Flight Plan to Safety

European pilots' perspective: Threats & challenges to commercial air transport

ECA Piloting Safety
European Cockpit Association

BLANK PAGE

Contents

Foreword

by Sidney Dekker

Sidney Dekker, M.A., M.Sc., Ph.D
Professor and Director, Safety Science Innovation Lab, Griffith University

Knowledge of the messy details is important. This is one key finding that research on safety, high-reliability organisations and resilience keeps returning. Signals of potential danger, after all, and of a gradual drift into failure, can be missed by those who are not familiar with the messy details of practice. This means that stakeholders of all kinds – managers, regulators, customers – should be interested in engaging those who are practiced at recognizing risks and anomalies in operational processes.

So-called high-reliability organisations, for example, have been acclaimed for their sensitivity to operations and their deference to expertise. Stakeholders in and around these organisations are attentive to their operational front-end: the so-called sharp end where the "real" work gets done, where workers are in direct contact with the organisation's safety-critical processes. High-reliability organisations push decision making down and around, creating a recognizable "pattern of decisions 'migrating' to expertise" as Karl Weick puts it.

Such engagement must happen even for decisions that have, at the surface, little connection to operations or design. Budgets, for example, are often insensitive to operations but can in the long run very well have operational or safety consequences. As can many kinds of regulations. Paying attention to the sharp end pays off: recent research in the oil industry, for example, has linked leadership involvement in daily work operations with worker competence, role clarity and safety involvement. This is echoed in organisational-psychological research into the effects of leadership presence on employee performance, loyalty and attachment as well.

In hindsight, not deferring to expertise – or not taking knowledge of the messy details seriously – is often constructed as a major safety shortcoming. Prior to the Texas City refinery explosion in 2005, for

example, BP had eliminated several thousand US jobs and outsourced much of its refining technology work, and several hundred engineers who had been centrally located within the company left. Many experienced others retired. It was only years later that BP realized it had lost too much in-house technical expertise – too much knowledge of the messy details. The loss of human expertise in the refining business, both in the line and supporting functions, meant that line managers became miscalibrated about process safety. The focus was on cost-control and rationalization of the refining business, and managers believed that process safety was adequately tracked and controlled. They tended to simplify operational and technical problems, and not defer to expertise or operations.

This ECA report, or series of reports, represents an instalment in communicating the messy details – they constitute a report, literally, from the front, a series of notes from the sharp end. You will find notes on fatigue, on legislation and regulation, on safety culture, on training. It might be easy, for some, to downplay what is in these reports because they can be argued to be partisan, or biased, or driven by particular industrial or political agendas. Yet, these are concerns and ideas expressed by the people who know what it takes to get a job done – that doing the job and following all the rules, procedures, protocols and treatises may not be possible at the same time. These are the people who understand that in an increasingly complex system, success does not stem from a few heroic acts or actors, and that failure does not inhere in single components either (like "human errors").

Success and failure, in such complex systems, are made and broken the whole time, collaboratively, relationally. These are the people who, on a daily basis, hold together an incoherent and not always thought-through patchwork of technologies, rules, pressures, expectations, collaborations and interactions. These are the people from whom we can get first-hand insight into the gradual normalisations of deviance, into the incremental shifts in what is considered acceptable in the name of getting the job done.

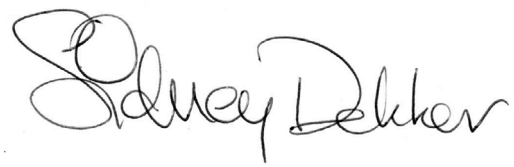
Of course, it is easy to come back and show these people the rulebook – which says how work is supposed to be done – and overlay their or their organisation's actions on it, and then point out where the mismatches are. You can call these mismatches "deviations" or, with even more moral indignation, "violations." And then you might be

"These are the people from whom we can get first-hand insight into the gradual normalisations of deviance, into the incremental shifts in what is considered acceptable in the name of getting the job done"

moved to say to them and everybody else: “Try a little harder!” But all of that proves little, except for your own ignorance of the messy details.

Even if there might be discomfort with a slippage of norms and standards (in the name of production or other targets), with evidence that some rules, regulations, treatises, interventions or implementations are not working as well as hoped, this is no basis for dismissing reports from the front – reports full of messy details. A safety culture, after all, is a culture that allows the boss (or other relevant stakeholders) to hear bad news. A climate of openness, of honesty, disclosure and learning, is the best basis for bad news to make it to the boss. What this will show is that in the real world, where messy details matter, people’s actions are to be compliant not just with explicit rules but with a huge complex of implicit rules, informal norms, peer standards and relationships, historical evolution of apparent risk, and with subliminal organisational messages about what really matters.

As one executive in the oil and gas industry told me recently: “Safety is binary. Whether we do it depends on whether the gas is flowing or not.” Denying the reality of such a context by judging the input of one set of critical stakeholders as partial, is really kidding everybody. Perhaps it persuades some gullible stakeholders that they can live on in the myth of their industry’s ideal image. But it will fool only a few. And, as physicist Richard Feynman said in the wake of the first Space Shuttle accident, it certainly won’t fool nature.

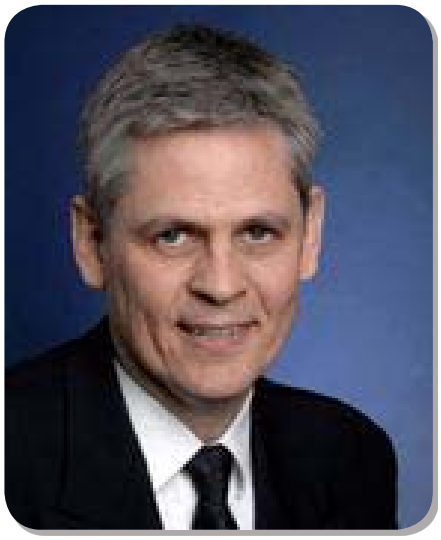


Sidney Dekker, M.A., M.Sc., Ph.D.

Professor and Director, Safety Science Innovation
Honorary Professor, School of Psychology, The University of Queensland
First Officer, B737NG
Author of a.o.: “The Field Guide to Understanding Human Error”, “Drift into Failure”, “Just Culture”, “Second Victim”

Editorial

by Pete Kaumanns



Burkhart 'Pete' Kaumanns
Captain Boeing 747
ECA Technical Director and Member of the Board

When I was a new captain on the Boeing 747 Jumbo Jet, this was the instant I was afraid of the moment of truth. Coming back from Bangkok in the very early morning, I had a full load of more than 300 souls on board and I really felt the weight of responsibility.

Winter had just arrived: the first heavy snowfall had hit Central Europe over night. In fact, the weather at destination was worse than forecasted and really marginal: low clouds, gusty crosswinds, snow drifted across the runway obscuring some of the lights. There were no reports from preceding flights to help our situation assessment since we were the first ones in. Alternate airports were even worse, no automatic landing was possible, the other pilot – as tired as me.

This early morning, I felt the odds were against me. I had to land this – still not fully familiar – airplane in challenging conditions. Now, if you think I am a melodramatic person, you couldn't be further from reality: I am just a typical no-nonsense pilot.

Why should you – the passengers – listen to us – the pilots – about safety? The simple truth: because we are in there with you. We are in the same boat, and we want to finish a flight the same way as you do: safe and sound. Survival is the very primal reason why we are doing our best for our flights to be safe. Comfort and economy are definitely only runners up – unless the economic situation is so dire that it also becomes a survival issue and challenges the priority of safety. It is easy to see that the motivation of airlines and governments to have a safe aviation system is less direct and less compelling. Being unsafe would be bad publicity, threaten the business model, and maybe even endanger the wellbeing of the public but it is far from a personal survival issue.

A question of balance and motion

Aviation is the only inherently unstable transportation system: if you stop, you drop. On the road, in a car or a bus, if the engine acts up, when the rain is too heavy, when nothing else helps: the driver can still pull over to the curb and stop. On a train, as a last resort, even a passenger can pull the emergency brake. Shipping does not need forward speed to keep afloat either. In fact it needs no input at all. Yet, an airplane needs that forward speed otherwise, if it goes too fast or too slow, it will simply stop flying. And you better be on the ground when the fuel is all used. To handle these very complex and expensive flying machines, pilots are selected to fulfil basically two requirements. First, they have to be able to manually handle these machines in 3D, and at the same time quickly and calmly make good judgments.

So there is a quantum of "The Right Stuff" involved but it is mostly a sober, permanent effort to operate all those millions of flights as safely as possible. Of course we, the pilots, have many modern tools such as autopilot, fly-by-wire, GPS navigation and collision warning at our disposal to help. Yet all of these have their own limitations and design flaws and relying too much on them will lead us into trouble as well.

Flying, like every other human skill, needs constant training and practise. Just like driving a big bus on a narrow country road at high speed (remember, you can't go slower) it needs a lot of attention, focus and brain power. So the golden rule is to have as much brain power available as possible from the start, and avoid distractions and fatigue. This is even more valid for modern airliners which are more complex, and their inherent logic is less intuitive: this requires not less but more and better training, which is expensive, and the cost pressure in aviation is ever getting higher.

In the end, when nothing else works (and pulling over is not an option) the pilot will have to manually fly the airplane to a safe landing.

This skill and the way we train it creates the first stepping stone for flight safety.

"In the end, when nothing else works (and pulling over is not an option) the pilot will have to manually fly the airplane to a safe landing."

The other quality sought after in pilots is the ability to make quick, rational and correct decisions. This decision making ability is at least equally relevant for the safe conclusion of the flight as it is for the flight training of the pilot.

To identify a hazard and to prevent it from affecting the safety of the flight is the name of the daily game never to be cornered by outside influences, never to be target-centered, always to have a "Plan B". Try and avoid as much as possible a risky situation like my story from the beginning. There is so much truth in the old aphorism: "a superior pilot is the one who uses his superior judgment in order to avoid using his superior flying skills".

Yet, good decisions don't grow on trees and are not learnt by reading a book. Good decisions rest on experience, a solid fact and knowledge base, good situational awareness and freedom to decide. Time or other pressures and a fatigued brain are the obvious enemies of a good decision.

Taking the best decision possible forms the second stepping stone for safety.

"Taking the best decision possible forms the second stepping stone for safety."

The safety principle to always have two pilots on duty at any given time not only serves the 'redundancy' principle which is a cornerstone in aviation (airliners always have two components of any relevant system built in) but also doubles the knowledge base and the experience available. And the (typically) younger pilot is able to learn and to feed his/her experience for the day when s/he will be the older pilot.

To further broaden the knowledge base on safety traps, we advocate a reporting system, where pilots can freely share the judgment errors they have made and got away from. Pilots are usually very self-critical professionals and they probably hate their mistakes even more than the average person. So we are asking them to open up and self-incriminate, which even a legal system cannot do. All in the mission of preventing the next crew from falling into the same trap.

It is obvious that this information is very sensitive and needs to be protected (also from legal follow up since there was no legal basis for requesting this information in the first place). The US FAA

has understood this principle already for a long time: a safety report automatically protects from FAA penalties. But government bodies relevant to aviation have not all kept pace with the rapid increase of air traffic (and mentality changes). Most of them even shrunk over time which immediately raises the question: how can less people oversee the safety performance of ever more operators? Paper is patient, are they still close enough to reality to see the real aviation problems?

With thousands of flights a day, which make it to their destinations safely, the score for good decisions vs. bad decisions is overwhelmingly positive.

Time to relax?

Certainly not: on the contrary, we need to further enhance our safety efforts. The increasing number of flights will inevitably produce more accidents and close calls – statistics are not in our favour. We need to drive down the accident rate, just to keep the number of accidents at present level!
Coming back to my personal memory, this early morning landing in drifting snow turned out to be one of my better ones and I disembarked with a little afterglow of pride because this time I had mastered the challenge well. But all of us on the flight deck dread the day when the challenge is bigger than our combined abilities and skills.

From a pilot's safety perspective, "good flying skills" and "good decisions" still have a lot of potential for improvement and will always remain our top priorities. But there are additional areas that need our increased attention. They might evolve over time and change. Like a pre-flight briefing package, we have bound them together and present them for your consideration: this is the European Pilots' "Flight Plan to Safety".

Burkhart 'Pete' Kaumanns
Captain Boeing 747
ECA Technical Director and Member of the Board

Methodology

A word on methodology

Identifying emerging risks and potential threats is at the core of every pilot's skillset. The key challenges discussed in this document have been distilled through a thorough analysis of the current economic, political and operational environment in Europe and around the world.

Yet, risk identification and classification is essentially a subjective estimate. The key challenges presented in this document are not set in stone. This means they will evolve, change, influence and become influenced by current developments. The ECA 'Flight Plan to Safety' is thus a living document and like any flight plan is subject to deviations. As new potential threats are identified, the Flight Plan will be amended. Other issues already identified will (hopefully) find a satisfactory solution and disappear from the list. The sole purpose of this analysis is to put the finger on any potential issues and help aviation safety professionals and policy-makers put in place appropriate prevention or mitigation measures.

© Andreas Tittelbach

Next: Key Challenges

Key challenges

In the "Challenges of Growth 2013" report, EUROCONTROL looks at different scenarios how air transport might develop by 2035. Taking different factors into account, including economic growth, fuel prices and load factors, EUROCONTROL identifies "Regulated Growth" as the most likely scenario for European aviation. As the name suggests, this scenario entails moderate economic growth with regulations reconciling environmental, social and economic demands. This scenario also foresees a 1.8% average annual growth or approximately 50% more flights in 2035 compared to 2012.

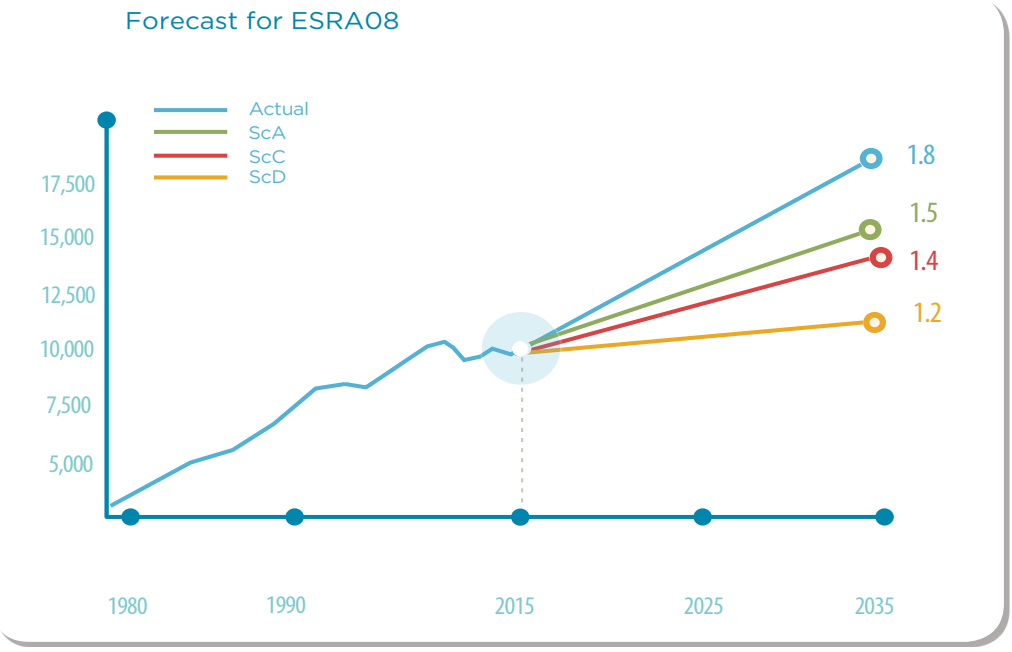


Figure 1: EUROCONTROL 2013 www.eurocontrol.int/STATFOR

This growth rate would not only mean more and bigger operators, which will have to manage more aircraft and flights. It also means increased productivity and challenges of reconciling high workload with better safety levels. Growth means that operators will be facing a balancing act to increase productivity of crews without eroding safety levels.

Aviation is an industry that is also hindered by borders. A harmonised European aviation system is a conditio sine qua non for successful growth and operations. Industry, however, has deeper problems on its own. The economic crisis is putting pressure on profit margins and pushing operators to cut costs where they can. This in turn can have a negative impact on safety margins which, once well above the legal minimums, are now quickly approaching these limits.

The complexity in the aviation system is rising as well. For example: operator A, selling tickets under company B, hiring planes from company C, crew from company D, and flying from country E to country F, and this increasingly with one operator having bases in several different countries. Complex operations like these are no exception nowadays and will increasingly become the norm. Yet, they raise the demand for operators to handle safety in a pro-active and responsible manner. This intricacy requires also an oversight authority with a lot of expertise, skills and adequate resources to supervise the safety performance of operators.

Along with the transition to performance-based regulatory oversight, the entire safety net in aviation needs to be managed carefully. Such a regulatory and oversight system will only be able to properly function if it is fed with operational data. It has been said over and over again: data is the fuel of a Safety Management System. Yet, collecting, storing and analysing this data remains a challenge.

Against this backdrop of economic pressure, forecasted traffic growth, a changing regulatory environment and the need to have a data-driven safety system, some key challenges for aviation are emerging at the European and global horizon. Being able to put the finger on those issues, pilots and safety professionals can adequately act to tackle them together.

The complexity of the aviation system illustrated

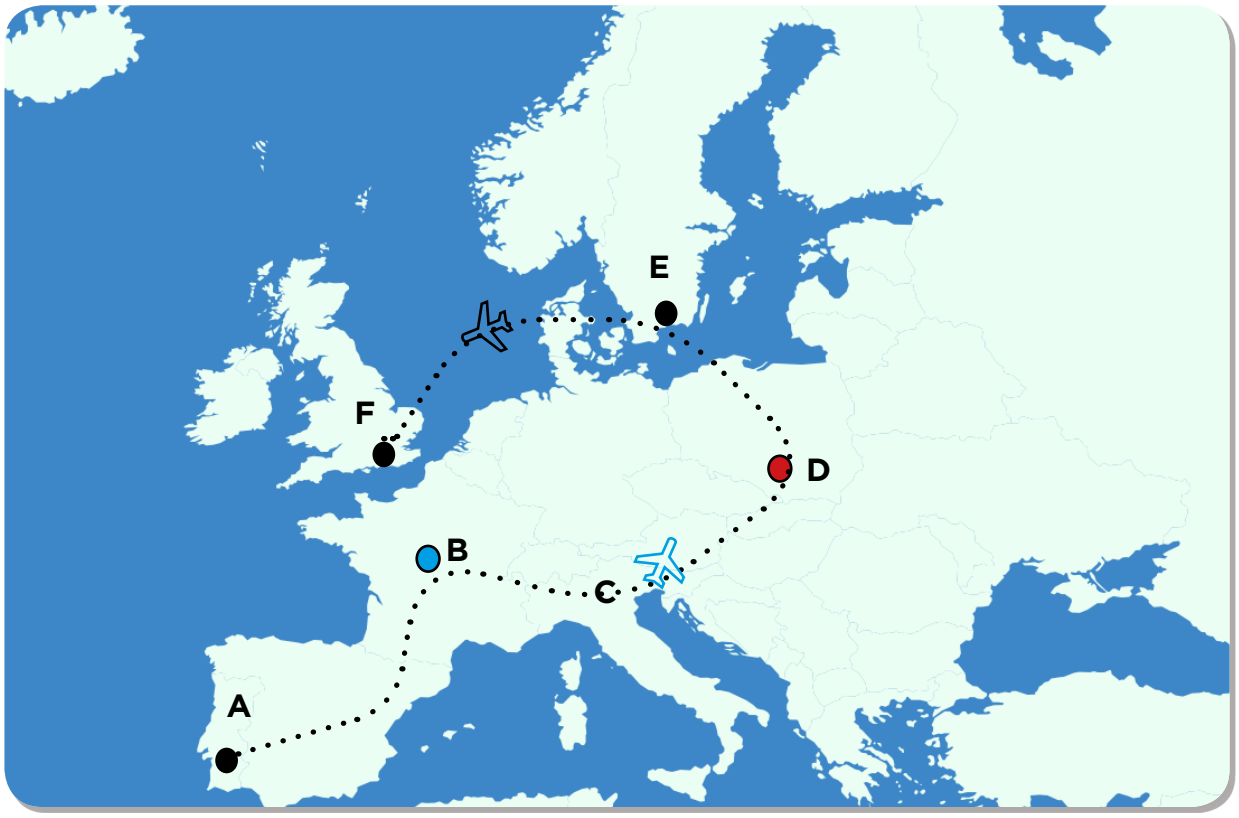


Figure 2: Complexity of aviation system illustrated

For example: Operator A, selling tickets under company B, hiring planes from company C, crew from company D, and flying from country E to country F, and this increasingly with one operator having bases in several different countries.

Overview

1

Inadequate regulation

Drawing lessons from various industries how to improve regulation and oversight in aviation and a look on the role of the European Aviation Safety Agency (EASA).

2

Pilot training

From the economic challenges of the aviation industry to the complexity that automation brings, becoming a pilot is much more than acquiring stick-and-rudder skills.

3

Safety culture

Establishing a true safety culture in aviation is a long process which has so far booked good results. We take a glimpse into the future to see what challenges might lie ahead for safety.

4

Fatigue

Fatigued pilots have made headlines worldwide. Yet, fatigue research and Fatigue Risk Management Systems have a long way to go.

Inadequate Regulation

A common denominator

Deepwater Horizon
Oil Rig explosion

Columbia Space
Shuttle launch

Alaska Airlines flight 261
Sundial memorial in California

Inadequate Regulation

Different industries have shown in the past what can happen if management and oversight authorities are not up to the task of maintaining safety.

We will look at some examples, including non-aviation industry accidents, and we will try to draw lessons for the aviation industry from these high profile cases. The Deepwater Horizon Oil Rig explosion and oil spil (picture 1), the Columbia Space Shuttle (picture 2) and the Alaska Airlines flight 261 accident (picture 3) - all these are highly visible cases that grasped the world's attention for weeks.

This is also an attempt to pinpoint where the European aviation safety system has to focus and improve. That the European Aviation Safety Agency (EASA) will have to play a key role in the solution is a given.

Download "Civil Aviation Legislation & Oversight: Can it guarantee safety?"

History has been a silent witness to many unfortunate events where the lack of proper regulations or the ability to enforce them has had grave consequences. In 2010 for several weeks, the world turned its eyes to the Deepwater Horizon Oil Spill, which may be one of the most telling examples of regulatory collapse. The worst environmental disaster ever had exposed a variety of regulatory failures by the US government but also triggered calls for more pro-active governance and oversight. Any such event is relevant for drawing lessons for aviation.

As an industry where regulatory regimes and adequate oversight lie at the very foundation of safe operations, aviation requires a thorough analysis of such events across different industries. Despite unquestionable differences, learning from such past "mistakes" could help aviation professionals and policy makers make sound choices when drafting legislation and step up efforts to ensure these regulations are correctly implemented.

Numerous events across different industries however show that there are many hurdles to drafting adequate regulations and overseeing their implementation. A lack of expertise and resources can be such a powerful obstacle. Currently, legislation in Europe scarcely covers the "soft" issues of aviation safety data handling, decriminalization, reporting culture, etc. There is a tangible threat that quality of oversight will drop in the changing European legislative and economic environment and this will become a downward spiral having a major negative impact on flight safety.

Deregulation combined with liberalisation can accentuate the problem. More and more oversight functions will be transferred to airlines themselves, with less binding rules and more flexible legislative tools. This will dilute any real empowerment from oversight authorities and heavily restrict the effectiveness of legislation.

The European Aviation Safety Agency (EASA) also plays a key role not only for rulemaking but increasingly also for safety oversight. How the Agency will cope with increasing responsibilities with the same resources remains to be seen.

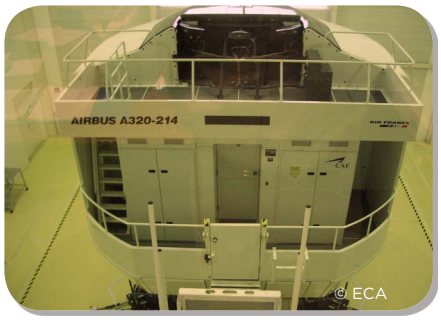
When stepping up efforts to regulate, the key will be making sure these regulations are adequate to current developments and requirements.

Download "Civil Aviation Legislation & Oversight: Can it guarantee Safety?"

Next: Pilot Training

Pilot Training

Otto Lilienthal, 1891



Pilot training simulator

ECA "Pilot Training Compass: Back to the future"

Pilot training

Ever since the first take-off of a manned aircraft 110 years ago aviation has been undergoing constant change. Increasing automation, proliferation of technology, complex regulations and tighter budgets are affecting aviation and the demands on the profession of an airline pilot.

Despite sophisticated technology, the laws of physics have remained the same and the good old-fashioned 'stick-and-rudder' was not only crucial in the past but will remain essential in the future. An early investment in fundamental flying skills lays a foundation upon which pilots can rely for the rest of their flying career.

To identify how pilot training should look like now and in the future, ECA has published its "Pilot Training Compass: Back to the future".

Published in early 2013, the "Compass" is a first part of this series of publications looking at the key challenges for civil aviation. The Compass reflects the vision of pilots and pilot training experts and identifies several key principles of flight training: early investment in good basic flying skills, fluency in critical manoeuvres and more time for training rather than checking.

Download "Pilot Training Compass: Back to the Future"

Pilots need a very unique set of skills, competences, abilities and personality that partially has to be present as a prerequisite. Some of these can be trained but others will simply have to be developed over the years. What is clear is that pilot training is not a one-off exercise but rather a continuous effort to train skills and develop competences. Equally important is to remain proficient throughout the entire career.

When discussing pilot training, however, aviation safety experts often end up with the question of how to better train pilots in an industry marked by proliferation of automation and technology. New sophisticated systems and aircraft are extremely helpful and an irreplaceable part of aviation nowadays but with advances of technology many worry that eroding basic flying skills and over-reliance on automation systems will negatively impact safety.

Fears that pilots are getting accustomed to electronics and new technology and might be losing their piloting edge have urged calls for going "back to basics". Pilots can only develop skills needed to override these automated systems if more attention is paid to training core flying skills. Attention to these skills, which remain at the basis of any flight training, should be the driver behind any pilot training program.

While the debate about automation and pilot training remains an essential part of discussions, there is much more to be said. Today's tasks for pilots also include much more than the pure handling of an aircraft. A pilot today has to manage the whole event of a commercial flight which requires a completely different set of skills, including decision-making, crew resource management, threat and error management, etc. The list is long and prospects are it will expand even further.

Balancing this ever expanding list of skills and competences of pilot training with drive to reduce costs will become an even more pressing issue. Pilot training seems to be the number one field that airlines tend to outsource. This means airlines no longer have an exclusive grip on the qualifications and skills of one of the most important safety barriers – the flight deck crews.

So it is important to trace these developments and make sure pilot training programs are continuously up to date and striking the right balance.

Download "Pilot Training Compass: Back to the Future"

Safety Culture & Data

Safety culture

Reporting incidents as a cornerstone for safety culture

Safety Culture

Safety culture is generally defined as a set of beliefs, norms, attitudes or practices which reduce the exposure to conditions considered dangerous or hazardous. In aviation, this also entails a great responsibility for individuals to communicate safety issues in order to help maintain a true safety culture.

This is why it is of crucial importance for an organization to have a high rate of information flow: top-level decision-makers need to have a clear and up-to-date picture of what is happening and front-line personnel needs to have willingness and confidence to report safety concerns.

In Europe, a new legislation, the Occurrence Reporting Regulation, will soon add to this equation. It will provide new tools for collecting and analysing information but it could also shape Just Culture in Europe. Monitoring these developments will be crucial for the safety of aviation.

Until recently, the aviation safety system primarily relied on technological progress, legislation overseen by regulatory authorities and lessons learned from investigations into accidents. This reactive approach, however, now shows its limits in the ability to still generate significant safety improvements. With the growth of air traffic, it will become increasingly important to reduce the number of air accidents even further in order to even maintain the safety levels of today.

Air transport today is an increasingly complex socio-technical system. It is a well-established fact that such a complex system cannot be fully controlled. For that reason, although the reliability of individual components (both technical and human) is fairly high, it is their interactions that sometimes result in unwanted outcomes and accidents at worse. Moreover, all components and their interactions are evolving with a growing pace.

For that reason, it is of crucial importance for an organisation to have a high rate of information flow: top-level decision-makers need to have a clear and up-to-date picture of what is happening and front-line personnel needs to have willingness and confidence to report safety concerns. Simply put, an organisation where management fails to listen to concerns of its personnel is an organisation without control – therefore unsafe.

An informed organisation encourages, collects and analyses relevant data. Then it is able to learn from its mistakes and make changes. In order to have data, people must be confident to report safety concerns without fear of blame. This is how components of safety culture come together: informed culture, learning culture, reporting culture and just culture.

One of the solutions on the radar of safety experts in Europe and beyond is to shift the focus from taking 'corrective' action after an accident has happened to pro-active prevention of air incidents and accidents. This shift will imply much more attention to collecting and analysing safety occurrence data. Safety data is vital to enable the timely identification and management of potential safety hazards – and this before these hazards turn into an actual accident. Yet, collecting relevant data is easier said than done. Existing incident reporting schemes have often proven to be insufficient when collecting and analysing data. Despite promising legislative initiatives in Europe, it still remains a challenge to obtain all relevant

information. One of the leading factors to explain this is the fear of repercussions when aviation safety professionals report mistakes or mishaps.

Criminalisation of air accidents (and incidents) is an unmistakable trend in Europe and overseas and has inevitably a negative impact on reporting. Pilots, air traffic controllers and all other aviation safety-professionals will be able to openly share safety information only in an environment based on trust, one which neither entails blame nor leads to ungrounded prosecution.

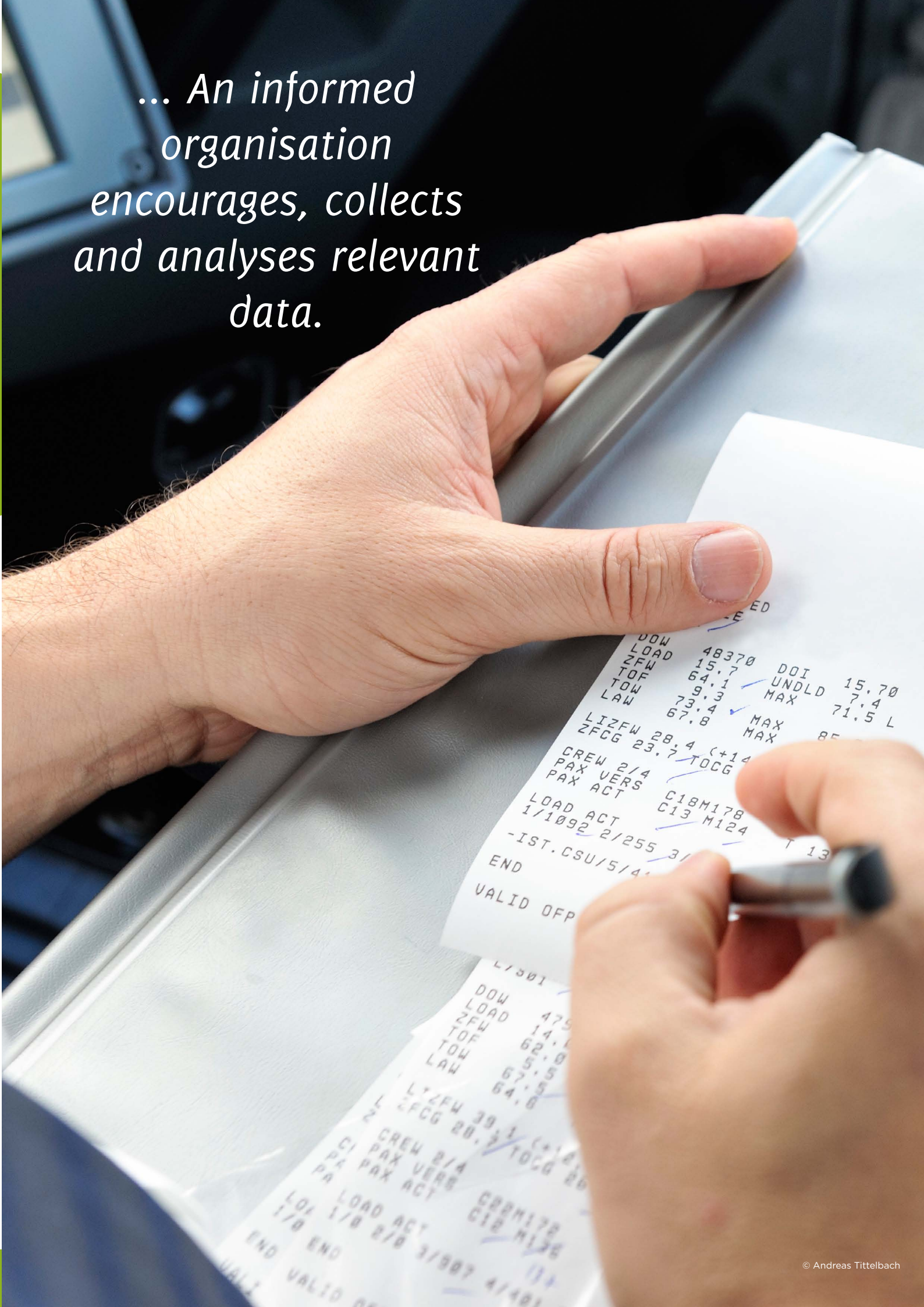
It is in this context, where the importance of the 'Just Culture' environment cannot be stressed enough. The European Union is in the process of adopting rules which will enhance the 'Just Culture' principles and protect professionals who report safety occurrences. The Occurrence Reporting Regulation contains provisions against the inappropriate use of safety information and for a strict protection of the reporter of a safety occurrence.

Society as a whole however is not very cooperative. The proliferation of social media may already be influencing at least the perception of accident investigations. People are (by nature) quick to judge (after all in the good old times of the caveman we all had to make quick calls: friend or foe?; otherwise we would die rather quickly and painfully). Social media at the hand of (almost) everyone gives society an almost real-time description of what they think is happening, complete with videos, pictures and their judgment on who is to blame. This is picked up by media who are more concerned about being the first to report breaking news than about fact checking – leading to a 'societal conviction' even before the fire from the crash is put out.

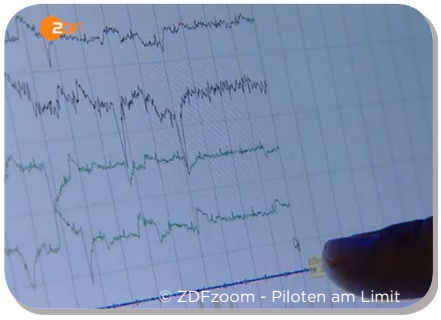
EU Occurrence Reporting

In December 2012, the European Commission proposed new rules to enhance aviation safety through better use of safety incident data. The so-called Occurrence Reporting Regulation proposal is a core element of the future European aviation safety system which aims to shift Europe towards a proactive and evidence-based safety system, i.e. a system that attempts to foresee and prevent accidents based on the collection and analysis of data, rather than simply reacting after accidents.

The current proposal contains also provisions which are related to the Just Culture principle. They constitute an important central pillar of the new Occurrence Reporting system, as everyday reality shows that establishing a proper safety culture at company level – even with a good legal framework – remains a challenging task.



Pilot Fatigue



Pilot fatigue: genuine concern in aviation world

Pilot fatigue

Over the last few years, fatigue among pilots and cabin crew has become a genuine concern in the aviation world. Despite scientific studies showing that fatigue could jeopardise the safety of air operations, data about the prevalence of fatigue across Europe is scarce.

A 2010-survey by the Norwegian public service broadcaster, NRK, revealed that half of the pilots have fallen asleep or dozed off while on duty, with almost 4 out of 5 pilots stating they have felt too tired to be in the cockpit. Following these striking results, ECA Member Associations took up the challenge of surveying pilots in Europe. Results are bundled into **"ECA Barometer on Pilot Fatigue".**

With the adoption of the new FTL rules on European level, much attention will have to be given to how these rules are implemented but also central will remain the scientific fatigue research as well as the development of Fatigue Risk Management Systems (FRMS) at company level.

Download ECA Barometer on Pilot Fatigue

or visit www.eurocockpit.be/pages/flight-time-limitations

It is estimated (e.g. by the NTSB) that fatigue contributes to 20-30% of transport accidents (i.e. air, sea, road, rail). Since in commercial aviation operations about 70% of fatal accidents are related to human error, it can be assumed that fatigue of the operating crew contributes to about 15-20% of the overall accident rate. The same view of fatigue as a major risk factor is shared by leading scientists in the area, as documented in several consensus statements.

In fact, since the early 1990s scientific studies clearly show the negative effect of fatigue and sleep deprivation on reaction time and decision making. A duty time of 13 hours is likened to a blood alcohol content of 0.05%, the legal limit for driving a car in many countries. But still flight duty periods of 13 hours and more are scheduled for air crew.

On the other hand, the competitive pressure in commercial aviation drives the momentum in the opposite direction and makes many companies opt for tighter flight schedules to make optimum use of the crews, as close as possible to the legal limit. This in itself shows the need for adequate Flight Time Limitation (FTL) rules to be put in place and applied effectively.

In the US, the Colgan Air accident (2009) triggered a legislative initiative for safer flight time limits, but unfortunately this momentum has not carried over to Europe. The EU recently amended its FTL regulation, but fell well short of their own scientific evidence, consensus and best regulatory practice.

In the Fatigue Barometer, ECA sampled today's pilots and how fatigue influences their (safety) judgment in the cockpit. Clearly fatigue is a major concern in today's daily operations and science can help in better defining the schedules and rosters to minimise fatigue and have crew in the cockpits that are able to make good judgments and land their airplane safely.

So safe and scientifically-based rules are a must. But it is also true that rules do not eradicate fatigue. The knowledge and the evidence on fatigue as a safety risk is the same all around the globe. Hence, it is through constant effort, initiatives and education that mitigation measures will be put in place and the safety risk stemming from fatigue can be reduced. Decreased alertness due to insufficient sleep or rest and too long duties however will continue to be a looming hazard.

Therefore – looking ahead – numerous challenges lie in front of us, such as ensuring a uniform, safety-oriented interpretation and implementation of the new set of EASA FTL rules; the proper use of Fatigue Risk Management Schemes (FRMS) by the operators with full involvement of crew representatives and a strong oversight by the European and National Aviation Authorities;

the need for open and frank fatigue reporting by the pilots and cabin crew – based on the new EU Occurrence Reporting Regulation – and embedded in a Just Culture environment; further operational data-based scientific research and surveys about fatigue in Europe's cockpits; dealing with a potential wave of deviation and derogation requests from the new EASA rules coming from the operators to adapt the new rules to their operational and commercial needs; etc.

The list is long and Europe's pilot community will continue to play an important role to ensure fatigue is taken seriously as a safety hazard and is properly addressed at regulatory, company and crew level.

Pilot Fatigue: Overview scientific studies

A selection of studies

- European Transport Safety Council (ETSC) **Position Paper on FTL**, based on advice from 6 scientific fatigue experts.
- **Scientific assessments of EASA NPA-2010-14,** by Dr. Alexander GUNDEL, Dr. Philippe CABON, Dr. Mick SPENCER, June 2011 (see p. 103-194)
- **Moebus Aviation.** "Final Report - Scientific and Medical Evaluation of Flight Time Limitations" – study mandated by EASA, 2009.
- **Flight Safety Foundation**. An extract from "Consensus Emerges from International Focus on Crew Alertness in Ultra-long Range Operations". 2003.
- **Goode, J. H.** Are Pilots at Risk of Accidents Due To Fatigue?. 2003.
- **Akerstedt, T., Mollard, R., Samel, A., Simons, M., Spencer, M.** Paper prepared for the ETSC Meeting to discuss the role of EU FTL legislation in reducing cumulative fatigue in civil aviation. 2003.
- **Spencer, M. B., Robertson, K. A.** Aircrew Alertness During Short-Haul Operations, Including the Impact of Early Starts. 2002.
- **Crew Augmentation Study**. 2000.
- **Spencer, M. B., Robertson, K.A.** The Haj Operations: Alertness of Aircrew on Return Flights Between Indonesia and Saudi Arabia. 1999.
- **Spencer, M. B., Robertson, K. A.** The Alertness of Aircrew on the London-Sydney Route: Comparison with Predictions of a Mathematical Model. 1999.
- **Samel, A., Wegmann, H.-M., Veivoda, M.** Aircrew Fatigue in Long-Haul Operations. 1997.
- **Rosekind, M. R., Neri, D. F., Dinges, D. F.** From Laboratory to Flightdeck: Promoting Operational Alertness. 1997.
- **Spencer, M. B., Montgomery, J. M.** Sleep Patterns of Aircrew on Charter / Air Haulage Routes. 1997.
- **Dawson, D., Reid, K.** Fatigue, Alcohol and Performance Impairment. 1997.
- **Dawson, D., Lamond, N., Donkin, K., Reid, K.** Quantitative Similarity between the Cognitive Psychomotor Performance Decrement Associated with Sustained Wakefulness and Alcohol Intoxication.
- **Gander, P.H., De Nguyen, B. E., Rosekind, M. R., Connell, L. J.** Age, Circadian Rhythms, and Sleep Loss in Fight Crews. 1993.

Conclusion

Not a standalone

In order to make it more practical and avoid talking in a void, ECA's 'Flight Plan' refers to the European Aviation Safety Plan, which is developed by EASA. The plan proposes a path for the next 4 years that depicts a comprehensive picture of the safety work in Europe across all domains of aviation.

The Safety Plan establishes the first layer of priorities which is further complemented at national level by local safety plans. The Plan is an integral part of a European Aviation Safety Programme, a regional approach to the ICAO requirements for State Safety Programmes.

SAFETY PLAN FRAMEWORK		
SYSTEMATIC ISSUES	**OPERATIONAL ISSUES**	**EMERGING ISSUES**
Working with States to implement and develop SSP	Commercial air transport by aeroplanes	New products, systems, technologies and operations
Working with States to foster the implementation of SMS in the industry	Runway Excursion	Environmental factors
Safety Management enablers	Mid-air Collisions	Regulatory considerations
Complexity of the system	Controlled Flight Into Terrain	Next generation of Aviation professionals
Training of personnel	Loss of Control in Flight	
	Ground Collisions	
	OTHER TYPES OF OPERATIONS	
	Helicopters	
	General Aviation	
HUMAN FACTORS AND PERFORMANCE		

The EASA Safety Plan encompasses three broad areas: systemic, operational and emerging issues. The risks identified in these areas are mitigated by safety actions that Member States, EUROCONTROL, the European Commission, the industry and the Agency take on board in order to drive accident rates even further down.

- Inadequate Regulation
- Pilot Training
- Safety Culture
- Fatigue

SAFETY PLAN FRAMEWORK		
SYSTEMATIC ISSUES	**OPERATIONAL ISSUES**	**EMERGING ISSUES**
Working with States to implement and develop SSP	Commercial air transport by aeroplanes	New products, systems, technologies and operations
Working with States to foster the implementation of SMS in the industry	Runway Excursion	Environmental factors
Safety Management enablers	Mid-air Collisions	Regulatory considerations
Complexity of the system	Controlled Flight Into Terrain	Next generation of Aviation professionals
Training of personnel	Loss of Control in Flight	
	Ground Collisions	
	OTHER TYPES OF OPERATIONS	
	Helicopters	
	General Aviation	
HUMAN FACTORS AND PERFORMANCE		

The ECA 'Flight Plan' items can be linked to various topics identified in the EASA Safety Plan. This is where they impact safety and where solutions, promoted through the EASA Safety Plan, should be established.

The key topics of this 'Flight Plan' and their identified challenges are offered to all aviation stakeholders as an open invitation to share thoughts and ideas and identify constructive solutions that are workable, improve safety and address the challenges identified.

Photo credits:
Cover: Airbus
p. 2 Sidney Dekker, archive
p. 5 Burkhart ‘Pete’ Kaumanns, VC
p. 9 Andreas Tittelbach www.andreastittelbach.de
p. 14 US Coast Guard/ Wikipedia; NASA/ Wikipedia; Wikipedia - Creative Commons
p. 16 Wikipedia & ECA
p. 18 Andreas Tittelbach & ECA
p. 21 Andreas Tittelbach
p. 22 ACA; Andreas Tittelbach; ZDFZoom
p. 26 Andreas Tittelbach

Figures:
p. 10 EUROCONTROL
p. 12 ECA
p. 27 EASA/ EASA & ECA

About ECA

The European Cockpit Association was created in 1991 and is the representative body of European pilots at the EU level. It represents over 38.000 European pilots from the national pilots' associations in 37 European states.

European Cockpit Association - AISBL
Rue du commerce 20-22, 1000 Brussels
www.eurocockpit.be