

Digitalization, AI in Aviation and the Human Factor

Presented by A4A

[Introduction]

Digitalization has drastically changed the way humans live and has affected every aspect of our life, our work, the way we travel and do business. Digitalization and AI is influencing almost every aspect of business as we transition to a smarter and more connected world.

Profound changes through digitalization in aviation present both opportunities for growth, cost reduction and greater productivity and at the same time difficulties since the industry needs to adapt quickly to these rapid and complex changes.

There are huge implications for the operating model of organizations working in aviation, with massive impact as consumer behaviours evolve to include digital and physical interactions and engage in greater sharing of personal data.

It is crucial that the aviation industry proactively embraces digitalization and AI in a way that ensures continued safety, security and sustainability with the right digital strategy.

1. What changes are needed to ensure that aviation proactively embraces digitalization and AI in a way that ensures continued safety, security and sustainability? Are current arrangements with ICAO (regulations, standards, etc) adequate or is there a need for more explicit leadership in aviation and, if so, by whom?

Digital disruption can drive change in the aviation industry overnight. Our companies must make digital investments wisely and cautiously build long term digital strategies.

Digitalization and advances in AI are reshaping the future of the aviation industry, developing new business models, innovative technologies, processes and practices for better customer experience, revenue management, predictive maintenance and flight scheduling.

Currently, there is no one definition for artificial intelligence. In the context of this paper, AI will be referred to as the wider variety of functionalities and technologies which help machines to simply and efficiently perform tasks. Depending on the level of autonomy of AI, this technology can generate data from different systems to enable them to respond proactively to their environment.

AI and digitalization should be regarded as a prerequisite to solving the problems posed by the increasingly growing demand for air travel, and the need to meet evolving consumer expectation. Many aspects of the airline industry will benefit from AI and digital technologies to realise greater efficiency. The desirable goal will be to simplify tasks, improve efficiency, develop new services and opportunity's and manage this transition without increasing resources

AI maintenance, if implemented properly, can result in cost savings and assist in the prediction of failures before they occur. Flight maintenance is another aspect to consider for safety and economic reasons, as unplanned aircraft maintenance is a direct cause for delays or cancelation.

AI can help airlines achieve greater profitability with their **ticketing systems**, calculating the most efficient prices for each flight and provide competitive pricing for customers.

Airlines continue to seek ways to offer better customer experience. Digitalization and AI open up opportunities to adopt new technologies in **passenger identification, self-service bag drop machines**, automated **customer service**, and simplified communication between a pilot and air traffic controller.

Changes are needed to realise these opportunities. Concrete actions are coming out from industry, regulators and policy makers. adapting legacy systems into agile and interoperable platforms. The current arrangements with International Civil Aviation Organization (ICAO) are an important initiative, but it takes around two years for an initial proposal for a new or improved Standard, Recommended Practice or procedure to be formally adopted or approved. With a growing demand for travel and the rise of the digital consumer, successful digital transformation requires strong leadership, investments from organisations, evolution of corporate culture and positive communication towards adoption and acceptance.

A key challenge remains the issue of privacy and the goal of working with the data of our customers in a way that is secure and respectful. Data is the essence that drives Digitalization and AI, and the trust of the consumer to provide their data is a critical element in any system. Multi-stakeholder approaches among private, public and civil society organizations to define regulatory frameworks for appropriate uses of data are therefore important.

2. What policies and regulations need to be instituted, altered or removed to ensure successful implementation of digitalization and AI in aviation? Is a performance-based approach to human involvement and to regulation sufficient or is there a need to be more prescriptive on when human involvement and management is essential?

AI drives efficiency improvements either by disrupting how certain tasks are performed or by doing it faster than previous methods, resulting in lower resource required and increased efficiency.

AI and digitalization are great opportunities for the aviation sector to realise advances in increased safety, efficiency and capacity. New technologies will contribute to the future of aviation and will redefine the core competencies of the Next Generation of Aviation Professionals.

To allow for the development of AI and digitalization and to benefit from these technologies, ICAO, States and Industry must work together to update existing and create new standards where necessary. Data sharing between all stakeholders in a trusted environment will be essential to the success of AI and should be supported by the development of open standards and a secure environment.

Nonetheless, additional regulations in this sector should be limited. Efforts should be rather centred on data sharing initiatives to allow efficiency gains in the industry. Trust is a key enabler for data sharing between stakeholders across borders. A flexible and scalable framework that ensures intellectual property and cybersecurity will need to be developed to prevent any potential obstacle in the flow of data.

Although innovation now plays a substantial role in discussions at the international level via ICAO, the latter will have to find a regulatory framework that can support innovation while regulating new entrants. A framework that enables this regulatory balance has already been initiated in the field of digitalization and aviation safety. The ICAO Global Aviation Security Plan (GASP) has outlined key priority areas to facilitate digitalization, such as flight tracking and unmanned aircraft systems.

3. Digitalization and AI will reduce the cognitive load on humans but will also have a significant impact on the need for human time and resources. How can aviation best anticipate and manage that impact? What changes are needed to recruitment, management, retention and retraining practices to ensure adequate and appropriate human resources that thrive in the aviation workplace?

By 2037, the air transport industry is forecasted to carry 8.2 billion passengers¹ (IATA, October 2018). To meet this growing demand for air travel, it is estimated that 94% of commercial aircraft will need to be equipped with advanced digital technologies. This digital revolution implies increased efforts in terms of R&D and innovation.

It's a new world that needs to meet the global demand for qualified and competent aviation personnel. In order to fly and maintain fleets, the airline industry will need to hire 804,000 pilots over the next twenty years, as well as 914,000 cabin crew and 769,000 new maintenance technicians (Boeing, 2019)². However, by simplifying tasks through AI, labour resources can be reduced as well as associated costs, such as crew wages and pensions.

However, the development of unmanned drones and UAVs may represent an opportunity to alleviate the strain from the global shortage of pilots. Moreover, this solution could save associated costs, such as crew wages and accommodation costs.

This progress is also challenging businesses in fundamental ways. The workforce of the future will require a new set of skills and knowledge. Skills mismatch on a global scale will impact millions of jobs. People need to better understand technology, upskill, understand and manage artificial intelligence and merging autonomous vehicles that will be created in the digital age. Digitalization and AI will reduce the cognitive load on humans but will require learning how to think, act and thrive in a digital world.

Digitalization and AI will deeply impact the competencies, set of skills and the abilities needed for future operations and performance by aviation professionals. The best way to approach this trend is to anticipate the required actions for transitioning to new ways of working and thriving in a digital aviation workplace. These changes are going to be needed in recruitment, management, retention and retraining practices.

Beyond recruiting technology driven professionals, the aviation industry will have to reinvent its entire work organization/strategy to better incorporate AI technologies. In this context, employees will have to constantly improve their analytical skills.

A new division of work will have to be developed in order to optimally and ethically allocate tasks between technologies and human resources. The current organizational structure may be increased by communities of interest. Workers will need to develop both AI operational skills and interpersonal skills.

At the industry level, the acceleration of data usage will imply that the decision making-process will have to be accelerated. To support this technological transition, all levels of decision-making in the industry will have to accept the role of AI while giving some meaning to activities that will be renewed at the rate of tool updates.

¹ IATA, "[IATA Forecast Predicts 8.2 billion Air Travelers in 2037](#)", 24 October 2018.

² Boeing, [Pilot & Technician Outlook 2019-2038](#), 2019.

Ignorance of AI or of their evolution will limit business strategies in the industry. People need to be open to learn new skills as automation will significantly change or make their jobs obsolete. Companies need to approach training of employees as an investment strategy.

In the medium term, soft skills rather than technical skills will become critical to the industry. Team management, creativity and emotional intelligence will be the most desired qualities for aviation professionals in the next ten years.

At the political level, new functions and services induced by AI technologies combined to digitalization waves will only be possible if collaboration is fostered between industries and ICAO States. This cooperative effort will permit us to establish the adequate frameworks for operations, data sharing, training, certifications and qualifications.

Similarly to the ICAO TRAINAIR Plus programme, regional and international regulatory aviation agencies will be pressured to create some data-driven programmes to enhance the knowledge of aviation professionals in the field.

This is a very important step, since several reports forecast the transport sector to lag behind many other sectors in terms of adoption and exploitation of AI technologies.

In conclusion, digitalization and AI will undoubtedly have a significant impact on the entire aviation value chain over the next 10 years. How governments, organizations, businesses and individuals involved in the sector adapt to these changes will dictate their success or lack thereof. What is certain is that this profound change will reach into every aspect of how the airline industry operates, how travellers interact with the industry and how the industry is governed. This will require diligence, a willingness to adapt established processes to take advantage of more efficient possibilities and ensure that the workforce we depend upon today is trained in the requisite skills to overcome the challenges of tomorrow.

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