FRANKFURT UNIVERSITY OF APPLIED SCIENCES

MBA in Aviation Management

Part 2: Air Traffic Functions

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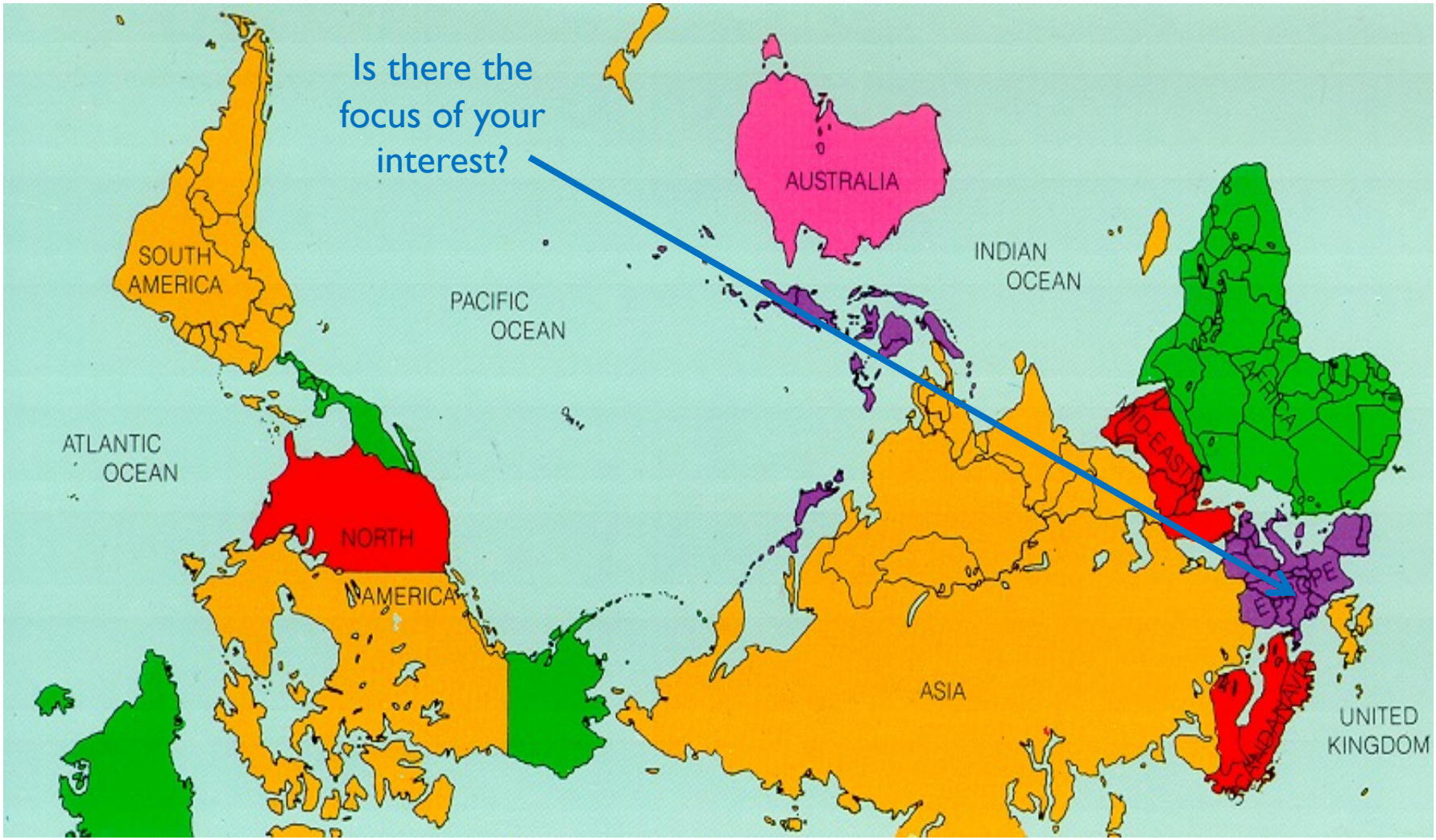
MBA AVIATION MANAGEMENT


Is there the focus of your interest?
AUSTRALIA
SOUTH AMERICA
PACIFIC OCEAN
INDIAN OCEAN
ATLANTIC OCEAN
NORTH AMERICA
ASIA
UNITED KINGDOM

Weblinks

ACI Europe	http://www.aci-europe.org
ACI Global Safety Network	http://www.aci-safetynetwork.aero/
Airports Council International (ACI)	http://www.aci.aero
Arbeitsgemeinschaft Deutscher Verkehrsflughäfen	http://www.adv-net.org
Australasian Aviation Ground Safety Council (AAGSC)	http://www.aagsc.org/
Bird Strike Canada	http://www.birdstrikecanada.com/
Deutsche Flugsicherung	http://www.dfs.de
EUROCONTROL	http://www.eurocontrol.int
European Aviation Safety Agency (EASA)	http://www.easa.eu.int
European Commission / Gesetzgebung	http://europa.eu/scadplus/leg/de/s13004.htm
European Commission / Single European Sky	http://ec.europa.eu/transport/air/single_sky/framework/implementing_rules_en.htm
European Commission	http://www.europa.eu.int

Weblinks

Federal Aviation Administration (FAA)	http://www.faa.gov
Flight Safety Foundation (FSF)	http://www.flightsafety.org/
Fraport AG	http://www.fraport.com
Health & Safety Executive – Air Transport	http://www.hse.gov.uk/airtransport/index.htm
International Air Transport Association (IATA)	http://www.iata.org/index.asp
International Association of Airport Executives (IAAE)	http://www.iaae.org/index.htm
International Bird Strike Committee (IBSC)	http://www.int-birdstrike.com/
International Civil Aviation Organization (ICAO)	http://www.icao.int
International Federation of Air Line Pilots' Associations (IFALPA)	http://www.ifalpa.org/
International Organization for Standardization (ISO)	http://www.iso.org/
Joint Aviation Authorities (JAA)	http://www.jaa.nl/
National Fire Protection Association (NFPA)	http://www.nfpa.org/index.asp
Transport Canada (TC)	http://www.tc.gc.ca/
UK Civil Aviation Authority (CAA)	http://www.caa.co.uk

What Happens during one day at Frankfurt Airport ?

190,00

Passengers*

6,100

tons of Cargo*

82,500

pieces of outbound baggage*

200

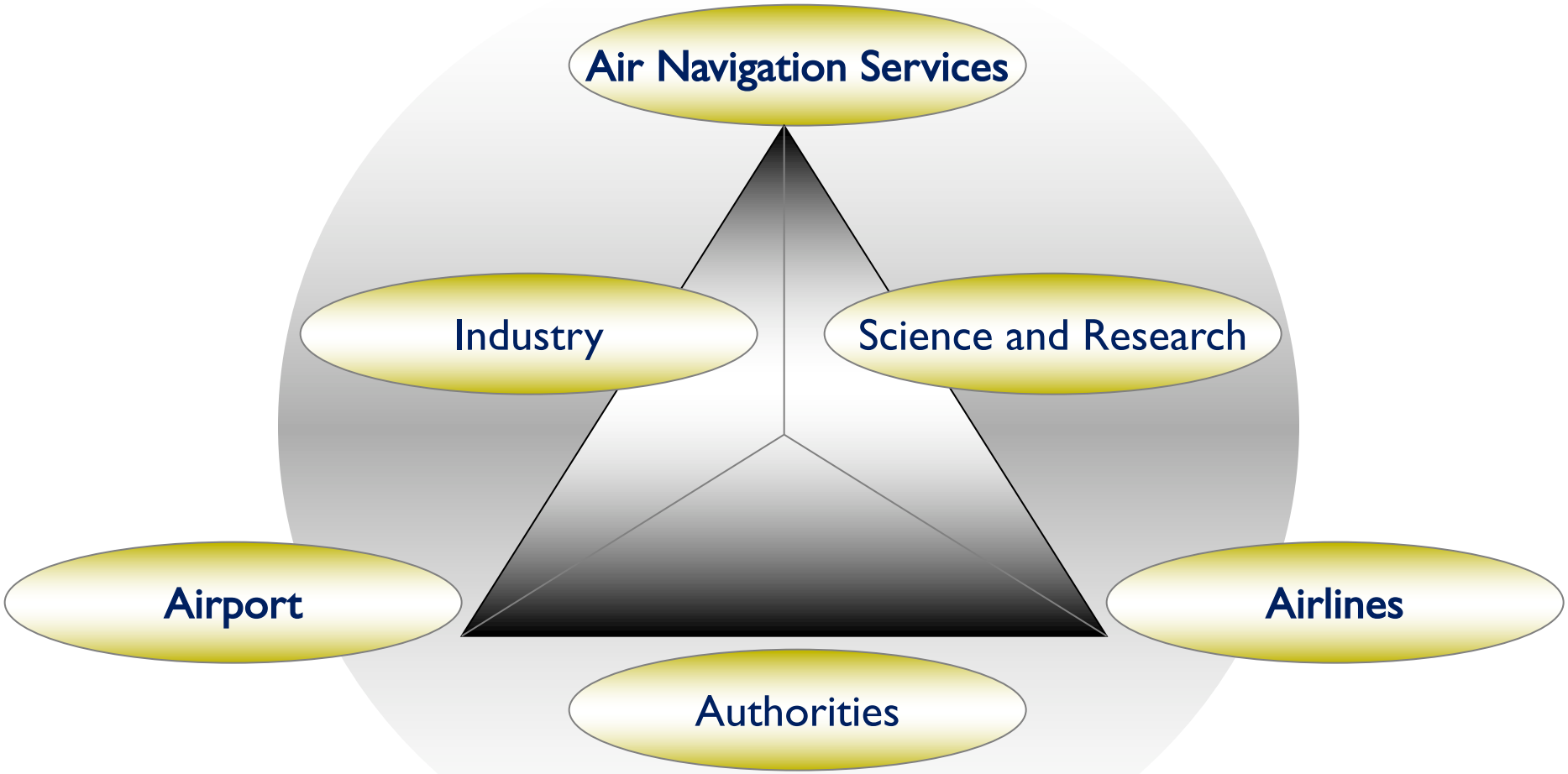
long-distance trains and

260

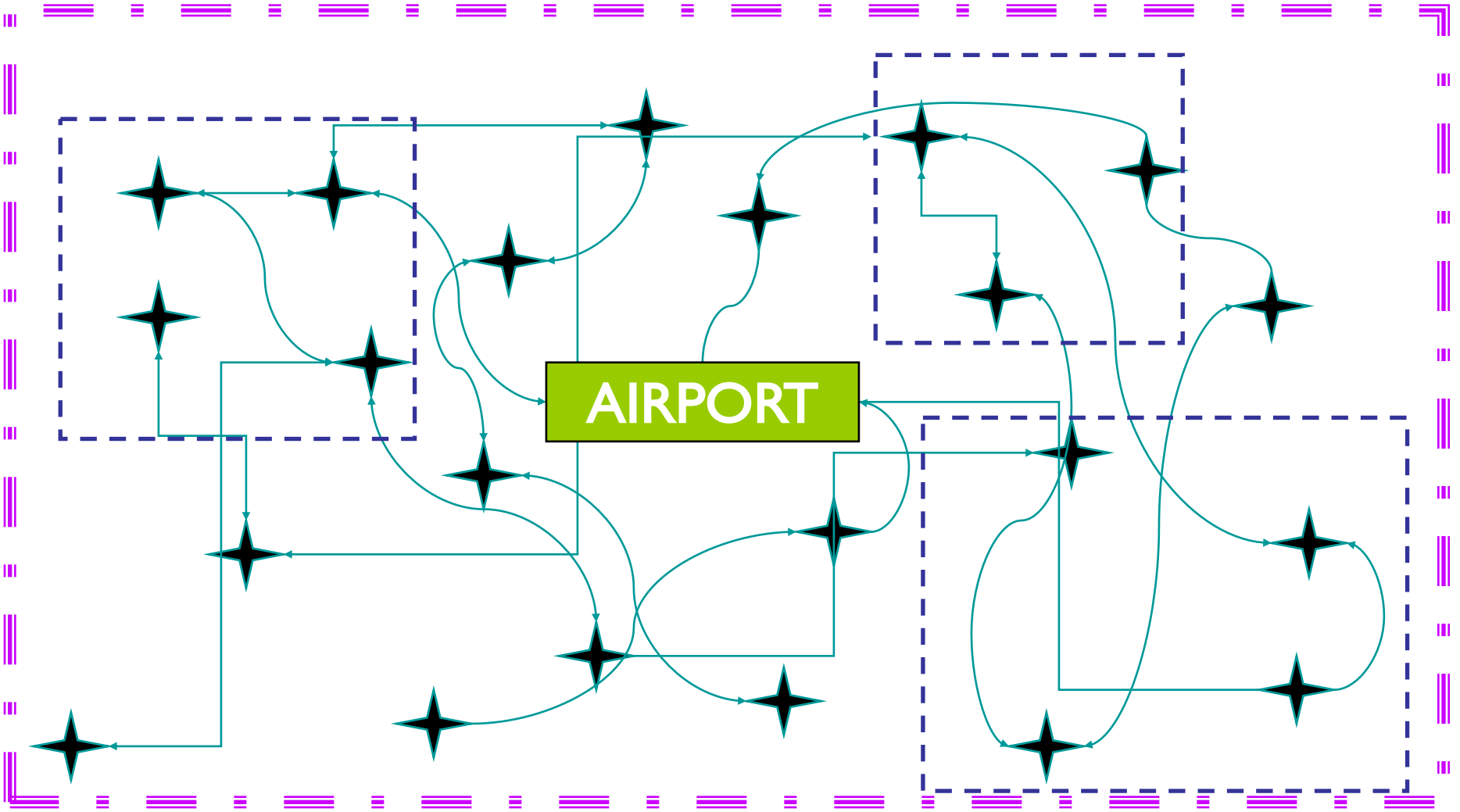
Regional trains*

**average figures 2018, numbers were rounded*

The Air Traffic System



A system of challenges:
Airports as the nodes in the ATM (Air Traffic Management) Network



The classical dilemma: Perspectives

Air Traffic Control:

The „En-route“ view:

„Aircraft are popping up from the ground, enter „our“ airspace, need to be treated, handed over, caressed and to be landed somewhere else.“

The „Tower“ view:

„Aircraft are handed over to be landed and leave to the apron. Suddenly they appear again and expect to be departed“

Airport:

„Aircraft are coming out of the clouds, land on „our“ runway, need to be treated, turned around, caressed and depart to somewhere.“

Airline:

“We pick up passengers at an airport, fly them through the airspace, being handed over too many times by too many units and land them an another airport.”

Process Orientation

Ground Operation around each flight:

Approach / Landing / Taxiing / Docking / Disembarkation / unloading / Servicing / Fuelling / Loading / Start-Up / Undocking / Taxiing / Take-Off / Departure

Airport:

Public Transport / Vehicles / Passengers / Baggage / Freight / „Support“ / Security etc.

Retailing / Real Estate:

Railway-Station / Hotels / Shops / Garages / Offices / Logistic / Workshops / Constriction Sites etc.

Development:

Expansion / Refurbishing / Maintenance

Network Management

Process-Optimisation is mainly dealt in the own “Claim” only
(Airports, Airlines, ANSP’s and their associations).

Single-sided Process-optimisation may be counter-productive

Challenges for the Future:

- Co-operation of the associations in identifying of potentials
- Early and continuous exchange of planned developments
- Enforcing of Co-operations with supranational Organisations (ICAO)
- Definition of commonly agreed Minimum Standards for Airports, Airlines, ANSP’s

Key Elements:

- CDM (Collaborative Decision Making)
- Safety Management System

The special thing about Air Traffic

a) Aircraft are not able to fly "slow" or aren't able to "stop"

Therefore there are special technology and special procedures necessary to deal with aircraft – compared with ground traffic.

b) Aircraft need to be accelerated / decelerated to a defined speed for aero dynamical needs on a defined portion of runway.

Therefore they need a comparably high velocity which stands in relation to the gross weight and load capacity.

The special thing about Air Traffic

c) Aircraft are typical for passenger transport. However practically it is combined solution for the transportation of passengers, freight and mail.

Therefore it is complex to define parameters like "specific energy consumption".

d) Aircraft have a higher cruise speed as land vehicles by ten times.

The special thing about Air Traffic

e) Aircraft are operated under six effective degrees of freedom.

Therefore there are much higher requirements on the operator and the the safe operation under crucial conditions.

f) Aircraft are able to bridge wide distances non-stop (1000-10.000 km).

Therefore air traffic should not be compared with other means of transportation like cars..

The special thing about Air Traffic

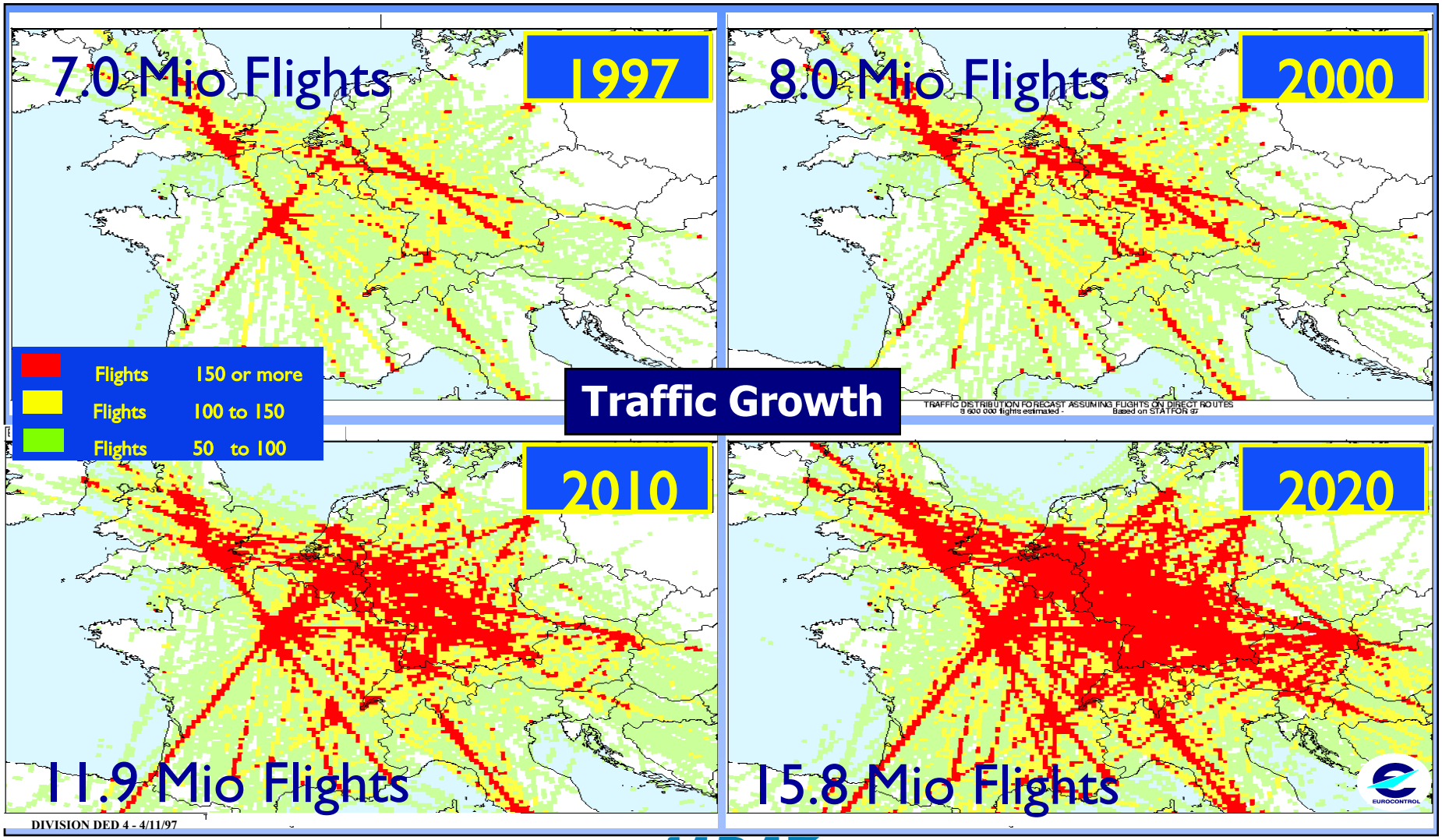
g) Aircraft are operated with a high load-factor and a high direct-routing factor.

h) The operation of an aircraft needs a high degree of additional technological effort. E.g. for pressurization, air conditioning, water and waste-supply, safety and security, staffing and training.

Handling of Air Traffic is special

- Separation of Passenger and Baggage
- Selling and checking of Ticket before the trip
- Number of passengers is limited by number of seats available
- Susceptibility to unlawful interference
- complex handling procedures consuming a lot of space
- weight and balance needs lead to complex calculations and limitations
- Ground Handling by various servicing partners lead to a high co-coordinating effort

Kind of evolution



What about sustainability ?

Basic Questions:

How to define aviation sustainability?

How to measure aviation sustainability?

What about sustainability ?

Safety?

- No fatalities
- no injuries

Balance of energy

- Use of fossil energy….
- Environmental balance…

Safety – Air Proximity

Year	2001	2002	2003	2004	2005	2006
Risk Class A*	10	5	4	3	2	0
Risk Class B**	5	8	4	3	1	2
Proximities Class A+B	15	12	8	6	3	2
Percentage of IFR- Traffic	0,0006	0,0005	0,0003	0,0002	0,0001	0,00006

* Proximity with Collision Risk.

** Proximity where the safety of flight was infringed

Controlled flights 2006: 2.983.000

Safety ?

Safety is paramount !

What about economical sustainability ?

Transportation fares [Euro/Fzkm]

- Covering internal and external cost
- All cost-components must be known
- However: the problem of the external costs is hardly tangible!

What about ethical sustainability ?

Transport Performance [Pkm/a]

- the amount, that is currently consumed by people without minimizing the amount to be consumed by future generations.

Effecting national economy

- connecting economical centres (Business travel)

- connecting low populated areas with the economical centres (Regional airports)

- Satisfying mobility requirements (Tourism)

- Rapid exchange of goods (Cargo)

- Investment and Workforce

Airports as part of the public service obligation

Core-Business of an airport :

Provide the appropriate infrastructure for the safe operation of air traffic:

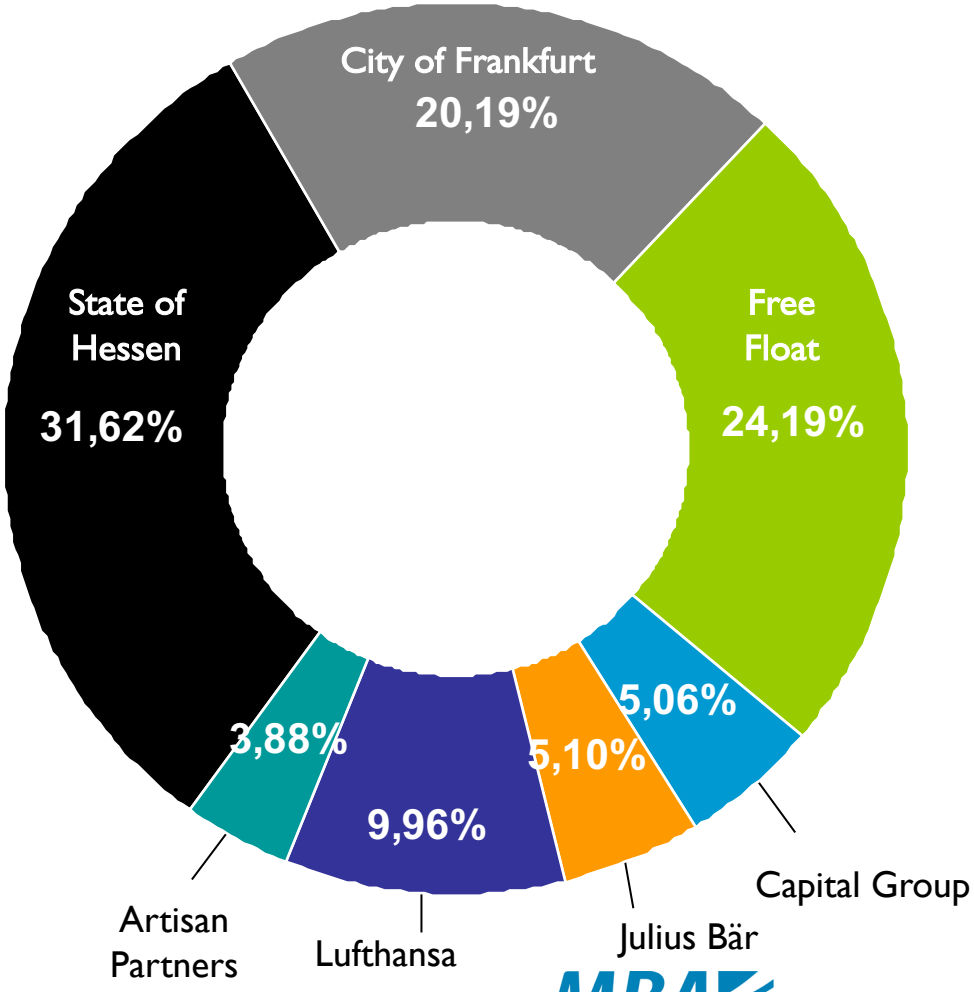
- Runway - System
- Taxiways
- Apron
- Terminals (partially)

Fulfilling this core-functions is independent to the legal structure of the company

Company structures:

- special fund under public law (Airport Authorities)
- Joint stock company
- PPP – Private-Public-Partnership

Airports as part of the public service obligation



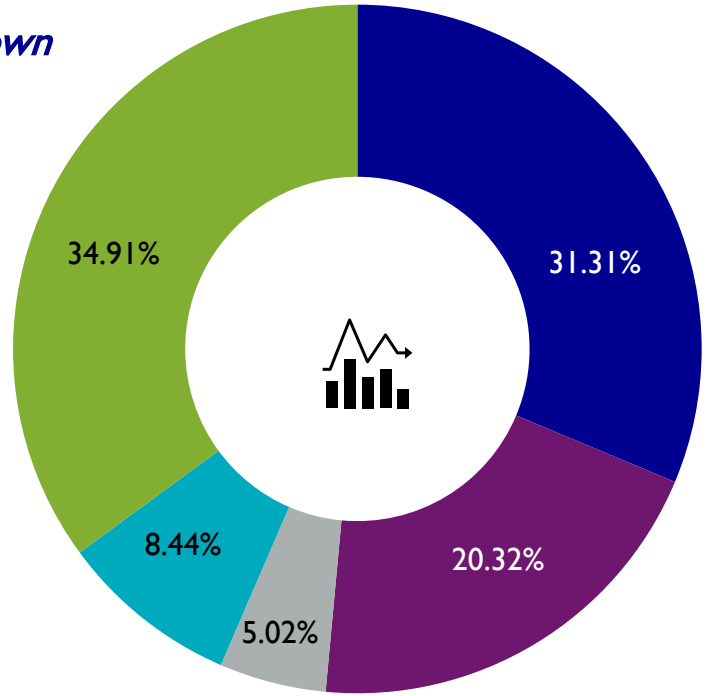
Fraport Shareholder Structure

(2007)

MBA AVIATION MANAGEMENT

Airports as part of the public service obligation

Shareholder breakdown



Fraport Shareholder Structure

(2020)

Airports as part of the public service obligation

Assuring the Core-Business of the airport Company by:

Direct State Regulation of

- Infrastructure
- Operations
- Charges

Airports as economical enterprise

The legal structure of the Future is subject to private law!

Reason:

- State steering is guaranteed by law and company structure
- Private capital strengthens the financial basis
- Flexibility of entrepreneurial action will be improved
- Focus on maximising margins and entrepreneurial action will be supported
- Competitiveness will be increased

Airports as economical enterprise

The success as an airport enterprise depends on the positioning on the market and on the success of the primary customers (airlines):

Aviation Segment

- Number of passengers
- Declared capacity
- Operational Key parameters (24h-Operations or restrictions)
- Fight-plan (Destinations und „Wide-body“ rate)
- Amount of Cargo
- Intermodality

Airports as economical enterprise

Non-Aviation Segment

- Retail-area and Concept
- Concessions
- Real Estate Concept

Ground-Handling Segment

- Passenger-, Cargo- and Aircraft-Handling

Other Business-Segments

- Consulting

Airports as economical enterprise

Business segments

<table>
<tr><td colspan="5"></td></tr>
<tr><td colspan="2">Airport related activities</td><td colspan="2">Not airport related activities</td><td>Other activities</td></tr>
<tr><td>aviation</td><td>on airport</td><td colspan="2">non aviation on airport</td><td>off airport</td></tr>
<tr><td>Primary Service</td><td>Traffic Services</td><td colspan="2">Retailing</td><td>Consulting</td></tr>
<tr><td>Runway Operations</td><td>A/C Handling</td><td colspan="2">Advertisement</td><td>Project Development</td></tr>
<tr><td>Infrastructure-Provision</td><td>Baggage and Freight Transport</td><td colspan="2">Parking Garage Operations</td><td>Management-Contracts</td></tr>
<tr><td>Terminal-Operation</td><td>Pax-Transporte</td><td colspan="2" rowspan="3">Other rents/ concessions Restaurants, Banks etc.</td><td>Shareholding</td></tr>
<tr><td>Security</td><td></td><td rowspan="3"></td></tr>
<tr><td>Safety</td><td>Infrastructure renting</td></tr>
<tr><td>RFF</td><td rowspan="2"></td><td colspan="2" rowspan="2">Real Estate</td></tr>
<tr><td>Administration</td></tr>
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Core business activities account for the largest share of sales

29%

1.027 billion euros

Aviation

19%

707 million euros

Ground Handling

15%

507 million euros

Retail & Real Estate

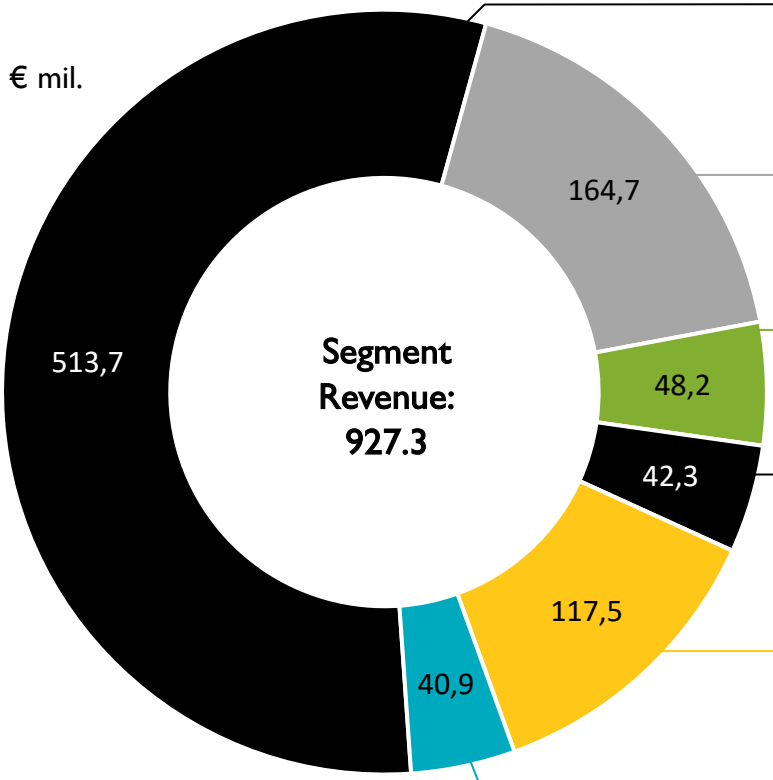
37%

1.464 billion euros

International Activities & Services

Sales of the overall group by segments in 2019

Fraport at a Glance
Aviation – Segment Revenue Split 2015



Passenger Charges
related to the number of departing and destination and transfer-/transit passengers

Landing and Take-off Charges
related to MTOM, number of departing passengers, freight/mail tonnage (arrival and departure), noise and emission

Aircraft Parking Charges
related to time, aircraft size and position

Security Charges*
related to the number of departing passengers, freight/mail tonnage (arrival and departure)

Revenue from Security Services (Federal Ministry of the Interior)
e.g. costs of passenger security controls are charged to the Federal Ministry of the Interior

Others
e.g. identity card and counter services

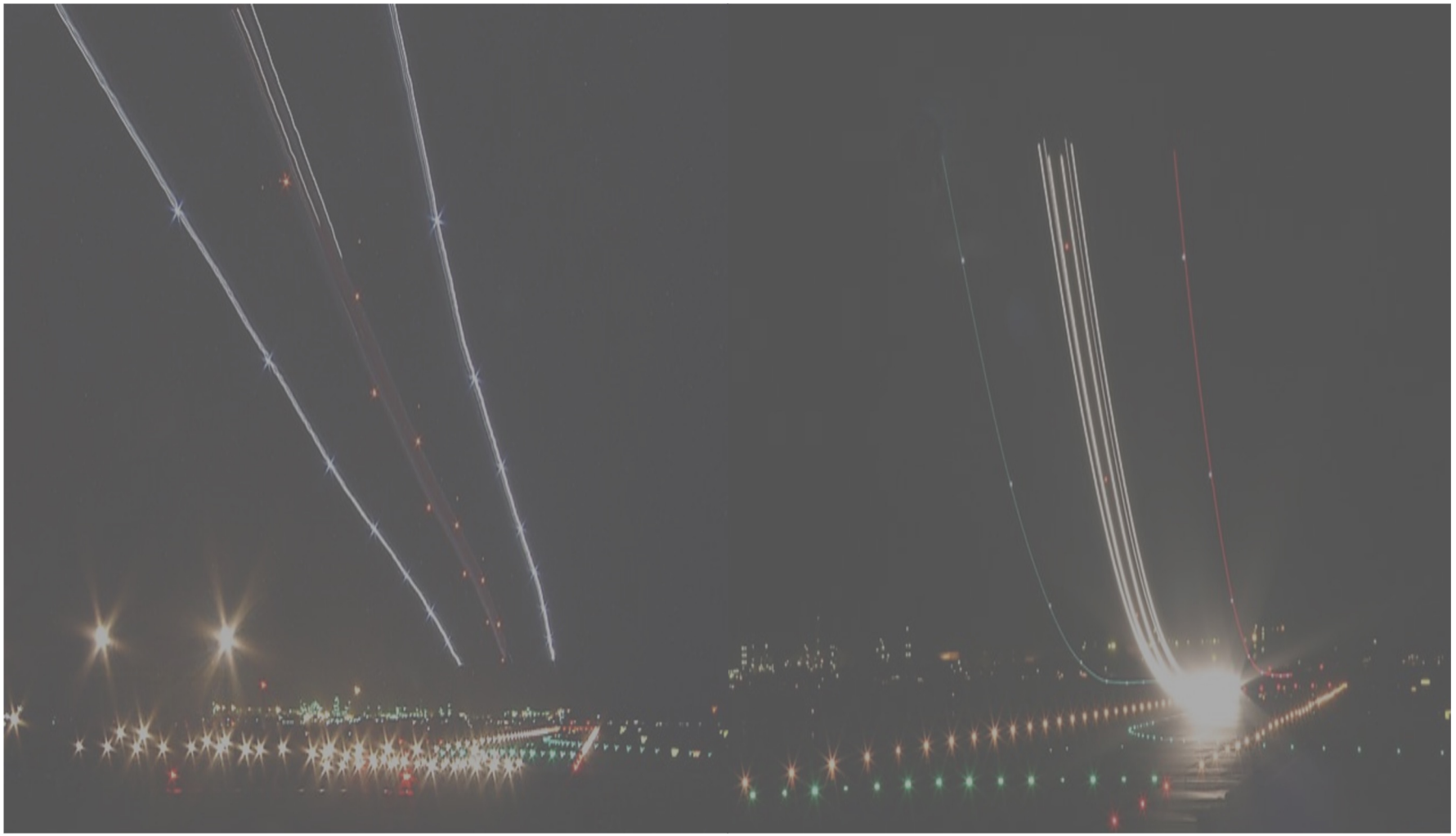
Regulated Airport Charges

Other Revenues

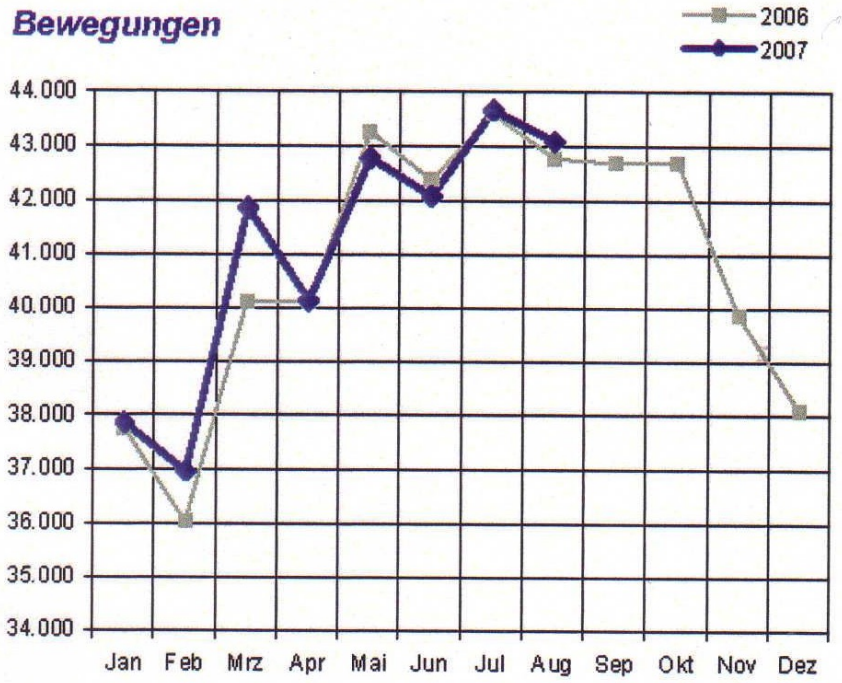
* E.g. critical parts, additional security measures and passenger segregation, insurance, etc.

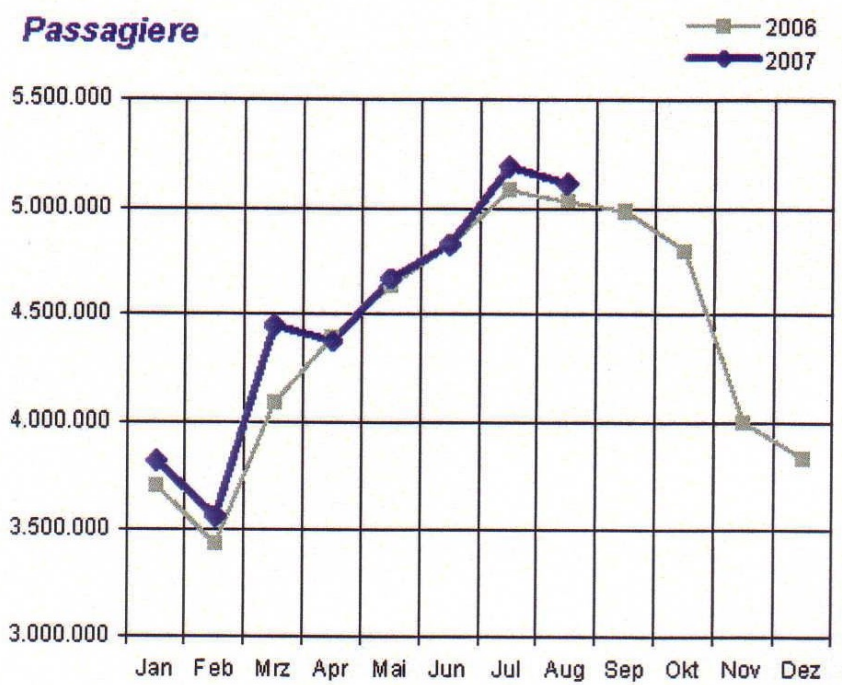
Airport Capacity

Intermezzo



Intermezzo: Understanding statistics?





Airport Capacity

- **Runway-System**

- **Aprons**
  Aircraft Stands

Terminals
Check-In Counter, Gates

Result: „Declared Capacity“.

Airport Capacity
Runway System – Apron – Terminal

The Runway System is the most valuable infrastructure component.

Very high Investment-decisions
- Amortisation over 2 – 3 decades.

Problem: Customers are more flexible, they may move away on short notice.

Challenge: the airport can not react on short-term changes on the market due to very long pre-investment-phases. High risk of distraction due to long lasting juridical processes.

The capacity offered must be harmonized with the Apron and Terminal capacity

Airport Capacity
Runway System – Apron – Terminal

Aviation Charges are a major income-source
– however they are subject to regulation

Criteria:

Equitableness (§ 315 BGB),
Cost-Producer,
Equality principle (no discriminating),
Transparency,

EU - Regulations

Airport Capacity

Negative Impact due to exogenous factors increse the pressure on cost and result in negative factors on the balance sheet.

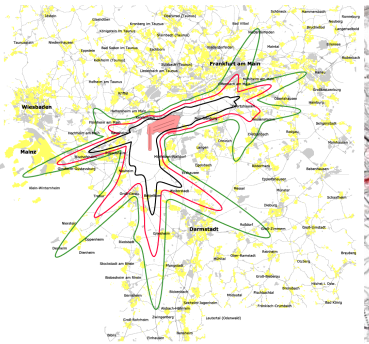
- hardened law on fire protection measures
- security law (100% HBS, critical parts, in-out separation)
- September, 11th 2001
- SARS
- industrial action / strike

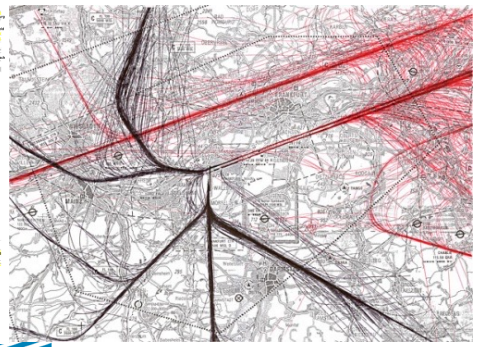
Future Challenge:

- close co-operation with the rulemaking bodies
- close co-operation with Airlines, ANSP's and other airports

Environment

- political opportune decision-making structure
- raising concern of the population
- increasing demand for information of the surrounding communities
- Growth of the airport vs. growth of the communities – approaching the frontiers
- Unclear Priorisation in public:
  „all noise for some“ vs. „some noise for all“





AVIATION MANAGEMENT

Market

European Union:

27 ~~28~~ Member states and

2 Applicants (inkl. Candidates)

Schengen Area:

31 ~~30~~ States have signed

Future Challenges:

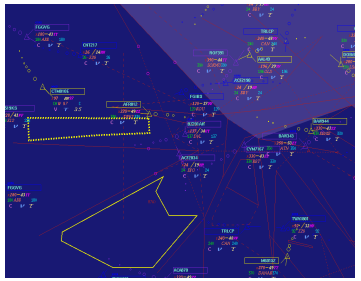
Is there enough Terminal capacity considering further expansion of the Schengen area?
(Schengen / Non-Schengen Balance)

Market

Single European Sky:

- sovereignty of states
- continuous increase of traffic
- capacity gap
- increased delay
- civil-military integration

Total system Approach!



Ground Handling

The farther the airport operator moves away
from the Status “Authority”
the more he is acting as a “Service Provider”

The most important Service Segment is: Ground Handling:

- Apron aircraft handling
- Apron Cargo Handling
- Passenger Handling in the terminals (landside)
- Cargo handling landside
- Transportation Service (Passenger, Cargo, Baggage)

However: EU 96/97/EG establishes competition!

Ground Handling

Ground Handling Charges are not regulated by law, but by market...

Criteria:

- equal treatment of customers
- Cost-Relation
- Transparency
- Freedom of contraction if the customer

New Pricing system with three elements:

„Pricing + Packaging“

- Contract-Model
- Calculation-Model
- Pricing Model

Retail and Properties / Real Estate

Airports are increasingly attractive as location for shops and services

The concession is issued by the airport operator and maybe subject of charges :

- Rental (according to the market)
- concession fees (revenue-/turnover-related, flat-rated)

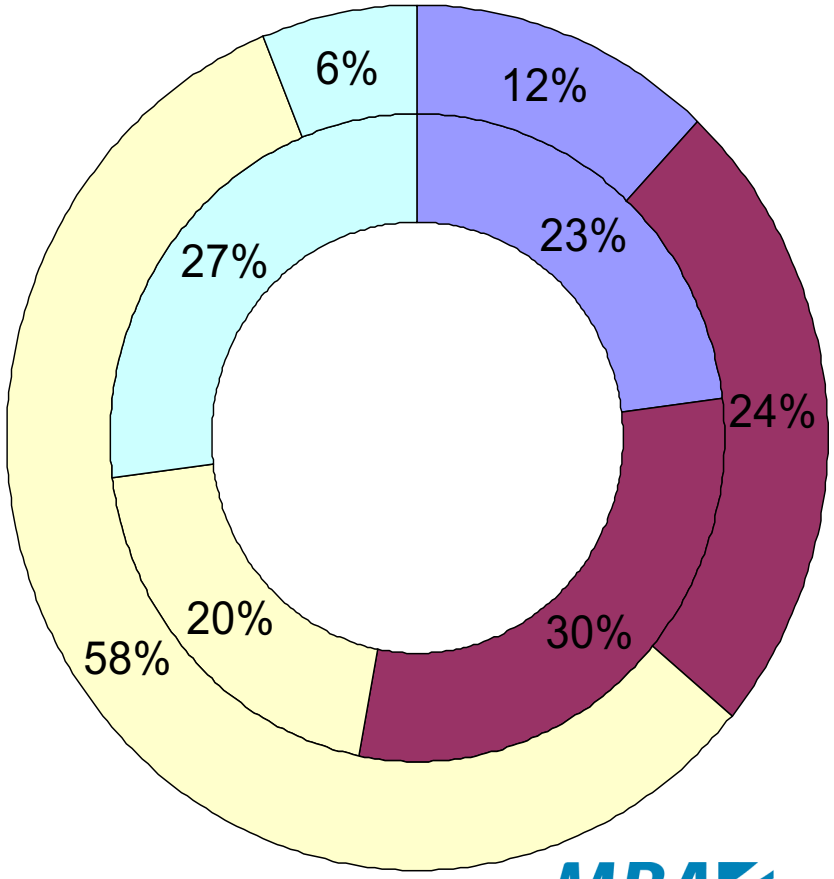
Criteria:

- Market
- Adequacy
- Equitableness (§315 BGB),
- Equality principle (no discriminating),

Problem: Relationship to the surrounding communities

Airports as part economical enterprise

Retail and Properties (2006)



2007: Segments of Revenues (outer) und EBITDA (inner)

- External Activities
- Aviation
- Retail & Properties
- Ground Handling

MBA AVIATION MANAGEMENT

Other activites of the airport operator

According to the company strategy there are various field to act:

- Consulting,
- Shareholding
- Management Contract
- ICT-Services
- Facility-Management
- Real Estate Development

Use of the proceeds

Cover the costs and build up reserves.

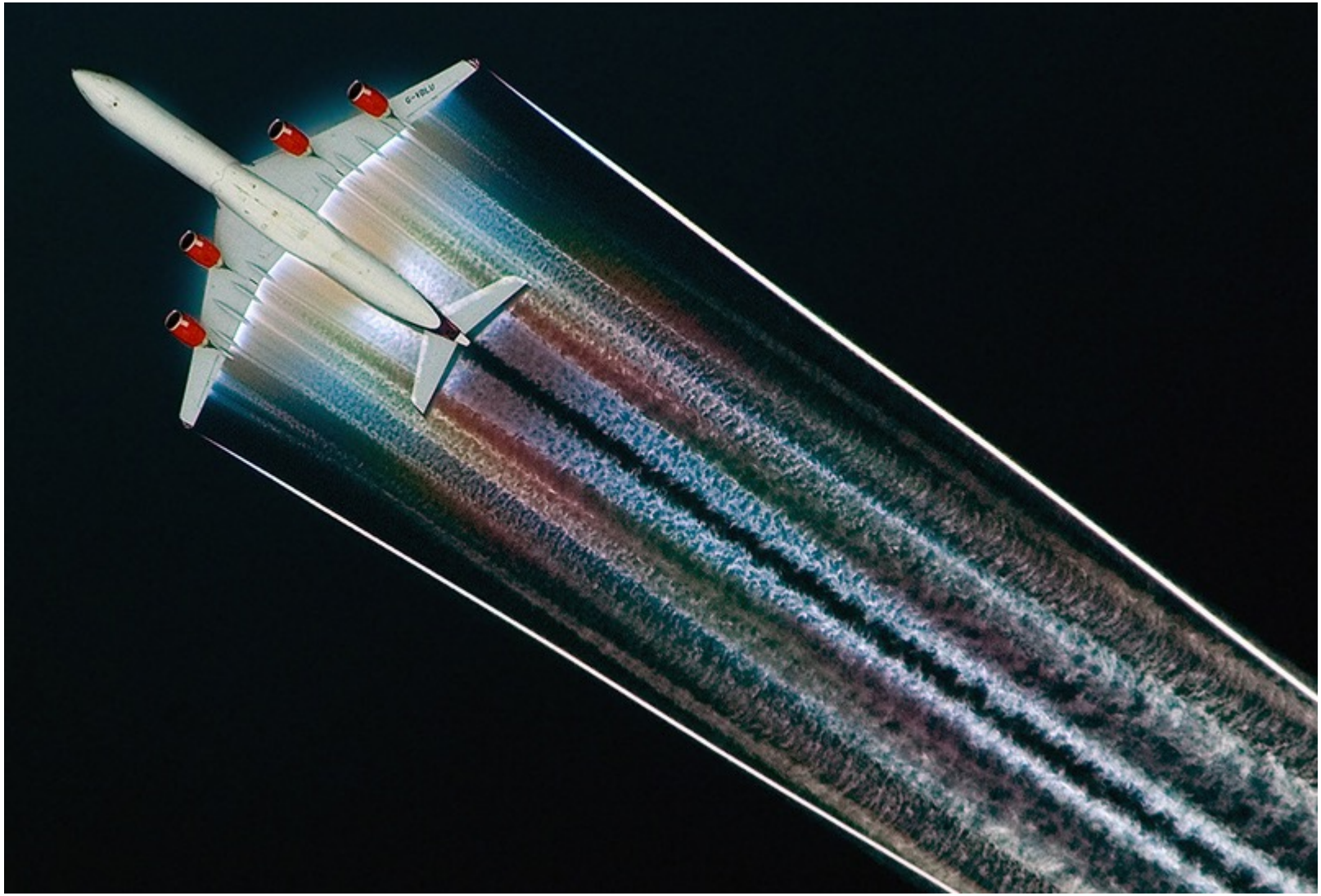
Revenues are subject to taxation.

After-Tax-Profit may be used for reserves or dividends.

Trend-change:

- until now earnings are used for investment and low interest
- nowadays an acceptable interest of equities

Problem: customers are claiming for adequate proportion of earnings out of other business segments. (single till-principle)



Regulatory framework

Principle:

DGCA: BMVBS, LuftVG

Regional Governments

Airworthiness: Luftfahrtbundesamt, LBA

Accident Investigation: Bundesstelle für Flugunfalluntersuchungen, BFU

ANSP: Deutsche Flugsicherung, DFS

Weather Service: Deutscher Wetterdienst, DWD

NSA: National Supervisory Authority BAF

Regulatory framework

Air Navigation Service Charges

- En-Route Charges

Aircraft Mass and Route-Length

- Arrival Charges

Aircraft mass

- VFR: lower charges due to less control effort

Cost recovery principle

- No earning because of the sovereign task!

Regulatory framework

ICAO ANNEX 11 and Doc. 4444:

Air Traffic Service

Air Traffic Control Service

Flight information Service

Aeronautical information Service

Alerting Service

Aviation

Basic Principle

To establish and maintain a safe, orderly and expeditious flow of air traffic

Economically beneficial and environmentally friendly

Thanks for you attention

Hope to see you in FRA!