# Initial Trajectory Information Sharing

## Informe

Información del proyecto

**PJ31 DIGITS**

Identificador del acuerdo de subvención:
731818

Sitio web del proyecto

**DOI**
10.3030/731818

Proyecto cerrado

**Fecha de la firma de la CE**
12 Octubre 2016

**Fecha de inicio**
1 Septiembre 2016

**Fecha de finalización**
31 Diciembre 2020

**Financiado con arreglo a**
SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

**Coste total**
€ 27 802 829,78

**Aportación de la UE**
€ 18 955 106,38

**Coordinado por**
AIRBUS
France

## Este proyecto figura en...


# Periodic Reporting for period 4 - PJ31 DIGITS (Initial Trajectory Information Sharing)

**Período documentado:** 2020-01-01 hasta 2020-12-31

## Resumen del contexto y de los objetivos generales del proyecto

DIGITS stands for "Demonstration of air traffic management Improvements Generated by Initial Trajectory Sharing" and contributes to reinforcing the “Enabling Aviation Infrastructure” key feature of the Single European Sky Air Traffic Management (ATM) Research (SESAR) 2020 program by assessing the benefits for ATM when the aircraft shares its complete predicted four-dimensional trajectory (3D + time), the so-called Extended Projected Profile (EPP), with Air Traffic Control services. DIGITS will also allow to fine tune the requirements for integration of EPP in ground systems and to understand the impact of flight crews’ practices on the downlinked data.
DIGITS started in September 2016 and covers the developments of Air Traffic Service Baseline 2 (ATS-B2)avionics and ANSP controller support tools for air-ground trajectory synchronization. It consists of a set of tightly coordinated development and demonstration actions by key airborne and ground stakeholders in Europe, performed in a close to operational environment and under fully representative operational conditions:
• for Maastricht Upper Area Control (MUAC), implemented in the operational system
• for the Air Navigation Service Providers of Germany (DFS), Italy (ENAV) and United Kingdom (NATS), integrated in their test platforms.

DIGITS-AU is the Airspace User complement project, with the participation of Air France, British Airways, EasyJet, Iberia, Novair and Wizz Air. It started in Jan-2018 and targets to upgrade up to 100 A320 family aircraft with enhanced communication and surveillance capability compliant with the new ATS-B2 standard through the Airbus Future Air Navigation System avionics (FANS C). By end 2019, about 5000 successful DIGITS flights were achieved involving 29 aircraft.

In the frame of DIGITS, MUAC has adapted its operational system while DFS, ENAV and NATS have built up shadow-mode system platforms capable of receiving and processing ADS-C data including EPP. These platforms will display the shared trajectory data to controllers on their working positions

and/or explore the integration of the shared data into the Flight Data Processing Systems for the enhancement of the ground Trajectory Prediction. A system at Eurocontrol Experimental Centre (EEC) collects ADS-C data (with complete EPP trajectories) for off-line data access and online distribution.

## Trabajo realizado desde el comienzo del proyecto hasta el final del período abarcado por el informe y los principales resultados hasta la fecha

Main project conclusions (extract from PJ31 Demo Report Executive Summary):

1) Ground part
Under DIGITS project, DFS, ENAV, NATS and ECTRL/DECMA developed their systems to work in a shadow mode, where partner airlines logged on to a dedicated “log-on server” at DFS, which distributes the data to the other shadow mode systems. The three ANSPs connect to the aircraft in their own airspace and ECTRL/DECMA connects to each flight as much as possible gate-to-gate.
After the airlines committed to the project, MUAC decided to evolve their SESAR1 i4D platform towards an operational platform and train a sub-set of their ATCOs to work with the downlinked data in real live operations. Technically the MUAC system is fully operational, but since only a sub-set of ATCO’s (approximately 10%) have been trained the demonstration has been labelled as “pre-operational demonstration” for which a maturity level of TRL8 could be claimed.

2) Airborne part
For the PJ31 project, fully certified equipment has been built compliant with the formally released ATS-B2 standards of March 2016.
The airborne equipment has been built by Airbus, Honeywell and Thales Avionics. The first aircraft upgraded with Honeywell FMS joined the demonstrations in April 2019 and the first upgraded with Thales FMS in October 2019. The upgraded aircraft cover both, new forward fit (in total 50 a/c) as well as retrofit (in total 41 a/c) A320 family ones.
All equipped aircraft have been participating in PJ31 with normal commercial schedules, under different meteorological conditions and behaviour and as such providing representative normal operations flight data.

4) Trial flights
The big batch of demonstrations with revenue flights started in April 2019. As from that moment, a number of aircraft have been equipped every month, resulting in a steady growth of flights per months.
The steady increase of the number of revenue flights stopped with the start of the COVID-19 pandemic in March 2020, which more or less brought the figure down to close to zero. As from June 2020 flights slowly came back and since the equipage continued during the “lockdown” hundreds of flights have been recorded every week during autumn 2020.
By the end of September 2020, in total 20.000 flights have been processed by the shadow mode systems and in parallel 11.000 flights in the pre-operational mode of MUAC.
It should be noted that the COVID pandemic had a catastrophic effect on the level of traffic from late March 2020 until picking up again beginning of July 2020. The mentioned number of flights (20

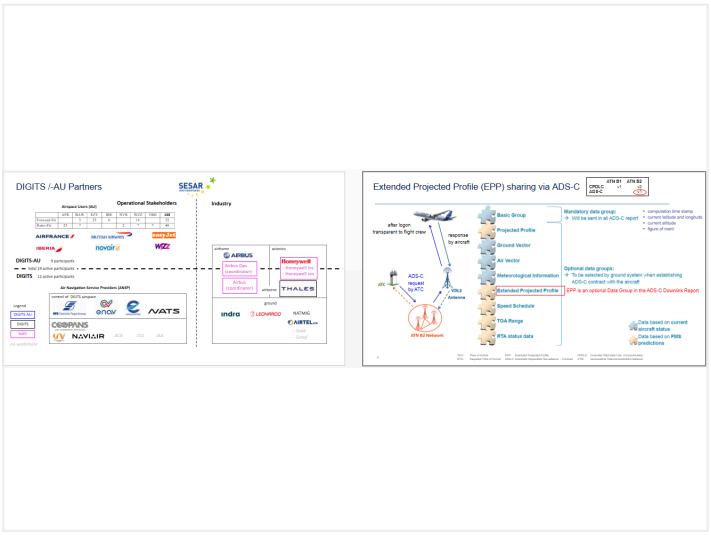
000/11 000) is the total covering pre-COVID and COVID period.

5) Results
Because of the delay in developments and certification of both the air and ground systems PJ31's deadline was extended to June 2020, which was further extended to December 2020 when the pandemic stopped more or less all flights.
At a high level it can be claimed that the standard for ATS-B2 of March 2016 is mature to deploy ATS-B2 operationally. Some proposals are under discussion, of which some ideas should be addressed within the Eurocae WG78/RTCA SC214 groups, but this discussion is ongoing within PJ31 and does not block deployment.
In general, it is concluded that the downlinked data is stable and has been used for off-line, shadow mode and pre-operational trials to demonstrate the display of the EPP on the controller's workstation, the use of the automatic discrepancy monitoring and use of e.g. the ToC/ToD to assist controllers in executing clearance instructions at a more optimal moment. Especially the EPP display and use of the discrepancy algorithm are of high interest as these two requirements are part of the latest proposed text of the new CP1 (endorsement expected by end 2020).

6) Way forward
Although the results of PJ31 can be considered as quite conclusive, it is proposed to continue with these demonstrations to bridge the gap until a wide scale European deployment under the SESAR Deployment Manager starts and evolves on the use of downlinked data. Some objectives for future work under SESAR2020 Wave 2 &3 are described in the PJ31 Demonstration Report.

## Avances que van más allá del estado de la técnica e impacto potencial esperado (incluida la repercusión socioeconómica y las implicaciones sociales más amplias del proyecto hasta la fecha)

By the end of the project, EPP data of about twenty thousand revenue flights have been collected, which are analyzed to proof the various operational benefit cases.
In parallel, other SESAR projects have been working to integrate Aircraft Trajectory Predictions data in air traffic controllers' support tools.
The overall goal is to optimize the aircraft's trajectory and make traffic flows more fluid to ultimately improve efficiency for airspace users and air navigation service providers. The project demonstrated its potential in reducing the environmental impact of ATM Operations in Europe. Further work to quantify the savings will be carried out in the frame of SESAR Albatross project in 2021 and 2022.

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