Bruno Santos
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Category: **Airborne**

Country: the Netherlands

Bruno Santos started researching the digitalisation of the aircraft maintenance decision processes in 2015 when contributing to the Clean Sky project AIRMES (Airline Maintenance Operations implementation of an E2E Maintenance Service Architecture and its enablers, 2015-19)

This gave him a good understanding of the current challenges and opportunities in the Aviation Maintenance, Repair and Overhaul (MRO) industry, and together with colleagues and other European partners, he created the Integrated Fleet Health Management (IFHM) solution proposed in the EU funded project ReMAP (Real-time Condition-based Maintenance for Adaptive Aircraft Maintenance Planning, 2018-22). The aim of ReMAP is to make aircraft maintenance smarter and more efficient by using operational data for health diagnostics and prognostics from different aircraft systems and structures. Dr Santos is not only the project coordinator of ReMAP, but also a researcher, continuing the work started with the AIRMES project on developing maintenance planning decision-support.

Part of ReMAP was to develop an IT platform and machine learning models. The IT platform architecture is unique, allowing airlines and other partners to share models without the data having to leave the servers of the airlines, guaranteeing cooperation between stakeholders and the confidentiality of the data. The machine learning models can detect and predict future failures for eight different aircraft systems and adaptively schedule maintenance tasks based on health predictions. Despite the low TRL expectation from the call (TRL 4-5), the platform and models were deployed and successfully tested in-service with KLM, using live operational data from 50 of their aircraft. The data from these tests were made publicly available for future research.

ReMAP has reinforced European leadership in aeronautics. The results to date, ongoing demonstration, and the IT platform architecture have attracted the attention of many key aviation stakeholders, including Airbus, Embraer SA, Delta Air Lines, American Airlines, IATA, and Collins Aerospace. It is estimated that ReMAP will have an estimated benefit to European aviation of more than 700 million euros per year due to a direct decrease in maintenance costs, reduced unscheduled aircraft maintenance events, and increased aircraft availability.

Key research themes
Condition-based maintenance; data-driven decision support; aircraft maintenance;
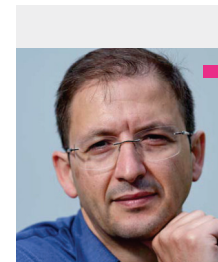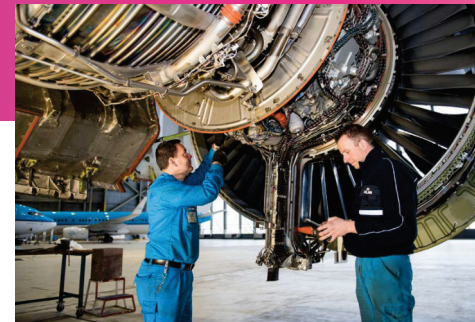
Dr Bruno Santos is an Associate Professor of Airline Operations and Aircraft Availability at the Faculty of Aerospace Engineering from the Delft University of Technology. He is also the Section Leader of the Air Transport and Operations group and is responsible for the KLM E&M Chair at his faculty. Developing digital transformative solutions for sustainable aviation operations is his main research goal.