

Private Commercial Spaceflight

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Introduction

- ‘Space tourism’ *versus* ‘private commercial spaceflight’
 - Scientific experiments & astronaut flights
- ‘Sub-orbital’ *versus* ‘orbital’
- Interaction with aviation
 - Flying through airspace
 - Using airports (?)
 - Similarity to aviation ... (?)

The state of the art

Virgin Galactic WhiteKnightTwo plus SpaceShipTwo

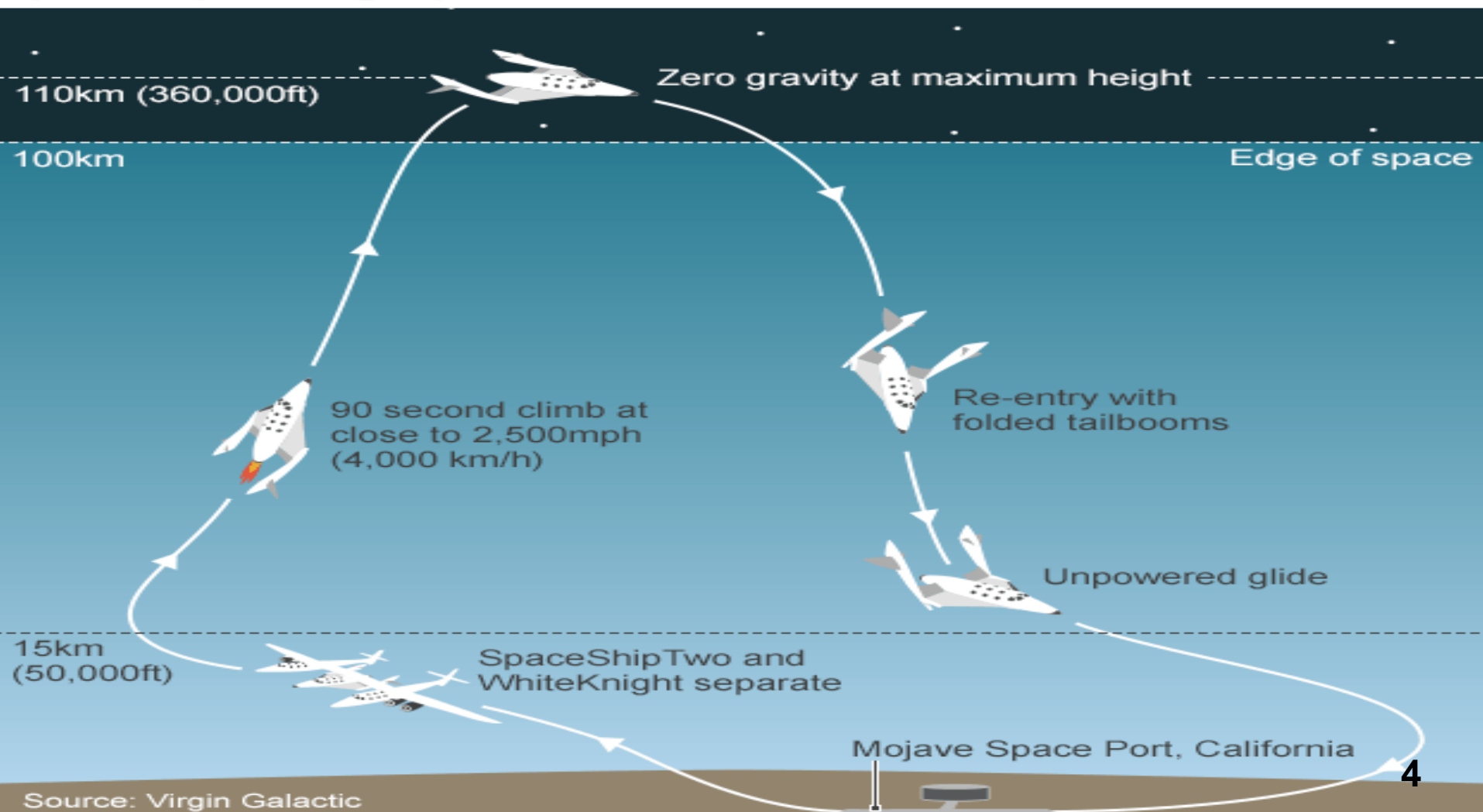


The state of the art



UNIVERSITÀ DEGLI STUDI
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SpaceShipTwo flight plan



Other sub-orbital projects

XCOR Lynx



Blue Origin New Shepard



Orbital projects

Boeing CST-100 – docking with International Space Station



Blue Origin orbital spacecraft



Sierra Nevada Corporation Dream Chaser



The law & private commercial flight

- Focus on space character \leftrightarrow interaction & similarities with aviation
 1. Air law only applicable in order to address interaction
 2. Air law (to be made) applicable to all private commercial flight
 - But then: orbital flights? Scientific sub-orbital flights? Astronaut training flights? New technologies?
 - ICAO position: so far, not for us to deal with...7

International (space / & air law)

- International character requires fundamentally international approach
 - Space law
 - Arts. II, I, 1967 Outer Space Treaty: 'outer space' = 'global commons' → international law delineates scope national jurisdiction & limit sovereignty
 - Air law
 - Art. 1, 1944 Chicago Convention: sovereignty over national airspace → pre-eminence national law ↔ international character of most aviation calls for international regime of harmonization

Main legal issues

- Need for national law to implement international responsibility & liability respective state(s)
 - Which state should license? Subject to which requirements – for crew, ‘spaceflight participants’, vehicle?
 - How should registration be arranged for?
 - How should liability be applied to private operators?



Air law or space law?

On licensing

- Air law
 - Arts. 29–33, Chicago Convention: (registered) ***aircraft & crew*** are to be certified resp. licensed
- Space law
 - Art. VI, Outer Space Treaty: national ***activities*** in outer space ***by non-governmental entities*** require authorization & continuing supervision
 - Interpretations ‘national’ vary...

On registration

- Air law
 - Arts. 17, 18, Chicago Convention: nationality = registration; no dual registration possible
 - Art. 19, Chicago Convention: national registration only
- Space law
 - Art. II, 1975 Registration Convention: national register – no nationality; no dual registration
 - Arts. III, IV, Registration Convention: international registration

On liability – air law

- Third-party liability
 - 1952 Rome Convention / national tort law
 - Limits to compensation / various regimes
- Passenger liability
 - From 1929 Warsaw Convention to 1999 Montreal Convention
 - Various limits to compensation – under first tier



On liability – space law

- Third-party liability
 - 1972 Liability Convention
 - No limits to compensation – & state liability
 - Passenger liability
 - No contractual liability – at least not as per international law
 - Astronauts: as per employment contract
- National (space) law?

National space law



Air law or space law?

- Depends on: ‘aircraft’ or ‘space object’?
 - *E.g.* Arts. 3, 5, 7, 8, Chicago Convention & liability Rome Convention & Warsaw system triggered by involvement ‘aircraft’
 - *E.g.* Arts. VII, VIII, Outer Space Treaty & 1972 Liability Convention triggered by involvement ‘space object’
- = ‘Functional approach’

Air law or space law?

- Depends on: ‘airspace’ or ‘outer space’?
 - *E.g.* Arts. 1, 5, 6, 12, 28, Chicago Convention triggered by involvement ‘airspace’ (‘territory’)
 - *E.g.* Arts. I–IV, VI, Outer Space Treaty, triggered by involvement ‘outer space’ (as ‘global commons’)
- = ‘Spatialist approach’



Air law or space law?

- *Note:*
 - Both may in principle apply at the same time
→ overlap of legal regimes...?
 - None may apply in principle → absence of legal regime...?
 - Each may apply to different elements / parts / scenarios within a broader context → overlaps & gaps



Aircraft or space object?

- Various Annexes to Chicago Convention:
 - ‘Aircraft’ = ‘Any machine that **can** derive support in the atmosphere **from the reactions of the air** other than the reactions of the air against the earth’s surface’
= ‘*Everything with wings / rotors & balloons*’
 - Note: propulsion ≠ relevant



Spot the aircraft!

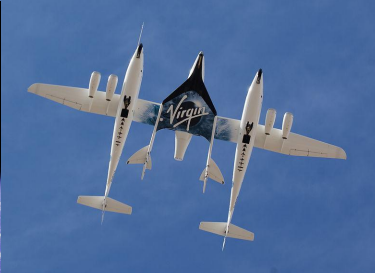
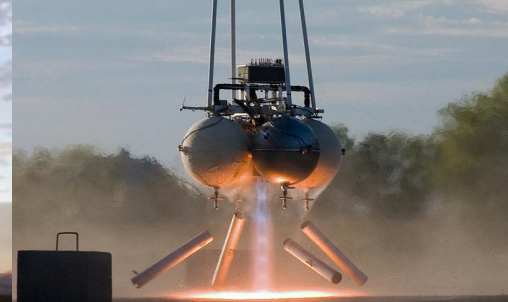
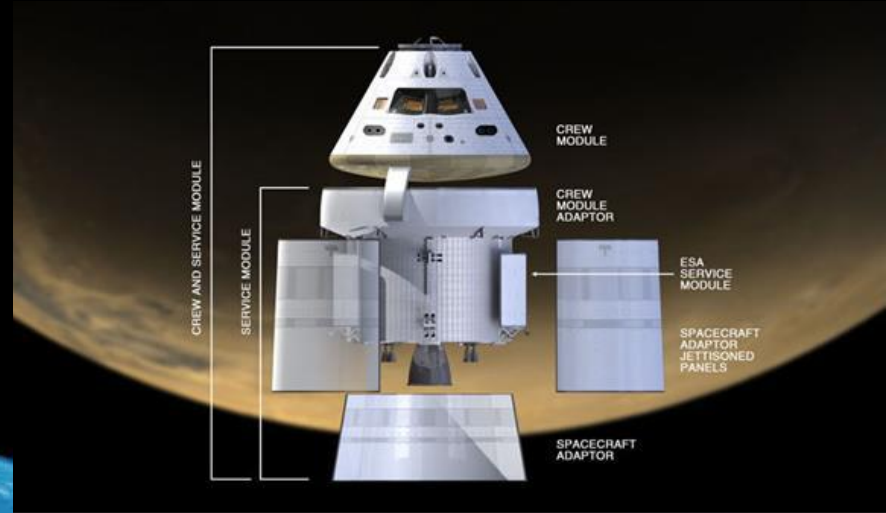


Aircraft or space object?

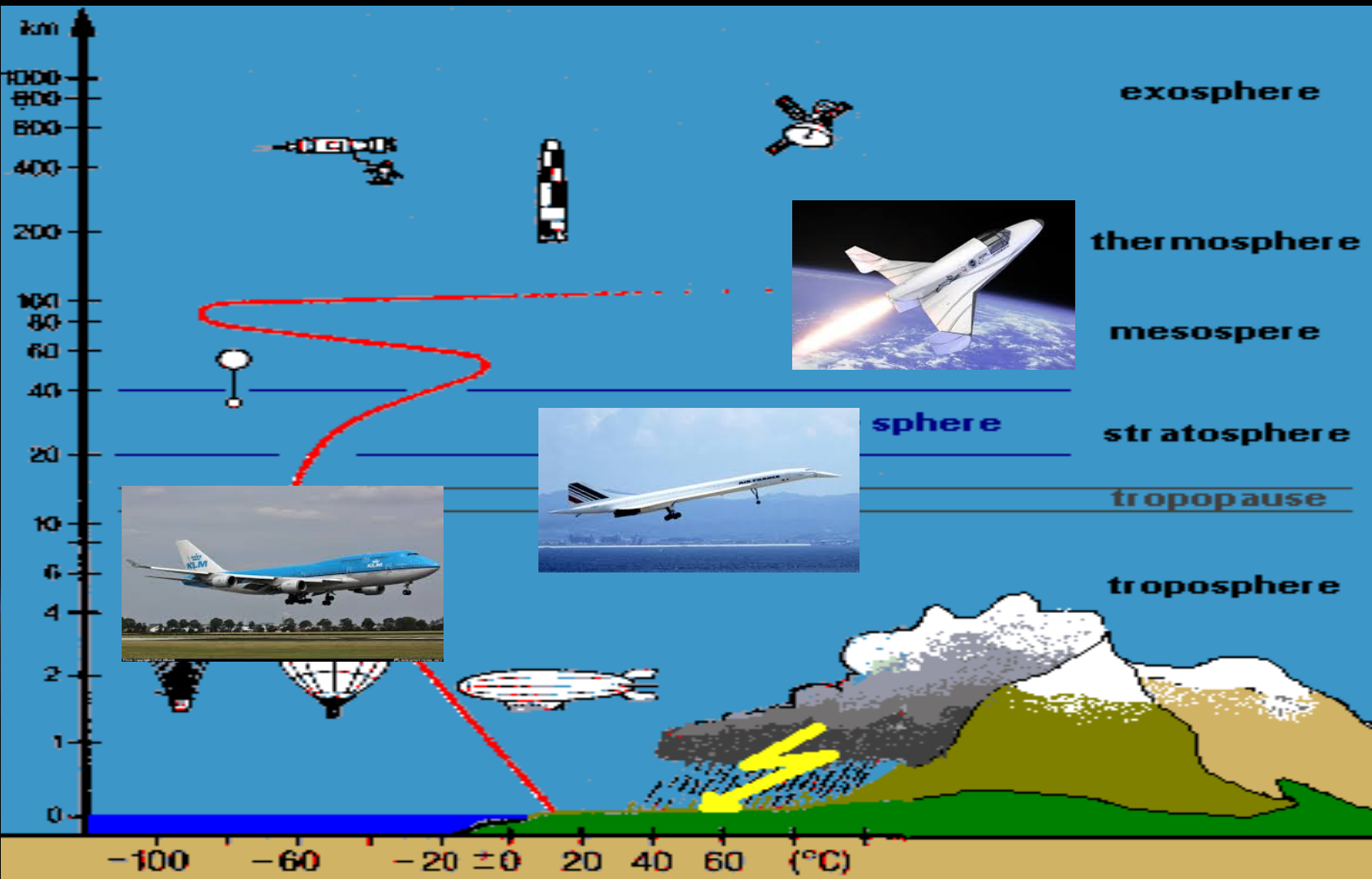
- Art. I(d), Liability Convention:
 - ‘Space object’: ‘... includes ***component parts & launch vehicle***’
 - By \approx general expert consent: ‘Any man-made object ***intended*** to be sent into outer space’
 - *Note*: propulsion \neq relevant; ‘launch’ = broadly interpreted



Spot the space object!



Airspace or outer space?

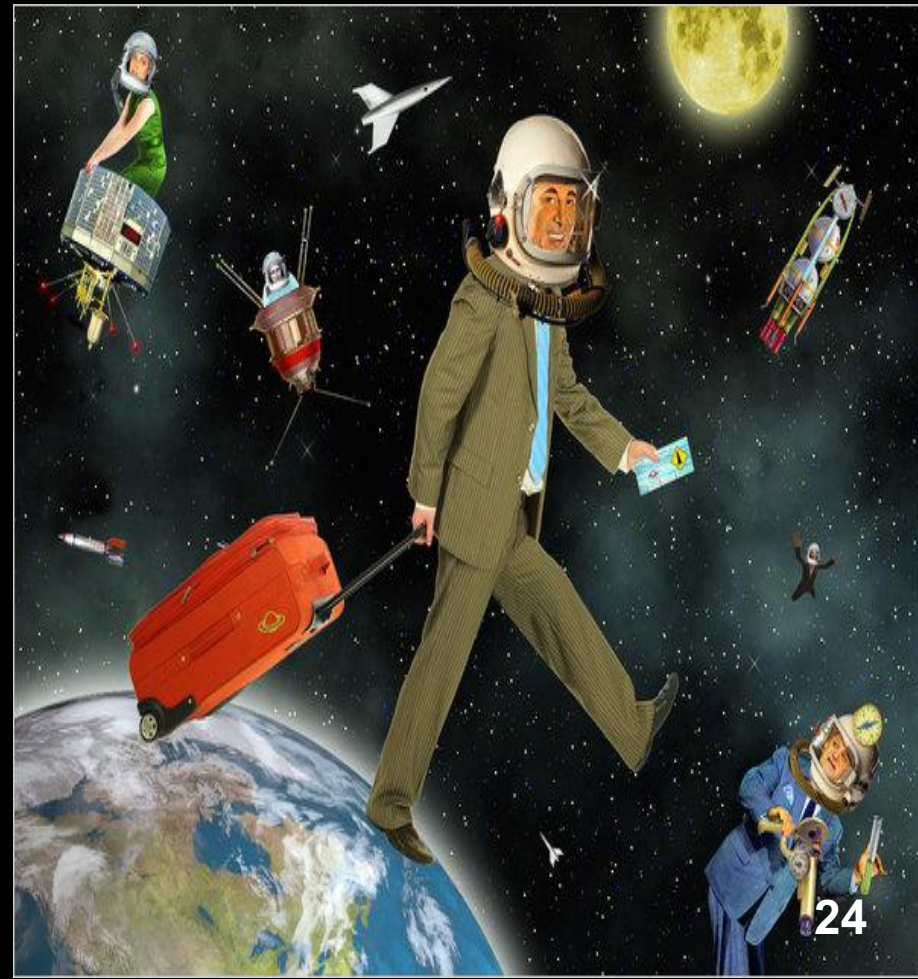


The boundary issue

- Tendency to converge on 100 km
 - Various proposals for international treaties & answers to questionnaire
 - Russia, China, Germany, Pakistan
- Several national space laws
 - Australia, Kazakhstan, Denmark, Nigeria
 - EU Regulation on export controls
- Even in the US various (non-)legal documents
 - Virginia draft statute, export controls
- Private initiatives & FAI definition

National approaches

- (Plans for) spaceports & spaceflights
 - ***United States***
 - Sweden
 - Curacao
 - Scotland & England
 - Catalonia
 - France
 - *UAE, Japan, South Korea, Singapore???*



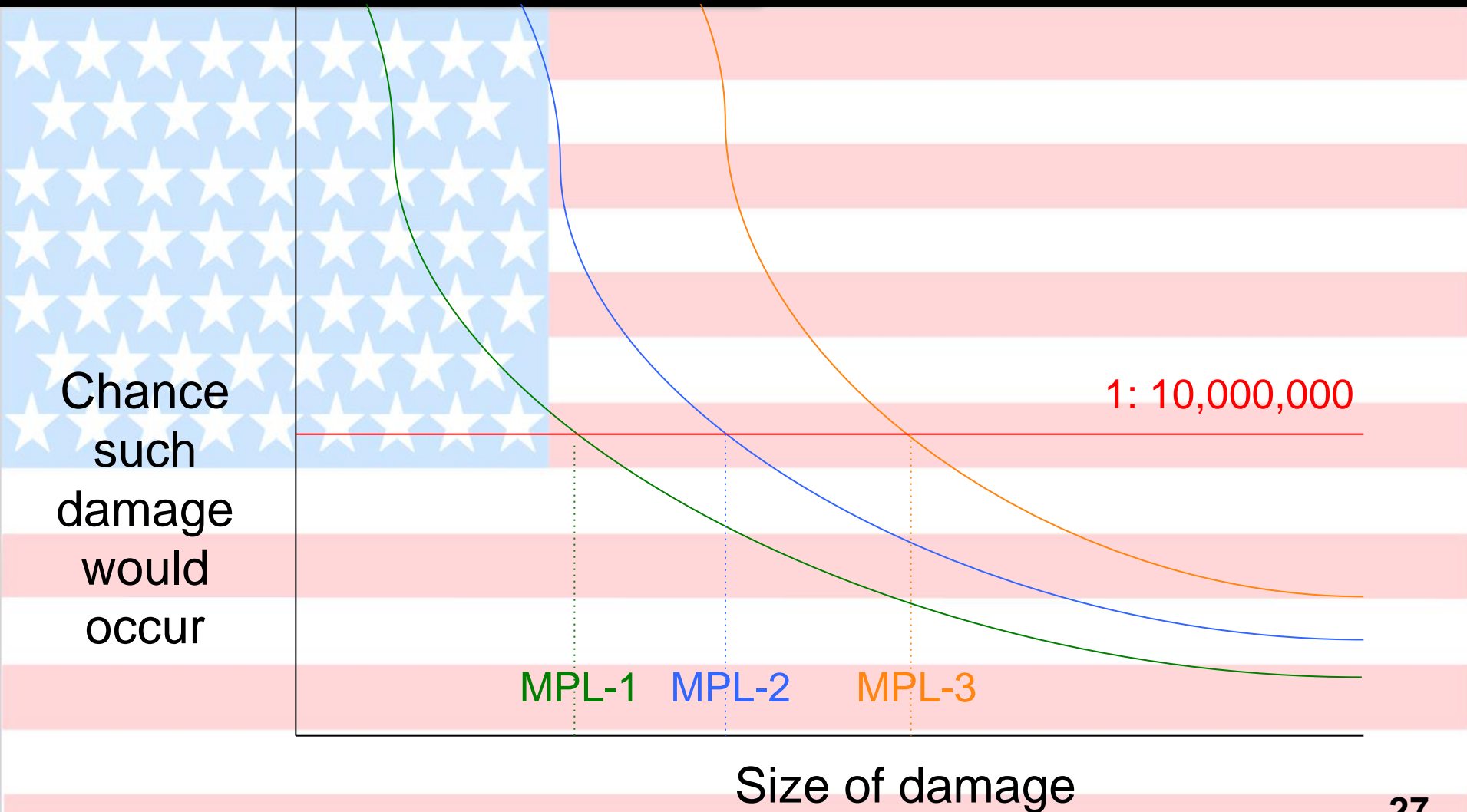
The US approach

- 1982: first private launch unmanned payload
 - Approval required from 5 different federal agencies, took 6 months & cost > US\$ 250,000
- 1984 Commercial Space Launch Act
 - Now codified as 51 USC
 - Licenses required for launches from US territory & facilities / by US citizens & for operation of launch site on US territory / by US citizens; both incl. by non-US operator if controlled by US citizens (Sec. 50904(a))
 - Liability: full reimbursement US government

The US approach

- 1988 Amendments – mainly on liability
 - Obligations to compensate damage to federal launch site if used & obtain insurance up to certain level (Sec. 50914(a)(1)(B), (3))
 - General waiver of inter-party liability *vis-à-vis* other partners to launch (Sec. 50914(b))
 - Obligations to compensate damage to third-party victims & obtain proper insurance up to certain level (Sec. 50914(a)(1)(A), (3))
 - The lesser of: Maximum Probable Loss / US\$ 500 million / reasonably insurable contractual liability coverage

The MPL



The US approach

- 2004 Amendments – to adapt CSLA to manned launch & re-entry
 - ‘Space law approach’ instead of ‘air law approach’
 - Possibility for experimental permit next to license (Sec. 50906)
 - Third-party liability regime continues to apply
 - Inter-party liability regime continues to apply
- No contractual liability to ‘crew’ & ‘spaceflight participants’ – but ‘informed consent’ regime & waiver of liability (Sec. 50914(b)(4) & (5))

US discussions

- No obligatory passenger liability + informed consent \neq automatic waiver!
- Seven individual US states:
 - *For us*, informed consent = automatic waiver
 - However, various approaches & problems
- ‘Federal pre-emption’?
- 2015 amendment:
 - Cross-waiver now also extends to ‘spaceflight participants’ (Sec. 50914(b)(1) as amended)

US discussions

- Interest NASA in particular in orbital flights
 - COTS → CCDev to replace shuttles
 - ‘Informed consent’ & waiver of liability for astronauts...?
 - 2015 amendment:
 - Third category of ‘government astronauts’ next to ‘crew’ & ‘spaceflight participants’ defined (Sec. 50901(15) as amended), & excepted from ‘informed consent’ & liability of waiver
- Most legal arrangements with time horizon!

- 1982 Act & Decree on Space Activities
 - License required for all space activities (Sec. 2)
 - License required from Sweden / elsewhere by Swedish citizen / company (Sec. 2)
 - Licensee required to provide full reimbursement international claims paid by Swedish government ... ‘unless special reasons tell against this’ (Sec. 6)
 - No arrangements for ‘passenger’ liability ...
- Discussion on application air law ...

Curacao

- *Note:* part of Kingdom of the Netherlands ☺
- 2007 national space law
 - License required for launch, flight operation or guidance of space objects in outer space (Sec. 2(1))
 - License required for activities from Dutch territory, ships or aircraft; scope could under circumstances be extended (Sec. 2)
 - Licensee required to (in principle) fully reimburse Dutch government for international claims

Curacao

- ... however, Dutch space law does not extend to non-European territories!
→ Regional Curacao space regulation under development
- Following US approach: addressing private commercial flight as spaceflight
- Application of 'informed consent' not yet certain
- Extent of potential liability towards passengers also not yet certain
- Some elements air law may be used

United Kingdom

- *Note:* includes both Scotland & England 😊
- 1986 Outer Space Act
 - License required for launching, procurement or operation of space object / any other activity in outer space (Secs. 1, 3)
 - License required for UK nationals (Sec. 2)
 - Licensee shall reimburse UK government for claims brought against the government for loss arising out of licensed activities (Sec. 10)
 - Insurance originally capped at £ 100 million

- Recent developments
 - Insurance for third-party liability capped at € 60 million by 2011 amendments
 - Third-party liability itself capped (also) at € 60 million by 2015 amendments
 - Current discussion on Draft Spaceflight Bill
 - Requirement 'informed consent' *à la* US (Sec. 15)
 - Baseline: no liability towards 'passengers' (Sec. 30(3))

Catalonia

- *Note:* part of Spain 😊
 - No Spanish national space law
- Discussion about establishment regional Catalanian space law?
- *Cf.* example of Hong Kong!
- ↔ Application of Spanish air legislation?

- 2008 Law on Space Operations
 - Authorization required for launching or returning space object, incl. procuring it / commanding a space object in outer space (Art. 2)
 - License required for French nationals & (launch & return only) activities from France (Art. 2)
 - Licensee shall reimburse French government for claims brought against the government for international claims up to limit of (ultimately) € 60 million (Arts. 14, 15) (= also insurance cap)

- 2008 Law on Space Operations – *ctd.*
 - Cross-waiver of liability between ‘persons having taken part in the space operation or in the production of the space object which caused the damage’ – unless ‘wilful misconduct’ applies (Art. 19)
 - Cross-waiver of liability also in case of damage ‘caused to a person taking part in this space operation’ – unless contract specifies otherwise
 - *Unclear: does this apply to ‘passengers’?*

- Originally, 'space' did not figure in the European legal order
 - ESA was 'taking care' of European interests in civil space activities
 - E(E)C was about trade liberalization & private commerce \leftrightarrow outer space was about governments, strategic/military & science
- \leftrightarrow 1986: Single European Act & Toksvig report on potential 'space' in context of broader European economic development

- EC/EU gradually became more involved in particular in a legal sense
- Satellite communications: start development Internal Market with 1994 Satellite Directive
 - Satellite remote sensing: 1996 Directive on Database Protection prominently included databases with remote sensing data
 - Satellite navigation: 1998 Tripartite Agreement on Galileo with ESA & EUROCONTROL
 - 2003: Framework Agreement with ESA

- 2004 Constitutional Treaty (aborted)
 - First effort to achieve so-called comprehensive ‘space competence’
 - Art. I-3: includes space in new objectives EU
 - Art. I-14: on ‘shared competences’
 - § 3 ‘On space, EU shall have competence to carry out activities, in particular to define & implement programmes; however, exercise of that competence shall not result in EU m/s being prevented from exercising theirs.’
- Actually a ***parallel*** competence

- 2004 Constitutional Treaty (aborted) – *ctd.*
- Art. III-254: space policy
 - § 1 ‘To promote scientific & technical progress, industrial competitiveness & implementation of its policies, EU shall draw up European space policy. To this end, it may promote joint initiatives, support research & technological development & coordinate efforts for exploration and exploitation of space.’
 - § 2 ‘European laws or framework laws shall establish necessary measures, which may take form of European space programme.’
 - § 3 EU shall establish appropriate relations with ESA

- 2007 Treaty of Lisbon
 - Amends EC Treaty & relabels TFEU
 - Art. 4(3) copies Art. I-14 ('parallel competence')
 - Art. 189 replaces Art. III-254
 - § 1 & § 3 remained identical
 - § 4 'This Article without prejudice to other provisions.'
 - § 2 'EP & Council, ***acting in accordance with ordinary legislative procedure***, shall establish ***necessary measures***, which may take form of European space programme, ***excluding any harmonization laws & regulations m/s.***'

The EU approach

- National space law on private commercial space activities \leftrightarrow not specifically on private commercial spaceflight...?
- \leftrightarrow EASA looking to treat at least sub-orbital flight as aviation
 - ICAO study: many vehicles qualify as aircraft
 - EASA clear authority to address (international) aviation in Europe (esp. on certification & ATC)
- \rightarrow Investigates possibilities to apply special aviation regime to sub-orbital vehicles

The EU approach

- However...
 - EASA part of Transport Title TFEU → not applicable to non-European territories (*Curacao*)
 - Several vehicles do not qualify as aircraft
 - Several vehicles not only for sub-orbital flights
 - Approach different from US approach & possibly stifling EU industry...?
- Approach (at least) shelved by 2011
- Development European legal regime in disarray...

Concluding remarks

- Most advanced projects in US
 - ‘Space law’ approach more likely than ‘air law’ approach
- Public interest in ‘cost-to-space’ issue
 - Europe ready to ‘hand over’ flights to the private sector?
- Discussion on ‘spaceflight participants’ *versus* ‘astronauts’ of the space treaties