Key Security Considerations for International Space Commerce

Content

- **US Government Space Policy & Regulation**
- **US Government Who's Who?**
  - ITA: Commercial Space Promotion & Support
  - OSC: Advocate, Operator, Regulator
  - DoS, Space Affairs: Foreign Policy Considerations
- **Key Security Considerations for Trade**
  - Standards
  - Cyber Security
  - Intellectual Property Protection
  - Export Control
- **Aligned norms, policy, regulation - all help the global community, to include industry and governments, work together, trade, and operate in a common space**

The State of US Space Regulation Today

Regulation of Launch, Launch Sites & Re-entry

Dept of TRANSPORTATION:
Federal Aviation Administration (FAA)

Spectrum Management

Independent:
Federal Communications Commission (FCC)

Dept of COMMERCE:
National Telecommunications and Information Admin (NTIA)

Regulation of Sensors

Dept of COMMERCE:
Office of Space Commerce (OSC)

Export Control

Dept of STATE:
Directorate of Defense Trade Controls (DDTC)

Dept of COMMERCE:
Bureau of Industry and Security (BIS)

Updating US Regulation: Mission Authorization Proposal

OSC Releases Updated Mission Authorization Proposal

OSC's proposal expedites and streamlines today's laborious and sometimes duplicative system for regulating the commercial space industry with a consolidated space commerce certification process.

space.commerce.gov

Traffic Coordination System for Space

Focused on Safeflight Safety

TraCSS will provide access to selected SSA data and information, such as:

- A TraCSS satellite database.
- Owner/operator contact information.
- Owner/operator ephemerides.
- Two-line element (TLE) Catalog.
- Conjunction Data Messages (CDMs), which include an estimated probability of collision (Pc).

Onboarding satellite operators first, national accounts to follow.

- Can express interest & join **waitlist**.
- Planning SSA orientation at IAC 2026.

www.tracss.gov

Waitlist signup

Content

- US Government Space Policy & Regulation
- **US Government Who's Who?**
  - **ITA: Commercial Space Promotion & Support**
  - **OSC: Advocate, Operator, Regulator**
  - **DoS: Office of Space Affairs: Foreign Policy Considerations**
- Key Security Considerations for Trade
  - Standards
  - Cyber Security
  - Intellectual Property Protection
  - Export Control
- Aligned norms, policy, regulation - all help the global community, to include industry and governments, work together, trade, and operate in a common space

US Government Who's Who; US Embassies are the U.S. "Front Door"

Dept of State Office of Space Affairs

- Connect foreign affairs with technical and regulatory agencies
- Lead on foreign policy objectives related to civil and commercial space – Artemis Accords & UNCOPUOS
- Promote U.S. commercial space industry abroad

Dept of Commerce Office of Space Commerce

- Coordinate government-wide commercial policy issues and actions
- Pursue the removal of legal, policy, institutional barriers to space commerce
- Operational - SSA Coordination
- Regulatory - US Remote Sensing

Dept of Commerce International Trade Administration

- Locate U.S. products, services, and business partners
- Business matchmaking
- Trade shows
- Works with international business investors: to navigate the US federal regulatory system

Content

- US Government Space Policy & Regulation

- US Government Who's Who?
  - ITA: Commercial Space Promotion & Support
  - OSC: Advocate, Operator, Regulator
  - DoS: Office of Space Affairs: Foreign Policy Considerations

- **Key Security Considerations for Trade**
  - **Standards**
  - **Cyber Security**
  - **Intellectual Property Protection**
  - **Export Control**

- Aligned norms, policy, regulation - all help the global community, to include industry and governments, work together, trade, and operate in a common space

Standards for Space Security

- **International Organization for Standardization** (ISO)
  - Space Traffic Coordination (STC)
  - Orbital Debris Mitigation
- **Consultative Committee for Space Data Systems** (CCSDS)
  - Data Exchange
  - Data Security
- **American Society for Testing and Materials** (ASTM)
  - Design, manufacturing and use of vehicles used for spaceflight
  - Human Spaceflight Safety
- **Institute of Electrical and Electronics Engineers** (IEEE)
  - Cyber Security

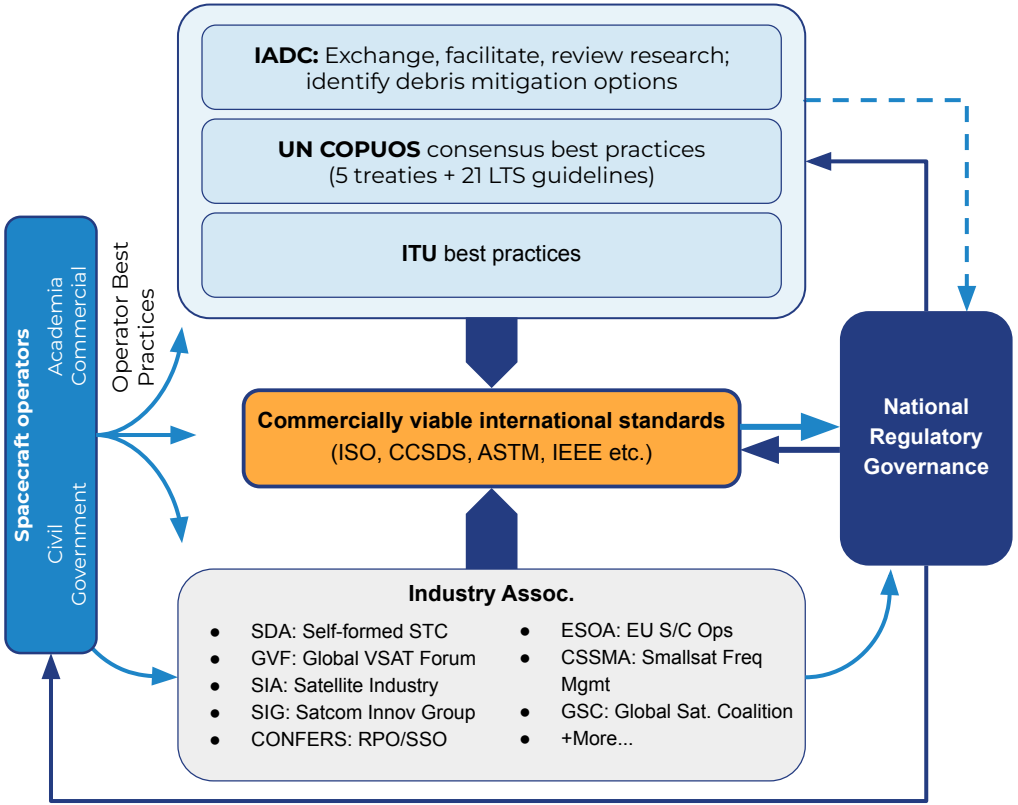


Figure adapted from: Oltrogge, Dan, "International Organization for Standardization (ISO) activities for Long-Term Sustainability (LTS) of Space Activities" (2019). Space Traffic Management Conference. 31. https://commons.erau.edu/stm/2019/presentations/31. Used with permission.

What do published international standards do?

- 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 standards (VCS) are technical specifications, guidelines, or best practices developed by private-sector organizations using open, balanced, and collaborative processes.
- They promote safety, quality, and efficiency, allowing industries to innovate and adopt best practices—often exceeding mandatory government regulations—without being legally required unless adopted by a regulator.

VCS offer a way to overcome political obstacles, diplomatic agendas, and competitive disputes.

ISO Standards

- Top Standards Producing Technical Committees out of 275 Committees for publishing standards
- TC20 – Aircraft and space vehicles is 6/275

Reference	Title	Published standards	Standards under development
ISO/IEC JTC 1	Information technology	3678	567
ISO/TC 22	Road vehicles	1053	229
ISO/TC 34	Food products	972	141
ISO/TC 184	Automation systems and integration	919	51
ISO/TC 61	Plastics	757	112
ISO/TC 20	**Aircraft and space vehicles**	**692**	**107**
ISO/TC 45	Rubber and rubber products	455	51
ISO/TC 29	Small tools	450	24
ISO/TC 38	Textiles	448	40
ISO/TC 8	Ships and marine technology	442	96
ISO/TC 23	Tractors and machinery for agriculture and forestry	413	39

ISO TC20 Air and Space Standards

ISO/TC 20 develops and maintains standards for aircraft and space vehicles, including:

- materials, components and equipment for construction and operation
- equipment used in the servicing and maintenance of these vehicles

- **692** published standards, **107** standards in development

TC 20 Subcommittees:

ISO/TC 20/SC 1: Aerospace electrical requirements

ISO/TC 20/SC 4: Aerospace fastener systems

ISO/TC 20/SC 6: Airframe bearings

ISO/TC 20/SC 8: Aerospace fluid systems and components

ISO/TC 20/SC 9: Air cargo and ground equipment

ISO/TC 20/SC 10: Aerospace fluid systems and components

ISO/TC 20/SC 12: Materials, structures and fracture mechanics

ISO/TC 20/SC 13: Space data and information transfer systems

ISO/TC 20/SC 14: Space systems and operations

ISO/TC 20/SC 16: Uncrewed aircraft systems

ISO/TC 20/SC 17: Airport infrastructure

ISO/TC 20/SC 18: Materials

TC20 Participating Member Country	National Body
Brazil	ABNT
China	SAC
Ethiopia	IES
Finland	SFS
France	AFNOR
Germany	DIN
India	BIS
Iran, Islamic Republic of	INSO
Italy	UNI
Japan	JISC
Mongolia	MASM
Russian Federation	GOST R
Switzerland	SNV
Ukraine	SE UkrNDNC
United Arab Emirates	MoIAT-SAS
United Kingdom	BSI
United States	ANSI

Additional 28 observing members

ISO TC20/SC13 - Space data and information transfer systems

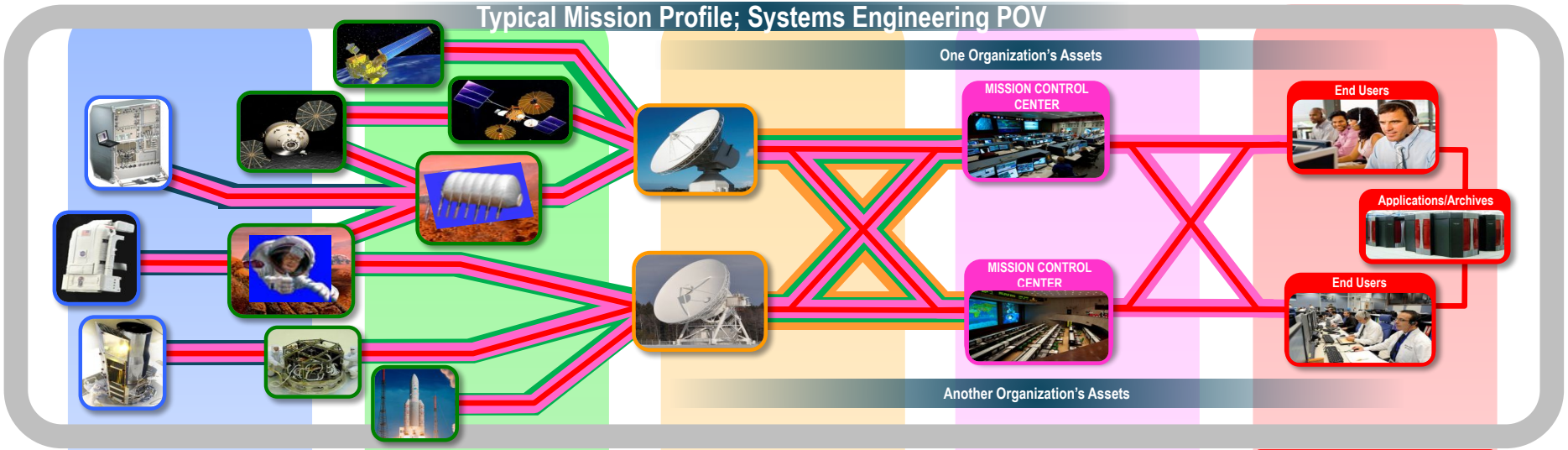
- **SC13 has 13 member countries, 13 observing members**
- **Organizations in liaison:**
  - Consultative Committee for Space Data Standards (CCSDS) – comprised of 11 space agencies (shown at the bottom right)
  - European Space Agency (ESA)
- **Develops recommended standards and practices for data and communications systems to:**
  - enhance governmental and commercial interoperability
  - reduce risk, development time and project costs
- **SC13 operates in a dual partnership with CCCSDS by publishing CCSDS documents as ISO standards**
- **CCSDS navigation data messages supporting SC13:**
  - Orbit Data Messages (ODM)
  - Attitude Data Messages (ADM)
  - Conjunction Data Message (CDM)
  - Tracking Data Message (TDM)
  - Pointing Request Message (PRM)
  - Reentry Data Message (RDM)
- **Office of Space Commerce TraCSS uses CCSDS standards**

The ODM is a most popular SC13 standard

SC13 Participating Member Country	National Body
Brazil	ABNT
China	SAC
Finland	SFS
France	AFNOR
Germany	DIN
India	BIS
Italy	UNI
Japan	JISC
Russian Federation	GOST R
Sweden	SIS
Ukraine	SE UkrNDNC
United Kingdom	BSI
United States	ANSI

CCSDS Overview: End-to-End Architecture

Six technical areas, twenty-six teams developing recommended standards and practices



Spacecraft Onboard Interface Services

- Onboard Wireless WG
- Application Supt Services (incl. Plug-n-Play)

IN SPACE

Space Link Services

- RF & Modulation
- Space Link Coding & Sync.
- Multi/Hyper Data Compress.
- Space Link Protocols
- Next Generation Uplink
- Space Data Link Security
- Optical Coding and Mod

Cross Support Services

- CS Service Management
- CS Transfer Services
- Cross Supt Service Arch.

Space Internetworking Services

- Motion Imagery & Apps
- Delay Tolerant Networking
- Voice
- CFDP over Encap
- CFDP Revisions

Mission Ops & Info Mgt Services

- Data Archive Ingestion
- Navigation
- Spacecraft Monitor & Control
- Digital Repository Audit/Certification
- Telerobotics

END USERS

Figure credit: www.CCSDS.org

ISO TC20/SC14 - Space Systems and Operations

- **SC14 has 19 member countries, 10 observing members**
- **Organizations in liaison (9):**
  - AeroSpace and Defence Industries Association of Europe - Standardization
  - Consultative Committee for Space Data Systems
  - Committee on Space Research
  - European Commission
  - European Cooperation for Space Standardization
  - European Space Agency
  - International Academy of Astronautics
  - International Telecommunication Union
  - World Customs Organization

- **Scope:**
  - Standardization of crewed and uncrewed space systems that include management of space programs, design, production, verification, launch, operations, maintenance, and disposal of space systems, end user applications and services, and for the environment in which the space programs operate.
  - Includes space traffic coordination and orbital debris

202
Published ISO standards*

52
ISO standards under development*

SC14 Participating Member Country	National Body
Australia	SA
Brazil	ABNT
China	SAC
Finland	SFS
France	AFNOR
Germany	DIN
Greece	ELOT
India	BIS
Italy	UNI
Japan	JISC
Korea, Republic of	KATS
Netherlands	NEN
Romania	ASRO
Russian Federation	GOST R
Spain	UNE
Sweden	SIS
Ukraine	SE UkrNDNC
United Kingdom	BSI
United States	ANSI

ISO TC20/SC14 - Space Systems and Operations

Eight working groups develop standards for SC14

- **SC14/WG3:** Space operations, space traffic coordination
- **SC14/WG7**: Orbital debris mitigation

Working Group	Convener
WG 1 Design, engineering and production	Japan
WG 2 Interfaces, integration and test	United States
WG 3 Space Operations	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
WG 8 Downstream space services and space-based applications	France

ISO TC20/SC14 Space systems and operations
WG7 Orbital Debris Working Group

Inter-Agency Space Debris Coordination Committee (IADC) guidelines have been codified as ISO standards through WG7's Orbital Debris Mitigation Work Program since 2003

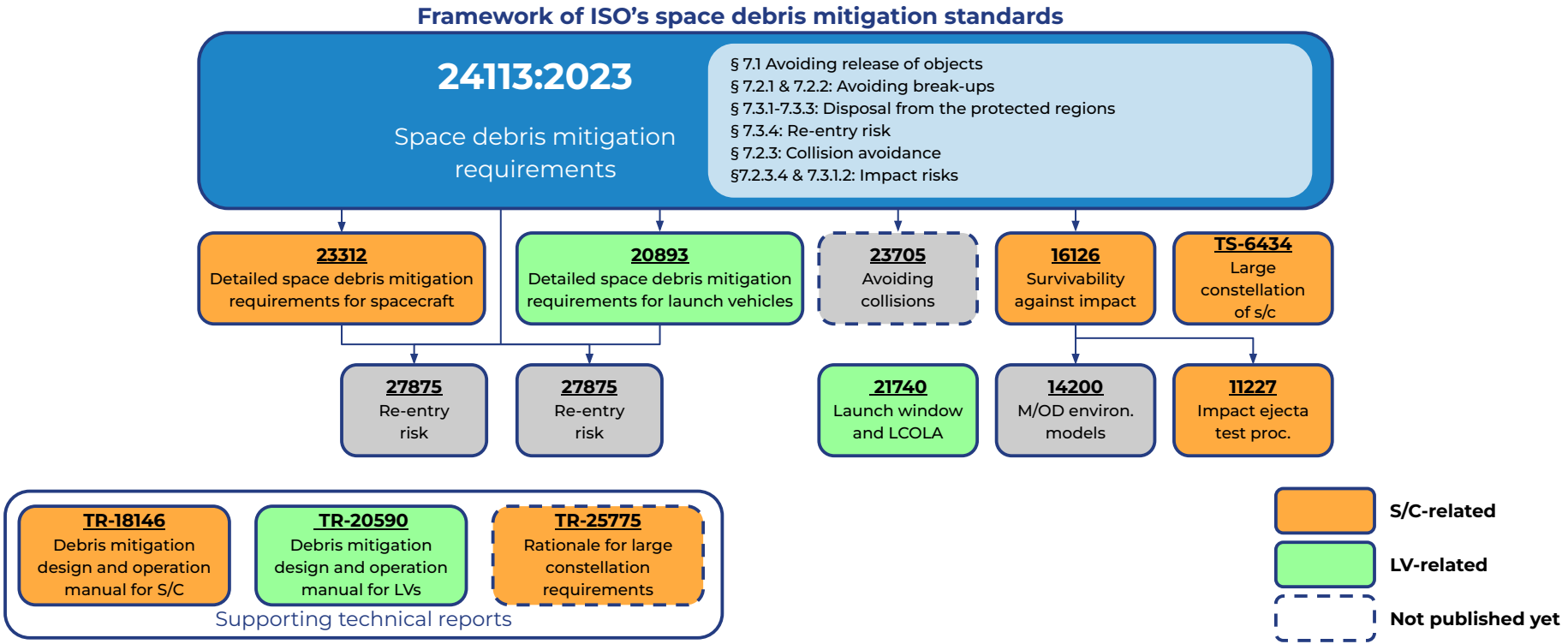


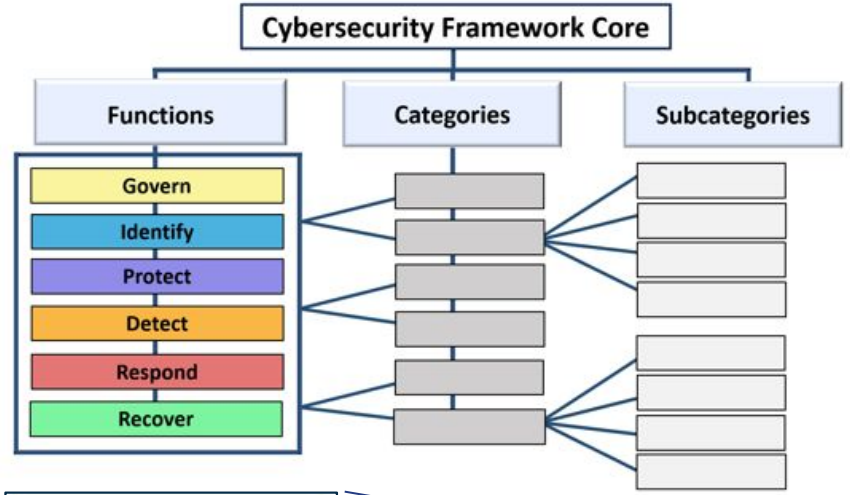
Figure credit: Anthology of CCSDS and ISO standards for Space Data Exchange, Space Traffic Coordination, and Orbital Debris Mitigation (6 February 2026)

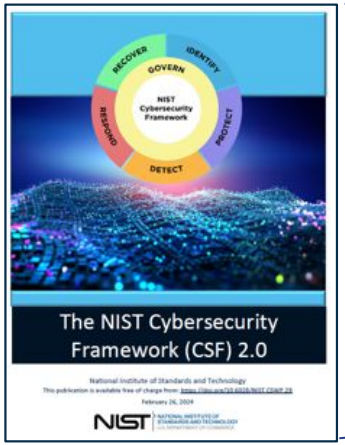
Helping organizations of all sizes and sectors improve their cybersecurity posture

Most downloaded document of all NIST technical pubs in 2024!

NIST Cybersecurity Framework 2.0

www.NIST.gov/cyberframework





Credit: Suzanne Lightman, NIST

NIST CSF Space Profiles

1. NIST IR 8323 v.1 *Foundational* ***Position, Navigation and Timing*** *(PNT) Profile - under an update in 2026*
2. NIST IR 8441 *Cybersecurity Framework for* ***Hybrid Satellite Networks*** *(HSN)*
3. NIST IR 8401 *Satellite Ground Segment: Applying the Cybersecurity Framework to* ***Satellite Command and Control***
4. NIST IR 8270 *Introduction to Cybersecurity for* ***Commercial Satellite Operations***

www.NIST.gov/cyberframework

Credit: Suzanne Lightman, NIST

P3536 - Space System Cybersecurity Design Standard Working Group

IEEE SA
STANDARDS ASSOCIATION

- Establishing comprehensive, harmonized cybersecurity regulations and standards is critical for consistent practices and global safety in complex space missions requiring international cooperation.
- The P3536 Working Group, consisting of five subcommittees, is developing a standard to:
  - define requirements for five segments of a space mission
  - identify threats and vulnerabilities
  - recommend controls
- This standard's focus is on deriving functional technical requirements for protecting space system segments and components.
- A Call to Action emphasizing this need was published by over 40 co-authors at ASCEND 2022 (available at the IEEE website).

See https://sagroups.ieee.org/3349/the-project/

How to engage in space standards development

- Join an **ISO working group** – via your **national standards organization**
- Join a **CCSDS working group**
  - Join via your **national space office or agency** to become a CCSDS member
  - Reach out to points of contact on the CCSDS website: https://ccsds.org/contact_us/
- Join the community of interest for **space cybersecurity**: **(open to public)** https://www.nccoe.nist.gov/cybersecurity-space-domain
- Join the **IEEE** (**as an industry or academic representative**) P3536 WG: https://sagroups.ieee.org/3349/the-project/

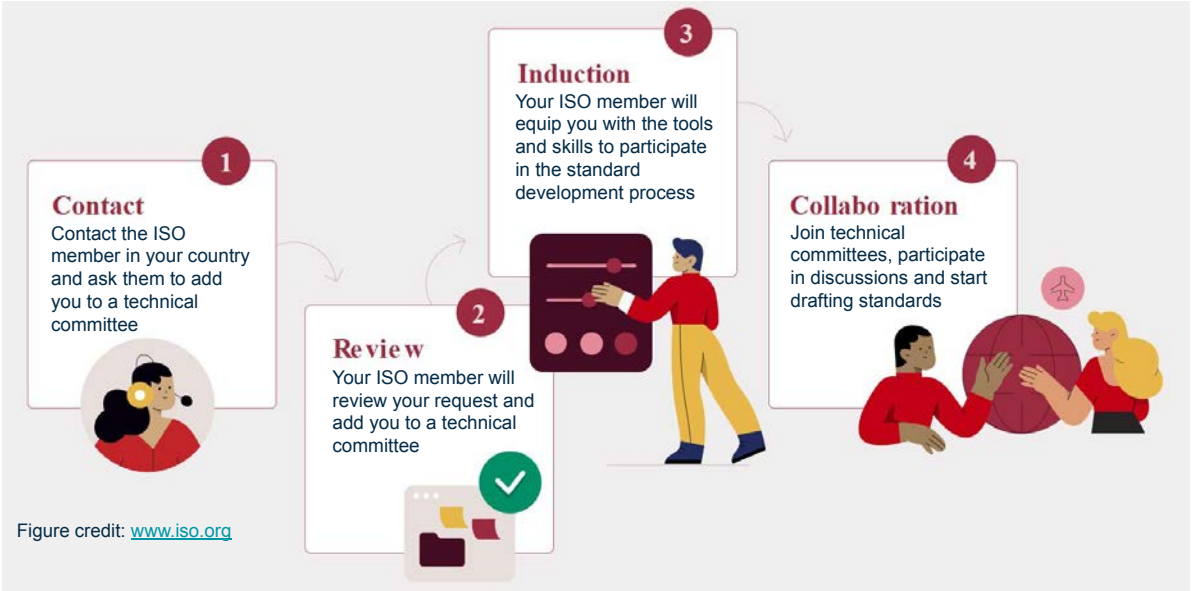


Figure credit: www.iso.org

Acknowledgements

Standards and Cybersecurity Content:

- Dianne Poster, Office of Space Commerce, NIST
- Suzanne Lightman, NIST
- Fred Slane, Space Infrastructure Foundation
- Dan Oltrogge, COMSPOC Corp.
- Marlon Sorge, The Aerospace Corp.

Want to discuss, learn, cooperate on Standards? POC:

Rose Croshier
International Relations
rose.croshier@noaa.gov

Intellectual Property (IP) Protection

- **IP Protection is a legal framework that protects "creations of the mind." Legal mechanisms used to secure, own and enforce rights include:**

Protects

Patent	Trademark	Copyright	Trade secret
New, inventive ideas	Identifies the origin of goods or services	Creative expression stored in a tangible form	Any information that is valuable & kept confidential


"Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce." - World Intellectual Property Organization (WIPO)

See USPTO.gov:

Intellectual Property (IP) Protection

- **To foster a "*predictable and transparent*" environment for U.S. industry, the USG encourages partners to:**
  - Align Standards - simplify cross-border filings
  - Enforce rights – prioritize IP actions and issue deterrent-level remedies
  - Licensed Representation- adopt requirements for practitioners
  - Provide Equal Treatment

"Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce." - World Intellectual Property Organization (WIPO)

See USPTO.gov:

Intellectual Property (IP) Protection - Why?

- **Strong IP protection and enforcement drives innovation, creativity and new business.**
- Magnet for IP-intensive industries: U.S. and international companies are often hesitant to export advanced technology to markets where it can be easily infringed.
- Builds investor confidence: It's a primary "due diligence" factor for venture capital and institutional investors.
- Trigger for economic growth:
  - Encourages local startups to innovate, knowing their work won't be undercut by unfair competition.
  - Intellectual property rights (IPR) can be businesses assets, e.g. licensing as a revenue stream.
- By aligning with USPTO standards, partners signal they are "open for business" to U.S. and other Partners

Want to discuss, learn, cooperate on IP? POC:

Katherine Hiner
IP Attaché, serving in Johannesburg, South Africa
(Katherine.Hiner@trade.gov)

Export Control

- **Builds international legitimacy & responsible stewardship of sensitive technology**
- Demonstrates that a space capabilities are for peaceful purposes
- Export control alignment accelerates partnerships with the United States
- Major Export Control Regimes include:
  - Wassenaar Arrangement (National Security)
  - Missile Technology Controls Regime (Missile Technology)
  - Nuclear Suppliers Group (Nuclear Proliferation)
  - Australia Group (Chemical/Biological)

Export Control - More Information

- **For further information on U.S. space export controls, contact:**

Dept of State: Directorate of Defense Trade (DDTC)

International Traffic in Arms Regulations (ITAR) = military use

Dept of Commerce: Bureau of Information and Security (BIS)

Export Administration Regulations (EAR) = civil & military "dual use"

Also see: ***Introduction to U.S. Export Controls for the Commercial Space Industry***

Content

- **US Government Space Policy & Regulation**
- **US Government Who's Who?**
  - ITA: Commercial Space Promotion & Support
  - OSC: Advocate, Operator, Regulator
  - DoS Space Affairs: Foreign Policy Considerations
- **Key Security Considerations for Trade**
  - Standards
  - Cyber Security
  - Intellectual Property Protection
  - Export Control
- **Aligned norms, policy, regulation - all help the global community, to include industry and governments, work together, trade, and operate in a common space**

Learn more:
space.commerce.gov