



Avionics & Operations

Demonstration of Air Traffic Management Improvements generated by initial Trajectory Sharing

Thierry Harquin – AIRBUS ATM Program
Andreas Linner - Novair

DIGITS Webinars 1st and 2nd Dec 2020

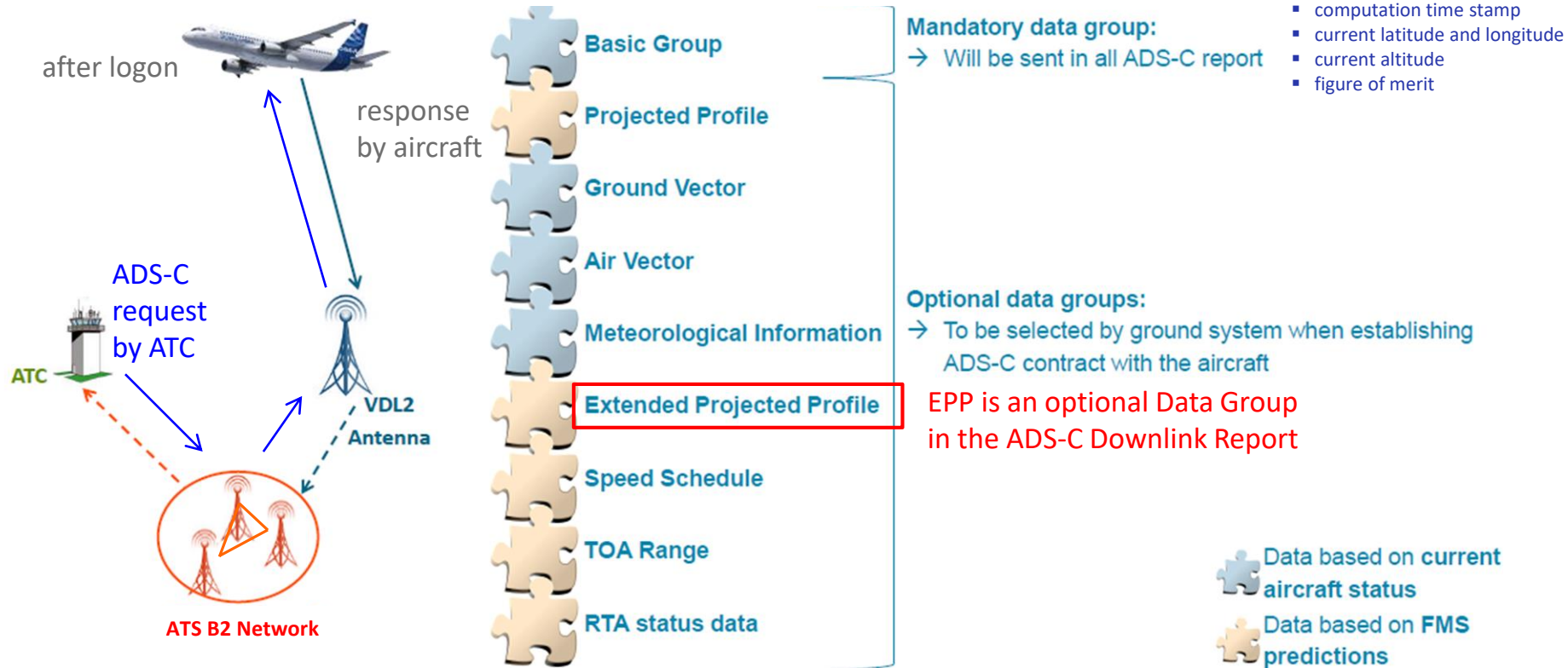


founding members



Automatic Dependent Surveillance – Contract (ADS-C)

ATS B2 – ADS-C downlink report - content



ADS-C Extended Projected Profile

DATA FOR UP TO 128 PSEUDO- / WAYPOINTS

Aircraft predictions latitude, longitude, altitude
time, speed

Waypoint	name	
	vertical type	e.g. ToC, ToD
	lateral type	e.g. start of offset
	constraint	altitude, speed, time

TRAJECTORY INTENT STATUS

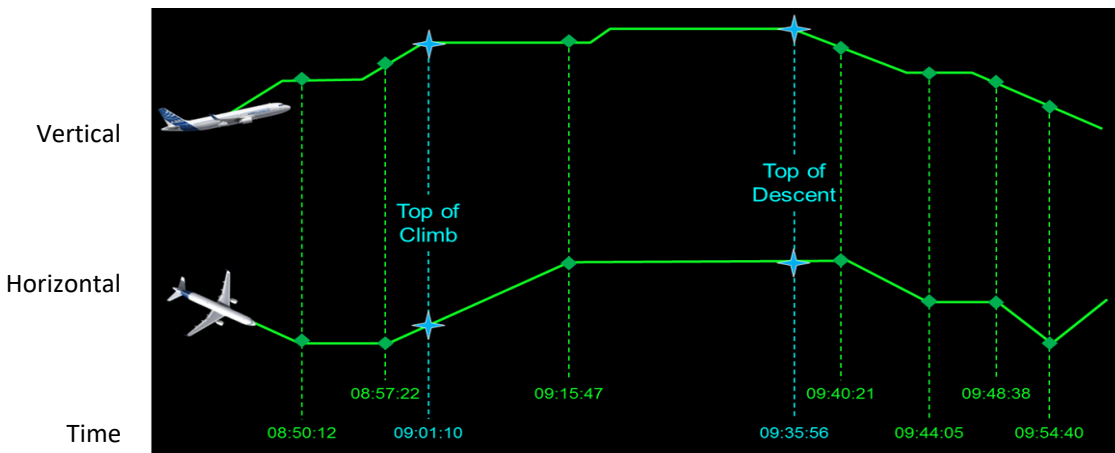
lateral flight managed
vertical flight managed
speed managed
time managed

COMPUTATION TIME STAMP

CURRENT GROSS MASS

TOC: Top of Climb
TOD: Top of Descent

4D Trajectory predicted by the Flight Management System



Downlink triggered by ATC

- periodically e.g. every 10 min
- on event e.g. if more than 30 sec late at a WPT
- on demand as needed by ATC

ADS-C EPP is part of the ATS B2 set of standards published in March-2016

Safety & Perfo Requirements Standard for Baseline 2 ATS Data Com
Interoperability Requirements Standard for Baseline 2 ATS Data Com
Interoperability FANS 1/A Accommodation
Interoperability ATN B1 Accommodation

RTCA DO-350A / EUROCAE ED-228A
RTCA DO-351A / EUROCAE ED-229A
RTCA DO-352A / EUROCAE ED-230A
RTCA DO-353A / EUROCAE ED-231A

AIRBUS Avionics upgrades – FANS C / 4D

Displays

EIS2 (S15 Software)
Display of Required
Time of Arrival (RTA)
data

Soft retrofit from EIS2

Data Link Router

ATSU (CSB9 software)
Air-ground datalink
communications
(ACARS, ATN B1, **ATS
B2**)

*Soft retrofit from
HW A10 (FANS B+)*

Flight Management System

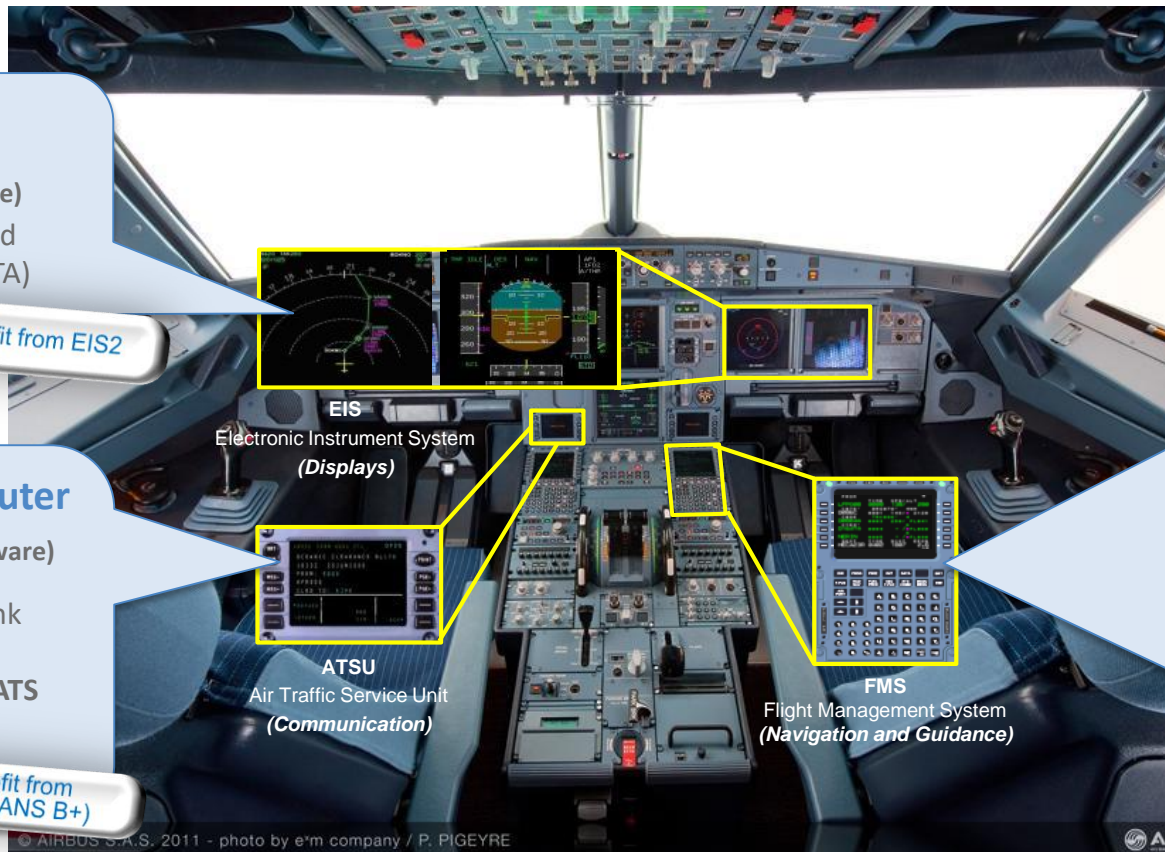
FMS (S8 Thales or
H3 Honeywell)

Computation of FPLN
predictions and
generation of ADS-C
data

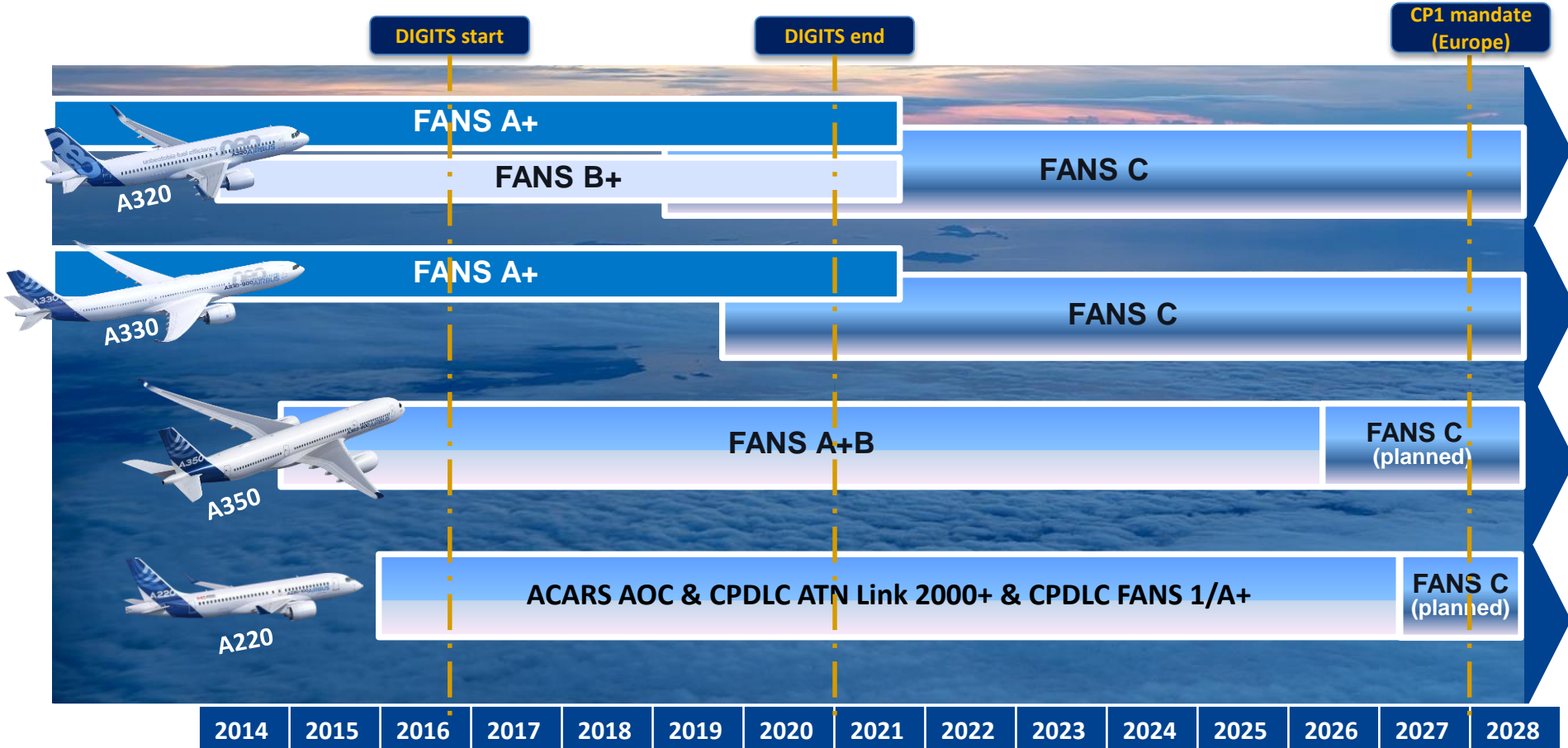
FPLN automatic loading
from CPDLC instructions

Aircraft guidance (speed
adjustments to meet
the Required Time of
Arrival (RTA))

*Soft or hard retrofit depending on
a/c configuration*



AIRBUS - FANS Dev. Roadmap (future deliveries)



Fleet upgrade - Forward-fit

Forward-fit

Relatively simple process
to manage by the airline

New aircraft delivered with
FMS2 / FANS C installed...



... however, delayed
certification lead to
unplanned retrofits of
some aircraft (e.g. BA
fleet)

Fleet upgrade – Retro-fit

Retro-fit

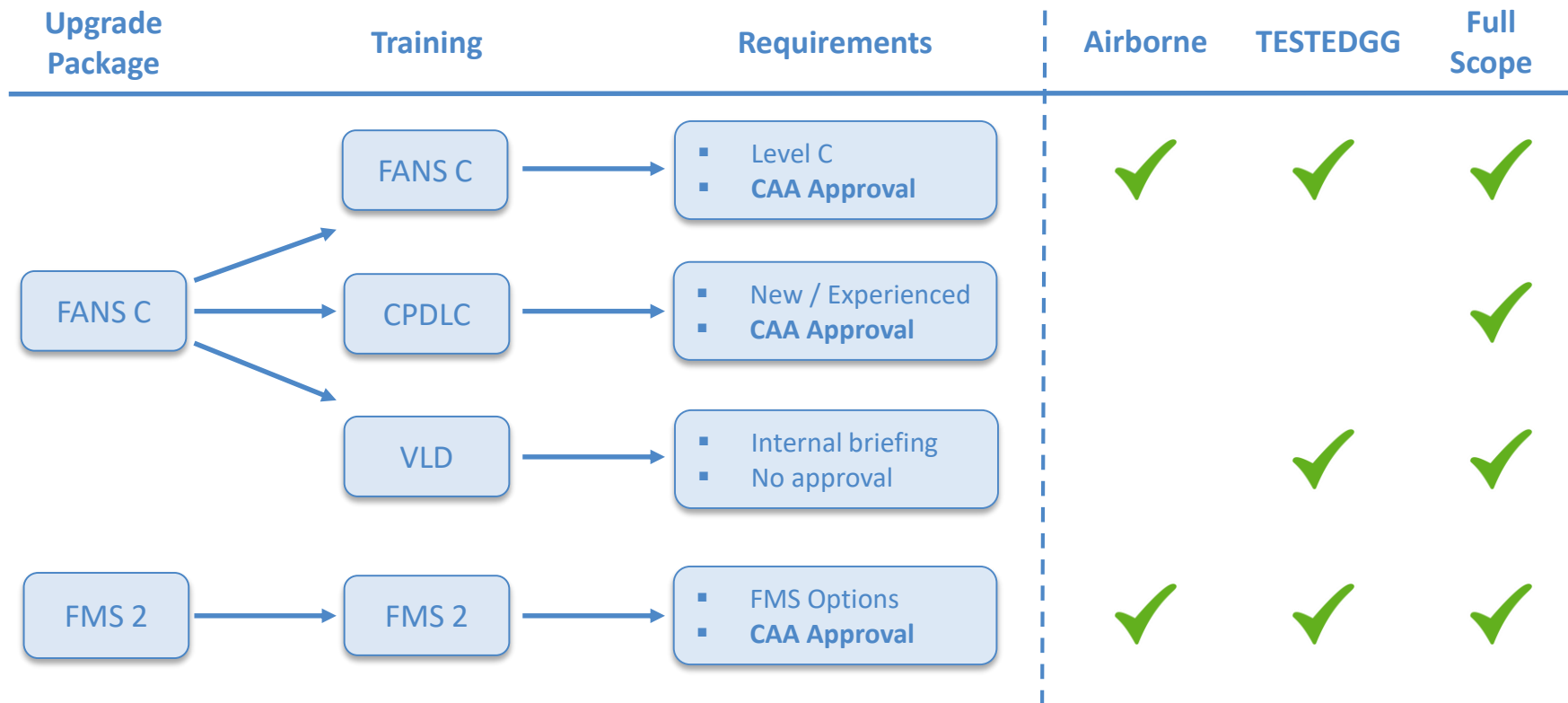
Performed by the airline during aircraft maintenance stop(s).

Planned to be part of maintenance A-check.



- Certification delays heavily impacted retrofit schedule
- Aircraft downtime longer than expected → C-check
- COVID crisis → Staff partially furloughed

Fleet upgrade – Training and approval

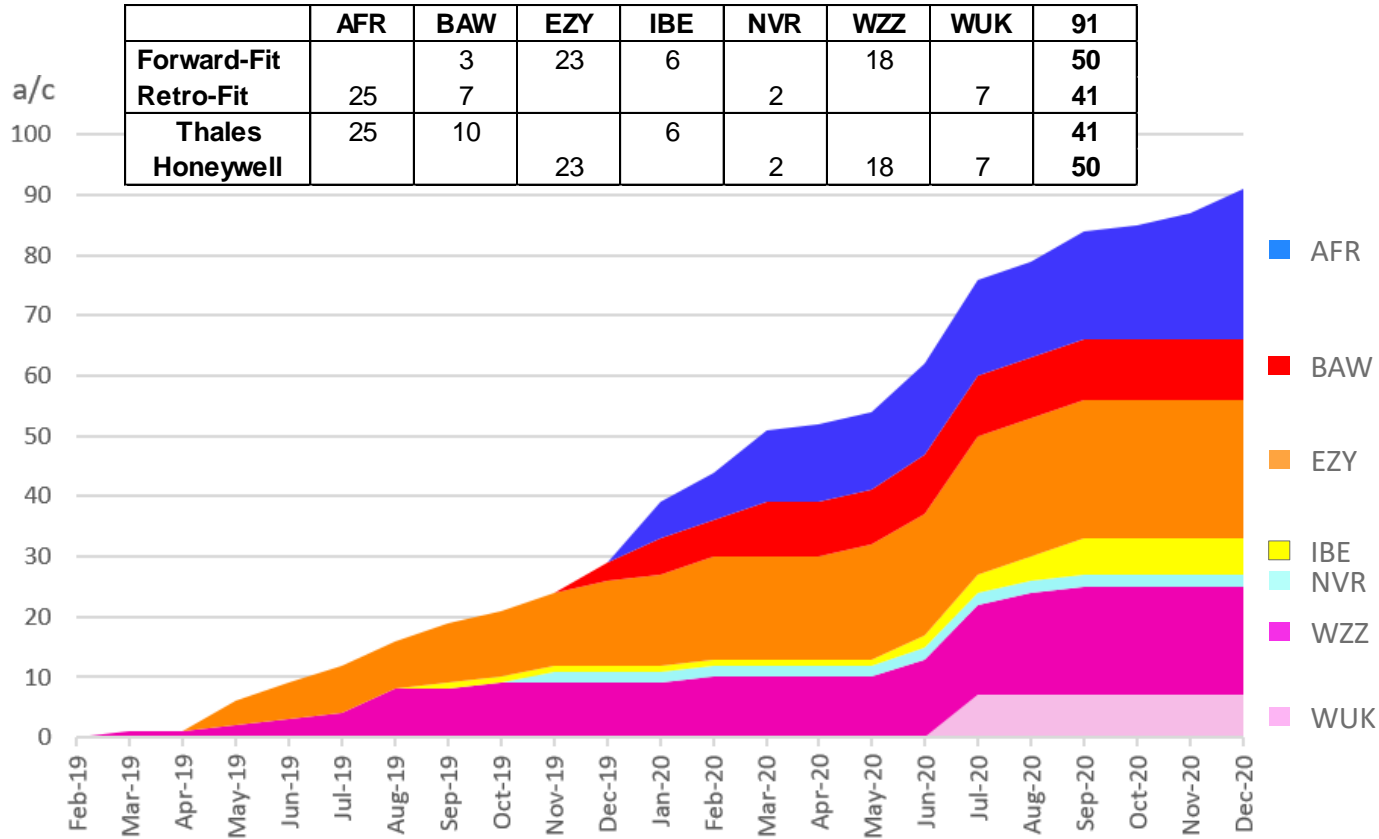


Fleet upgrade – Lessons learnt

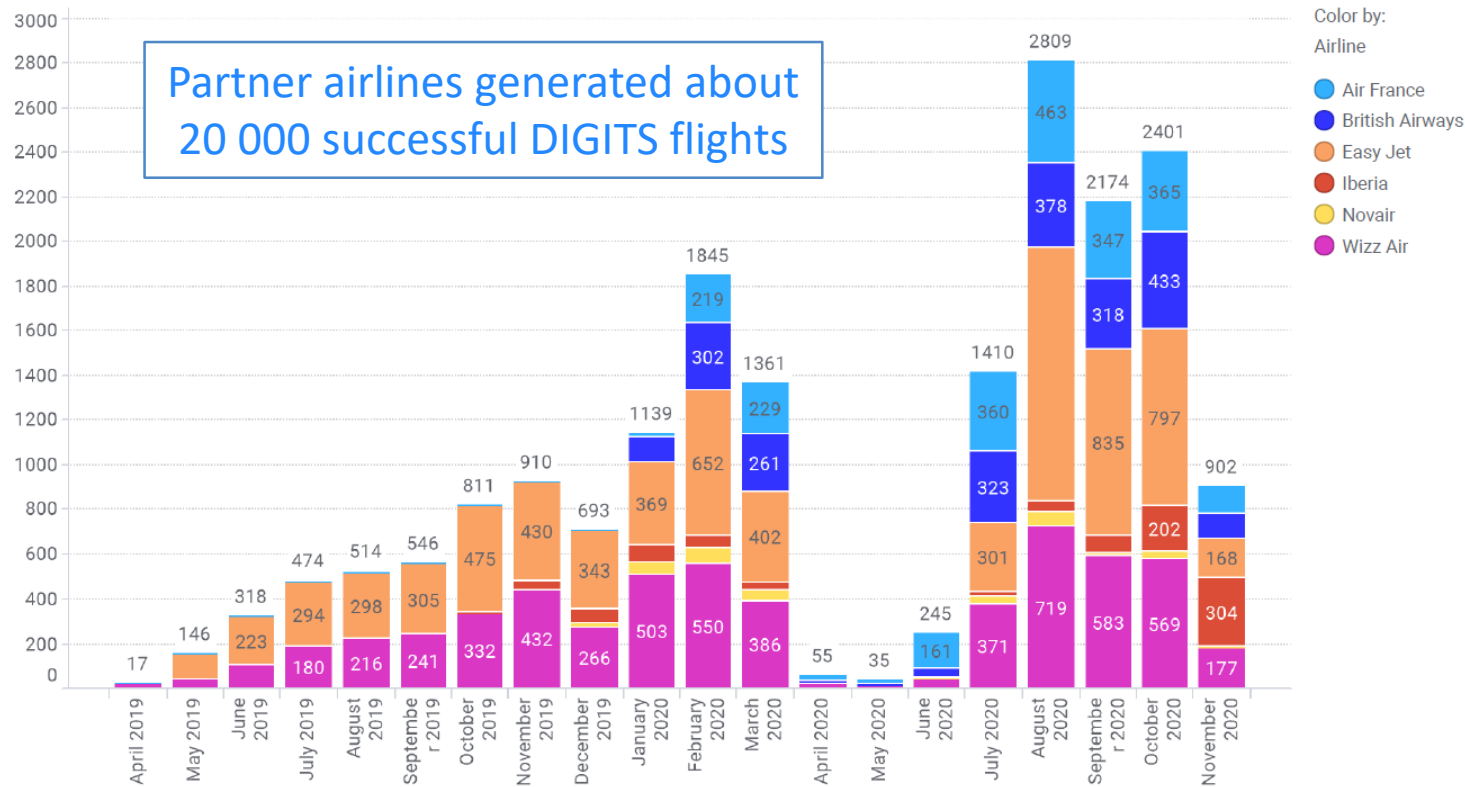
- Being pioneering airlines, cost/effort still much higher than expected
- Delays (e.g. certification) profoundly impacts overall progression
- Lack of common interpretation of regulations by national CAAs.
- Training requirements overreaching, especially for airlines with previous FANS A and/or B experience.
- **Strong recommendation** to review and relax regulations (e.g. Grandfather Rights).



Evolution of Avionics Upgrades per Airline



Evolution of DIGITS flights per Airline



Conclusion – Takeaways

- Teamwork crucial – brings success stories (e.g. Wizz Air).
- R&D essential for progression. Airline effort clearly shows commitment and willingness to be a vital part of current and future initiatives.
- Despite initial and successive challenges, airlines are pleased to conclude VLD was successfully achieved.



AIRFRANCE

BRITISH AIRWAYS

easyJet

IBERIA

novair

WIZZ

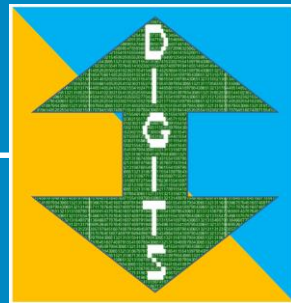
Airlines

AIRBUS

Honeywell

THALES

Airborne
Industry



Thank you very much for your attention!

ANSPs

AIRTEL^{ATN}

indra

LEONARDO

Ground
Industry

DFS Deutsche Flugsicherung

ENAV

EUROCONTROL

NATS

LFV
AIR NAVIGATION SERVICES
OF SWEDEN

NAVIAIR



founding members

