

# How Intelligent Systems Will Transform the Business of Flying

Roberto Valla | Feb 8, 2022



Commercial aviation has traditionally followed the ups and downs of economic cycles. Then, overnight, the pandemic halted air traffic and disrupted operations, devastating the industry. Since then, the volatility in passenger demand, coupled with shortages of crews, has made it increasingly difficult for airlines to align their schedules and resources to match where and when customers want to fly.

The industry cannot predict the next unexpected demand upheaval, whether it turns out to be medical, geopolitical or driven by forces of nature. But the recent struggles have driven home the point that the aviation sector needs to be better prepared to respond to sudden changes in market demand. That means becoming much better at ensuring that the aircraft and crews are ready for the passengers at the right time and in the right place and can operate the planes more efficiently.

## The business case for intelligent systems

The business cycles in commercial aviation will continue to compress, creating a more urgent need for more operational efficiency. This can be achieved by empowering airlines with software-enabled intelligent systems to manage in real time which assets need to be where, and to operate the assets most efficiently.

Wind River research finds that 62% of technology leaders say that their organizations are putting into place strategies to become intelligent systems companies.

Today, many advanced technologies that could make commercial aviation more efficient and safer are being used or tested by the military. Wind River is at the forefront of software-enabled intelligent systems and delivers the highest safety standards for the space, military, and commercial sectors. As such, it is well positioned to facilitate cross-pollination of technologies among these sectors.

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## Data as fuel for more efficient aviation operations

The winning commercial operators will be those that will digitally transform to use data as fuel for efficient operations. The future of airlines' operational efficiency is in the software-enabled intelligent system of systems, powered by artificial intelligence, 5G and edge computing. Such a system

is fueled by data collected from sensors on board the planes, at the airports, at the maintenance centers and distribution warehouses. Some of the data will be processed at the edge, close to where it originates, to allow real-time localized actions.

Becoming reliable and efficient boils down to how well an airline can leverage software capabilities to extract more value from the data and to make better-informed decisions faster than competitors. An integrated operations center powered by an intelligent system of systems will be able to tie all the relevant data involved in the functioning of commercial aviation—from people to aircraft resources, to maintenance equipment, spare parts and weather conditions—and proactively manage it for optimal performance.

For instance, by having airplanes with health-monitoring sensors that can predict when certain parts are going to fail, the intelligent operations center will proactively place spare parts and mechanics with the right skill sets, to preempt any breakdowns and service interruptions.

Another efficiency improvement will be when new software capabilities are patched onto the planes' systems over the air, without having to take the aircraft out of circulation to update the software. If you have a Tesla today, you get software up-

dates in real time. In the future, software-enabled capabilities for aircraft will be able to do something similar, without compromising the safety and security that is so paramount to the industry.

## Using intelligent technologies to manage the highways in the sky

Part of today's aviation inefficiency is caused by the air traffic management system, which is based on pre-defined routes—the highways in the sky. The paths that planes follow are well defined and relatively limited, forcing the planes to stay within specific parameters, which are not always the most optimal for each flight. Intelligent technology will deconflict air traffic, open up the skies and provide the most efficient and safest route for each individual airplane.

Such enhanced traffic management systems are being tested today, but they are not yet used in commercial aviation. There exist technologies that are part of the mission critical systems on the planes and within the operations centers that can enable such air traffic management, but the industry is not there yet in terms of the regulatory environment. The aviation community has to really push the envelope in terms of testing, in order to collect enough data, so that the regulators can be convinced that the policies and procedures can be changed, allowing more efficient route planning and operations.

### Wind River Studio for Intelligent Systems

The more volatile business cycles that commercial aviation will face with increasing frequency, and the accelerated technology insertion pace required to remain competitive in the marketplace, will require greater flexibility in how software is not only developed but ultimately deployed and integrated into aircraft as well as into airline operations and maintenance centers.

Technologies such as artificial intelligence and machine learning will need to work transparently and easily with edge devices. And, because needs continuously evolve, devices will need to be easily adaptable, upgradable, and reprogrammable with new software via over-the-air updates and throughout their lifecycle.

Wind River® Studio is the first cloud-native platform for the development, deployment, operations, and servicing of mission-critical intelligent edge systems that require security, safety, and reliability. Studio has been architected to deliver digital scale across the full lifecycle through a single pane of glass to accelerate transformative business outcomes. It effectively reengineers development workflows into solution sets that reduce development costs and accelerate capabilities for building, testing, and deploying on the edge.

To learn more about Wind River® Studio, visit:  
[www.windriver.com/studio](http://www.windriver.com/studio)

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Solving the air traffic gridlocks will be crucial for entering an exciting sub-segment within commercial aviation – advanced / urban air mobility, moving people (air taxis) and cargo (air delivery of packages) in time-critical scenarios. This entire new sub-segment will require an air traffic management system that will enable air vehicles to self-deconflict, and adjust flight paths as needed, while following optimal routes for each individual air vehicle.

## Automating the cockpit and reducing pilots' workload

Ultimately, intelligent systems – which can sense, infer, learn, act, and adapt – will unlock the new machine economy across all industries.

Greater automation of the cockpit, enabled by the software-led intelligent systems, can reduce the pilot workload. Commercial flights require at least two pilots, who share tasks such as controlling the aircraft itself, voice communications with the air traffic management systems and running the checklists, which have to be done prior to departure, throughout the flight and upon landing. Some of these tasks, especially the voice communications and the checklists, can be automated and performed by intelligent systems with a higher degree of reliability than a human.

In time, the automation of the cockpit can lead to reducing the number of pilots per flight. There is a high degree of automation that is used and being tested by the military, which can perform missions without pilots. On the commercial side, more automated cockpits may one day lead to reducing the number of pilots, starting on freight flights carrying cargo. Advanced / Urban Air Mobility companies are likely to take a page from uncrewed military systems and deliver goods such as medicines to remote areas via autonomous vehicles.

Ultimately, intelligent systems – which can sense, infer, learn, act and adapt – will unlock the new machine economy across all industries. The aerospace & defense sector, to include commercial aviation, is recognizing the significance of this trend and investing in new capabilities to accelerate its own digital transformation journey and deliver a better travel experience for all.