

# The Space Safety Coalition in the context of international space cooperation

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Space Safety Coalition Administrator

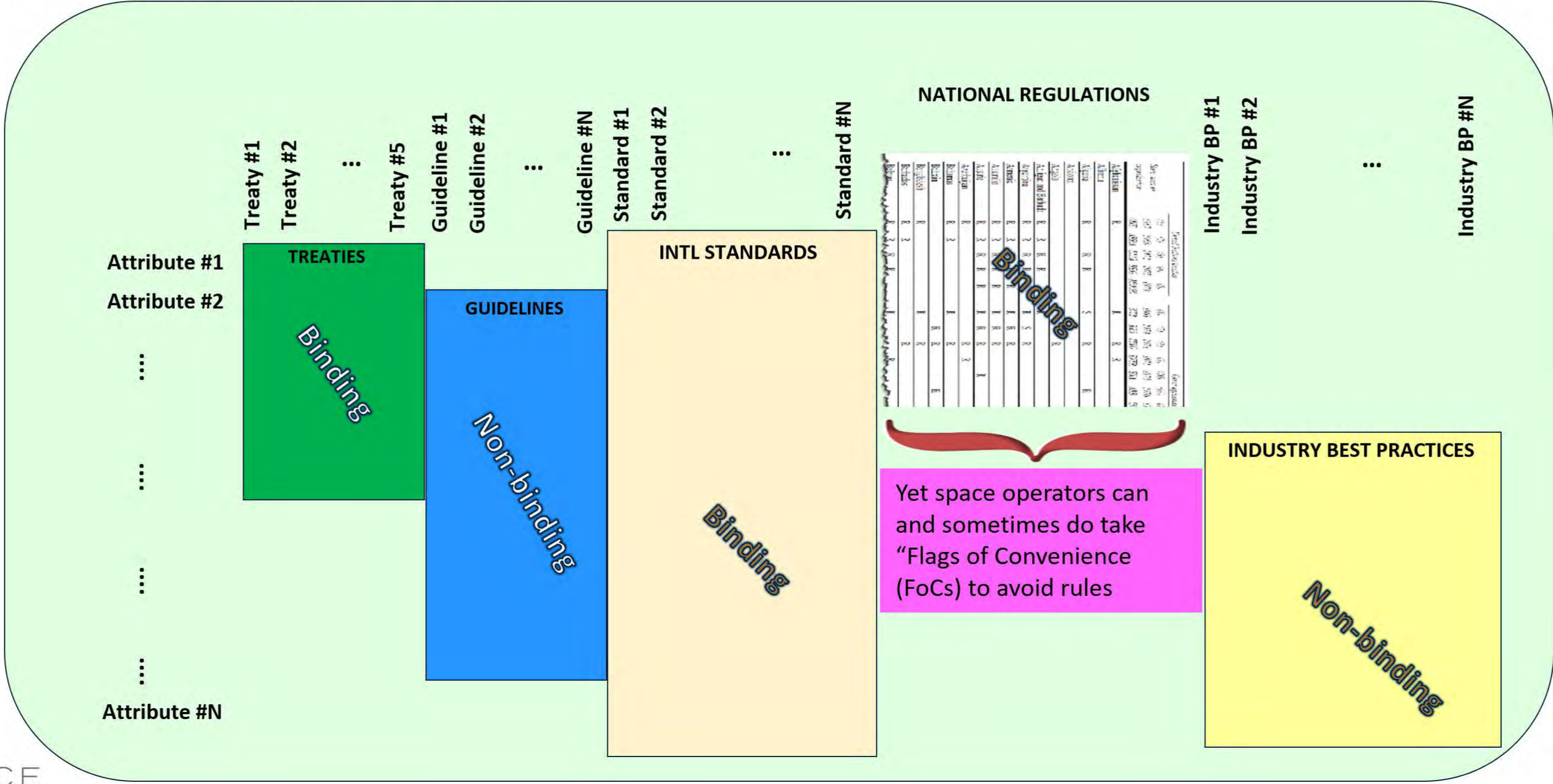
31 January 2020

**SSC** SPACE  
SAFETY  
COALITION



# Basic types of international space cooperation

- Today, our landscape is a mix of treaties, principles, guidelines, standards, and industry best practices





# AIAA global space safety policy characterization



## United Nations

## International NGOs

## National Regulatory

## Industry Consortia

	UN COPUOS (Treaties)	UN COPUOS (Excl. Treaties, SDM & LTS Guidelines)	United Nations Space Debris Mitigation Guidelines	United Nations Long Term Sustainability Guidelines	Committee on Space Research (COSPAR)	Consultative Committee for Space Data Stds	Inter-Agency Debris Coordination Committee	Intl Assoc for Adv of Space Safety (IAASS)	Intl Organization for Standardization (TC20/SC14)	International Telecommunications Union (ITU)	Canada	EU	France	Japan	South Africa	UK	USA Commercial	USA NASA	USA USAF	AIAA	Association of Space Explorers (ASE)	CubeSat Standard (Cal Poly)	Consortium for Execution of RPO & OOS (CONFERS)	Satellite Industry Association (SIA)	Space Data Association (SDA)	Space Safety Coalition (SSC)	World Economic Forum
Normative? (●=Y ○=N ●=Mix)	●	○	○	○	○	●	○	○	●	○	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○
Capacity building																											
Casualty risk																											
Contamination (physical)																											
Contamination (radiation)																											
Contamination (RFI)																											
Cooperation, inclusiveness																											
Exchange of space data																											
Health & status																											
Jurisdiction & ownership																											
Moon & celestial bodies																											
Registration																											
Responsibility/Liability																											
RPO/OOS																											
Safety																											
Security																											
Space law																											
Space weather effects																											
SSA																											
Standardization																											
TCBMs																											



# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

Degree of stringency



Lenient

Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

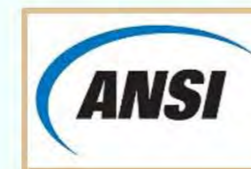
Color scheme:

Non-Gov't Organizations	National regulations
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Demanding

## As of 1947

Degree of stringency



Lenient

Minimum allowed

Lowest common

denominator

Voluntary

Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

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Non-Gov't Organizations	National regulations
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Demanding

1951

Degree of stringency



Lenient  
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Normative  
Binding  
Mandatory





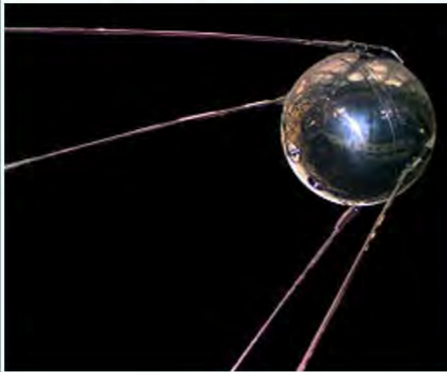
# Space safety policy landscape continuum

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Demanding

1957



Degree of stringency



Lenient

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Binding  
Mandatory





# Space safety policy landscape continuum

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Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1958

Degree of stringency



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Voluntary  
Non-binding

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Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
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Demanding

1960

Degree of stringency



Lenient  
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Lowest common  
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Voluntary  
Non-binding

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Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1963

Degree of stringency



Legal principles governing outer space

Lenient  
Minimum allowed  
Lowest common  
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Non-binding

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Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1967

Degree of stringency



(I) Outer Space Treaty



Legal principles governing outer space

Lenient  
Minimum allowed  
Lowest common  
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Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1968

Degree of stringency



(I) Outer Space Treaty  
(II) Rescue/Return Astronauts

Legal principles governing outer space

Lenient  
Minimum allowed  
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Voluntary  
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Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1972

Degree of stringency



Legal principles governing outer space

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention

Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1976

Degree of stringency



Legal principles governing outer space

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Lenient  
Minimum allowed  
Lowest common denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1979

Degree of stringency



Legal principles governing outer space

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Lenient  
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Lowest common  
denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

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Mandatory





# Space safety policy landscape continuum

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Demanding

1982

Degree of stringency



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Non-binding

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Normative  
Binding  
Mandatory



Legal principles governing outer space

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention



# Space safety policy landscape continuum

Color scheme:

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Demanding

# 1985

Degree of stringency



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Non-binding

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Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations

National regulations

Industry Associations

International bodies

Demanding

1993

Degree of stringency



- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Legal principles governing outer space

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory

Lenient  
Minimum allowed  
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Voluntary  
Non-binding





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

1995

Degree of stringency



NASA Safety Std 1740.14

25-yr Rule

Legal principles governing outer space

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory

Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2001

Degree of stringency



IADC Guidelines



US Orbital Debris Mitigation Support Plan 2001



25-yr Rule

Legal principles governing outer space

NASA Safety Std 1740.14

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory

Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding





# Space safety policy landscape continuum

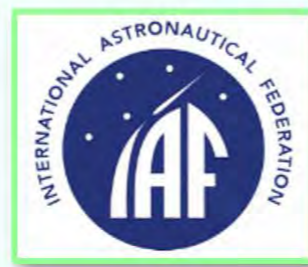
Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2002

Degree of stringency



IADC Guidelines



US Orbital Debris Mitigation Support Plan 2001

25-yr Rule

Legal principles governing outer space

NASA Safety Std 1740.14

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory

Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2004

Degree of stringency



IADC Guidelines



US Orbital Debris Mitigation Support Plan 2001



25-yr Rule

Legal principles governing outer space

EU Code of Conduct  
NASA Safety Std 1740.14

- (I) Outer Space Treaty
- (II) Rescue/Return Astronauts
- (III) Liability Convention
- (IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory

Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2006

Degree of stringency



IADC Guidelines



US Orbital Debris Mitigation Support Plan 2001



25-yr Rule

Legal principles governing outer space

EU Code of Conduct

NASA Safety Std 1740.14

(I) Outer Space Treaty

(II) Rescue/Return Astronauts

(III) Liability Convention

(IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory



# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2007

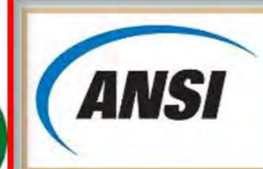
Degree of stringency



IADC Guidelines



UN Guidelines



US Orbital Debris Mitigation Support Plan 2001



25-yr Rule

Legal principles governing outer space

NASA NPR 8719
EU Code of Conduct
NASA Safety Std 1740.14

(I) Outer Space Treaty

(II) Rescue/Return Astronauts

(III) Liability Convention

(IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory

Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2009

Degree of stringency



Degree of mandatory compliance (incorporates ratification rate)



Lenient  
Minimum allowed  
Lowest common  
denominator



Voluntary  
Non-binding

Normative  
Binding  
Mandatory



# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

# 2010

Degree of stringency



IADC Guidelines



UN Guidelines



US Orbital Debris Mitigation Support Plan 2001



25-yr Rule

Legal principles governing outer space

AFI 91-217

NASA NPR 8719

EU Code of Conduct

NASA Safety Std 1740.14

(I) Outer Space Treaty

(II) Rescue/Return Astronauts

(III) Liability Convention

(IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory



# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2011

Degree of stringency



IADC Guidelines



ODCWG

UN Guidelines



US Orbital Debris Mitigation Support Plan 2001



25-yr Rule

Legal principles governing outer space

AFI 91-217

NASA NPR 8719

EU Code of Conduct

NASA Safety Std 1740.14

(I) Outer Space Treaty

(II) Rescue/Return Astronauts

(III) Liability Convention

(IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

2017

Degree of stringency



25-yr Rule



(I) Outer Space Treaty

(II) Rescue/Return Astronauts

(III) Liability Convention

(IV) Registration Convention

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

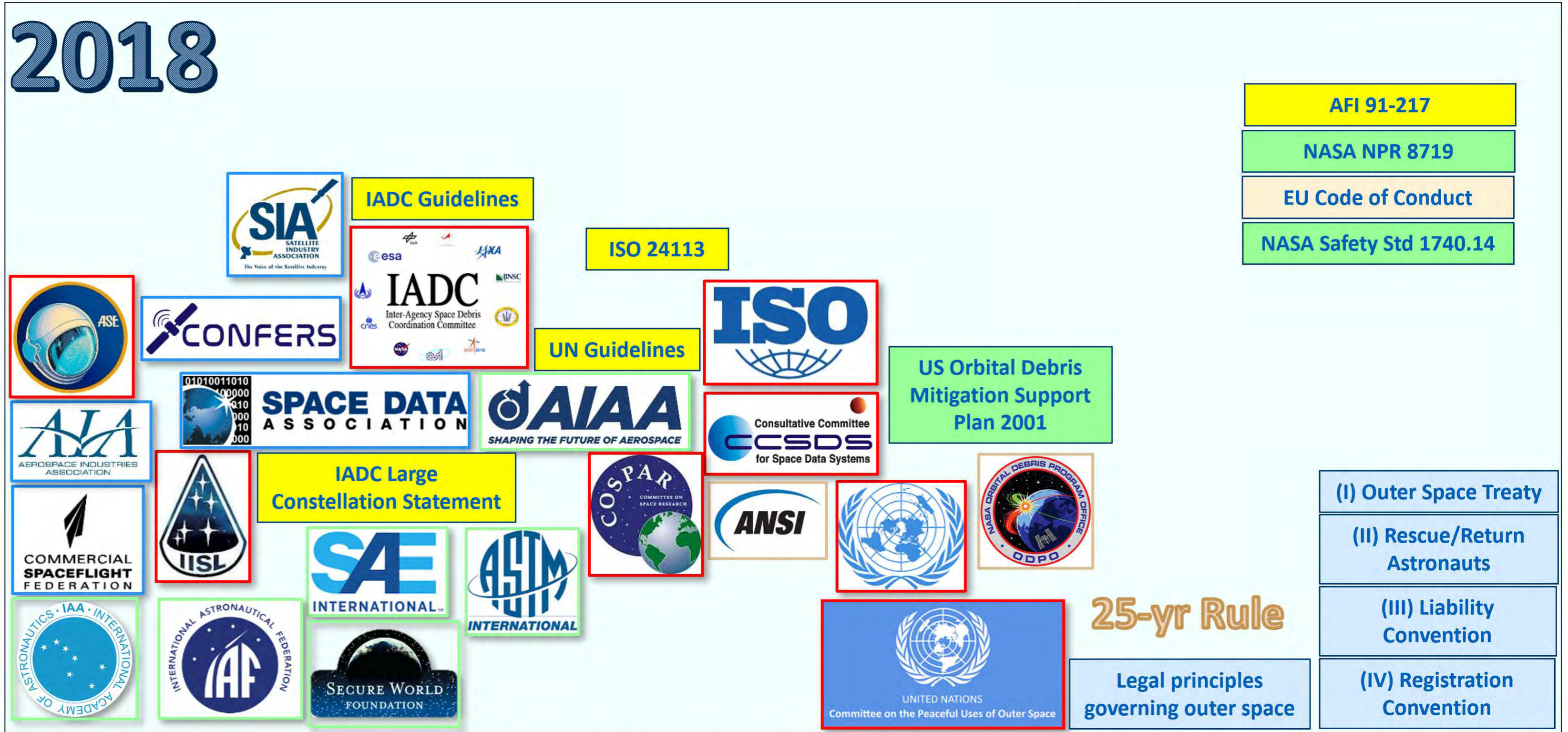
Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding

## 2018

Degree of stringency



Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory





# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding



Degree of stringency



Lenient  
Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)

Normative  
Binding  
Mandatory



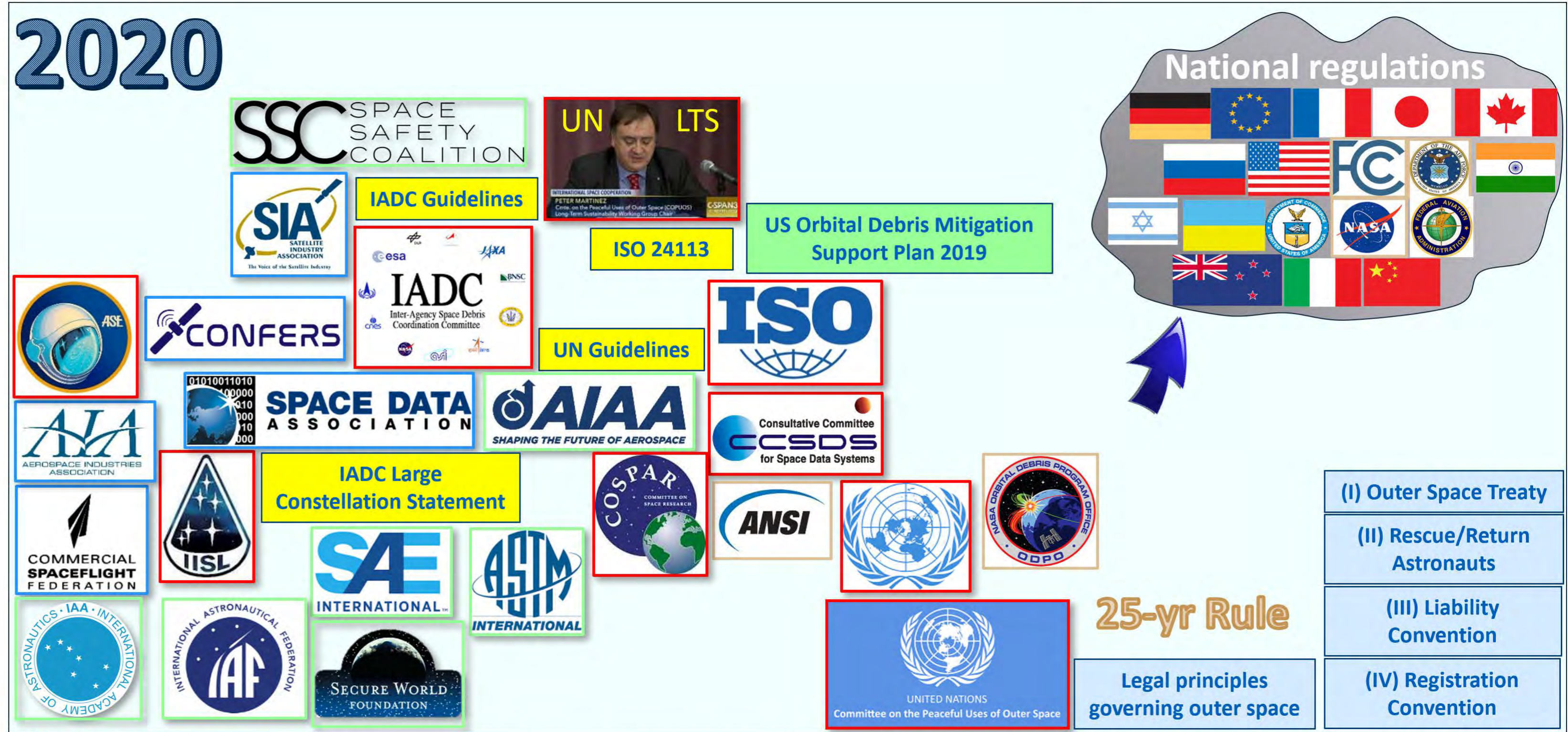


# Space safety policy landscape continuum

Color scheme:

Non-Gov't Organizations	National regulations
Industry Associations	International bodies

Demanding



Degree of stringency

Minimum allowed  
Lowest common denominator

Voluntary Non-binding  
SSC SPACE SAFETY COALITION

Degree of mandatory compliance (incorporates ratification rate)

Normative Binding Mandatory

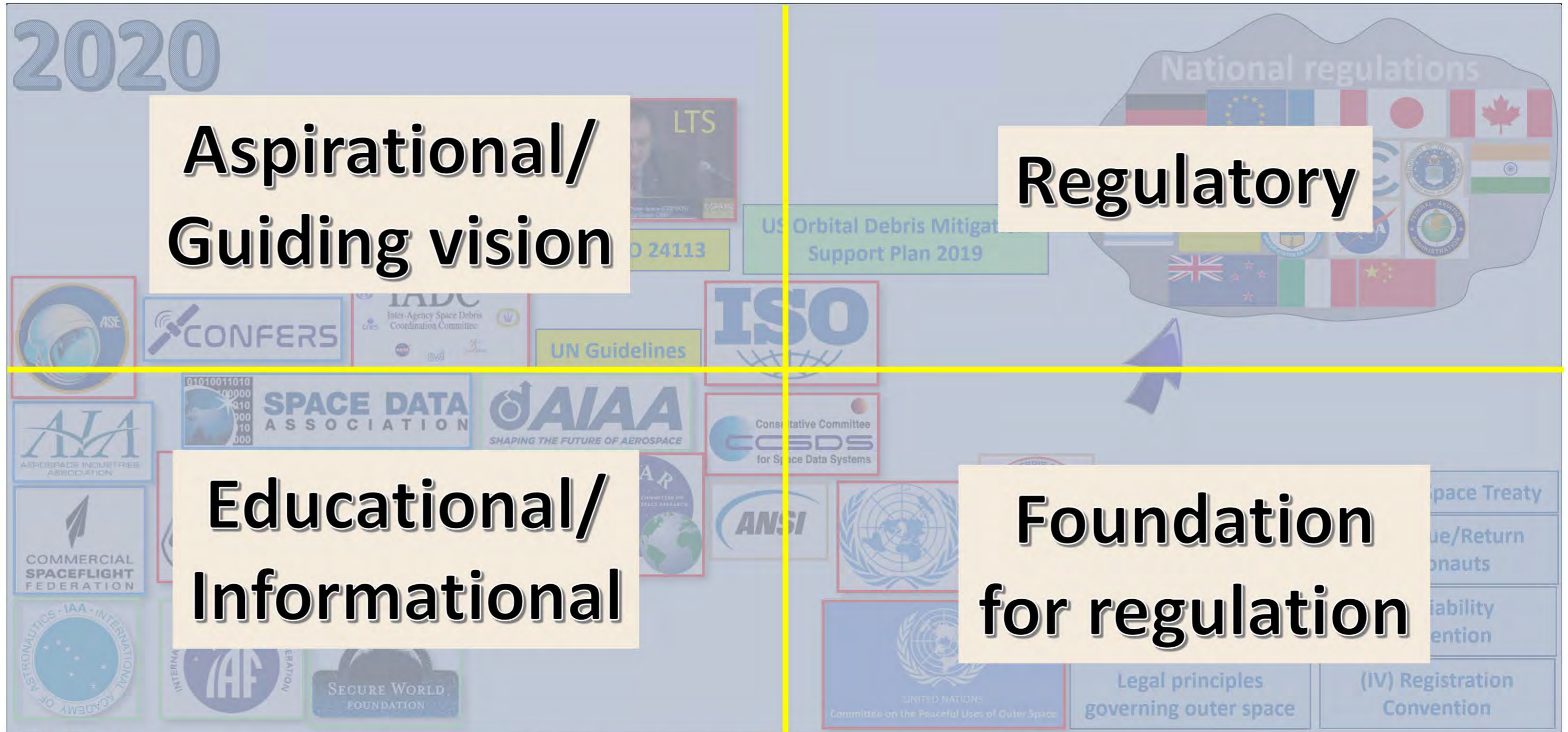


# Space safety policy landscape continuum

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Demanding



Degree of stringency



Lenient

Minimum allowed  
Lowest common  
denominator

Voluntary  
Non-binding

Degree of mandatory compliance (incorporates ratification rate)



Normative  
Binding  
Mandatory



# Space Safety Coalition (SSC)

- <https://spacesafety.org>
- Most operators support space sustainability
  - “It’s just good business sense”
  - Especially important for new large constellations
- SSC is a new ad hoc coalition of willing space operators and relevant industry stakeholders
  - Formed to assemble aspirational best space operations practices
  - Not a legal entity
- SSC can make a difference, in *advance* of:
  - Space treaties and consensus guidelines
  - Standards
  - National regulations
- Signatories endorse and agree to strive to implement best practices
  - To ensure safety and commercial viability of space activities



# SSC draws on ISO TC20/SC13 space data standards

- **SC13 is operated by the Consultative Committee for Space Data Systems (CCSDS)**

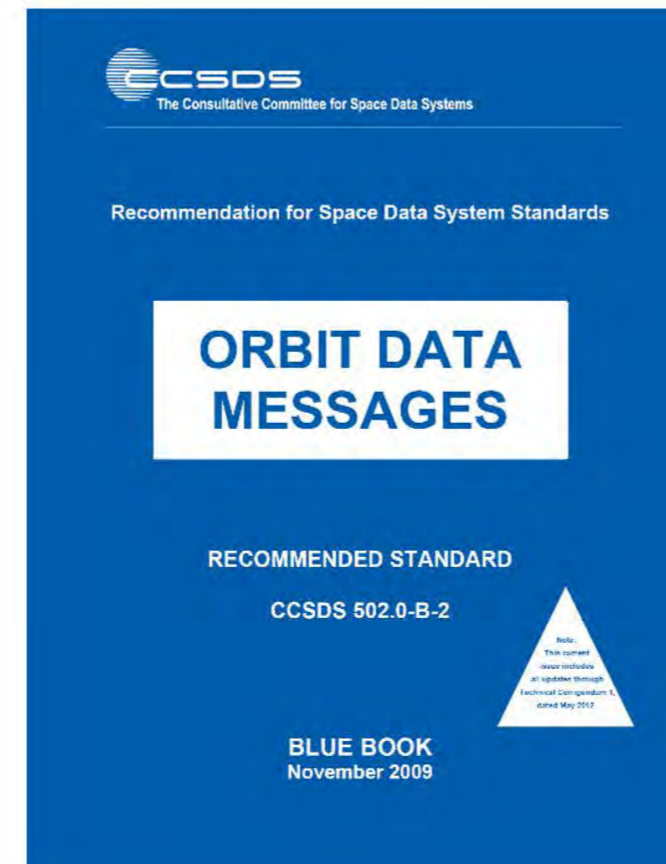
- Comprised of 11 space agencies

- Standards available through ISO and also at: <https://pub>



- **STM-relevant CCSDS navigation data exchange messages:**

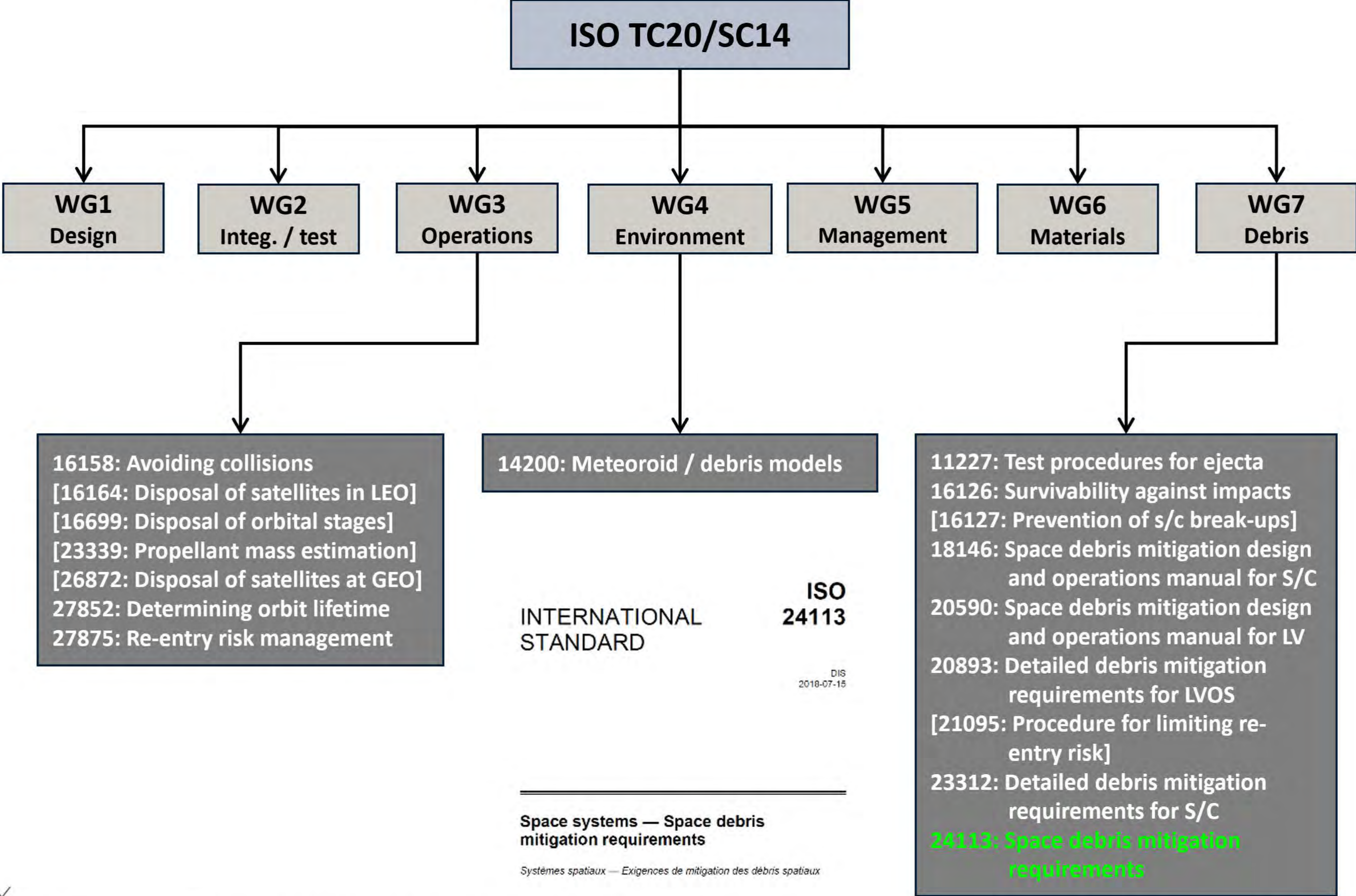
- Orbit Data Message (ODM)
- Conjunction Data Message (CDM)
- Tracking Data Message (TDM)
- Attitude Data Message (ADM)
- Events Data Message (EDM)
- Reentry Data Message (RDM)



The ODM is the most popular SC13 standard today

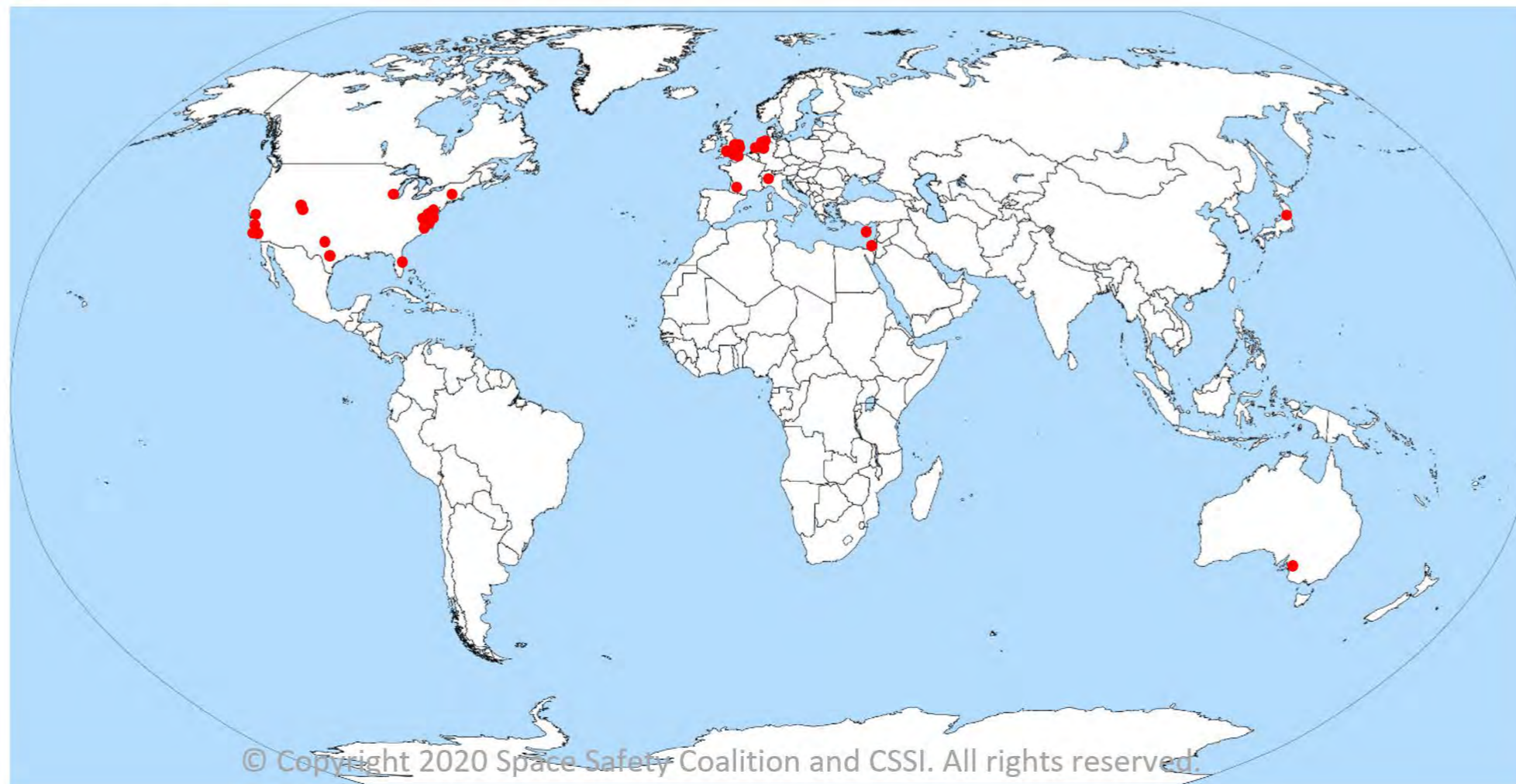


# SSC draws on ISO TC20/SC14 space systems standards





# Diverse set of 37 global space organizations have endorsed so far





# SSC's "Best Practices for the Sustainability of Space Operations"

- **A ground-breaking "living" best practices document:**
  - **Part 1:** Endorses existing international guidelines and standards (**IADC, UN, ISO**)
  - **Part 2:** Contains **over forty additional specific best practices** to further enhance and secure the long-term sustainability of space operations
  - Spans all phases of design and spaceflight, orbit regimes, spacecraft form factors, life cycle phases, and mission types



Legal entities that have a direct and material interest in space safety and sustainability can learn more about the space safety coalition at: <https://spacesafety.org> or email us at [info@spacesafety.org](mailto:info@spacesafety.org)

## Best Practices for the Sustainability of Space Operations

