



Panel: Assessing new liabilities

Liability in space and space-related activity

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„Chinese space station Tiangong-1 has returned to Earth, crashing into the South Pacific

Space agencies weren't sure exactly when, or where, the out-of-control station would fall out of orbit.

After two years of unmanned cruising in orbit, the Chinese space station Tiangong-1, or “heavenly palace” in Mandarin, has finally fallen out, crashing into the Earth’s atmosphere. At 8:16 pm Eastern time on Sunday, **the school bus-size craft** plummeted into the southern Pacific Ocean, the United States Joint Force Space Component Command has confirmed.

The crash ends weeks of speculation about when and where the space station might return to Earth in a fiery finale. **Even in the days leading up to the crash, no one could predict the spot of the final plunge, leading to a worldwide guessing game.”**

Risk in space activities

US Congressional findings

- ▶ “Space transportation is **inherently risky...**”
- ▶ Space transportation is “**vital to the Nation's economic well-being and national security**”
- ▶ Congress acknowledged that some risk is acceptable

Columbia Accident Investigation Board Findings:

- ▶ “Building and launching rockets is still **a very dangerous business, and will continue to be so for the foreseeable future** while we gain experience at it. It is unlikely that launching a space vehicle will ever be as routine an undertaking as commercial air travel.”
- ▶ “Throughout the Columbia accident investigation, the Board has commented on the widespread but erroneous perception of the Space Shuttle as somehow comparable to civil or military air transport. They are not comparable; **the inherent risks of spaceflight are vastly higher**, and our experience level with spaceflight is vastly lower.”

Specifics of space industry - facts

- ▶ Ultrahazardous activity: a 'rocket science'
- ▶ High value versus small volume of projects
- ▶ New technologies: constant development versus demand of ultimate reliability
- ▶ Volatility of profits
- ▶ Industrial practice of risk allocation
- ▶ New tendencies: small satellites/ constellations of satellites
- ▶ 'New space' movement –as a challenge for traditional space industry
- ▶ Role of insurance in space endeavours: 'no insurance, no financing'

Scope of space industry – impact on liability regime

- ▶ Upstream versus downstream activities
- ▶ Scope of space activities from the legal *versus* economic point of view:
 - ▶ Launch
 - ▶ Satellite operation
 - ▶ Satellite manufacturing
 - ▶ Satellite services: navigation/ observation (remote sensing) / communication
- ▶ Regulatory approach and its impact on risk management, liability and insurance

Consequences of distinguishing space and space –related activity: only the first one is included in the space law regime

Risk and liability in space activity

- ▶ **International space law liability regime** (Outer Space Treaty, Liability Convention)
- ▶ **National regulatory regime:** 27 countries adopted national space laws (subsequent laws in drafting stage) with the aim to regulate issues of:
 - ▶ Liability
 - ▶ Insurance or other financial security
- ▶ **Industrial contractual practice** with respect to liability regime:
 - ▶ Waiver of claims
 - ▶ Hold harmless / indemnification
 - ▶ Flow down clauses
- ▶ **Not coherent legal regime on international and national level**

Liability – legal issues

Some potential problems with liability rules, e.g.

- ▶ in certain circumstances – not certain which State is deemed to be responsible (problems with the the “launching state” notion)
- ▶ what constitutes a “space object” included in the liability regime?
- ▶ to what extent can space debris be considered a space object?
- ▶ what is meant by “fault” and “negligence” (both terms being used)?
- ▶ is indirect damage covered as well as direct damage?

There are likely to be some different interpretations under national legal systems

Application of the liability convention

Only one instance where the Liability Convention was invoked (under article 2 – strict liability in respect of damage on earth):

- ▶ In 1978 Soviet Spacecraft RORSAT Cosmos 954, in part survived re-entry and left a scattering of radio-active debris on Canadian territory.
- ▶ Canadian Gov. lodged a \$6M claim to clean up. Was settled for \$3M on diplomatic basis (without recourse to a Commission established for the specific purpose as envisaged in the Convention)

Application of the liability convention

- ▶ No claim made under Liability Convention relating to damage in orbit - proof of fault is required
- ▶ At least one event possible: 2009 - the Iridium-33 civil communication satellite was in collision with COSMOS 2251 (a derelict Russian military satellite).
- ▶ possible complication is the determination of the “launching State”. Iridium is a US Corporation which procured the satellite and its launch but the launch itself was undertaken by the Russian Space Agency on a Proton vehicle from Baikonour in Kazakhstan. Therefore Russia or Kazakhstan could be considered to be the launching state.

Liability in national space laws

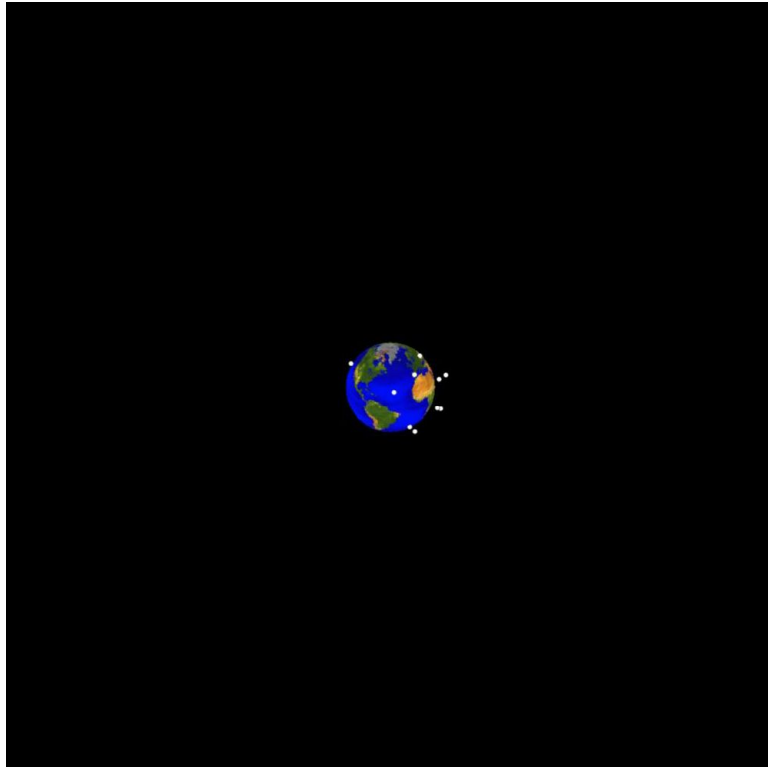
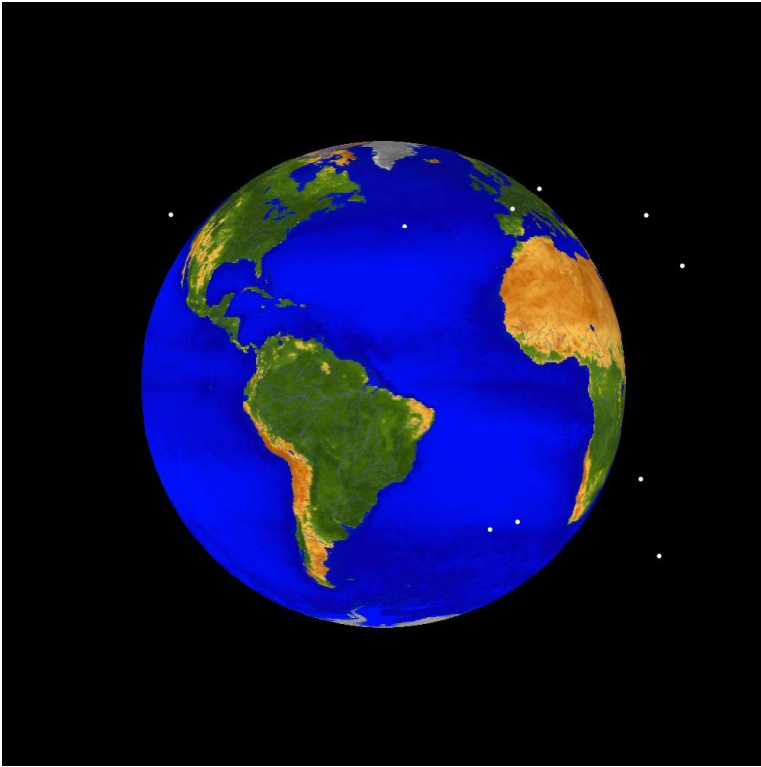
- ▶ Liability regime reflecting the international law: the state is internationally liable
- ▶ The state shifts its liability to the space operators which obtained the license
- ▶ The limits of the liability under the national space laws: connected with the compulsory liability insurance
- ▶ Allocation of the liability between the entities involved in the same space project.

Concerns only space activity (space –related activity falls under general liability regime)

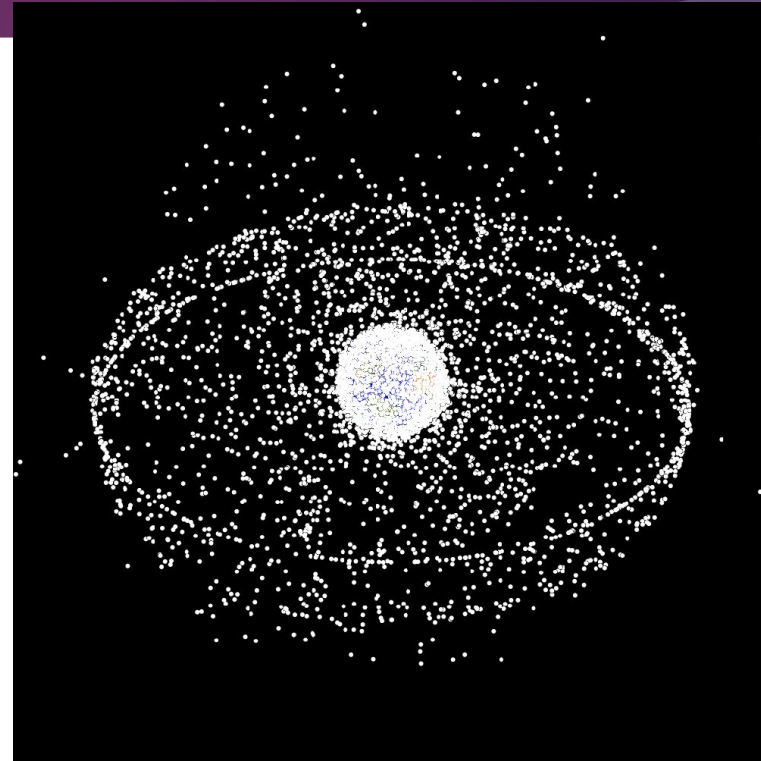
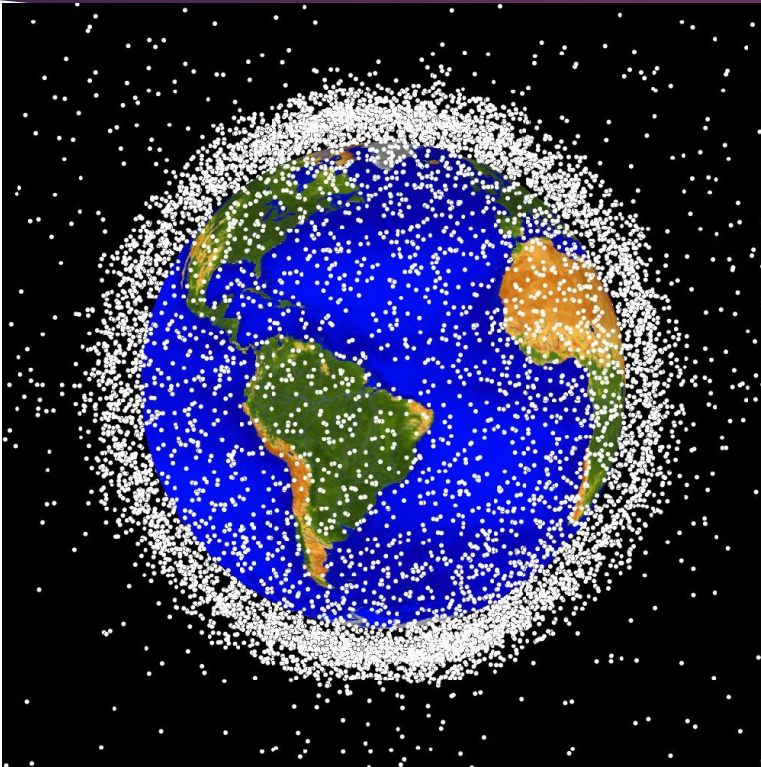
Legal challenges for space sector

- ▶ **Liability in tourist space flights**
 - ▶ International Law – no specific provisions; application of general rules
 - ▶ National Law – six states in the US adopted law on liability regime towards Space Flights Participants: concept of informed consent / reciprocal waiver of claims
- ▶ **Small satellites and mega constellations**
 - ▶ growing number of projects
 - ▶ Uncertain legal regime
 - ▶ ‚New Space‘ movement
- ▶ **Space debris – unresolved problem**
- ▶ **Cyber risks !**
- ▶ ***„The world is dangerously unprepared for a global disaster sparked by cyber attacks on space infrastructure, experts have warned.” (source:Independent)***

Space debris 1960



Space debris 2010



Space debris

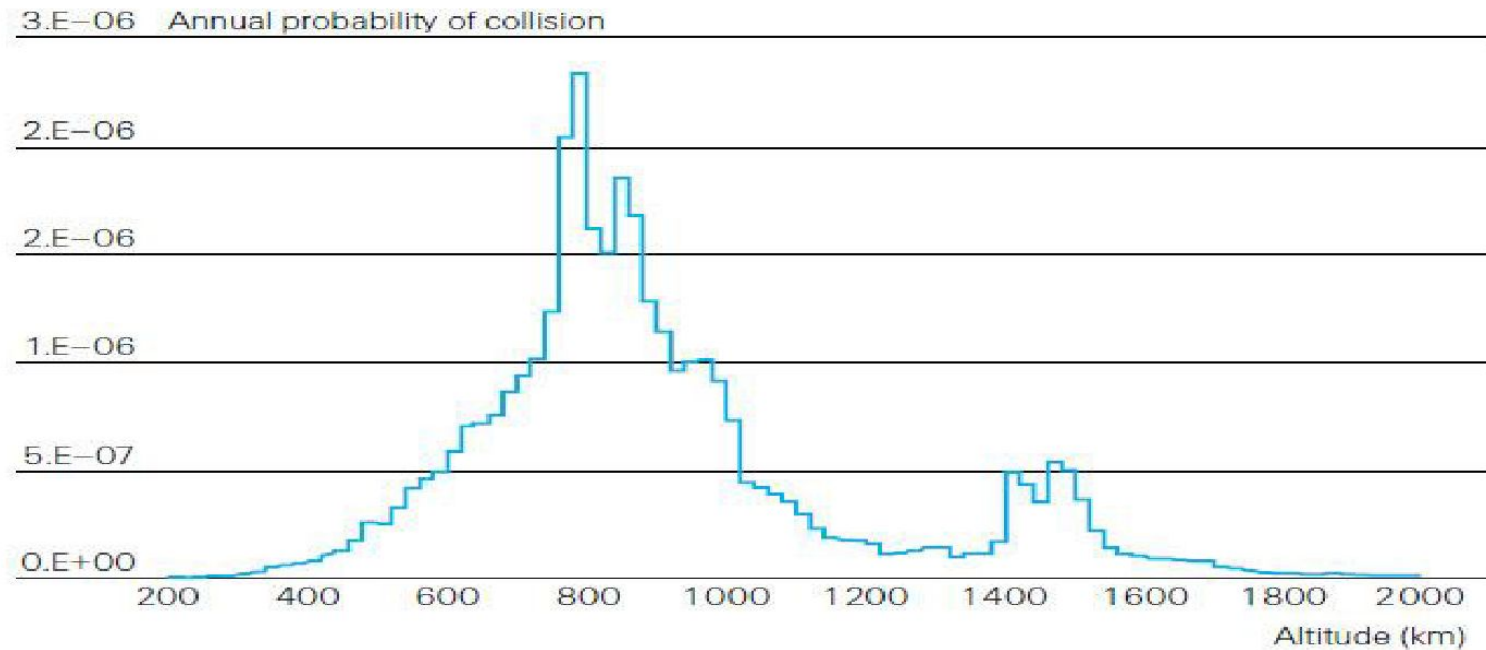
Debris:

- ▶ Satellites with a completed service
- ▶ Launch vehicle upper stages remaining in space for years
- ▶ Space objects exploding due to depleted tanks

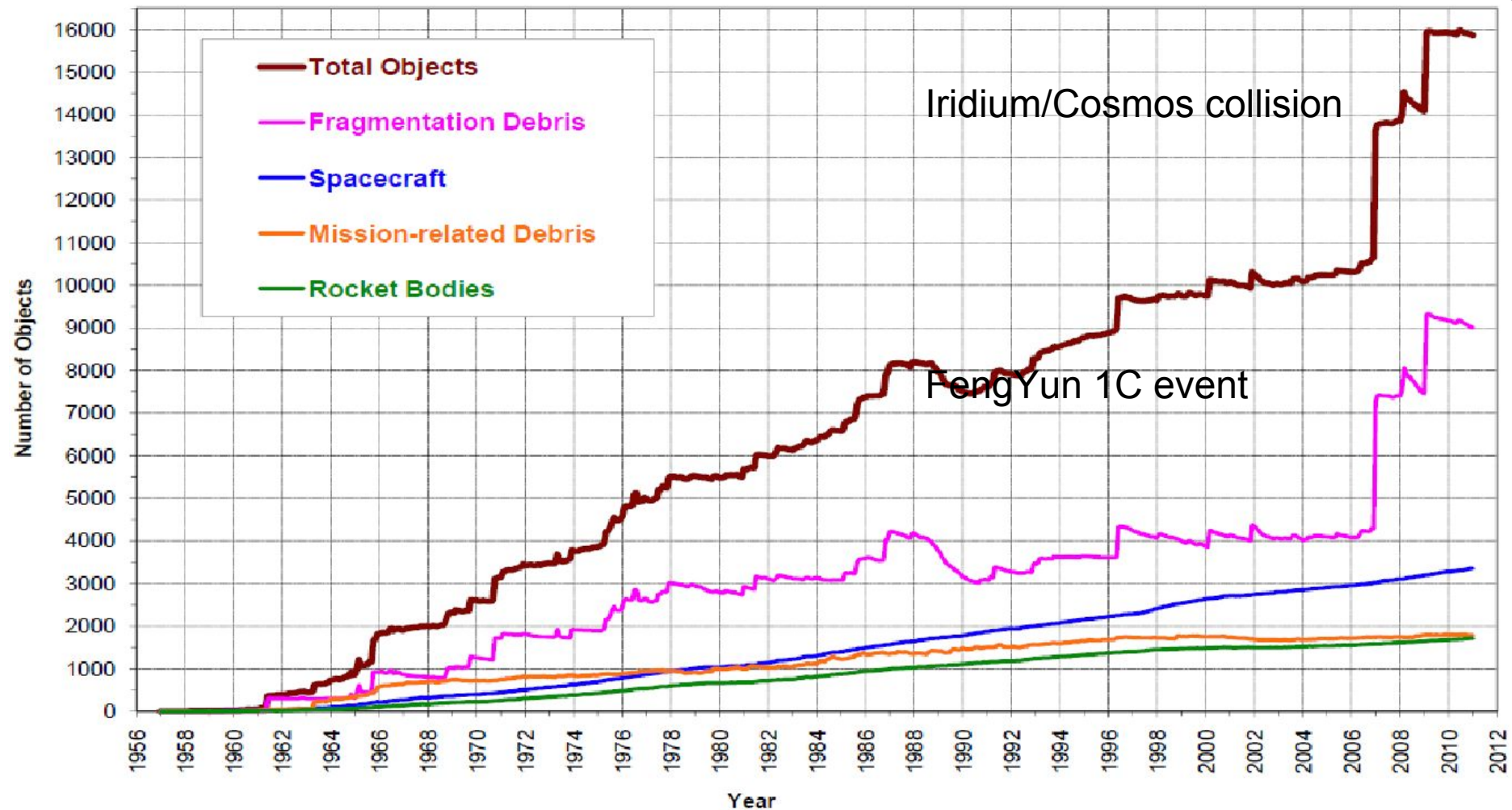
Threat to:

- ▶ space assets
- ▶ Astronauts/space station
- ▶ Environment on Earth and in outer space
- ▶ Earth observation, telecommunications, navigation
- ▶ Assets of Earth
- ▶ Bodily injuries on Earth

Probability of collision in LEO



Debris - Source – Swiss Re



Consequences of debris

- ▶ **On earth:**

- property damages

- environmental damages

- bodily injury

- ▶ **In outer-space:**

- property damages to satellites /Space Station

- bodily injury to astronauts

Space debris



Liability for damage and insurance

- ▶ Market approach: „no insurance, no financing” – but it only refers to ,first party' insurance
- ▶ Legal approach:
 - ▶ No mandatory insurance under international law
 - ▶ Incoherent national laws
 - ▶ only ,space activity' subject to mandatory insurance (space-related out of space law regime)
- ▶ Industrial contractual practice reduces ,second party risk' – no contractual liability insured

Compulsory insurance

- ▶ Scope of cover: The space third party liability insurance covers the financial consequences of the liability of the insured in case of damages caused to third party and due to the space activity of the insured.
- ▶ Duration of coverage varies depending on the legal requirements: standard 1 year
- ▶ Several Nations require licensed or registered operators to provide in orbit third party liability insurance. Limits and scope vary from one country to another