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AIR AND SPACE LAW

The Galileo Project – Some Legal Aspects

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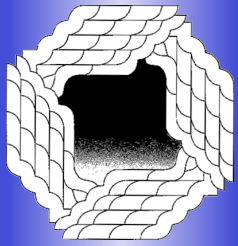


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Introduction

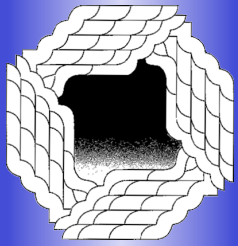
- Global Navigation Satellite System (GNSS): generic term
- *How GNSS works*
 - Satellite with atomic clock
 - Receiver (user segment) with atomic clock
 - 3 sats for 2D, 4 sats for 3D, 5 sats for failure detection; 6 sats for identification failing sat
 - Timing + positioning → navigation

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Primary systems

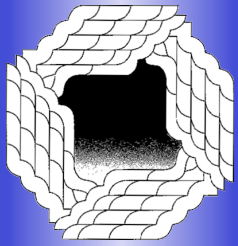
- Satellites & ground infrastructure
- Current situation
 - GPS (NAVSTAR) – 1994 / 1996
 - ◆ US military; 24 sats in Middle-Earth Orbits (MEO)
 - ◆ Free for 10 years as of 1996
 - GLONASS – 1995 / 1996
 - ◆ Russian military; 24 (\pm 16) MEO
 - ◆ Free for 15 years as of 1996
- Individual receivers / usage

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Problems with GNSS

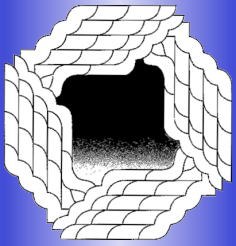
- Dependency military one state
- No guarantees → no / limited liability
- Insufficient accuracy
 - 16 m theory; usually 6-10 m in practice
- Insufficient continuity & availability
- No integrity
 - Aviation: time-to-alert down to 2 sec (ICAO)

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'Augmentation' required

■ Characteristics

- No global availability (in principle)
- Enhancing accuracy
- Monitoring integrity & providing integrity information ('information on information')
- Possibly adding further navigation-related services

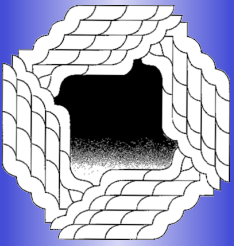
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Augmentation systems

■ Current developments

- Wide-Area Augmentation System (WAAS)
 - ◆ 2 sats; 30 ground stations US
- Local-Area Augmentation System (LAAS)
 - ◆ 143 ground stations around US airports
- Multi-transport Satellite Augmentation System (MSAS: Japan & region)
- EGNOS (*more later*)
- Beidou (PR China); GAGAN (India)

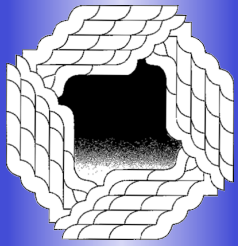
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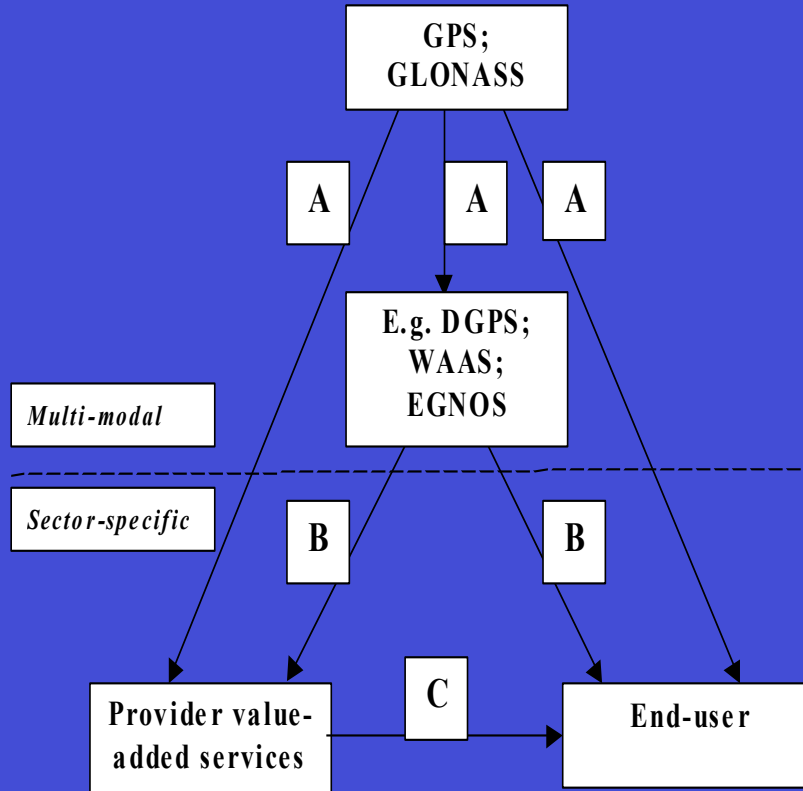
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GNSS model



■ Legenda:

A = basic signals (free, non-augmented, ≈ no liability)

B = augmented signals (provided outside GPS / GLONASS framework)

C = value-added services involving GNSS signals

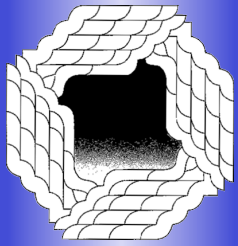
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GNSS & aviation

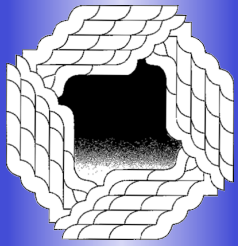
- Single 'seamless' system
- Economic & safety gains
 - 'Sole means' concept
 - 'Free flight' / 'free routing' concepts
- International / oceanic areas
- ↔ Sovereignty issue elsewhere
 - ICAO categories of required accuracy
- Liability & certification questions

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EGNOS

■ European Geo-stationary Navigation Overlay System

- 2 x INMARSAT-3, ARTEMIS: more integrity
- Ground infrastructure: more accuracy
 - ◆ Ready by 2005
- Focus on aviation – up to Cat. I-landings
- Full availability planned by end 2007
- N.B.: non-aviation applications!

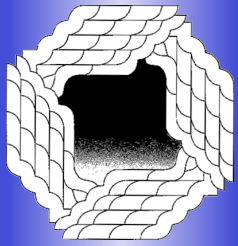
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EGNOS institutionally

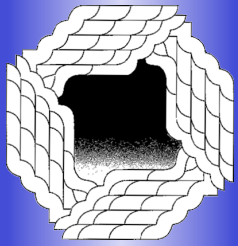
- European Tripartite Group (ETG)
 1. ESA → space system
 2. Eurocontrol → aviation aspects
 3. European Commission → general market & multiple applications
- *But:*
 - Still dependent upon one (two) system(s)
 - Users want guarantees & liabilities

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Europe & GNSS

■ Commission & ESA:

- European autonomy (political & strategic)
- Interests European industry (incl. spin-off)
- Demand for higher accuracy, integrity, guarantees & liability

■ GNSS-1 → GNSS-2

- Idea (of GNSS-2): truly global system

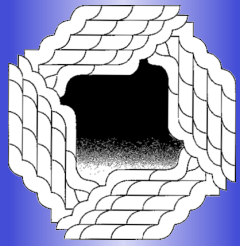
→ Galileo

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Towards Galileo

■ Key elements Galileo:

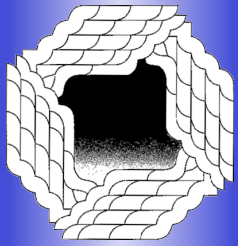
- Internationally-operated system
- 30 sats in MEO
- Controlled by civilians (even if military & security issues will be taken into account)
- Augmented world-wide
- For multi-modal usage & non-transport applications
- With liability & service guarantees possible...
- ...but then against a fee

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Galileo: overview

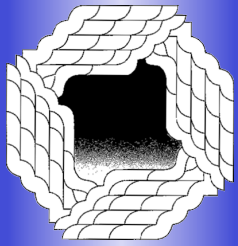
- Development phase 2002-2008
 - [?] 1500M: EU ([?] 950M) & ESA ([?] 550M)
 - Joint Undertaking (Reg. 876/2002/EC)
 - ◆ Tender process private operator (concessionaire)
 - ◆ EU (Commission) & ESA
- Deployment phase 2008-2010
 - [?] 2100M: [?] 700M EU, rest private...
- Operational phase as of 2011
 - [?] 220M per year – for operator

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1. Open Service (OS)

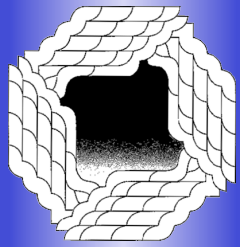
- Comparable with GPS (accuracy)
- Interoperable with GPS
- Free & open access
- No integrity, no guarantee, no liability
- Applications
 - Individualised; mass-market applications
 - ◆ Mobile phones; private cars; leisure

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2. Commercial Service (CS)

- Better accuracy, perhaps integrity
- Extra data
- Service guarantee & liability
- Against service fee
- Applications
 - Banking; enhanced telecommunications & Location-Based Services; fleet management; toll systems

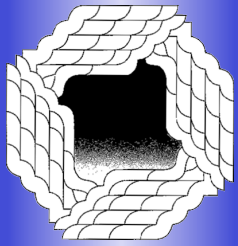


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3. Public-Regulated Service (PRS)

- Secured (encrypted) incl. guarantee
- Liability (?)
- Availability payments
- Applications
 - Security-related & (other) governmental usage (police, emergency services)
 - Strategic public services (energy & telecoms)



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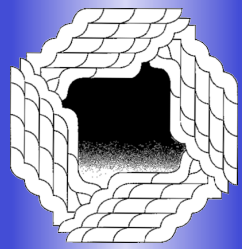
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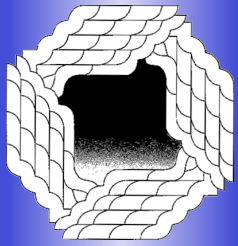
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4. Safety-of-Life Service (SOL)

- Integrity & better accuracy
- Liability & (integrity) guarantees
- Indirect service fee (user charges)
- Applications
 - Esp. aviation → Cat. III landings
 - Shipping: harbour, docking & High Speed Vessels (HSV)
 - Rail transport: High Speed Lines (HSL)





Other roles Galileo

5. Search-And-Rescue support service

- Addition to COSPAS-SARSAT
- Free (↔ availability payments)
- Incl. feedback telecom link

6. World-wide augmentation

- GPS (& GLONASS) !

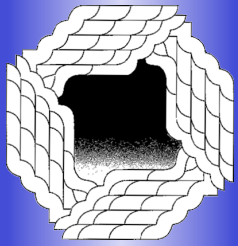
7. Interoperability → redundancy

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Current status Galileo

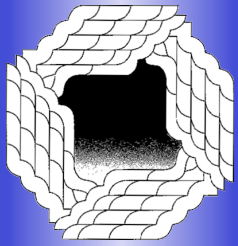
- Launch 2 test satellites
 - GIOVE-A (Surrey Space Techn.; XII/2005)
 - GIOVE-B (Galileo Industries; end 2007?)
- GSA Reg. No. 1321/2004, 12/VII/04
 - European GNSS Supervisory Authority
 - ◆ GSA as 'Community Agency', Art. 308 EC Treaty
 - Taking over from GJU, per 1/I/2007
 - Administrative Board (M/S & Commission)
 - System Safety & Security Ctee.

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Galileo: the PPP – 1

■ GNSS Supervisory Authority

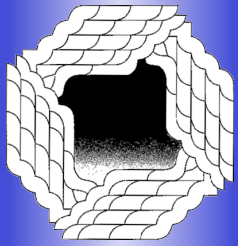
- Owns the satellite system & other assets
- Grants & supervises concession
- Monitors public interests in Galileo
 - ◆ Security (PRS) & safety (SOL, SAR)
 - ◆ General economic benefits (OS)
 - ◆ International relations (*more later*)
- Ensuring certification system
- Ensuring security accreditation
- Coordination on frequency issues

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Galileo: the PPP – 2

■ Concession negotiations – *now in limbo...!*

- Combined consortium:
 - ◆ Eurely (Aena, Alcatel, Finmeccanica, Hispasat)
 - ◆ iNavSat (EADS Space, Inmarsat, Thales)

➔ Concessionaire

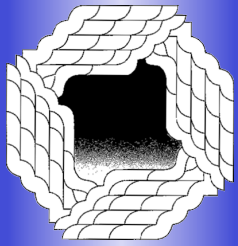
- Receives concession for operating the system
- Develops markets & sells services (CS)

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Contracts for Galileo services

- Service level agreement
 - When available, meets with standards
- Service guarantee
 - Adds availability & integrity
 - Adds sanctions / recourse / compensation
- Liability
 - Both contractual & dealing with third-party

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Galileo Legal / Functional Model

Galileo Public Authorities – EU & ESA States, Commission, Others?

IGO's
(ITU, ICAO,
IMO, etc.)

Regulation 1321/2004

Galileo

GSA

Concession

Concessionaire

Regional
Elements

Local
Elements

OS

CS, SOL, PRS

OS

Providers VA Services

VAS

End Users

CES

Consumers

Non-Galileo Public Authorities (Third States)

Legend

EU = European Union

ESA = European Space Agency

GSA = European GNSS Supervisory Authority

IGO's = Intergovernmental Organisations

OS = Open Service

CS = Commercial Services

SOL = Safety-of-Life Services

PRS = Public-Regulated Services

VA = Value-Added

VAS = Value-Added Services

CES = Consumer End-Services

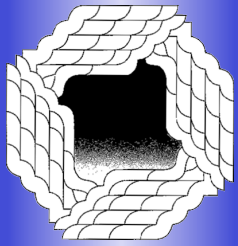
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Galileo & space law

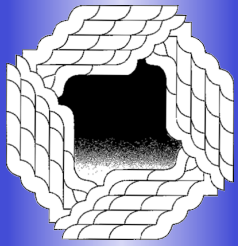
- Freedom of space activities
 - Benefit of all countries (Art. I, OST)
- Registration
 - Jurisdiction & control (Art. VIII, OST; RC)
- State responsibility (Art. VI, OST)
 - N.B.: private operator
- Role ESA, then GSA, in Galileo
- N.B.: space navigation!

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Galileo & telecom law

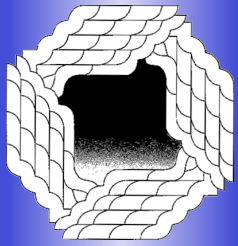
- Satnav & telecom:
 - Satnav form of telecom & needs telecom
 - Satnav services may be added to telecoms
- Orbits & frequencies: ITU
 - Allocations → allotments / assignments
 - Compatibility with GPS & GLONASS
- Operating license – concession!
- Trade issues: services & equipment

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Galileo & air law – 1

- General safety regulation
 - Global level
 - ◆ Chicago Convention, Artt. 1, 28
 - ◆ Annex 2: Rules of the air & air navigation
 - ◆ Annex 11: Air Traffic Services
 - European level
 - ◆ Eurocontrol standards → EC law
 - National level
 - ◆ Implementation

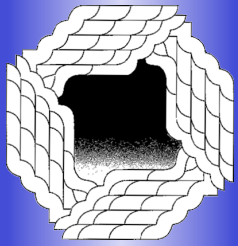
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Galileo & air law – 2

- Avionics → licensing & certification
 - Global level
 - ◆ Annex 6: Operation of aircraft
 - ◆ Annex 1: Personnel licensing
 - ◆ Annex 8: Airworthiness of aircraft
 - ◆ Annex 10: Aeronautical Telecommunications
 - European level
 - ◆ Joint Aviation Requirements → EC law
 - National level
 - ◆ Implementation

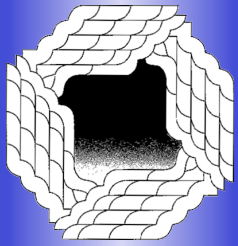
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GNSS Charter

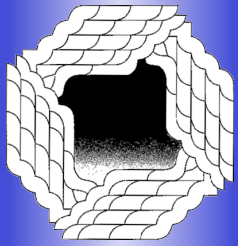
- Charter on the rights & duties of states relating to GNSS services
 - ICAO Assembly Res. A32-19
 - Fundamental principles
 - ◆ Access on non-discriminatory basis
 - ◆ Continuity of services & full operability
 - ◆ Compliance with ICAO Standards
 - ◆ Respect for sovereignty & responsibility states
 - Over own airspace & safety therein
 - ◆ Cooperation & mutual assistance called for

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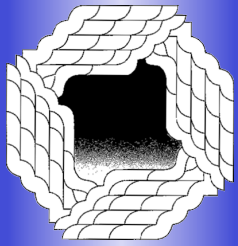


Liability

- Liability is:

“the accountability of a person or legal entity to compensate damage caused to another person or legal entity, as determined by specific legal rules and principles and based upon specified sources of law”





Liability & GNSS

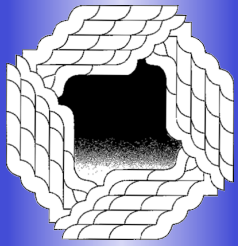
- No GNSS-dedicated legal regime...
 - ↔ Many partially applicable legal regimes
 - E.g. space law liability
- Nature of damage to be focused on
 - 'Indirect' – e.g. aviation accidents
- ➔ Largely matter of non-contractual liability

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Liability & GPS

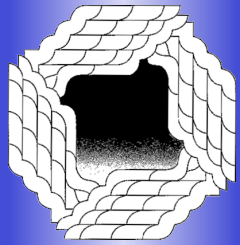
- Discussions in ICAO
 1. Lack of liability acceptance US
 - No contract, no guarantees, no fees
 2. US acceptance of civil liability
 - Liability under national US law
 - ◆ Federal Tort Claims Act; Admiralty Act
 - ◆ Sovereignty-issues foreign user states
 - ◆ Practical problems with US cases
 - No 'international' liability acceptance

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Liability & Galileo

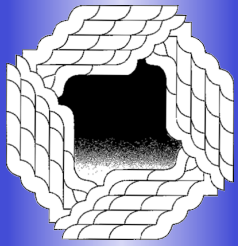
- International civil system
 - Commercial, with key private participation
- Towards liability acceptance
 - No product liability as such
 - Non-contractual liability
 - ◆ Not for ‘Galileo’ itself to change, outside EU
 - ➔ Deal with it through contracts!
 - ➔ Provide for black box-like monitoring
 - ➔ Role contractual liability:
To allow appropriate derogation of liability ...

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Liability aspects

■ Space

- Scope of liability regime (Art. VII, OST; Artt. II, III, LC)
- Definition “damage” (Art. I(a), LC)

■ *By way of example: aviation*

- Inter-party: Warsaw system
- Third-party: Rome viz. national tort law
- Product liability: nat’ l law → role EC law
- N.B.: ATC / Eurocontrol liability?

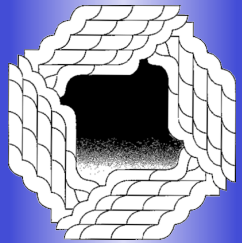
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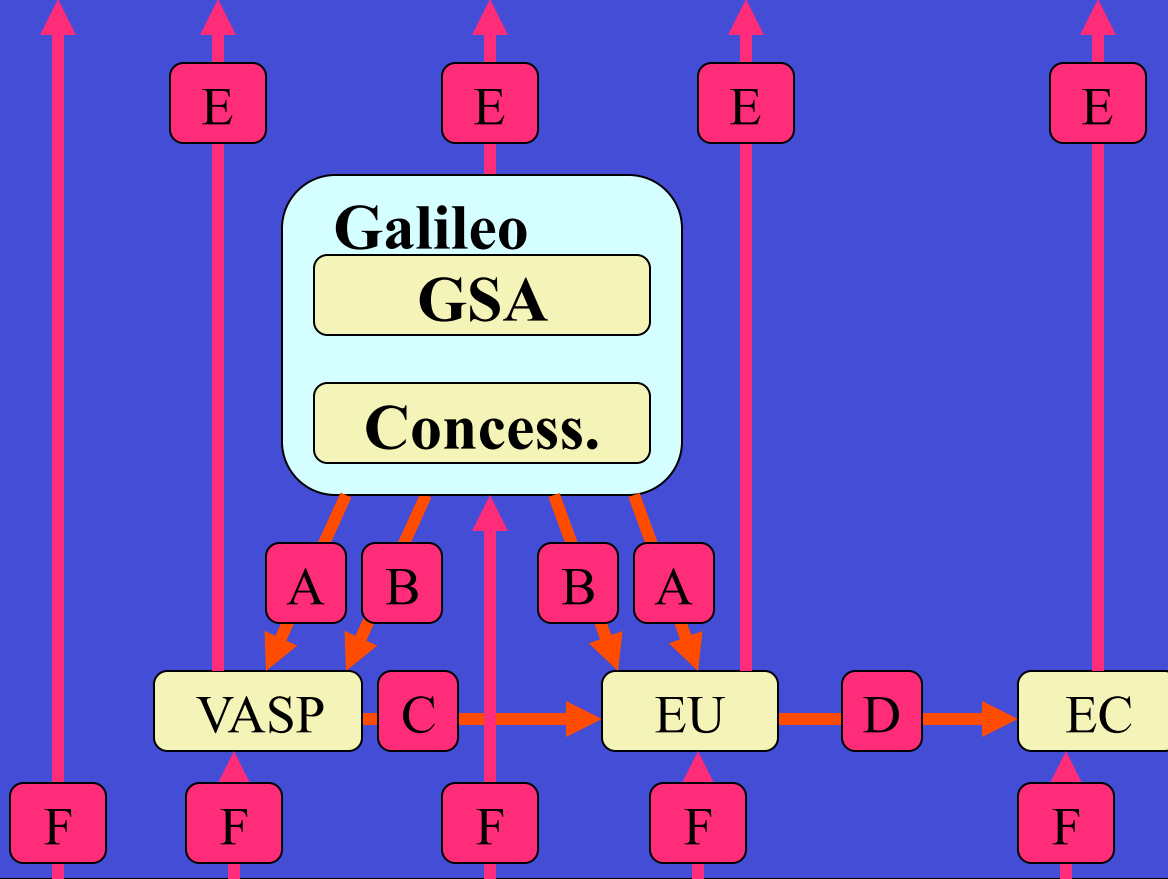
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Galileo Legal/Functional Model: liability



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Third party victims



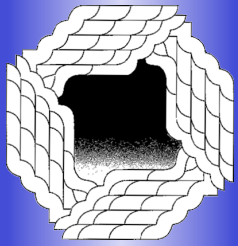
Legend
 EGSA = European GNSS
 Supervisory Authority
 Concess. =
 Concessionaire
 VASP= Value-Added
 Service Providers
 EU = End-Users
 EC = End-Consumers
 A = No/tort liability(OS)
 B = Contractual
 liability(CS, SOL, PRS)
 C = Contractual liability
 D = Contractual liability
 E = Tort/third-party
 liability
 F = Product liability

Manufacturers of relevant products



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International cooperation

- Global signal & service provision
N.B.: not only of OS!
- Six legal aspects
 1. Third states as primary partners
 2. Third states as public users (PRS, SOL)
 3. Third states hosting ground stations
 4. Third states hosting commercial assets
 5. Relationship with rule-making IGO's
 6. Third states as potential markets

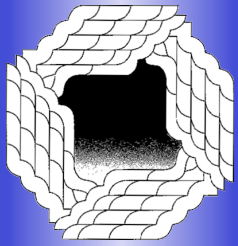


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1. Primary partners

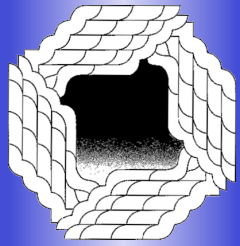
- EU / ESA *versus / cum* 3rd states...
 - Accession to GJU → GSA?
- Two main concerns (PRC example)
 1. Security issues
 - ◆ PRS excluded from scope agreement
 - ◆ Galileo Security Board monitors sensitive exports
 2. Intellectual property rights
 - ◆ Reference to 'international standards'
- Role Commission? M/S?

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2. Public users

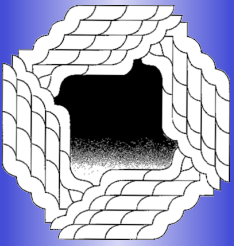
- Concess.-3rd state agreements
 - Dispute settlement
 - Role GSA? Commission?
- Regional Elements for SOL
 - Responsibilities & liabilities to be arranged
- PRS & Wassenaar Arrangement
 - Confining access to encrypted services
 - Role EC Regulation 1334/2000
 - Authorisation state-by-state affair...

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3. Ground station hosts

■ Requirement for int'l agreements

- Distribution of responsibilities & liabilities
 - ◆ State responsibility & national space laws
 - ◆ Liability for ground stations ops & derogation
- GSA? Commission?
- Precedent no. 1: (old) INMARSAT
 - ◆ LESO Agreements, including access
- Precedent no. 2: US LANDSAT
 - ◆ Bilateral agreements US-host state, incl. access
 - N.B.: annual fees 600K-1M US \$!

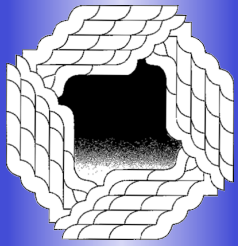
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4. Asset hosts

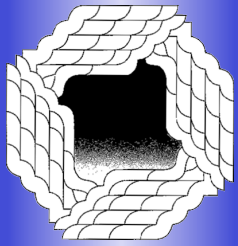
- Commercial assets private operator
 - Dispute settlement: role GSA (Commission?)
 - Application EC law – public procurement
 - ◆ *If* GSA is to procure itself
 - Four Directives 92/50; 93/36; 93/37; 93/38
 - Amended by Directive 97/52
 - For assets in 3rd states:
 - ◆ WTO law on public procurement
 - ➔ 1981 Agreement on Government Procurement
 - Standard of non-discrimination

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5. Rule-making IGO's

■ ITU

- Frequency allocation
 - ◆ Two- / three-step process for coordination
 - ◆ Role GSA? Commission?

■ WTO & GATS

- Separate representation EU!

■ ICAO, IMO *et al*

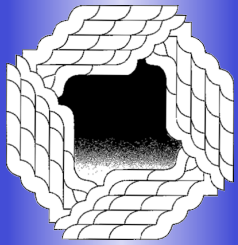
- No formal role EU, Commission or GSA
- N.B.: Different with Eurocontrol & EASA

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6. Service markets

■ Market access

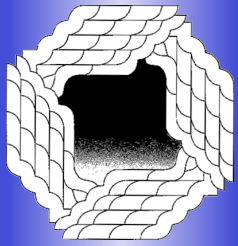
- ...for Galileo signals & services
 - ◆ No inclusion in WTO / GATS as of yet
 - ◆ National sovereignty / discretion prevails
 - Cf. fate Iridium, Globalstar *et al*
 - ◆ Underlying principle in WTO / GATS: reciprocity
 - ◆ Comparison with satcoms
 - 1997 Telecom Agreement (GATS Protocol 4)
 - Individual schedules of commitment
- ...for downstream value-added services using Galileo

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European cooperation

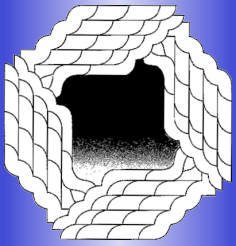
- Two Europes in space...
 - ...in particular: those of EU & ESA
 - ESA main driver in space integration
 - EU overwhelming politico-economic power
- Convergence on industrial policy

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Industrial policy ESA – 1

- Focus on technical / operational aspects – of space activities
 - Tools: mandatory & optional programmes
- Aims industrial policy
 - Art. II, ESA Convention
 - Cost-effectivity; world-wide competitiveness; using existing industrial potential Europe; preference for European industry; equitable member state participation; exploitation advantages competitive bidding

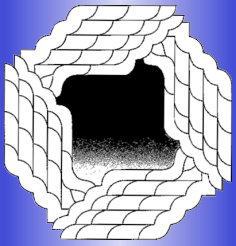
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Industrial policy ESA – 2

N.B.: Industrial policy ESA & / or M/
S...

■ ‘Geographical distribution’

- Preference for industry & organisations
member states, resp. member states
participating in a programme
 - ◆ Derogation only by Council determination
- ‘Fair return’
 - ◆ ‘*Ideal*’ = return coefficient of 1
 - ◆ Some weighting possible

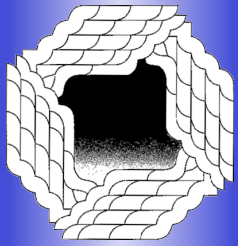
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European Union (EU)

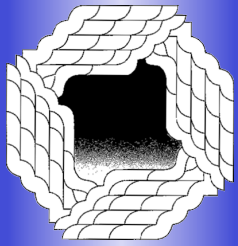
- EEC a.o. → EC → EU
- Established for economic purposes
 - Common Market → Internal Market
 - Then including social, cultural, political a.o. areas as far as economic aspects went
 - With three-pillar structure definitively widened beyond economics
- Now 25 member states

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EC law in a nutshell

■ Primary EC law

- Treaties between sovereign member states
 - ◆ Provide for general principles & rules
 - ◆ Provide for competencies four main organs

■ Secondary EC law

- Regulations, Directives & Decisions
- N.B.: of enormous size

■ ‘Subsidiarity’

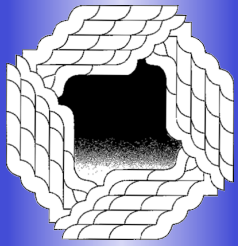
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EC law & outer space

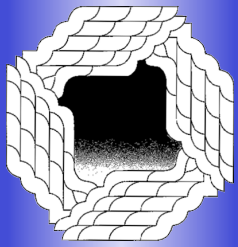
- No reference as such to ‘outer space’ in treaties or secondary law
- Only reference in policy documents
- ➔ Only to the extent space activities are economic activities *may* EC law be(come) relevant

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Official aims of the Community / Union

■ Art. 2, EC Treaty

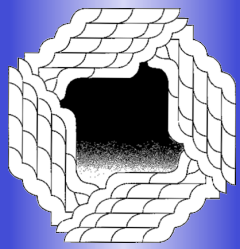
- Promote harmonious, balanced and sustainable development EC economy/ies
- Promote high level of employment & social protection
- Promote environmental protection at a high level
- Promote enhancement standard of living
- Promote economic & social cohesion EC/EU

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'Pillars' of the Internal Market

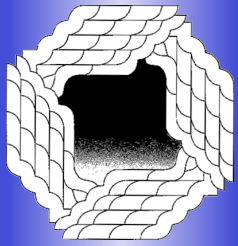
- Four freedoms of movement
 - Goods, persons, services, capital
- Competition regime
 - Rules applying to private enterprise
 - Rules applying to states
- Harmonisation national laws
- Sector-specific Titles
 - Agriculture, transport

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EC Law & space activities

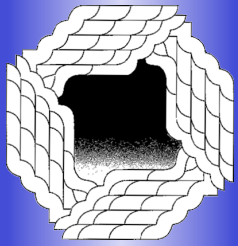
- Involvement EC / EU very recent
- Limited to specific applications
 - no single space (policy) division
 - no coherent ‘space policy’
- Involvement takes legal shape as soon as commercial operations become feasible in a certain area...

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‘Competition ...’

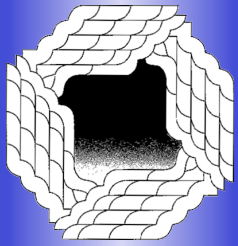
- 1985: **ESA** single-handedly defined European space policy
- 1986: **EC** given 1st competence relevant for space (in R & D)
 - 1986: Also Toksvig Report
 - ◆ Establishment favourable environment
 - ◆ Complementarity EC actions with ESA
- Discussions ‘fair return’ in 80’s...

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‘... & Cooperation’

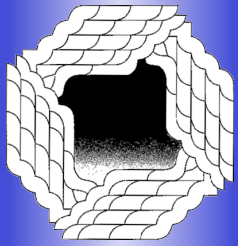
- Fair return justified by external interests of Europe(an industry)
- Cooperation institutionalised after 1992
 - ➔ Space Advisory Group (1993)
 - ➔ Joint projects being developed
 - ◆ EGNOS (incl. Eurocontrol)
 - ◆ Galileo – joint funding & control ➔ joint bodies
 - ◆ Global Monitoring for the Environment & Security – GMES: similar to Galileo?

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Towards the future

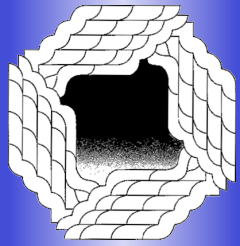
- European Space Strategy
- White Paper
 - EC / EU & ESA distinct roles in space
 - ◆ EC / EU regulatory & general in character
 - ◆ ESA technical / operational & space-focused
 - ➔ EU “federating demand”, ESA “federating supply”
- European Space Policy
 - COM(2007)212 final, of 26/IV/2007

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The 'latest' development

■ European Constitutional Treaty

- Art. I-3: (new) objectives EU
- Art. I-13: about shared competences
 - ◆ § 3: not even that:
 - M/S retain sovereign rights to conduct their own space programme (incl. ESA...)
- Art. III-150: space policy
 - ◆ § 2: European law or framework law
- But such basic competences have to be followed up with actual laws or framework laws for the EU to 'control space policy'

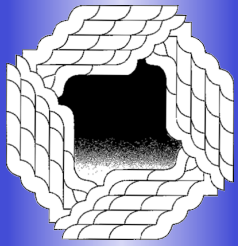


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Institutional options

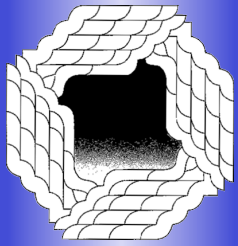
- Status quo
 - Inefficiency / lack of coordination...?
- Status quo-plus
 - More institutionalised cooperation
 - **Framework Agreement:** per project → ...?
- EU absorbs ESA
 - ESA as executive arm Commission – but expertise / capacity issues (WEU ?)
 - Ex. European Environmental Agency

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Still clashing...

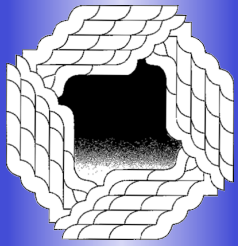
- Internal Market principles vs. ‘Geographical distribution’
 - So far *de facto* justified by overriding European interests → accepted even by EU
 - *Is that changing now...?*
 - ◆ EU solution: bring ESA & activities in ESA
 - Sway of Commission → phase out fair return
 - “Don’ t throw away the baby with the bathwater...”
 - ◆ ESA expertise & flexible system very valuable

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My solution

■ EU member → of ESA

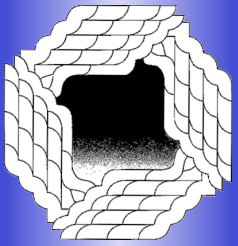
- Precedents...!
- Not two captains on one spaceship...
...but one captain and one additional member of the shipping company board!
- EU takes space policy initiative
- ➔ Involvement & investment optional programme (ESA as instrument of industrial policy)
- ➔ Introduce competition on EU contribution

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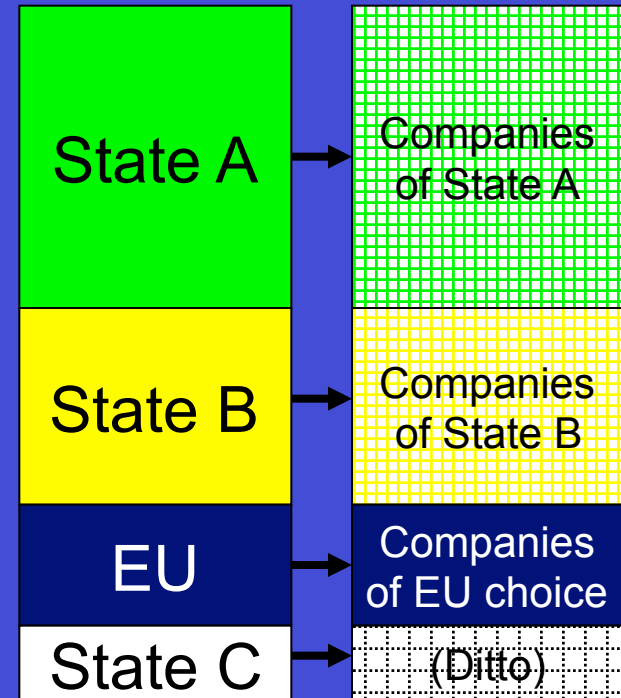
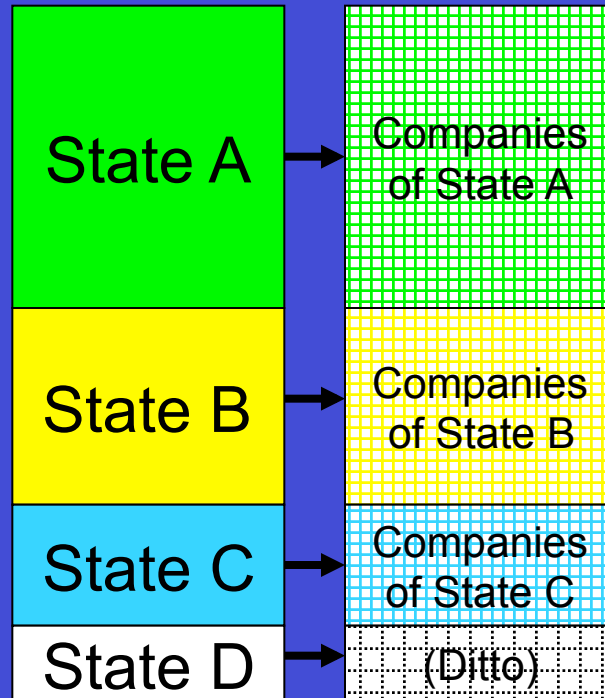
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Visualising solution – 1

■ Fair return Mk. I

■ Fair return Mk. II

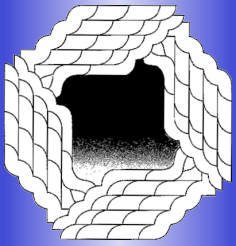


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Visualising solution – 2

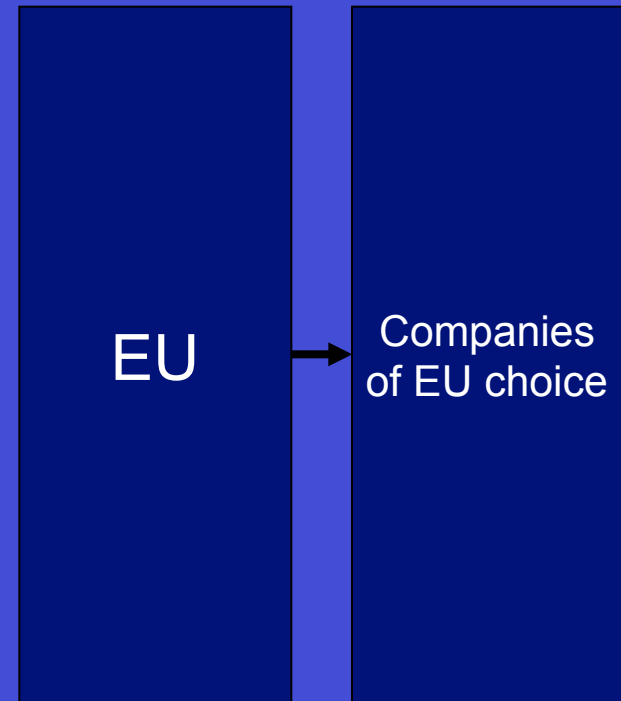
■ EU portion

- Open competition
- ‘Second chance’
- Favour ‘European Companies’
- Favour SME’s

■ Flexible :

“as competencies & activities grow, so does competition”

■ Fair return Mk. III



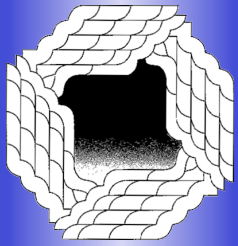
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Towards a bright future?

■ Basis EU & ESA not dissimilar

N.B.: Framework Agreement

- ◆ Does include option EU as member ESA...
- ◆ ...but does not elaborate...
- ◆ ...and creates uncertainties...
- ◆ ...as well as institutional complexity (Galileo!)

→ *Use fair return to implement competition & harmonise industrial policy by increment!*

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