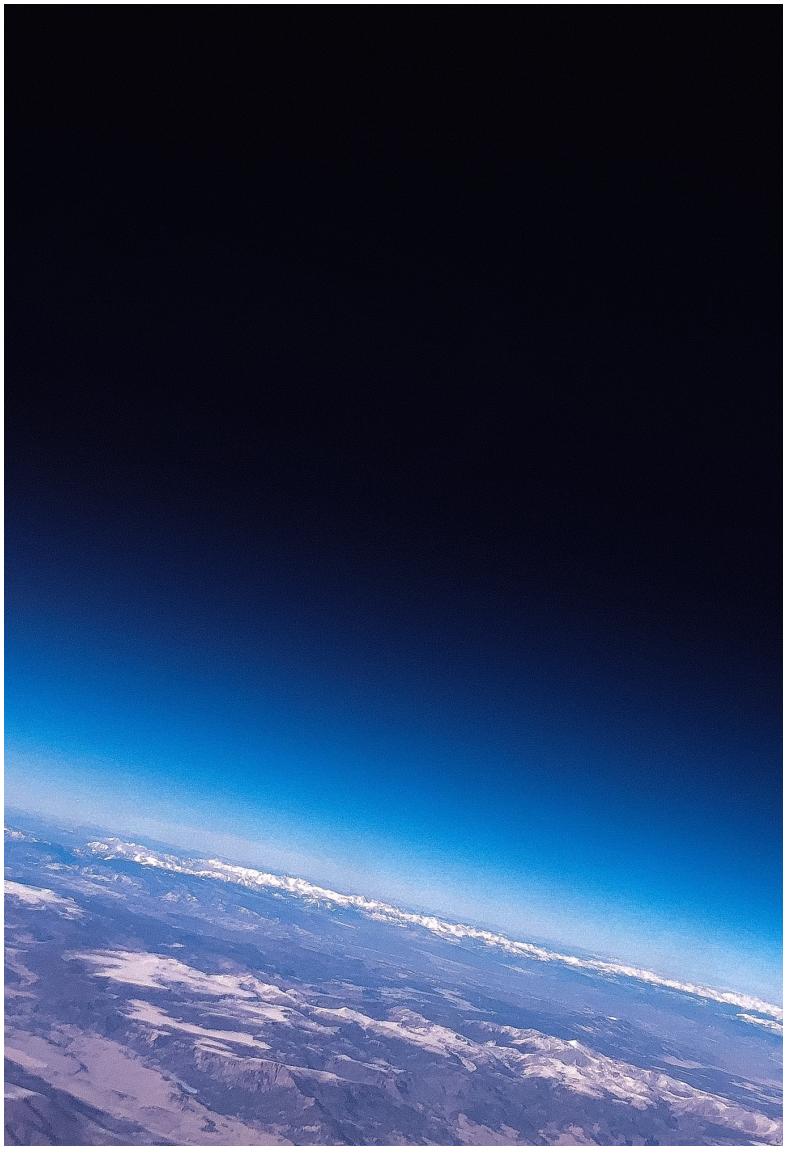
States are not legally required to ensure space sustainability or mitigate debris beyond direct damages

Weak Enforcement

No robust mechanisms exist to compel compliance; multilateral decisions often diluted

Fragmented Approaches

Multiple agencies, guidelines, and national practices → inconsistent implementation



National Approaches to Space Sustainability

Debris Mitigation and Licensing

- **Australia**
  Environmental plans and debris mitigation strategies required
- **China**
  Small satellite standards; de-orbit and safety plans

Liability and Insurance

- **UK**
  Consultation on orbital liability, insurance, and licence fees
- **France (FSOA)**
  Third-party liability insurance; strict liability; financial guarantees defined by decree

Industrial and Capability Plans

- **UAE**
  National Space Policy; forums for collaboration and sustainable operations
- **UK**
  Space Industrial Plan (2024) → regulatory and financial incentives for sustainability

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Incentives and Market Tools for Responsible Space Operations

Sustainability Ratings (SSR)

- SSR scores operators on:
  - Debris mitigation
  - Collision avoidance
  - End-of-life plans
  - Transparency

Adaptive Licensing and Risk-Based Fees/Taxes

- Licensing and fees adjusted for sustainable practices
- Risk-based satellite tax charges operators based on number, orbit, and size of satellites

Insurance and Financial Incentives

- Premiums, grants, or subsidies linked to sustainability performance

Global Industry Commitments

- ESA Zero Debris Charter
  - Targets “zero debris” by 2030
  - Adopted by 12 countries and 100+ companies

Public-Private Collaboration Pathways

Data-Sharing and Transparency

- SST relies on shared data between government sensors and private operators
- UK and EU SST partnerships provide collision alerts and risk assessments
- Industry missions (e.g. Astroscale 2024) enhance operator transparency

Industry in Co-Developing Frameworks and Standards

- ADR, ISAM, and laser-based deorbiting led by private companies
- FCC ISAM licensing (SpaceLogistics, NanoRacks, SpaceIce) integrates industry innovations into regulation

Multi-Stakeholder and Regional Cooperation

- **Japan**: JAXA + private sector ecosystem (Astroscale, Sky Perfect JSAT, Ex-Fusion) supported by CRD2 programme and USD 6 billion fund
- **Japan–Australia**: Joint laser-tracking initiatives (Ex-Fusion + EOS)
- **Europe:** EU SST partnership (15 states + EUSPA)
- **UK:** COSMIC mission funding ADR removal by 2026

Relevance and Opportunities for CTU Members

Supporting Long-Term Connectivity and Resilience

- **Sustainable Space Operations**
  Help preserve orbital slots and spectrum needed for reliable satellite connectivity
- **Reduced Debris Risks**
  Support continuity of broadband, IoT, and emergency communications services

Enabling Climate, Disaster and Public Safety Services

- **Clean and Predictable Orbits**
  Improve reliability of Earth observation, weather forecasting, and disaster response satellites
- **Space Surveillance and Tracking (SST)**
  Reduces collision-related outages that could disrupt critical public services

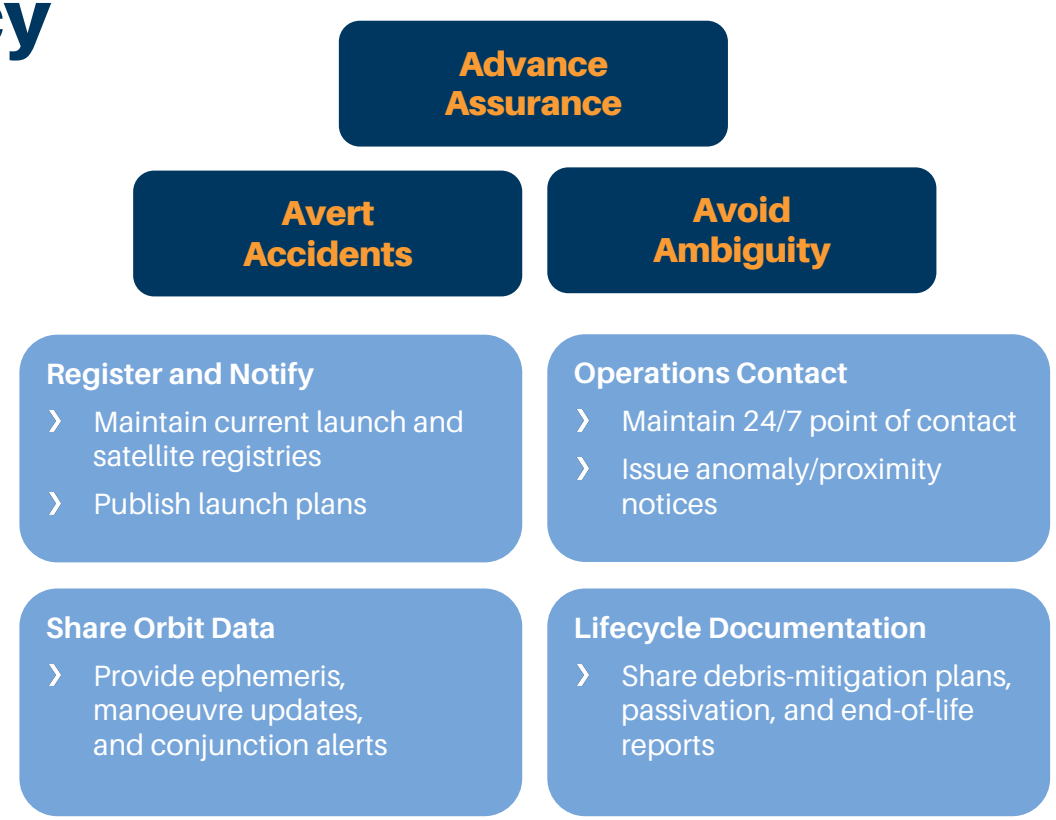
Considerations for Emerging and Smaller Operators

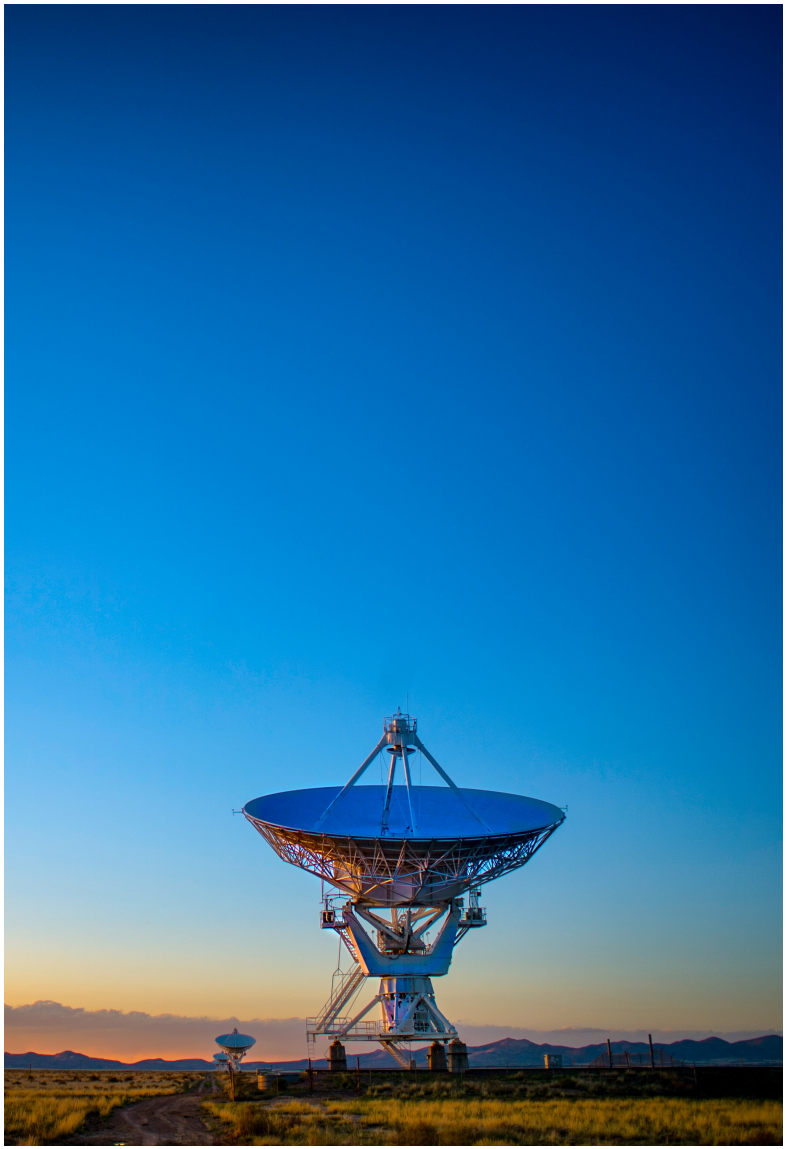
- **Capacity Building**
  Access to shared SST data and regional cooperation frameworks lowers technical barriers
- **Market Access**
  Sustainable practices support fair access to orbital resources and reduce dominance by high-risk constellations
- **Fair Use of Orbits**
  Sustainability frameworks help protect long-term access for new entrants and smaller administrations

From Sustainability to Space Transparency

Goal of building trust and minimising risks

By making space activities, assets, and aims clear and understandable





From Sustainability to Space Transparency

Why Transparency Matters for CTU Members

- **Supports reliable satellite connectivity** for disaster response and public services
- **Shared information reduces asymmetric advantages** held by large operators
- **Predictability safeguards fair access** to spectrum and orbital resources for smaller markets

Potential Next Steps for CTU

- Regular regional exchanges on space sustainability and transparency
- Small expert discussions to develop shared best-practice guidance

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Thank you

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