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DIGITALISATION

Shaping Aviation's Future



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Publication Director
Salvatore Sciacchitano

Editorial Committee
Salvatore Sciacchitano, Patricia
Reverdy, Gabrielle Hubler

Editor
Gabrielle Hubler
ghubler@ecac-ceac.org

Designer
Bernard Artal Graphisme
Cover: © kwanchaift - Fotolia.com
Ph: © CEAC

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and content ideas from interested
parties.

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requests should be made to
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Digitalisation, an essential driver of change in aviation

Salvatore Sciacchitano
Executive Secretary of ECAC



The progress of digitalisation is already showing its tremendous impact on civil aviation today. Our sector, while being one of the most advanced in the process, is yet to face further developments resulting from this deep transformation. New technologies are crafting new opportunities for all those involved in air travel but also creating new challenges that must be understood. Operators, as well as regulators, all need to keep pace with the fast transformation driven by innovation and digitalisation.

A first glance at the matter already demonstrates the complexity of the topic. Terms such as ‘digitisation’, ‘digitalisation’ (a two-letter difference!) and ‘digital transformation’ are often confused. Let me set the scene.

‘Digitisation’ is the process of converting information into a digital (i.e. computer-readable) format which can then be used by a computing system for numerous possible reasons. It is the automation of existing manual and paper-based processes, enabled by the digitisation of information.

‘Digitalisation’ is the use of digital technologies and of data in order to change a business model and provide new revenue and value-producing opportunities. It is the process of moving to a digital business, and the digital information is at the core of this process.

‘Digital transformation’ relates to the profound change in business and organisational activities, processes, competencies and models. It aims at fully leveraging the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritised way, with present and future shifts in mind.

In light of these clarifications, it becomes even more obvious that digitalisation is happening now, everywhere, in every sector, and the future is heading in this direction. Digitalisation is an extremely wide topic that affects, in different terms and at different levels, all the various aspects of aviation.

Safety, security, flight and airport operations, facilitation and the environment are all subject to digital transformation. And all stakeholders – whether airlines, airports, air navigation service providers, manufacturers, maintenance companies or regulators – are called to play an active role in this transformation.

Therefore, at its latest Forum in December 2017, ECAC chose to reflect on what this transformation already involves and how it will shape the future evolution of civil aviation. With insights from experts from various backgrounds, ECAC Directors General engaged in lively discussions on the opportunities – and the risks – that this digital transformation represents to our sector.

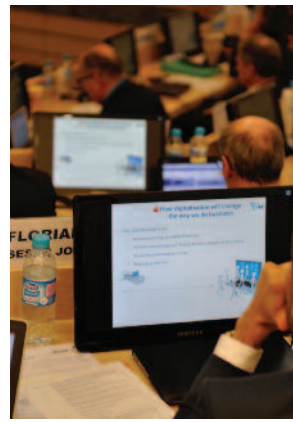
In this issue of ECAC News, we have invited some of the speakers at the ECAC Forum to share their organisation’s approach to maximising the value of digital aviation. Each contribution presents the latest innovations in one component of air transport and some of the prerequisites to successful digital transformation – from the European Aviation Safety Agency to SESAR Joint Undertaking, from airlines to manufacturers.

Digital transformation offers many opportunities for civil aviation but its challenges must be addressed today in order to unlock the substantial benefits it can offer the industry and society at large. It requires concerted action from regulators, policymakers and the industry, presenting our sector with a unique chance to shape the future.

Views of the annual ECAC Directors General Forum



Director General for Civil Aviation Rob Huyser (Netherlands) and EASA Executive Director Patrick Ky



Digitalisation in Swedish aviation

Ingrid Cherfils

*ECAC President and Director Strategic Development
and Management Department, Swedish Transport Agency*



In June 2017, the Swedish government adopted a digital strategy for sustainable digital transformation in Sweden. The overall objective is for Sweden to become the world leader in harnessing the opportunities of digital transformation⁽¹⁾. A clearer central government leadership in this transformation is necessary and aviation is no exception.

Digitalisation reshapes the whole aviation sector and several initiatives have been taken to improve daily operations for airlines, airports and air navigation service providers. The aim is to provide to the consumers a safe and secure air transport sector which they can rely on. It is aviation's "raison d'être".

One of the most recent technical innovations in Sweden is the development of remote tower, a functional system which comprises technology, safety procedures and human factor. In 2015, the first flight was operated at Örnsköldsvik Airport using a remote tower service in Sundsvall. Now remote tower operations are conducted in Sundsvall and, in the future, in Linköping.

The Swedish air navigation service provider, LFV, plans to provide remote digital air traffic control to bigger and more complex airports – Malmö, Östersund, Umeå and Kiruna. The future brings more advanced technical features, the digital revolution creates additional

challenges, one of them being the management of cyber security.

How policymakers and regulators enable and facilitate this technical evolution in a safe and secure environment is one of the most challenging tasks ahead. It requires a shift of mind set, which is easy to say but not always easy to do.

In 2017, the Swedish Transport Agency adopted a digital agenda which defines the following principles:

- Think digital first.
- Assume citizens' and business requirements.
- Use and develop common digital infrastructure.
- Think new to create added value.

Based on these principles, we also identified three focus areas: the citizen at the centre, internal efficiency and security and, lastly, innovation. An action plan for the period 2018-2020 also defines the concrete steps the Swedish Trans-

port Agency will take in the coming years. One of our main activities is related to blockchain and big data.

To enable us to evaluate our progress, we regularly monitor our performance with an e-index, which measures services provided to citizens, digital steps in our internal processes and the degree of data shared with other authorities. The index gives us a better understanding of the needs of citizens and businesses, it raises awareness and helps us prioritise our efforts.

The digital transformation requires people, businesses and organisations to have trust and confidence in the digital services provided. The effective, safe and secure use of new technologies will require adaptive rule-making and new skills but above all the ability to adapt even faster to the rate of change. We need to combine knowledge in a new way but also to think new. ■

(1) Government offices of Sweden

Ingrid Cherfils was elected as President of ECAC and Focal Point for External Relations in December 2014. She was appointed Director Strategic Development and Management of the Swedish Transport Agency in June 2017 and additionally became its Deputy Director General last September. Ms Cherfils began her career in aviation in 1998 as an advisor within the Swedish Civil Aviation Administration, where she dealt with bilateral agreements, competition and consumer protection issues. She became head of the market analysis section in the Swedish Civil Aviation Authority in 2005, and in 2009 she was appointed head of the legal unit within the Civil Aviation Department in the Swedish Transport Agency. Ms Cherfils then became Director of the Swedish Civil Aviation Authority in 2010 and Director of the Civil Aviation and Maritime Department between 2013 and 2017. Ms Cherfils has a master's degree in law from Lunds University, as well as in international and European Law from the University of Paris Assas II.



Digital transformation at EASA

Patrick Ky

Executive Director, European Aviation Safety Agency (EASA)

What is digitalisation? Digitisation simply means converting analogue or physical data into digital data. The role of this digital technology is rapidly shifting, from being a driver of marginal efficiency, describing the automation of processes and business models, to an enabler of fundamental innovation and disruption, so-called digitalisation. Digitalisation enables access to a wealth of information and knowledge which can fundamentally drive major improvements in the aviation sector, in particular on safety issues. For instance, by giving a better understanding of 'low noise signals' which, when aggregated, can lead to safety loopholes; or systematising and organising access to product history and contextual information.

► Impact on the regulatory framework

The aviation industry has been at the forefront of the digital transformation, changing the way people travel. These changes have been mostly dealing with efficiency and costs issues, such as digital maintenance organisations, or digital boarding cards. Regulators have not so far been associated to most of these changes, creating a risk of disconnect between the regulatory and operational frameworks. Now that digitalisation is likely to profoundly change processes and operational activities, regulatory authorities can no longer distance themselves from this topic.

NEW BUSINESS MODELS

Over the past ten years, a number of business terms have come into common usage in the aviation industry. All of these terms relate to the ongoing digital transformation of aviation, which is not really a new trend but something which has been evolving for decades. Since the first automated baggage sorting systems appeared in the 1990s and the first e-ticket was issued in 1994, it has affected both the passenger journey and internal processes.

Overall, the infusion of digital technologies in aviation management has had a positive impact for all stakeholders by supporting:

- process optimisation and industry 4.0;
- enhancement of non-aeronautical revenue streams, which are now becoming commercially significant;
- introduction of new business opportunities (e.g. total care packages, Uber-type aviation services, unmanned aircraft delivery services, etc.);
- overall improvement in the passenger experience.

NEW TECHNOLOGIES

Digitalisation is now widely accepted as a disruptive force that changes management mind sets, business processes and business models. The concept is defined around three separate, but intertwined, drivers: digitisation, connectivity and data.

Digitalisation does not only have a huge impact on the flight experience of passengers, on cost reductions and on flight efficiency, but there will also be improvements within flight safety and an important transformation of the role of regulators in the near future.

The access to large amounts of decentralised aviation-related data as well as the increased capability to process it will allow authorities to better identify weaknesses and take action where it is most efficient. "Digital Twins" of aircraft and products aggregating data and records from manufacturers, operators and maintenance organisations. Data and record management requirements will need to be reconsidered across the regulatory silos.

The increased connectivity will change the way flight safety is managed with real time access to key open source data and information. The database required by the new Basic Regulation could include much more information, in a secure environment, where anyone, including authorities, could have access to the information they are entitled to, thanks to the use of blockchain technology.

Also, numerous elements will be dematerialised. Already the use of RFID technology (radio frequency identification technology) is becoming common in aviation. Soon, all information will be digitised, rendering the old manuals and forms obsolete. Improved connectivity will even allow real time collection of vast amounts of operational and technical data.

► Examples of digital transformation at EASA

DATA4SAFETY

Data4Safety (also known as D4S) is a data collection and analysis programme that will support the goal to ensure the highest common level of safety and environmental protection for the European aviation system.

The programme aims at collecting and gathering all data that may support the management of safety risks at European level. This includes safety reports (or occurrences), flight data (i.e. data generated by the aircraft via the flight data recorders), surveillance data (air traffic data), weather data... But those are only a few from a much longer list.

As for the analysis, the programme’s ultimate goal is to help to “know where to look” and to “see it coming”. In other words, it will support the performance-based environment and set up a more predictive system.

More specifically, the programme will allow a better understanding of where the risks lie (safety issue identification), determine the nature of these risks (risk assessment) and verify whether the safety actions are delivering the needed level of safety (performance measurement). It aims to develop the capability to discover

vulnerabilities in the system across terabytes of data.

EASA has now set up a pilot phase in D4S, in cooperation with a group of pioneer partners, including aircraft operators, authorities, manufacturing industry and, last but not least, social partners. This pilot phase will enable to prove the concept of sharing information in a secure, confidential framework, and is expected to show the power of big data analysis.

ADAPTIVE SYSTEMS AND ARTIFICIAL INTELLIGENCE

The next generation of aircraft will embed artificial intelligence or adaptive systems. The aim of the aircraft manufacturers introducing these technologies is to improve the aircraft autonomy and safety gains.

However, such systems have specific characteristics that might be incompatible with the current certification requirements: non-determinism, no possible nor complete specification of the behaviour, not complete verifiability, etc.

As through artificial intelligence, machines are supposed to learn continuously during their lifetime. And because how and what they learn determine part of their behaviour, this constitutes a chal-

lenge for our certification process, which is fundamentally deterministic.

The more widespread use of complex numerical tests instead of physical tests in the certification of new aircraft and products is also expected to create new challenges, in particular in a context of artificial intelligence where numerical test beds can increasingly complexify the scope and range of tests, submitting machines to an enhanced virtual reality.

ELECTRONIC PILOT LICENCES – eLEAP

The electronic Licences for EU Aviation Pilots (eLEAP) Programme is presented in the context of the EU digital public services as part of the EU eGovernment Action Plan. The objective of eLEAP is to replace the current paper-based licences by a fully digital licence. It is a very good example of how far a digitalisation project can go, not limiting itself to pure replacement of analogue data with digital but also, and foremost, enabling full access to all ancillary data and information through an interoperable, real-time platform. The project is expected to start with a pilot phase, for which four countries have already volunteered (Austria, Ireland, Italy and Norway). If successful, and on the basis of a thorough cost/benefit analysis, the project could then be extended to other European States.



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► General considerations and conclusion



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Digitalisation is already taking place in aviation at a rapid pace. It has an impact on operations, on vehicles and systems, and on the ability of the community to learn from a very large amount of information. Digitalisation will moreover have a deep impact on jobs, skills profiles for aviation professionals, possibly also offering new perspectives and opportunities for different types of professions.

Authorities cannot stay idle. The regulatory framework can and should facilitate digitalisation in aviation with all its promises of increased quality of service, safety and efficiency. But not at all costs, in particular on the human-machine/system interfaces which are well known to be a major cause

of safety issues. It is also the duty of regulators to think strategically about the evolution of careers, social and societal aspects of this digital journey. It is also the duty of authorities to build the proper safeguards that will ensure interoperability, but also protection of data and appropriate use of such data.

Authorities in general, and EASA in particular, may need to rapidly modify existing regulations in order to enable digitalisation, and will possibly need to revise the rule-making programme to accelerate some work, in order to seize new opportunities but also minimise the potential embedded new risk.

This is the start of a new era, full of promises, challenges and interesting work! ■



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Patrick Ky became Executive Director of the European Aviation Safety Agency (EASA) on 1 September 2013. His mission is to further consolidate the role and responsibilities of the Agency to become a worldwide reference in aviation and to make the European aviation regulatory system a fully consistent, efficient and reliable framework. Prior to leading EASA, Mr Ky was in charge of the SESAR programme, Europe's ATM modernisation programme. He also held different managerial positions in the French Civil Aviation Authority, in a consulting company and in EUROCONTROL. In 2004, he joined the European Commission to work on SESAR. In 2013 Mr Ky was the recipient of the The Glen A. Gilbert Memorial Award of the Air Traffic Controllers Association as a recognition of his achievements in the field of aviation and for being an advocate of innovation and change in air traffic control. In 2015, he was designated "Industry Leader of the Year" by the German publication *Fliegermagazin* for his commitment to develop simpler, better and lighter rules for general aviation. In total, Mr Ky has more than 24 years of work experience in civil aviation. A graduate from the Ecole Polytechnique and the Civil Aviation Engineering School in France, Mr Ky also holds degrees in economics from the University of Toulouse and the Massachusetts Institute of Technology.

SESAR and the digitalisation of Europe's skies

Florian Guillermet

Executive Director, SESAR Joint Undertaking



European aviation has been at the forefront of innovation for many decades. Some might think that our industry has reached its zenith and that it is now just a matter of operating and fine-tuning the system. Florian Guillermet, Executive Director, SESAR Joint Undertaking, does not share this belief. He sees the opportunity and potential for the aviation industry to soar to even greater heights. The key to unlocking this potential is digitalisation. In this article, he explains how SESAR is harnessing digital technologies to transform the European aviation and air traffic management systems and infrastructure.

Fifty years ago European leaders anticipated that the development of commercial aviation was about to literally take off and change the world forever. With it would come new opportunities and challenges requiring individual States to go beyond their own national interests and to team up on very strategic and ambitious decisions. These decisions would bring together the brightest minds from across the continent to build extraordinary aircraft and gradually the tools and operating environment to make them fly – the launch of the A300 and subsequent creation of Airbus is a case in point. These decisions led to what aviation is today, the lifeblood of our economy, the key to mobility in Europe and a driver of connectivity with the rest of the world.

But the world of aviation is changing, starting with the aircraft itself. In the not-so-distant future, air vehicles are set to become more autonomous, more connected, more intelligent. That's not all: there will be all sorts of new vehicles, such as drones, not to mention balloons or even sub-orbital aircraft. All these vehicles are edging in, claiming their share of the skies. This is nothing short of a new

frontier in aviation, which presents many opportunities but also challenges for the European aviation industry – let me spell out just some of the factors shaping the debate.

► Air traffic growth

On average, global air traffic doubles every 15 years, and is expected to continue its natural growth reaching up to four times its current level by 2050⁽¹⁾. Air traffic management will need to adapt to this increased traffic and the move from thousands of conventional aircraft in the sky every day to potentially hundreds of thousands of highly connected and automated air vehicles or devices, offering advanced data-driven services and operating in all environments.

► Urban mobility and the creation of new markets

In the future, two-thirds of the global population will reside in urban areas, which will foster the creation of megacities with an in-

creasing need for transportation within and between them. This growth opens up possibilities for European aviation players or new entrants to create markets, such as urban mobility, with drones in particular positioned to provide new services across industries. New infrastructure (e.g. new airport models, traffic management systems for drones, communication and network technologies) and the appropriate level of regulation will be needed to support these new markets.

► Technological disruption

The top five companies in the world today are digital platforms⁽²⁾. With their access to financial capital and skilled people, these companies have become innovation frontrunners, along with an emerging ecosystem of tech start-ups, in advanced technologies that are now overlapping with traditional aviation. And it is these advanced technologies (i.e. big data, automation, artificial intelligence, connectivity/smart devices, Internet of Things, autonomous

(1) Airbus Global Market Forecast 2017-2036: <http://www.airbus.com/aircraft/market/global-market-forecast.html>

(2) World Economic Forum White Paper "Digital Transformation Initiative Aviation, Travel and Tourism Industry", January 2017: <http://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/wef-dti-aviation-travel-and-tourism-white-paper.pdf>



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vehicles, augmented reality, virtual reality, etc.) that are revolutionising the business landscape. European aviation needs to embrace this change and engage in its digital transformation based on data, connectivity and automation.

► High customer expectations

The expectations of a sophisticated customer base living in smart megacities will be reshaped by hyper or 'always-on' connectivity, and personalisation stemming from data-driven customer insights and the imperative to save increasingly valuable time. Connectivity and innovation are driven by tech actors setting new standards in all industries (e.g. retail, broadcasting, automotive, consumer goods), raising the bar of customer expectations and adding impetus for digital transformation within traditional industries. Traditional busi-

ness and leisure travel will be transformed by travelling-on-demand and door-to-door service capabilities.

► Safety and security

As the number of manned aircraft and drones grow, the future infrastructure needs to provide robust enablers for ensuring collision avoidance and safety. Equally, with the digital transformation will come increased connectivity and data sharing, which will open the system up to cyber threats. Mitigating cyber security risks in systems will require the establishment of a sustainable framework in which high-level security requirements in each of the technological solutions are defined. At the same time an integrated operational and technical architectural approach is required, leading to increased operational resilience against cyber attacks. There will also be a need to address the pri-

vacy, data protection and other societal challenges that will result from this digital transformation.

► Automation

The recent and rapid evolution of automation beyond routine work and its expansion (in combination with artificial intelligence) into machine learning and mobile robotics have opened new business opportunities in many industries. Digital transformation demands a different skill set from workers in today's economy, and will create new types of jobs. Challenges such as balancing automation and the human factor, and reskilling the workforce for the digital economy will need to be tackled collaboratively by industry, regulators and policymakers.

► Global competition

Europe is not alone in its efforts to generate value from digitalisation. The United States, South Korea, Japan and China are significantly investing into technology and innovative businesses. The EU Innovation Scoreboard report⁽³⁾ shows that while the innovation performance of the EU is improving, progress must accelerate. Many of our global competitors are increasing their innovation performance at a much faster pace, and within the EU performance gaps must be addressed.



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(3) European Innovation Scoreboard 2017: <https://ec.europa.eu/docsroom/documents/24829/attachments/1/translations/en/renditions/native>

▶ Delivering Aviation 4.0

To deliver this new era of air travel, digitalisation is key – whether it's through harnessing the Internet of Things, big data, artificial intelligence, augmented reality or quantum computing. We need to embrace the technologies on offer to build an aviation ecosystem that can handle the growth and diversity of traffic efficiently, safely and with minimum environmental impact. In doing so, we will be able to deliver the best possible passenger experience while also unlocking tremendous economic value for Europe.

This future aviation ecosystem is characterised by:

- **Higher levels of autonomy and connectivity of all (air) vehicles** coupled with a smarter, more automated management of the traffic, and enabled by an “intranet of flight”.
- **Mobile, terrestrial and satellite-based communications**, which are used to provide real-time vehicle trajectory information, shared between vehicles and with the ground infrastructure.
- **Digital and automated tools** provided on board the air vehicle itself, or as part of the ground-based infrastructure.
- **Virtual technologies** to decouple the physical infrastructure such as sensors, communication or navigation devices from the services that are provided to man-

age the airspace.

- **High-tech video, synthetic and enhanced sensor technologies** to operate air traffic services for airports or to enable aircraft to land in low-visibility conditions.
- **Big data analytics and open source data usage** to encourage the creation of new services and to allow for better integrated transport delivery for the passenger.
- **System modularity** to allow for scalable and easier upgrades and greater interoperability.
- **System flexibility** to handle increasing number of air vehicles, such as drones.

The SESAR Joint Undertaking is exploiting investment in these technologies. In 2016 we delivered a first set of technologies or solutions for which deployment plans are underway. These have been validated by all stakeholders, including air traffic controllers. With these solutions, we have set in motion the digital transformation of aviation, enabling better information sharing and synchronisation, and the delivery of a high-performing aviation and air traffic management system. With SESAR 2020, the next wave of research and innovation, we are progressively integrating into the programme digitally enabled solutions, in line with EU Aviation Strategy and with stakeholders' needs both now and in the future.

▶ Growing momentum for digitalising Europe's skies

But this is only the start, as digitalisation will play an increasingly important role in the future safety and efficiency of the aviation industry, not to mention ensuring greater air connectivity with the lowest carbon footprint. Realising this ambition cannot be achieved by any one organisation alone as the infrastructure is shared and needs to rely on homogeneous standards to foster innovation. That's why the SESAR collaborative model is so critical to achieving this digital transformation as it breaks down silos and brings together both established aviation players, and new entrants, such as digital start-ups, SMEs, academia, research centres, as well as other industries. The result is a mode of public-private partnership which blends corporate and academic values, new talent, expertise and capital, giving rise to fresh ideas that are fed into the innovation pipeline.



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→ Read more about SESAR and the digital transformation: www.sesarju.eu/letsgetdigital

There is clearly growing momentum among all stakeholders to go digital. In November 2017, European industry leaders representing manufacturers, solutions providers, airspace users, airports and air navigation service providers published a signed declaration⁽⁴⁾, committing to creating a "Digital European Sky" by working collaboratively to transform their business processes, services and systems to enable more connected aviation and with that, seamless travel and transport for all.

An important means to ensuring that digitalisation is mapped, developed and effectively deployed by these stakeholders will be through the European ATM Master Plan, the European roadmap for ATM modernisation in line with the performance goals of the Single European Sky. The 2015 edition flagged this digital shift, referenc-

ing the aspirations of the EU Aviation Strategy and Flightpath 2050. The 2018 edition will bring together aviation stakeholders for a 12-month consultation to further investigate the potential of technological advances and identify the key development and deployment activities needed to bring Europe's aviation infrastructure into the digital age. The results of this consultation will be published in the fourth edition of the European ATM Master Plan (December 2018).

SESAR has set in motion the digital transformation of aviation and its infrastructure. New innovations will continue to be delivered, increasing the pace of change towards this new era in aviation. ■

(4) Joint Industry Declaration Towards the Digital European Sky: Airlines for Europe, CANSO, Airports Council International, EBAA, ASD Europe, IATA and the EHA (November 2017).



About SESAR

- › As the technological pillar of the Single European Sky initiative, SESAR aims to modernise and harmonise air traffic management in Europe. The SESAR Joint Undertaking (SESAR JU) was established in 2007 as a public-private partnership to support this endeavour. It does so by pooling the knowledge and resources of the entire ATM community in order to define, research, develop and validate innovative technological and operational solutions. The SESAR JU is also responsible for the execution of the European ATM Master Plan which defines the EU priorities for research and development, and implementation. Founded by the European Union and EUROCONTROL, the SESAR JU has 19 members, who together with their partners and affiliate associations represent over 100 companies working in Europe and beyond. The SESAR JU also works closely with professional staff organisations, regulators, airport operators, airspace users and the scientific community.

Florian Guillermet, was appointed as Executive Director in April 2014. Mr Guillermet is responsible for leading the SESAR JU public private partnership, which is modernising Europe's air traffic management system. Mr Guillermet has worked in the civil aviation field for 20 years. He is an engineer and graduate of the École polytechnique and Civil Aviation Engineering School in France. He holds a master's degree in aeronautics and airport management.

ECAC Cyber Security Study Group: Time for an update

Helena Hallauer

Chair of the ECAC Study Group on Cyber Security in Civil Aviation



Optimal digitalisation strategies are accompanied by well-designed cyber resilience frameworks. Including such a framework in the civil aviation sector requires a progressive update of existing safety and security policies.

A journey by air brings passengers from one continent to the next overnight, as the aircraft flies over mountain ranges and vast bodies of water to a faraway land. Temperatures at arrival and departure might span between 50 degrees, and not only passengers but also crew are probably tired upon arrival.

On a long 12-hour trip a number of risks could occur. From weather influences to technical issues, from human error to medical emergencies, many worst-case scenarios have been thought of and are actively anticipated by the civil aviation community. Designs, certification, training and examinations across the globe reflect these risks and the right response to them.

From time to time, bad surprises awaken the civil aviation community with a jolt to new risks. The community finds itself having to find solutions under time pressure and with intense public scrutiny.

Hopefully, the cyber risks that accompany increased digitalisation will not have this effect, but can rather be managed in a step-by-step approach. The civil aviation sector's long-standing experience with risk management will allow it to move forward with ambitious projects for digitalisation, as long as safety and security policies are updated in parallel.

This article provides a short overview of the types of updates

that are required to ensure continued safety and security of operations while addressing cyber risks.

► Supporting the potential of digitalisation

First of all, it is important to note that measures put in place to minimise cyber risks should be designed to accompany the advantages of digitalisation. The objective is to minimise risks as systems progress, and not to stop progression of systems or innovation.

The aviation sector has always been a global and integrated sector. Information has been transmitted internationally for years, by telex from departure to arrival stations, from ground to air to inform the flight deck about significant information, or from air to ground in cases requiring immediate support. Simply put, without international transmission of information, flying would not be as safe as it is today, and it certainly would not be as well coordinated.

Further digitalisation of these communication processes therefore, does not change the way the sector works – it just integrates it even more. This digitalisation and integration can bring significant safety benefits, e.g. allowing for coverage of aircraft where before this was not possible. But it also comes with risks as more integration may imply more “single points of failure”.

The process of further digitalisation in civil aviation is a process of numerous upgrades of systems and procedures. It is a mid-term process and not an overnight occurrence. And just as this process will lead to adaptations in operations, where – as an example – electronic flight bags have already paved the way to reduce the use of paper, this process of digitalisation also calls for updates in security and safety policies.

► Updating security and safety policies – joining forces

The first step to updating security and safety policies is making sure to use the best available know-how.

Every day, the aviation sector employs a large and diverse set of experts. Experts on de-icing, airport bird population and maintenance experts, for example, each play their own specific role and contribute their valuable expertise to ensure safe and secure flights. In addition, coordinating roles exist that allow the system to function as a whole.

Including cyber aspects into the civil aviation sector now means welcoming one more category of experts into the exciting world of aviation. Together, know-how will be built and resilience will develop.



Meeting of ECAC Cyber Security Study Group, September 2017, Paris

But just as digitalisation does not happen overnight, gaining experience on cyber risks and resilience for civil aviation is also a slow process. However, a number of procedures can be put in place within a short timeframe to allow for the right conversations to happen. One priority would be to ensure up-to-date risk registers.

As we mentioned in the introduction to this article, a flight encounters numerous potential risks along the way. From weather, to birds, to fatigue in the cockpit, a whole array of risks is encountered while flying.

In updating our systems and procedures to allow for further digitalisation, it is important that in parallel, risk registers are updated to include cyber risks. We must understand the potential impact a cyber attack can have on our systems and flights, and especially the increased impact that can come from increased integration. We must also consider other risks to our digital infrastructure and analyse their potential impact on the safety and security of operations.

Updated threat registers are required. Existing information-sharing processes must be updated to make sure that current information regarding cyber threats reaches the right persons in our civil aviation system. It is a matter of connecting the right people to ensure that information on cyber threats can be taken into account on a daily basis. Much like the weather, cyber threats evolve and a static picture is only part of the picture. Putting in place the right links

between safety and security managers and national/sectoral CERTs (Computer Emergency Response Teams) allows for an updated threat picture.

Updated vulnerability registers are also required. Increased and improved information sharing regarding relevant IT system vulnerabilities will allow for improved risk management. Just as the aviation sector shares information about technical vulnerabilities in aircraft or operational hazards, it should also improve information sharing about technical vulnerabilities in IT systems, especially those common to the aviation sector.

Updated assessment methods With updated and improved threat and vulnerability information available, the assessment of the corresponding hazards to civil aviation must also be updated to take into account the three different perspectives synonymous with cyber resilience:

- **Confidentiality:** What are the risks to civil aviation when confidentiality is breached?
- **Integrity:** What are the risks to civil aviation when aircraft or pilots and other staff base their action on data that is incorrect or incomplete?
- **Availability:** What is the effect on aircraft or on the civil aviation system as a whole when critical functions are no longer available?

The challenge here is combining individual risk registers with a holistic perspective of civil aviation. These questions need to be asked by authorities and operators not only with respect to their own op-

erations, but asking themselves what the potential impact of cyber attacks could be on flights, and on civil aviation as a whole. It is not a question of “*What effect could a cyber attack have on my business or systems?*”, but rather “*What effect could a cyber attack have on aircraft in flight and on aviation operations as a whole?*”.

As we ask these questions and join forces to find the best answers, it is important to bear in mind the basics already implemented by the aviation sector for many years.

► Keeping the basics – and updating them as digitalisation moves forward

As one of the most international and well-connected industries, civil aviation has all the tools it needs to move forward on digitalisation, and to do so while addressing new risks in parallel.

ALIGNING CORE CONCEPTS

As we start combining aviation know-how with IT security experts, we find common core concepts in the worlds of aviation security, aviation safety and IT security. These core concepts allow us to align and integrate implementation, and even to coordinate regulation. Examples of such core concepts are:

- the importance of designated points of contact;
- the importance of incident reporting and information sharing to inform risk analysis;
- the analysis of risks;

- the management of these risks within a systemic approach;
- and the existence of coordinated public-private cooperation.

When we discuss with cyber or IT security experts regarding the implementation of these concepts to address cyber risks, it is important to highlight that these basics already exist in the civil aviation sector. Solid mechanisms for incident reporting and risk management have been in place for many years and these do not need a full overhaul. Rather, they just require an update that integrates cyber risks into existing mechanisms.

UPDATING REGULATORY FRAMEWORKS

The above-mentioned core concepts are existing basics in the civil aviation sector. They are well-embedded in our daily business and of course in our regulatory frameworks. Even though risk types might be new, and some of the technical protection measures might require know-how from outside of our sector, the regulatory tools remain the same. They are the tools aviation has been using effectively for numerous years, and they do not have to be reinvented.

Rather, civil aviation regulators need to ensure that alignment and integration of existing concepts are prioritised when updating regulatory frameworks for civil aviation to include cyber elements, or when implementing horizontal cyber frameworks for the civil aviation sector.

Properly aligned regulatory requirements will allow the aviation industry to update their existing processes with only slight tweaks where necessary, and to continue safeguarding a more digitalised aviation sector.



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UPDATED ECAC DOC 30, PART II AND GUIDANCE MATERIAL

The ECAC Cyber Security Study Group, in 2017, provided ECAC members and observers with an updated Chapter 14 of Doc 30, Part II related to the management of cyber threats. In addition, a consolidated guidance material document was created to share existing best practices. In doing so, the study group took care to combine aviation security, aviation safety and IT security know-how. The available documents provide ECAC members and observers with a consolidated view and further references.

In 2018, this consolidation is being further developed, with a focus on specific topics such as combined guidance on contingency and resilience planning. In addition, the members and observers of the ECAC Cyber Security Study Group actively participate in ongoing initiatives at European and international levels in order to continue to progress on the topic of cyber resilience in the civil aviation sector.

Conclusion

As the digitalisation of civil aviation moves forward even more rapidly, the updates of aviation risk registers, risk management strategies and measures must progress in parallel.

In doing so, let us take to heart the notion of “update” – integrating one more type of risk into a well-working risk management framework is what is required of the civil aviation sector. Nothing more, nothing less.

The ECAC Cyber Security Study Group looks forward to continuing its work in assisting ECAC members and observers with this update. ■

Helena Hallauer holds a Master of Arts in International Relations from the Graduate Institute in Geneva, where she specialised in international law. Her professional experience includes multiple years in the aviation sector, more precisely in the field of ground handling process management and aviation security regulation. She is currently the chief negotiator for air services agreements at the Swiss Federal Office of Civil Aviation (FOCA). Following her former position as security coordinator, she is the current chair of the ECAC Cyber Security Study Group. In addition, Ms Hallauer represents Switzerland in numerous international and European civil aviation committees and working groups.

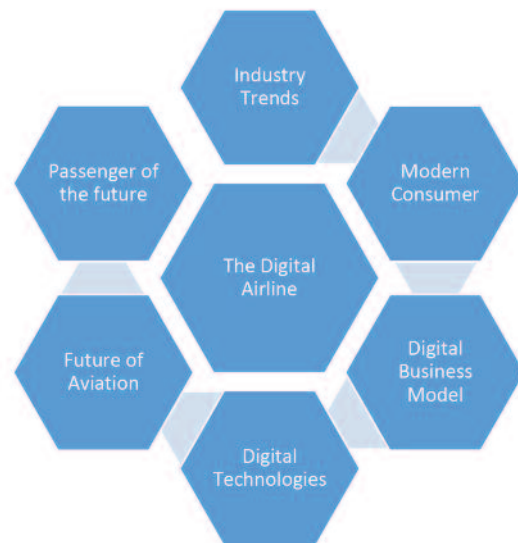


The Digital Airline

Tim Grosser

Head of Digital Transformation,
International Air Transport Association (IATA)

The airline industry, like other industries, is being impacted by the digital wave. This pressure is being compounded because the industry needs to double the capacity in the next 20 years, passengers continue to demand a higher level of service through personalisation and transparency, and new digital business models continue to provide innovative solutions. To best understand this digital trend, we have broken down different aspects of the ecosystem to better understand the true impact.



► Industry trends

Air traffic is forecast to double in the next 20 years from 3.8 billion passengers to 7.8 billion passengers per year. This growth forecast is based on a “constant policies scenario”, and there are an estimated additional 3 billion passengers if the most favorable scenario is taken into account⁽¹⁾.

Global revenue passenger kilometres (RPKs) increased by 7.6% year on year in 2017 as a whole, which was another year of above-trend growth and well ahead of the ten year average of 5.5%⁽²⁾. This growth was faster than capacity at 6.3%, resulting in a load factor increase of 0.9 percentage points to 81.4%, a record high for a calendar year⁽³⁾.

► The modern consumer

The “everyday consumers” are changing in the way they consume technology. This is having a profound impact upon business

models across industries. The aviation industry is no different and is not able to influence this consumer behaviour. On the contrary, aviation must adapt to the new behaviour.

The most striking change is that consumers are now more knowledgeable. Consequently, they are more demanding and more empowered. They expect a greater level of transparency. This transparency has a direct impact on how we should communicate with the passenger. Should we communicate to them the real-time status of a flight? Should we communicate to them when their baggage is not on the connecting flight? The passenger of today expects to know this information in real time. Putting the systems in place is the first step to ensure we can communicate in real time, but the next and more important capability is to ensure we have the right supporting processes to ensure a

seamless and customer-orientated real-time communication culture.

Today is a world of ‘mobile first and always on’. Consumers are connected 24/7 via their mobile. 29.7% of e-commerce is now performed via the mobile device, up from 24% in 2014⁽⁴⁾. Mobile commerce is seeing growth rates of 53.4%⁽⁵⁾.

The average consumer’s attention span is getting shorter and shorter. An extreme example is the video-sharing application called Vine. Vine hosted a service where users could share a six-second-long looping video clip. Six seconds is an incredibly short time to tell a story with a start, a middle and an end. However, by 2015, they had 200 million active users, before it was acquired by Twitter and its features disabled.

Customers are being more collaborative. As they increasingly bring their own devices, applications and other tools from outside

the ecosystem of the service provider, they increasingly determine not just what services they wish to consume but exactly how they wish to consume them.

▶ Digital business model

The importance of digital technologies on the traditional business models cannot be underestimated. Digital technologies have the capacity to change business models. Previous technology waves such as web, e-commerce or ERP systems did not have this capacity to change business models. Those “pre-digital” technologies enabled operational efficiencies and incremental revenue opportunities and provided a more effective channel to sell to the customer. (See box below).

The famous technology examples of transformation such as Airbnb, Uber, Netflix and many others have been so successful because they were able to transform the business model.

▶ Digital technologies

Whilst there are many digital technologies in the marketplace today, the really interesting ones are those which have a direct impact on business models. These can be categorised into two areas: consumer experience and ability to run the business.

Consumer experience technologies enable the consumption of a business service to be more personalised and easier. Augmented or virtual reality, and personalisation of content are key areas to watch out for.

Ability to run your business technologies cover many different areas; however, two main areas stand out. Firstly, the Internet of Things (IOT) which, in a physical business, allows one to track the location of remote objects, such as people, bags or assets. If a company can place a sensor in this object, then they can read information from this sensor (such as temperature, humidity and location) and then make actions from these decisions.

However, currently the critical path is not installing the sensors and collecting data but rather being able to interpret this data in a meaningful and timely manner. The latest Airbus A350 has 50 000 sensors on board collecting 2.5 terabytes of data every day⁽⁶⁾.

This brings us to the next category of digital technologies, and perhaps currently the most important: artificial intelligence. How can airlines use all of this newfound data to help make better decisions - decisions which impact the customer experience, improve revenue opportunities and optimise operations faster and more reliably? Aviation inventory is a perishable asset: once the flight has departed, that product has “expired”. How can airlines maximise revenue before the product has expired?

Underlying all of these technologies is the need to share data between entities in a trusted, efficient and timely manner.

The above technologies drive the consumer’s ability to transact without friction, be fully aware, en-

DIGITAL BUSINESS MODEL EXAMPLE – THE TOOTHBRUSH

Currently, a toothbrush is manufactured by the supplier, then sold to the wholesaler, who sells it to the retailer, and then it is finally sold to the customer. The manufacturer has no relationship with the customer and therefore the manufacturer’s influence is restricted to traditional marketing and pricing models.

Now, let us overlay digital technologies onto this business model to see what is possible. The customer’s first toothbrush is still sold in the retail store. But this toothbrush has an embedded Internet of Things (IoT) sensor which counts how many minutes it has been

used. Now, assume that the toothbrush has a life of 300 minutes of brushing. Once the consumer has registered their account, the manufacturer can now automatically send out a new brush to arrive the day before the current toothbrush hits 300 brushes. In addition, we can offer to send the brushing history to the customer’s dentist for \$5 per month. Plus for an extra \$5 per month, we can provide a detailed analysis of the brushing history for the whole family. We could even gamify toothbrushing for the children. Would insurance companies offer rebates to families who could prove their brushing history?

In this example, we have been able to significantly change the business model so that the middle man is no longer needed, the supplier now has a direct relationship with the customer, enabling additional revenue opportunities. We have created a new revenue model of a data subscription and increased our likelihood of repeat sales via a frictionless process. We have been able to directly increase the customer satisfaction and engagement by gamification and greater transparency. This is a very simple example of how digital technologies can radically change business models.



able personalisation and keep the customer in control with full transparency. Perhaps this is one reason why Uber is so successful. The passenger transacts in a frictionless way (the application knows the location, the payment is automatic), and they are aware of the status at all times (who the driver is, where the car is, where the passenger is, they can even share the ride details). Ultimately, the passenger is in control of their experience through the use of technology.

► Future of aviation

A report recently released by IATA regarding the future of aviation⁽⁷⁾ found 11 key themes that were important when understanding what aviation could look like in 2035. There were two themes in particular that are directly impacted by the digitisation of the aviation industry: infrastructure and data.

Lack of infrastructure development is already a major challenge for the travel and tourism industry. When the forecasted growth of passenger traffic doubles in the next 20 years, then this problem will not be going away. How can airports become more efficient and effective to manage this additional growth by using digital technologies? Technologies such as IoT and artificial intelligence should be able

to play a key role. Can we use IoT to better manage the passenger flow and predict disruptions to further increase airport capacity? Is there a possible scenario where each passenger has their own personalised journey which is seamlessly communicated to them? For example, the passenger looks up at the large flight status screen and rather than seeing every flight, he has a personalised view and only sees his flight and the directions to his gate. The person standing next to him looks at the same screen and she only sees her flights.

Flight disruptions continue to cause headaches to airports today. Can we make better use of technology to predict disruptions, then make better and faster decisions about what needs to change, and then quickly re-communicate this? Imagine if an airport could predict whether a flight in two-days' time will arrive late (perhaps due to the weather forecast in two days). It could then use artificial intelligence to realign the gates, staff rosters or connections to minimise the impact – and all this is in advance of the incident occurring. Since January this year, Google has been offering this feature: "Using historic flight status data, our machine learning algorithms can predict some delays even when this information isn't available from airlines yet."⁽⁸⁾

It is inevitable that the importance of big data will grow expo-

nentially over the next 20 years. Corporations that are able to effectively gather, store, keep safe and use for commercial and non-commercial purposes will come out on top. Will airlines eventually have more data scientists than baggage handlers?

The issue of sharing data will also grow with the additional data. How can all entities in the value chain share data in a trusted and efficient manner? IATA is working on an Open API concept⁽⁹⁾ where we encourage each party to share key operational data via an Open API. This allows an open data sharing ecosystem. Underpinning this concept is the Aviation Industry Data Model (AIDM) which ensures everyone has the same definitions enabling sharing at a scale possible⁽¹⁰⁾.

► Passenger of the future

The passenger of the future is also taking all of these changes on board. According to the annual IATA Global Passenger Survey, passengers want to use more technology to improve their experience.

Passengers want more, and to deliver these services airlines and airports will need to potentially rethink their existing model and look to various digital solutions. For



From left to right: *Tim Grosser (IATA), Mauro Oretti (SkyTeam), Sherry Stein (SITA Lab), David Beardmore (Open Data Institute) and Piotr Samson (Poland)*

example, 26% would like to have their bag picked up from home and delivered to the airport. 24% would drop off bags in locations other than the airport.

Communication with the passenger is perhaps one of the most requested features. This is not a surprise. As we can see from the global consumer trends earlier, the average consumer is more demanding and more empowered. Within aviation, 61% of passengers would like to track their bag throughout the journey. 85% would like to know of any flight status changes, and 60% would like to know the baggage status and the waiting time on delivery. Passengers are willing to share their data if it makes their journey smoother.

► In conclusion

Airlines should look to use relevant digital technologies to enable them to meet the growing demand from the customer and continually strive for efficiencies and revenue opportunities. More importantly, they should look at new business models which will enable them to better leverage the new digital technologies.

Continually improve the usage of the data currently within the airline. Understand what data they have within the business and start

to explore what opportunities are available to either improve the customer experience or improve revenue.

Airlines should look to see how they can open their data to allow sharing in a trusted and secured way. This will enable everyone to have the tools available to drive customer personalisation, use data to make smarter decisions faster, and optimise revenue opportunities at every stage of the journey. ■

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Tim Grosser is Head of Digital Transformation at IATA. His responsibilities include using digital technology to help drive product innovation and process improvements within IATA and across the industry. Mr Grosser is a member of several IATA innovation work groups, which aim to transform the entire passenger journey through the implementation of innovative solutions. His areas of specialisation include digital strategy, corporate innovation, design thinking, Open API strategy, and artificial intelligence. In addition, Mr Grosser hosts the annual IATA CIO (chief information officer) Forum. The CIO Forum brings together airline and airport CIOs, key suppliers and research organisations to drive digital transformation for the aviation industry.

Alliances in the digital era



Mauro Oretti

*Vice President Sales and Marketing,
SkyTeam*



Alessandro Fusaro

*Coordinator Digital Marketing
and Innovation, SkyTeam*

How will new technology benefit alliances, their members and their passengers? How will alliances evolve in the digital era and how will this impact the customer experience?

Established around 20 years ago, the three main airline alliances were created to open up the world by building extensive networks through a web of connecting members. SkyTeam was founded by Delta Air Lines, Air France, Aeroméxico and Korean Air to do precisely that; the alliance was built upon a customer-centric vision, symbolised by its main claim 'Caring More About You'. Today, SkyTeam has grown to become a 20-member coalition.

Aviation is ever changing. Alliances are no exception: together with their member airlines they have been evolving and shifting their focus. In today's landscape, now that routes and networks have been established, customer experience is at the forefront of any alliance offering.

▶ A digital world

We live in a digital world, one in which technology is playing an increasingly important role. If alliances are to stay relevant, they need to relentlessly pursue a streamlined end-to-end journey for their passengers, developing services and solutions dedicated to 'closing the seams'. The airline business is hampered by legacy technology, often the basics from a customer perspective (such as the possibility to easily check in online for a multi-airline, multi-city trip) are complex and tricky to solve.

Legacy technology, such as GDSs (Global Distribution Systems) which have so far been used for distribution and airport operations, is still essential for enabling smooth travel across different airlines. However, what used to work

well in the past – often in silos – is no longer enough in the ever-changing digital sphere. Some of the issues currently faced by alliances originate from technologies that are not necessarily effective at facilitating digital communication among airlines. Different airlines use different technologies and a multitude of challenges arise from this, which no airline alone can solve. This is where alliances step in.

▶ Customer-centric digital solutions

To address these obstacles, SkyTeam is working on a range of customer-centric digital solutions, which reside and are made available on its shared IT platform called SkyLink. This platform works as an aggregator, meaning that each member may connect to another through it, irrespective of their individual IT systems used. Simply put, SkyLink acts as a translator, a transformer.

Moreover, all the SkyTeam-powered services offered on its digital platforms (website and applications) can be integrated in the digital touchpoints of the members



by using open APIs (Application Programming Interfaces), adding a "SkyTeam Inside" (or "SkyTeam Across") component to their digital proposition.

SkyLink – the IT infrastructure – is slowly but surely walking the VCH (Value Creation Hub, as defined by travel and transportation analyst and guru Henry Hartevelt) talk, enabling applications that can be used by a wider array of members' customers.

Third-party providers, namely retailing platforms external to the airline world offering data aggrega-

tion (meta-search engines, OTAs [Online Travel Agencies], vacation package platforms such as Kayak, Skyscanner, Expedia, Ctrip, Alitrip, Priceline et al.), are making it easy for customers to shop by offering a broad range of information and options in one single digital location. Thus, customers can stay on those specific sites without the need to go elsewhere. Airlines and alliances need to adapt and follow suit, or they risk losing these customers altogether.

► Reigniting the conversation with the customer

By creating a comprehensive and compelling set of services, airlines and alliances can claim back the relationship with the customer, adding value and “owning” the conversation throughout the whole journey, from trip planning to arrival at destination. Success will come through information sharing and integration.

A ‘one stop shop’ for ancillary services, both air and non-air (seats, bags, meals, lounge access, wifi, etc., but also hotels, insurance, car rental et al.), plus all the additional useful information that a customer needs, will help to make sure that airlines don’t become just a metal tube that takes passengers from one place to another – and only that!

Nowadays, passengers can plan their travel via their preferred carriers’ direct digital channels, in most cases both for operated and code-shared flights. Booking directly with the airline of choice works for straightforward itineraries, such as those involving just one carrier and one destination. However, when the journey includes multiple carriers and connections, customers are not able to leverage the wider alliance network without using a different (external) channel, for example a travel agent, a meta-search engine or an OTA.

The moment they leave the airline’s web page, they are in the hand of third-party providers. This

potentially puts their loyalty to test and threatens revenue generation. Alliances can help by providing additional aggregated options, tailored to each customer’s specific travel needs.

SkyTeam’s ‘Find Flights’ – a schedule search tool – is one of the most-used services on the alliance website. Currently the tool displays results by leveraging the powerful, expanded alliance network, providing the most convenient itineraries and best connectivity available.

Traffic data to skyteam.com show that customers like to plan their travels with an alliance.

► The next digital steps for alliances

In the future, alliances will likely move towards providing one digital destination with simple, clear and effective information. Price, availability, product data, all displayed in one space, reducing confusion and speeding up the shopping process, while at the same time supporting customer loyalty, engagement and retention. By providing all details for each flight within the same search result, customers can save time and resources, and are more likely to book then and there.

Another area that alliances are exploring is the cross-selling of ancillaries, both in the reservation and the check-in window. This appears to be a priority, as it allows for

an enhanced customer experience and solid value creation for members.

When booking an interline (aka multi-carrier) itinerary on any airline’s website, customers can only purchase ancillaries on the legs operated by that airline; adding the ancillaries of another partnering airline is not possible. Again, alliances can help to overcome this by developing technologies that can bridge these gaps, allowing their member airlines to offer ancillaries across the whole itinerary, irrespective of which carrier is operating the flight.

By creating platforms that can operate as transformation and translation engines, the differences in each member’s IT and distribution capabilities are neutralised, so that the exchange of seat maps and ultimately the cross selling of ancillaries between different airlines is made possible. This is a powerful way to reduce customer confusion and generate incremental revenues.

As previously mentioned, another area of frustration for passengers is check-in. Due to the legacy technologies this industry has grown accustomed to, often passengers cannot check in on the same airline website that they used for booking their flight.

The challenge is to provide customers with a multi-carrier check-in portal, something that does not exist today (for clarity: some applications do that, but bypass entirely



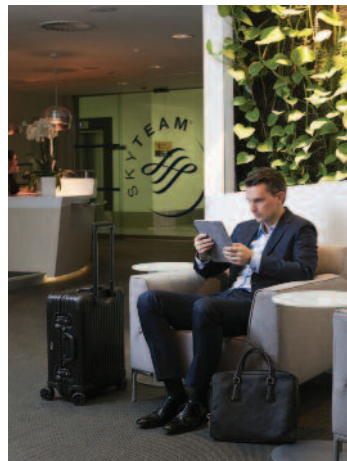


the whole ancillary offering, thus creating a suboptimal experience). There is need for a digital solution capable of identifying on which DCS (Departure Control System) check-in can occur, regardless of the platform or website used for booking. This would get rid of a crucial pain point, one where customers can get frustrated quickly. According to SkyTeam's research data, a smooth web/mobile check-in can be a key enabler towards higher CSAT (customer satisfaction) scores.

On a different note, in the coming months SkyTeam will launch interactive airport maps. The service will help customers to have a smoother experience while at the airport. In particular, it will help to increase the number of successful connections.

Passengers travelling through airport terminals will have a better understanding of their location,

making it easier to find their way to the right concourses and gates. We expect that the number of successful connections with tight transfer times will grow. In addition, customers will be able to make their time at the airport more enjoyable, by quickly locating their restaurant of choice, the brands of preference, the transfer and assistance desks



needed, the lounges they are granted access to and, most importantly, their departure gates.

Travelling to a foreign country in which airport signage can be unclear – due to language barriers or iconographic differences – will be easier, since navigation and customer positioning in the terminals will be provided by the map. Passengers will not need to connect to data to use the service, which will be available on the SkyTeam digital platforms first and then rolled out across the 20 member airlines.

► In conclusion...

At SkyTeam, we are convinced that aggregation is the key to alliance success in the digital world, where products and services walk hand in hand. The alliance role is to help members in closing the seams and bridging the gaps that still exist. Alliances can enable a better multi-carrier travel experience, reclaiming the direct airline-customer interaction by investing in shared technology hubs that allow data collection, processing, transformation and sharing: powerful, strategic platforms that can create incremental value to their members. ■

Mauro Oretti has over 30 years' experience to his name and a career that has spanned the globe. Before joining SkyTeam, Mr Oretti held positions with Valeo and Alitalia, before moving to Amsterdam in 2009 to join the global airline alliance. In the position of Vice President of Sales and Marketing at SkyTeam, he is responsible for both the commercial and customer areas of the alliance, including customer experience, brand and communications, loyalty, digital and commercial synergies. Mr Oretti is co-author of the book *"Airline Choices for the Future: from Alliances to Mergers"* (Ashgate, 2007). A native Italian, Mr Oretti taught the international partnership and joint ventures course at the Luiss Business School in Rome as part of its Aviation MBA in 2009 and 2011.

Alessandro Fusaro joined SkyTeam in 2017 as Coordinator, Digital Marketing and Innovation. Based in Amsterdam, he oversees all the digital touchpoints of the leading airline alliance, working to enhance the seamless travel experience through technology. Bringing a decade of experience to the role, Mr Fusaro has previously held positions within the communications, branding and product development areas at both Edison Energy and Backroads travel. Mr Fusaro studied media technologies engineering at the Polytechnic University of Turin, and completed an MBA at the *Collège des Ingénieurs* in Paris, Munich and Turin.

Airbus's data revolution with Skywise

Frédéric Sutter

Digital Transformation Programme Director, Airbus



WHY YOU SHOULD BELIEVE IN THE DATA REVOLUTION THAT AIRBUS WANTS TO BRING WITH SKYWISE

Every plane is the sum of millions of physical parts. For these parts to work well and fly together, you need experience, a deep and fine engineering knowledge. You need to have the right high-level view and you need to have a robust platform well anchored in the right environment. Bringing all these parts together, despite their complexity and high-tech nature, has been Airbus's well-mastered mission for the past 40 years or so.

Now all this expertise is moving from a purely industrial field to a less physical one, which happens to require similar approaches, mindset and set-up: data analytics.

Airbus launched its new aviation data platform Skywise in collaboration with Palantir Technologies – pioneers in big-data integration and advanced analytics – during the Paris Air Show in June 2017, after experimenting substantial benefits when applying its technologies to its own internal processes for two years.

“As the aircraft ‘architect’ and integrator, we naturally thrive in our role of building digital continuity across the aviation ecosystem. What we want to do with Skywise is really to bring together the different actors of the industry, breaking the silos within and outside each organisation – and this is a real revolution”, Airbus digital transformation officer Marc Fontaine says. “We’ve seen the power of data analytics in our own operations, and Airbus is convinced of its huge potential to bring value to our customers and industry partners.”

In 2015, Airbus made a strategic choice to put **data at the heart of its digital transformation** programme. Physical products remain core, but data continuity and insights allow for better efficiency as well as innovative services offerings based on an integrated envi-

ronment, from design to support, and an increased digital integration with suppliers and customers.

The expected benefits are extremely promising and, by nature, very diverse. They include improving industrial performance, shortening development cycles, improving products and developing new services. It is important to remember that this value-creating transformation is not only a technological challenge. It must be supported by a change management approach, new processes and new ways of cooperating across the value chain.

Airbus envisions that such a data gold mine can change how the aviation sector works, eliminate its inefficiencies, and enable new levels of performance at every point along the aviation industry ecosystem. In other words, operators of Airbus aircraft will be in a position to leverage the power of its deep reservoir of engineering expertise and to follow the performance of each MSN – Manufacturer’s Serial Number – (for a “tail-centric” approach) over its entire operational life.

Skywise aims to become the platform of reference used by all major aviation players to improve their operational performance and business results and to support their own digital transformation. The deliverables will be tailored for

each user and will include scalable services (such as analytics, applications and Advance Passenger Information) which can be used by Airbus, customers and suppliers – ensuring complete data continuity with benefits across the entire value chain.

The platform extends the work of Airbus’s digital transformation office. “Internally, we saw that we needed digital continuity across sites and systems so that we could see what was going on aircraft by aircraft, and connect the dots across the lifecycle,” Matt Evans, who is Skywise’s business architect, explains. “The success of this approach showed us that a huge amount of insight could be gained from connecting the supply chain and operators.”

“The core platform is starting off in the services sector but our ambition is much broader,” Mr Evans says. “We want our aircraft to be 100% reliable. We can achieve that through having access to the right data and the ways to use it to eliminate root causes and fix any issues.”

Everyone – from Airbus’s own suppliers, plants and engineers, right through to airline customers, airworthiness authorities, air navigation service providers, airports and service providers – can potentially use it. Long-term, Skywise will be deployed companywide for helicopters and military aircraft.

Early adopters are cooperating on its development, collaborating on projects including event tracking and resolution, turnaround-time analysis, operations analytics, predictive maintenance, reliability analysis and benchmarking, and maintenance decision support. "The feedback is really good so far," says Laurent Martinez, who is leading Airbus Services business unit. "Airlines are really excited by the project. There are several levels of services available and the platform is very flexible meaning they can integrate their existing tools and also develop customised dashboards and applications." But this is not just an application, Mr Martinez adds. "We really want to be their life-long partner in transforming their operations."

AirAsia, Asiana Airlines and Etihad Airways have become the first airlines to use full aircraft data and advanced predictive analytics on Airbus's open aviation data platform Skywise, with each signing a premium subscription contract covering Skywise Predictive Maintenance.

The agreements cover the retrofit of their respective A320 and A330 Family fleets with FOMAX* – a new on-board data-capture / transmission module which provides greatly expanded volumes of recorded aircraft data – only about 400 aircraft parameters could pre-

viously be recorded on an A320, compared with roughly 24 000 from an aircraft equipped with it.

The sheer quantity of information that Skywise can unlock for each aircraft equipped with the new module will be used by airlines to gain deep insights, create bespoke recommendations and apply state-of-the-art Skywise analytics applications for enhanced decision-making. In turn this will allow them to anticipate, with higher levels of accuracy, the need for maintenance before an event happens, and thus maximise the operational reliability and utilisation of their assets.

In addition to the new premium predictive maintenance contracts outlined above, AirAsia, Asiana Airlines and Etihad Airways will gain access to Skywise Core, providing them with a cloud-based platform offering unparalleled visibility into their fleet operations.

Airlines using Skywise Core can integrate their own operational, maintenance and aircraft data into the Skywise cloud so they can store, access, manage and analyse selected Airbus data together with their own data and global benchmarks without the need for additional infrastructure investments. This resulting value will give them new insights at aircraft, fleet, company and global level while allowing them to enhance their

operations through access to Original Equipment Manufacturer (OEM) expertise and global fleet context.

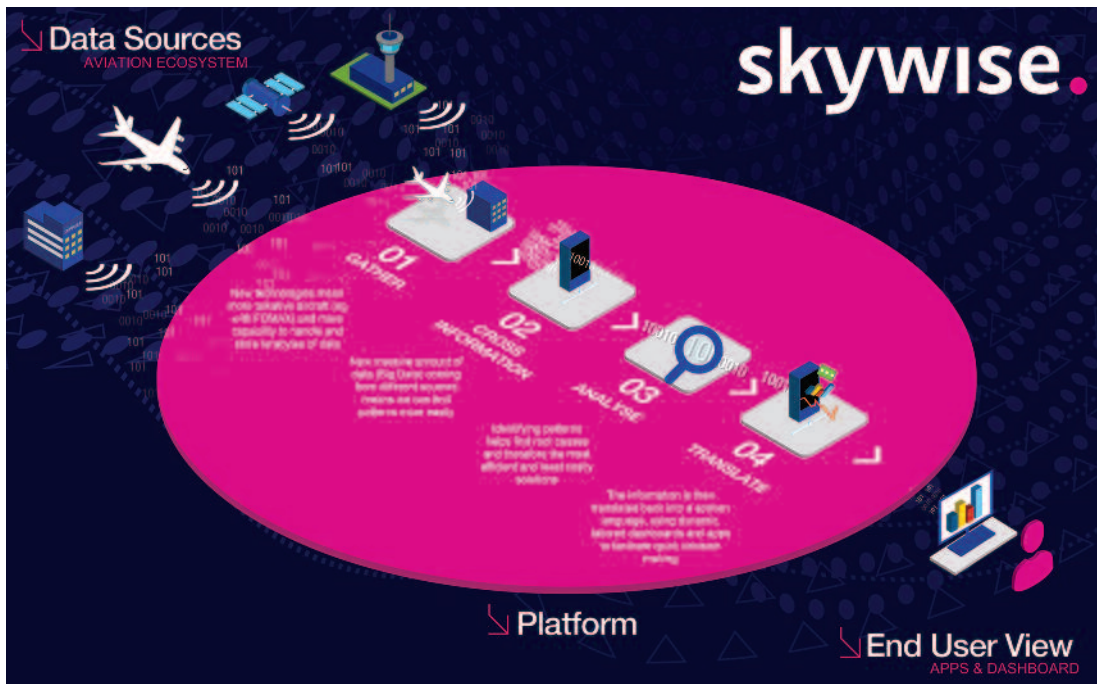
For airlines who have not yet selected the premium predictive services, Airbus offers Skywise Core under a "shared value" arrangement: airlines that agree to share operating data from their Airbus fleet can access the platform at no cost. Airbus has recently signed several agreements with airlines around the world to join Skywise Core, including Bangkok Airways, LATAM and WOW air. These latest subscribers bring the total number of airlines now connected to the Skywise Core platform to nine – including previously announced Peach Aviation, easyJet and Emirates – representing more than one thousand aircraft.

"I really want to thank our airline customers for their trust, for their forward-thinking approach and for sharing our vision in this adventure," Marc Fontaine commented. "If 'information is power', then clearly we are all becoming more powerful, together."

Laurent Martinez said: "Just like the industry was disrupted by Airbus's "Fly-by-Wire" concept back in the days, we are now bringing the full benefits of "Fly-by-Data" to our customers. These deals we are announcing are the result of years of strong co-innovation with our customers, and I am very proud to



From left to right: Frédéric Sutter (Airbus), Patrick Gandil (France), Neil Hickey (Ryanair), Florian Guillermet (SESAR JU) and Robert Baltus (EBAA)



see that our customers, our reason for being, are confirming the fact that Skywise is meant to become a leading data platform in the industry." Skywise provides all users with one single access point to their enriched data by bringing together aviation data from multiple sources across the industry into one secure, cloud-based platform physically hosted in Europe. The more data that airlines or OEMs share into the Skywise Core platform, the more accurate the predictions and models for anyone connected.

We are putting data privacy at the heart of the platform. All data is anonymised so knowledge and lessons learnt are shared and data confidentiality is ensured.

► What benefits?

- Improved fleet operational reliability through predictive and preventative maintenance.
- Improved operational efficiency for legacy fleets.
- Rapid root-cause analyses of in-service issues.
- Optimising each aircraft's performance through flight operations data analytics.
- Tracking maintenance effectiveness over time.
- One-click reporting workflows, including complex reporting to regulatory bodies. ■

* FOMAX (Flight Operations and maintenance exchanger): an integrated & secured data pathway from the Airbus aircraft to Skywise

Frédéric Sutter was appointed Digital Transformation Programme Director in May 2015, reporting to Group Digital Transformation Officer, Marc Fontaine. Mr Sutter joined Airbus in 2012 as Vice President, Services Development, with responsibility to coordinate strategic projects and to develop recommendations for aerospace market disruptions. Previously, he worked for 15 years at Alcatel-Lucent in strategy and services leadership positions. In 1992, he began his career as an information systems architect at the Sema Group and as a consultant at KPMG Peat Marwick. Mr Sutter is an auditor of the French Institute for National Defence Studies (IHEDN). He holds a master's degree in international business (EM Lyon) and a telecommunications engineering degree (ENST-Bretagne).



Smarter at Every Step: Customer experience and biometrics

Sherry Stein

Senior Manager of Projects and Innovation, SITA Lab



Imagine the possibilities of an airport where you can simply walk, at pace, without having to stop and show your boarding pass or passport; where your bags are already delivered to the designated location; where problems are prevented before they occur. An air travel experience that is *Smarter at Every Step*, a truly frictionless airport experience. Seems a long way off, doesn't it? Not so! The future is now. Technology is evolving faster than ever before and adoption is accelerating changes in process, technology and customer expectations as today's digital natives become tomorrow's highly valued consumers and investors.

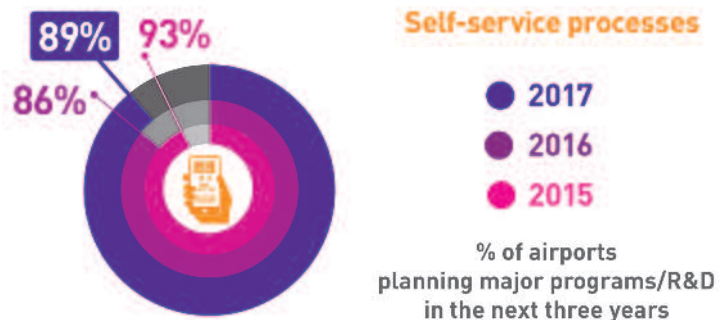
IATA estimates that passenger volumes will nearly double by 2036 to more than 7.8 billion air travellers annually⁽¹⁾. This requires airport operators and airlines to seriously consider investments in self-service solutions that streamline the traveller experience while also providing the ability to scale infrastructure and operations to keep pace with the ever-growing travel volumes. All without compromising security.

In 2017, 89% of airports invested more than USD 33 billion in self-service and cyber security-related initiatives⁽²⁾ to continually improve the terminal experience and keep pace with the ever-changing demands of the industry. As digital technologies and self-ser-

vice solutions continue to be core to our everyday lives, the demand for continued investments will rise.

(1) <http://www.iata.org/pressroom/pr/Pages/2017-10-24-01.aspx>

(2) <https://www.internationalairportreview.com/news/38292/airlines-airports-invest-it-2017/>



► Self-service requires identity assurance

To meet regulatory requirements for safety and security, self-service solutions still require that an airline agent or government official must inspect a traveller's passport and compare the face on the document to the face of the person standing at the counter, bag-drop, security checkpoint or boarding gate. This inspection can be done manually, by an agent physically looking at the person and making a judgement call about how closely the presented person resembles the provided passport photo. Alternatively, traveller identity verification can be done using biometric technology and sophisticated algorithms to programmatically perform the matching process and grant approval to proceed. Whether low-tech or high-tech, each implementation model has implications for cost (time, money, quality) and experience, for the operator as much as for the traveller.

But is the use of biometric technologies "scary"? This is an often-debated topic, particularly among privacy advocates, and can be among the leading arguments

against the investment in biometric solutions for travel.



Yet, look outside of our industry and to the likes of Facebook, Instagram, Apple, Google. Refer to a "selfie" or "Face ID" or "Touch ID" and suddenly the fear is gone. Social media, technology and the rise of the digital natives continues to change expectations of the availability of service and the inherent trust and acceptance of convenient solutions. Are we constrained by our own ideas and concerns of our

older generation? Are we listening to the voices of the customers we are trying to serve?

According to the 2017 SITA Passenger IT Trends Survey, 92% of global travellers who were interviewed suggested that they would consider or be willing to use biometric solutions for air travel if they were available ⁽³⁾. There has never been a better time to explore and trial new solutions; yet, less than 30% of airlines and airports currently plan to invest in end-to-end solutions that would offer this capability by 2020 ⁽⁴⁾. Here lies a huge opportunity gap: if we agree that self-service solutions require identity assurance and that customers are ready and willing to share their information, how do we move more quickly to accelerate adoption and transformation of the customer experience?

(3) <https://www.sita.aero/resources/type/surveys-reports/passenger-it-trends-survey-2017>
 (4) <https://www.sita.aero/insights-2017>

Airline Trends



% of airlines planning to implement single-travel token solutions by 2020

Airport Trends



% of airports planning to implement single-travel token solutions by 2020

Passenger Trends



% of passengers who would consider using biometrics instead of passport or boarding pass

► The exploration of digital identity to improve security, AND customer experience



Maintaining safety and security is of the utmost importance in our industry. This cannot be compromised in the race to implement new, innovative self-service solutions. There are many initiatives and trials underway across multiple industries and geographies, which include the evaluation of biometric modalities (iris, fingerprint, facial recognition, odour, DNA) and technologies to determine effectiveness and acceptance by customers.

The financial industry has been one of the early leaders, working to find ways to reduce the ever-growing impacts of fraud in a digital world, which accounts for more than USD 16 billion stolen in 2016 ⁽⁵⁾. Of course, the risk of fraud in the financial industry is quite different than in the air industry – the economic impact of 9/11 alone is nearly USD 2 trillion ⁽⁶⁾, excluding loss of life and residual impact on global markets. We can, however, use the knowledge from activities in other industries to learn, adapt and apply similar models that can meet our unique needs and help guide us in

our approach to innovation and improved customer experience in the air travel industry.

Of particular interest are the digital identity initiatives led by governments for the creation of national identity programmes. These tie biometric and biographic information to a state-run enrolment programme to help manage social and civic programmes, as well as reduce voter fraud. Fundamental to identity assurance and verification is the authenticity of the identity itself. The source of identity must be of the highest quality and trust to be accepted by others in the value chain. These programmes can provide quality sources of identity assurance in airport self-service when integrated with airline and airport solutions.

Building on this, there are a number of government-led and privately managed trusted traveller programmes. These link biographic and biometric information to a

paid enrolment programme that allows travellers to undergo extensive background checks to gain access to expedited screening and travel privileges. At present, these programmes tend to be regional and are limited in implementation. However, consortiums, like the World Economic Forum (WEF), are promoting the idea of a global trusted traveller programme. This could provide a great opportunity to reduce risk in the travel space. All member travellers would become ‘known travellers’, allowing for better risk-based systems implementation and staffing models that would allow travellers to be pre-vetted before arrival. This would set the foundation for the vision of the frictionless airport experience.

That said, the creation of these enrolment programmes raises concerns about cyber security and data privacy and the need to avoid a global database where everyone’s information is stored and

(5) <https://www.cnbc.com/2017/02/01/consumers-lost-more-than-16b-to-fraud-and-identity-theft-last-year.html>
 (6) <http://www.iags.org/costof911.html>

► The passport is the universal identity standard of the air transport industry

With all this disparate activity, how does one decide what to do? Which approach and solution is “right”?

First, one must agree on a baseline standard. The universal standard document across the industry is the passport, which is based on biographic detail and a photograph. Facial recognition is used to ‘match’ the passport holder to the photograph to grant access to systems. The e-chip is based upon a digital copy of the photo. The use of any other biometric (such as iris or fingerprint) requires access to, collection of, and storage of an alternative biometric to provide a reference source for future comparison and matching. This limits implementation to a small subset of selected travellers who choose to opt in and allow their biometric to be collected and stored.

That is not to say that other biometric modalities will not be accepted or supported, possibly with higher levels of accuracy as technology evolves at a different pace



for each. However, when looking for the widest opportunity for global adoption, the passport and facial recognition technologies offer the greatest immediate promise. As national identity programmes and/or trusted traveller programmes gain adoption, this can certainly change, depending on which biometric modality each State or entity chooses to implement. There is no doubt that biometric technology is continually advancing and any investment in today's solutions must consider a design that is future-proof, able to keep pace with the evolution of technology and provide the ability to create a consistent customer experience across providers and networks.

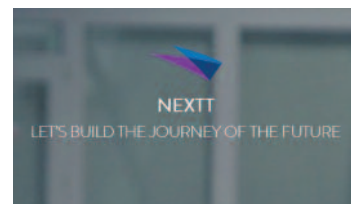
potentially subject to vulnerabilities. This is where the promise of new technologies, such as blockchain, hold attraction. They offer the promise to allow data sharing between parties without requiring a central database, allowing participants to easily opt in or opt out, and addressing key privacy concerns. As of today, more than 30 start-ups claim to have blockchain-based identity solutions at various stages of maturity and usage. It is certain that as the technology continues to advance and converge, we will see promise of an enterprise solution for the air transport industry.

Certainly, as the number of technology providers and solutions continues to evolve, so too will the need for consortiums and associations to help foster collaboration across industries on design and development of solutions and standards. Key initiatives are already underway through organisations such as Open Identity Exchange (OIX), Fast Identity Online (FIDO), International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), Airport Council International (ACI), World Economic Forum (WEF).

► Single token travel and the ONE Identity initiative

IATA's *Simplify the Business* (StB) Think Tank collaborated in 2016 on defining a strategy for single token travel and the “Travel Identity of the Future”⁽⁷⁾. The focus of implementation considers whole journey management and single-token travel: combining biometric, biographic and trip information into a single form factor to create a seamless process for all stakeholders in the journey. One that is highly secure, involves reduced administration and improves the passenger experience.

Beyond the obvious security and privacy considerations, the key objectives of “Travel Identity of the Future” emphasise the need for persistence (*beyond one trip*), interoperability (*beyond one airport or*



airline), and borderless (*beyond one country, government*) capabilities. IATA ONE Identity white papers and the NEXTT programme, in partnership with ACI⁽⁸⁾, will continue to drive that emphasis with a push towards standards and industry guidelines. Mobile and blockchain technologies are seen as key enablers for a global solution and represent a core area of ongoing strategic industry research and project use cases.

(7) <http://www.iata.org/whatwedo/stb/Documents/2016-White-Paper.pdf>
(8) <http://nextt.iata.org/>

► Key challenges and considerations for industry

As the industry continues to develop self-service solutions and deploy biometric technologies, it is important to remember a few key considerations to avoid investment in solutions that may not meet industry expectations and regulatory requirements:

- All self-service solutions must meet essential core criteria to foster adoption and achieve success.
- Regulation will continue to change.
- Safety and security will ALWAYS be the primary consideration.

ALL SELF-SERVICE SOLUTIONS MUST MEET ESSENTIAL CORE CRITERIA TO FOSTER ADOPTION AND ACHIEVE SUCCESS

Customer value proposition

To gain adoption and create the willingness for customers to participate (opt in), there must be a clear message and customer value proposition. Are you offering VIP service? Shorter wait times? Membership perks? A fun experience? The chance to be an early adopter (some people just like to be first!)?

Stakeholder acceptance

In addition to the customer value proposition, the needs of ALL stakeholders must be met. Clearly address how the solution meets the needs for airline, airport, government and traveller stakeholders. Continue to revisit this at various stages since needs may change as new information becomes available.



Business tools & core competency

The ability to deliver and continually meet objectives is critical. To succeed, the project requires access to the right organisational resources: people, partners, tools, technology, process and funds that allow the team to create success. This, more than anything, is the “secret sauce”. It is difficult to replicate, unique to each organisation, and creates the key opportunity for differentiation in the solution design and implementation.

REGULATION WILL CONTINUE TO CHANGE

General Data Protection Regulation (GDPR) is the latest example; however, all systems and processes should abide by at least the same minimum core principles:

Traceability

Clearly understand and document what, where and why data is collected, processed, stored and/or deleted.

Opt out

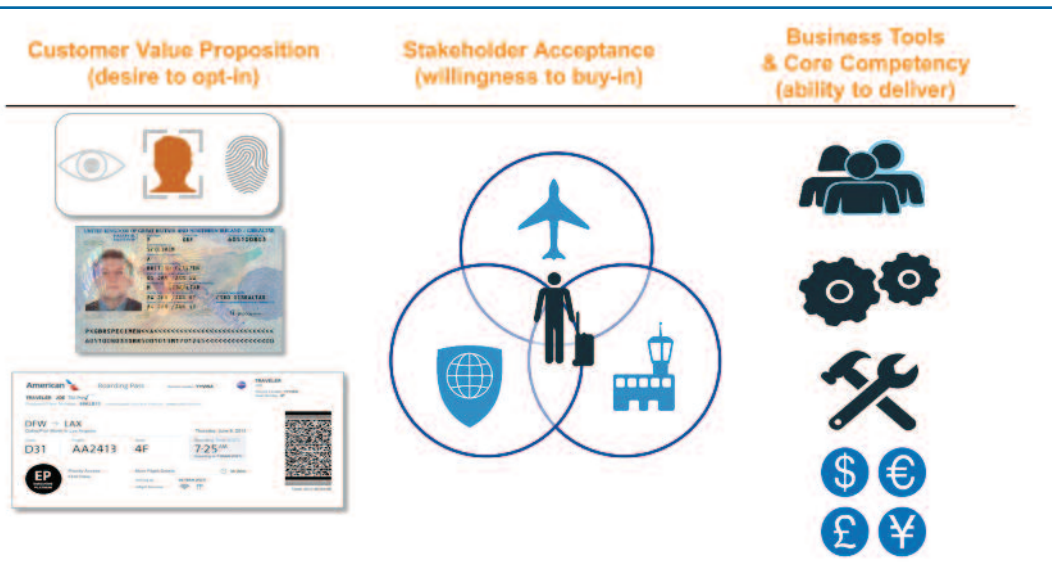
As important as the choice to “opt in” is the ability to opt out and provide assurance that data is permanently removed from the system(s).

Privacy by design

Have policies to ensure that data is only used for its intended purpose, held for its intended time, accessed only by authorised personnel, and protected in accordance with best practices and controls.

SAFETY AND SECURITY WILL ALWAYS BE THE PRIMARY CONSIDERATION

We operate in highly regulated environments. Deterring bad actors from choosing airports for their activities is at least as high a priority as traveller convenience. The use of innovative concepts and technologies to increase security, enhance screening and improve access controls will lead to the creation of efficient, safe, end-to-end solutions. These will support the continued growth of the industry and improved customer experience.



► Get started: conduct a trial and build the business case

We operate in a risk-averse industry with high regulatory constraints and limited budget for innovation. With the seeming uncertainty, changing regulation and innumerable options, how does an airline, airport or government agency choose a direction or get started? The important thing is to start with a trial or scientific approach to find the right solution.

Be sure to have clear Key Performance Indicators (executive top five will do) and approach the project as a scientific hypothesis – define expected results and objectives, what to measure, how to measure – and commit to actively monitor, measure and report progress. This period should be used to define the criteria for developing a business case and support decision-making for future investments.

Pick a simple use case, one that is low risk and relatively straightforward. This is often called the “happy path”, the basic, straight-line flow with no edge cases, exceptions or “extreme” error handling. Edge cases and exceptions can be introduced over time as separate project phases.

Run a small experiment during a well-defined, time-boxed period (45 days, 90 days, 6 months, 2 years). Whatever the period that you determine to be right for your environment requires active implementation, support for data collection, monitoring and diagnostics.

During this time, the team will collect metrics and information to drive the learning and help solidify the investment business case. Due diligence is critical during this period.

Practise adaptive learning.

Monitor systems and behaviour, conduct objective diagnostic analysis, assess performance, then adapt your approach as you test and acquire new knowledge. Pivot if you identify a new opportunity that you had not initially considered. Be bold and stop the test if performance expectations are not met or negatively impact operations, staff or experience.

► Conclusions

As we look towards the airport of the future and a seamless traveller experience, airlines and airports will continue to rely upon and invest in self-service solutions to support the rapid growth of travel volumes, while minimising capital investment and expansion where possible. Self-service solutions and standards will ultimately include the use of biometric technologies to help scale existing infrastructure investments. Choosing solutions that meet today’s needs while also supporting future growth helps ensure the infrastructure is future-proof and resilient to meet the demands of changing technologies and customer expectations. Digital natives will soon be the industry’s primary customers and solutions must continually evolve to support the ever-changing expectations of our tech-savvy customers.

Security and safety is the primary focus of the industry. Customer experience gives airlines as well as airport operators the ability to differentiate, add value and generate new revenues. With the right value proposition, passengers will willingly share information that increases security in exchange for convenience and access to a faster, easier process. The time has never been more right for airline, airport and government stakeholders to collaborate on integrated solutions that delight customers, reduce risk and improve efficiencies in operations and security.

When exploring new technologies and evaluating the investment business case, choose to explore options through time-boxed trials, with clearly defined evaluation criteria and objectives. Take a pragmatic approach and invest in phases that can increase in complexity and scale to address edge cases or potential areas of concern that could impact enterprise roll-out.

It is only through collaboration and adaptation that we can find opportunities that allow us to be *Smarter at Every Step*. ■

► The time has never been more right for airline, airport and government stakeholders to collaborate on integrated solutions that delight customers, reduce risk and improve efficiencies in operations and security.

Sherry Stein has over 20 years in travel technology experience, with a passion for business transformation and technology innovation. In 2015, Ms Stein joined SITA Lab where she leads the identity management programme, focused on strategic research on behalf of SITA’s 450+ ATI members, to create a secure, frictionless travel experience through the applied use of emerging technologies and co-innovation with key industry stakeholders. Key world’s firsts and programme successes include *Travel Identity of the Future*, a world premiere blockchain-based mobile ID project, recognised at the 2016 IATA World Passenger Symposium to be the foundation for its *One Identity* initiative; Miami Airport’s FTE Award for *Best Immigration Initiative 2017*, for its mobile passport control implementation; and JetBlue’s “*Boarding by Selfie*”, noted by Popular Science as one of the *100 Greatest Innovations of 2017* and recognised across the world’s press and media outlets for its ground-breaking approach to supporting the United States Customs and Border Protection’s (CBP) biometric exit programme. Ms Stein holds her MBA from Georgia State University (GSU), J. Mack Robinson College of Business as well as a Certificate in Innovation and Design Thinking from GSU, hosted at Oxford University in England. She is a Fellow of the Royal Society of Arts (RSA), focused on design thinking principles and creating an environment for social change by cultivating private and public partnerships.



The Legal Task Force at your service

Susanna Metsälampi
Chair of ECAC Legal Task Force

▶ The early years

The Legal Task Force was first established by the ECAC Directors General in 1996, and it held its first meeting on 12 December 1996 under the chairmanship of Alan Jones (United Kingdom). The task force started by looking at the SAFA system and at a safety clause proposed by the United Kingdom. The European Commission was invited to attend from the beginning.

Once the task force was established and running, it was quickly found to be useful for several purposes. It was a group that Directors General (and other ECAC groups) could consult on any legal matter. It could be used to develop common positions for ECAC States on international conventions prepared in ICAO, and also for legal matters being discussed in ICAO Assemblies. It could also serve to prepare the ICAO Legal Committee meetings. And, as long as ECAC did not have a legal officer of its own, it could also provide assistance to the ECAC Secretariat on legal matters.

Mr Jones became a long-standing chairman of the group. In 2005, he was followed by Anders Gradin (Sweden). The task force worked on the basis of its initial assignment, meeting once or twice a year. It was only when Mr Gradin announced in 2014 that it was time for him to retire that a discussion was held on how the work should be organised in the future.

▶ The reorganisation

By that time, ECAC had a well-established practice on how to organise the work of preparatory and cooperative groups, bringing together Member State experts. Following the same format, terms of reference and rules of procedure were drafted, and Member States were asked to nominate candidates for the positions of chair and deputy chair of the task force. It was a great honour to be chosen to chair the group, with Frankie Deckers (Belgium) as deputy chair.

It is up to Member States to nominate members to join the group.

▶ Diversity of issues, diversity of expertise

In the last three years, the group has received requests on issues pertaining to immaterial rights, liability and contractual law. Additionally, the task force has looked into some of the legal aspects of safety, security and environmental matters that had arisen in the past.

Fortunately, the group has benefitted from a wide range of expertise, as Member States have nominated legal experts with different kinds of backgrounds. Some represent transport ministries, some work with the national aviation authorities, some come from the ministries of justice.



The Legal Task Force subgroup at work in 2018. From left to right: Susanna Metsälampi, Laurent Noel, Frankie Deckers and Laurence Vincent.



Meeting of the ECAC Legal Task Force, Paris, 2017

We meet two to three times a year at the ECAC premises in Paris. Our group is well-supported by the ECAC Secretariat, in particular by its air transport officer who has been overseeing the group for over a year now. Between meetings, when necessary, task force members can be consulted via email. For specific issues, the task force has established subgroups to look deeper into the matters at hand.

Over the past three years, the task force has explored some of the legal aspects relating to – among other topics – Remotely Piloted Aircraft Systems (RPAS), the global market-based measure, State aircraft obligations, the ECAC-EASA Cooperation Agreement and, lately, the application of Article 21 of the Chicago Convention.

▶ Currently under scrutiny

Currently, the Legal Task Force is looking at two older agreements, namely the Multilateral Agreement on Commercial Rights of Non-scheduled Air Services in Europe from 1956, and the International Agreement on the procedure for the establishment of tariffs for scheduled air services from 1987. We are looking at their relevance and potential need for updating. The task force is also preparing for the ICAO Legal Committee scheduled in September 2018 during

which the issues related to RPAS and the application of Article 21 of the Chicago Convention will be examined.

▶ Air law questions of the next decade

Globalisation and new business models guarantee that issues of responsibility and liability will remain high on the legal agenda of the aviation community. The traditional way of looking at responsibilities and liabilities is no longer suitable in a world where multinational businesses are being set up at an ever-increasing pace and where companies outsource their activities more and more.

RPAS operations also require totally new ways of regulating air traffic. It remains to be seen how RPAS rules will best fit with those applied to traditional aircraft.

Among all global challenges, we must also not forget about cyber threats, which may require a new legal approach. ■

Susanna Metsälampi started working at the Finnish Civil Aviation Authority in 1992, first as a legal adviser, then as head of unit and finally as head of department. During her career, she has worked with aviation rulemaking both at national and European Union level, with international cooperation at European and ICAO levels, and with air transport services negotiations. In 1999, she completed a training entitling her to act as a judge in the Finnish courts. After heading a Civil Aviation Authority unit responsible for the Finnish aircraft register from 1999 to 2001, she transferred to air transport issues. In 2006, she became head of the air law unit. Since 2012, she has been working as head of department in the Finnish Transport Safety Agency, responsible for rulemaking issues in all modes of transport. She was nominated representative of Finland in the ECAC Legal Task Force when it was established in 1996. In 2015, she was appointed chair of that task force. Ms Metsälampi has been representing Finland in aviation working groups of the Council of the European Union, and was the Finnish representative in the EASA Rulemaking Advisory Group from 2012 to 2016. Currently she represents Finland in EASA as member of the Member State Advisory Group and as the Alternate Member for Finland in the Management Board of EASA. Ms Metsälampi holds an LLM degree from Helsinki University.



▶ Directors General gather for last meeting of 2017 • Paris, 7 December 2017

ECAC's Directors General gathered in Paris on 7 December for their 149th meeting, the last of the year. Addressing recent ICAO and EU developments, the discussions focused on reviewing further improvements to European coordination for ICAO events with Directors General identifying some key elements to address this issue. European priorities for the 13th ICAO Air Navigation Conference to be held in October 2018 were examined and the meeting looked at topics that could be considered for the development of European papers.

On environment matters, the importance of developing capacity-building activities, in line with the Bratislava Declaration, to clarify what was expected from Member States in the implementation of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) was also underlined.

Directors General also considered proposals for the 2019-2021 Work Programme and related budget and acknowledged the need for coordination, for example with EASA on cyber security and RPAS (Remotely Piloted Aircraft Systems) issues, as well as the impor-



tance of analysing the programme on environment matters following the recent consultation of the newly established environment groups.

In training matters, Directors General adopted the new ECAC Training Policy Statement. This new statement focuses on strategic objectives Member States wish to pursue in the field of training, such as quality training, effective oversight on training being delivered, and cooperation between training organisations. And in the field of security, Carla Pinto was appointed as the new chair of the Security Forum.

The day concluded with a statement issued by Directors General to mark International Aviation Day.

▶ Executive Secretary addresses the Hellenic Aviation Society General Assembly • Athens, 12 January 2018

Executive Secretary Salvatore Sciacchitano joined a number of distinguished guests at the Conference and Annual General Assembly of the Hellenic Aviation Society in Athens. In his keynote address to the Assembly, Mr Sciacchitano recognised the aviation sector's contribution to the growth of European and international economies. Recalling that Greece is a founding member of ECAC, he underlined the achievements in the field of safety, security and sustainable air transport development in Europe and confirmed ECAC's continued commitment to support its 44 Member States in addressing the key issues affecting the European civil aviation sector.



President of the Hellenic Aviation Society Ionna Papadopoulou and ECAC Executive Secretary Salvatore Sciacchitano

► Focus on digitalisation in the aviation sector at the annual ECAC Directors General Forum • Paris, 6 December 2017

The event assembled over 70 participants and featured contributions from a number of guest speakers from ECAC Member States, academia and the industry. Spread across three sessions, the discussions were moderated by Piotr Samson (DGCA Poland), Patrick Gandil (DGCA France) and Rob Huyser (DGCA Netherlands). The first session focused on the customer experience, exploring new technologies and how they are shaping a new travel experience for air passengers (SkyTeam, IATA, SITA Lab). The second looked at the implications of digitalisation on operations and performance, offering the operators' per-

spective on how innovation enables cost reduction, better data analysis and improved operational efficiency (SESAR Joint Undertaking, Airbus, Ryanair, European Business Aviation Association). The final session provided a more general overview of the impact of digital technologies and big data on aviation (EASA, Irish Aviation Authority, University of Glasgow). The three sessions provoked lively debate and offered much food for thought, especially on the challenges faced by regulators to keep pace with the rapid changes driven by the digital transformation of the sector.

► ECAC contributes to the ICAO Study Group on the Universal Security Audit Programme Cape Town, 29-31 January 2018

ECAC Deputy Executive Secretary Patricia Reverdy joined members of the ICAO Study Group on the ICAO Universal Security Audit Programme (USAP) to discuss issues such as the prioritisation criteria for ICAO audits and the rules governing the disclosure of USAP audit results, and to review the questions used by ICAO auditors. Members also agreed on some amendments to the group's existing terms of reference with the aim of more accurately describing the actual activities of the study group.

► EMTO finalises ECAC 2019-2021 Work Programme Vienna, 16 February 2018

Chaired by Urs Haldimann (Switzerland), the 53rd meeting of the ECAC Medium Term Objectives Task Force (EMTO) focused on finalising the proposal for the ECAC 2019-2021 Work Programme. The task force also pursued its discussions on budget-related matters and on the concept of ECAC associated body, which is included in the ECAC Constitution. A set of proposals will be presented to the next Coordinating Committee meeting on 28 March 2018.

► ECAC Secretariat welcomes Thierry Barrière as Aviation Security Technical Officer

The ECAC Secretariat is delighted to welcome new team member Thierry Barrière as its Aviation Security Technical Officer. As from 1 March, Mr Barrière will be in charge of the ECAC Common Evaluation Process of Security Equipment (CEP) as well as other security-related activities, such as the Technical Task Force. Mr Barrière has over 22 years of experience in aviation security, gained with a European manufacturer as programme manager for the CEP compliance of equipments and as project leader for EDS deployment through the EMEA region (Europe, Middle East and Africa). He also took part in the activities of the working groups of the European Organisation for Security (EOS). Mr Barrière holds a master's degree in international business and graduated from the ICAO Aviation Security Professional Management Course in 2017.



▶ Events to come

MARCH

- 1 55th meeting of the Facilitation Working Group (FAL/55), Paris
- 6 21st meeting of the ad hoc coordination group on security, Brussels
- 6-7 EaP/CA workshop on cargo and mail security, Paris
- 12-13 19th meeting of the Behaviour Detection Study Group (BDSG/19), Paris
- 14 21st meeting of the European ad hoc group on economic regulation, Madrid
- 14-15 28th meeting of AIRMOD (EAEG-AIRMOD/28), Brussels
- 15 6th meeting of the Economic Working Group (ECO/6), Madrid
- 28 181st meeting of the Coordinating Committee (CC/181), Paris

APRIL

- 1-4 3rd Recurrent Training for National Auditors (RTNA/3), Bulgaria
- 3-6 9th Vulnerability Assessment Training and Certification (VATC/9), Paris
- 5-6 24th meeting of the Study Group on Explosive Detection Dogs (EDD/24), Madrid

- 9-13 CASE Project Best Practices for National Auditors – Level 1 training, Sal
- 18 33rd meeting of the Legal Task Force (LEGTF/33), Paris
- 25 37th meeting of the Common Evaluation Process Management Group (CEP-MG/37), Paris

MAY

- 2-3 29th meeting of the Study Group on Cyber Security in Civil Aviation (CYBER/29), Vienna
- 7-8 2nd meeting of the European Aviation and Environment Working Group (EAEG/2), Brussels
- 8-9 CASE Project Regional Workshop on Security in Airport Design (CASE-WSSAD-REG/1), Jeddah
- 10-11 38th meeting of the Training Task Force (TrTF/38), Berlin
- 14-15 150th meeting of Directors General of Civil Aviation (DGCA/150), Paris
- 22-23 44th meeting of the Guidance Material Task Force (GMTF/44), Dublin
- 23-24 3rd meeting of the European Aviation and Environment Working Group (EAEG/3), Brussels

CASE IN BRIEF

▶ Training course for national auditors in Lebanon
Beirut, 8-12 January 2018



A Best Practices for National Auditors – Level 1 training course was delivered by two ECAC instructors to seven Lebanese participants from 8 to 12 January.

All the national auditors involved in this training are members of the *Centre d'Entraînement pour le Renforcement de la Sécurité Aéroportuaire* (CERSA), the national training centre for aviation security. CERSA is additionally the organisation with responsibility for compliance monitoring activities within Lebanon's aviation security administration.

The participants included CERSA's director, General Ziad Chahine, and deputy director, Colonel Georges Nader. This second national activity conducted for the benefit of the Lebanese authorities, following a cargo



security audit at Rafic-Hariri International Airport in December 2016, was also the opportunity to remit a Standard Test Piece to CERSA, in order to further reinforce its quality control activities.



▶ ECAC and AFCAC host CASE Project's most attended workshop in Kenya Nairobi, 17-18 January 2018

The CASE Project's first workshop on security culture, held in Nairobi, Kenya, from 17 to 18 January 2018, attracted the highest number of participants for any such event organised by the Project since its inception. Forty-nine African experts representing 27 Partner States – including, for the first time in the CASE Project, aviation professionals from Lesotho, Madagascar and Malawi – were sponsored by the Project to attend the workshop, which was jointly organised by ECAC and the African Civil Aviation Commission (AFCAC), with the support of the Kenya Civil Aviation Authority (KCAA).

The event was opened by Jean-Pierre Bardoul, Regional Programme Manager of the European External Action Service (EEAS) in Kenya and Mugambi M'Nchebere, Director of the East African School of Aviation, acting on behalf of the KCAA. Dr M'Nchebere highlighted Kenya's efforts to instil a security culture not only in the field of aviation but across society as a whole.

During the two days that followed, seven highly experienced aviation security experts from the appropriate authorities of the Netherlands, United Kingdom, Kenya and the United States, as well as Gatwick Airport, IATA and ECAC, invited participants to consider key issues impacting the effective implementation of a security culture. Alongside these presentations,



moderator Yves Mabbe, from the air cargo industry, facilitated breakout sessions during which experts shared the reality of the security contexts in which they work and the obstacles they face in achieving buy-in to aviation security standards. Discussions on how to best tackle these challenges were animated and generated a number of interesting and practical conclusions.

The very positive feedback from this first edition of the workshop will be used to inform and further refine the planning of the Project's second security culture workshop, which is due to take place in Morocco in February.

▶ Best practice training for national security auditors in Jordan Amman, 28 January - 1 February 2018

Eight Jordanian aviation security auditors from the National Civil Aviation Regulatory Commission (CARC), as well as the country's airports and airlines, participated in a level 1 best practices training course from 28 January to 1 February.

The two ECAC instructors recognised the commitment, knowledge and operational experience of the trainees, which allowed for stimulating discussions, as

well as the strong support of staff at Queen Alia International Airport, which facilitated the organisation of practical exercises. The trainees were keen to apply the acquired expertise to their daily work, and the CASE Project team will continue cooperating with CARC to support aviation security in Jordan, particularly in the field of quality control.



► Cargo and mail security mentoring activity

Armenia, 21-23 November 2017

The main objective of the mentoring activity organised within the framework of the EU-funded Project for Eastern Partnership and Central Asia Countries for the General Department of Civil Aviation of Armenia was to review the legal framework in the field of cargo and mail security, and to provide proposals for amending and further developing the regulatory require-

ments in this field, taking into consideration ECAC Doc 30 Recommendations. In the course of the activity, ECAC also provided the General Department of Civil Aviation with the ECAC Standard Test Piece and explained the best practices in its use to verify the image quality of x-ray equipment used to screen cargo and mail.

► Best Practices for Cargo Inspectors

Poland, 5-7 December 2017

The EU-funded Project for Eastern Partnership and Central Asia Countries (EaP/CA) conducted its second training course on best practices for cargo inspectors from 5 to 7 December. This three-day activity, hosted by the Polish Civil Aviation Authority (CAA) in Warsaw, allowed experts from Armenia, Azerbaijan, Georgia, Kazakhstan and Ukraine to learn more about international and European cargo and mail security requirements and best practices in conducting oversight activities in this field and to strengthen their competencies in audit/inspection techniques.

Thanks to the kind hospitality of the CAA and Welcome Airport Services, participants also had the



opportunity to develop their expertise in monitoring the implementation of cargo and mail security measures through practical activities conducted at a cargo (regulated agent) facility.



► Cargo and mail security audit

Azerbaijan, 8-12 January 2018

The cargo and mail security audit organised under the auspices of the EU-funded EASA/ECAC-implemented Project for Eastern Partnership and Central Asia countries (EaP/CA) took place from 8 to 12 January in Baku, Azerbaijan. The main objective of this audit was to assess whether existing aviation security legislation and operational procedures were compliant with international rules and best practice in the field. The audit was based on ECAC Doc 30, Part II Recommendations.



Ramil Mammadov, Deputy Chairman of the Board, State Inspectorate on Civil Aviation Flight Safety, SCAA, and Maciej Karwacinsky, ECAC

News from the JAA Training Organisation (JAA TO)

► Editorial

Paula V. de Almeida, JAA TO Director



Dear readers of ECAC news,

Digitalisation in the aviation industry is a very exciting topic for us! On a regular basis, JAA TO offers courses on advancing technology, contributing to industry compliance. From the use of new software to gadgets, there are many interesting implications of digitalisation in aviation. Below we present some JAA TO courses that reflect this evolution in several ways. Would you like to learn more? Visit our website: jaato.com.



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"The "Electronic Flight Bag (EFB) - The Paperless Cockpit Training Course" is an essential for Pilots, EFB Administrators, Inspectors, Quality and Compliance Managers, Training Managers and instructors."

- Faculty Manager Brian G. -



www.jaato.com

► Electronic Flight Bag (EFB) – The Paperless Cockpit Training Course

EFB is much more than a system or an electronic flight bag, as the name suggests. "It started like that but nowadays the sky is the limit for EFB", says the JAA TO-qualified instructor, Dominic, an experienced safety and compliance manager. "Since the iPad pushed the possibilities far, everybody has rushed into EFB and the technology keeps developing", he says. Interested? The next session is taking place on **20 March 2018**. Register in time to save your seat!

► Advanced Safety Management Systems (SMS) and Integrated Management Systems (IMS)

Many aviation safety professionals struggle with their company's SMS. It is a common wish to want to reduce overall operating costs, while improving the SMS position within the organisation. Market leaders go further and integrate the several management systems inside their organisations in an IMS. But besides having it operating efficiently, one needs to understand how to be compliant with the respective regulations for SMS and IMS. If you also need to overcome those challenges in your organisation, the "Advanced Safety Management Systems (SMS) and Integrated Management Systems (IMS)" training course is for you.

Daniyar Bizhanov, Director and SMS Manager for JetQ S.r.l. San Marino, attended the course in January 2018. "I attended the SMS and IMS course and I found it very helpful for every operator in aviation. It provides a deeper understanding of the safety management system and it is very helpful if you implement all the



Daniyar Bizhanov, Director and SMS Manager for JetQ S.r.l. San Marino

theory", he said. "A lot of examples were given in this course and I really enjoyed it. After you have taken the course, you really want to implement everything you have learned", concluded the CEO. The next session will take place on **25-26 April 2018**. You can register online.

► Flight Data Monitoring/Flight Data Analysis Programme (Intro)

Do you know how to set up and run a Flight Data Monitoring (Flight Data Analysis) Programme under the present ICAO and EU framework? It is important to know because it is a regulatory requirement and an essential part of your SMS. In case you need

help, JAA TO has a course where participants can gain good knowledge of the requirements, process, practical usage and benefits of an FDM/FDA programme. You can learn more on the website. The next session is taking place on **28-29 March 2018**.

JAA
Training Organisation

"The Flight Data Monitoring (Flight Data Analysis) Programme is under the ICAO and EU regulatory requirements. It is also an essential part of your SMS."

- JAA TO Faculty Manager Brian G. -

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JAA
Training Organisation

"Besides having it operating efficiently, one needs to understand how to be compliant with the respective regulations for SMS and IMS."

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FOR MORE INFORMATION,
PLEASE CONTACT:

ECAC Secretariat

3 bis, Villa Emile Bergerat
92522 Neuilly-sur-Seine Cedex FRANCE

Tel. : +33 1 46 41 85 44

Fax : +33 1 76 73 98 57

secretariat@ecac-ceac.org

www.ecac-ceac.org
