Network Intelligence for Network Performance

ICAO Aviation Data and Analysis Seminar, Paris

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5 April 2018
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- EUROCONTROL and the European Network
- Data
- Forecasting
- Windows on the network
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  - Connectivity
EUROCONTROL

Who are we?
ICAO: The contracting States recognise that every State has complete and exclusive sovereignty over the airspace above its territory.

EUROCONTROL:

- 41 Member States, typically each with its own ANSP
  - +2 ‘comprehensive agreement’ States
- Approximately 63 Area Control Centres (ACC)
- Over 700 sectors when at full capacity
- Approx. 17,000 Air Traffic Controllers
- Approx. 41,000 other staff

Total employees 58,000
Total revenue €8Bn/year

EUROCONTROL Agency:
HQ Brussels
One view of the network
Data on 10 Million flights per year in Europe

Flight Plans
- scheduled
- actual

Radar data
Flight data

Landings,
Take-offs
- agreed slots
- actual

PRISME
Datawarehouse

Statistics
Analysis
Forecasts
Who uses our forecasts?

- Airlines, airports, service providers, regulators, manufacturers, banks, research organisations, banks & finance institutions, ...
- Operations planners
  - Staffing
  - Airspace & Airports
- Finance staff
- Development teams
- Researchers
- Policy-makers
- Investors

Decisions:
- Rosters
- Capacity
- Income, Charges
- Business cases, Priorities
- Designs, Models
- Targets, Strategies
- Investments
Forecast
Why do they need the forecast?

Traffic
Uncertainty
Now Future

Traffic
Forecast
Now Future

Decision-Making = Managing Risk

Forecast knows best

You know best
Forecast

What do we forecast?

“Traffic” in a wide sense
Forecast

20-year forecast: Four forecast scenarios

Europe adapts

Faster Growth

Europe: outward perspective

Scenario A
GLOBAL GROWTH

Most-likely

Europe less adaptable

Scenario C
REGULATION & GROWTH

Scenario C'
HAPPY LOCALISM

Europe: inward perspective

Scenario D
FRAGMENTING WORLD

Slower Growth
Forecast

Demand exceeds capacity at airports

2035:
Around 15 Million flights

But, demand is 2 million flights higher
Forecast
Growth stronger in Eastern Europe
Five Challenges from *Challenges of Growth 2013*

- Deliver planned **airport capacity** and bridge the 1.9million flight gap
- Deliver **network performance**, with airport delays up by factor of 5
- Adapt to an era of **slower growth**, perhaps half the historic rate
- Ensure **sustainability** of that growth, eg emissions will continue to grow
- Build **resilience to climate change** that will affect demand, infrastructure and day-to-day operations
Forecast

How well do we forecast?

Relative performance (RP) = 1.9 in 2017
Means benchmark forecast had 90% bigger errors than STATFOR

Our target: > 1.5
Fleetwatch-Live

Central Office for Delay Analysis

coda@eurocontrol.int
www.eurocontrol.int/coda
Business problem

- Flow management using the flight plan
  - missing airline context
  - airline commercial schedule v. flight plan
- Airline focus on (punctual) arrival v. ATC focus on take-off
- Passenger rights costs influencing airline decision making
- Reactionary delays not visible to ATC
- Flow management delay not always impacting airlines

Fleetwatch-Live

- Matching airline schedule with ICAO flight plan
- Airline-centric KPIs
- Alert functions (eg potential passenger rights costs)
CODA Fleetwatch-Live
Matching ICAO flight plans with airline schedules

Network Manager

Flow Management Operations

Airline Operations

Operational systems

Fleetwatch-Live

B2B

flight plans
radar updates
activation & other messages

IATA phraseology
Commercial schedule
Cancellations
CODA Fleetwatch-Live
Network delay propagation

Orange bar shows ATFM delay
Current Time

One aircraft

1

2

3

4
CODA Fleetwatch-Live
Visualisation of all air transport delays

Network gains

• Improved assistance to airlines from the NM Helpdesk
• Steer ATFM delays where it has lower impact
• Early detection of reactionary delay potential

Way ahead

• Further deployment with airlines and airports
• Improved data sharing to understand airline behaviour
• First Rotation Optimisation to reduce knock-on delays
• Learning & building indicators

Transparency, transparency, transparency
Business problem

- Safety, efficiency, performance gains need new equipment
- Gains increase with the number of aircraft fitted
  - But not (necessarily) linearly
- Local and Europe-wide pictures differ
- Where to prioritise investment

CNS Dashboard

- Merges data on how the fleet is equipped with where and when it flies
- Explore these data from different perspectives
  - Place, flight, aircraft, time, operator, country of registration
CNS dashboard
http://www.eurocontrol.int/services/communication-navigation-surveillance-cns-dashboard

CNS: Communications, Navigation & Surveillance
CNS Dashboard - overview

Aircraft or Flight view

Filters

Reports: graphs or tables, absolute or relative

What is shown depends on your profile
## CNS Dashboard

### Example: Performance-based or basic navigation equipage

<table>
<thead>
<tr>
<th>Capability</th>
<th>July 2016</th>
<th>July 2017</th>
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<tbody>
<tr>
<td></td>
<td># Flights</td>
<td>% Flights</td>
</tr>
<tr>
<td>B - RNAV 5</td>
<td>969,000</td>
<td>97%</td>
</tr>
<tr>
<td>D - RNAV 1</td>
<td>904,000</td>
<td>91%</td>
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<td>O - Basic RNP 1</td>
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<tr>
<td>S2 - RNP APCH with BARO-VNAV</td>
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<td>53%</td>
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<tr>
<td>B - LPV (APV with SBAS)</td>
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<tr>
<td>T1 - RNP AR APCH with RF</td>
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<tr>
<td>T2 - RNP AR APCH without RF</td>
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<td>G - GNSS</td>
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<tr>
<td>A - GBAS landing system</td>
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</table>
STATFOR Interactive dashboard (SID)

Monthly flight statistics and trends

**Business problem**

- Rapid, consistent view of traffic trends *and forecast*
  - Varying classification, counts
- Drilling-in to ‘why?’
- Availability and access

**SID**

- Monthly updates on European flights
- Standardised classification of market segments
- Twice-yearly forecast update
STATFOR Interactive dashboard (SID)
Monthly flight statistics and trends

Network Business Intelligence

STATFOR

Market segment
STATFOR Interactive dashboard (SID)
Current developments

- Web-service access coming soon
Connectivity
Connectivity

- Connectivity
  - Moving people and goods
  - Enabling
    - Business, tourism, education, visiting friends & relations
  - Economic and social benefits
- When we discuss ‘connectivity’, do we mean the same thing?
  - **Aim:** Provide indicators to inform these discussions
- *Current* scope of the indicator
  - Aviation, but including ground access: ‘door-to-door’
  - *Intra*-EU28
  - People
Connectivity

Questions about a trip

Where can I get to? Who can I visit?
How long will it take?
How much choice do I get? (How much will it cost?)

Reachable Population
Travel time (including ground access)
Flight Choice
Number of Carriers

Other qualities of the trip:
• Direct flight, or change?
• Low-cost or not
• Scheduled, or ‘charter’?
• Business-friendly times?
Connectivity

Travel time example

From Tallinn, where can I get to for a 10am meeting?

Arriving 10am local time makes some destinations just possible (eg Edinburgh)
Connectivity

Hands-on with the indicators

- Initial dashboard
  - 2 quarters of data

- Short link
  - ow.ly/5vWI30flnen
Connectivity
Current developments

- Indicator improvements
  - Seasonality and changes from year-to-year
  - Other modes of transport
    - high-speed train replacing or complementing aviation
    - driving, over short distances
  - Global scope
  - Reachable GDP as interesting as reachable population
Summary
Summary

- Efficient network operations
  - Getting data to those who can use it
  - Transparency