Space Traffic Management as an International Legal Regime

3rd ICAO / UNOOSA Aerospace Symposium
Panel 4: Perspectives on Air Traffic Management and Future Potential Space Traffic Management

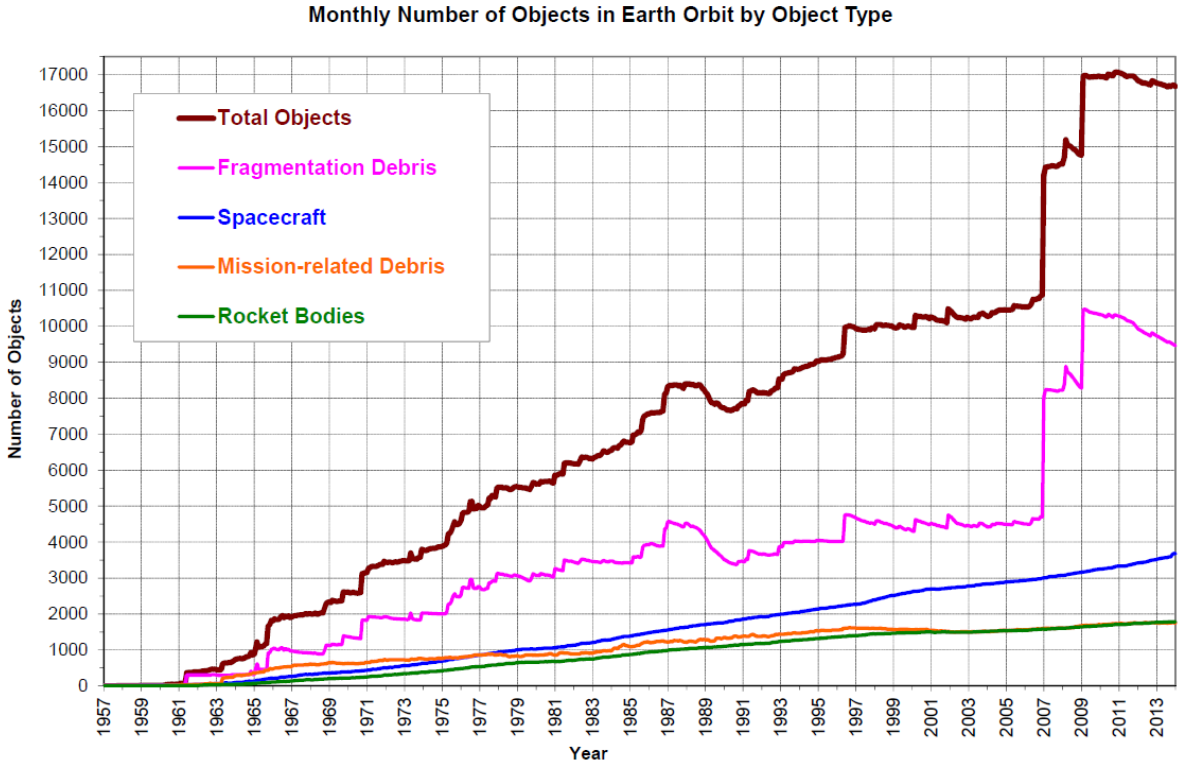
Peter Stubbe, 30 August 2017

DLR

Overview

I. International Legal Regimes
II. Elements of Space Traffic Management
III. Towards Space Traffic Management

International Legal Regimes (i)
Background: Congested Space Environment



NASA, Orbital Debris Quarterly News (18,1) 2014

International Legal Regimes (i)
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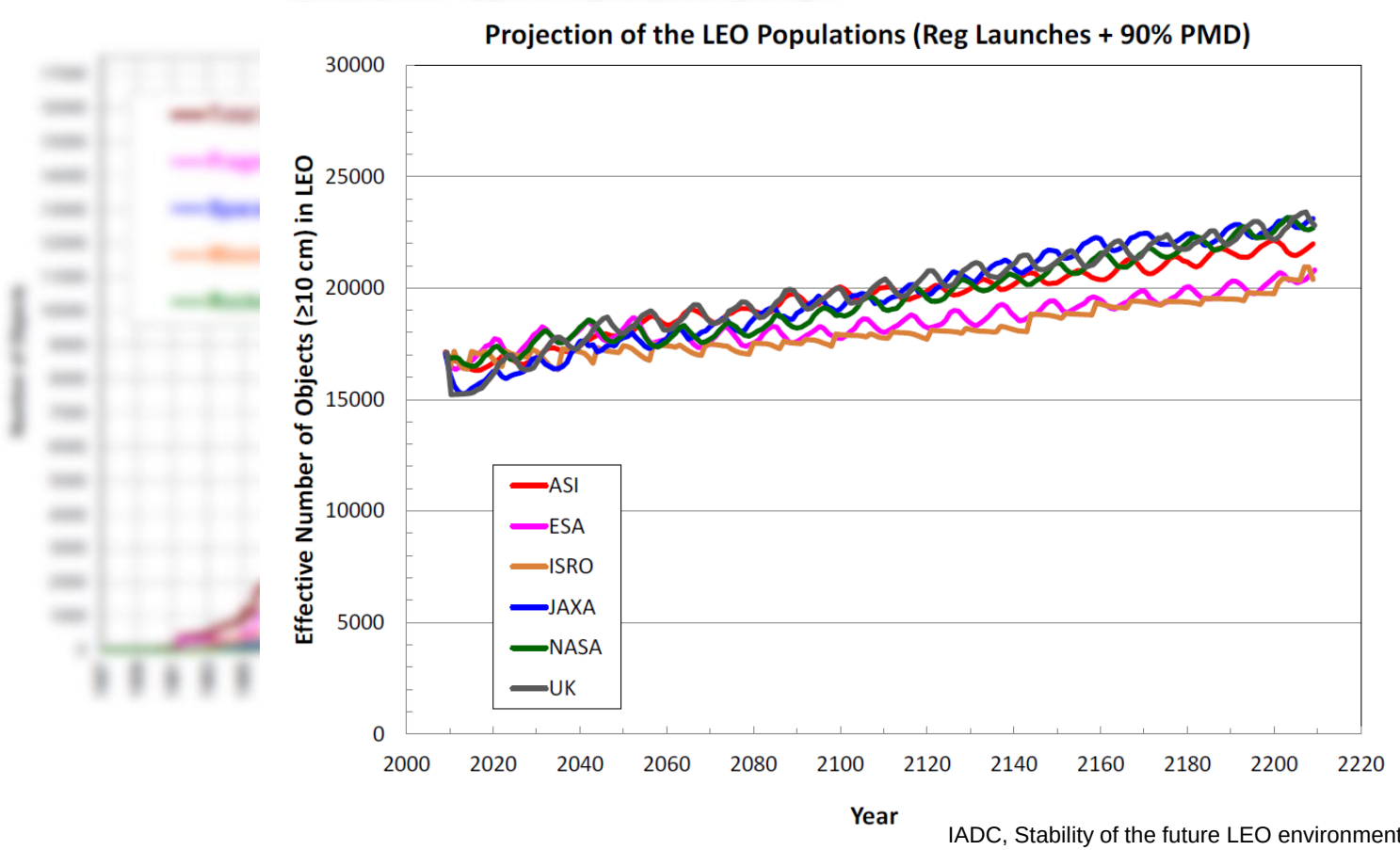
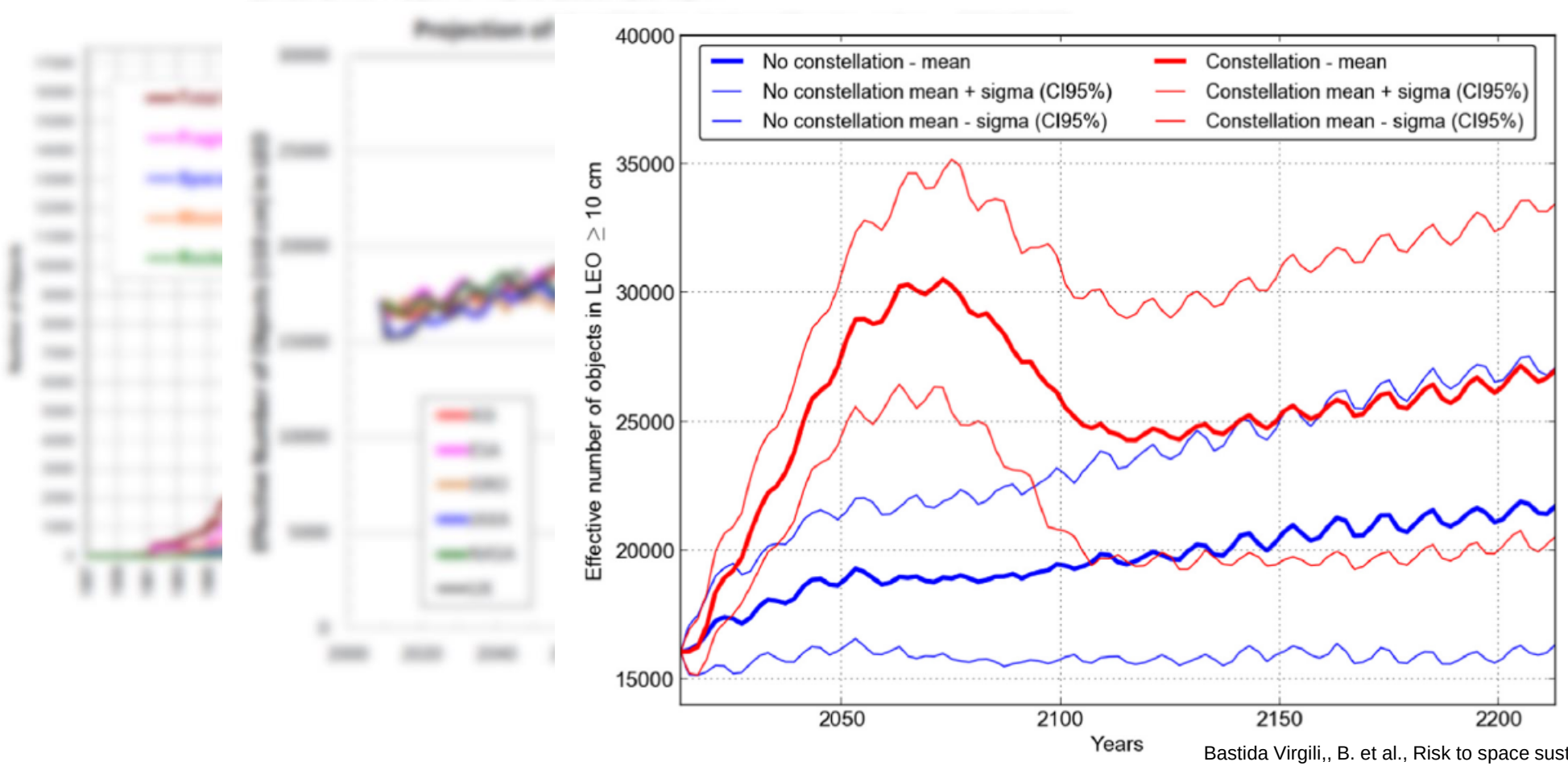


IADC, Stability of the future LEO environment, 2013

International Legal Regimes (i)
Background: Congested Space Environment



Bastida Virgili,, B. et al., Risk to space sustainability from large constellations of satellites, Acta Astronatica 126, p. 155

International Legal Regimes (ii)
Conceptual Background

Sectorial international regimes

- Driven by: Challenge/problem of an international character
  Need for cooperation and regulation
- Examples: trade, human rights, international civil aviation, telecommunications, space activities
- Result: diversification of the globalized society into functional subsystems
  (system theory)

Impact on international law

- "Self-contained regimes"
- Unity vs. fragmentation of international law

International regimes consitst of…

> "implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations".
>
> (S. Krasner, 1983)

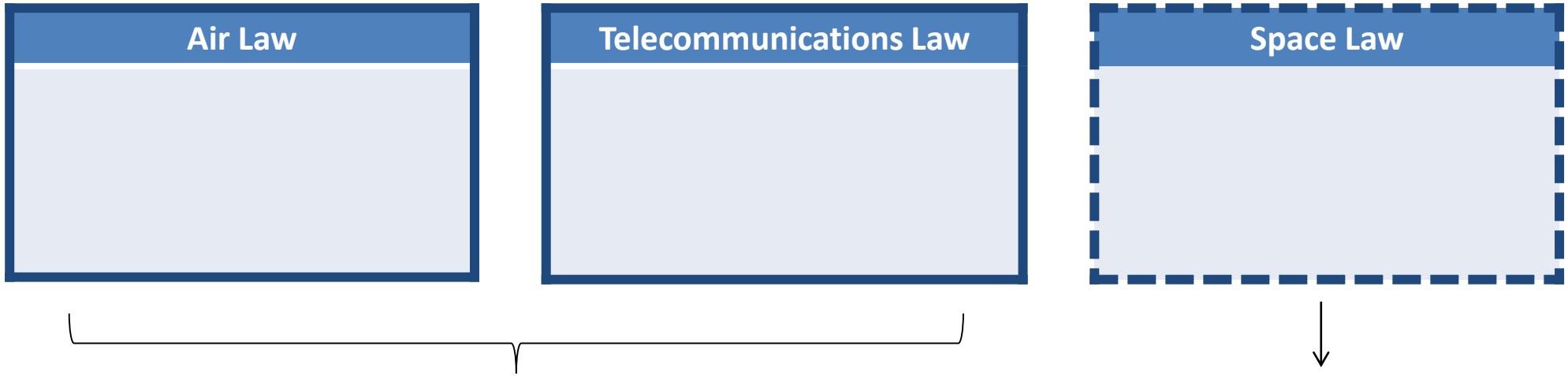
International Legal Regimes (iii)
Elements

	Air Law	Telecommunications Law	Space Law
1st normative level	Chicago Convention (CC)	ITU Constitution, Convention (CS, CV)	OST, ARRA, LIAB, REG, MOON
2nd normative level	International Standards and Recommended Practices (SARPs)	Administrative Regulations (Radio Regulations, International Telecommunication Regulations), Decisions, Resolutions, Recommendations	UNGA Space Resolutions, Debris Mitigation Guidelines (COPUOS, IADC, ISO), LTS Guidelines, Planetary Protection, Draft ICoC, etc.
Decision-making organs	Assembly, Council, Air Navigation Commission, Air Transport Committee	Plenipotentiary Conference, Council, World Conference on Int. Telec., Sector-specific Conferences and Assemblies	COPUOS (including STSC, LSC), other bodies (COSPAR, IADC, ISO)
Executive organs	Secretary-General	Secretary-General, Directors of ITU-R, ITU-T, ITU-D, Radio Regulations Board	OOSA
Dispute settlement	Art. 84 CC, RoP for the Settlement of Differences	Art. 56 CS and Art. 41 CV, Optional Protocol on Dispute Settlement	Instrument-specific dispute settlement provisions

International Legal Regimes (iv)
Criteria of Institutionalization

	Air Law	Telecommunications Law	Space Law
Organization	(+) ICAO	(+) ITU	(–)
Norm hierarchy and integrated norm development	(+) • Art. 37 • Art. 12 CC, Annex 2	(+) • Art. 4.3 CS: Complementary function of 2nd level norms • Art. 4.4 CS: Conflict of norms	(+/–)
Differentiation of decision-making organs	(+) • 1st level: Assembly • 2nd level: Council	(+) • 1st level: Plenipotiary Conference • 2nd level: Sector-specific Conferences and Assemblies	(–) • 1st level: COPUOS (other bodies) • 2nd level: COPUOS (other bodies)
Implementation and comprehensive dispute settlement	(+) 1st and 2nd level norms	(+) 1st and 2nd level norms	(–)

International Legal Regimes (v)
Degree of Institutionalization



Unitary international regimes for effective regulation:

- Norm hierachy and flexible norm development
- Organizational frame
- Coherent implementation

Fragmented regime in terms of:

- Norm hierarchy and development
- Organizational frame
- Implementation

→ Institutionalization needed:
from ***corpus iuris spatialis*** to **STM**

Elements of Space Traffic Management (i)

Safety of space operations

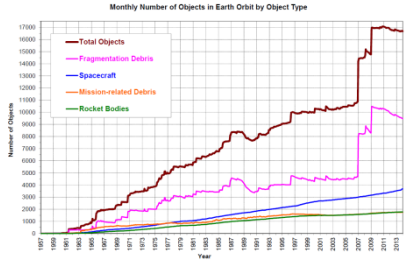
- Traffic coordination rules
- Space debris mitigation, space environment protection
- Rules for close-proximity operations

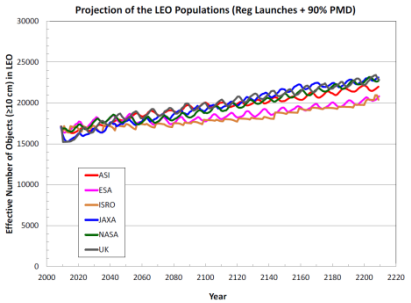
Space situational awareness

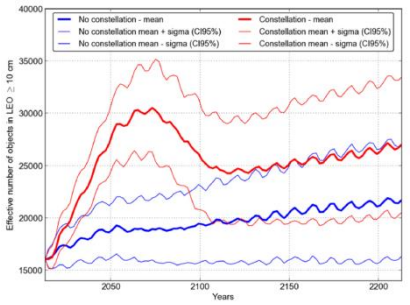
- Basis for traffic coordination and compliance monitoring
- Unitary, global SSA system vs. federalized, net-centric approach

Active debris removal

- Sustainability: stabalizing LEO object environment
- Mechanism for targeted removal (on the basis of objective criteria)



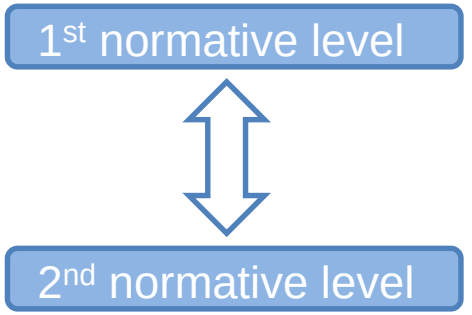




Elements of Space Traffic Management (ii)

Mechanism for flexible norm development

- Hierarchy of norms (1st/2nd), differentiation of decision-making bodies



Accomodating new developments

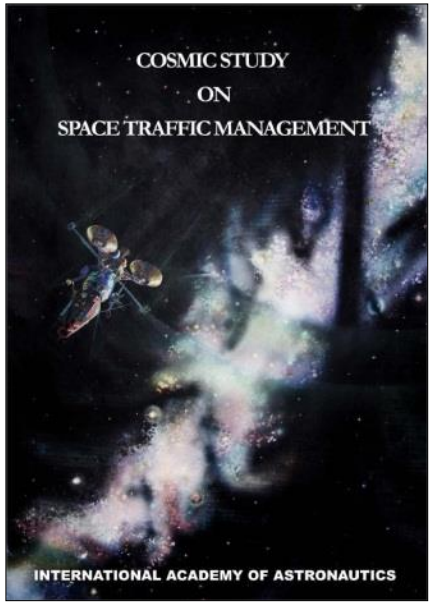
- Example: safety challenges through mega constellations (increased collision risk, accelerated growth)
- Introduction of use/object-specific regulations (allocation of costs and risks)

Dispute Settlement

- Ensuring the rule of law, mandatory character for effective implementation of STM
- Including 1st and 2nd normative level

Towards Space Traffic Management (i)
2016 STM Study

STM Study 2006: Space Traffic Management (STM) means...



"... the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference."

STM Study 2016

New element: Institutionalization through Outer Space Convention

Towards Space Traffic Management (ii)

Example: Outer Space Convention

Chapter 1	Scope and use of terms
Chapter 2	Principles (Status of outer space and celestial bodies, free use, peaceful purposes, sustainability, harmful interference, cooperation with developing countries, status of humans)
Chapter 3	Responsibility, liability, registration
Chapter 4	Space traffic managment (SSA, traffic coordination and rules through OSTR)
Chapter 5	International STM regime (International Space Organization, decision making bodies for OSC, OSTR and OSTTS)
Chapter 6	General provisions (Relation to UN space treaties, enforcement, dispute resolution, etc.)

OSTR
Outer Space Traffic Rules

OSTTS
Outer Space Traffic Technical Standards

Towards Space Traffic Management (iii)

Example: Outer Space Convention

OSTR
Outer Space Traffic Rules

- Binding legal norms of a technical content
- Adoption and review through regular conferences
- Categories of OSTR relating to:
  - Registration
  - Spaceflight, operations and traffic management
  - SSA
  - Space transportation safety and liability
  - Space environment, celestial bodies, natural resources

OSTTS
Outer Space Traffic Technical Standards

- Technical standards for all elements of the STM regime (facilitate interoperability, licensing and certification)
- Adoption and review through OSTTS conference
- Possible areas of OSTTS, *inter alia*:
  - Spacecraft engineering
  - Space data systems, SSA data sharing
  - Ground segments, spaceport infrastructure
  - Spacecraft disposal

Towards Space Traffic Management (iv)

Gradual approach: LSC 5 Treaties Working Group w.r.t. TP 2 of UNISPACE+50

	Cluster 1	Cluster 2	Cluster 3
Organization	Assess conceptual gaps of space law regime		
Norm hierarchy and integrated norm development	• Assess status and effectiveness of space law regime in terms of treaties, customary law → 1st normative level • Assess substantive and operational gaps → 1st/2nd normative level	• Develop a matrix addressing the interlinkages between LTS guidelines and UN space treaties (i.e. linking 1st and 2nd normative level) • Consider procedural and institutional measures for improving STSC and LSC cooperation	Promote universality of UN space treaties (i.a. through guidance document) → 1st normative level
Implementation and dispute settlement	Assess regulatory gaps in terms of responsibility/liability		

Thank you for your kind attention.