

SPACE LAW AND SPACE DEBRIS: MOVING IN THE RIGHT DIRECTION

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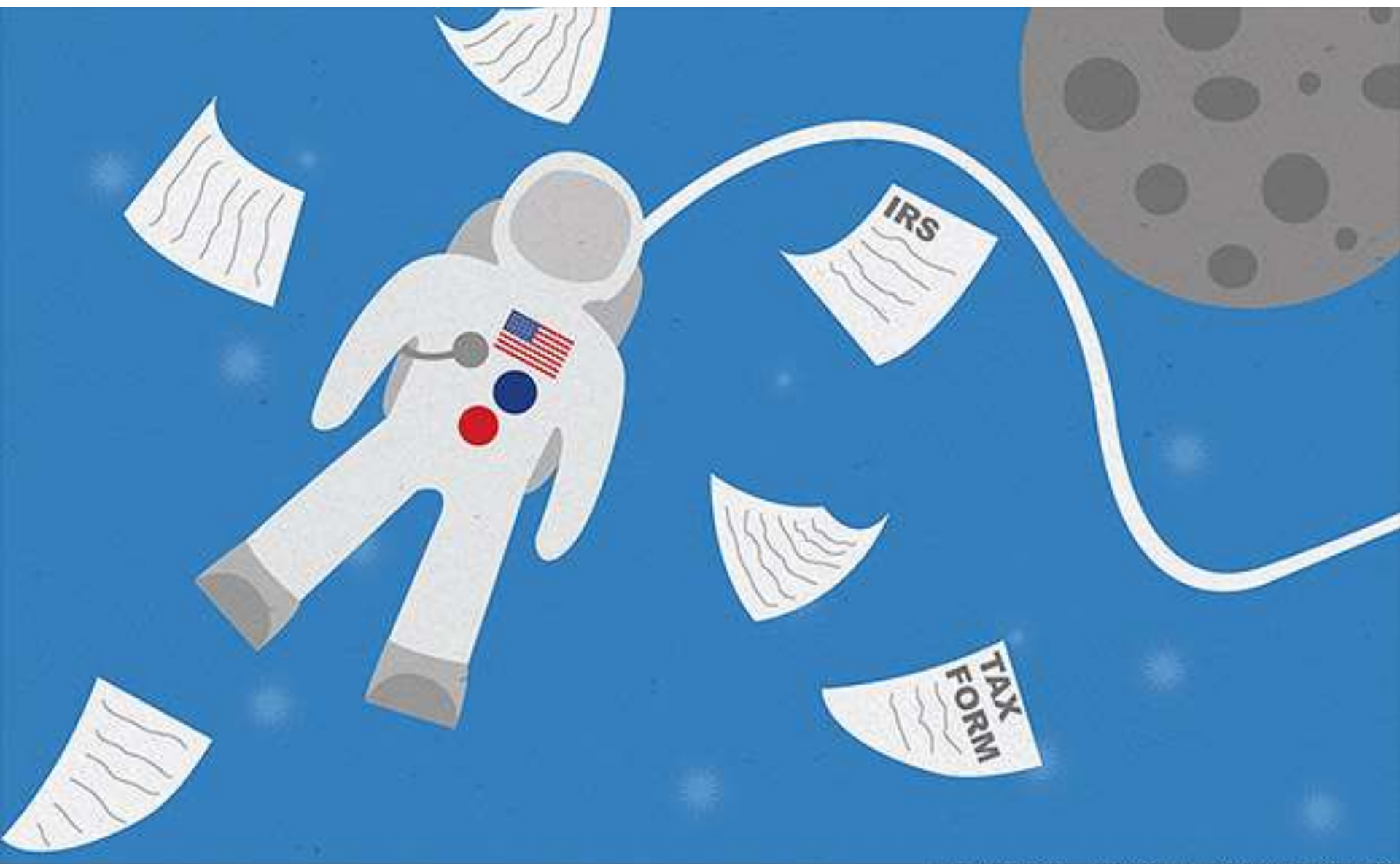




ROAD MAP

- 1. Crash course in international space law**
- 2. The role of national (space) law in the context of international space law**
- 3. International space law and ‘space debris’ – the baseline**
- 4. International & national space law and ‘space debris’ – recent developments**

WHEREVER MAN GOES, ...





1957
Sputnik I

- 1958 Creation of UN Committee for the Peaceful Uses of Outer Space for discussion legal questions outer space
- 1959 International Telecommunication Union starts to address frequencies for space communications in its regulatory work

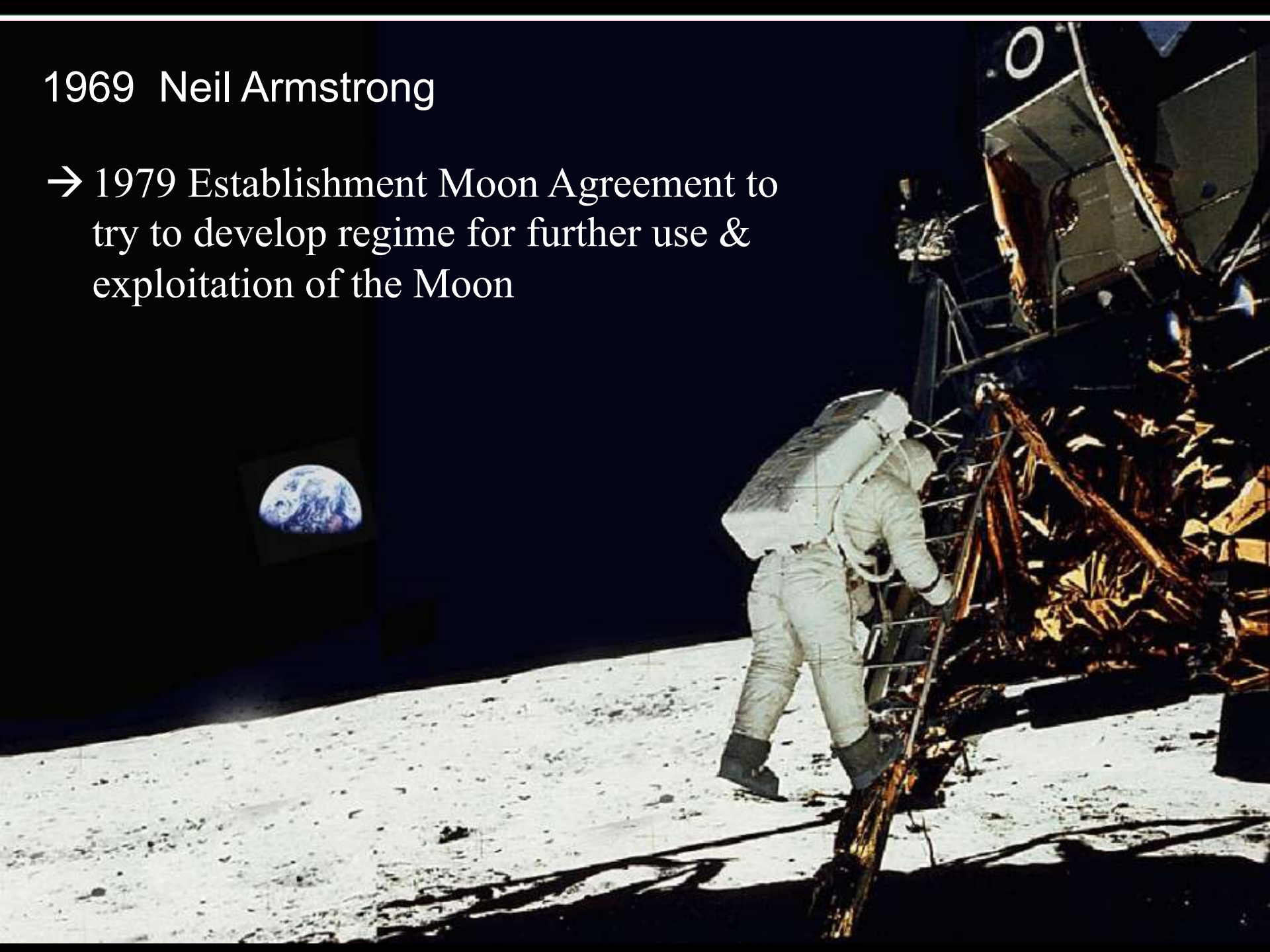


1961
Yuri Gagarin

- 1961 UN Resolution on registration spacecraft
- 1963 UN Resolution on general legal principles on space activities

1969 Neil Armstrong

→ 1979 Establishment Moon Agreement to try to develop regime for further use & exploitation of the Moon



2009 First collision between
two intact spacecraft –
Cosmos 2251 & Iridium 33

COSMOS 2251

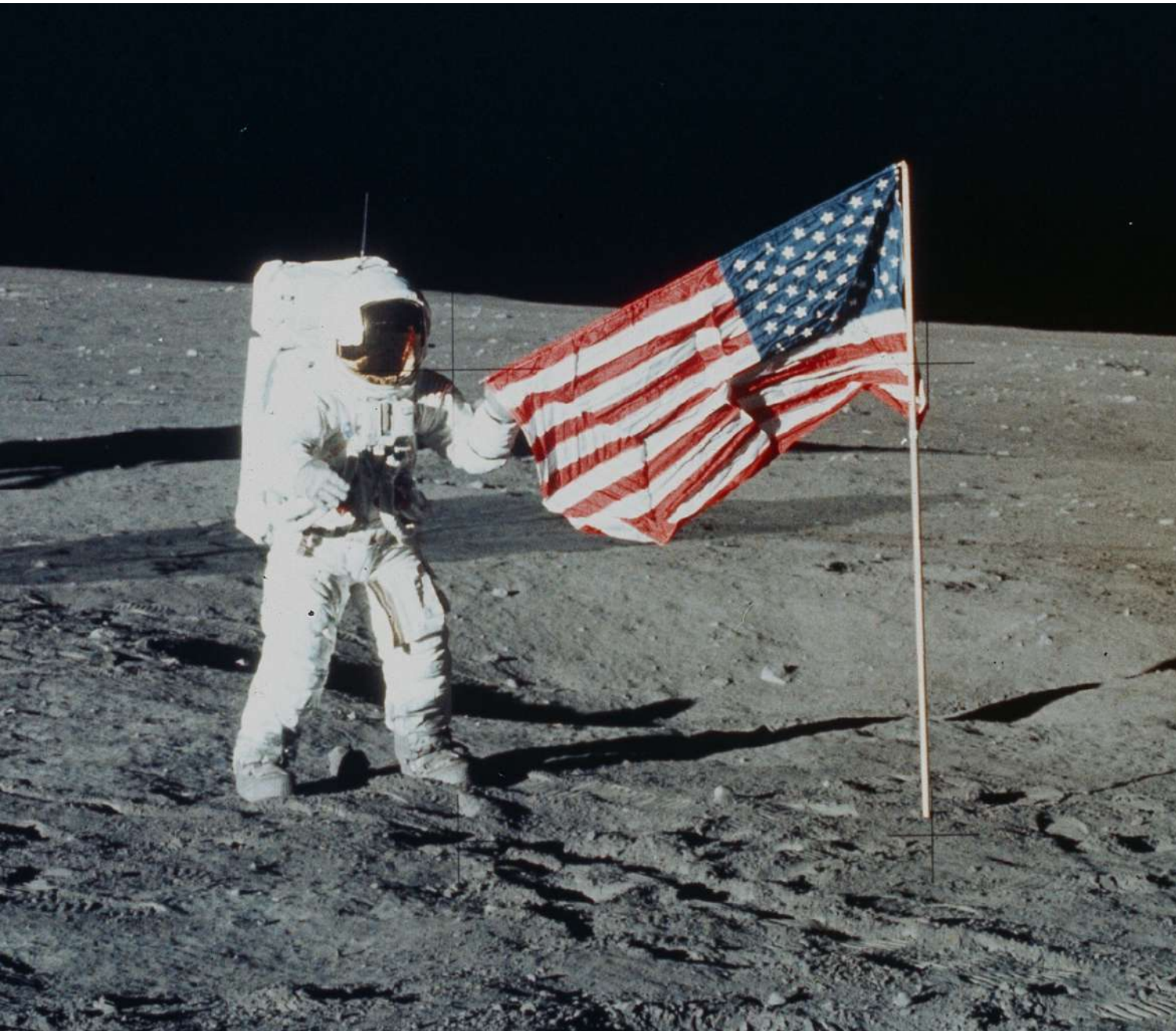


COLLISION
72.52 deg. N
97.39 deg. E
Alt. 789 Km

102.2 degrees

IRIDIUM 33





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OUTER SPACE TREATY (2)

- ◆ Limitations to freedom under Treaty itself
 - No stationing / orbiting weapons of mass destruction (Art. IV)
 - Use moon and other celestial bodies for peaceful purposes (Art. IV)
 - Conformity space activities with general international law, specifically including UN Charter (Art. III)
 - E.g. aggression against other sovereign states also prohibited in / via outer space



OUTER SPACE TREATY (3)

- ◆ Limitations to freedom under national law ...
 - In addition to existing jurisdiction: quasi-territorial jurisdiction over registered space objects & personnel thereof (Art. VIII) → Registration Convention
 - State responsibility also for *private* activities in outer space (if 'national') (Art. VI)
 - State liability for damage caused by space objects (also if *privately* owned & operated) (Art. VII) → Liability Convention



LIABILITY CONVENTION (1)

- ◆ 1972 – accepted by all major spacefaring states
- ◆ Absolute liability for damage on earth \leftrightarrow
fault liability for damage to other space objects
(Arts. II, III)
- ◆ Liability for damage caused *by space object* for
state(s) *involved in launching* (Art. I(c))
 - Launching / procuring / territory / facility
- ◆ Liability in principle unlimited (Art. XII)



LIABILITY CONVENTION (2)

◆ Definitional issues

- ‘Damage’: “loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations” (Art. I(a)) → environmental damage?
- ‘Space object’: “includes component parts of a space object as well as its launch vehicle and parts thereof”(Art. I(d)) → *‘anything launched into space’*




REGISTRATION CONVENTION

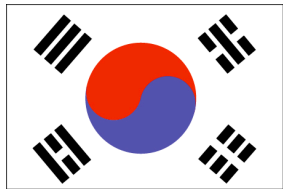
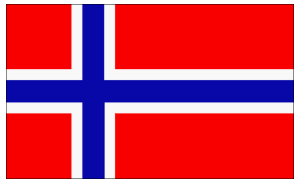
- ◆ 1975 – accepted by all major spacefaring states
- ◆ Launching state has to establish national register & inform UN thereof (Art. II)
 - If more than one launching state, only one of them
- ◆ Launching state shall provide UN with basic information for international register (Art. IV)
 - Incl. date & territory of launch, basic orbital parameters & general function space object



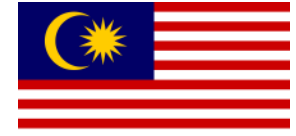
→ NATIONAL SPACE LAWS

- 
- ◆ Licensing requirement private space operators
 - In absence of a license: criminal responsibility
 - Focus on safety & (national) security, also general compliance with international obligations
 - ◆ Often including liability requirements
 - Reimbursement state for international claims
 - Partially or comprehensively
 - Sometimes also domestic claims
 - Liability insurance may be imposed

NATIONAL SPACE LAWS!



Major states missing so far...



HIGH-LEVEL SUMMARY (1)

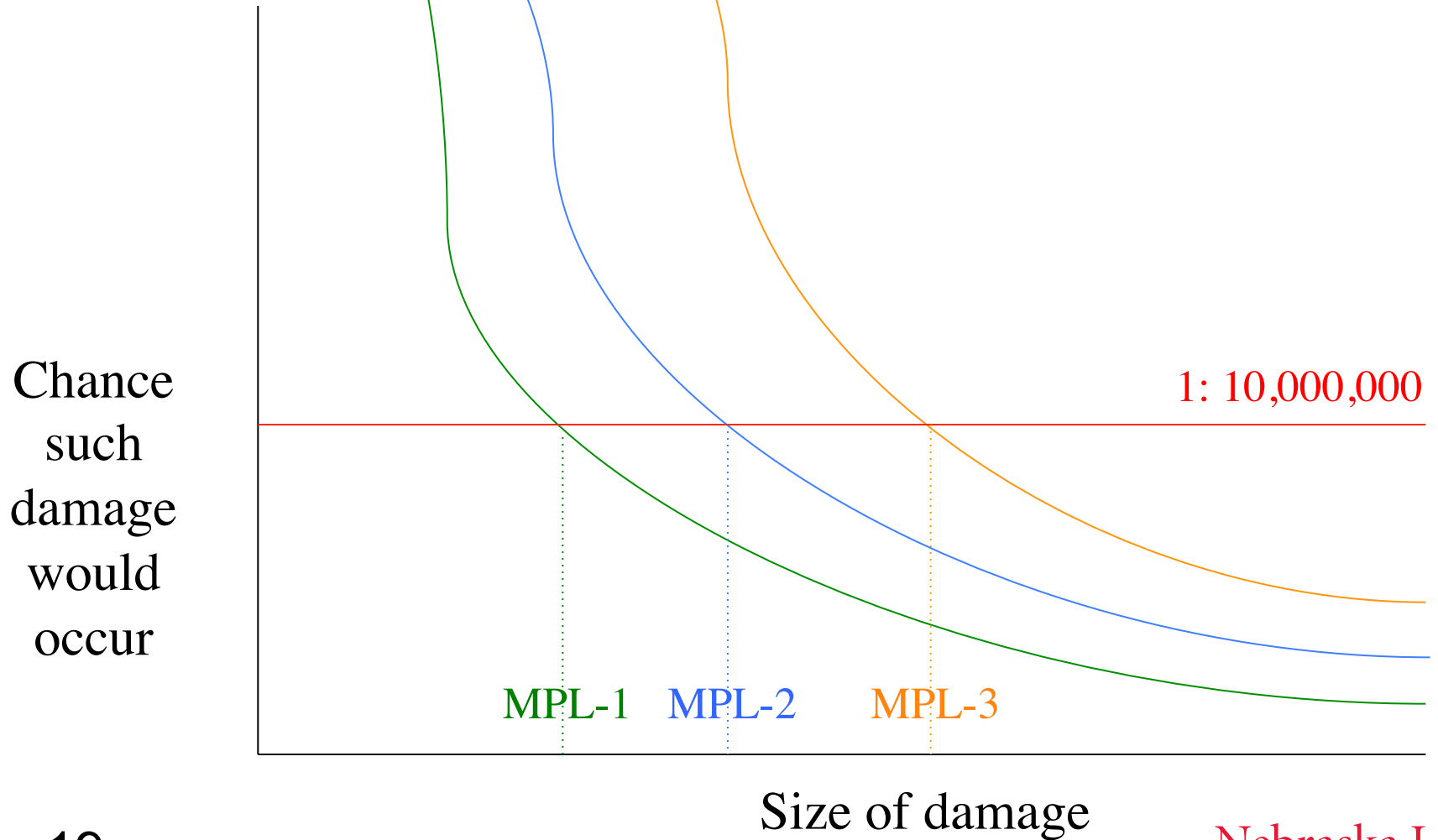
- ◆ All national space laws require license / authorization / permission for private operators to launch / operate space objects
- ◆ US most complex system
 - Various Acts & various licensing authorities
 - Only one also addressing specifically private manned spaceflight
- ◆ Some focus on launching \leftrightarrow others include \approx all space activities

HIGH-LEVEL SUMMARY (2)

◆ Licensing

- Some national laws are more explicit, others less so, regarding details of requirements for obtaining license
- Most deal with reimbursement of state for international liability claims, explicitly or implicitly
 - Following unlimited liability at international level: choice between one-on-one derogation to licensee & limiting such derogation to fixed / flexible caps
- Most provide for some relevant insurance obligations
 - For third-party liability: up to cap on reimbursement – often ‘Maximum Probable Loss’ (MPL) – or otherwise

MPL CALCULATION



'SPACE DEBRIS' IN SPACE LAW...

- ▶ Space debris is a problem
- ▶ Numerous obligations under treaty and national law
- ▶ No obligation to create space debris
- ▶ Liability (Outer Space Treaty (1967) - Art. VII)
 - US law (USC 50505 (2007))
 - US law (USC 50506 (2008))
- ▶ No recognition, strictly legally speaking, of any responsibility in advance of serious damage being done
- ▶ Outer Space Treaty
- ▶ US downing of Japanese satellite

SPACE DEBRIS & LIABILITY

→ *Liability for damage caused by space debris*

→ *Functional space objects*

→ *Liability for damage caused by space debris*

→ *Outer Space Treaty Convention*

→ *Liability for damage caused by launching state(s)*

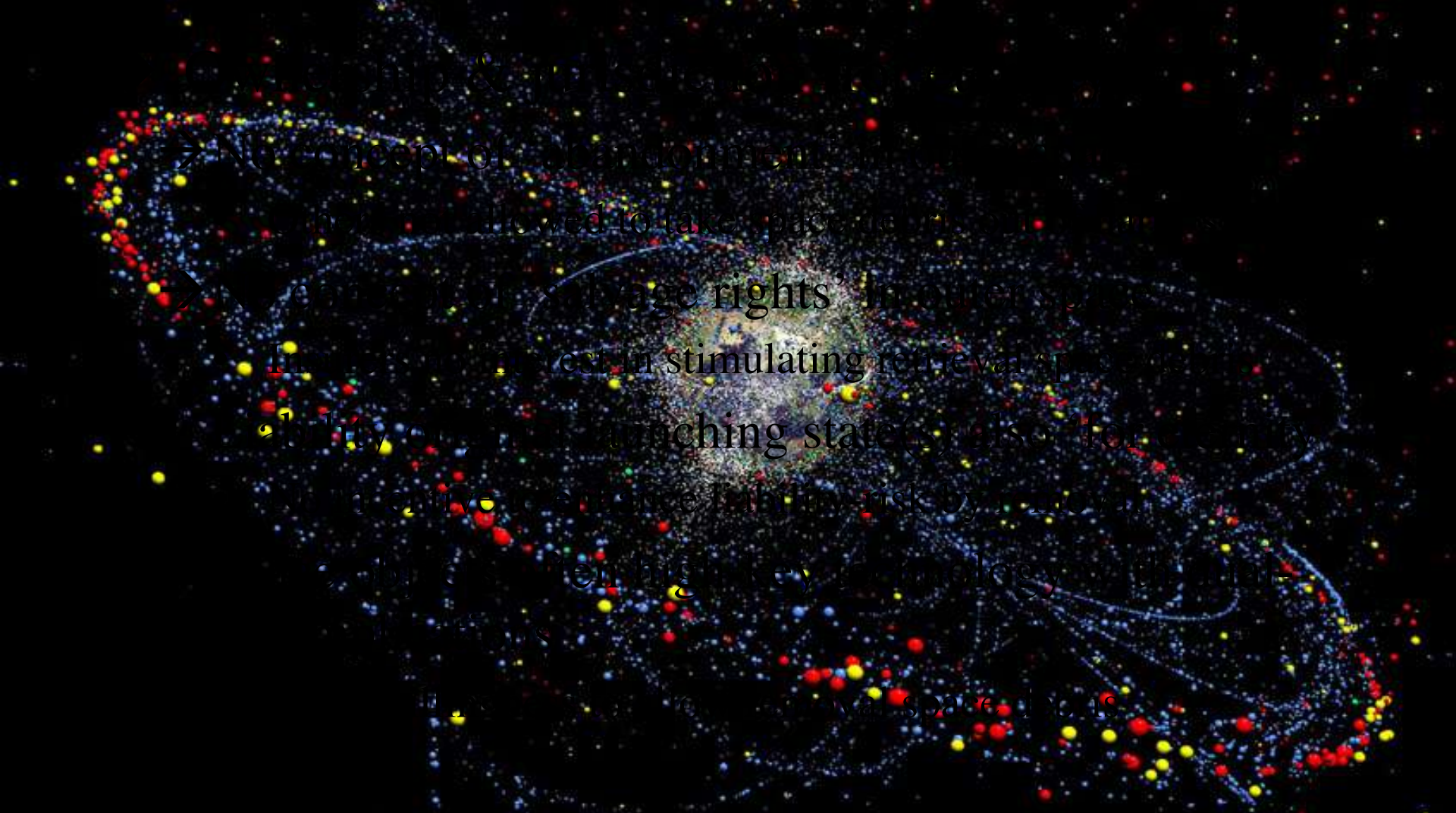
→ *Liability for damage caused by launching state(s)*

→ *Liability for damage caused by launching state(s) or state(s) of origin*

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SPACE DEBRIS & REGISTRATION

- 
- No concept of 'ownership' in space
 - States allowed to take space resources
 - 'Ownership' & 'space rights' in outer space
 - Interest in stimulating retrieval space debris
 - Liability of launching states, also for damage
 - Launches increase debris risk by a factor of 10
 - Launches increasing by a factor of 10 in 10 years
 - 2000000 objects in orbit, 1000000 are debris

RECENT DEVELOPMENTS

◆ Mitigation of 'space debris'

■ Inter-Agency Space Debris Coordination Committee

- All major public governmental + IC (O) space agencies
- 2002 Guidelines, Revised 2007
- Two protected regions ('zones') Low-Earth Orbit (< 2,000 km) & Geo-Stationary Orbit (35,580 - 35,986 km)

1. Preventing on-orbit break ups
2. Removing space objects at end of mission
3. Limiting release objects during normal operations
4. Prevention on-orbit collisions

Inter-Agency Space Debris Coordination Committee



MOVING BEYOND 'GUIDELINES'

- ◆ *Guidelines*, (initially) for 'internal' use by (public) space agencies
 - Possibility to become customary international law
- UN General Assembly Resolution 2007: 'upgrades' level of legal importance
- National licensing systems start using *Guidelines* as *binding* licensing requirements...
 - *Enhanced* possibilities to become customary international law

EXAMPLE 1: UNITED STATES

- ◆ FCC licenses private satellite operations
 - 1934 Communications Act, as specified 1970
 - Primary responsibility to license use of satellites for general public's benefit → requirement of debris-mitigation standards (first NASA, then IADC/UN)
- ◆ FAA/AST licenses private launch operations
 - 1984 Commercial Space Launch Act
 - License requirements include 'payload review' to determine possible jeopardy to public safety – making use of IADC standards

EXAMPLE 2: UNITED KINGDOM

- ◆ Secretary of State licenses private satellite operations – delegated to UK Space Agency
 - 1986 Outer Space Act
 - License only granted if activities “will not jeopardise public health or safety” & “consistent with international obligations UK”
 - Following IADC/UN: prevent contamination outer space & adverse changes in terrestrial environment & dispose of licensed space object at end of licensed activity & inform UK Space Agency thereof

EXAMPLE 3: FRANCE

- ◆ CNES authorizes private space operations
 - 2008 Law on Space Operations
 - Authorization may be granted only if activities compliant with technical regulations for the protection of public health and the environment, which could include specifics “in order to limit risks related to space debris”
 - First CNES standards, then IADC/UN & requirements also compliant with ISO 24113, incl. end-of-life operations

BEYOND THE STANDARDS? (1)

◆ Enhancing effectiveness Registration Convention?

- UN Resolution 2007 recommending practices enhancing registration
 - Add more details under “general function of the space object” → ‘non-functioning’
 - Comply with recommendation to provide information on space objects “which have been but no longer are” in orbit
 - Broader ratification: almost half of actual launching states are not parties; relatively more newly-launched satellites remain unregistered

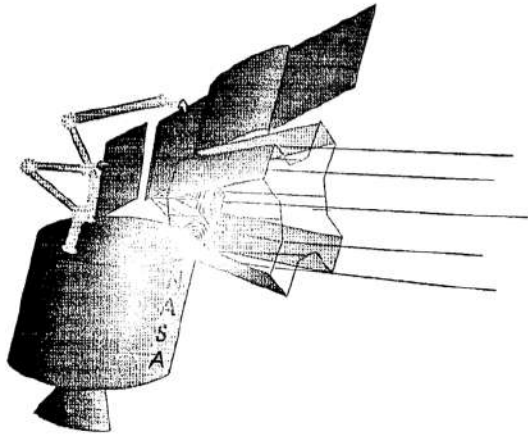


BEYOND THE STANDARDS? (2)

- ◆ Compensation fund for victims unidentified space debris?
 - Cf. nuclear power plants; oil pollution at sea; (nationally:) road accidents
 - Financed by space-faring states & administered at international level
 - Percentage launch costs? MPL? Insurance premiums?
 - All options cost money...

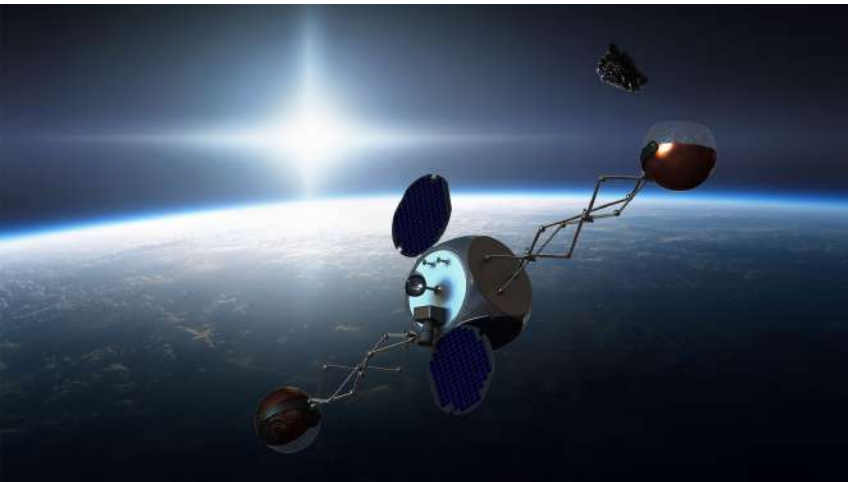


BEYOND THE STANDARDS? (3)



◆ ASPOD-project

- University of Arizona, mid-1990s: Autonomous Space Processor for Orbital Debris
- Capture, fragmentation & de-orbiting



◆ TAMU Sweeper

- Texas A & M University, 2010s
- Sling-Sat to sling debris out of the way

Nebraska Law

University of Nebraska

BEYOND THE STANDARDS? (4)



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BEYOND THE STANDARDS? (4)

- ◆ ‘Space traffic management’ – the ultimate challenge
 1. Situational awareness
 - Many national/IGO/NGO systems
 - Move to global(ly accessible) system
 2. Authority to operate/supervise
 - COPUOS/ITU/ICAO/national space agencies
 - Move to globally coherent system
 3. Create specific responsibilities & liabilities for damage



CONCLUDING REMARKS

- ◆ Challenges to space debris problem beyond technical/operational & economic also legal:
 - Ensure better situational awareness, with help of Registration Convention & SSA-to-be-developed
 - Clarify & enhance obligations of end-of-life ‘neutralization’ & clarify concept of ‘fault’ as related to launching states of ‘space debris.’
 - Allow for ‘abandonment’ & removal of abandoned satellites while appropriately dealing with liability & ‘registration-for-eternity’