Flightpath 2050 revisited – An analysis of the 4-hour-goal using flight schedules and origin-destination passenger demand data

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INAIR Conference, Budapest
13th November 2019
Agenda

- Introduction
- Interpretation of the Flightpath 2050 4-hour-goal
- Modelling assumptions
- Data and Methodology
- Results
- Conclusions and Outlook
Introduction

- Air transport’s key benefit is connectivity
- Connectivity is a complex term consisting of flight destinations, flight frequency, flight time and onward connections
- Passengers enjoy travel time savings
- Out of travel time savings, economic efficiency can be improved
- The level of connectivity influences business location decisions, firm productivity and incoming tourism

⇒ Policy objective: improving connectivity
⇒ Key challenge: Finding the right indicators quantifying connectivity
The high level group created in 2011 strategic objectives for aviation in Europe:

- “Meeting societal & market needs”;  
- “Maintaining and extending industrial leadership”;  
- “Protecting the environment and the energy supply”;  
- “Ensuring safety and security” and  
- “Prioritising research, testing capabilities & education”.

Key objective in the area of societal & market needs:

“90% of travellers within Europe are able to complete their journey, door-to-door within 4 hours”

2017 ACARE SRIA aims at quantifying and monitoring the goal achievement (DATASET2050 Horizon2020 project)
Modelling assumptions

- Modelling the 4-hour-goal requires a definition of the elements of the statement:

  - **90% of travellers within Europe**
    - Geographical Europe? EU28? IATA Definition?
    - Which distance? What kind of mode?
      ⇒ Interpretation in this study: EU28 and at least one segment by air

  - **are able to complete their journey**
    - Theoretical option or actually chosen mode/routing?
    - There are good reasons why travellers choose mode/routing which is not the fastest
      ⇒ Interpretation in this study: Theoretical possibility to travel < 4 hours

- Re-phrased 4-hour-goal in the course of this analysis:

  “90% of trips involving at least one flight segment and car traffic as airport access/egress mode within and between the EU-28 member states could theoretically be completed door-to-door within 4 hours”
Data and Methodology

• Europe has no up-to-date, freely available origin-destination passenger demand matrix on small geographical scale (e.g. NUTS-3)

⇒ Insufficient knowledge on real OD passenger flows (since ETISplus, TREMOVE data not freely available)

• Commercially available are airport-to-airport origin-destination demand data (Sabre Market Intelligence) and Innovata flight schedules (OD shortest travel time)

⇒ Second best solution, as we do not know distribution of true origins/destinations

• As we do not know actual airport access and egress times, which would depend on the exact origin and destination of each trip, this study uses a matrix of plausible airport access and egress times

⇒ Objective: sensitivities of goal achievement wrt. different access/egress times
## Results – Trip Distribution by number of stops

Distribution of origin-destination passengers in Europe by number of stops, 2018

<table>
<thead>
<tr>
<th>Number of stops/transfers within the air transport system</th>
<th>Number of passengers in million</th>
<th>Passenger share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Stop</td>
<td>513.78</td>
<td>93.47%</td>
</tr>
<tr>
<td>One-Stop</td>
<td>34.93</td>
<td>6.36%</td>
</tr>
<tr>
<td>Two-Stop</td>
<td>0.96</td>
<td>0.17%</td>
</tr>
<tr>
<td>Three-Stop</td>
<td>0.02</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>549.69</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Source: Based on Sabre MI Data 2018

- With one or more stops, 4 hours total travel time nearly impossible to achieve
- Already today, 93.5% of travellers use non-stop connections ⇒ only very limited scope to lower travel times with more non-stop connections
Results – Calculation of „scheduled speed“

Relation between flight distance and speed for intra-European flights, 2018

Avg. scheduled speeds

517 km/h at 1000 km
628 km/h at 2000 km
693 km/h at 3000 km

Assumption: 60 minutes airport access time (incl. process time) and 30 minutes airport egress time ► maximum flight time is 2.5 hours to stay within 4 hours total
2.5 hours ► 1440 km maximum flight distance
About two thirds of OD passengers in 2018 travelled 1440 km or less

Source: Based on Innovata Flight Schedules 2018
Results - Longest possible flight distance to stay <4 hrs

Cumulative distribution of origin-destination air passengers by distance, 2018

- Even if all passengers had the shortest possible airport access/egress and process times, ~12% of travellers would need for travel D2D more than 4 hours
Results – Sensitivity Analysis

Sensitivity of the degree of achievement of the 4-hour-goal towards variations in airport access/egress times

<table>
<thead>
<tr>
<th>Airport access &amp; process time – minutes before scheduled departure time</th>
<th>15 minutes</th>
<th>30 minutes</th>
<th>45 minutes</th>
<th>60 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 minutes</td>
<td>82.4%</td>
<td>79.0%</td>
<td>73.2%</td>
<td>64.8%</td>
</tr>
<tr>
<td>45 minutes</td>
<td>79.0%</td>
<td>73.2%</td>
<td>64.8%</td>
<td>56.7%</td>
</tr>
<tr>
<td>60 minutes</td>
<td>73.2%</td>
<td>64.8%</td>
<td>56.7%</td>
<td>47.9%</td>
</tr>
<tr>
<td>75 minutes</td>
<td>64.8%</td>
<td>56.7%</td>
<td>47.9%</td>
<td>39.0%</td>
</tr>
<tr>
<td>90 minutes</td>
<td>56.7%</td>
<td>47.9%</td>
<td>39.0%</td>
<td>28.9%</td>
</tr>
<tr>
<td>105 minutes</td>
<td>47.9%</td>
<td>39.0%</td>
<td>28.9%</td>
<td>17.6%</td>
</tr>
<tr>
<td>120 minutes</td>
<td>39.0%</td>
<td>28.9%</td>
<td>17.6%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

If we added 30 minutes airport access time (incl. process time) and 15 minutes airport egress time to real shortest flight times, only 82.4% of passengers would be able to complete their journey within 4 hours.
Conclusions and Outlook

• >93% of travellers fly non-stop on intra-EU trips
• ~12% of travellers fly on OD pairs, which are simply too long, so that the 4-hour-goal cannot be achieved, even if non-stop flights with sub-sonic jets were offered on all airport pairs
• Based on theoretically shortest flight times contained in the 2018 flight schedules and actual air passengers, only 82.4% of passengers could have travelled D2D in less than four hours – if D2D = Airport-to-Airport
• If airport access/egress/process times are assumed to be 90 minutes, this value declines to 64.8%

• Potential measures and their effectiveness:
  • More non-stop flights – very low to low
  • Higher flight speeds – medium to high (intra-EU supersonic highly unlikely)
  • Reducing buffer times in flight schedules – medium to high
  • Speeding up airport access/egress – high
  • Speeding up airport processes – high