Space Standards at the ISO Level

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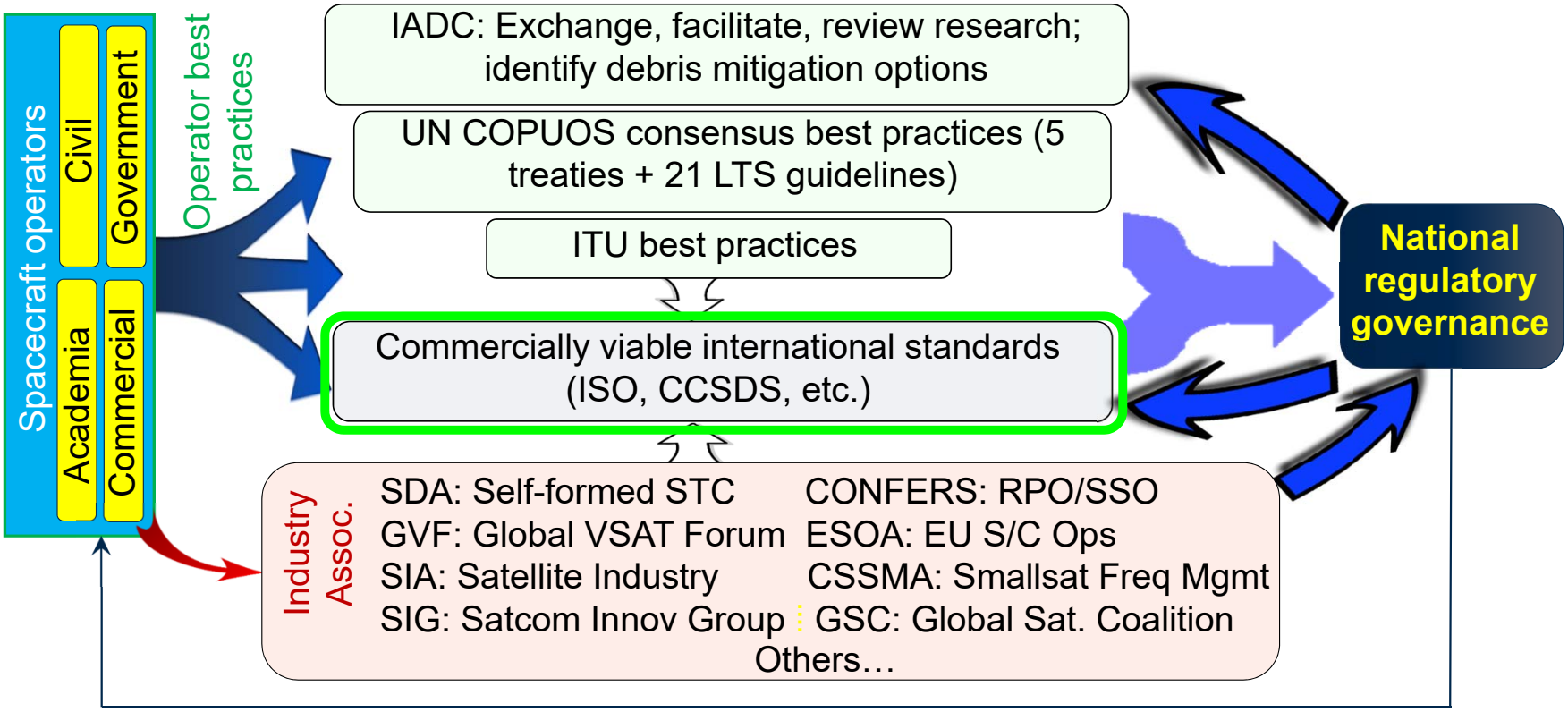
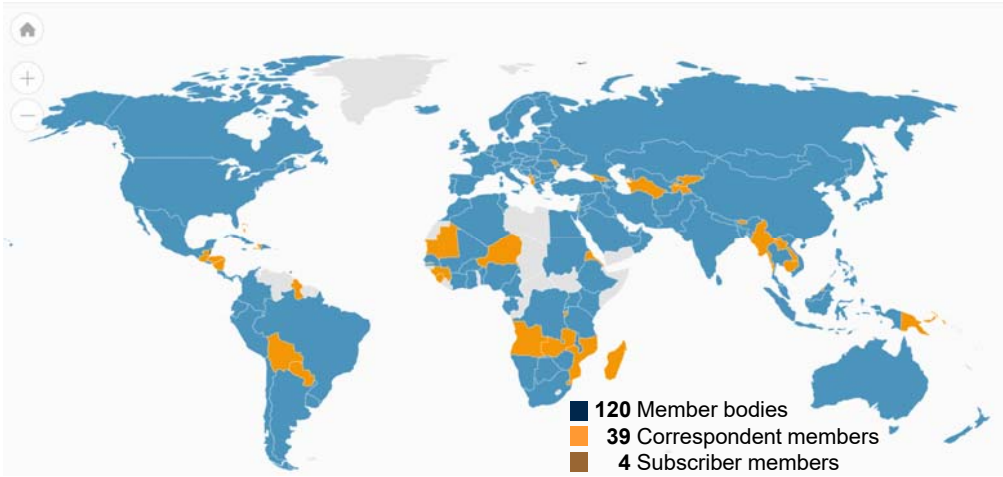
ESA-ECSL Space Debris Workshop: Regulation, Standards and Tools

Today's complex space governance framework



About ISO

- ISO established in 1947 to promote standards in international trade, communications, and manufacturing
  - ISO general consultative status with UN ECOSOC since 1947
- ISO is an independent, non-governmental organization made up of members from national standards bodies of 163 countries
- “World's largest developer of international standards”
- “One country, one vote”



Globally, international standards …

… provide a reference framework and a common language to facilitate trade and technology transfer

… prioritize describing performance requirements and interfaces

… are verifiable and well-suited for contractual mechanisms

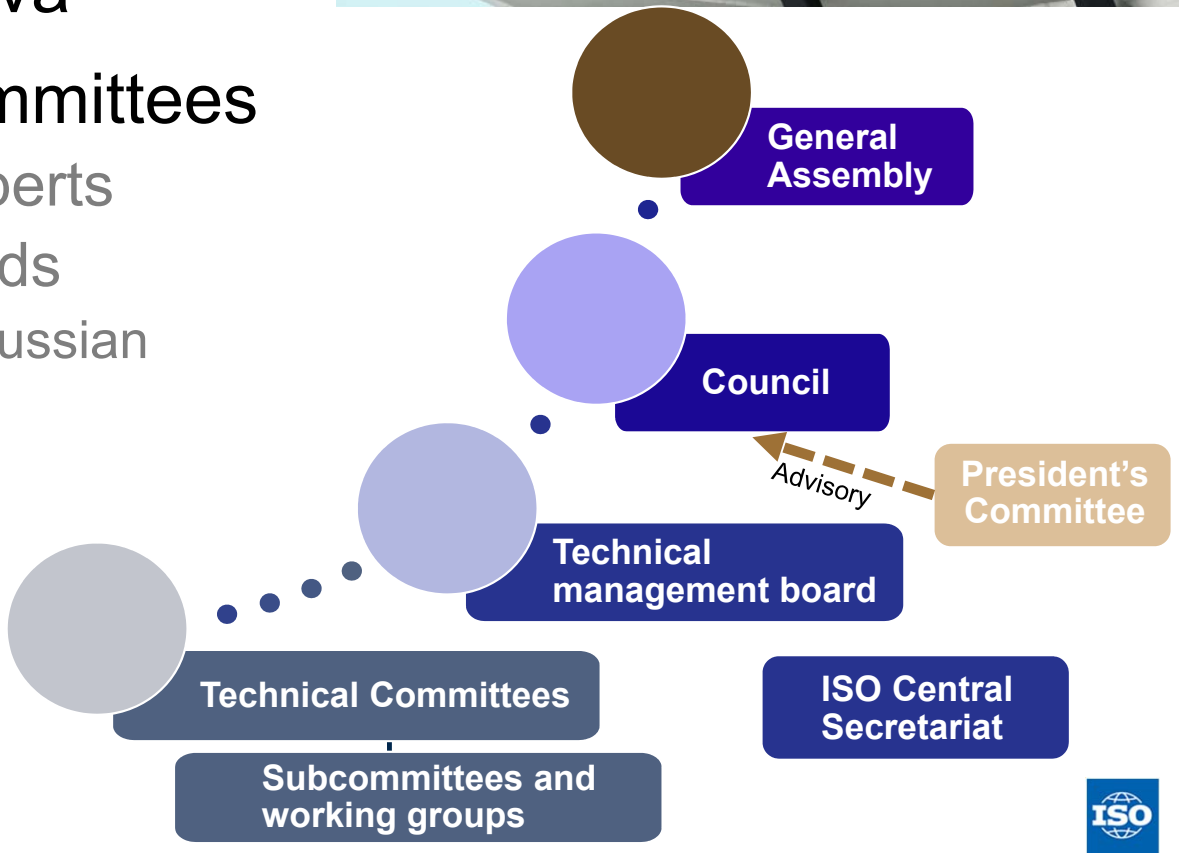
… ensure shared technical knowledge and compatibility

… provide scientific basis for health, safety and environmental legislation

Voluntary, consensus international standards can overcome political barriers, diplomatic objectives, and competitive rivalries.

ISO Governance Structure

- ISO General assembly and secretariat based in Geneva
- ISO has 245 technical committees
  - 100 000+ subject matter experts
  - 22 000 international standards
    - Languages: English, French, Russian



ISO air and space standards developed in TC20

- ISO/TC 20 develops and maintains standards for aircraft and space vehicles, including:
  - materials, components and equipment for construction and operation of aircraft and space vehicles
  - equipment used in the servicing and maintenance of these vehicles
- Over 600 published standards
- Over 200 in development

ISO TC 20/SC 1 Aerospace electrical requirements
ISO TC 20/SC 4 Aerospace fastener systems
ISO TC 20/SC 6 Standard atmosphere
ISO TC 20/SC 8 Aerospace terminology
ISO TC 20/SC 9 Air cargo and ground equipment
ISO TC 20/SC 10 Aerospace fluid systems and components
ISO TC 20/SC 13 Space data and information transfer systems
ISO TC 20/SC 14 Space systems and operations
ISO TC 20/SC 15 Airframe bearings
ISO TC 20/SC 16 Unmanned Aircraft Systems
ISO TC 20/SC 17 Airport Infrastructure

SC13 develops international space data standards

- SC13 is operated by the Consultative Committee for Space Data Systems (CCSDS)
  - Comprised of 11 space agencies
  - Standards available through ISO and also at: https://public.ccsds.org/default.aspx

- LTS-relevant CCSDS navigation data exchange messages:
  - Orbit Data Message (ODM)
  - Conjunction Data Message (CDM)
  - Tracking Data Message (TDM)
  - Attitude Data Message (ADM)
  - Events Data Message (EDM)
  - Reentry Data Message (RDM)

The ODM is the most popular SC13 standard today

SC14 develops best practices for space

- Space Systems & Operations
  - SC14/WG3: Space operations international standards.
  - SC14/WG7: Orbital debris mitigation international standards.

Working Group		Convener
WG 1	Design, engineering and production	Japan
WG 2	Interfaces, integration and test	United States
WG 3	Operations and ground support	Germany
WG 4	Space environment (natural and artificial)	Russia
WG 5	Space system programme management and quality	France
WG 6	Materials and processes	Japan
WG 7	Orbital debris	United Kingdom

SC14 core space debris mitigation standards

ISO TC20/SC14

- **WG1** Design
- **WG2** Integ. / test
- **WG3** Operations
- **WG4** Environment
- **WG5** Management
- **WG6** Materials
- **WG7** Debris

WG3 Operations

16158: Avoiding collisions
[16164: Disposal of satellites in LEO]
[16699: Disposal of orbital stages]
[23339: Propellant mass estimation]
[26872: Disposal of satellites at GEO]
27852: Determining orbit lifetime
27875: Re-entry risk management

WG4 Environment

14200: Meteoroid / debris models


INTERNATIONAL STANDARD

ISO 24113

DIS
2018-07-15

Space systems — Space debris mitigation requirements

Systèmes spatiaux — Exigences de mitigation des débris spatiaux

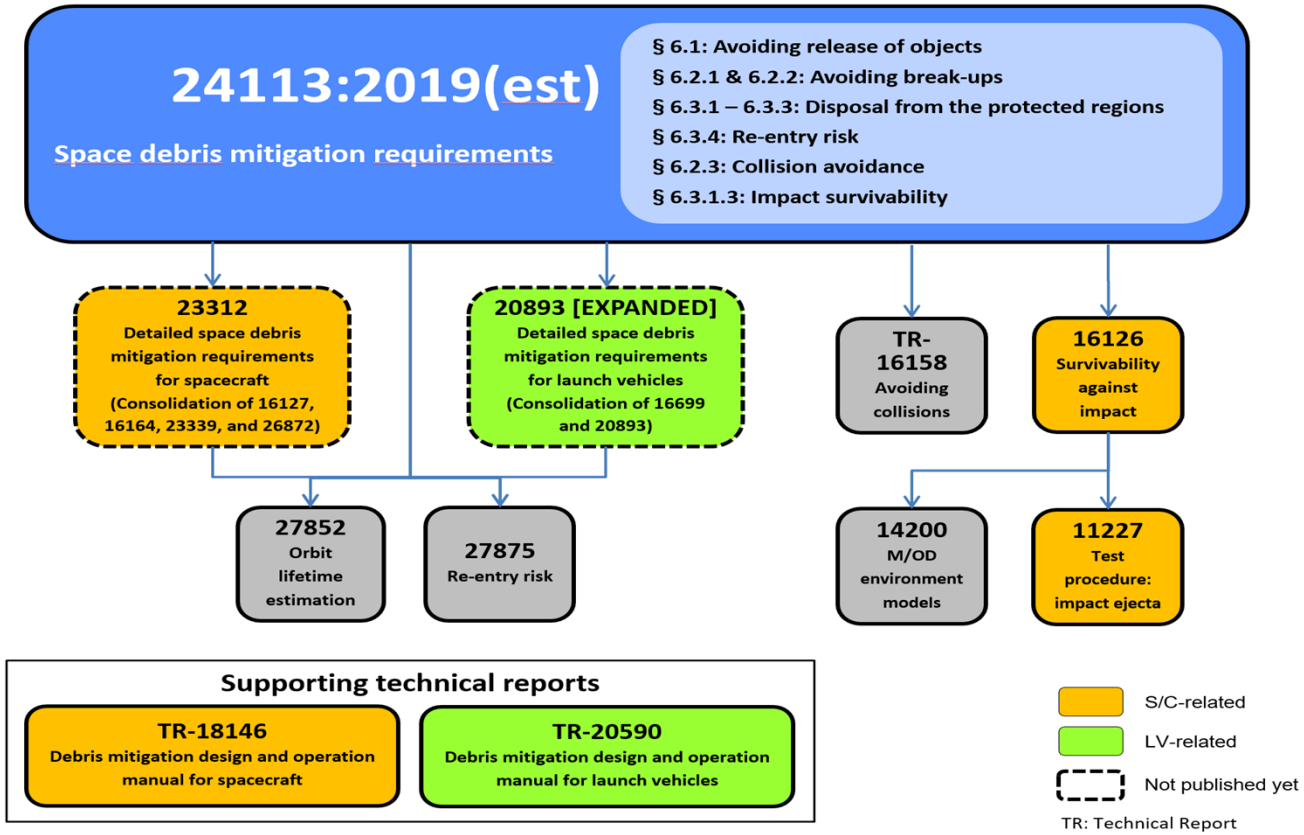
WG7 Debris

11227: Test procedures for ejecta
16126: Survivability against impacts
[16127: Prevention of s/c break-ups]
18146: Space debris mitigation design and operations manual for S/C
20590: Space debris mitigation design and operations manual for LV
20893: Detailed debris mitigation requirements for LVOS
[21095: Procedure for limiting re-entry risk]
23312: Detailed debris mitigation requirements for S/C
24113: Space debris mitigation requirements

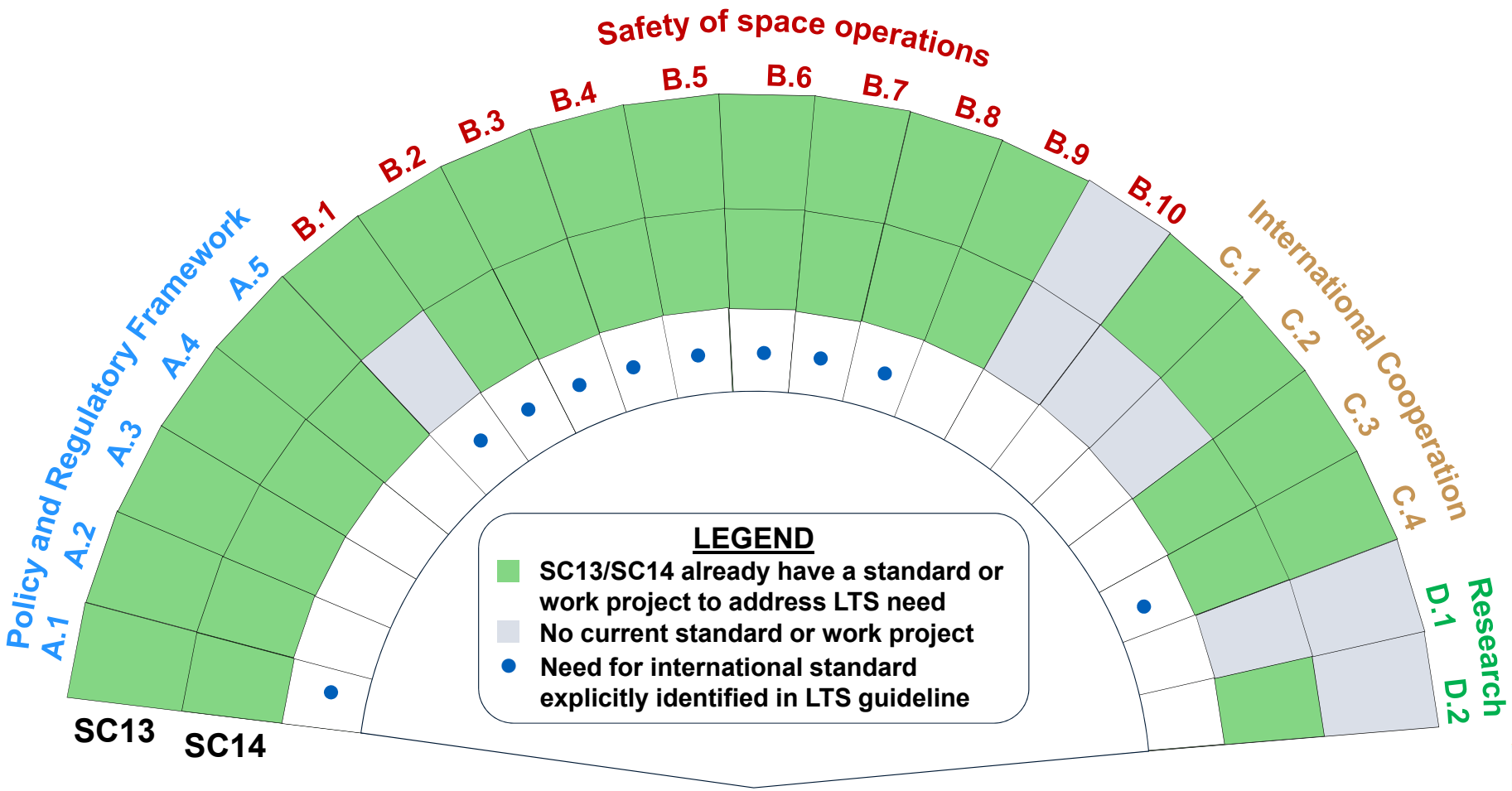
** [bracketed standards] will be merged/replaced*

WG7 Orbital Debris Working Group

- IADC guidelines have been codified as ISO standards through WG7's Orbital Debris Mitigation Work Program since 2009

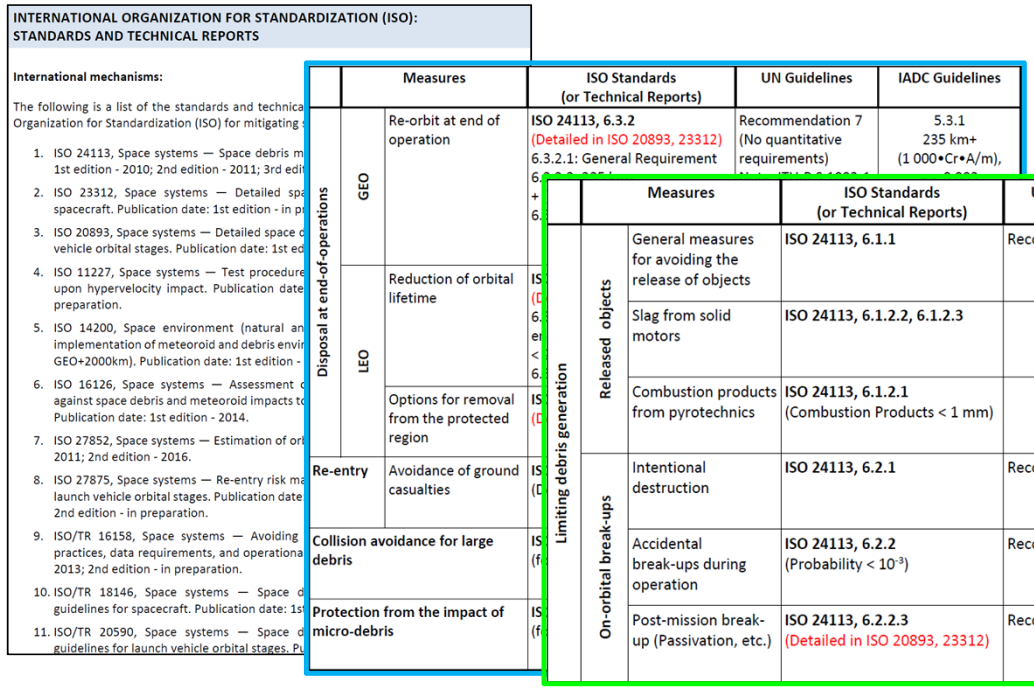


Published ISO documents addressing LTS guidelines*



Compendium of space debris mitigation standards

- Appreciate UNOOSA assistance adding international standards to "Compendium document (5 Sep 18)



INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO): STANDARDS AND TECHNICAL REPORTS

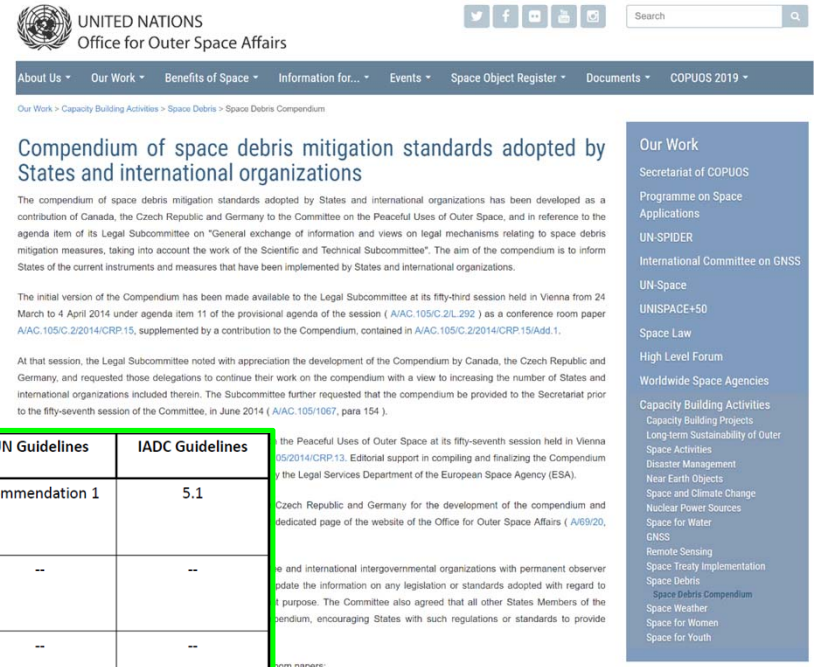
International mechanisms:

The following is a list of the standards and technica
Organization for Standardization (ISO) for mitigating

1. ISO 24113, Space systems — Space debris m 1st edition - 2010; 2nd edition - 2011; 3rd edit
2. ISO 23312, Space systems — Detailed spa spacecraft. Publication date: 1st edition - in p
3. ISO 20893, Space systems — Detailed space c vehicle orbital stages. Publication date: 1st ed
4. ISO 11227, Space systems — Test procedure upon hypervelocity impact. Publication date preparation.
5. ISO 14200, Space environment (natural an implementation of meteoroid and debris envi GEO+2000km). Publication date: 1st edition -
6. ISO 16126, Space systems — Assessment against space debris and meteoroid impacts t Publication date: 1st edition - 2014.
7. ISO 27852, Space systems — Estimation of or 2011; 2nd edition - 2016.
8. ISO 27875, Space systems — Re-entry risk ma launch vehicle orbital stages. Publication date 2nd edition - in preparation.
9. ISO/TR 16158, Space systems — Avoiding practices, data requirements, and operationa 2013; 2nd edition - in preparation.
10. ISO/TR 18146, Space systems — Space d guidelines for spacecraft. Publication date: 1
11. ISO/TR 20590, Space systems — Space d guidelines for launch vehicle orbital stages. P

		Measures	ISO Standards (or Technical Reports)	UN Guidelines	IADC Guidelines
Disposal at end-of-operations	GEO	Re-orbit at end of operation	ISO 24113, 6.3.2 (Detailed in ISO 20893, 23312) 6.3.2.1: General Requirement	Recommendation 7 (No quantitative requirements)	5.3.1 235 km+ (1 000•Cr•A/m),
	LEO	Reduction of orbital lifetime	IS		
		Options for removal from the protected region	IS		
Re-entry		Avoidance of ground casualties	IS		
Collision avoidance for large debris			IS		
Protection from the impact of micro-debris			IS		

		Measures	ISO Standards (or Technical Reports)	UN Guidelines	IADC Guidelines
Limiting debris generation	Released objects	General measures for avoiding the release of objects	ISO 24113, 6.1.1	Recommendation 1	5.1
		Slag from solid motors	ISO 24113, 6.1.2.2, 6.1.2.3	--	--
		Combustion products from pyrotechnics	ISO 24113, 6.1.2.1 (Combustion Products < 1 mm)	--	--
	On-orbital break-ups	Intentional destruction	ISO 24113, 6.2.1	Recommendation 4	5.2.3
		Accidental break-ups during operation	ISO 24113, 6.2.2 (Probability < 10^{-3})	Recommendation 2	5.2.2 (Monitoring)
		Post-mission break-up (Passivation, etc.)	ISO 24113, 6.2.2.3 (Detailed in ISO 20893, 23312)	Recommendation 5	5.2.1



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Our Work > Capacity Building Activities > Space Debris > Space Debris Compendium

Compendium of space debris mitigation standards adopted by States and international organizations

The compendium of space debris mitigation standards adopted by States and international organizations has been developed as a contribution of Canada, the Czech Republic and Germany to the Committee on the Peaceful Uses of Outer Space, and in reference to the agenda item of its Legal Subcommittee on "General exchange of information and views on legal mechanisms relating to space debris mitigation measures, taking into account the work of the Scientific and Technical Subcommittee". The aim of the compendium is to inform States of the current instruments and measures that have been implemented by States and international organizations.

The initial version of the Compendium has been made available to the Legal Subcommittee at its fifty-third session held in Vienna from 24 March to 4 April 2014 under agenda item 11 of the provisional agenda of the session (A/AC.105/C.2/L.292) as a conference room paper A/AC.105/C.2/2014/CRP.15, supplemented by a contribution to the Compendium, contained in A/AC.105/C.2/2014/CRP.15/Add.1.

At that session, the Legal Subcommittee noted with appreciation the development of the Compendium by Canada, the Czech Republic and Germany, and requested those delegations to continue their work on the compendium with a view to increasing the number of States and international organizations included therein. The Subcommittee further requested that the compendium be provided to the Secretariat prior to the fifty-seventh session of the Committee, in June 2014 (A/AC.105/1067, para 154).

Our Work
Secretariat of COPUOS
Programme on Space Applications
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International Committee on GNSS
UN-Space
UNISPACE+50
Space Law
High Level Forum
Worldwide Space Agencies
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Capacity Building Projects
Long-term Sustainability of Outer Space Activities
Disaster Management
Near Earth Objects
Space and Climate Change
Nuclear Power Sources
Space for Water
GNSS
Remote Sensing
Space Treaty Implementation
Space Debris
Space Debris Compendium
Space Weather
Space for Women
Space for Youth

http://www.unoosa.org/oosa/en/ourwork/topics/space-debris/compendium.html

SUMMARY

- Many global voices contribute to our space governance and LTS discussions
- Standards exist to codify, in an implementable and verifiable way, what international guidelines seek to accomplish
- ISO space standards are, and since the dawn of the space age always have been, an integral part of this complex and inter-connected framework
- Standards are an important part of a holistic approach to ensuring space sustainability