

**FUTURE
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A central graphic on a dark grey background with a circuit board pattern. It features four interlocking gears (two white, one orange, one yellow) connected by thin white lines to a white airplane silhouette. Below the airplane is a yellow Wi-Fi signal symbol. The text 'ONBOARD CONNECTIVITY 2025 THINK TANK' is centered below the graphic.

**ONBOARD
CONNECTIVITY 2025
THINK TANK**



Brief:

“Harnessing the full potential of the connectivity pipeline between now and 2025”

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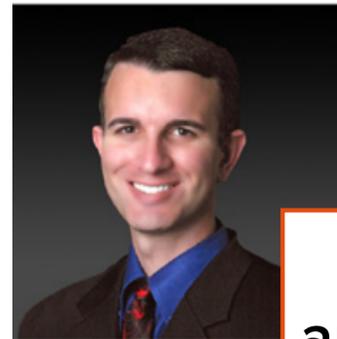
Disclaimer: The views expressed in this Think Tank are the result of ideas developed during brainstorming sessions, and do not necessarily reflect the views of the organisations these individuals represent.



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The connectivity market in 2025



- Approximately 80% of aircraft will be connectivity-enabled.
- All new aircraft will be delivered with a connectivity system installed.
- The cost of moving one megabyte of data to an aircraft will drop incrementally.
- 100+ Mbps aircraft connection speeds will be the norm.
- In-flight connectivity will move from being a “hygiene” factor to an “innovation” factor.

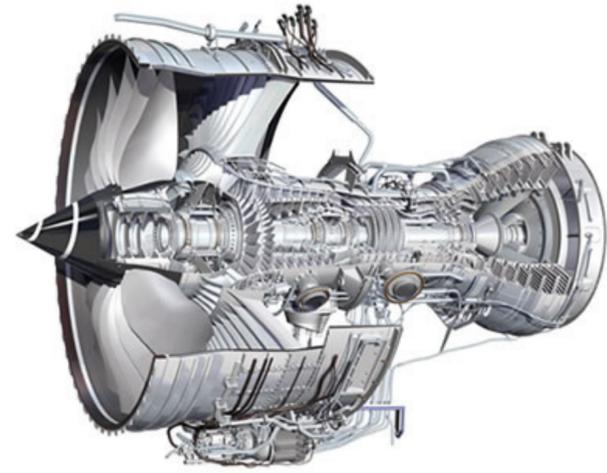
Contents:

“Harnessing the full potential of the connectivity pipeline between now and 2025”

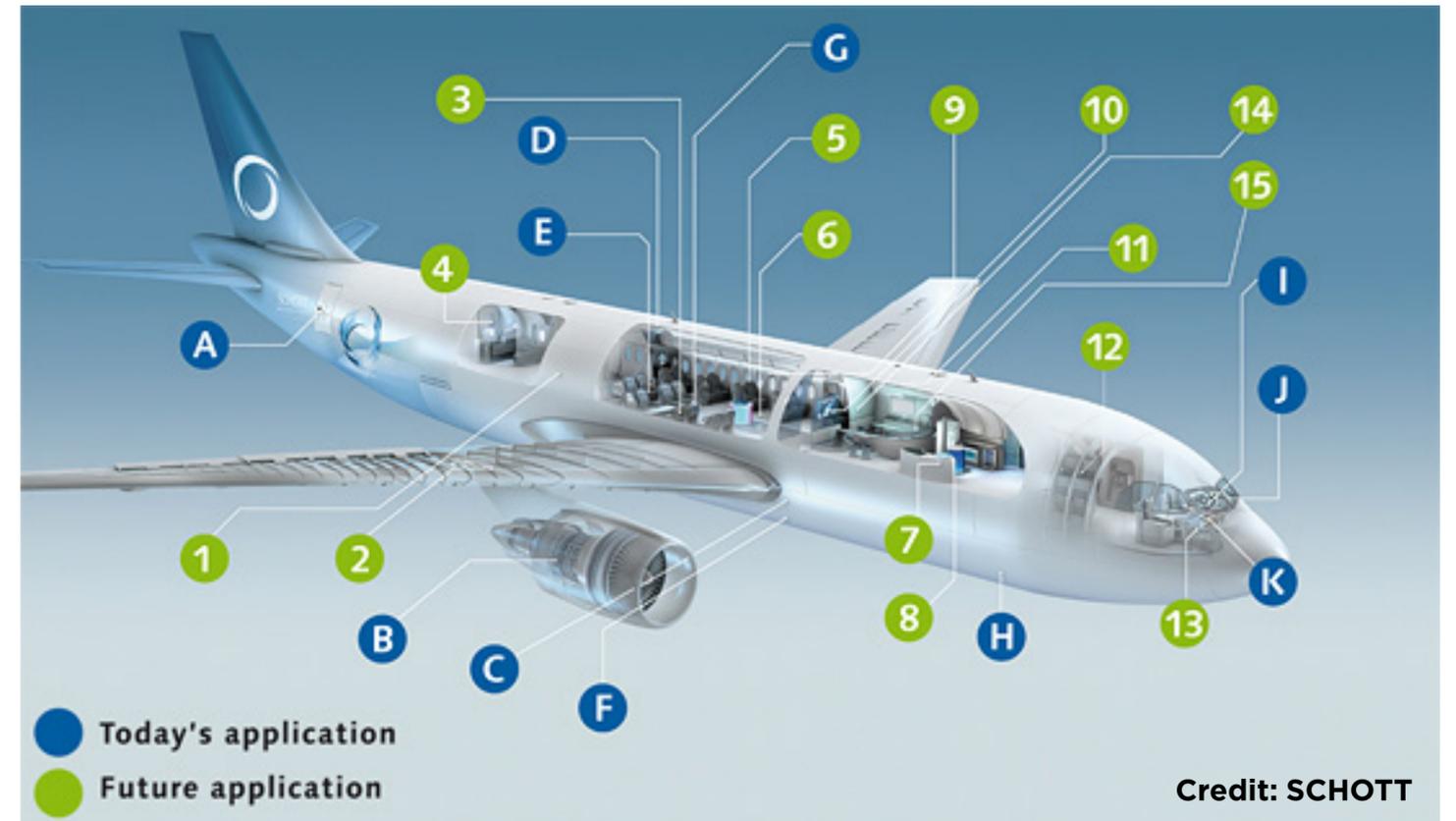
1. Operational opportunities
2. Crew empowerment opportunities
3. Passenger empowerment and personalisation opportunities
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1. Operational opportunities

The Internet of Things

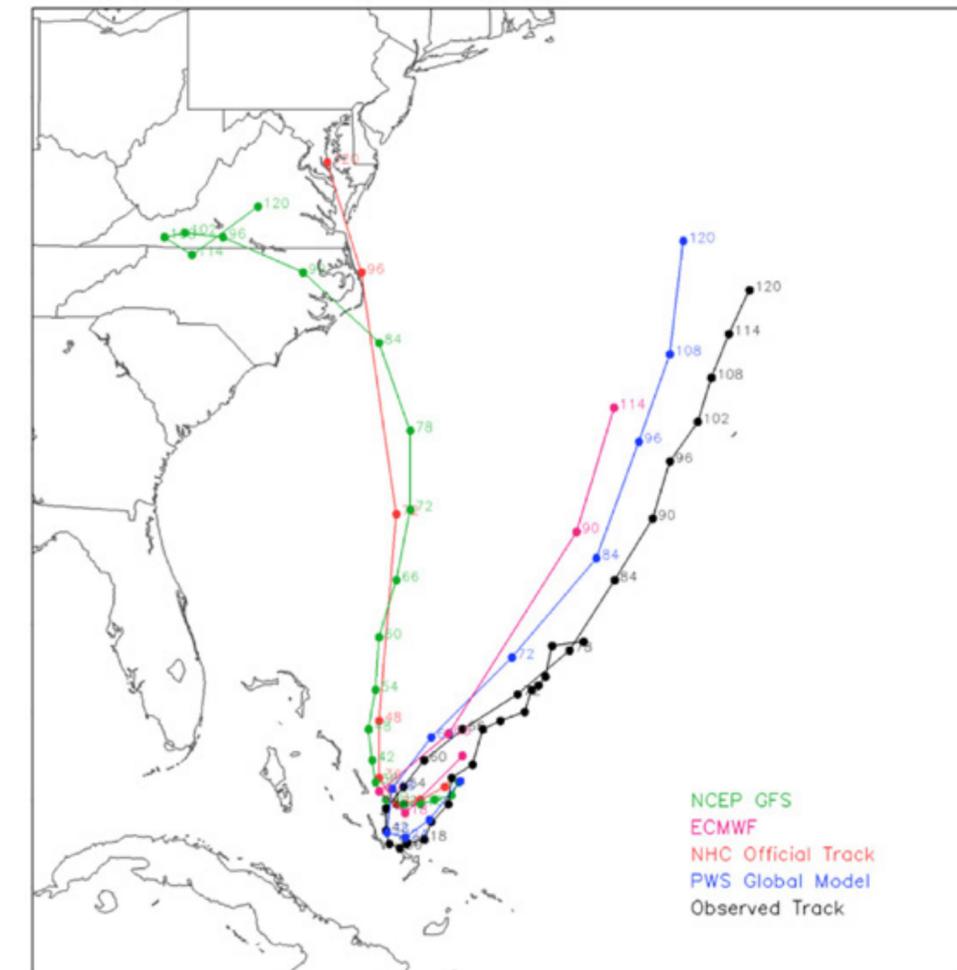
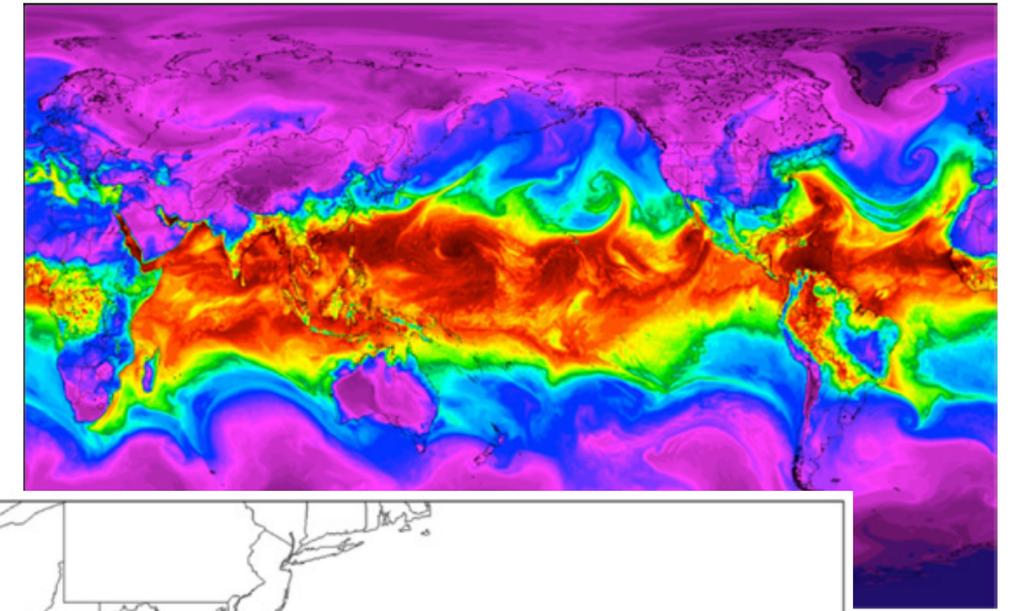


- All “things” on board will be connected and monitored – the health of everything from engine performance to the IFE system will be monitored in real-time.
- Sensors will automatically detect and report faults to alert maintenance teams on the ground (seats, IFE systems, lighting, etc.) removing the need for crew to manually report faults.



Improving efficiency

- Airlines will be able to make better use of real-time weather data to drive efficiencies.
- Weather events predicted accurately in real-time and shared between crews in-flight and on the ground will enable airlines to quickly react and immediately start to reorganise their daily operations if necessary.
- Ensuring all in-flight crew are kept updated in real time will help to remove any delays in this process.
- Access to this real-time, accurate information also creates other efficiencies, which can create valuable cost savings. E.g. more efficient ascent/descent profiles.



Irregular operations

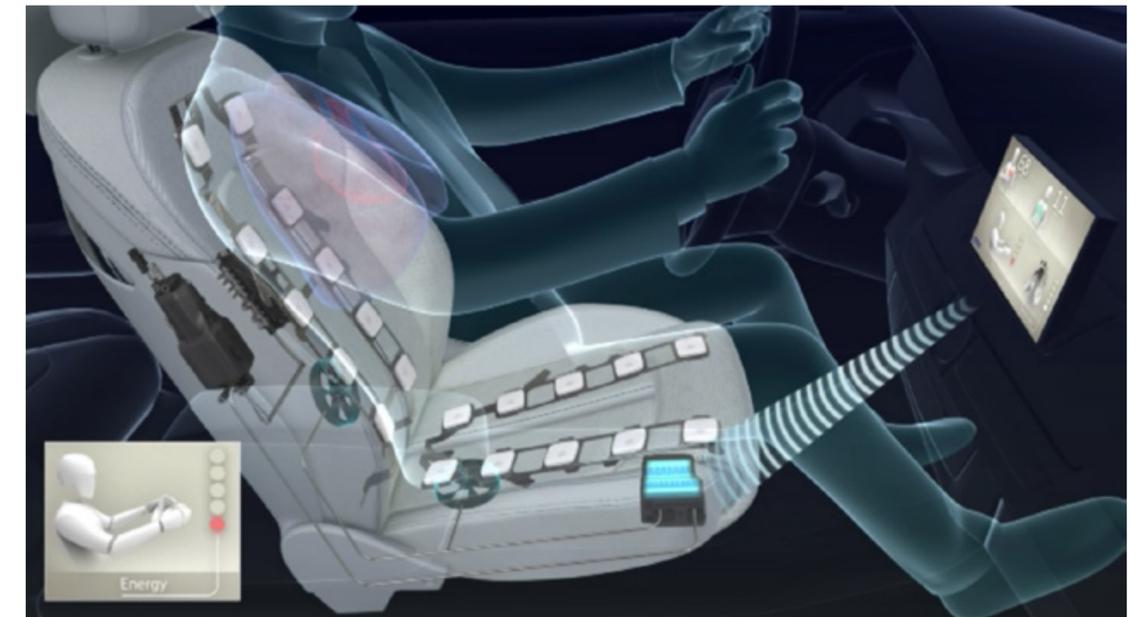
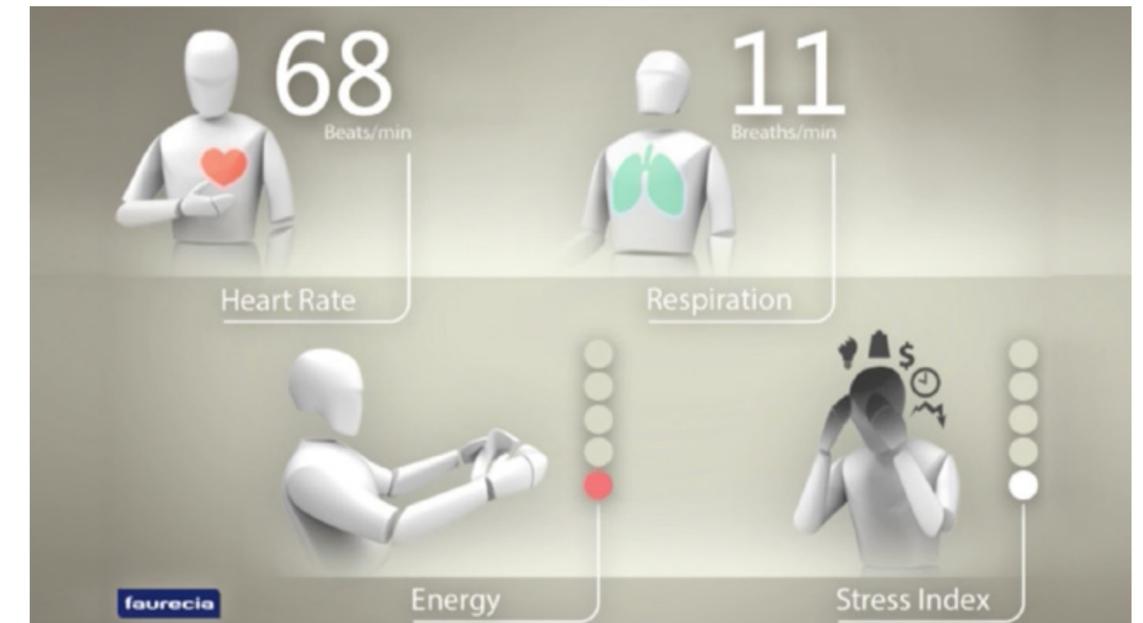
- An expanded connectivity pipeline will not only enable more information to be shared between ground and air, but will enable airlines to make far better use of it.
- Onboard connectivity will enable passengers to troubleshoot their own problems, satisfying the demand to have more control over their own experience.
- E.g. If a flight delay is going to lead to a missed connection, the passenger can use the airline's app/website on their own device to search for and book alternatives.
- Crew will be on hand as a back-up option to offer assistance to those who are either unable or unwilling to use a personal device for this task.
- This combination of technology and human touch will ensure that all passengers receive a service that meets their own needs.



2. Crew empowerment opportunities

Connected crew

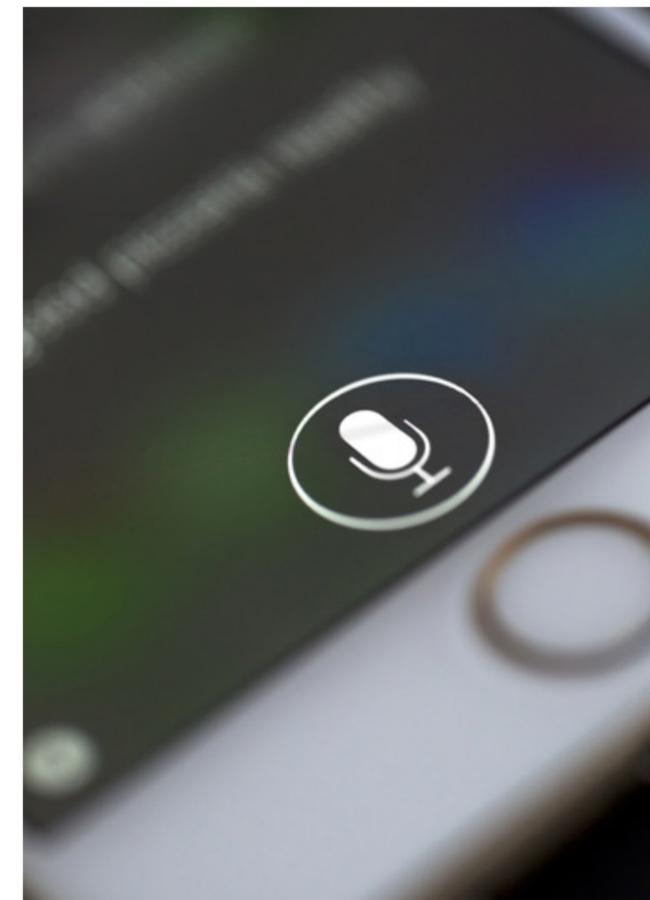
- Using their all-purpose device, crew will be able to control the cabin environment (lighting, temperature, etc.)
- Sensors in the seats will enable crew to monitor individual passenger health and wellbeing.
- Integration with wearables and apps will enable sensors to monitor passengers' temperatures, heart rate, etc.
- If a passenger is cold, crew can offer them a blanket; if the passenger is hot, they can offer them a glass of water.



3. Passenger empowerment and personalisation opportunities

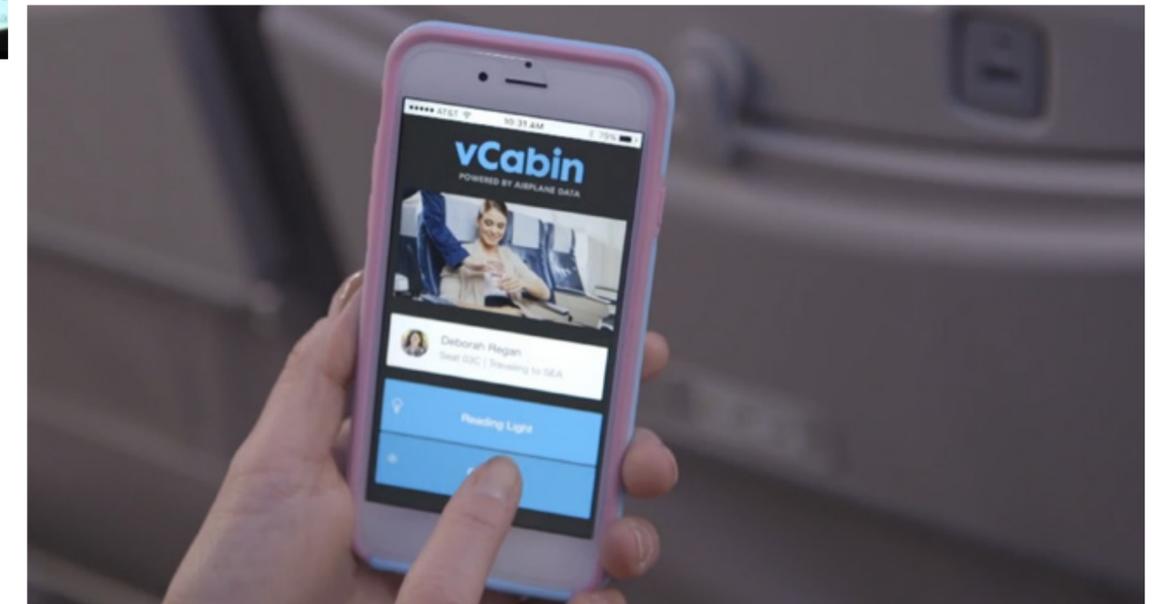
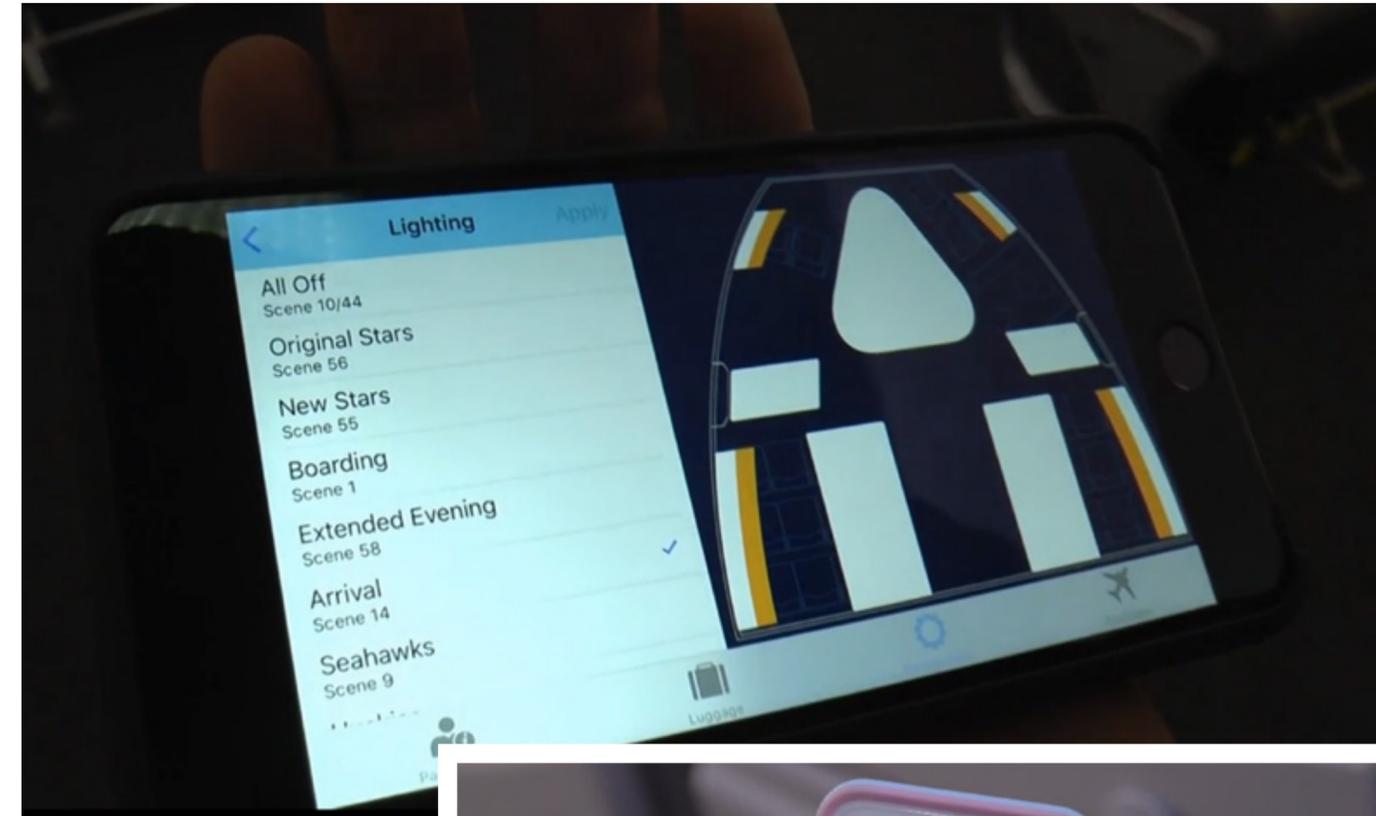
Passenger empowerment

- In addition to allowing passengers to communicate with crew via their PED, the connected aircraft will bring about a number of other benefits.
- The connected passenger is at the heart of this – more than 80% of passengers carry a smartphone today and this number will continue to rise.
- Smartphones and other personal devices are the key enablers for passenger empowerment and personalisation.



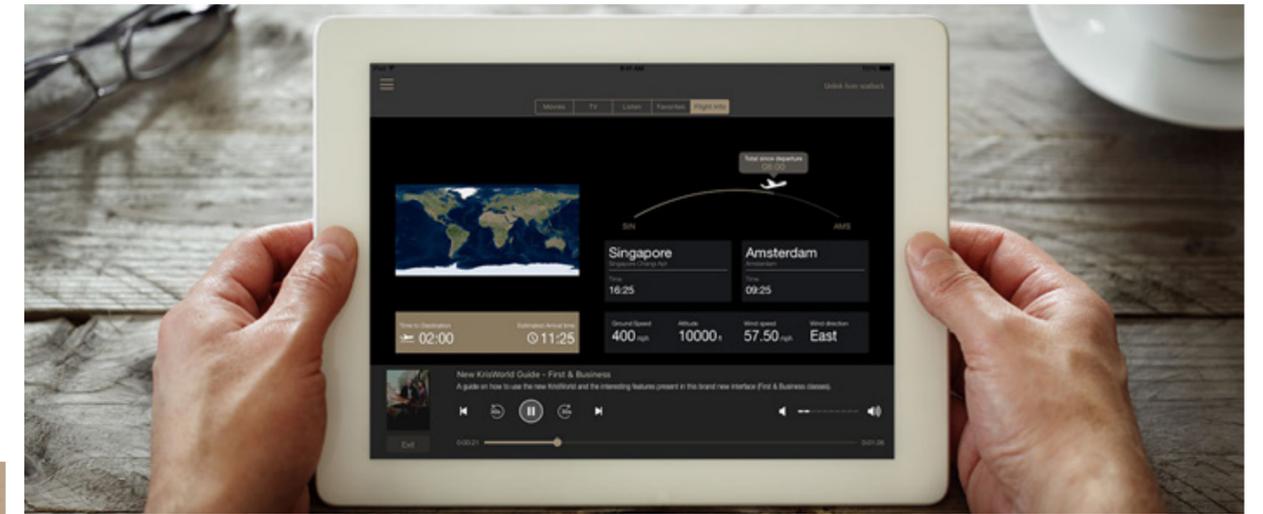
Controlling the cabin environment

- Via the connectivity network, airlines could allow passengers to control their personal environment (e.g. temperature, lighting) using their own device.
- E.g. Boeing's 'vCabin' concept - using smartphones to adjust lighting and temperature, check lavatory availability.
- If necessary, crew members will be able to override this using their own connected, all-purpose device.



IFE

- Wi-Fi based synchronisation between the smartphone and the IFE system will mean the majority of passengers will be able to preview IFE before travelling, create a playlist, and then pull up this playlist on their IFE screen after boarding (e.g. Singapore Airlines' 'Companion App').
- If the flight ends before the movie ends, smartphone/IFE synchronisation on the next flight will allow the passenger to pick up from where they left off.
- Airlines could allow passengers to request specific content via the app ahead of the flight. After boarding, smartphone/IFE synchronisation would automatically present the passenger with their requested content.
- Also, more bandwidth = on demand content as standard (Netflix, Amazon Prime, live TV, connected VR/AR, etc.)
- Airlines will have the ability to make use of real-time, data-based, customer-centric personalisation.



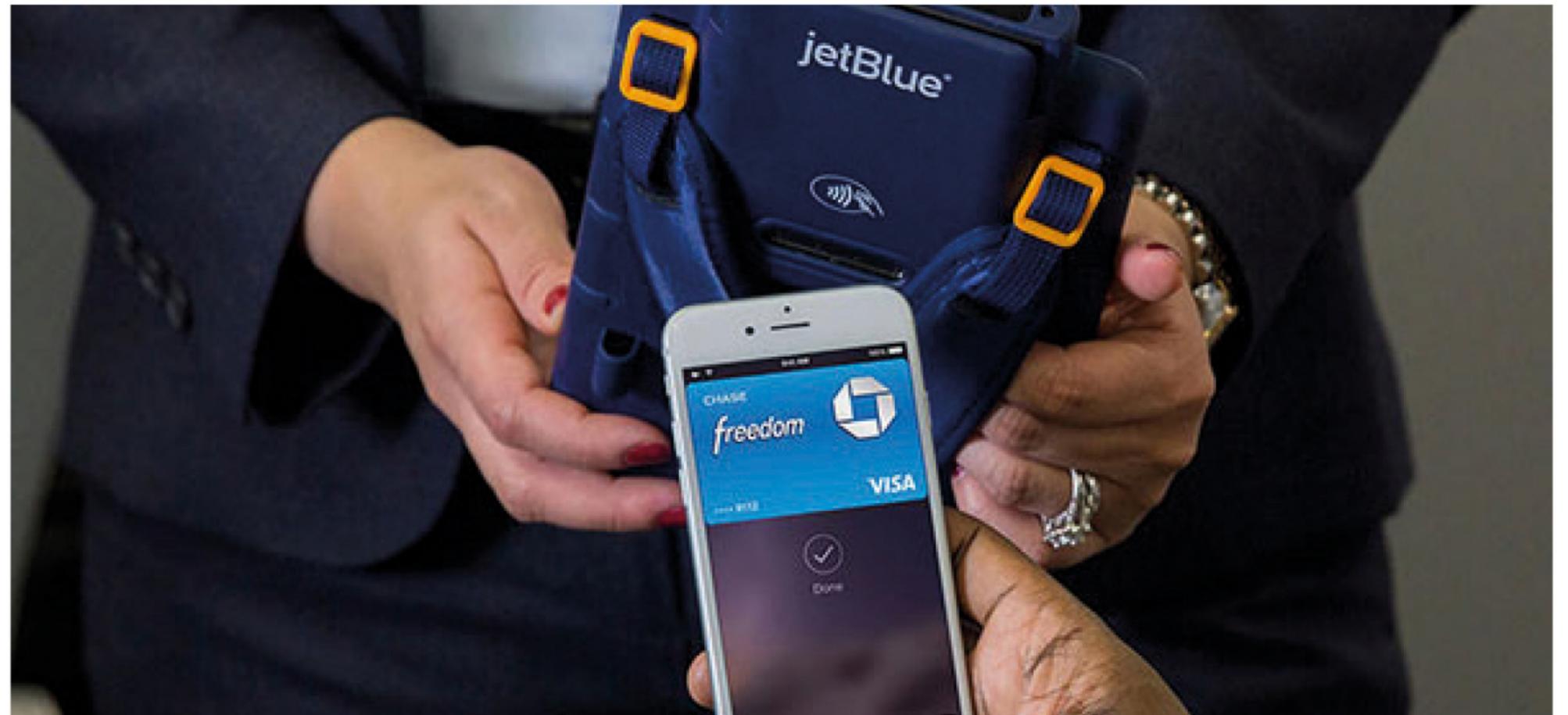
Ancillary revenues

- The emergence of the truly e-enabled aircraft should force airlines to re-think their onboard retail strategies.
- In-flight F&B, duty free, onward travel and destination activity purchases via IFE screens and PEDs will become commonplace.
- Passengers will be able to order products in-flight for delivery to the gate. Time-constrained connecting passengers will be able to order F&B for delivery to their connecting gate.



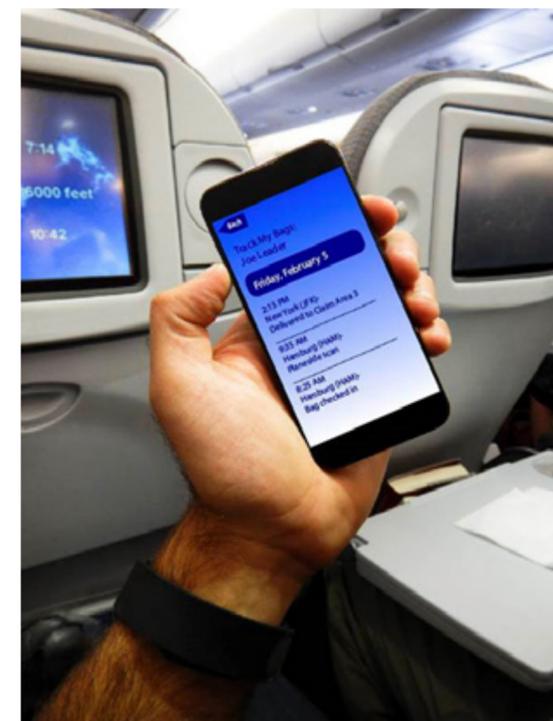
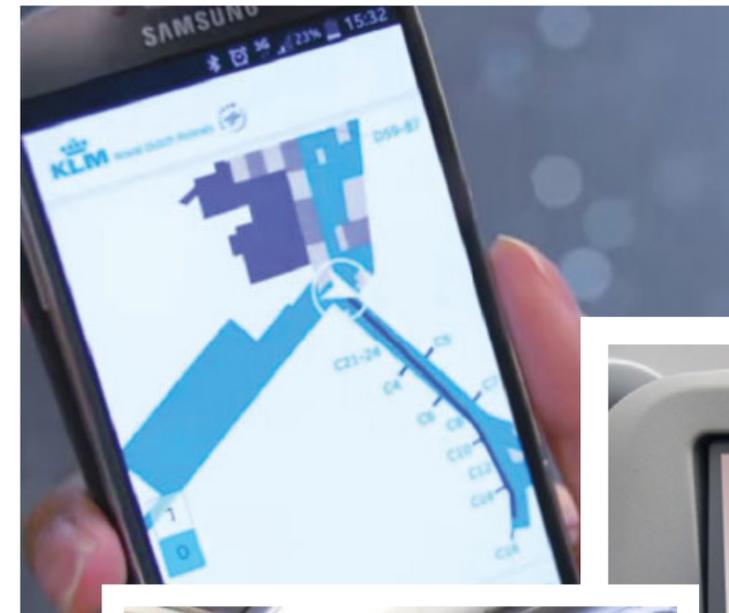
Ancillary revenues

- Passengers' digital browsing habits, both on the ground and in-flight, will enable airlines and advertisers to tailor offers based on their preferences.
- Modern payment methods (such as Apple Pay and Android Pay) will mean passengers can browse, book and pay for items in a self-service, à la carte manner.
- Crew will be automatically notified of purchases via their all-purpose device, removing the need for them to manually take orders and payment.



Simplifying the airport experience

- Delivering bespoke gate information via the IFE screen or the personal electronic device could transform the connecting experience.
- As the airline knows who is sitting in each seat, it can deliver a message to the IFE screen (or directly to the smartphone).
- E.g. “Hello Mr FTE. Here’s your connecting flight status. Here are the directions to your gate. Would you like us to transfer this information directly to your smartphone?”
- Helping more passengers make their connections will have a positive knock-on effect across airlines’ daily operations.
- More widespread implementation of tracking technologies (e.g. RFID) will enable passengers to know exactly where their checked bags are at all times. This information could be delivered via the IFE system or PEDs.





Challenges and recommendations

Challenges 1:

- Security - using wearables, sensors, PEDs, etc. creates a number of security questions. How can the industry work together to tackle these challenges?
- How can we motivate airlines to move faster in terms of adopting these technologies? Airlines often wait for others to take the first step; many are naturally cautious.
- If an airline implements these solutions to create a personalised experience, but only across 25% of the fleet, this can have a negative knock-on effect. How can we address this?
- Long lead times are an issue. Google, Facebook, etc. think six months is a long time. For airlines, a three-year lead time is not unusual. As the relationships between these technology companies and airlines/suppliers continue to evolve, how can we address this imbalance?
- When you start streaming wirelessly, you exhaust the Wi-Fi spectrum, so we need every type of spectrum available inside the cabin in order to accomplish everything we want to do.

Challenges 2:

- A lot of these opportunities require airlines to change their service profile/philosophy. How can we encourage airlines to do so?
- Cost is still an issue. How can we move all of this from being a cost for the airline, to a revenue-generating tool for them?
- Suppliers must also help to show the way by creating concepts that capture the airlines' excitement. Airlines could also be more involved in this process from an earlier stage. Are they willing to get involved?
- How can OEMs, suppliers, etc. tap into the variety of knowledge in the airline space more effectively in order to be able to make better use of feedback?

Think Tank recommendation – personalisation super-app

- Many of the passenger-focused personalisation opportunities rely on synchronisation between an app and onboard systems. However, passengers will not download a new app for every airline they fly with.
- The Think Tank recommends that airlines and suppliers collaborate on the development of a personalisation super-app, which will become the central point for the delivery of the personalised in-flight experience.
- Such an app will not only provide airlines with the most detailed view of passengers, but will remove the need for them to rely on passengers to download their own specific app to make use of all of these opportunities.

Think Tank recommendation – central data repository

- Many of the operational opportunities rely on more effective sharing and analysis of data – not just from individual airline fleets, but from all flying aircraft.
- The Think Tank recommends the development of a common, secure network architecture that wirelessly captures operational data from all aircraft to a secure central ground data repository.
- OEMs would continuously analyse the data and identify fault indicators. This would lead to increased prognostic maintenance, limiting downed aircraft for unscheduled maintenance.
- This will require a change in mindset from airlines – allowing the wider industry to benefit from their operational data, rather than keeping it guarded for their own use.

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CONNECTING AIRLINES, AIRPORTS AND VENDORS

Image credits

Slide 4: The Guardian – Interactive Flight Map

Slide 7: Rolls-Royce (Trent 1000), Panasonic Avionics Corporation, SCHOTT

Slide 8: Panasonic Avionics Corporation

Slide 9: Norwegian Air Shuttle,
Delta Air Lines

Slide 11: Panasonic, Thomson Airways,
JetBlue Airways

Slide 12: TU Delft/Flightbeat, Faurecia
(Active Wellness Seat)

Slide 14: APEX

Slide 15: Boeing (vCabin)

Slide 16: Singapore Airlines

Slide 17: Virgin America, Monarch Airlines

Slide 18: JetBlue Airways

Slide 19: KLM, APEX