



Digital Aviation

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www.cranfield.ac.uk



FLYING TEST BED
G-BWWW

NATIONAL FLYING LABORATORY CENTRE
Cranfield UNIVERSITY
G-NFLA





AIRBUS

AIRBUS A350-1000

XWB

065

90VA DEMONSTRATOR
GL



X-48B

X-48B



Boeing Phantom Works



G-ANTON



Predictions for the Future

Air travel will be a seamless experience

Jude Schramm, CIO, GE Aviation

The amount of automation will increase

Rod Matheson, Scientific Solutions Division, Olympus

Big data will improve the airport experience

Ben Vogel, Editor, IHS Jane's Airport Review

Digital design will change how we make planes

Professor Herve Morvan, Institute for Aerospace Technology, University of Nottingham

Source: Businessinsider.com



Predictions for the Future

Digital analytics will improve airline operations

Tom Palmer, Senior Vice President of Services, Civil Aerospace, Rolls-Royce

Security processing time will shorten

Clement Cesarine, Spherea Test & Services Limited

Big data will drive smarter operations

Kevin Crowley, Vice President of Digital Aviation, Boeing

Source: [Businessinsider.com](https://www.businessinsider.com)

Drivers of change

Society	Technology	Environment	Economy	Politics
<ul style="list-style-type: none"> • Terrorism • Urbanization and the growth of megacities • Passenger identity and fraud • Global aging • Middle class growth in China and the Asia-Pacific region • New modes of consumption • Tensions between data privacy and surveillance • Global population growth driven by Asia and Africa • Shifting ethnic, political and religious identity • Disability, fitness and health 	<ul style="list-style-type: none"> • Cybersecurity • Expanding human potential • Robotics and automation • 3D Printing and new manufacturing techniques • Virtual and augmented reality • Internet(s) of Things • Alternative fuels and energy sources • New aircraft designs • Alternative modes of rapid transit • Geospatial technology 	<ul style="list-style-type: none"> • International regulation of emissions and noise pollution • Resource nationalism • Personal carbon quotas • Water and food security • Environmental activism • Extreme weather events • Rising sea levels and reclaimed habitats • Human-controlled weather • Circular economy • Infectious disease and pandemics 	<ul style="list-style-type: none"> • Global income inequality • Strength and volatility of global economy • Price of oil • Level of integration along air industry supply chain • Shift to knowledge-based economy • Privatization of infrastructure • Concentration of wealth into a "Barbell economy" • Unionization of labor and regional independence • Open data and radical transparency • Changing nature of work and competition for talent 	<ul style="list-style-type: none"> • Bribery and corruption • Geopolitical (in)stability • Government ownership of airspace and critical infrastructure • Strength of governance chain • Anti-competitive decisions • Defense priorities dominate civilian needs • Shifting borders, boundaries, and sovereignty • Increasing influence of alternative regional and global institutions • Trade protection and open borders • Rise of populist movements

Figure 2: 50 Drivers of Change for the Airline Industry



THALES PART OF NEW £65 MILLION CENTRE TO SPEARHEAD UK RESEARCH IN DIGITAL AVIATION TECHNOLOGY

| 25.07.2017 |

RESEARCH

AVIATION

AEROSPACE

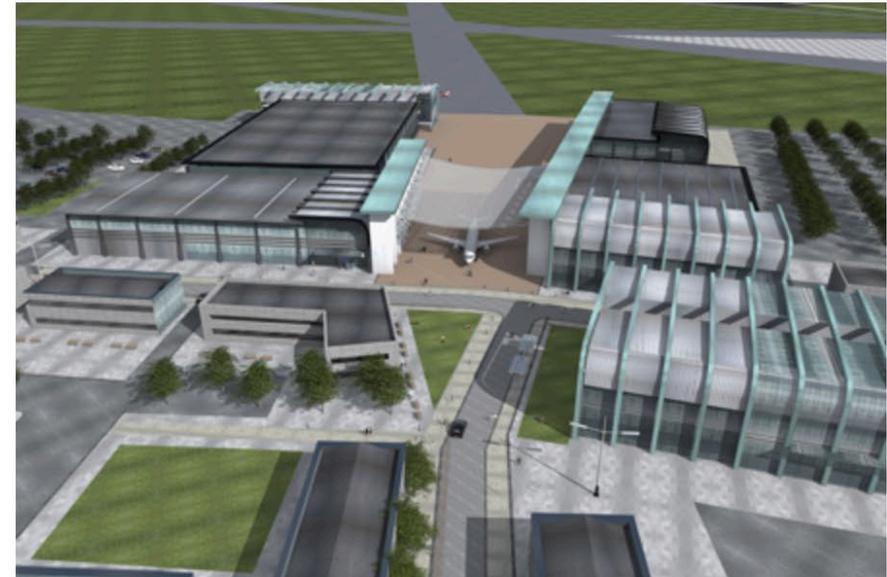
AIR TRAFFIC MANAGEMENT

DARTEC

SHARE 

Thales is a founding member of a consortium of leading aerospace and aviation companies which, with Cranfield University are creating a new £65 million Digital Aviation Research and Technology Centre (DARTEC).

DARTEC will be built at Cranfield University and will spearhead the UK's research into digital aviation technology, and will provide research facilities unprecedented in Europe.

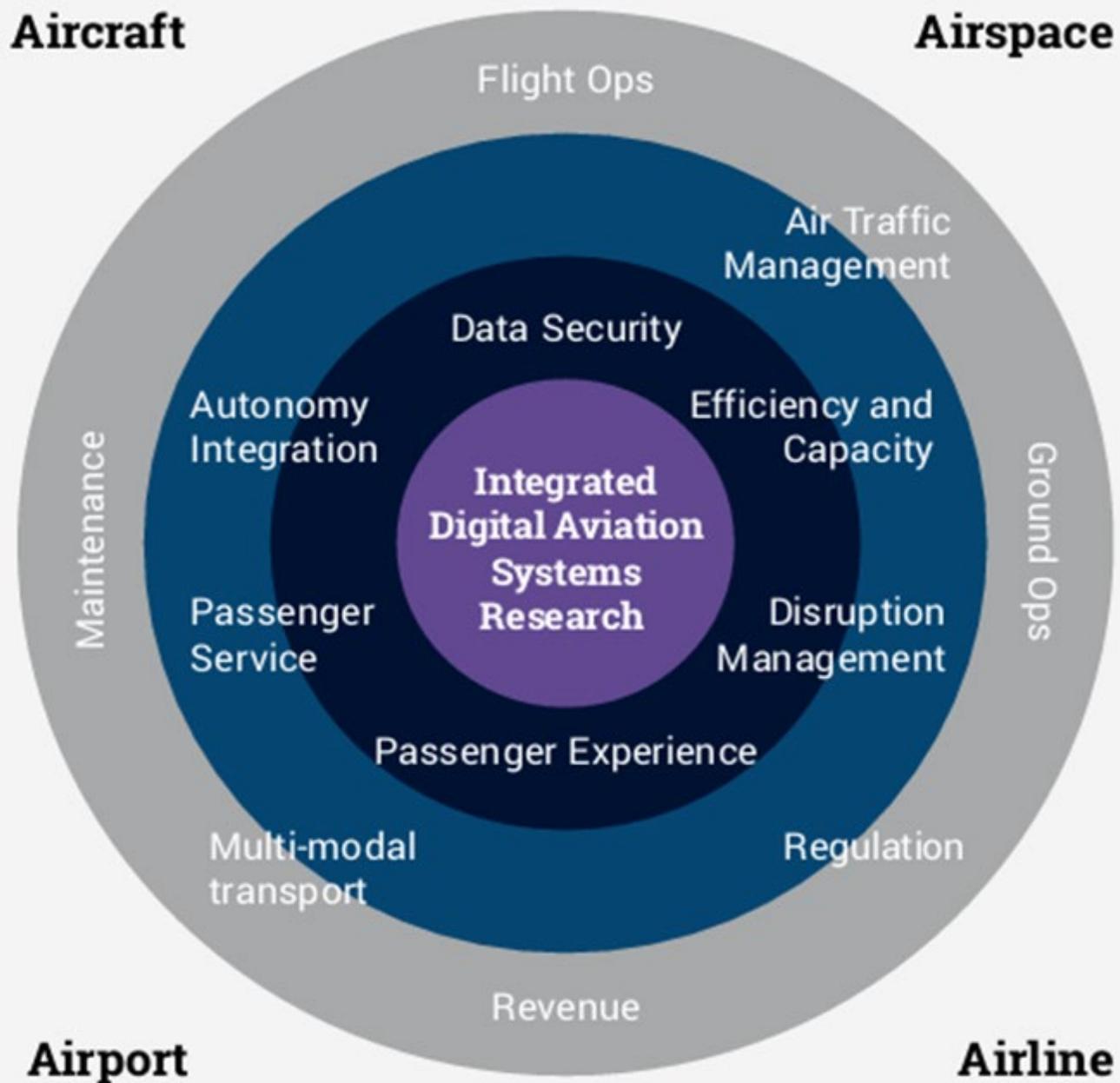


Opening Early 2020



Digital Aviation Research Technology Centre (DARTeC)

DARTeC



Ambitions – Ultra-Low Maintenance Aircraft



- Zero AOG
- Zero unscheduled maintenance
- Truly paperless
- < 50% Scheduled maintenance
(using B787/A350 datum)
- Robotic maintenance
(e.g. drone-supported maintenance)

More productive aircraft; reduced requirement for spares



The management of change

“The digital airline will enable further integration between humans and machines, leveraging artificial intelligence to streamline business operations while enabling airline operators to be more efficient, competitive and attractive to consumers.”

(Microsoft, 2016)

The implications of realising the ambition

- International standards / recommended practices
- Speed of change
- New players
- Cost model
- Attracting the right talent

Cyber-security will remain a continuous challenge



- Cyber security issues may affect:
 - Manufacturing
 - Regulatory approval
 - Provenance of spares
 - Software and updates
 - Paperless aircraft aspirations
- Use / troubleshooting must overcome:
 - Data persistence
 - Encryption
 - Anti-forensic techniques
 - Volume of recorded data



An increasingly connected ecosystem

“Opportunities in artificial intelligence will ultimately succeed or fail based on the security systems that surround them. The current state of aerospace security is appropriate for current systems. However, the increasing pervasiveness of smart devices with ‘Internet of Things’ (IoT) connectivity is already targeting hitherto everyday household items.

For example, the security provisions included for a smart kettle were commensurate with the criticality of a kettle, but the unexpected weakness became clear when they were collectively hacked and used to target another system by over-loading it with spurious messages.”

Source: Aerospace Technology Institute, 2017





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