Expert **TALKS**

The accuracy of air traffic forecasts, causes and consequences

Presentation by:

Prof. Dr.-Ing. ***Hartmut Fricke****,*

Director of the Institute of Logistics and Aviation at the Faculty of Traffic Science, Technische Universität Dresden (TUD)

TECHNISCHE UNIVERSITÄT DRESDEN

The first InterFAB Expert Talk hosted by FABEC on 2 March 2021 attended by more than 220 delegates from all over Europe discussed the impact of traffic forecasts on resource allocation by air navigation service providers (ANSPs). Prof Dr-Ing Hartmut Fricke, Technische Universität Dresden (TUD) and his team examined how the same forecast scenario applied across all European states can lead to significant variations amongst individual states between actual and predicted demand. While overall traffic levels fall within the range forecast by EUROCONTROL STATFOR, some regions experience much higher uncertainty than others, leading in some cases to hundreds of thousands of additional flights while others can incur excessive costs arising from unused resources. In view of these uncertainties, Prof. Fricke identified additional parameters that could be incorporated in the forecast to help fine-tune the outcome and contribute to improved performance by air navigation service providers (ANSPs).

ANSPs rely on air traffic forecasts to plan infrastructure and personnel resources to provide safe air traffic control services in a cost-effective way. The prediction horizon to secure critical controller skills is five years, covered under STATFOR's medium term 7-year forecast horizon. The forecast provides high-, base-, and low-level scenarios that currently aim at finding at least 50% of all forecasts within this range accuracy, referred to as the Confidence Interval (CI), to provide an indication of future traffic. However, the effective CI based on real observations along the last decade did change significantly over a five-year period, for example in response to economic crises (e.g., 2009), fuel price hikes (e.g., 2012) and geopolitical events, with significant consequences for ANSPs and their ability to comply with Single European Sky performance regulations.

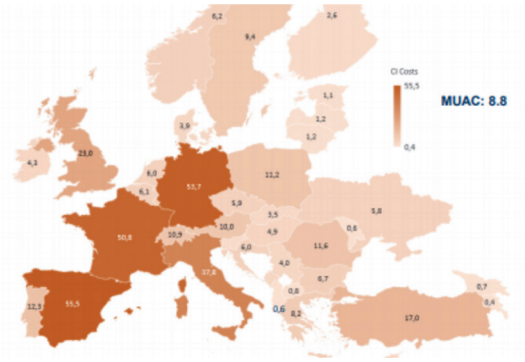
When TUD examined the impact at FAB level over a five-year period from 2019 and 2023, the research identified based on these CI fluctuations 788,000 optional (uncertain) flights across FABEC states, 495,000 in BLUE MED FAB and 386,000 in FAB CE, double the number in other FABs, concluding non-homogeneous uncertainties for every flight zone. The research also found similar high uncertainty and variations in human resource requirements and ATCO employment costs between ANSPs.

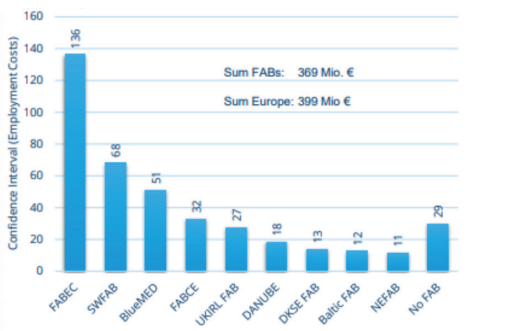
Traffic Forecasts and implications

How does it affect costs of ANSPs?

CI Spreads lead to relevant uncertainty regarding costs for ANSPs (and FABs). The figures illustrate the CI conversion to ***ATCO employment costs*** *in Mio. € (5-year prediction, 2019-2023).*

Fact : *High uncertainties in costs for some ANSPs, e.g., for DFS, DSNA, ENAIRE and ENAV.*





TECHNISCHE UNIVERSITÄT DRESDEN

DRESDEN concept

Data: Spring Report 2019. Illustration: IFL

The Accuracy of STATFOR Forecasts - Webinar InterFAB ExpertTalks
TU Dresden, Institute of Logistics and Aviation / Dr. Hartmut Fricke, Thomas Standfuß
ATM performance data - can we do better ? // 02.03.2021

FABEC

InterFAB
Cooperation for Single European Sky

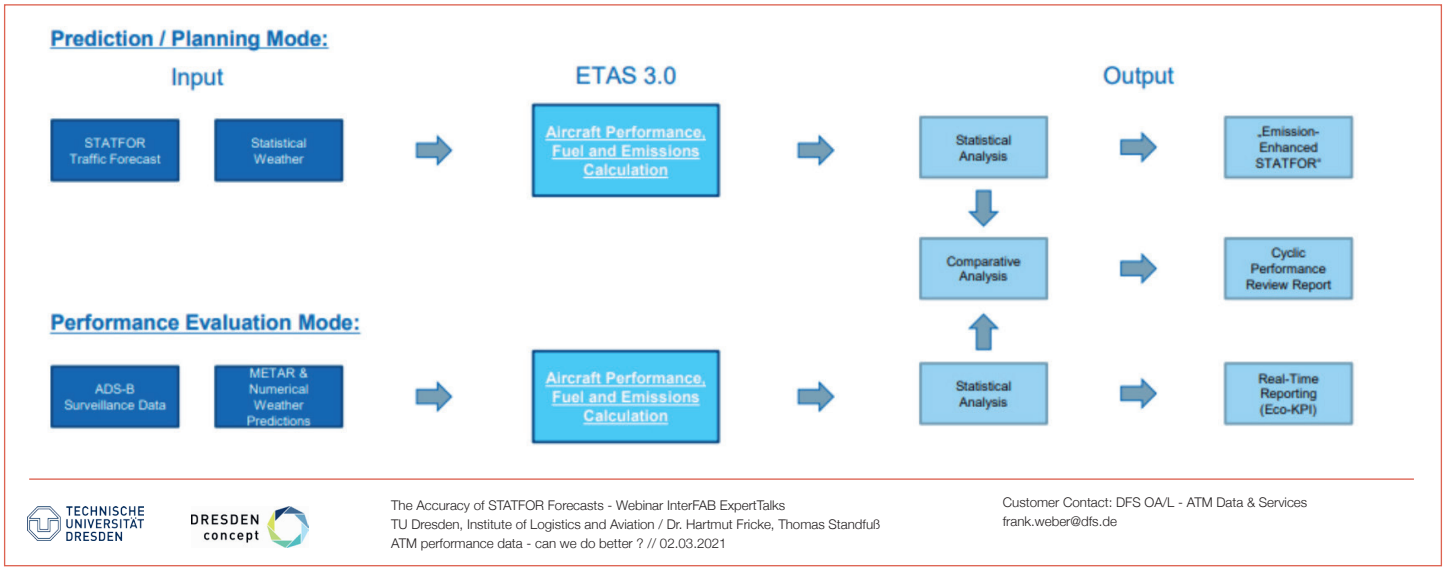
Expert **TALKS**

TUD proposes supplementing STAFOR analysis with the Mean Average Percentage Error (MAPE) statistical value used by heterogenous industries with homogenous products such as ANSPs. MAPE compares predicted values with actual values to measure the forecast bias and applies qualitative indices to assess forecast accuracy, thereby adding a further technique to the existing STATFOR scores. When TUD tested the MAPE tool on STATFOR results with some slight adjustments to allow distinguishing between over- and underestimations, the research provided more precise information, for example tracking over-estimations in demand during the period 2011-2013, and the more recent under-estimations from 2015-2918. It also found that delay increases exponentially with demand, showing a linear model to be inappropriate.

In conclusion, Prof. Fricke said STATFOR high and low scenarios have negative consequences for ANSPs with regard to resource and cost planning, however, there is an opportunity to introduce other quality indicators. MAPE is just one example of several techniques available. Looking ahead, the next decade presents many challenges as the industry recovers from the impact of COVID-19.

The performance scheme is already introducing new parameters around environmental performance and it is this focus on ecology that Prof. Fricke believes will add value to the existing airspace capacity, delay performance indicators, and, finally improved social acceptance of air transport for the decade to come. TUD proposes a fuel-consumption assessment system linked to the STATFOR forecast to allocate estimated emissions to the predicted flights (planning mode), and determined these same emissions based on real data along the performance assessment (evaluation mode). There is an example of this in Germany, where the DFS' Enhanced Trajectory Assessment System (ETAS) estimates emissions for thousands of overnight flights in German airspace since 2016 using standard aircraft track data (FANOMOS or ADS-B), weather data, and engine combinations verified against the ICAO emissions database. The result would be an enriched STATFOR forecast and performance assessment with real data such as surveillance information, emissions, staff costs and charging differences, providing a platform with strong environmental credentials for the years ahead as air traffic recovers from the pandemic.

ETAS: How to link-in ecology in the STATFOR process (2)?



InterFAB Expert Talks provide a platform where experiences can be shared and views exchanged on the key issues which relate to data and performance in ATM. **www.fabec.eu/ExpertTalks**