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
### Drivers of change

<table>
<thead>
<tr>
<th>Society</th>
<th>Technology</th>
<th>Environment</th>
<th>Economy</th>
<th>Politics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrorism</td>
<td>Cybersecurity</td>
<td>International regulation of emissions and noise pollution</td>
<td>Global income inequality</td>
<td>Bribery and corruption</td>
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<td>Urbanization and the growth of megacities</td>
<td>Expanding human potential</td>
<td>Resource nationalism</td>
<td>Strength and volatility of global economy</td>
<td>Geopolitical (in)stability</td>
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<td>Passenger identity and fraud</td>
<td>Robotics and automation</td>
<td>Price of oil</td>
<td>Level of integration along air industry supply chain</td>
<td>Government ownership of airspace and critical infrastructure</td>
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<td>Global aging</td>
<td>3D Printing and new manufacturing techniques</td>
<td>Environmental activism</td>
<td>Shift to knowledge-based economy</td>
<td>Strength of governance</td>
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<tr>
<td>Middle class growth in China and the Asia-Pacific region</td>
<td>Virtual and augmented reality</td>
<td>Extreme weather events</td>
<td>Privatization of infrastructure</td>
<td>Anti-competitive decisions</td>
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<td>New modes of consumption</td>
<td>Internet(s) of Things</td>
<td>Rising sea levels and reclaimed habitats</td>
<td>Concentration of wealth into a &quot;Barbell economy&quot;</td>
<td>Defense priorities dominate civilian needs</td>
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<td>Tensions between data privacy and surveillance</td>
<td>Alternative fuels and energy sources</td>
<td>Circular economy</td>
<td>Unionization of labor and regional independence</td>
<td>Shifting borders, boundaries, and sovereignty</td>
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<tr>
<td>Shifting ethnic, political and religious identity</td>
<td>New aircraft designs</td>
<td>Infectious disease and pandemics</td>
<td>Open data and radical transparency</td>
<td>Increasing influence of alternative regional and global institutions</td>
</tr>
<tr>
<td>Disability, fitness and health</td>
<td>Alternative modes of rapid transit</td>
<td>Geospatial technology</td>
<td>Changing nature of work and competition for talent</td>
<td>Trade protection and open borders</td>
</tr>
</tbody>
</table>

**Figure 2: 50 Drivers of Change for the Airline Industry**

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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.
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
“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