

HindSight31

Human and organisational factors in operations



LEARNING FROM EVERYDAY WORK

CONDITIONS FOR LEARNING

By Erik Hollnagel
.....

HOW COMPLEX SYSTEMS FAIL

By Richard I Cook
.....

EXPLORING PERFORMANCE VARIABILITY AT SKYGUIDE

By Melanie Hulliger & Matthias Reimann
.....

OBSERVING EVERYDAY WORK: NORMAL OPERATIONS MONITORING AT ENAIRE

By Alberto Rodriguez de la Flor
.....

LEARNING IN THE HEAT OF THE MOMENT: AN INTERVIEW WITH SABRINA COHEN-HATTON

By Steven Shorrock
.....

Plus much more on learning from everyday work in aviation, shipping, healthcare, firefighting, elite sport, and beyond.



Tony Licu is Head of the Safety Unit within the Network Manager Directorate of EUROCONTROL. He leads the deployment of safety management and human factors programmes of EUROCONTROL. He has extensive ATC operational and engineering background, and holds a Master degree in Avionics.

Learning from day-to-day operation is something that we tend to forget or neglect. In classical safety management, we traditionally preached learning from incidents and accidents. In an ultra-safe and reliable industry like aviation, due to the low number of mishaps, we seemed to be locked in a Catch 22, waiting for an occurrence to happen to push learning in organisations that are busy reducing cost, improving efficiency and handling pressure to do more with less.

It seems that there is a huge source of knowledge that is untapped, especially because daily operations reveal crucial context for intervention. This brings me back many years during my on-the-job training period in the ops room. It was an exponential learning curve. Why do we seem to be unable to provide organisations with what individuals get from exposure to the day-to-day operations?

Watching how the work happens first-hand provides managers with a vivid picture of how your organisation is performing. Furthermore, it's the best

way to correct mistakes, offer guidance on how tasks can be better completed, gauge efficiency and analyse any problems that may occur. This also allows to better plan for change that not only addresses problems, but identifies new opportunities. Even if operations managers, and managers in general, are already experts in their field, they should have a periodic operational reality check. Don't wait for an incident; if you stop learning, you stop leading.

At the time of writing this foreword, the world at large is shaken by not only COVID-19, but many other events, including an oil spill over the coral reef in Mauritius. On 25 July 2020, the Japanese-owned vessel MV Wakashio hit a coral reef two miles off the country's southeast coast, near Pointe d'Esny. The ship was en route from China to Brazil, carrying 3,894 metric tons of low-sulphur fuel oil, 207 metric tons of diesel and 90 metric tons of lubricant oil.

After the accident, the crew was safely evacuated, but early efforts to stabilise the ship and pump out the oil were



WORD

unsuccessful. Eventually, a new crack appeared in the vessel's hull and oil started spilling into the pristine waters around Mauritius, endangering coral, fish and other marine life and threatening the economy, food security and health of the Mauritius Archipelago.

Many questioned why the captain of MV Wakashio had to go off route and come so close to the coral reef. This is reminiscent of Costa Concordia, which on 13 January 2012 struck a rock in the Tyrrhenian Sea just off the eastern shore of Isola del Giglio. The Captain of Costa Concordia went off his normal track to pass by close to Isola del Giglio.

None of two captains came to work on those days with the intention to collide with rocks and sunk those ships. The public and experts, however, camped on two sides – one blaming individuals and another taking a system view. I do not want to open that debate. I just want to raise a question: "How close is close, and how does this affect the safety of operations?"

The answer will be known only in the context of operations. How many maritime companies asked themselves that question after the 2012 accident of Costa Concordia? Why wait for a disaster when we can learn from day-to-day operations?

This edition of *HindSight* magazine reveals many insights and good practices on how to learn from everyday work that you can use and apply, for the benefit of safety and all other goals. Enjoy the reading.

WELCOME

Welcome to issue 31 of EUROCONTROL's *HindSight* magazine. Over the last few issues, *HindSight* has evolved toward a more general focus on human and organisational factors in operations. We have included different perspectives on work-as-imagined and work-as-done, collaboration, competency and expertise, change, goal conflicts and trade-offs, and wellbeing. What unites all of these issues is 'work' and in this issue we focus on 'learning from everyday work'.

In this issue we have the usual blend of articles from front-line staff and specialists in safety, human factors, and human and organisational performance, in aviation and elsewhere. The articles cover all aspects of everyday work, including routine work, unwanted events, and excellence. The authors discuss a variety of ways to learn from everyday work, including observation, discussion, surveys, reflection, and data analysis. There are articles on specific topics to help learn from others' experience, including from other sectors in 'views from elsewhere'. Here you will find reflections on human performance in elite sport, and articles on learning in healthcare, shipping, and firefighting.

As mentioned in the Editorial, learning from everyday work should involve those who do it, support it, and are affected by it. Learning and change are activities that should primarily be done BY and WITH the people involved and affected, not just FOR them. Your conversations are crucial for learning and we hope to help support these conversations. Do your operational and non-operational colleagues know about *HindSight*? Would you be willing to ask them, and encourage them to subscribe? Search 'SKYbrary HindSight' for details.

There is also a separate supplement on COVID-19 and learning in the context of the pandemic. This will be expanded in the next Issue of *HindSight* on 'The New Reality'. How have you and your colleagues adjusted and adapted to work in the context of the COVID-19 pandemic? Let us know, in a few words or more, for Issue 32 of *HindSight* magazine.

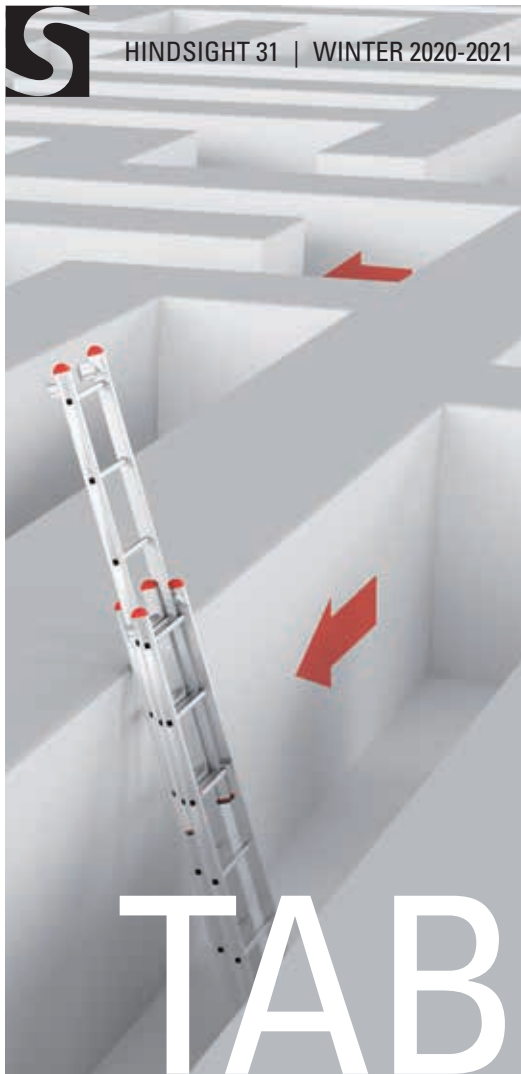


TABLE OF CONTENTS

FOREWORD

- 3** Welcome
- 6** INVITED FOREWORD: AUSTRO CONTROL

EDITORIAL

- 8** WHY LEARN FROM EVERYDAY WORK? *By Steven Shorrock*

OP ED

- 10** CONDITIONS FOR LEARNING *By Erik Hollnagel*

FROM RESEARCH TO PRACTICE

- 13** HOW COMPLEX SYSTEMS FAIL *By Richard I. Cook*

VIEWS FROM THE GROUND

- 18** LEARNING FROM PERFORMANCE VARIABILITY AT SKYGUIDE *By Melanie Hulliger & Matthias Reimann*
- 22** OBSERVING EVERYDAY WORK: NORMAL OPERATIONS MONITORING AT ENAIRE *By Alberto Rodriguez de la Flor*
- 25** LOCAL SAFETY SURVEYS: FROM AUDITING TO UNDERSTANDING *By Patrick Gontar and Philipp Kurth*
- 29** IDENTIFYING 'INVESTIGATIVE BLIND SPOTS': THE EVERYDAY WORK OF OCCURRENCE INVESTIGATORS *By Rogier Woltjer, Jonas Lundberg, and Billy Josefsson*

- 32** LEARNING TO ENHANCE PRACTICES FOR AIRFIELD SAFETY DURING CONSTRUCTION *By Gaël le Bris*
- 36** COULD A BIRO (OR TWO) MAKE YOUR DAY? *By Bartosz Gicala*
- 37** IT TAKES TWO TO TANGO: LEARNING FROM EVERYDAY COMMUNICATION *By Lynn Davis*
- 40** SAFETY MANAGEMENT Q&A *By Stéphane Deharvengt*

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TENTS

VIEWS FROM THE AIR

- 44** ASSESSMENT OF PILOT COMPLIANCE WITH TCAS RA *By Stanislaw Drozdowski and Mateusz Michalski*
- 49** HOW DO WE GET THE INFORMATION? *By Wolfgang Starke*
- 50** THE MESSY REALITY OF WORKING IN THE CABIN *By Tricia Green*

VIEWS FROM ELSEWHERE

- 52** LEARNING IN THE HEAT OF THE MOMENT: AN INTERVIEW WITH SABRINA COHEN-HATTON
- 56** REFLECTIONS ON HUMAN PERFORMANCE FROM ELITE SPORT

60 LEARNING FROM EXCELLENCE IN HEALTHCARE *By Adrian Plunkett and Emma Plunkett*

63 LEARNING FROM WHAT GOES WELL: ANOTHER TACTIC TO MILK THE COW? *By Nippin Anand*

65 THE REAL DANGER FOR A FIREFIGHTER INSTRUCTOR *By Leonie Boskeljon-Horst and Ron Koppes*

BOOKSHELF

EUROCONTROL SAFETY NEWS

CONTACT US

HindSight is a magazine on human and organisational factors in operations in air traffic management and related sectors. The success of this publication depends on you. Please tell us what you think. And even more important, please share your experiences with us. We would especially like to hear from front-line personnel (the main readership) with a talent for writing engaging articles.

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Axel Schwarz
 Managing Director Austro Control

INVITED FOREWORD: AUSTRO CONTROL

This year has been hard on all of us. It has seen not only an unprecedented slow down in air traffic, but it has brought to the forefront many questions which we as industry might have been putting off facing. Not only were we facing questions of rescaling our operations, minimising health risks for our staff and addressing human factors concerns, but we were also confronted with the limitations of our underlying regulatory and financial framework. This raised the need to re-think much of our industry and many embedded habits.

That has been and remains a recurring theme for us this year at Austro Control. The learning of lessons every day was crucial during the fast-evolving months of March and April – when global forecasts of the nature of the pandemic and how it would spread, as well as the appropriate individual measures that needed to be taken, had to be rapidly adopted just to keep air traffic moving and our people safe. In order to keep the skies open, our procedures for the planning and conduct of day-to-day operations had to be more adaptable than they have ever been designed to be. But Austrian airspace, along with much of rest of the world has demonstrated that resilience and adaptability in the face of uncertainty can still be achieved, especially when our people come together in creativity and determination.

Applying acute measures is one kind of rapid lesson learning, but out of the ashes of the slowdown has been the need to face larger and much tougher questions about the future of our industry. Here again, Austro Control is not alone in attempting to get this right even as the global situation continues

to change. One thing we have learned already is that we need to make sure we are asking the right questions of ourselves, our systems and our data. The right questions might not always be the most comfortable, and they might reveal things we do not want to hear, but above all else a safe operation needs to be an honest operation.

One of these uncomfortable answers was the realisation that, in many respects, the way we provide our services and the extent to which these are available is determined more by tradition than by an actual and current assessment of the demands, requirements and necessary safety levels, let alone by an agreement between the stakeholders, particularly the State, and the ANSPs. We have yet to learn how to better address this issue and what impact it will have on air navigation services in the future, balancing financial constraints, service provision, capacity demand and safety levels in a new way.

The more immediate question of skill fade led us to conclude a large survey

of operational controllers to look at human performance through the unusual situation of having almost no air traffic. We wanted to understand how the novel situation has affected our operation and our people. This survey has shown us that we can be proud of the flexibility, cooperation and vigilance of our staff during the COVID lockdown, but also that as traffic returns, we must not ignore the effects that low traffic loads over such an extended period of time have had on controllers and pilots alike. We are grateful for even the smallest lessons and insights that our people and operation can provide, so that we can ensure a smooth and safe transition back to normal operations.

By listening and learning through interaction with our operations staff, whether it be through surveys, safety reporting or honest conversations with management, we will continue to build a system that can adapt to all kinds of situations – whether it be the overloads we experienced in 2019, or the underloads in 2020. Listening and learning is the key to providing our services effectively, efficiently and safely.

Axel was born in Vienna in 1975, where he also concluded his studies of physics and law. He became a professional pilot in 1996 and worked in the commercial aviation industry in various management and non-management positions, including his own executive charter company. He currently holds an ATPL with flight instructor and flight examiner privileges. From 2005 until 2008 he was part of Austro Control, responsible for the approval and oversight of pilot training organisations at a time when Austria introduced JAA regulations. Afterwards, being self-employed, he directed his focus more on safety and quality management for the aviation industry. Having prepared different airlines for IOSA audits, he became an IATA-approved IOSA auditor in 2015 and conducted a large number of airline audits worldwide. He was appointed managing director of Austro Control from 1 January 2019. He lives in Vienna and is always happy to share his passion for his hometown with any visitors.

SKYclips

SKYclips are a growing collection of short animations of around two minutes duration which focus on a single safety topic in aviation. Created by the industry for the industry, they contain important messages to pilots and air traffic controllers with tools for safe operations.

There are SKYclips on the following topics

- Aimpoint selection
- Airside driving
- Airspace infringement
- Callsign confusion
- Conditional clearance
- Controller blind spot
- CPDLC
- Helicopter somatogravic illusions
- Immediate departure
- In-flight fire
- Landing without ATC clearance
- Level busts
- Low level go around
- Low visibility takeoff
- Mountain waves
- Pilot fatigue
- Readback-hearback
- Runway occupied medium term
- Sensory illusions
- Speed control for final approach
- Startle Effect
- Stopbars
- TCAS - Always follow the RA
- TCAS RA High Vertical Rate
- Unexpected Traffic in the Sector
- Workload Management

Each **SKYclip** is developed by aviation professionals from a variety of operational, technical, and safety backgrounds.

Find the SKYclips on SKYbrary at
<https://www.skybrary.aero/index.php/Solutions:SKYclips>

EMERGENCY FREQUENCY





Steven Shorrock
Editor in Chief of HindSight

WHY LEARN FROM EVERYDAY WORK?

For a few reasons – especially regulatory requirements – the majority of effort when it comes to safety management concerns abnormal and unwanted outcomes, and the work and processes in the run up to these. In my estimation, based on contact with safety practitioners in many countries, this tends to take up around 90% of work hours for safety specialists. We need to learn from incidents – for moral, regulatory and practical reasons. But incidents alone don't tell us enough about the system as a whole. If we view incidents as the tip of the iceberg in terms of total hours of work or total outcomes, then what lies beneath?

Understanding failure isn't enough to ensure effective performance. No organisation, team or family can be understood by focusing only what goes wrong. And more than this is needed to thrive and flourish. We have to look at *what goes on*. We don't tend to pay much attention to what goes on under our noses to keep things safe and effective because it's so...ordinary. And sometimes, things also change slowly over time, and we find these slow changes hard to 'see'.

When we stop to take a closer look, especially with the help of an 'outsider', we see things below the surface that we've not noticed before. These include individual, team and organisational practices, and the conditions of work. How do we communicate and coordinate? How do we train? How do we do handovers? How do we supervise? How do we manage? And why do we do these things in the way

that we do them? Such issues are often taken for granted. But, to be able to get things right, we all have to pay attention to these and other issues. There are a few reasons why this is a good idea.

1. Learning from everyday work helps to improve all aspects of performance and wellbeing

In any organisation, several goals must be considered and achieved to an acceptable level. When we learn from everyday work, we understand safety in the context of efficiency, capacity, security, the environment and human wellbeing. When work is viewed in the whole, rather than through the lens of isolated incidents alone, many things emerge. We start to see patterns rather than just individual events. The goal conflicts, trade-offs, and dilemmas that are part of normal work become clearer. With that understanding, we start to see how everything is connected, and we can improve all aspects of performance and wellbeing, including our experience of work – satisfaction, meaning, comfort, connection, and so on. And since it is better to improve on several dimensions than just one, it is easier to get the resources and commitment for learning that we need, at all levels of the organisation.

2. Learning from everyday work does not require unwanted events

Learning from unwanted events such as incidents is essential, and there is much to be learned from them. But it is not necessary to have unwanted

events to learn. Extraordinary events can be a symptom of a failure to learn from ordinary work. We can learn much from the ordinary, if we pay attention to it. The conditions for wanted and unwanted outcomes are often hiding in plain sight, especially things that happen frequently and conditions that are always present. Once these are understood, incidents seem less exceptional and more of an expression of everyday challenges and changes. By discussion and observation, along with other sources of information, we can learn about both problems and opportunities.

3. Learning from everyday work helps to see and build on what's strong

By focusing on a few trees, we don't see the forest. By looking at the forest as a whole, we can see what's strong, as well as what's wrong. We can see what works well and why. In any part of an organisation, there are good practices and favourable conditions that we appreciate. These might relate to operational, technical, specialist, support, management and regulatory activities, and everything that connects these activities up. These practices and conditions need to be protected, reinforced, extended and expanded. But to do this, we have to understand them. We can reveal what we have done together that we are proud of, what we wish we would have done earlier, what we would recommend to others, and what help we might be able to offer.

4. Learning from everyday work helps to see slow changes

Things often change slowly over time. One kind of change is what is sometimes called 'practical drift'. In his book *Friendly Fire*, Scott Snook defines this as "the slow uncoupling of practice from procedure" (p. 24). Without paying attention to everyday work, we don't see such changes until a noticeable unwanted event occurs, especially when changes happen slowly and are only known to those who are closely associated with the work, whether front-line staff or management. Another kind of shift or change is where performance moves towards exceptionally good performance, where work is sustainably productive, innovative, healthy, joyful,

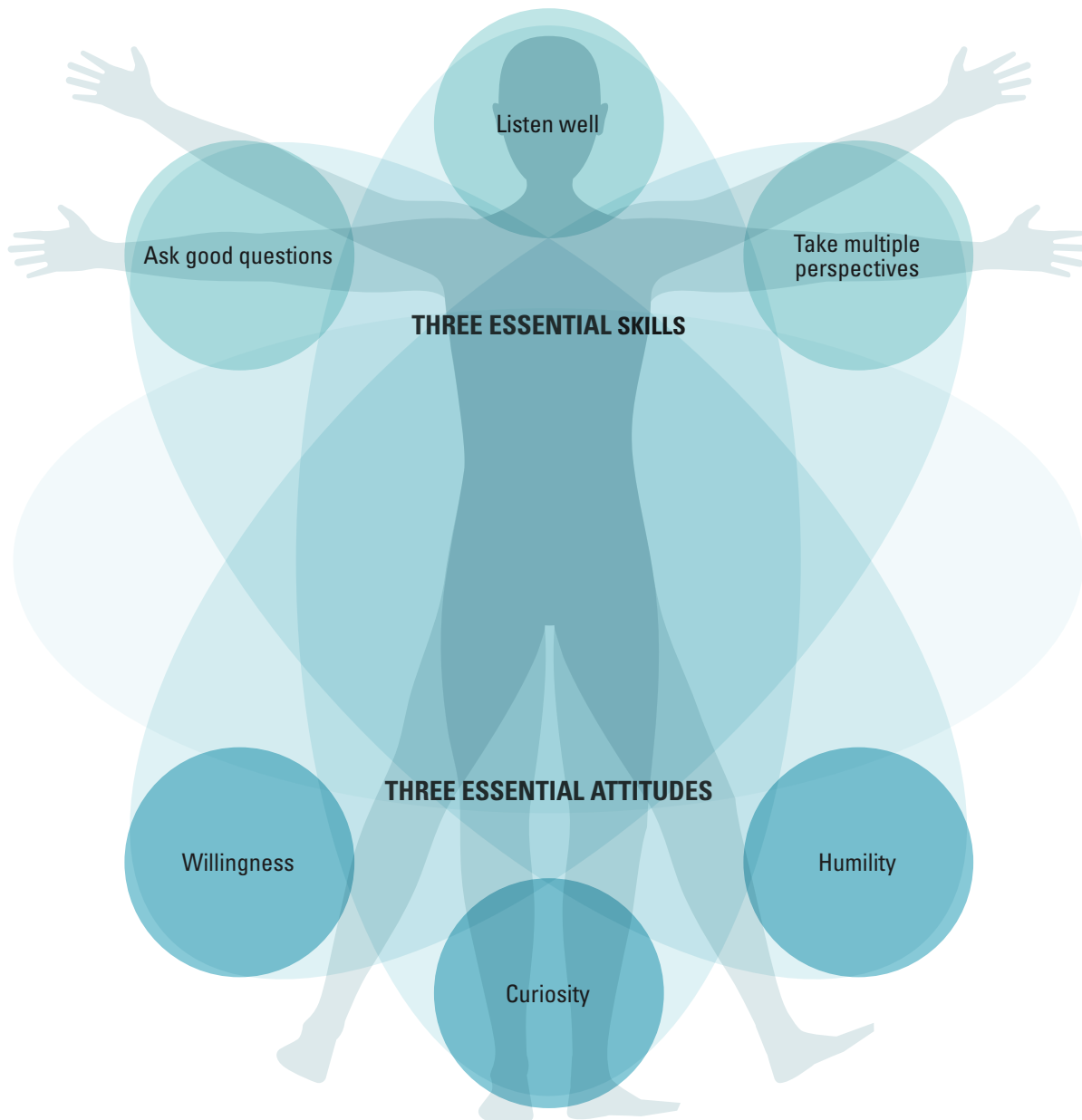
etc. Again, if everyday work is unknown and generally ignored, then we may not see the way that work is changing for the better.

5. Learning from everyday work can involve everyone

When we focus on everyday work, we can – and should – involve those who do it, support it, and are affected by it. Learning and change are activities that should primarily be done BY and WITH the people involved and affected, not just FOR them (see *HindSight* 28). Learning from everyday work is not easy, but much can be done without specialist technical skills. Most important are three essential attitudes and three essential skills (see below).

All of this requires reflection and practice. Some learning activities are led by specialists (in human factors, psychology, safety investigation, and so on), but most aspects of learning need a range of people with different things to give. Learning and improvement can also be a valuable and worthwhile experience for everyone involved. So we need to think of our jobs as having two parts: doing the work and improving the work.

Once it becomes clear that learning from everyday work is a good thing to do, the next question is how? This question is explored in different ways in the rest of this issue of *HindSight*.



CONDITIONS FOR LEARNING

Learning is a critical to resilient performance, but we tend to focus most safety learning on things that have gone wrong. In this Op Ed, **Erik Hollnagel** argues that everyday work provides the best basis for learning. To achieve this, three conditions for learning are proposed.

It is practically an axiom of safety management that learning must be based on things that have gone wrong – from accidents and incidents (Kletz, 2001, originally 1988). There is an intuitive logic to this. Things that go wrong are unwanted and costly both in the short and the long run and may also disrupt planned operations. It therefore stands to reason that failures should be prevented as far as possible and it is assumed that this is best achieved by analysing them to find their underlying causes. Once these have been found then steps can be taken to ensure that they will not happen again, at least according to the current safety dogmas.

The purpose of learning is generally accepted to be the acquisition of knowledge or skills through study, experience, or being taught. The ultimate purpose of learning is, of course, to change behaviour – either so that something can be done better, so that something different or new can be done, or so that certain specific behaviours can be avoided. Psychology, in fact, refers to a special form of learning called avoidance learning, defined as the process by which an individual learns a behaviour or response to avoid a stressful or unpleasant situation. Learning that does not lead to a change in behaviour is of very limited interest and also very hard to verify.

If we look beyond safety management and consider learning in general, for instance as one of the four potentials that are proposed as the basis for resilient performance (Hollnagel, 2018), then it can be argued that three conditions are necessary for learning to take place.

Condition #1: The Opportunity to Learn

In order to learn anything, there must clearly be an opportunity to learn. This condition is so obvious that it usually is just taken for granted. If nothing happens then nothing can be analysed and nothing can be learned. But this condition actually creates a small paradox for learning to improve safety. If learning is reserved for situations where something has gone wrong – for accidents and incidents – then there will actually be few opportunities to learn. The (relative) absence of accidents is, of course, desirable for an organisation or a business, but it is not a good basis for learning. Efforts to improve safety therefore have the unintended and undesirable side-effect that they reduce the opportunity to learn, the extreme case being the zero accident principle (Zwetsloot et al., 2013). This evokes the so-called ‘fundamental regulator paradox’.

“The task of a regulator is to eliminate variation, but this variation is the ultimate source of information about the quality of its work. Therefore, the better the job a regulator does the less information it gets about how to improve.” (Weinberg and Weinberg, 1979, p. 250).

In relation to safety, this means that if something rarely or never happens, then it is impossible to know how well it works – and probably also difficult to justify investments to further improve how the system works.

For the sake of learning it would make sense to increase the opportunity to learn, which means increasing the number of conditions where something can be learned. In relation to safety,

this appears to constitute a paradox, for who would seriously propose that we should increase the number of accidents? But the paradox only exists as long as safety is defined as the freedom from accidents and incidents. If instead of trying to learn what not to do we tried to learn what to do, then the focus would change from situations where things went wrong to situations where things went well. The purpose of learning would likewise change from trying to avoid something to trying to approach something. This corresponds to a definition of safety as a condition where as much as possible goes well, also referred to as ‘Safety-II’ (Hollnagel, 2014).

In the daily life of an organisation nearly everything goes well, not in the sense that there is a perfect agreement between performance and rules, procedures, and regulations, but in the sense that the outcomes are acceptable to the organisation itself as well as to its customers. (This, by the way, applies not only to safety but also to quality, productivity, etc.) Indeed, the less spectacular the outcomes are, the more opportunities for learning there will be, both in the sense that there will be more situations to learn from and in the sense that the cost of making the necessary changes will be significantly lower than for classical accident prevention.

Condition #2: The Similarity Between Situations

Learning cannot take place unless there is enough similarity between situations to make generalisation possible. This allows people and organisations to recognise situations based on their experience, and therefore to respond more efficiently. Without having some

patterns or traits to look for, each situation would have to be analysed anew, which is neither reasonable nor practicable.

If there are few or no similarities between situations then the nature of learning changes from generalising across situations to become the ability to remember an ever-growing set of individual situations. This corresponds to a kind of signature-based detection that was the initial approach used by anti-virus software. However, as the number of signatures grow, so does the time it takes to make a thorough search of them – and not being thorough would defeat the purpose.

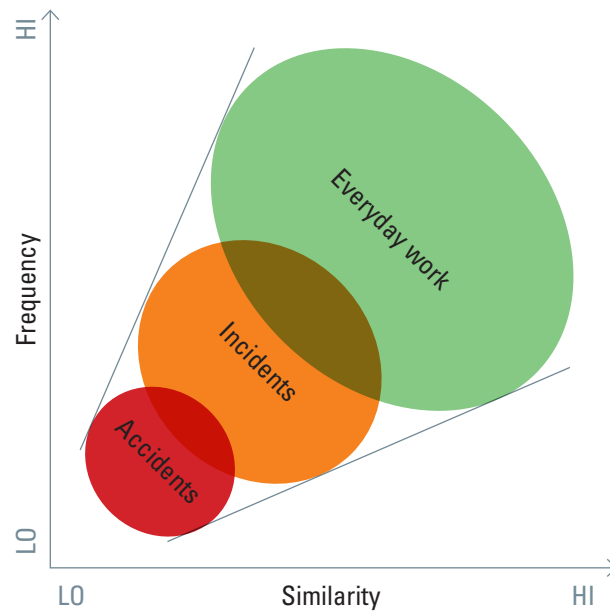
In relation to safety, accidents are usually rare events – just as they should be. This is not the best condition for learning, but to make matters worse, accidents tend to be less similar as they become more serious. This is unfortunate because of the dogma that it is more important to learn from severe accidents than from minor ones. The psychological reasons for this are obvious: the more serious and disruptive the outcomes of an event are, the higher the motivation is to ensure that it does not happen again. But it also makes general learning more difficult and leaves signature-based learning as the only option.

The situation is completely different if learning adopts a Safety-II perspective and includes things that go well. These not only happen far more frequently, but also occur as clusters of similar activities. It is therefore much easier to learn from them, to understand their characteristics and to find ways to improve or facilitate them. The clusters or patterns are furthermore not only the foundation for understanding how things go right, but also for understanding how they occasionally go wrong.

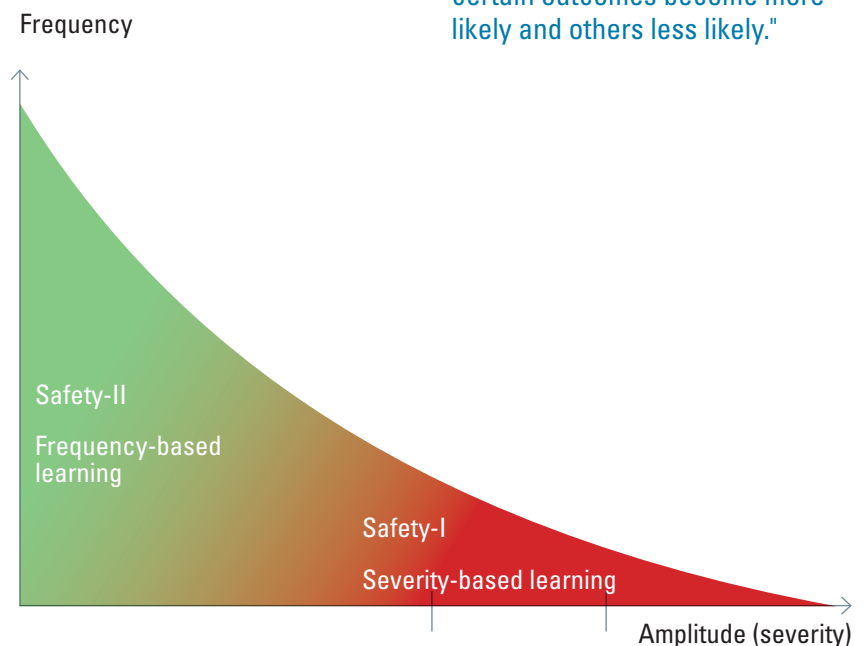
Condition #3: The Opportunity to Verify that Learning has Taken Place

The proof of the pudding is in the eating, as the proverb says. In relation to learning this means that there must be some recognisable difference in behaviour before and after learning. The

"Everyday work provides the best basis for learning while accidents provide the worst."



"The purpose of learning is after all to change behaviour so that certain outcomes become more likely and others less likely."




purpose of learning is after all to change behaviour so that certain outcomes become more likely and others less likely. This is notably difficult to establish for learning from accidents, since it requires that the same or a similar condition occurs again. While incidents and minor accidents may occur from time to time – but hopefully not too often – serious or severe accidents neither happen frequently nor are they very similar. The lack of feedback means that there are few opportunities to verify that the lessons that have been learned – whatever they may be – actually work as intended. This is unfortunate not least because the cost of learning from such cases can be quite high.

In contrast to that, learning from work that goes well can easily be verified. There is no need to wait for another accident to happen or even for the same accident to be repeated. Things that go well happen all the time which makes it easy to verify the effects of learning. It is, of course, not possible to look at everything that happens, but neither is it usually possible to learn from everything that goes wrong. For practical reasons a selection must be made. In the case of things that go wrong, the traditional criterion is severity of outcomes. In the case of things that go well, a good criterion would be to look at what happens most frequently. It is also easy and affordable to make adjustments and

improvements, and therefore to learn incrementally and continually rather than by large jumps or steps.

Conclusions

The essence of the three conditions described above is captured in the figure below. Here, three different categories of events are shown relative to each other in terms of frequency of occurrence and severity of outcome. Accidents are low in both frequency and similarity, everyday work happens frequently – in fact it happens all the time – and has high similarity, while incidents are in between. Relative to the three conditions described above, everyday work provides the best basis for learning while accidents provide the worst. This, of course, assumes that everything happens in basically the same way and that there are no special causes of failures that appear *Deus Ex Machina* when something goes wrong but otherwise just lie in wait.

Accidents attract attention because they are unexpected while everyday work – things that go well – is more or less invisible. “Reliable outcomes are constant, which means there is nothing to pay attention to” (Weick, 1987). So instead of limiting learning to what we do not want to happen to find out what we should not do, it might be worthwhile also to learn from what we want to happen in order to find out what we could do. 

"Learning from work that goes well can easily be verified. There is no need to wait for another accident to happen or even for the same accident to be repeated."



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HOW COMPLEX SYSTEMS FAIL

When complex systems fail, what does this tell us about everyday work?

Richard I. Cook explains this and more, in this classic treatise on the nature of failure, how failure is evaluated, how failure is attributed to proximate cause, and the resulting new understanding of safety.

1) Complex systems are intrinsically hazardous systems.

All of the interesting systems (e.g., transportation, healthcare, power generation) are inherently and unavoidably hazardous by the own nature. The frequency of hazard exposure can sometimes be changed but the processes involved in the system are themselves intrinsically and irreducibly hazardous. It is the presence of these hazards that drives the creation of defenses against hazard that characterize these systems.

2) Complex systems are heavily and successfully defended against failure.

The high consequences of failure lead over time to the construction of multiple layers of defense against failure. These defenses include obvious technical components (e.g. backup systems, 'safety' features of equipment) and human components (e.g., training, knowledge) but also a variety of organizational, institutional, and regulatory defenses (e.g., policies and procedures, certification, work rules, team training). The effect of these measures is to provide a series of shields that normally divert operations away from accidents.

3) Catastrophe requires multiple failures – single point failures are not enough.

The array of defenses works. System operations are generally successful. Overt catastrophic failure occurs when

small, apparently innocuous failures join to create opportunity for a systemic accident. Each of these small failures is necessary to cause catastrophe but only the combination is sufficient to permit failure. Put another way, there are many more failure opportunities than overt system accidents. Most initial failure trajectories are blocked by designed system safety components. Trajectories that reach the operational level are mostly blocked, usually by practitioners.

4) Complex systems contain changing mixtures of failures latent within them.

The complexity of these systems makes it impossible for them to run without multiple flaws being present. Because these are individually insufficient to cause failure they are regarded as minor factors during operations. Eradication of all latent failures is limited primarily by economic cost but also because it is difficult before the fact to see how such failures might contribute to an accident. The failures change constantly because of changing technology, work organization, and efforts to eradicate failures.

5) Complex systems run in degraded mode.

A corollary to the preceding point is that complex systems run as broken systems. The system continues to function because it contains so many redundancies and because people can make it function, despite the presence of many flaws. After accident reviews nearly always note that the system has a history of prior 'proto-

accidents' that nearly generated catastrophe. Arguments that these degraded conditions should have been recognized before the overt accident are usually predicated on naïve notions of system performance. System operations are dynamic, with components (organizational, human, technical) failing and being replaced continuously.

6) Catastrophe is always just around the corner.

Complex systems possess potential for catastrophic failure. Human practitioners are nearly always in close physical and temporal proximity to these potential failures – disaster can occur at any time and in nearly any place. The potential for catastrophic outcome is a hallmark of complex systems. It is impossible to eliminate the potential for such catastrophic failure; the potential for such failure is always present by the system's own nature.

7) Post-accident attribution accident to a 'root cause' is fundamentally wrong.

Because overt failure requires multiple faults, there is no isolated 'cause' of an accident. There are multiple contributors to accidents. Each of these is necessary insufficient in itself to create an accident. Only jointly are these causes sufficient to create an accident. Indeed, it is the linking of these causes together that creates the circumstances required for the accident. Thus, no isolation of the 'root cause' of an accident is possible. The evaluations based on such reasoning as 'root cause'

do not reflect a technical understanding of the nature of failure but rather the social, cultural need to blame specific, localized forces or events for outcomes.

8) Hindsight biases post-accident assessments of human performance.

Knowledge of the outcome makes it seem that events leading to the outcome should have appeared more salient to practitioners at the time than was actually the case. This means that *ex post facto* accident analysis of human performance is inaccurate. The outcome knowledge poisons the ability of after-accident observers to recreate the view of practitioners before the accident of those same factors. It seems that practitioners “should have known” that the factors would “inevitably” lead to an accident. *Hindsight bias remains the primary obstacle to accident investigation, especially when expert human performance is involved.*

9) Human operators have dual roles: as producers & as defenders against failure.

The system practitioners operate the system in order to produce its desired product and also work to forestall accidents. This dynamic quality of system operation, the balancing of demands for production against the possibility of incipient failure, is unavoidable. Outsiders rarely acknowledge the duality of this role. In non-accident filled times, the production role is emphasized. After accidents, the defense against failure role is emphasized. At either time, the outsider’s view misapprehends the operator’s constant, simultaneous engagement with both roles.

10) All practitioner actions are gambles.

After accidents, the overt failure often appears to have been inevitable and the practitioner’s actions as blunders or deliberate willful disregard of certain impending failure. But all practitioner actions are actually gambles, that is, acts that take place in the face of uncertain outcomes. The degree of uncertainty may change from moment to moment.

That practitioner actions are gambles appears clear after accidents; in general, *post hoc* analysis regards these gambles as poor ones. But the converse: that successful outcomes are also the result of gambles; is not widely appreciated.

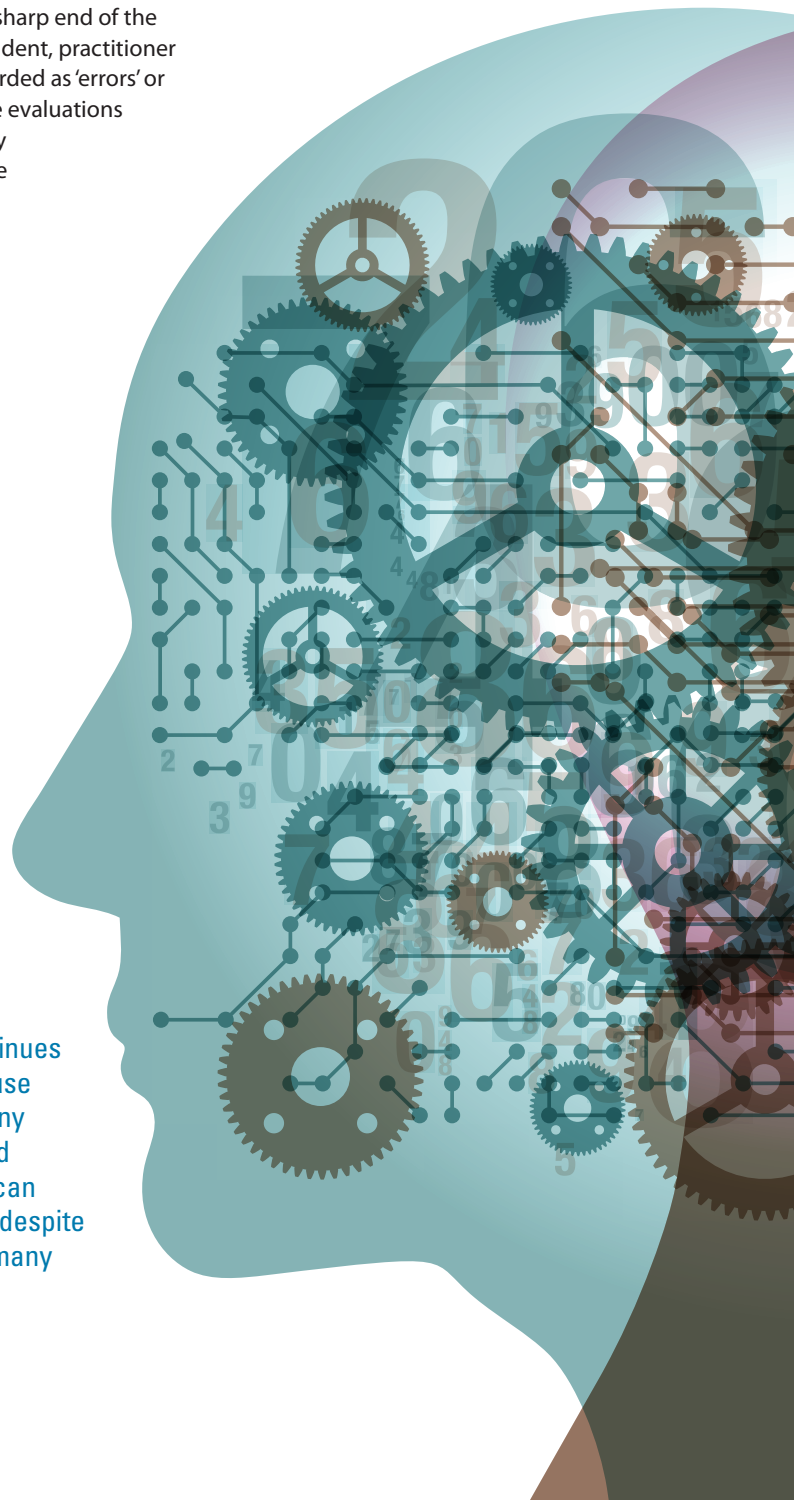
11) Actions at the sharp end resolve all ambiguity.

Organizations are ambiguous, often intentionally, about the relationship between production targets, efficient use of resources, economy and costs of operations, and acceptable risks of low and high consequence accidents. All ambiguity is resolved by actions of practitioners at the sharp end of the system. After an accident, practitioner actions may be regarded as ‘errors’ or ‘violations’ but these evaluations are heavily biased by hindsight and ignore the other driving forces, especially production pressure.

12) Human practitioners are the adaptable element of complex systems.

Practitioners and first line management actively adapt the system to maximize production and minimize accidents. These adaptations often occur on a moment by moment basis. Some of these adaptations include: (1) Restructuring the system in order to reduce exposure of vulnerable parts to failure. (2) Concentrating critical resources in areas of expected high demand. (3) Providing pathways for retreat or recovery from expected and unexpected faults. (4)

"The system continues to function because it contains so many redundancies and because people can make it function, despite the presence of many flaws."



Establishing means for early detection of changed system performance in order to allow graceful cutbacks in production or other means of increasing resiliency.

13) Human expertise in complex systems is constantly changing.

Complex systems require substantial human expertise in their operation and management. This expertise changes in character as technology changes but it also changes because of the need to replace experts who leave. In every case, training and refinement of skill

and expertise is one part of the function of the system itself. At any moment, therefore, a given complex system will contain practitioners and trainees with varying degrees of expertise. Critical issues related to expertise arise from (1) the need to use scarce expertise as a resource for the most difficult or demanding production needs and (2) the need to develop expertise for future use.

14) Change introduces new forms of failure.

The low rate of overt accidents in reliable systems may encourage changes, especially the use of new technology, to decrease the number of low

consequence but high frequency failures. These changes maybe actually create opportunities for new, low frequency but high consequence failures. When new technologies are used to eliminate well understood system failures or to gain high precision performance they often introduce new pathways to large scale, catastrophic failures. Not uncommonly, these new, rare catastrophes have even greater impact than those eliminated by the new technology. These new forms of failure are difficult to see before the fact; attention is paid mostly to the putative beneficial characteristics of the changes. Because these new, high consequence accidents occur at a low rate, multiple system changes may occur before an accident, making it hard to see the contribution of technology to the failure.

15) Views of 'cause' limit the effectiveness of defenses against future events.

Post-accident remedies for "human error" are usually predicated on obstructing activities that can "cause" accidents. These end-of-the-chain measures do little to reduce the likelihood of further accidents. In fact that likelihood of an identical accident is already extraordinarily low because the pattern of latent failures changes constantly. Instead of increasing safety, post-accident remedies usually increase the coupling and complexity of the system. This increases the potential number of latent failures and also makes the detection and blocking of accident trajectories more difficult.

16) Safety is a characteristic of systems and not of their components.

Safety is an emergent property of systems; it does not reside in a person, device or department of an organization or system. Safety cannot be purchased or manufactured; it is not a feature that is separate from the other components of the system. This means that safety cannot be manipulated like a feedstock or raw material. The state of safety in any system is always dynamic; continuous systemic change insures that hazard and its management are constantly changing.


"All practitioner actions are actually gambles, that is, acts that take place in the face of uncertain outcomes."



17) People continuously create safety.

Failure-free operations are the result of activities of people who work to keep the system within the boundaries of tolerable performance. These activities are, for the most part, part of normal operations and superficially straightforward. But because system operations are never trouble free, human practitioner adaptations to changing conditions actually create safety from moment to moment. These adaptations often amount to just the selection of a well-rehearsed routine from a store of available responses; sometimes, however, the adaptations are novel combinations or *de novo* creations of new approaches.

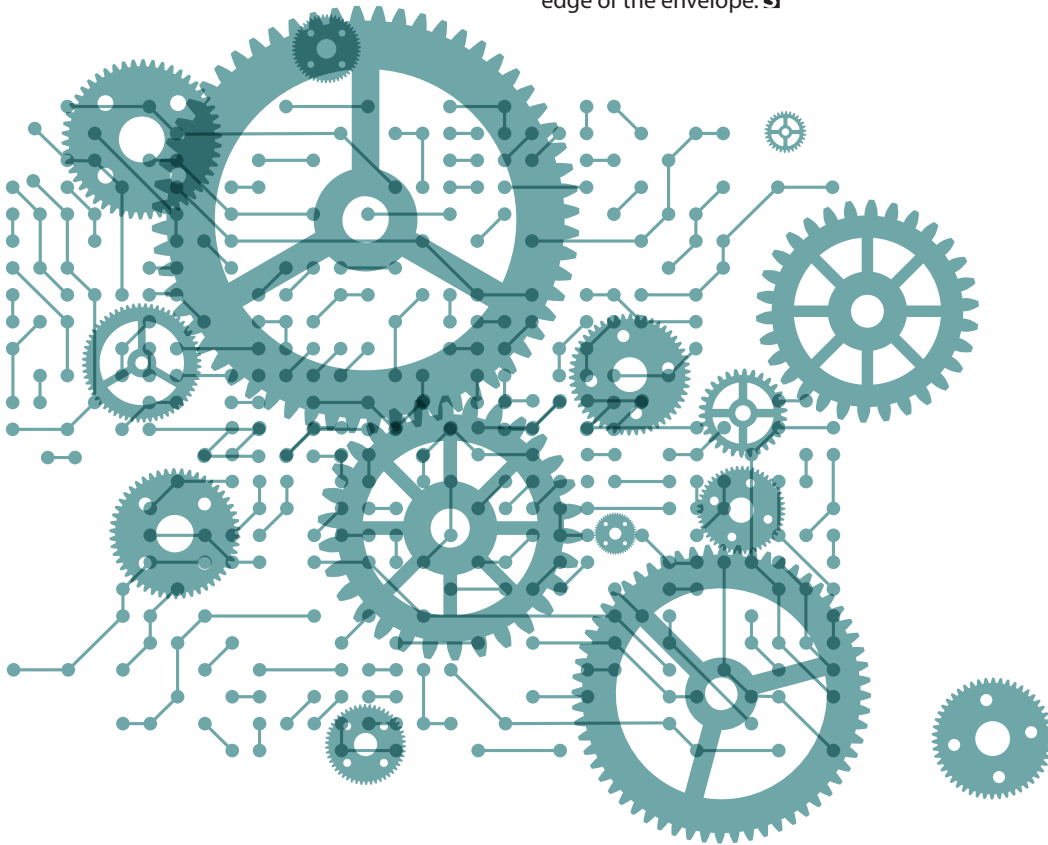
18) Failure free operations require experience with failure.

Recognizing hazard and successfully manipulating system operations to remain inside the tolerable performance boundaries requires intimate contact with failure. More robust system performance is likely to arise in systems where operators can discern the “edge of the envelope”. This is where system performance begins to deteriorate, becomes difficult to predict, or cannot be readily recovered. In intrinsically hazardous systems, operators are expected to encounter and appreciate hazards in ways that lead to overall performance that is desirable. Improved safety depends on providing operators with calibrated views of the hazards. It also depends on providing calibration about how their actions move system performance towards or away from the edge of the envelope. 

"Practitioners and first line management actively adapt the system to maximize production and minimize accidents."

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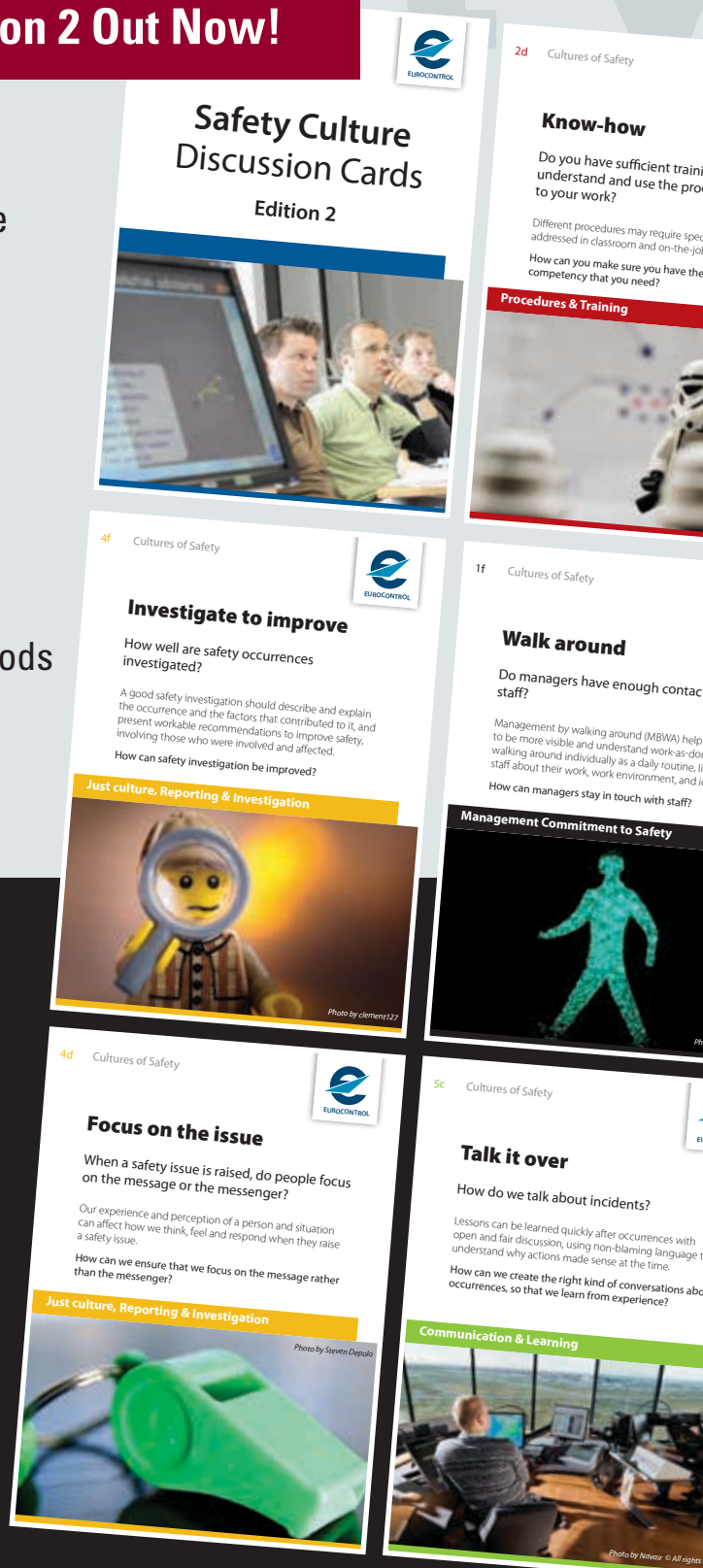
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LEARNING FROM PERFORMANCE VARIABILITY AT SKYGUIDE

The reality of everyday work is that – confronted with varying conditions and limited resources – people must adapt and adjust to make the system work. The details of these adjustments often remain a mystery to those who don't do the work. **Melanie Hulliger** and **Matthias Reimann** report on a study at **skyguide** to learn from them.

KEY POINTS

- In air traffic control, performance variability such as deviations from procedures and rules is an inevitable reality of everyday work, also at skyguide.
- An internal, independent study on performance variability sheds light on areas, situations, reasons and perceived impact of deviations.
- This article includes a detailed description of the applied approach, shares main results, puts them into context and discusses them.
- The study helped to understand a very complex topic and allows to continuously improve to the benefit of safe and efficient operation.

"Deviation examples in areas other than one's own were assessed more critically in terms of their impact on safety."

Introduction

Performance variability was a key topic both at the EUROCONTROL Safety Forum in 2018 and in issue 25 of *HindSight* magazine. This growing interest, as well as a EUROCONTROL safety culture survey for skyguide in 2016, led to an independent study of performance variability in skyguide in 2019.

What do we, skyguide, understand as 'performance variability'? Front-line operators such as air traffic controllers or technicians permanently find themselves confronted with varying conditions. They must constantly adapt to tackle the realities of daily work. Organisations cannot function if people simply stick to every existing rule and procedure to the letter. Sometimes, these adjustments therefore involve deviations from procedures. But systematic deviations are not desirable from a corporate, legal and safety perspective. This presents a challenge.

The goal of this study was to analyse performance variability in skyguide's air traffic control services provided to controlled flights. The study aimed to understand the gap between work-as-prescribed and work-as-done by identifying areas, situations, reasons as well as specific procedures and rules in order to improve them.

As we write this *HindSight* article, we find ourselves in the global COVID-19 crisis. At this time, performance variability is even more relevant, as we experience daily adaptations, innovations and improvisations. While creative problem-solving and flexibility are part of the daily job of ATM professionals, the results of our study will hopefully help us to continue operating safely during and after this human and economic crisis.

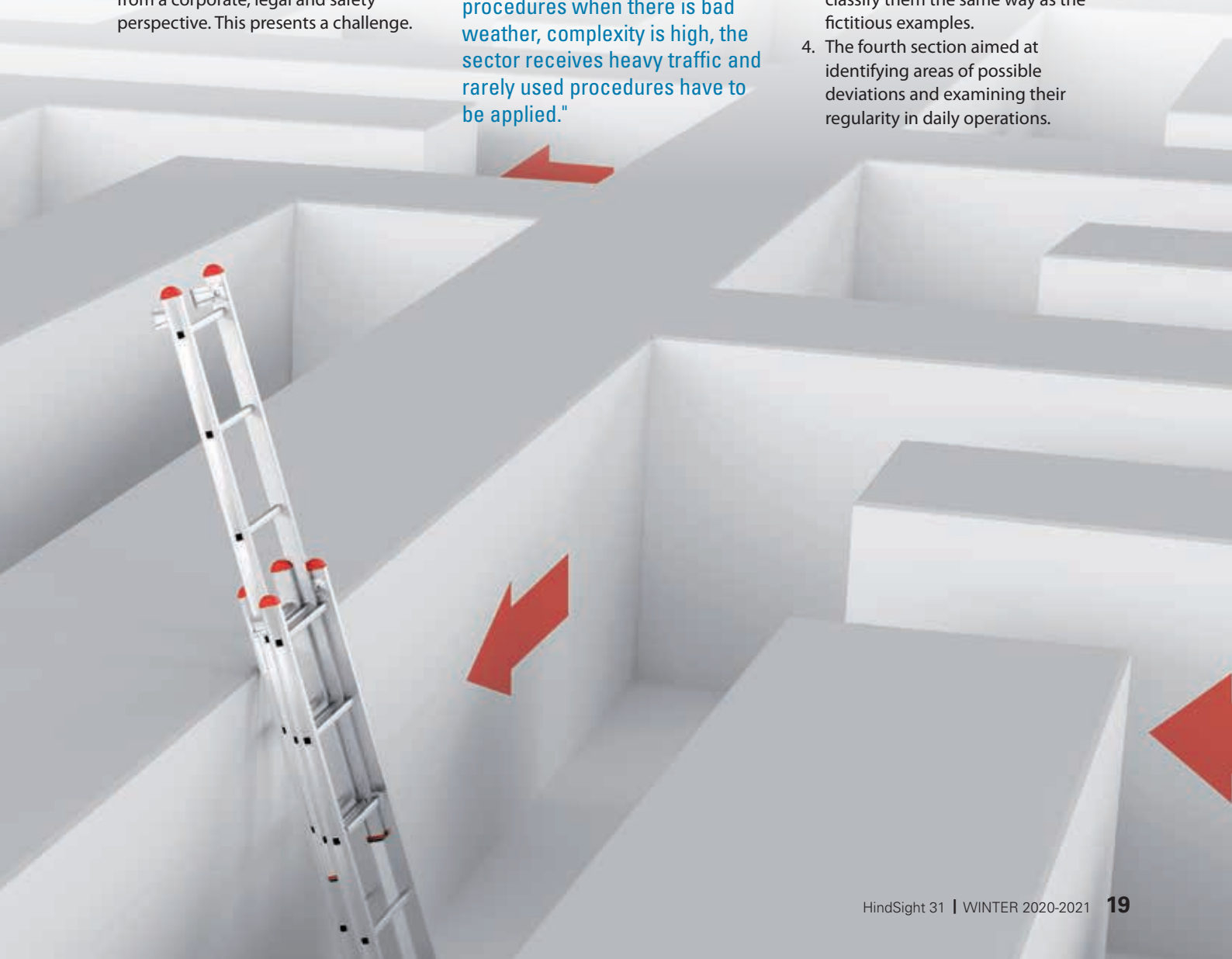
"It seems particularly difficult for controllers to comply with procedures when there is bad weather, complexity is high, the sector receives heavy traffic and rarely used procedures have to be applied."

Approach

Questionnaire

Following a literature research, an internal document analysis and several expert interviews, we developed an online questionnaire. This questionnaire consisted of seven different sections, to approach the deviations from procedures.

1. The first section included a repetition of some procedure-related questions from the EUROCONTROL safety culture survey in 2016.
2. The second section presented some fictitious deviation example situations. These were to be rated regarding the degree of deviation ('violation', 'grey zone' or 'normal ops'), and impact on safety, capacity and punctuality.
3. The third section provided some space to describe examples and to classify them the same way as the fictitious examples.
4. The fourth section aimed at identifying areas of possible deviations and examining their regularity in daily operations.



5. The fifth section assessed to what extent certain situations hinder or enable controllers to comply with procedures.
6. The sixth section aimed at understanding the most relevant reasons for deviations.
7. The last section captured the perceived impact of deviations on the SESAR key performance indicators.

The surveyed target group included all skyguide air traffic controllers except those at regional aerodromes and military units. The return rate was around 22% of the staff targeted.

Main Findings and Conclusions

The need to deviate from procedures

The results of the EUROCONTROL safety culture survey questions showed us that, very similar to 2016, a significant number of controllers felt a need to deviate from procedures.

The role of professional culture

The results of the fictitious deviation examples as well as the examples provided by the respondents helped to understand the topic of deviations in everyday work, but are difficult to describe, as they are diverse and situation-dependent. However, we discovered one interesting tendency: deviation examples in areas other than one's own were assessed more critically in terms of their impact on safety.

This could be explained by a rather strong belief that one has control over the outcome of events (so-called 'internal locus of control') due to one's knowledge and experience in the respective unit. It could also be explained by drift due to habituation to certain situations. Another interesting discovery was the fact that there were no significant differences in perception between geographical regions. This suggests that deviations are rather a topic of professional or company culture than national subculture.

Main areas of deviations

Overall, four main areas stand out, in which deviations from regulations and

"While procedures are developed with the intention to be complied with, we see that this is becoming increasingly difficult as they become more prescriptive and detailed."

procedures are comparatively frequent, meaning that participants indicated they occur at least occasionally. These four areas are: 1) voice communication, 2) areas of responsibility, 3) noise abatement and 4) traffic priorities.

Deviations concerning air traffic control areas of responsibility and voice communication are of particular interest concerning safety. Are deviations in these areas inevitable to reduce workload in a highly complex environment? Are they inevitable to provide the required capacity? Or have they become an established working habit? These are interesting questions that we would like to further examine.

Compliance-hindering factors and a word about workload

It seems particularly difficult for controllers to comply with procedures when there is bad weather, complexity is high, the sector receives heavy traffic and rarely used procedures have to be applied. Particularly strong VFR traffic, special restrictions such as parachute dropping, photo flights and rare operational concepts also play a role.

High workload seems to be related to deviations. Workload is, of course, likely to be affected by all the situations above, especially when several of these situations co-exist. For example, high complexity coupled with rarely used procedures makes work difficult and that leads to a higher workload. Reducing workload with current procedures is likely to be difficult, especially under performance pressure within a complex environment.

Under certain circumstances, the calculated capacity limit may be exceeded. In such situations, the deviation from a procedure might be seen as the only way out to ensure safe management of traffic and can

therefore be tolerated, provided it is just for a very limited period of time. However, systematic deviations for capacity reasons need to be tackled carefully.

Procedures or awareness?

In addition to the reduction of workload and complexity, procedural issues were also evident in controller responses. The reasons included perceived senselessness and impracticability of procedures, procedures not being applicable, conflict with other procedures, or too much room for interpretation. On one hand, these results could indicate issues on the procedure side, even though knowledgeable experts are developing procedures. On the other hand, they raise the question of whether it can be claimed that controllers know all the reasons behind the design of procedures and how they fit together in the broader operational context. The deviation examples provided by controllers help to decide whether procedures need to be clarified, adapted, modified or even withdrawn. Alternatively, the rationale for certain procedures may need to be communicated more clearly. To understand this, operational staff support is needed to help understand the procedures, the work and the context of work.

Perceived impact on safety

Another interesting reason for deviations from procedures is the intention to improve safety. However, questions sometimes remained about whether the deviation is really safer? This uncertainty is also reflected in the results regarding the estimated impact of deviations. Here, people are unsure about whether deviations help or hinder safety. It might be that a locally taken decision to deviate for safety reasons has a positive effect at small scale, but an adverse effect at a bigger scale. This may be hard to know at the time.

Some questions about capacity

Except for safety, controllers indicated an enabling impact of deviations on all of the SESAR 2020 key performance

indicators, namely 1) airspace and aerodrome capacity, 2) customer satisfaction, 3) fuel efficiency, 4) cost efficiency, and 5) predictability and punctuality. Most of the time this may really be the case, and obviously helps us in handling high capacity demands. However, can we really claim to know how favourable these deviations are for the capacity, efficiency and punctuality of the whole (Swiss or international) aviation system? This is an interesting question, especially in the current light of COVID-19, where the capacity demand has changed significantly compared to when this study was conducted.

Closing Words

Performance variability is an integral part of human work. In our highly regulated environment, this creates some inevitable challenges. While procedures are developed with the intention to be complied with, we see that this is becoming increasingly difficult as they become more prescriptive and detailed. The deviations we studied here are usually the result of a conscious choice, with distinct underlying goals, i.e., reducing current workload, reducing complexity, or local optimisation in a situation. Individual and local optimisation, however, also carries the risk of creating unintentional, and potentially negative impacts on the overall system.

This study is a starting point for us to reassess and hopefully simplify our procedures. Ideally, a future procedure framework will account for performance variability and provide prescriptions within appropriate room for manoeuvre. **S**



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Air Traffic Management (ATM) is most probably one of the most regulated businesses, requiring unambiguous procedures, well-defined processes, stringent rules and highly skilled people doing the job. This is the recipe for a high level of safety and efficiency in a domain that is subject to impressive growth over the last decades. However, in a human centric system, 100% standardisation can never be achieved, as individuals always have a different approach to a given problem. This is also true for ATM and thus for skyguide.

Does this leave the skyguide COO with a bad feeling? Yes, and no. Of course I would like to have an operation which is perfectly standardised, running according to the defined processes and thus guaranteeing the safety level we aim at delivering. However, since I know that individuals will always tackle a given situation in a slightly different way, I am more than happy to know that the job is being done by highly skilled and reliable professionals. This gives me the assurance that things are going well, even though not all procedures are strictly followed by everybody in the same way. One thing is for sure: if our controllers deviate from procedures, I want to know why, in order to be able to act accordingly. Is it for safety reasons or capacity reasons? Is it for personal comfort, or due to lack of knowledge? Or is it simply because the procedure does not make sense and is badly designed?

This Performance Variability Study allowed us, for the first time, to better understand to what extent controllers deviate from procedures and why. Thanks to the numerous examples we were able to gather, we can now define appropriate remedial actions.

I would like to warmly thank all controllers who were ready to participate in this study and openly share their experience with us. This is a major component of information allowing us to permanently improve our processes, rules and procedures, to the benefit of a safe and efficient operation.

Urs Lauener
Chief Operating Officer skyguide



OBSERVING EVERYDAY WORK: NORMAL OPERATIONS MONITORING AT ENAIRE

Observation and listening are two of the most basic but powerful tools to help understand everyday work. In this article, **Alberto Rodriguez de la Flor** explains the approach to observing normal operations at ENAIRE, and some of the unexpected benefits.

KEY POINTS

- **Safety-II and systems thinking have been important topics of discussion in recent years, but practical implementation has been limited in ATM.**
- **The priority for many organisations is still traditional occurrence investigation and risk assessment. Neither provides significant understanding of everyday work.**
- **Many safety interventions do not have the intended effects since they are applied from a proximal perspective, only addressing those factors close to the incident, mostly the pilot or the controller, the local equipment and procedures.**
- **ENAIRE has developed and applied a normal operations monitoring method to understand everyday work via observation and listening. This has had a range of benefits for operational safety, and operational performance more generally.**

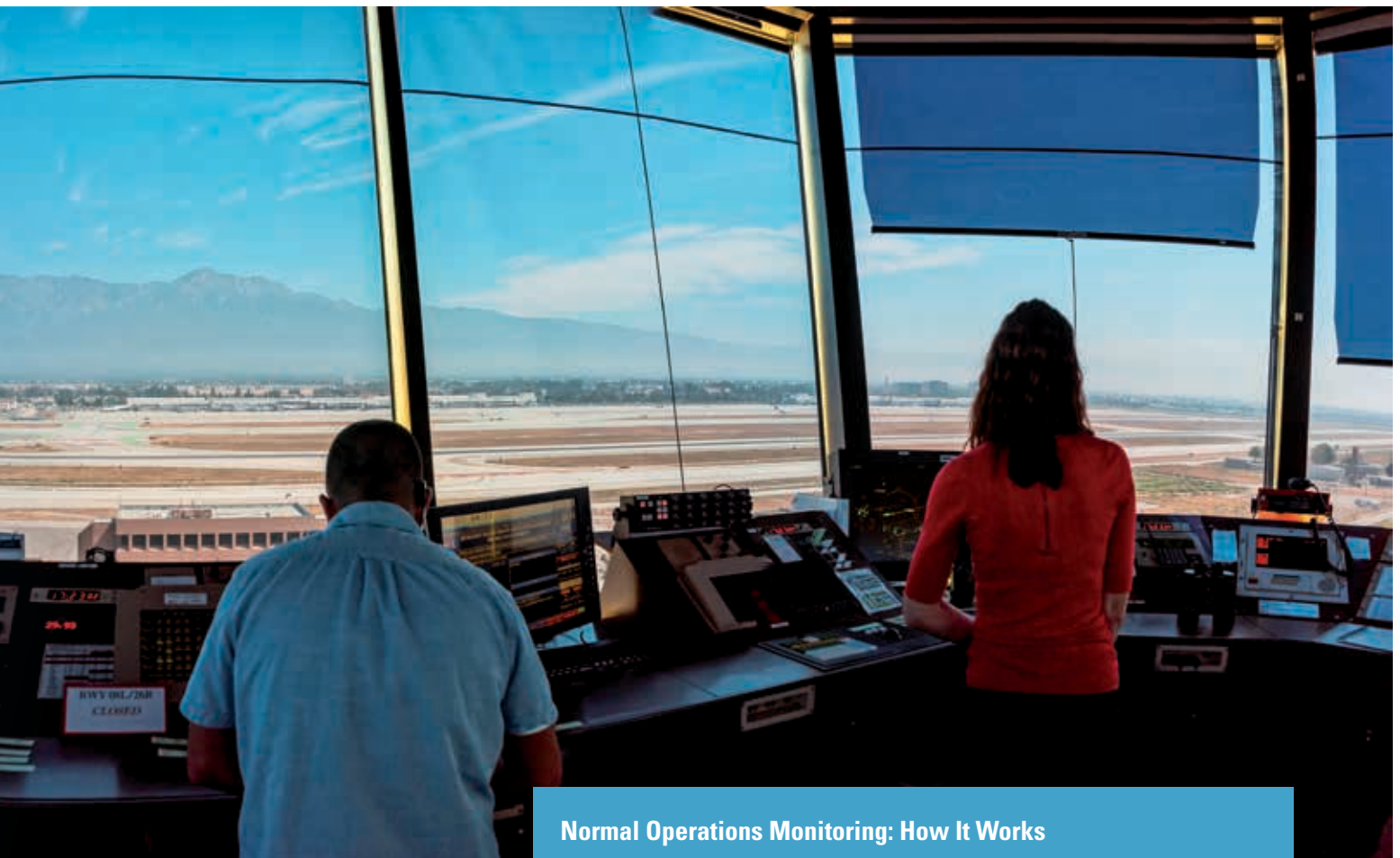
Over recent years, concepts of Safety-II and systems thinking have been promoted by EUROCONTROL (2013, 2014). A large part of this effort has been to improve learning from everyday work. ENAIRE has been following the

development of these approaches since their conception.

To summarise, Safety-II is an appealing concept that evolves from traditional thinking about reducing what goes

wrong to maximising what goes right. But there are aspects that have hindered its development into real practice in aviation. Apart from the fact that it is not a hot topic for regulators, Safety-II uses normal operations as the 'observation space'. This is immensely bigger than the typical Safety-I area of interest – unwanted events – which is often reduced to local and proximal factors in incidents.

Systems thinking principles are not opposed or particularly different from Safety-II thinking. Systems thinking simply enlarges the way to think about Safety-II. It can have a profound impact on the way that safety is approached within an organisation, but it concerns more than safety itself. It recognises that designed processes cannot fully cope with the complexity of work. It allows an understanding of the local and distal factors that shape all types of events, which is key to all safety activity. Root causes and chains of events are replaced by networks of interactions and influences, which naturally makes



Normal Operations Monitoring: How It Works

NOM has a focus of interest on what happens everyday: the actions of front-line operators, the factors influencing them, and the reasons behind, in order to keep operations safe and efficient. Most of the methodologies require over-the-shoulder observations that can be more or less structured. Structured observations seek pre-defined actions or elements and their relevance in the operation. ICAO NOSS aims at profiling the number of errors and threats present in everyday work, and how these are captured and managed. More recent methodologies, like the one we are developing, enlarge this scope by identifying the good practices, even if not related to threats or errors, and seek for a deeper search for systemic and distal factors. It is essential that observations are complemented by talking with the observed people to gain a better understanding of the dynamics, this also being a chance to identify relevant factors not necessarily observed. Observation sessions can total around 50 hours during one week. The gathered data is then processed and analysed and recommendations are made to reinforce good practice, along with proposals to tackle recurrent error types and existing threats. Other methodologies combine observations with group facilitated sessions.

the concept of linear causality and guilt for 'honest mistakes' disappear, left only for judicial analysis, if required.

The practical application of such thinking is still a challenge for many organisations, and remains limited. Only a few ANSPs have developed and deployed practical and tailored methodologies.

Indeed, the priority for many organisations is still traditional occurrence investigation and risk assessment. Safety interventions often remain biased toward local aspects at a certain point in time, which can hinder the understanding of everyday work. There is also an invisible but strong effect on safety language, focused on negative and judgemental vocabulary and structures. This is far from normal operational reality. The result is a negative mindset that holds back safety thinking and practice. There could be several reasons for this, not least regulatory requirements and the difficulty of integrating new concepts and approaches with existing ones.

Some safety applications have focused on 'everyday work' (without necessarily adhering to Safety-II principles). For instance, ICAO developed a standard for

line operations safety audits (LOSA) for ATM, namely normal operations safety surveys (NOSS). Other approaches look for the application of good practices by front-line actors (see EUROCONTROL/ FAA, 2011).

However, one-fits-all methods for normal operations monitoring face difficulties, since they might not be suitable for a specific problem. Normal operations related methodologies need to adapt to everyday work, not the other way around. It is necessary to develop new methodologies and adapt them to

an organisation's needs, problems and objectives. Methods need to be flexible and adaptable.

During the past six years, ENAIRE has successfully explored this line of thinking by implementing new normal operations monitoring (NOM) processes and policies. NOM offers a window to operational reality and can influence safety processes and an organisation's mindset. The approach combines existing and new safety approaches into tailored methodologies to tackle specific problems.

The practical application of normal operations monitoring started years ago by chance. Despite efforts to improve investigation and the implementation of recommendations, the rate of occurrences in a tower ATS unit was still unusually high. A project was set up to perform an observational survey in order to understand the operational reality and the complexity of factors that could have been invisible in the investigations. We drafted a methodology and performed weeks of preparation, briefing the unit controllers. After many hours of observation, we were astonished about the simplicity of the issues at hand when observed with a fresh mind.

During the first 30 minutes of observation, a key topic underlying many past incidents was identified: visual scanning practice. This was confirmed by the ATS unit managers, based on their own observations. There was then an effort to get further information regarding the influencing factors and possible solutions from ATCOs. Previously, visual scanning was taken for granted, and ATCOs had not been observed with the aim to understand their scanning in the context of the system as a whole.

The analysis showed that the common trick of using a flight strip paper when the runway is occupied was not useful due to the working position design, which made operation fully dependant on the ATCO performing a runway visual scan. In addition to this, the traffic types were so varied that it added an unusual complexity to the operation.

By investigating normal work, we could trace this issue back to ATCOs initial training. After developing a specific training module based on self-observations, aimed at making the motor behaviour of visually scanning the runway more automatic for controllers, the safety occurrences lowered by 80% the following year, with severities also dropping dramatically.


Since then, observational surveys have become a flexible and valuable tool. It is especially valuable where the safety issue is just a concern, a weird feeling, or so unspecific that is difficult to verbalise.

It is also valuable where a problem is complex and requires a systemic understanding.

Observational surveys have had a great impact on safety through new and creative ways of understanding normal work and promoting everyday safety. NOM has had other unexpected, deep effects. The simple presence of safety observers within the units has broken the invisible divide between safety experts and front-line operators. Working practices that are usually taken for granted are identified and discussed, thus creating an opportunity for analysis and improvement using the expertise of the staff.

At ENAIRE this systems thinking implementation strategy is changing safety-related language to explain why things happen, and is providing new tools for investigation. We have also used 'influence maps' to understand interactions between people and other elements of the system, starting from the event, moving up and out to the system as a whole, considering the whole organisation and beyond, including events that may have happened in the past.

This positive thinking has allowed us to 'decriminalise' human error and find new directions for safety recommendations, both locally and globally. Creative recommendations are frequently adopted, like involving ATCOs previously involved in incidents (on a voluntary basis) in the design of changes, procedures, working tips and safety culture events.

The interaction of NOM with existing processes has been beneficial for all safety activities, including investigations and our approach to just culture. No complex methodologies are necessary. No state-of-the-art software is required. The true prerequisites to encompass these concepts are a sound safety mindset, getting rid of prejudices, and being able to zoom in and out. Ultimately, the best methodology is to be quiet, watch, listen and ask yourself why things are happening that way. 

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LOCAL SAFETY SURVEYS: FROM AUDITING TO UNDERSTANDING



When we think of audits, the gap between ‘work-as-imagined’ and ‘work-as-done’ often comes to mind. But with a complementary understanding from front-line operators, we can better learn from everyday work. **Patrick Gontar** and **Philipp Kurth** explain the approach in DFS.

KEY POINTS

- **There are differences between rules and standards and live traffic handling, which are often not detected or understood via traditional safety audits.**
- **Local safety surveys, involving several workshops with all levels of staff from the sharp end (e.g., ATCOs) to the blunt end (e.g., unit management), can help to bridge the gap.**
- **Trust, feedback and transparency are key ingredients for survey teams to get an unfiltered and behind-the-scenes insight into everyday work.**
- **Local safety surveys are useful for individual units, and for the entire organisation to understand interfaces between their units, and between different ANSPs.**
- **Both audits and surveys support us to achieve the highest level of safety that is reasonably possible within our organisation.**

In recent years, some excellent papers have been published exploring the field of work-as-imagined versus work-as-done (see *HindSight* 25). That is, understanding the differences between how operators actually work and how people think that they work. It is not our aim here to add to this research, but rather to apply these ideas to auditing an organisation and to learning from actual controllers’ behaviour.

Why might there be differences between rules and standards and live traffic handling?

Originally described by Loukopoulos, Dismukes, and Barshi (2003), and later also found in our own research in airline operations (Gontar et al., 2017; Gontar, 2018), operational manuals and procedures often make three assumptions, which do not always hold true in actual operations. Those are: 1) linearity, assuming a linear consecutive order of tasks that have to be accomplished by the operator; 2) predictability, assuming operators’ ability to anticipate tasks in terms of

their occurrence and their content; and, 3) controllability, assuming operators’ ability to control the execution of the task independently of anything else (Loukopoulos, Dismukes, and Barshi, 2009).

However, in the air traffic management (ATM) environment, air traffic control officers (ATCOs), at the sharp end, must cope with more complexity (e.g., go-around, medical emergency, unexpected traffic), reduced predictability (e.g., weather, estimated vs. actual departure time, direct routings) and limited controllability (e.g., due to aircraft performance constraints). ATCOs have to adjust using their expertise and might have to aim for an individual solution. This solution, which seems to be the safest and at the same time the most efficient, may depart from published procedures. This illustrates a gap between work-as-imagined and work-as-done.

So how does this relate to audits?

Over the last couple of years, we, as an air navigation service provider (ANSP), have learned that pure conformity audits are far from sufficient, if we want to achieve the highest possible level of safety. We are convinced that we must dig deeper and understand the operational viewpoint to identify further weaknesses within the system to improve already very safe operations. Improving the operations from a

system point of view means supporting the operators and enabling them to create safety by establishing rules and procedures that fit with the reality of the operations and allow ATCOs to respond appropriately to specific traffic situations.

The easiest way to find areas for improvement in rules and procedures is to ask the operators and consider their perspectives. And here comes the crucial point – if professionals are asked during an audit whether certain processes are in place, the answer is most often “yes”. If they are asked whether they adhere to the process, the answer will also most often be “yes”.

These answers are usually correct, but not always. These ‘not always’, where work-as-done may differ from work-as-imagined, are opportunities to learn from everyday work.

An audit, however, is mostly designed and facilitated in a different way. The auditees, especially when they are operators, of course know how the work is imagined and believe that the audit is there to confirm that they follow the imagination of the work designers. During an audit, the auditees explain how work is mostly done and how it should be done. They do not tend to elaborate on situations where they cannot adhere to the standards and

rules. This leads to the problem that is not possible to understand how the work is really done and how the rules and standards could be improved to better fit with the reality of the work.

This poses another problem. As soon as people start deviating from published procedures, it can be difficult to identify when they will stop and which procedures they will follow. So, if the difference between work-as-imagined and work-as-done is large, operators stop trusting the organisation. Classical audits do not enable an organisation to deal with these challenges since they do not provide insights into the variability of front-line operators’ work.

"Pure conformity audits are far from sufficient, if we want to achieve the highest possible level of safety."



How do we better understand work-as-done?

To encourage professionals to open up about their everyday work, we believe that three major ingredients are necessary to establish a fruitful environment:

- *trust* that issues raised by operational staff are not used against them and are purely used to learn and improve safety
- *feedback* to enable employees to understand and track what happened with the issues they have raised, and
- *transparency* at the management level to seriously address, handle, and resolve the issues raised.

We facilitate such an environment by using a 'local safety survey' (LSS). The LSS involves several workshops with all levels of staff from the sharp end (e.g., ATCOs) to the blunt end (e.g., unit management). Such workshops give surveyors the opportunity to discuss potential issues with a group of ATCOs to get a picture of the actual situation, their daily routines, and why rules and norms may not always fit. The objective is to transform the role of an auditor, who addresses deviations with findings, into a surveyor, who acts as a co-worker and understands the different circumstances and why – in some cases – rules are interpreted differently. It is also acknowledged, that efficient work routines are often possible because of people's effective informal understanding, interpretation, and improvisations at the edges of those rules.

What are our experiences so far?

Within DFS we have been able to conduct LSSs at our tower, centre, systems and infrastructure, and aeronautical information service units, where we have always met operational colleagues who are committed to this approach. We believe that this commitment has been developed because we have been able to show that various issues that were brought up were solved within a short period of time. This fact was especially acknowledged by those colleagues who brought up the issues, as they were those affected. The workshops bring together two groups of people – operational and non-operational staff. Thus, the survey teams get an unfiltered and behind-the-scenes insight, which proves useful in all the different discussions concerning procedure design or change implementation.

All the issues raised by the workshop participants are categorised in a way that they can be retrieved from a database and used for further evaluation. Categorising the issues helps to connect topics raised in different LSSs at different units. On a larger scale, this approach allows us to

identify issues that are important for the entire organisation (as a whole). Additionally, good practices can be adopted easily and help other units by giving examples of how specific topics are approached. Communicating issues across the organisation supports our proactive approach to solve issues before they become a problem at a specific unit.

What challenges have we faced with local safety surveys?

Running LSS workshops puts a new responsibility on the safety department. It is up to us to follow up on the issues raised in workshops, knowing that often there is no simple solution. Therefore, we rely on a continuous review process and we repeat LSSs at every unit. This continuity allows us to close the feedback loop and to discuss whether concerns still exist or have been solved in the meantime.

Another challenge for the survey team is to stay aware of the various viewpoints on the same subject in different workshop groups. We listen to groups of operational staff, but also to the supervisors and managers at the unit. A good survey team needs to recognise

"Making use of different sources of information, especially the direct contact to the sharp end, is of enormous value to improve safety."

and understand what the underlying drivers for specific topics could be, and be aware that the same situation looks different from different viewpoints.

What is the outlook?

Many small improvements and several large ones have led to great acceptance of LSS during the last five years. Building on this success within our organisation, the next step is to analyse interfaces between our units, and between different ANSPs. We recently undertook the first trials together with neighbouring ANSPs, where we could identify several aspects at our interfaces



and facilitate a beneficial exchange among the ATCOs as a by-product. Based on these experiences, we are planning to focus on cross-border and cross-unit surveys, and further elaborate on our LSS method.

Closing Note

Some readers might conclude that we consider audits to be outdated and to not add value. That is not the intention of this article and it does not reflect our attitude. We believe that audits are a strong pillar in keeping the organisation in line with regulations and standards, and thus support the

overall safety of an organisation. As rules and regulations are adopted, it is essential to perform conformity checks across the organisation, for compliance and for safety. An LSS cannot and is not intended to substitute for audits. It is rather our experience, that making use of different sources of information, especially the direct contact to the sharp end, is of enormous value to improve safety. We are convinced that both methods – audits and LSS – support us in our efforts to achieve the highest level of safety that is reasonably possible within our organisation. **S**

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"Similar to organisational factors that affect ATCO performance, investigators are also affected by organisational blunt-end factors."

IDENTIFYING 'INVESTIGATIVE BLIND SPOTS'

THE EVERYDAY WORK OF OCCURRENCE INVESTIGATORS

In learning from everyday work, we should learn not only from the work of front-line staff, but from the work of all support and specialist staff, and management. In this article, **Rogier Woltjer**, **Jonas Lundberg**, and **Billy Josefsson** consider the work-as-done of investigators, and blind spots that can affect their work.

KEY POINTS

- Occurrence investigators' 'work-as-done' may be different from the organisation's 'work-as-imagined'. This can create a discrepancy between the safety that the organisation aspires to, and the safety that it achieves.
- 'Investigative blind spots' are organisational factors that impede or otherwise affect the occurrence investigation process.
- We have developed a resource-light workshop-based method called 'MIBS: Method for identifying Investigative Blind Spots' using discussion cards.
- MIBS helps to identify and address aspects that, for organisational reasons, are (regularly) excluded from investigation work, from investigations' recommendations, or their implementation.

One could say that to understand sharp-end behaviour and risk (the operational safety of air traffic, the work of ATCOs and pilots), safety science has increasingly focused on blunt-end factors (organisational aspects further away from the operational work).

Recent research has uncovered that occurrence investigation processes may be subject to similar pressures. Occurrence investigation may therefore also have 'incidents', when issues are not examined or recommendations are not written, implemented or followed up, due to organisational factors that affect investigative work. Similar to organisational factors that affect ATCO performance, investigators are also affected by organisational blunt-end factors. These could be investigated to improve organisational safety performance through occurrence investigation.

Air navigation service providers (ANSPs) have extensive safety management arrangements and excellent safety records. They are often called 'ultra-safe'. Among other developments, occurrence investigations have become more oriented towards understanding

organisational factors and processes that can contribute to variations in the functioning of people (such as air traffic controllers (ATCOs) and pilots) and technical components, rather than focusing on individual humans and technical systems as 'root causes'.

In the language of the Safety-II perspective, investigation ‘work-as-done’ by occurrence investigators may be different from the organisation’s ‘work-as-imagined’ about investigation. This creates a discrepancy between the safety that the organisation aspires to, and the safety that it achieves. We call the organisational factors that impede or otherwise affect investigation as ‘investigative blind spots’. By this, we mean that the organisation is unable to see and address certain issues that affect their occurrence investigation processes.

"Investigation ‘work-as-done’ by occurrence investigators may be different from the organisation’s ‘work-as-imagined’ about investigation."

The Swedish ANSP LfV is interested in improving their investigation processes. A method that helps organisations to identify ‘investigative blind spots’ may be helpful to guide this improvement. Organisations will likely want to employ resource-light methods. To our knowledge no methods were available prior to our work, but some organisational factors affecting incident investigators’ work have been described in prior research. We developed these into a pragmatic ‘method for identifying investigative blind spots’ (MIBS), together with LfV.

MIBS was developed in close collaboration with occurrence investigation practitioners, and has now been applied in three iterations, some years apart. These involved semi-structured workshops focusing to identify investigative blind spots and come up with ways to improve investigative practices and safety.

The method relies on key personnel, in this case occurrence investigators, willing to discuss their work circumstances and difficulties, and the organisation allocating time. Our approaches required two five-hour workshops and some hours of ‘homework’, roughly following the steps

below. The first workshop focused on identifying blind spots. The second workshop focused on distilling the blind spots into the most important issues to address, and generating remedial actions.

Step 1: Workshop 1.

This workshop starts with a familiarisation with some relevant theory, introducing the investigative blind spots and blunt-end concepts, and the method. This is followed by an initial brainstorming session to determine which organisational factors and roles affect the occurrence investigators’ work, and the consequences of these factors. Following the brainstorm, a set of known factors (based on research or previous applications of the method) are presented on discussion cards with a heading and some examples.

A simplified example of one of the (currently 16) discussion cards is shown here:

2. Resistance to recommendations

Ownership of the recommendations, the level at which they are written, and how they are received, interpreted and understood, can hinder recommendations’ impact. ‘Education in the reception of recommendations’ may be necessary.

Limitations in resources, economic and personnel, which the receiver of the recommendations needs to allocate, can make implementation difficult.

A lack of agreement and feedback on expectations, purpose and outcomes of investigations, between investigator and receiver, can make recommendations difficult to implement.

Step 2: Homework.

Based on updated discussion cards from workshop 1, the participants go through the cards again allocating a few hours during the week(s) following the workshop (individually or in pairs). They prioritise by rating which discussion cards they would advise the organisation to work on to improve (a

first prioritisation can be done already during Workshop 1, if time allows). For their top-rated cards, participants write down: 1) real examples of the situations described on the cards, and 2) suggestions for how the organisation’s blind spots may be addressed.

Step 3: Workshop 2.

In this step, the blind spots are refined and prioritised based on the homework, and mitigating or improvement activities are generated. Cards may be revisited and reformulated, grouped or split in this step. A final prioritisation is done after these revisions, followed by a brainstorm to generate specific activities for mitigating or improving the circumstances that are regarded as ‘investigative blind spots’ that the organisation needs to address. As part of the wrap-up, participants reflect on how they experienced the workshops and homework, and improvements to the method are discussed with a feedback form and a round-table discussion.

The list of discussion cards headings that was generated during the last case study is shown here:

- 1a Fragmentation regarding ownership, use, management, and maintenance of technology
- 1b Fragmentation regarding the air traffic services market that is shared between several different ANSPs in Sweden
- 1c Fragmentation and inertia regarding the aviation industry and the ability to affect international regulations
- 1d Fragmentation and ANSP-internal circumstances
- 2 Resistance to recommendations
- 3a Relationally uncomfortable recommendations
- 3b Organisationally uncomfortable recommendations
- 4 Transitioning from analysis to recommendations: the stop rule
- 5 Focusing on own areas of interest
- 6 Focusing on what one understands oneself
- 7 Focusing on what is easy to understand and one knows will work

8	Focusing on what one can find facts/information about
9	Focusing on symptoms
10	Available resources for investigation: workload and manning affect the time it takes
11	Prioritisation of investigative work
12	Minimum levels of safety
13	Dissemination of information, principle of public access to official records, confidentiality

roles as part of the workshop activities. This would help to gain a more systemic multiple-perspective understanding of the issues. It is likely that other ANSPs and other stakeholders in both aviation and other safety-critical industries may benefit from applying a similar method.



For further details on MIBS, the MIBS Discussion Cards, and literature references on investigation practice, please contact the authors.

Editorial Note: The EUROCONTROL Safety Culture Discussion Cards include cards on many different aspects of investigation, which can be selected and used with this method. The Safety Culture Discussion Cards are available in different languages, which will be released in the coming weeks on SKYbrary.

Step 4: Stakeholder seminar.

Results are presented within the organisation at a seminar where investigators and other specific roles and managers with safety-related responsibilities are invited. Prioritised discussion cards and activities are discussed in some detail, as well as ideas on when to perform a next iteration, and with whom.

Note that this investigative-blind-spot method (MIBS) is not intended as a strict method: variations can be made to local practical circumstances. It requires facilitation skills and benefits from the facilitator having some domain knowledge. An open, trustful, blame-free and learning-oriented atmosphere is important. The method focuses on placing blind spots (and suggested activities to mitigate these) in the spotlight, but it is up to the organisation to address these and improve their safety management practices accordingly.

The participating occurrence investigators stated that they appreciated the method and the opportunity to reflect upon their work in an organised and methodological way, and they suggested (mostly practical) method improvements. LfV Safety Management expressed their interest in both the results and the suggested activities for mitigating the blind spots.

A fourth iteration of the MIBS approach is being considered for 2021. Future ideas for the method are among others to include safety assessors (tested in the third case), receivers of recommendations (e.g., ATSU chiefs, SOP managers), and various managerial

"An open, trustful, blame-free and learning-oriented atmosphere is important."



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BACK TO THE FUTURE: LEARNING TO ENHANCE PRACTICES FOR AIRFIELD SAFETY DURING CONSTRUCTION

What can we learn from past accidents to tackle operational airside operations safety challenges? **Gaël Le Bris** provides an example of how stakeholders can learn to enhance practices during airside construction work.

KEY POINTS:

- Questioning the status quo and enhancing safety isn't always expensive.
- A lot can be achieved through collaboration 'from the field to the field'.
- Airfield safety knows no border. Local progress needs to be advertised globally.

while the rest was being used as a taxiway. They collided with construction equipment at high speed. Only 96 of the 179 occupants survived.

I heard this story, for the first time, when I was a graduate student. Many things went wrong on that day. But something that astonished me at that time was the absence of any visual warning of last resort to the crew. I did not know yet, but this issue was going to keep part of my mind busy for many years.

Consider for a moment the horrific accident of the Singapore Airlines Flight 006 in Taipei, Taiwan in October 2000. The visibility was poor. The Boeing

747-400 was cleared for takeoff from Runway 05L. The crew mistakenly aligned Runway 05R instead, a portion of which was under maintenance

In 2011, I was appointed Airside Development Manager at Paris-Charles de Gaulle International Airport

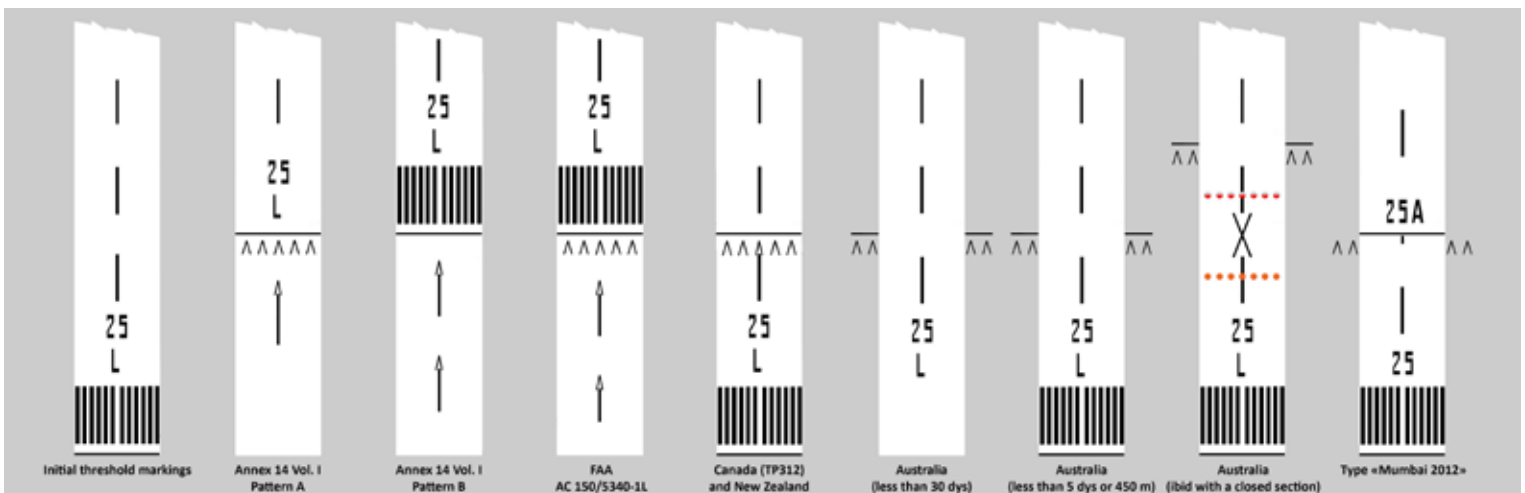


Figure 1. Mind the gap...existing standards and practices on temporarily displaced threshold markings around the world

"Several events that could have ended like the Taipei collision, were it not for the airmanship of the pilot-in-command in the last few seconds."

(CDG). The portfolio of projects was exciting. The 2011-2015 airside capital improvement programme was going to be one of the most extreme makeovers of the time. One of the projects was even going to require shortening a runway temporarily. My first thought was that such density of airfield construction projects would require us to think out of the box – beyond the standards – in order to keep flight operations safe and efficient.

When I started to investigate the potential hazards and search for past accidents and incidents worldwide, I identified several events that could have ended like the Taipei collision, were it not for the airmanship of the pilot-in-command in the last few seconds. Between 1997 and 2020, there were 60 accidents and incidents on runways during construction (excluding jet blast incidents and non-runway events).

Prior to the mid-2010s, very few countries had national standards on the matter. ICAO documents still lack adequate provisions; this was something identified in the accident report of the Taipei accident. And there are nearly a dozen different practices just on the temporarily displaced runway threshold markings, many of them raising safety concerns (Figure 1). So, we explored options for developing innovative features and discussed them with the airside community as part of our aviation safety risk assessments. These meetings involved all concerned parties, including air traffic controllers, airline pilots, and construction management, to make sure the safety devices were going to be both effective and implementable in the field.

Among these novelties was a special information sign for announcing the reduced TORA 26R before taking off toward the modified runway end that was going to be implemented from April to June 2012. Perhaps thanks to a



Figure 2. Innovative devices and systems for increasing safety during construction

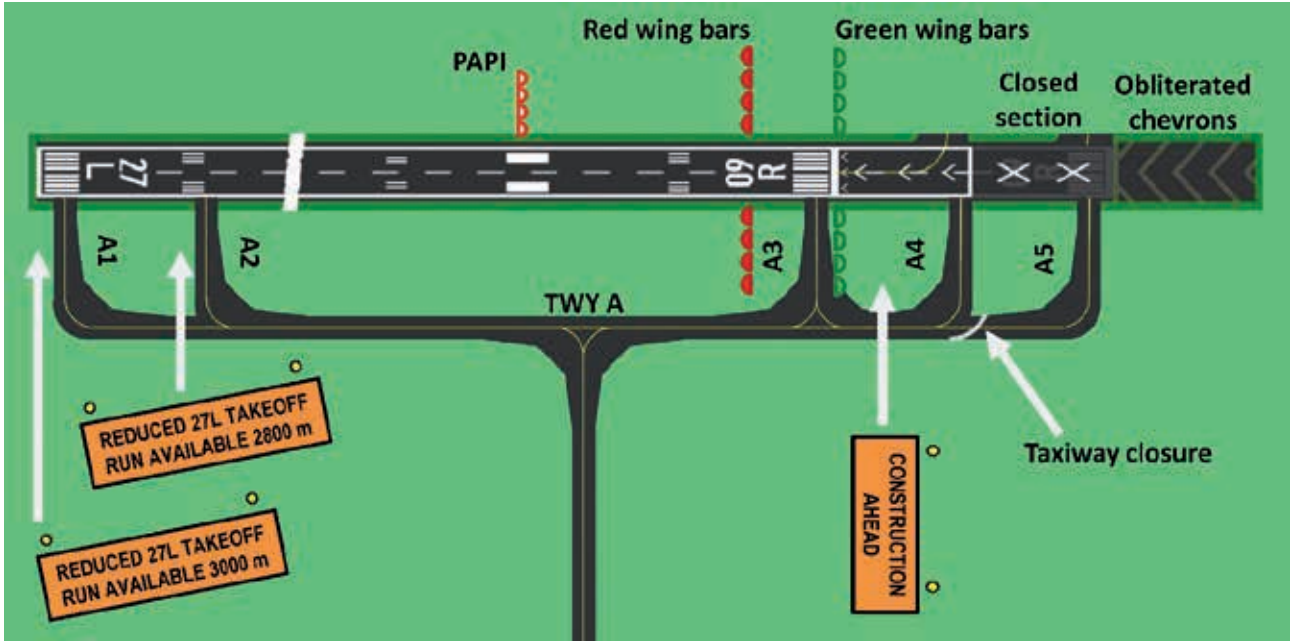


Figure 3. Temporary safety devices recommended for temporarily displaced thresholds by the Infrastructure WG of The French-Speaking Airports (UAF&FA)

comprehensive safety risk management approach, a markings and signage plan, enhanced phraseology for controllers, and the outreach we did to the pilot community and the flight data providers, we did not have any accident on the runway during this period (Le Bris, 2013).

The most critical part of the 2011-2015 construction program was behind us. But this was just the beginning of the journey for improving operational safety during construction.

In November 2012, I met with the FAA Airport Construction Advisory Council (ACAC) and learned that ORD and JFK faced very similar issues when preparing for runway maintenance projects they conducted few years earlier. Despite detailed preparation and an outstanding safety risk management effort, some serious incidents happened (Rosenkrans, 2009). Coordinated initiatives were quickly initiated on both sides to correct these deficiencies. In particular, we conducted parallel research efforts and human factors studies to develop temporary information signage also known as 'orange construction signage' (OCS) (Figure 2), which was presented in a previous issue of *HindSight* (Le Bris, et al, 2016).

Here is another epiphany... A few years later, when preparing a runway rehabilitation project, I got suspicions that the ICAO runway closure markers were underperforming as aircraft were too often overflying and even landing on closed runways. Perhaps the colour was not right. After all, white is used for regular, active runway markings. Adding red and yellow markers could do the job. Also, most runways under rehabilitation become unprotected at some point. Indeed, how can we maintain the markers on or along the runway when the pavement is being replaced? The solution was to create mobile markers on wheels that are resistant to wind. Our local runway safety team (LRST) loved these ideas. We started to apply them in the field in 2014 (Le Bris, 2019).

In 2016, I proposed to the Infrastructure Workgroup of The French-Speaking Airports (UAF&FA) to develop a guidebook to promote best practices and standardisation. We worked relentlessly for about six months, and we 'boldly went where no CAA has gone before' for our guidebook on markings and signage during airfield construction (The French-Speaking Airports [UAF&FA], 2017). This publication features exhibits with comprehensive safety mitigation systems and visual aids

for pilots. They cover about 20 different situations on runway, taxiway, helipad, and service road. They introduce many innovations and they address practical questions that can have consequences for safety, such as the notion of 'short term' closure, the type of safety device to use, or the separation distance between them.

Most importantly, they propose a mature configuration for runway closures and shortened runways (Figure 3). For the latter, we recommend a temporary PAPI as well as runway end (red) and threshold (green) wing bars among the items of our 'minimum equipment list'. Unlike for the runway end lights, there is no wing bar alternative for the threshold lights in the standards (ICAO, EASA, or FAA). In other words, the threshold wing bars are non-standard. They should be justified in a safety risk assessment and might be subject to approval by the national aviation authority.

To date, it is still the most advanced publication on the matter.

Shortly after the release, opportunities arose for these best practices and recommendations to go to the next level. They were introduced in the EAPPRI V3.0 (EUROCONTROL, 2017),



Figure 4. From the field to the field: The enhanced runway closure markers

the DGAC (France) 2017 National Symposium on Runway Construction Safety (2017), ACI's guidebook on Managing Operations During Construction Airports Council International (2018), and ANAC (Brazil)'s Manual of Maintenance and Airfield Construction (2018). Most importantly, airports effectively adopted these items: Paris-CDG, London Heathrow, Milano Malpensa, Québec City Jean Lesage, Oslo Gardermoen, Salvador da Bahia... The list grew pretty quickly.

What's next? By the end of this year, the Infrastructure Workgroup will release a new version of the guidebook, in both English and French, with new features. We will continue the promotion of these best practices with an emphasis on the developing and less developed regions. Also, there is still a lot to do about safety management, the aeronautical information, and the phraseology that could justify a new guidebook. To be continued... **S**



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COULD A BIRO (OR TWO) MAKE YOUR DAY?

How many operational staff take time to reflect and write down what they have learned during a debrief at the end of the shift or set of shifts? **Bartosz Gicala** argues that the humble pen should be used more often to help learn from everyday work.

Years ago, during my ATC *ab initio* course, one of the instructors really stood out. He was a demanding type, always emphasising the need to avoid complacency (his attitude would perfectly suit the idea of *'expect the unexpected'* found on EUROCONTROL leaflets). He would make sure that the simulation exercise under his supervision would check not only our prior preparation, but also our ability to think on our feet.

Midway through one exercise, at a time when paper flight progress strips were still in use, he announced to the trainee that his pen was experiencing an irreversible malfunction. Being left without any means to note down the essentials of each flight's progress, the confused trainee soon lost the picture; the whole traffic situation turned into a big, spinning mess. The lesson was learned, and the next day, not a single trainee turned up at the simulation facility without the possession of two fully operational bios.

This lesson – while quite unusual – was part of structured *ab initio* training. However, the way we learn from everyday work is still left very much to itself. We become experienced in a sort of natural manner, and learning becomes similarly unstructured.

This brings a risk of complacency when it comes to learning as a professional. What proportion of ATCOs devote any time to perform a sort of individual debrief on his or her last shift? I'd bet that very few of us do that.

Of course, experience is gradually accumulated, but it is also forgotten and

not shared. Perhaps we could learn much more from everyday work if we took time to reflect and write some notes in a journal. Take a few moments to consider our performance at the controller working position, and make a critical but fair brief written assessment. For instance:

- What were the pros and cons of my work performance?
- What other solutions could have been applied to solve the issues we had been faced? What might I avoid next time?
- Is there anything to make a reminder of?
- Does a skill or any knowledge need to be rehearsed, revised or gained?
- What surprised me?
- Was there any pivotal moment that requires deeper thought?

These are just a few questions that could be asked. And how about jotting down a couple of conclusions from a such a debrief? That could truly become a book of wisdom gained from reflection on day-to-day experience, available to sift through at any time, perhaps before resuming work after holidays.

Such individual, informal learning is limited only by one's willingness to reflect, record and incorporate lessons into one's professional activity. But then there are the organisational layers of learning. Our individual reflections could inform ATCO meetings (both formal and off duty), safety reporting systems, and team resource management. But do you get regular meetings at your ATS working unit aimed at discussing current

safety issues, changes in operational environment or simply sharing "front line" experiences? Does your reporting programme encourage learning from everyday work, adhering to just culture principles? Are reported issues dealt

with promptly, with all the involved parties being kept aware of the progress and result of an investigation? Is the reporting system overly concentrated at addressing faults while marginalising the need to gather and promote examples of good practice? Are conclusions

implemented into the organisation, without undue delay?

The cunning instructor could only use the pen trick once. Then he had to pick some other trick from his wide array. While many of us don't use pens for flight data recording any more, perhaps we need them for learning from everyday work. **S**

"Perhaps we could learn much more from everyday work if we took time to reflect and write some notes in a journal."



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IT TAKES TWO TO TANGO: LEARNING FROM EVERYDAY COMMUNICATION

Language skills are critically important in aviation. Whatever our level of fluency and confidence in English we can all continue to learn from even the most routine, everyday exchanges, says **Lynn Davis**.

KEY POINTS

- **Everyday communication in aviation has several characteristics that we need to be aware of, including automaticity, lack of body language and facial expression, inferencing, and the effects of stress and fatigue.**
- **There are several blocks to communication, including underarticulation, speed, accents, lack of clarity, vocabulary choice, and lack of consideration for the receiver.**
- **In an English exchange, arguably native Anglophones have greater responsibility than their non-Anglophone counterparts.**
- **We can all learn from – and improve – our everyday exchanges in aviation, no matter how routine.**

Safety in the sky depends on efficient, accurate and precise oral communication between ATC and pilots despite exchanges taking place over less than perfect frequencies with one or both parties working in a language which is not their mother tongue.

Communication involves remarkable and complex cognitive processes.

When we speak, our brains rapidly find the right vocabulary, arrange it in the correct order and synchronise the physical movements required to utter comprehensible sounds. This already demanding process becomes doubly complex in a non-native language.

Spoken communication is, by definition, instantaneous and transitory. We can't

take time to review and improve our grammar or lexical choice. As listeners, we have to keep up with the speaker, recognise and decode the message immediately. Listening comprehension requires speedy processing but also places a load on the memory – you have to remember how the sentence started to make sense of the whole.

Processing speed can be critical in an emergency. We need regular practice and training to keep our reflexes sharp.

Characteristics of Everyday Communication

Familiarity breeds automatic response

Routine vocabulary in a well-known context is processed in a flash precisely because of its familiarity. Essentially, we know the script already. Frequently used terms become automatic rather than consciously controlled. We are on autopilot, not actively flying the linguistic plane. But, inevitably, we have fewer fully automatic processes in

a second language than in our native tongue.

Challenges arise at the point where effective communication is at its most important and the stakes are at their highest – the non-routine situation when swift, accurate communication is vital.

Verbal only

Working on radio frequency poses special linguistic challenges as we lack the support of body language and facial expressions that usually aid understanding. The words themselves may be indistinct or distorted if transmissions are less than crystal clear. We depend on words alone, albeit supplemented unconsciously by our tone of voice and vocal quality.

Inferencing

Anticipation and drawing inferences are normal elements of listening skills. We automatically anticipate what we will hear based on the context augmented by our expertise and experience. If information is missing, for example if there is a momentary glitch in transmission, we fill in the gaps, intuitively making an educated guess. As with all language processing, this is more challenging in a second language.

Sometimes, however, the message is not the one we expected. Some comedy is based on this very idea of mistaken anticipation – a sentence appears to be going in one direction, we anticipate what’s coming next but are surprised and amused by a sudden change of tack. The humour is created by incongruity.

A simple example of such an unexpected linguistic twist is the story of two fish in a tank. One says to the other, “do you know how to drive this thing?” We imagine a fish tank until we realise we have to switch our mental picture to a different type of tank. Verbal gymnastics of this kind partly explain why humour is so difficult to appreciate in a second language.

"Native English speakers may not need English lessons, but they do need language awareness."

Psychologist Professor Richard Wiseman has demonstrated how long it takes a listener to decode a joke. For instance, the following has a three-second time lag between hearing and reaction: ‘A skeleton walks into the bar and orders a pint of beer and a mop.’

This illustrates how, even in our mother tongue, there is a time lag in processing unexpected information – we need a moment to recalibrate. Again, we see the particular linguistic challenge of the non-routine event.

Stress

Fatigue and stress impede our cognitive functioning, slowing down complex tasks. Stress, for instance associated with non-routine and emergency events, can affect language skills and communication, whatever our language level. Stress also conveys itself to our listener through our vocal quality and tone, with a knock-on effect on the listener.

It takes two to tango

This is obvious, but important: there are two sides to every conversation. Both participants contribute to successful communication. In an English exchange, arguably native Anglophones have greater responsibility than their non-Anglophone counterparts. After all, they have a wider range of linguistic resources at their disposal.

Native English speakers may not need English lessons, but they do need language awareness. They can fall into the trap of assuming that everyone else speaks English so they will be understood with no extra effort on their part. This isn’t helpful. Perhaps ICAO should require native English speakers to have regular training in communication skills.

Common Blocks to Communication

Every conversation, however routine, is an opportunity to develop and maintain good communication habits, which can then become reflexes

automatically deployed even in emergencies. After every exchange we have an opportunity to reflect on the effectiveness of communication and what could be improved. Here are a few common issues.

Under-articulation

When listening to a flow of speech, it can be difficult to identify where one word ends and another starts. We may be forced to make a guess, which may seem to make sense but can in fact be wrong. Anyone who has ever misheard a song lyric has probably experienced this problem.

In English lessons we use real live traffic recordings giving a wealth of examples of indistinct speech. ‘Lead-off lights’ can sound like ‘leader flights’, ‘CPR’ seems to be an unfamiliar word ‘seepeyar’, and ‘unconscious’ sound remarkably like ‘conscious’ if not clearly articulated.

The simple remedy is to articulate clearly, especially maintaining clear word boundaries.

Speed

Stress often makes us speak faster than usual. Given the decoding time lag and issue of memory charge, rapid speech places extra pressure on the already stressed listener, creating a constellation of unnecessary added difficulty.

We don’t need to speak at dictation speed, but maintaining a measured pace ultimately saves time, avoiding the need for repetition and reducing misunderstandings.

Accents

Pronunciation is an ICAO language testing criterion. For level 4, first language influence must ‘only sometimes’ interfere with ease of understanding. The bottom line is that accents must be comprehensible. But we should also consider regional native Anglophone accents, which can be just as strong and challenging to understand.

We naturally become used to familiar accents which seem less strong than



those we rarely hear, even if the speakers in fact have the same ICAO English level. Many of us are unaware of our own accents and how others hear us.

Specialist aviation English teachers know the importance of using listening materials illustrating a variety of regional and international accents. Improving pronunciation requires as much self-awareness and focused work as other aspects of language learning.

Clarity

Communication also has a cultural element. We English are notoriously indirect communicators. This is seen as polite. For example, a pilot request to ATC started: "Can I ask you if you would be kind enough to..." when "Please..." would have been better. In normal life this may be polite but on frequency we need clear, economical expression, remembering that controllers may be handling several conversations at a time.

Another peculiarly English tendency is minimising. When a pilot told ATC of "a small hiccup" and said "it would be nice" to have the police "on stand-by", ATC didn't know what was really happening or the appropriate response. If an English person says that he or she has "a bit of a problem", it may mean they are in real difficulty. We need to be aware of our own communication styles and work to be clear, precise and direct, eliminating extraneous verbiage

to allow listeners to process information quickly and accurately.

Vocabulary Choice

Native speakers usually have a broader lexical range than even fluent non-natives, but may not know which choices are easier for others to understand. For example, an Anglophone pilot may not appreciate the unnecessary complication caused by the small but critical difference between 'passed out' (became unconscious) and 'passed away' (died).

Language learners are usually taught the more formal register and may not encounter informal or casual language so often. Correct, direct, formal language is necessary.

Consideration

Native and strong speakers sometimes show little consideration for the challenges faced by others with weaker, though still functional, skills.

If your message has not been understood, you help no-one by simply repeating the same words in the same way, even increasing in speed and tone tension as irritation sets in. Stress or embarrassment may force the listener to guess – and guessing can be dangerous. A quick YouTube search under 'angry ATC' reveals numerous examples of controllers speaking to pilots from all over the world but making no effort to articulate clearly or to use standard

"Comprehension is not the listener's sole responsibility; if the message hasn't got through, it's up to the speaker to reformulate."

phraseology and sometimes becoming unacceptably rude.

Comprehension is not the listener's sole responsibility; if the message hasn't got through, it's up to the speaker to reformulate.

Conclusion

None of us can afford to be complacent about our communication skills, which need constant training and reinforcement to be available on demand in every situation. Above all, every conversation, however routine, is an opportunity to practise and to learn. **5**



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SAFETY MANAGEMENT Q&A



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1. What is the most significant change facing your organisation at the moment that has relevance to aviation safety?

In continuation of our Integrated Safety Strategy, DSNA is deploying a new Safety Risk Assessment methodology for evaluating all kinds of changes and their impact on the safety of our operations. Changes in our functional system range from unit level local issues such as relocating an approach control room or a local airspace change, up to the multiple deployment of future tower controller working position (SYSAT programme) with new functionalities. This is one of the foundation pillars of our SMS, together with investigation of incidents, so this is a major evolution in the way we manage safety.

2. Why is this change necessary? What is the opportunity or need?

It is both an opportunity and a need. The new European ATM/ANS regulation (EU 373/2017) comprises a fairly innovative and systemic approach for dealing with changes impacting safety. The regulatory team that helped EASA develop this requirement was composed of several experts from ANSPs, including DSNA. So we had the chance to influence the way the requirements were phrased. However, we then had to convince the regulator we were doing the right thing and that was a major challenge.

Thanks to our long-standing innovation work in safety, we were able to capitalise on several past initiatives. We integrated real-life scenarios into the safety analysis (e.g., OJT, stormy weather situations, shift handovers) for ERATO Electronic Environment (EEE) deployment in Brest and Bordeaux ACC. We also trained ATCOs to perform observation in the control room or tower to capture safety relevant issues to feed into a local change process (also called normal operations monitoring). The new method also relies on the concept of barrier models (an extension of the famous 'Swiss cheese') thanks to the work with EUROCONTROL Brétigny and several ANSPs in SESAR, and with a view towards deploying this tool in the field (via the IRiS User Group). The barrier models allow us to account for improvements in safety (success case) that the change will bring, so not only a negative view of safety.

All in all, the fundamentals are not different from the previous well-known Safety Assessment Methodology, but it incorporates new additions that make more sense from an operational point of view and also bridge the gap with safety investigation.

3. Briefly, how is safety assured for the change?

This method has been developed thanks to an incredible effort of various teams from many services, ops and tech, within DSNA converging towards the same interpretation of the requirements, of our needs and bringing all the pieces together. It also

incorporates more of the new view of safety such as 'success case', normal operations perspective, and technical performance supporting ops, while at the same time building on DSNA practices and people's expertise.

4. What are the main obstacles facing this change?

Training and promoting a new method in a time of crisis such as the one we are experiencing is a challenge. After the first sessions of training, we had to convert into virtual training sessions which is, of course, very different both for the trainers and the trainees. We are hoping to be able to organise local hands-on sessions with the persons in charge of organising the safety risk assessments at the units, so that we can go through their topics and provide first-hand advice and guidance on how to use the method.

5. What is the role of front-line practitioners? How is their expertise incorporated into change management?

In the past, DSNA has trained an important number of people on our safety risk assessment methods, actually more than 1000 people since the early days of EUROCONTROL ESARRs. This proved very useful to support our safety culture: even if people were not actually carrying out the safety risk assessment, they knew what this was all about when they were called to participate in

workshops to evaluate the risks linked to a specific change.

Based on this experience, we tailored the method so that it is an improvement over the previous one, focused more on operations and changes to operations. Then we can properly evaluate the effects of the change through structured interactions with practitioners. This is also meant to avoid the 'risk matrix number game' when people's ingenuity was focused on finding the right arguments to end up in the green box rather than the red one! In that sense, using a barrier model to describe the different ATCO activities (strategic, tactical, emergency) makes a lot more sense and is readily understandable.

Additionally, the barrier model is also a good way to take into account what really works (robustness of the barrier, 'people make safety') and also to liaise with the findings of specific investigations where we uncover the finer details of work-as-done and discuss those in a just culture environment.

6. What do they think about the change?

As we are in the process of training those who will use the method, this is still work in progress. A lot of support is needed for making this change a useful tool for the kind of changes we have to deal with, whether they are operational procedures, technical functionalities or runway works.

We hope everyone will benefit from this more operationally oriented view of the evaluation of the change, rather than the previous more reliability-oriented process. Our ATM environment will go through various changes, with more digitalisation, greener flight profiles, and new entrants. The change will contribute to maintaining collective confidence and trust in our system.

7. How can front-line practitioners get involved in safety management to best support operational safety?

As is usual since we introduced safety risk assessment a long time ago, operations are involved in the brainstorming for changes that may impact their activity. The real novelty is that we are also trying to capture their perspective prior to the change so that we can better evaluate the impact. The same approach – observation of normal operations – can be used after the change to validate our assumptions, capture new emerging issues.

This requires buy-in from all stakeholders, but we think this is a major opportunity to learn from adaptations to the various operational constraints. It is also an opportunity to support this adaptation in a constant dialogue between front-line practitioners and all staff and managers involved in safely running our complex operations for the benefit of airspace users. **S**



"Sir, this is not a drill!"



"...climb to next level and wait...turn left and continue 1000...target coming from right...look up and hurry"
"It looks like the Call of Duty TRM training session is going well?"



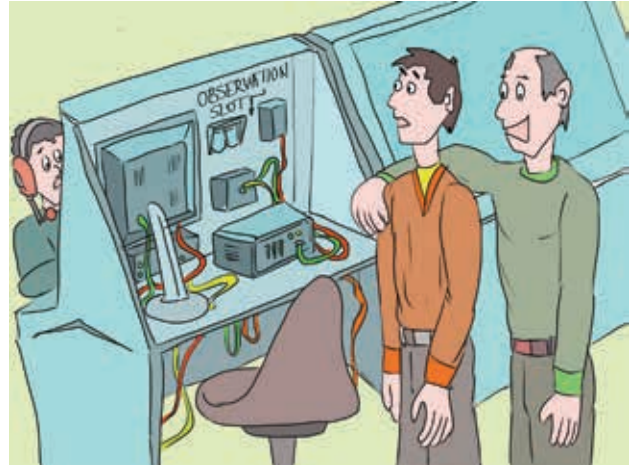
"Traffic is low, so we decided to shut down the radar for the duration and patch in some alternative surveillance data."



"Search and rescue please. I have a problem."



"So how did the audit go?"



"We redesigned the console to make observation a little easier."



"Frank takes data gathering very seriously."



"Are you still mad at the FMS for the go-around? Ignoring the RA won't help, you know."



WHAT'S GOING ON UP THERE?

ASSESSMENT OF PILOT COMPLIANCE WITH TCAS RA

TCAS Resolution Advisories are not everyday events for pilots, but dealing with them is part of the job. So how many RAs are flown correctly? **Stanislaw Drozdowski** and **Mateusz Michalski** report on a study of nine million flight hours, with some concerning results.

KEY POINTS

- **Anecdotal evidence suggests that pilot responses are often neither prompt nor accurate. To obtain a wider view on the quality of pilot response, we performed an assessment using radar data.**
- **Only 38% of RAs were classified as “followed”, and 58% of all RAs were flown in the opposite direction or not followed.**
- **The percentage of RAs followed 12 seconds after the RA improved markedly. But almost a third of RAs were not flown correctly and the proportion of excessive reactions doubled.**
- **Although the assessment using radar data comes with some limitations, it clearly indicates that the level of pilot compliance with TCAS resolution advisories is low.**
- **Aircraft operators should monitor carefully crew performance, to understand what influences performance, and take corrective measures as necessary.**

The development and implementation of the Traffic alert and Collision Avoidance System (TCAS) was driven by aviation accidents. When there is a risk of collision, TCAS will issue a Resolution Advisory (RA) telling pilots how to change or limit the vertical rate to avoid a collision, so a prompt and accurate pilot response to all RAs is particularly important. While pilot responses are typically only assessed in serious incidents, anecdotal evidence suggests that pilot responses are often neither prompt nor accurate. To obtain a wider view on the quality of pilot response, we decided to perform an assessment using radar data.

The radar data for this assessment was gathered in core European airspace over a period of 12 months. An aircraft's transponder downlinks Mode S radar messages providing details of RAs and RA termination on each radar interrogation, as well as details of the threat aircraft. These messages – RA downlink messages – were used for this study.

The assessment of pilot compliance with TCAS RAs using radar data comes with certain limitations. Firstly, radar data is subject to surveillance delays (due to radar rotation) – any downlinked event occurred up to three seconds before the time of downlink. Secondly, the aircraft's altitude and vertical rate may be inaccurately determined by the ATC system tracker. In order to deliver optimal display performance of radar data to air traffic controllers, the ATC system tracker software makes assumptions regarding the estimated position of tracks and approximates the data accordingly. Finally, for some RAs, Mode S downlink messages do not provide all the details required for the assessment.

Ideally, the assessment of pilot compliance with RAs should be conducted based on airborne recordings (Flight Data Recorders or dedicated TCAS recorders), which provide a level of detail that is not available from ground-based systems. Aircraft operators regularly assess compliance of their crews. However, they typically do not share the results of their studies. While results coming from individual carriers may be occasionally available, that does not provide a system-wide view.

How many RAs are happening up there?

In the first step of our study, we examined the frequency of RAs. The radar data consisted of over nine million flight hours and contained 1,022 encounters (events in which at least one aircraft received an RA) and 1,373 RAs, i.e., an RA occurred every 6,567 flight hours, making an RA an infrequent event.

In the majority of encounters (84%), only one aircraft involved in the encounter received an RA. This was because of one of two reasons: the threat aircraft was not TCAS equipped, or the geometry of the conflict required an RA for just one aircraft.

Low? High? Or everywhere?

Most RAs occurred above FL180 (67%). The distribution of initial corrective RAs (i.e., RAs requiring a change of aircraft's vertical rate) by altitude is shown in Figure 1.

What type of RAs are occurring up there?

When two aircraft are converging horizontally and with high vertical rates (i.e., climbing or descending towards their cleared levels 1000 feet apart), TCAS may trigger an RA even though the ATC separation is correctly applied. This is because TCAS calculates a risk of collision based on the closing speed and vertical rates. Therefore, high vertical rates while approaching the cleared level may cause the TCAS logic to predict a conflict with aircraft at the adjacent level. In these cases, TCAS will

Figure 1: Altitude distribution for first corrective RAs

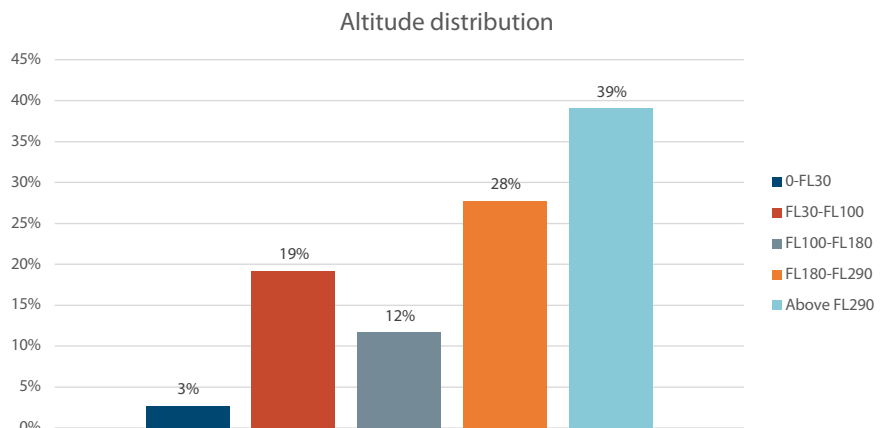
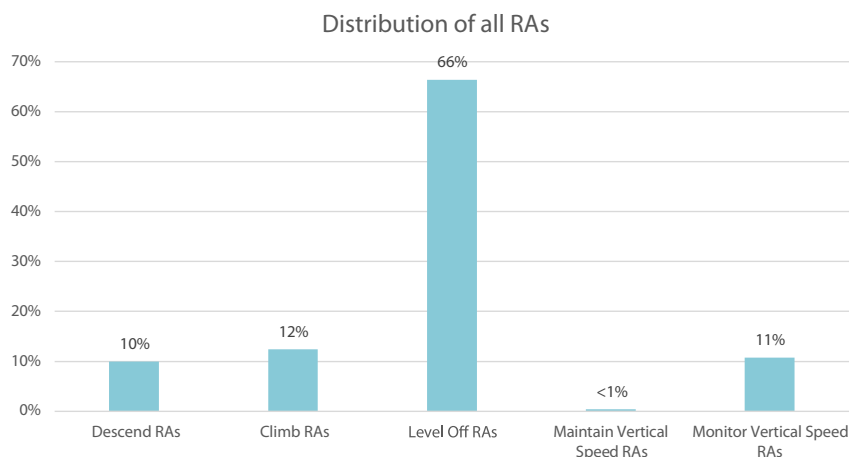


Figure 2: All first RAs taken into the assessment



issue a Level Off RA, instructing the pilot to reduce the vertical rate to 0 ft/min. In congested European airspace this is a common scenario, so quite predictably Level Off RAs top the list of all RAs (66%). The distribution of all recorded RAs is shown in Figure 2.

So, what is really going up there? Do pilots follow RAs?

A simple answer is “not quite”. ICAO standards assume the pilot will start response to an RA within five seconds. Depending on the vertical rate at the time when the RA was issued, it may take the pilot more than five seconds to reach the rate required by the RA. Given that, and the limitations of the radar data, only RAs with duration longer than eight seconds were initially evaluated.

In line with the IATA/EUROCONTROL guidance material (IATA/EUROCONTROL, 2020), the pilot responses were categorised as follows:

- Followed: when the required vertical rate was achieved within eight seconds after the RA.
- Not followed (too weak response): when any change was not sufficient to meet the vertical rate required by the RA. Too weak a response carries a risk that the required vertical spacing will not be achieved.
- Opposite: when the achieved vertical rate was in the opposite vertical direction to the required rate.
- Excessive: when the achieved vertical rate exceeded the required value. Any excessive responses increase the risk of a follow-up conflict (with another aircraft) and are disruptive to ATC.

The overall picture is not very encouraging (see Figure 3) with only 38% classified as “followed”. More than half (58%) of all RAs were flown in the opposite direction or not followed.

The best compliance was achieved for Level Off RAs (40% followed), but also approximately 40% of Level Off RAs were flown in the opposite direction (i.e., the vertical rate was increased rather than reduced). For Climb and Descend RAs, pilot responses were classified in the range of 20-25% as

Figure 3: Pilot compliance with first RAs – 8 seconds or longer

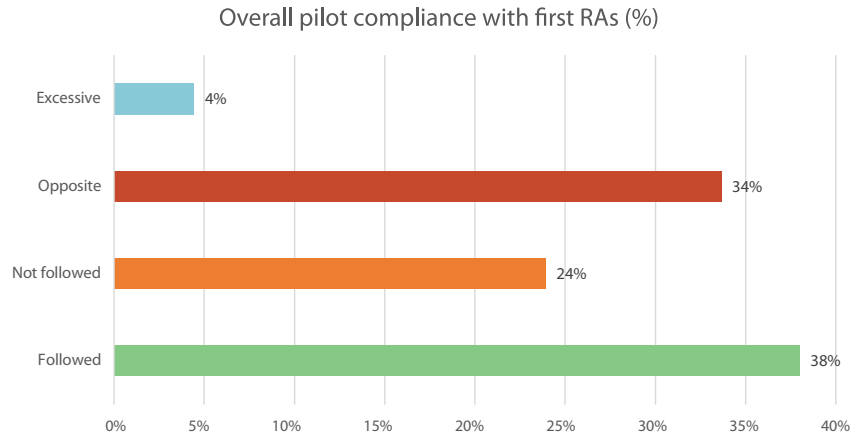
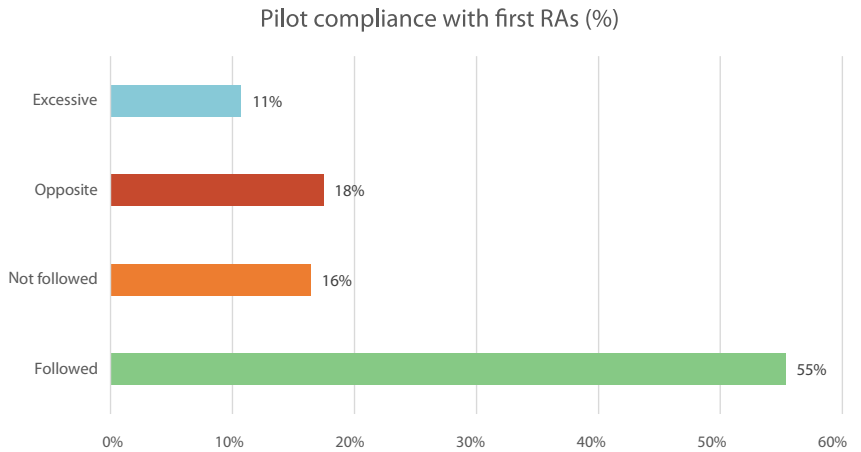


Figure 4: Pilot compliance with RAs – 12 seconds or longer



followed; however, 57-65% of these RAs were not followed correctly and 6-20% were flown in the opposite direction.

Given the poor level of response determined at eight seconds after the initial RA (or more precisely, eight seconds after the RA has been downlinked to the ground system, so up to 11 seconds after the RA), pilot responses were further assessed at 12 seconds after the RA, provided the RA lasted longer than 12 seconds. Initial RAs with a duration shorter than 12 seconds were disregarded. The expectation was that these responses would show an improvement associated with the time frame extension, thus giving the pilots more time to respond and achieve the required vertical rate. Indeed, as shown in Figure 4 the percentage of RAs followed improves

markedly. Still, almost a third of RAs are not flown correctly. Interestingly, the proportion of excessive reactions doubled.

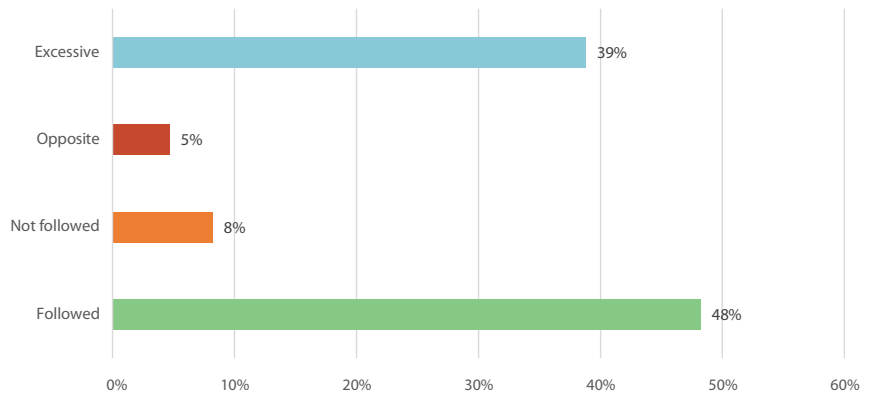
What happens if RAs are not followed?

In cases where the initial RA will not provide sufficient vertical spacing, the RA will be modified to either increase the vertical rate or reverse the vertical sense of the initial RA. For strengthening or reversal RAs, prompt and correct pilot responses are particularly important. On the other hand, if the collision avoidance logic determines that the response to the initial RA will provide sufficient vertical spacing, the initial RA will be weakened to limit any unnecessary altitude deviation.



Figure 5: Pilot compliance with second RAs - 8 seconds or longer

Pilot compliance with second RAs (%)



Secondary RAs were issued in 171 cases (12% of all RAs) and most of them (over 81%) were weakening RAs. Almost a fifth of RAs were strengthened or reversed and half of them were not followed or were flown in the opposite direction. This is particularly concerning. Globally, the compliance with the second RA is much better than with the first RA (48% vs 38%; see Figure 5).

Some RAs are not followed, but does that make a difference?

The study has revealed that a significant proportion of RAs are not flown correctly. Is this just a procedural breach or does it degrade safety? Unfortunately, the study could not determine whether safety is degraded if pilots do not follow RAs correctly. However, it is reasonable to conclude that any incorrect responses to RAs in critical circumstances may lead to a collision. Such circumstances cannot be assessed until after the event.

The study found a number of cases where, in the absence of correct pilot response, vertical separation at the closest point of approach was significantly reduced. However, these cases could not be used to give quantitative assessments because they were not frequent enough to draw statistically significant conclusions. Moreover, the achieved vertical separation was affected by additional factors, including: pilot responses to

modified RAs; manoeuvres of the other aircraft in the encounter; in case of Level Off RAs (which are typically issued when the aircraft are still separated) any degradation of separation is difficult to detect.

"The level of pilot compliance with TCAS resolution advisories is low. These results are in line with anecdotal evidence from various sources."

Conclusions

Although the assessment using radar data comes with some limitations (which could be overcome if less readily available airborne data were used), it clearly indicates that the level of pilot compliance with TCAS resolution advisories is low. These results are in line with anecdotal evidence from various sources.

Prompt and correct responses are particularly important for reversal and strengthening RAs. Unfortunately, in over half of the cases pilots did not react correctly to these RAs. This again emphasises the need for aircraft operators to monitor carefully crew performance, to understand what influences performance, and take corrective measures as necessary. **S**

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Note: Since the report on pilot compliance with TCAS RAs has been published, EUROCONTROL have received several comments. To address these comments, the study is being expanded to provide the view on pilot compliance with different granularity and using another assessment approach. Once the update is ready, it will be published on SKYbrary.



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HOW DO WE GET THE INFORMATION?

Even when we have a lot of data on everyday work, are we actually learning? **Wolfgang Starke** argues that we need to make learning more natural, with stories instead of just data.



Airspace Infringement - Aeronautical Information



TCAS RA High Vertical Rate



Unexpected Traffic in the Sector



Runway occupied medium term



Mountain Waves



En-route Wake Turbulence

One problem with learning from safety reporting may be different preferences for information between crew members and others in an aviation organisation, including management and safety specialists. While some might like numbers, graphs and detailed information, the same is not usually true of crewmembers.

A good safety department needs to go beyond analysis and evaluation of safety data. A mass of information is useless if it is not processed and communicated properly. At least two more things must be done. The first is to pass useful information to the training department. If there are issues in the operation that can be tackled with proper crew training, then the training manager will need to know so he or she can adjust training. The same applies to other relevant departments, such as engineering. The second, even more important and more difficult task, is to pass information directly to the

crewmembers. The importance of this task is obvious, but why is it difficult?

Most people like stories. So, to improve learning from everyday work, a smart move would be to make learning from everyday work an easy and interesting task. On SKYbrary, there are many short animated 'SKYclips' available, which tackle big and small issues in aviation. A large German airline has an interesting brochure in which their crewmembers can find digestible information about happenings and issues that are relevant to safety. A good safety department will need editors to put information into a format that is interesting and easy to understand. Then the information must be communicated to the staff. These competencies are quite different to those required for analysis.

The bottom line is this: if you make it easier to find and understand the right information, staff will make it easier for the company to maintain safety. **S**

"If you make it easier to find and understand the right information, staff will make it easier for the company to maintain safety."



Wolfgang Starke is a Type Rating Examiner currently licenced on Dash8-Q400 with former experience on Boeing 737 and Embraer 190 and about 9.000 hours of flight time. As a consequence of the COVID-19 crisis, Wolfgang is currently open to work opportunities.
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THE MESSY REALITY OF WORKING IN THE CABIN

When we think of aviation safety professionals, do we also think of cabin crew? If not, then we need to learn more about their work, as **Patricia Green** explains.

Our aim in aviation is to keep our skies safe and ensure every flight is as safe and efficient as it can be. We all have our individual roles to play, as cabin crew, engineer, dispatcher, pilot or air traffic controller. We all use crew resource management (CRM) to ensure effective communication, teamwork and decision-making processes. We try to understand human factors in operations, and use our CRM and threat and error management skills to mitigate risks every day.

Safety and service

There is a perception that cabin crew are not safety professionals, but rather service providers. This is perhaps because most people only 'see' the

"It would surprise most people that service is about 2% of our training."

service aspects of our everyday work. They don't see what we are trained to do. It would surprise most people that service is about 2% of our training. We are trained to deal with any emergency within the cabin, including fighting a fire to landing on water, handling a decompression, evacuation on land, and medical emergencies.

We have to know everything in our cabin; the emergency equipment, the communication systems, the oxygen systems as well as knowing all the associated procedures. With experience, we develop an intuitive approach in the cabin and become sensitive to our environment and the situations that unfold on each flight. We become sensitive to movement, sounds, smells and anything non-routine.

The ICAO website for cabin safety states:

"Cabin crew members also play an important proactive role in managing safety, which can contribute to the prevention of accidents."

The Contribution of CRM

There is no doubt that since the introduction of CRM training, aviation safety has improved. Communication between the flight crew and cabin crew is much better. We have more of an understanding of each other's work and there is less of a status barrier. Cabin crew are now actively encouraged to report to the flight crew anything they think is suspicious or potentially abnormal, and we are their 'eyes and ears in the cabin' at all times.

The effectiveness of CRM can be seen in such accidents as United Airlines

232 in 1989 in Sioux City, where there were many survivors and the crew handled the emergency well without conventional controls. United Airlines 811 in 1989 is another example, after an explosive decompression occurred causing considerable damage to the aircraft. British Airways 5390 in 1990 is another case, where a windshield was fitted incorrectly and the captain was blown partially out of the aircraft and the crew's actions saved his life.

However, this is not always the case. One such example (often used in CRM training) is the Kegworth disaster in 1989. BMA 92 tried to make an emergency landing after an engine issue – the cabin crew reported a fire in the wrong engine, and the flight crew shut down the working engine. The cabin crew “Didn’t feel it was their business...” to report anything further. Another example is Air Ontario 1363 in 1989, where there was snow on the wings on take off. A passenger, who was a pilot, asked the flight attendant to tell the flight crew but she didn’t. One of the training managers said that “The flight attendants were trained not to question the flight crew’s judgement regarding safety issues.”

Since then, basic knowledge of the aircraft and flight are taught in cabin crew training, as it was found that greater technical knowledge would improve communication in an emergency.

Even as recently as 2019 in Stansted, UK, an incident occurred on a Lauda Air flight where the senior flight attendant initiated an unnecessary emergency evacuation on the ground. There was an engine problem and she was overwhelmed, misunderstood the flight crew’s command and was having difficulty communicating with other crew members. She stated “For me, if the door was closed, I have nothing to do with them...” The investigation showed flaws in training and the senior flight attendant’s lack of flying experience.

Challenges to Effective CRM

So, what have we learned about the difficulties we may have with CRM in our everyday work life? There are regulatory barriers with the sterile cockpit procedure and the locked cockpit door, so it can still be difficult to communicate efficiently. Once the cabin door and cockpit door are closed, we are essentially sealed off from the rest of the aviation community and often there will be little understanding of what is going on in the cabin.

Outside of the aircraft, there can sometimes be issues organisationally, with a ‘them and us’ attitude, where there is a lack of respect towards the cabin crew and a lack of trust towards the management. Rules and procedures are often enforced by non-flying managers or people who do not work in the cabin, so dissatisfaction issues occur across all levels. Reports are not always responded to, even though we are on the frontline, dealing with these issues. This could be resolved by managers taking time to understand everyday work for cabin crew.

A small cabin crew complement is also an issue (one per every 50 passengers for most countries, but one per every 36 passengers in Australia).

Other issues affecting good CRM on a day-to-day basis can be the practicalities of working in the cabin. Long hours and often numerous sectors can result in fatigue, which affects our health and performance. Stress, workload and the potential threats that may be encountered such as an unruly passenger, medical emergency or other events, can make daily work more difficult. There are also worries regarding air quality and now, of course, COVID-19.


The cabin design and ergonomics also affect our day-to-day work. This includes

the design of the galley, the width of the aisles, seat pitch, and access to safety equipment in an emergency. Cabin safety focal groups can help to improve cabin design and effectiveness.

Learning as One Team

So, what can we take from a cabin crew perspective? You might not see us, but we are right at the heart of

aviation safety, every day. There needs to be greater learning about our everyday work, and learning together between professions, for safety as well as service. It is essential that we all work and learn as one

team, no matter what barriers there might be (physical or mental). We are all safety professionals. 

"There needs to be greater learning about our everyday work, and learning together between professions."



Patricia Green has been cabin crew for major airlines in the UK and Middle East. She has also worked as a VIP Flight Attendant for high profile clients and world leaders on their private jets. Most recently, Patricia was Head of Cabin Crew and Cabin Safety Focal Point. She has a Postgraduate Diploma in Human Factors in Aviation.

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LEARNING IN THE HEAT OF THE MOMENT

AN INTERVIEW WITH SABRINA COHEN-HATTON

In the heat of the moment, how do we make decisions, individually and collectively? And how can we improve decision-making at work? **Steven Shorrock** interviews firefighter and psychologist **Sabrina Cohen-Hatton**, about her work on decision-making in the emergency services, her journey from firefighter to Chief Fire Officer, and her extraordinary life.

Bring to your mind, for a moment, your mental image of a firefighter. The chances are, your image is similar to the image of most other people. Sabrina Cohen-Hatton would not fall within the stereotypical range of firefighters for most people. For a start, she is a woman in a male-dominated profession. In the UK, 6.4 per cent of firefighters are women, though this figure is increasing with firefighter trainee recruits. The figure is almost identical to that for pilots; Air Line Pilots Association International female pilots make up 6.6% of the pilot population.

This was an obvious place to start when I interviewed Sabrina Cohen-Hatton. *"I think for me it's a really important point because the stereotype of a firefighter is so strong"* said Sabrina. *"And sometimes when you can't conform to that stereotype, it can be a bit tough and you feel a bit like an outsider."*

And few would guess that Sabrina was homeless for two years from the age of 15, after the death of her father. She sold *The Big Issue* magazine on the streets of Newport in Wales; a magazine and initiative that she credits with having saved her life.

Despite these tough teenage years, Sabrina completed her high school examinations and joined the fire service in South Wales in 2001 at the age of eighteen. She was the first woman firefighter at the station. Now a Chief

Fire Officer (CFO), she is one of the 56 CFOs in the UK, five of whom are female. She is also now an ambassador of *The Big Issue*.

Talking to Sabrina, the issue of identity and diversity was an obvious place to start a conversation. One reason is that diversity is known from research to be important for learning and organisational performance.

"When I became comfortable with being different, what I realised is that I don't have to hold on to that stereotype anymore. I can be free to consider different things, to present different needs, and to be a bit more different."

Following her introduction into the service, Sabrina's route certainly was different. While working, and even while raising a family, she earned a degree in psychology and a PhD in behavioural neuroscience. These achievements influenced her contribution to the service, much of which concerns safety and learning.

Diversity and Learning

The power of diversity for learning is well known in the literature, and it's visible in practice. Having facilitated and observed well over 150 workshops and focus groups on organisational culture with aviation staff over the years, one thing has always struck me: more insights came from more diverse

groups, in terms of both gender and job roles. Gender parity in ATM is much higher in some countries than others.

Sabrina said that being different helped with her journey into psychology and eventually into neuroscience. *"I think we often underestimate the power of difference. When we talk to people in other industries with different backgrounds and different experiences, what we get is a new opportunity for different connections. And that is so important when we're trying to discover or do something new or different."*

Preparation and Performance

A different perspective that Sabrina brought concerned learning from training. Reading her book, *The Heat of the Moment: A Firefighter's Stories of Life and Death Decisions*, I wondered what I might learn about the everyday work of firefighters, including how they learn from everyday work. What I noticed is that everyday work for firefighters is not as I imagined.

"I think that people assume that we're all going out on fires and on emergency incidents literally all the time", said Sabrina. *"I think they watch things on TV like 'London's Burning' [a British TV show] and think that every shift you're going to have a career-defining fire. And the reality is, that only represents about five to 10 per cent of our time."*

So, what makes up the rest of the time? *"We spend a huge amount of time on training and investing in our skills,"* she said. On top of that is a lot of fire prevention work – as a legal duty.

It struck me that when it comes to preparation and performance, front-line, performance-critical professionals can be placed on a continuum in terms of time spent on front-line work versus time spent preparing for front-line work. On the one end, we have elite athletes who prepare for most of the time. On the other end, we have clinicians who perform for most of the time.

Firefighters are closer to the elite athlete end of the spectrum, and much learning comes from day-to-day training. In her book, Sabrina noted that over the past decade, the number of incidents to which the service attends has reduced by 50 per cent. Firefighters respond to a much greater range of incidents, but have less experience of each type. Today's commanders receive half the operational experience of their predecessors, she stated.

Simulation and Training

Sabrina and her colleagues have researched three very different training methods: virtual reality, traditional training exercises and 'live burns'. She wrote in her book *In the Heat of the Moment* that training simulations were found to be effective in building experience in the fire and rescue service. She added in our interview that many scenarios are used, particularly for incident command, for instance, wildland firefighting. *"These can be incredibly powerful learning tools because you can go through the 'what if' scenarios with that and run through a number of different variations of each scenario."*

For simulation, her research has found what many in aviation, healthcare and other sectors know from research and practice: realism is key. Participants need to experience a similar context and feel similar levels of stress, pressure and uncertainty as in real-world situations, said Sabrina. Since opportunities to train are so important, time must reflect the working environment. *"There is little use honing your situational awareness, decision-making, communication,*

resilience or leadership skills in a scenario you will never find yourself in," she remarked. Time for training is especially precious for senior strategic commanders from multiple agencies who coordinate the most complex and challenging of incidents remotely. Learning from training opportunities must be maximised.

There are implications for decision-making and coordination, individually and collectively, for teams and organisations, and between organisations. Commanders must experience stress, and be trained to handle it, not only to enhance decision-making, but to help manage emotions such as anger and irritability, which can affect communication, teamwork and leadership. Sabrina wrote, *"We already knew the importance of a good dose of stressful, emotional realism and how it could stretch commanders and prepare them for the unforgiving pressures of the incident ground. However, we also learned that command training simulations were effective in engendering similar decision-making processes to those we had observed in real life. Your brain responds to decisions in the same way."*

At a team level, Sabrina wrote in her book how training together builds mental models and creates a shared situational awareness.

"We know that responding to a major incident requires the effort of a large number of people, several different teams and multiple agencies. We know too that major incidents are dynamic environments. There are so many different micro-operations moving in tandem that, very quickly, individuals may find themselves responding within the confines of their own experience, based on their own mental models and their own situational awareness."

She described how individual responses can become detached and separated from the overall strategy, *"like an out-of-tune violin disrupting the sound of an orchestra"*.

Work-as-Prescribed and Work-as-Done

As with aviation and other safety-critical sectors, simulation in the fire service

is crucial in allowing for learning from scenarios that are impractical on a significant scale. This was one of the things Sabrina and her colleagues looked at during the research for the UK national command decision-making trials (Chief Fire Officers Association, 2015). The work looked at the effectiveness of simulated contexts for learning.

What they found was interesting: the decision-making processes that were applied were similar across the board. *"But if anything, there was a trend towards more 'textbook' responses in the very highly immersive but highly simulated environments – like virtual reality – than in real situations."*

This brought us to the balance of work-as-done and work-as-prescribed (Shorrock, 2016). In her book, Sabrina noted that *"there are certainly times when a policy offers a framework through which a scenario can be analysed. But what if sticking to it would make things worse?"* She invoked a policy-practice double bind: *"The fire commander could be criticized easily for defaulting to the policy line, for not applying discretion. However, is such criticism fair when someone is simply applying the rules laid out for a set situation?"*

Perhaps, she argued, the rigidity of policies could contribute to decision inertia, or have personal and legal consequences. *"A commander may fear disciplinary measures if they deviate from the procedures, or challenges to their reputation both legally and professionally."*

Decision Controls

One thing that can help in this, and in decision-making more generally, is what has been termed the 'decision controls process' (see Figure 1). This outlines how commanders can facilitate both analytical, reflective decision processes ('slow thinking') and intuitive, reflexive processes ('fast thinking'). The decision controls incorporate the findings of the research and help to support command decision-making.

"We found that most of the time, decisions were made in a very intuitive way", Sabrina explained. *"That means that people could respond very quickly in*

a very dynamic situation. But it might actually have unintended consequences, because what people were doing was responding to an individual cue as opposed to thinking about the big picture."

Sabrina and her colleagues wondered how they could help safeguard people against this. Three key questions were developed:

- Why are we doing this?
- What do we think will happen?
- In light of these considerations, is the benefit proportional to the risk?

There are also prompts to ensure a common understanding and position on all relevant factors, and to support individual decision-making (see *In the Heat of the Moment*, pp.187-188).

She explained that this *"very quickly gives you an opportunity to make sure that the decision that you're making is the best one in the circumstances or the least worst one."*

Sabrina wrote how commanders using the decision control techniques achieved the highest level of measured situational awareness five times more regularly than the commanders who weren't using the technique. When commanders used the decision control techniques, they gave more explicit consideration to their operational goals,

ensuring that each decision contributed to the overall aim of the exercise. They also anticipated the consequences of their decisions more often and with more accuracy. The decision controls helped to predict the likely outcomes of actions, or the likely development of the situation.

Critically, the decision control process didn't slow down decision-making. These results were a first for the emergency services: for the first time, the fire service had taken an evidence-based look at how they train.

The decision controls are now embedded in UK national guidance for multi-agency response to major and complex incidents. They are taught to all strategic commanders. Sabrina explained how every commander from every emergency service now carries a small card that lists some key prompts, including those decision controls. This serves as a reminder that decision-making is a learned skill that requires practice.

In her book, Sabrina wrote how other people can benefit from these techniques, from the family to the boardroom. *"The approach helps to weed out the tacit influence of the person with the strongest position"*, she wrote.

Mental Wellbeing

It has become increasingly clear in aviation and other sectors that work performance is not the only priority for us as human beings. And as a psychologist, a woman, and a senior firefighter in a male-dominated profession, Sabrina became especially interested in mental health and culture. *"I think the culture is a really key point, because without considering the culture, it's difficult to make any kind of progress"*, she said. *"In a male-dominant environment, there are times when it can be wonderful because you have cohesion, but there are other times when it can be incredibly destructive."* Wellbeing is a higher priority now in the time of COVID, and mental health is close to the Sabrina's heart. She is particularly interested in 'toxic masculinity' and male mental health.

"We know that suicide is the biggest killer of men who are under 45 in the UK. It's a really significant problem. Why is that? Culturally, we know that from being little boys, we say, 'come on, don't cry, be strong, boys don't cry'. We say things like 'man up' and 'don't be such a girl'. That kind of language tells men that you can't share your feelings and it becomes socially unacceptable to do so. You put that into an environment where you're also working on the front line or in a high-risk industry, and it brings another dimension."

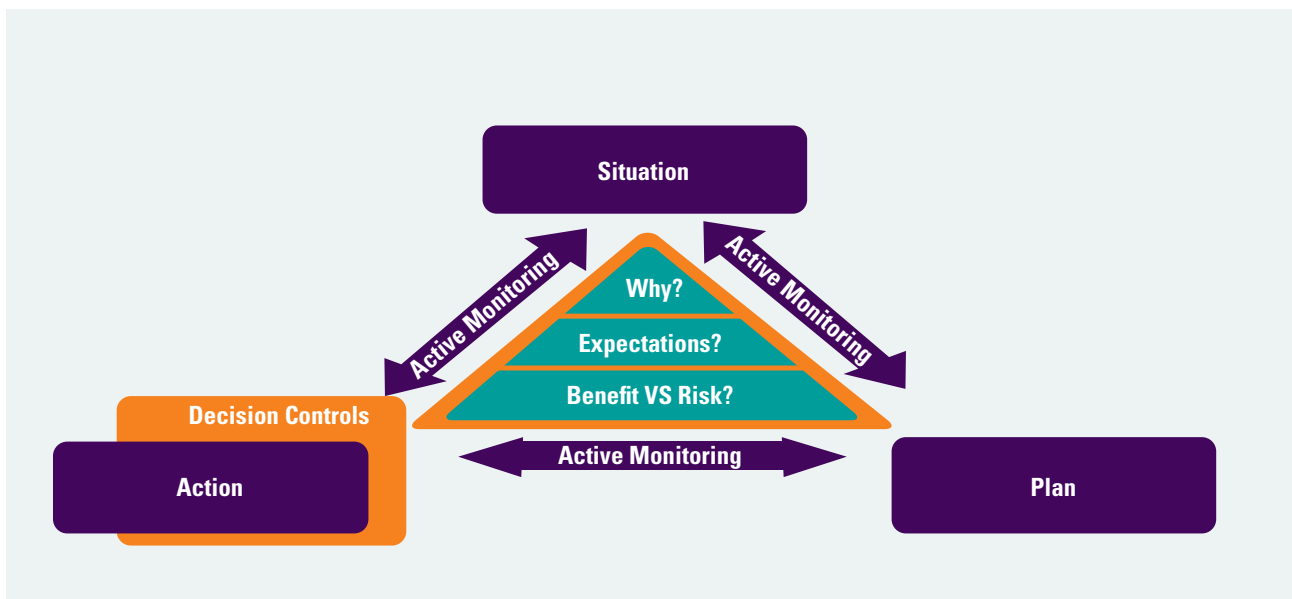


Figure 1: The Decision Control process. (Adapted from Chief Fire Officers Association, 2015).

Sabrina noted a paradox. The research shows that front line workers such as firefighters are disproportionately more likely than the general population to suffer with poor mental health. Yet they are disproportionately less likely than the general population to ask for help. *“For people on the front line, it becomes a huge part of your identity. You start to see yourself as a protector. And so the idea of being a protector and needing help doesn't chime with our ideas of who we are. We've done a lot of work to try to break down the stigma, but there's still a lot more to do in that environment.”*


In her book, Sabrina wrote about how it's almost impossible for firefighters to disentangle themselves as people from their jobs. Like many of us, Sabrina has found that refocusing on family and friends helps. *“I think that the kind of exposure to trauma that we have in the emergency services in particular really makes you value the people that you have around you”,* she said. *“You get to you get to appreciate in living colour the reality of our own mortality.”*

Career Change

Many in aviation have been forced to reconsider their career – even their sector – some for the first time. Sabrina has held several very different positions in the fire service, and we discussed the implications doing something different.

“That can be really frightening. It's your sense of security. It's a sense of who you are. But I think we often underestimate how transferable skills are and how valuable they can be in a multitude of situations. I think it goes back to that point that we discussed at the beginning about not being afraid to be different. We need to apply that to ourselves and think about what else we can do. And that might be something completely different.”

Sabrina thinks that there is something to be said for realistic optimism. *“How we view a situation will affect how constructively we can approach it. Not that it makes it any easier or a pleasant experience to go through something that's completely life changing, but I think that perspective is all important.”*

Sabrina's experience – moving from the streets to the fire service, so far to Chief Fire Officer – offers some inspiration for how we might work through adversity. Despite some traumatic experiences, she has no regrets. *“For me, while there might have been, some difficult days well, and there really have been, in all honesty, wouldn't change it for the world.”* 

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Dr Sabrina Cohen-Hatton is a British firefighter, psychologist and writer. She is now a Chief Fire Officer. She has been a firefighter for over eighteen years, and has held a range of positions. Since entering the service as a firefighter in South Wales Fire and Rescue Service, she progressed through various operational roles up to Group Commander. Following a period of research on the psychology of incident command, she moved to Chief of Staff for Her Majesty's Inspectorate of Constabulary and Fire & Rescue Services. Following this, she undertook a number of roles in the London Fire brigade, including Deputy Assistant Commissioner, responsible for all aspects of service delivery in the 9 Boroughs of North West London, protecting a community of nearly 3 million people. She was responsible for 28 fire stations, 1300 staff and a combined revenue and capital budget of £64m.

While serving as a firefighter, she completed a bachelor's degree in psychology, and a PhD in behavioural neuroscience. Sabrina has also been an Honorary Research Fellow (behavioural neuroscience) at Cardiff University. She has published my findings in several scientific journals, and presented internationally. Sabrina has won multiple awards for firefighting, academic research, innovation and influence. For Further information, see https://en.wikipedia.org/wiki/Sabrina_Cohen-Hatton.

The Heat of the Moment: A Firefighter's Stories of Life and Death Decisions was published in 2019 by Doubleday. <https://bit.ly/2TOTazN>



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REFLECTIONS ON HUMAN PERFORMANCE FROM ELITE SPORT

What might we learn about human performance from elite athletes? Two elite rowers and a sport psychologist, who now share a focus on human and organisational performance in industry, reflect on what they've learned for HindSight readers.

The Elite Rowers' Perspectives

Cath Bishop

Sport has been a great training ground for all the opportunities and challenges that I have encountered throughout life. Three lessons in particular have shaped my working life since I retired from Olympic sport. First, sport taught me always to connect what I do on a daily basis to a wider purpose. Always ask yourself, "what gets you out of bed in the morning?" What makes each day worthwhile, not measured in terms of short-term goals and targets, but in terms of what difference can you make to others around you? I learnt to define success each day not just by how fast I went or if I beat other people around me, but by whether I brought the best mindset to what I was doing, how I behaved and interacted with those around me, and whether I supported myself and others to learn as much as we could.

Second, sport taught me how to be resilient by focusing on what I could learn each day and how I could continue to improve and grow even when things didn't go well. It's that constant learning mindset that creates the resilience to adapt, adjust and find a way through when adversity strikes.

Third, sport taught me the importance of connecting with those around you at a deeper level in order to explore the boundaries of what's possible together. It wasn't enough that we all shared the goal of going fast when we rowed in a boat together.

We needed to understand each other beyond that, to know what our individual drivers were, our strengths and weaknesses, and our hopes and fears. This was needed to get the best out of each other, work together when

the pressure came on and play to our strengths to perform to our potential.

Over the period of a decade, training and competing at three Olympics, the most important lesson of all was to realise that success is not defined by medals or trophies. Those are great and I always wanted to deliver my best performance, but I realised that

winning usually depends on a range of external factors beyond my control. Success was defined by: how much I stretched my own personal mental and physical limits on a daily basis; how I responded

and reacted to the losses; the failures and the disappointments along the way; the impact I had on the athletes, the coaches and support team that I trained alongside; and the life-long friendships and bonds that I developed.

"Sport taught me how to be resilient by focusing on what I could learn each day and how I could continue to improve and grow even when things didn't go well."



"Never let someone else put limitations on what you can or can't do."

Ben Tipney

As much as I have learnt from my experiences in sport to my working life, we have to exercise caution when comparing high performance sport and the world of work. This is for a number of reasons, chiefly that as an athlete you spend in the region of 95% of your time 'preparing' for 5% of time spent 'performing'. Most people are 'performing' all day, every day in their workplace, with relatively little time put aside for 'preparing' (continuous professional development, training, coaching, etc.). This is an important distinction and why we need to be careful about directly applying performance strategies for the sporting world in the workplace.

What I can share is a couple of key lessons from elite sport about life in general as much as work. Firstly, never let someone else put limitations on what you can or can't do. At school I was the stereotypical 'skinny kid' who was never picked for sports teams and lacked confidence. Even when I started rowing at age 13, I was deemed too small for the 'A' crew. At the age of 16, when I professed a desire to row for my schools' first team one day, the response from my coach and peers was laughter and derision.

That conversation sticks with me to this day, but within 18 months (having left that school) I placed 2nd at GB National under 19 trials and ended up representing GB on several occasions. One point of satisfaction was that two of my peers from my schooldays who were deemed outstanding athletes were placed 98th and 112th at those same trials.

And so to my next point: I found proving people wrong to be a very powerful motivator. Unfortunately, that falls away once you achieve success and people start expecting high performance from you. So, beware of using others' perspectives and proving others wrong as your primary motivator. If you want to perform consistently, do it for yourself.

Because I gained so much confidence through my success in rowing, it became central to my identity as a

person. As a consequence, success affected how I felt about myself and how I behaved towards others. This was almost entirely dependent on how I was performing. When I was performing well, I thought I was a cut above the rest, but I was a nightmare to be around! When I was performing poorly, I was incredibly hard on myself and depressive. I retired at 23 through injury and spent subsequent years coaching, initially in rowing and afterwards with teams in risk industries. I now realise the dangers of one's profession being such a singular point of focus. I now strongly advocate seeking balance when working in vocational careers (as can be found in aviation, healthcare, and other industries) that demand a lot of our time and energy.

My three key lessons would be as follows. First, never let anyone (others or yourself) place artificial limits on what you can achieve. Second, find out what drives and motivates you internally for long-term success. Third, devote time and energy to interests outside of your career.



Cath Bishop competed at three Olympic Games in rowing, in Atlanta (1996), Sydney (2000) and Athens (2004), winning the World Championships in 2003 and Olympic Silver the following year. She also worked as a diplomat and now works as a business consultant, coach and speaker. 'The Long Win: The Search for a Better Way to Succeed' is published in October 2020.

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Ben Tipney represented Great Britain in rowing between 2001 and 2005, and coached rowing professionally between 2005 and 2016, including coaching the South Africa Rowing Team in 2010 (World Championship Bronze). He has a BA (Hons) in leadership in sport and is certified by the British Psychological Society in Cognitive Behavioural Coaching. He teaches human performance and coaches high-performing teams outside of sport, with focus on healthcare.

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The Performance Psychologist's Perspective

Tom Young

I have been fortunate to work with elite athletes, spend time in high performance environments, and pick the brains of sporting leaders across the world. As a consequence, I am often asked what lessons we can take from the world of sport. These can be summarised as follows:

Curious

Due to the high-profile nature of elite sport, there is a tendency to place those who operate within it on a pedestal. The first thing I would say is that the very best athletes and sporting leaders are constantly curious. They have a genuine thirst for learning, development and improvement. I guarantee that if I put them in a room with the readers of *HindSight* who perform under the most extreme pressure, they would want to be asking the questions, not answering them.

The best elite athletes spend time with mentors and peers, visiting different environments and studying. They never stop learning. There is no finish line.

Human

When I started out as a newly qualified psychologist, I spent time at an English Premier League club. I think I expected them to be almost superhuman. I quickly realised this wasn't the case. Athletes are just human beings, who happen to be very good at what they do. They are people like you and me, with strengths and flaws, hopes and fears, limiting beliefs, and irrational thought patterns. High performance

can be lonely, but once people feel strong and safe enough to show their vulnerability, they can start to grow.

Leadership for all

When researching my book 'The Making of a Leader', I was keen to test the widespread notion that leadership is reserved for the chosen few. In my consultancy work, I will often hear comments like "I'm not a leader" or "I'm not vocal enough to lead". However, from my interviews with head coaches from a range of team environments, I found many different characters and personality styles. The key is finding your style and method of leadership. You might be someone who leads by example, through quality and work ethic. Or you might be someone who leads through the enduring nature of the relationships and trust that you build. Do not underestimate your capability to lead.

Resilience

One consistent characteristic across sporting leaders is their own sense of resilience, a quality that can often be traced back to their formative years. In sport, one of the few things you can guarantee is that you will have setbacks and defeats. Each individual leader that I spoke to had 'failed' at one point or another. The leader cannot guarantee victory, but he or she can ensure they apply a rational mindset to both success and failure.

Reflection and learning

Regular reflection is another component of elite performers. They are always willing to learn lessons and evaluate themselves intrinsically before moving forward.



"The very best athletes and sporting leaders are constantly curious. They have a genuine thirst for learning, development and improvement."



Tom Young is a Performance Psychologist working in business and elite sport. He was recently part of the coaching team to PGA Tour and Ryder Cup golfer Tommy Fleetwood. He worked as a consultant to both the Belgian national team ahead of the World Cup in Russia, and the victorious European Ryder Cup team in Paris 2018. His book, 'The Making of a Leader: What Elite Sport Can Teach Us About Leadership, Management and Performance' is out now.

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The Air Traffic Controller's Perspective

Luis Barbero

COVID-19 and the different peaks and troughs we have experienced in air traffic has reminded me and my colleagues how our job as air traffic controllers is much more akin to that of athletes and sports people than to that of office workers. Every day, we have to perform to the best of our ability, applying the skills acquired during our training and perfected through experience.

But for that ability to be maintained, for our skills to be honed, we need to be professionally challenged by the traffic levels or the traffic scenarios we face. This pandemic and the drastic reduction in air traffic has resulted in air traffic controllers not being challenged as much as they normally are. The problem

of skill fade, which most controllers would not have experienced in a long time given the increase in air traffic in recent years, has become a very real one. We might not be as sharp as we were back at the beginning of 2020, our thought process might be a bit slower or decisions might take that little bit longer to be made (and might not be the optimum ones).

In my environment, air traffic controllers have become fully aware of the effects of skill fading and are doing everything they can to minimise them. That will be particularly important when (not if) air traffic returns. Additionally, in the same way that athletes practise competition scenarios during their training or racing drivers immerse themselves in races in the simulator, it will be important for air traffic controllers to have access to simulators so they can hone their controller skills back to their peak level.



"Our job as air traffic controllers is much more akin to that of athletes and sports people than to that of office workers."



Luis Barbero is a Heathrow Approach controller at the Swanwick Area Control Centre (Terminal Control) in the United Kingdom. He is President and CEO of GATCO, the Guild of Air Traffic Control Officers.

LEARNING FROM EXCELLENCE IN HEALTHCARE

Learning from everyday work means learning from all activities regardless of the outcome. But when things go well, this is typically just gratefully accepted, without further investigation. 'Learning from Excellence' is changing this, as **Adrian Plunkett** and **Emma Plunkett** describe.

KEY POINTS:

- **Learning from Excellence (LfE) is a system for capturing examples of good practice in healthcare as a complementary approach to traditional incident reporting.**
- **The LfE philosophy proposes that learning from what works well in a system enables improvements in the quality and safety of the work, and the morale of staff performing it.**
- **LfE systems comprise simple reporting forms for peer-to-peer positive feedback with sharing of examples to enable wider learning.**
- **LfE reporting identifies excellence and learning opportunities in both process and outcome.**
- **LfE is aligned with aspects of appreciative inquiry and Safety-II.**

Like aviation, healthcare is a safety-focused sector. Acknowledgement of the risks and potential for harm led to the development of the 'patient safety movement'. The traditional focus of patient safety work has been:

- to identify risks, errors and harms
- to establish the causes of these, and
- to institute changes in order to prevent these failures occurring again.

This approach, whilst laudable, results in a unilateral focus on a small part of the overall system.

Learning from Excellence

Most activities in healthcare (e.g., decisions, interactions with healthcare professionals, and administration of treatment) are successful. This success is not typically subject to the same scrutiny and enquiry as failure, and often passes unnoticed. Yet the healthcare system is highly complex and often these successes have not been easily achieved. If we could identify and study successful work, including that which happens despite challenging circumstances, we may be able to uncover conditions and factors

contributing to success. Capturing and sharing these examples provides a new lens through which to study work-as-done (*HindSight* 25) and enables reinforcement of positive practices and provision of learning opportunities which may otherwise be lost. This is the aim of 'Learning from Excellence' (LfE).

LfE is a philosophy and practice rooted in positive psychology. At its heart is a simple reporting system to allow healthcare professionals to identify excellence in practice and report it within their organisation. This strengths-based approach is intended to complement the well-established deficit-based approach to patient safety. It was first implemented in 2014 in the Paediatric Intensive Care Unit in Birmingham Children's Hospital (Kelly et al, 2016), and has now grown into a community of practice in many centres in the UK National Health Service (NHS) and elsewhere.

A Patient's Experience

The idea of recognising and learning from success is not a new one, but Adrian (co-author) realised its potential

in healthcare after experiencing being a patient for the first time.

"In 2010 I had two episodes of serious illness, requiring some time on the 'other side' of healthcare. During a hospital admission, I started actively noticing the successful care I was receiving; almost all of my 'episodes of care' were successful, despite the staff being under significant pressure from a high workload. The more I looked, the more I noticed excellence in the staff and in the processes and system. For me, 'excellence' was characterised by a mixture of compassion and competence: two characteristics which were often closely linked.

"Once I had recovered, I wrote a letter to the hospital staff highlighting what had worked well during my admission. I had intended that this letter, which contained expressions of gratitude and intelligence about successful care, would be shared with the staff who had cared for me.

"Approximately two years after I wrote the letter, I met one of the staff members who had cared for me, and discovered that he had not received the letter. I learned that gratitude and positive feedback are not given the same status as complaints and negative feedback. I started to wonder if this bias towards the negative also affects our efforts to improve systems in safety and quality improvement."

Focusing on the Glass Half Full

The human tendency to be more sensitive to negativity is well described in the literature. We find it easier to recall examples of when things have gone wrong and are much more likely to spend time thinking on these. This predisposition to focusing on the negative may be for good reason – we seek to learn and improve – but unbalanced negative thinking and feedback takes its toll professionally. The adverse psychological impact of medical error on healthcare professionals is highly prevalent (see www.secondvictim.co.uk/).

Back in 2014, when LfE was at its inception, patient safety activities were designed only to identify problems and deficits. This has been effective to an extent, but with some cost. Defining safety as the absence of harm, or freedom from error, is incomplete, and misses an understanding of the conditions needed to create safety. It also, at times, has led to the development of a culture of blame and shame where staff are fearful of reporting.

"Defining safety as the absence of harm, or freedom from error, is incomplete, and misses an understanding of the conditions needed to create safety."

Yet safety is inherently a positive concept. People need to feel safe and people can keep systems safe (and do so every

day in healthcare). A safe system is characterised by success, as well as lack of failure and harm. Prior to the introduction of positive reporting systems such as LfE, there was very little formal recognition of good or excellent performance in healthcare.

Positive Reporting

In response to this experience, we created LfE. LfE is a positive reporting system, complementary to the adverse incident reporting system. It is a simple, free text, qualitative positive feedback system, available to all staff. Colleagues are invited to capture 'excellence' voluntarily, with no prior definitions. The reports are forwarded directly to the named individuals or teams in order to close a positive feedback loop. Themes and learning points are shared with other colleagues when necessary and some reports are investigated with meetings using appreciative inquiry (a strengths-based approach to change that seeks to understand 'the best of what is', in order to imagine 'what could be', see Quinney and Slack, 2017).

Thousands of reports have been submitted since we launched the initiative in 2014, and now the system is used across the organisation. A community of practice has grown

around the initiative, with similar positive reporting systems now present in many centres in the NHS and overseas. As LfE continues to spread, we are now focusing on two areas:

- to nurture and support the LfE community of practice and
- to gather evidence for the impact of LfE and related strengths-based approaches.

One area where LfE is demonstrating an impact is in quality improvement (QI). Healthcare at its best is both safe and high quality and in 2018 the Birmingham Children's Hospital team ran a Health Foundation funded quality improvement (QI) project around the management of antimicrobial stewardship using only positive recognition and reinforcement methodology. LfE reports were completed when gold standard work was identified and appreciative inquiry interviews were conducted with staff to understand what works and what innovations might lead to improvements. The project was a success, surpassing its targets, and the methodology is now being tested on other projects in sites nationwide (Jones et al, 2019).

Learning from Excellence and Safety-II

"A safe system is characterised by success, as well as lack of failure and harm."


Over the same period as LfE systems have developed, so the patient safety world

has too. There is now also interest in the concept of Safety-II, which is cited in the latest NHS Patient Safety Strategy (NHS England and NHS Improvement, 2019). Safety-II suggests we need to understand all aspects of our system, including how it works, if we are to ensure things go right. It encourages us to talk about our work and to understand it from everyone's perspective. Intelligence gained through LfE insights can help with this too. LfE is not equivalent to Safety-II, although in our experience, many of the reports describe a process working well, even if the outcome was not necessarily a good one. So LfE can be used to inform a Safety-II perspective.

Learning from Excellence Everywhere

Whilst LfE was developed in healthcare, it is applicable to any organisation and sector – including aviation – as a complementary strengths-based approach to deficit-based approaches to improving performance and safety. We know of examples of spreading to education and veterinary medicine and appreciative inquiry, which links to and overlaps with LfE, is used throughout the business world.

Understanding our strengths and what is working in our systems is important. Giving positive feedback and showing appreciation to our colleagues for good work creates a positive feedback culture in which we can thrive and we believe it can help us be better able to learn from when things go wrong too.

We have created a blog and website with resources for the growing community of practice. Please visit our website if you wish to learn more about the initiative: www.learningfromexcellence.com 

"Whilst LfE was developed in healthcare, it is applicable to any organisation and sector."

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Dr Adrian Plunkett is a consultant Paediatric Intensivist at Birmingham Children's Hospital. He created Learning from Excellence (LfE) in 2014 after reflecting on his own experiences as a patient. Adrian supports the spread and development of LfE as a social movement in the NHS, and beyond. Adrian maintains the website and blog at

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Dr Emma Plunkett is a Consultant Anaesthetist at University Hospitals Birmingham and Birmingham Women's Hospital. She has helped to introduce LfE in both organisations and has trained in Appreciative Inquiry. With Adrian, she maintains the LfE website and organises the national LfE Community of Practice events. Her other non-clinical interests are fatigue and wellbeing and she is a trained mentor.

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LEARNING FROM WHAT GOES WELL: ANOTHER TACTIC TO MILK THE COW?

In learning from everyday work, we need to first approach workers as human beings. **Nippin Anand**, a former Master Mariner, reminds us of the importance of understanding human needs before we can understand what's working well.

A few months ago, I visited a ship all excited to put my knowledge about 'learning from what goes well' into practice. I thought I knew perfectly well what I needed to make it work. Instead of focusing on accidents, I will focus on everyday work, pay careful attention to the context, observe the gap between documented manuals and 'real' work and encourage people to talk about what really works. Simple.

Like an overzealous inspector, I approached an able seaman and asked, "*Raymond**, can you talk me through how you lower the lifeboat from the start to the end?" After a long and uncomfortable silence, Raymond replied, "*I will tell you everything about the lifeboat, but I want to share something else first if it's OK, sir. The company has introduced a new tax on our earnings. As seafarers, we never had to pay taxes on our income before and it's not small money. It's almost 30% of our*

earning, and it puts us in a very difficult situation." Raymond continued for a few minutes while other crew members joined us in the conversation. By now I was starting to get irritated. This was not really my question I said to myself. I was there to learn from what goes well.

But then I started listening to Raymond and something fascinating happened that took me by surprise. Nearly 35 minutes into his moaning, Raymond

looked into my eyes and said, "I know you are here as a visitor. You can do nothing about our situation, but you care to listen. Thanks for listening, nobody from the office listens to us."

By now, Raymond appeared far more relaxed. In a friendly manner, he said, "Sir, let's talk about the lifeboat now." We spoke at length about the entire process from preparation, to launching and lowering of the lifeboat. Raymond told me about the problem with the cranking handle used for hoisting the boat in an emergency. He highlighted the extra precautions that were needed during hoisting the boat (because the original fuse on the davit winch motor had been replaced with a fuse of much higher amperage). Several other issues came up in our discussion such as communication difficulties with hand-held radios and the problem with monitoring the boat whilst being stowed in position. Put simply, it made perfect sense how the design and operating problems were being compensated for by the crew during routine maintenance and drills. This to me was a perfect example of learning from what goes well.

Practising mutuality before learning

Over the years as accident rates have plateaued, both scientists and business leaders are exploring alternative approaches to improve safety and resilience. One approach is learning from what goes well, and includes 'positive deviance', 'learning teams', 'appreciative inquiry', and other ideas and approaches. A common thread across many new approaches is an attempt to humanise work by adopting a bottom-up approach to improve safety, where workers' contributions are considered vital.

"A common thread across many new approaches is an attempt to humanise work by adopting a bottom-up approach to improve safety, where workers' contributions are considered vital."

Raymond's story has taught me that any attempt to seek workers' participation should begin with recognising the worker as a social being. Going into the field with an agenda to observe a process or encouraging workers to talk about success is a mechanistic and impersonal approach. It could even appear like the crude deskilling approaches of the nineteenth century. A truly human-centred approach begins with practising 'mutuality'. By mutuality, I mean listening to the needs of others before we start to impose our expectations and demands on them. A worker whose needs are genuinely heard (not necessarily met, as I learnt from Raymond) is more likely to open up and share his or her experiences. In my view, mutuality is a powerful but often a forgotten aspect of the conduct of safety professionals.

In the past few years, I have interviewed hundreds of business leaders and frontline workers and sifted through thousands of safety and quality reports to understand the problems with organisational learning. What has struck me is the attitude of business leaders towards workers 'moaning' and 'complaining'. In addition, formal communication channels (employee appraisals, incident and hazard reporting systems, audit and site visit reports, risk assessments, etc.) are devoid of any meaningful engagement in most organisations I

have visited. What is more, apart from whistleblowing there are hardly any communication channels for workers to escalate their concerns to the leadership. A typical reaction from the management to moaning and complaining is "We do not have the resources to deal with it",

"Apart from whistleblowing there are hardly any communication channels for workers to escalate their concerns to the leadership."

"As much as we want workers to tell us what we need from them, we need to also listen to their needs."

to which my response is "good luck with process improvements".

As we move towards 'learning from what goes well', where we actively seek workers' contributions to improve safety and resilience, it is my hope that we recognise the power of mutuality and a shift from transactional *quid pro quo* approaches towards a more collaborative way to engage with

workers. The argument is straightforward. As much as we want workers to tell us what we need from them, we need to also listen to their needs. Otherwise, any attempt to seek

workers contribution may prove futile and become perceived as another tactic to milk the cow. **S**



Nippin Anand is a Principal Specialist in Safety Management System and Human Factors, and a former Master Mariner with a PhD in Social Sciences. His research interests include applied sciences, storytelling, cultural anthropology and safety management. **nippin.anand@nippinanand.com**



LEARNING FROM EVERYDAY WORK: THE REAL DANGER FOR A FIREFIGHTER INSTRUCTOR

Risks look different depending on the perspective that you take. In firefighting training, risks can look very different from the sharp end to how they look from the blunt end, as **Leonie Boskeljon-Horst** and **Ron Koppes** explain.

Learning from everyday work is vital for safety and performance more generally. This became apparent in a recent incident investigation in the Royal Netherlands Air Force (RNLAf). Before explaining the relationship between learning from everyday work and safety, let us first explore the incident. The incident happened at the Fire Department Training Centre (FDTC), where both firefighters and firefighter instructors are educated and trained. About two years ago, during a regular training exercise inside a building specifically developed for these exercises, a gas explosion occurred. No one was injured and there was only minor damage to the building itself. An investigation into this incident was conducted. The objectives were to determine the causes, learn from them and prevent similar occurrences in the future, as well as determining other limitations and hazards of the practice building of the FDTC. The approach

taken was a technical one: what went wrong and how can it be fixed?

Reading the investigation report, the danger faced by the people of the FDTC became obvious. Sometimes they use fires with flames up to 20 metres high to train different extinguishing techniques using various aircraft mock-ups. The recommendations therefore focussed on securing the mechanical system providing the gas and additional procedures for early detection of a fire getting out of control. From the perspective of the investigator, these were, at that point, obviously the primary hazards for the firefighters.

Learning Teams

Recently, the RNLAf has adopted a Safety-II perspective in the process of

incident and accidents investigation, applying more focus on the complexity of safety occurrences. Due to the articles written about Safety-II in the RNLAf safety magazine, the squadron commander learned about 'learning team' sessions performed by the RNLAf

Safety Department. The commander asked for learning team sessions, to see if this new approach would

reveal additional information about the incident in particular, and about safety at the FDTC in general, on top of the original investigation report.

A follow-up investigation based on Safety-II principles was therefore conducted. Since the original investigation had revealed a mechanical and electronic failure in the gas detection system causing the gas explosion, it was determined very

"The biggest risk, according to the firefighter instructors, is not fire."



quickly that no additional information could be found explaining the incident. Safety in general, however, was a different story. The learning team approach led to new and sometimes surprising information.

During the learning team sessions, in an attempt to understand the working environment that the FDTC workers face every day, the firefighter instructors were asked what they considered the biggest risk in their working environment. This was not what seemed so obvious from a distance, for a non-firefighter perspective. The biggest risk, according to the firefighter instructors, is not fire. Fire is familiar to them: they are trained to recognise it, contain it, and extinguish it. They have an emergency system that shuts down the fire by pressing a single button. They have excellent gear to protect them from harm. Even after the malfunction causing the gas explosion, they have faith in the proper workings of the system, since this malfunction could be easily fixed.

The biggest risk they face, as strange as it may sound, is tripping.

This can be explained as follows. In order to train different extinguishing techniques on different aeroplanes and helicopters, the FDTC has an outside training area with different mock-ups, resembling the different aircraft of the

"The biggest risk they face, as strange as it may sound, is tripping."

RNLAF. Extinguishing the fires is done using a crash tender (a specialised fire engine). The water tank contains almost 12,000 litres of water, and it takes about 2.5 minutes to empty the tank. The water jet is so strong that it creates holes on the surface, which consists of concrete, sand and gravel. Because of all the water on the ground, it is not possible to see how deep these holes are. Besides the holes, the ground is very uneven due to large concrete slabs that shift during the exercise (shifting of loads). The firefighters have to run with all of their gear on (which is also blocking their view) and sometimes have to walk backwards to keep facing the fire. These situations result in frequent ankle sprains and long-term back pain.

Tripping is not the risk one thinks of immediately when thinking about firefighters and their instructors. This is quite understandable, considering that we all have been taught from a very young age that fire is dangerous. It takes a firefighter instructor, one that works at this training area every day, to indicate the biggest risks as they see them, but also what might be the best solution. For instance, since there are plans to move the training area to a different

location in 2026, the FDTC expects that no structural changes will be made to the current training area (since this would require serious investments). Therefore, the firefighters sought an agreement with the army engineers themselves to reposition all the slabs when needed. But the problem keeps coming back. When asked the classic question: "What would you change in your department with 100,000 Euros?", the answers were simple: new slabs and a shovel truck.

Perspectives on Risks

This example shows that the ability of an organisation to learn and improve depends on the perspective one takes. The follow-up investigation used learning teams with firefighter instructors as subject matter experts (SMEs). The working conditions were discussed until there was proper understanding of the organisation as a system. The SMEs explained how they dealt with the risks on a daily basis. By discussing the work they do, and the way they mitigate the risks they encounter, we are able to learn about the hazards they face and help devise measures beyond containing the risk of fire. The key is that SMEs explain the situation in the context of their everyday work.



Whose Risks?

To be clear on this matter, everyone connected to this incident and its investigation did what seemed to be the logical thing to do at that time, before we took a Safety-II perspective on incidents and learning. The investigators focused on what they deemed to be the biggest risks. Commanding officers followed the advice given by the investigators, because it made sense to them at the time – it was 'locally rational'. What we did in the follow-up investigation was ask the operators involved what made sense to them as SMEs. That turned out to be a different story.

At every level in an organisation, employees have a view on what is dangerous and what is not. Based on this view they can come up with ways to increase the safety of their organisation. But unless we take the perspective of the people we are talking about, these ways say more about us and our take on risks than they do about the work. Looking at an occurrence or a work situation, the story and measures make sense from different perspectives. But it is not just about making sense, it is about learning. And learning is only possible when taking multiple

perspectives from the points of view of the operators doing the work. Asking them about why it makes sense to them to do what they do is key to organisational learning.

"Learning is only possible when taking multiple perspectives from the points of view of the operators doing the work."

To use the terms introduced by James Reason, people at the 'blunt end' see 'sharp end' risks when looking at the working environment of an operator. These are often risks that directly relate to the task at hand. The 'sharp end' people, on the other hand, usually identify 'blunt end' risks. These are the risks that are not directly related to the task at hand, and over which they have no control. But these risks have a strong influence on how they have to do their work. They often mitigate the 'sharp end' risks themselves during everyday work because they do not want to get hurt. Everyday work, then, is what drives learning. Everyday work is what we need to understand and share. And it is everyday work that helps us increase the safety of all the people involved. **S**



Leonie Boskeljon-Horst is a senior aviation psychologist and human factors specialist and currently the head of occurrence investigation of the RNLAF, focussing on implementing the Safety-II perspective through reactive and proactive occurrence investigations, research projects and safety promotion. Leonie is currently finishing her PhD thesis on safety culture and crew resource management training.



Ron Koppes works at both the RNLAF and Air Traffic Control the Netherlands, focussing on human factors in occurrence investigations. Ron has an MSc. in Aviation Safety & Human Factors and has been working in the safety field for 10 years, including several years as a rail accident investigator. Ron is taking flying lessons with the aim of obtaining a PPL.

LEARNING FROM EVERYDAY WORK EUROCONTROL IANS COURSES

The EUROCONTROL Institute of Air Navigation Services (IANS), located in Luxembourg, develops and delivers Air Traffic Management Training, Services and Tools for Air Navigation Service Providers, Airlines, Training Organisations and Civil and Military State Authorities worldwide. Building on over 45 years of expertise, the Institute provides a wide range of training courses, services and tools – from general introduction courses on ATM concepts through to advanced operational training. Here are some courses that may be of interest to readers on the topic of learning from everyday work.

Inside ATM [GEN-ATM-INTRO]

This course has been designed to introduce non-ATM experts to the field of Air Traffic Management and Air Navigation Services.

The first section of the course is called the Introduction to ATM and includes the following topics:

- Air Traffic Management and Air Navigation Services
- Air Traffic Control
- A deeper look at ATM/ANS
- The Global Picture

The second section is about ATM/ANS in Europe and includes the following topics:

- Main actors in the European ATM environment
- Managing European ATM

Objectives

This course will provide participants with an overview of:

- how ATM works and how air traffic controllers do their job
- it explains air traffic management from a global perspective using structures and concepts that have been agreed at international level, and
- takes a more detailed look at how ATM functions in the European environment.

Audience

This course has been designed for anyone who wants to learn more about Air Traffic Management and Air Navigation Services. It will be of interest for both complete beginners and those who already have some knowledge of ATM.

Systems Thinking for Safety [HUM-SYS-V]

To understand and improve the way that organisations work, we must think in systems. On this course, participants will explore systems thinking for safety to help make sense of, and improve system performance.

The HUM-SYS course is delivered in a workshop format and provides a background understanding for the majority of the existing SAF and HUM Domain courses.

Important Note

This course is virtual alternative to the existing classroom HUM-SYS course.

Objectives

The course will explore concepts of safety and systems, perspectives of the people in systems, system conditions, system behaviour and outcomes.

Duration

This course takes place over 3 days. You will have 3 virtual sessions. You need to plan 12 hours to complete this course.

Audience

The course may be of interest to anyone involved in trying to understand or intervene in complex sociotechnical systems.

Airport Collaborative Decision Making: from concept to implementation and partners' roles [APT-ACDM-E]

Airport CDM is about partners working together more efficiently and transparently in how they work and share data. This course highlights in detail the Airport CDM concept elements in support of local Airport CDM implementation. The dedicated modules focus on the role, tasks and responsibilities of each CDM partner. Finally, at the last module, a flight is followed from one A-CDM airport to another. It goes through each milestone highlighting working practices from airports which have implemented A-CDM.

The course will include interviews from airports partners who have already implemented CDM and demonstrated CDM benefits.

Important Note

This course is being reviewed and will be replaced in 2021. Please note that it uses Flash.

Objectives

After completing the course participants will have a basic understanding of the Airport CDM concept and the roles and responsibilities of each partner involved.

Duration

You need to plan 3 hours to complete this course.

Audience

This course is designed for operational staff from ANSPs, airports, airlines, ground handlers and pilots. It may also be of interest to anyone from other organisations involved in the implementation of A-CDM or interested in A-CDM concept elements.

ATC-I-HDG - Heading Game (web-based training) – practising what surveillance ATCO does, giving headings to pilots to fly so to remain safely separated from each other.

All Clear? Air Ground Communications for Controllers and Pilots [ATC-R-ALCL]

Air traffic controllers know a lot about air-ground communications. So why do communication problems still create difficulty and cause incidents? The All Clear? e-learning course attempts to investigate why sometimes communication problems still occur and focuses on expectation bias in human behaviour.

The module is light and includes rich media elements such as videos, animations and a game. Some background information regarding expectation bias is also included.

Important Note

This course includes content that requires the Adobe Flash plugin to be installed and enabled.

Objectives

To refresh air traffic controllers' knowledge on issues surrounding air ground communication with a focus on human behaviour in relation to expectation bias.

To provide hints and tips on how, better knowledge of how humans operate can help controllers improve communications with colleagues and with the flight crews.

Duration

You need to plan 1 hour to complete this course

Audience

- ATCOs
- ATC Ab-initio students

Other courses relevant to learning from everyday work:

- Introduction to TRM [HUM-TRM-INTRO]
- Design and Assessment of Systems Using Human Centered Approaches [HUM-DESIGN]

Check the prerequisites and dates for each course, and register at EUROCONTROL Training Zone.

<https://trainingzone.eurocontrol.int/>

If you want to read more about some of the issues raised in this Issue of *HindSight*, then these books might be of interest.

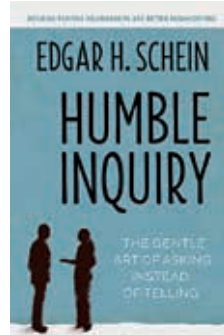


The Heat of the Moment: Life and Death Decision-Making From a Firefighter
by Sabrina Cohen-Hatton (2019)

From the publisher: “Dr Sabrina Cohen-Hatton has been a firefighter for eighteen years. She decides which of her colleagues

rush into a burning building and how they confront the blaze. She makes the call to evacuate if she believes the options have been exhausted or that the situation has escalated beyond hope. Taking us to the very heart of firefighting, she immerses us in this extraordinary world; from scenes of devastation and crisis, through triumphs of bravery, to the quieter moments when she questions herself. Revealing her own story for the very first time, she recounts her years spent sleeping rough and her passion for a career that allows her to rescue others as she was never rescued herself. This book is the result of everything she has learnt about how we respond in our most extreme moments..”

“A vivid reminder of the horrors that firefighters face daily - and the debt of gratitude society owes them . . . This book challenges assumptions about who firefighters are, and about what women can do.” (The Guardian)



Humble Inquiry: The Gentle Art of Asking Instead of Telling
by Edgar H Schein (2013)

From the publisher: “Communication is essential in a healthy organization. But all too often when we interact with people especially those who report

to us we simply tell them what we think they need to know. This shuts them down. To generate bold new ideas, to avoid disastrous mistakes, to develop agility and flexibility, we need to practice Humble Inquiry. Ed Schein defines Humble Inquiry as the fine art of drawing someone out, of asking questions to which you do not know the answer, of building a relationship based on curiosity and interest in the other person. In this seminal work, Schein contrasts Humble Inquiry with other kinds of inquiry, shows the benefits Humble Inquiry provides in many different settings, and offers advice on overcoming the cultural, organizational, and psychological barriers that keep us from practicing it.”

“The lessons contained in this deceptively simple book reach beyond the author's experience gained from a lifetime of consultation to organizations of all sizes and shapes. It provides life lessons for us all. If, as a result of reading this book, you begin to practice the art of humble asking, you will have taken an important step toward living wisely.” (Samuel Jay Keyser, Peter de Florez Professor Emeritus, MIT)



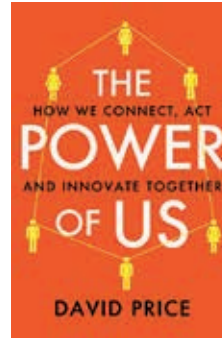


The Long Win: The Search for a Better Way to Succeed by Cath Bishop (2020)

From the publisher: "In this fascinating examination of our widespread obsession with winning, Cath Bishop draws on her personal experience of high-performance environments to trace the idea of winning through history,

language and thought to explore how it has come to be a defining concept in fields from sport to business, from politics to education. Faced with the challenges and opportunities of the 21st century, Cath offers a new, broader approach: The Long Win."

"This book is so relevant, timely and exciting for any person or organization wanting to investigate what success means to them. It couldn't be a more relevant book right now and Cath's exceptional ability in so many areas of life make it a gripping read with a lot of key takeaways whatever your area of interest. I wish every leader could immediately read this book as the world would be a better place if they did!" (Goldie Sayers, Olympic Medallist in the Javelin, Coach)



The Power of Us: How We Connect, Act and Innovate Together By David Price (2020)

From the publisher: "The Power of Us is the result of a three-year journey around the world seeking out highly successful companies from BrewDog and Patagonia to inner city schools and renewable

energy co-ops to find the answers. Cultivating people-powered innovation enables everyone to collaboratively work to figure things out. We just need to nurture the mindset and culture that makes innovation an everyday occurrence. Consultant, global thought leader and author David Price shows you how with a practical toolkit of ideas centred on 8 key principles:

- Trust and Transparency
- Engagement and Equity
- Autonomy and Agency
- Mastery and Meaning

Thought-provoking and incisive, The Power of Us is an urgent call for leaders, teams and individuals to challenge the status quo, transform our lives and rebuild a better world for the future."

"David Price shows us how our response to a pandemic points the way to our economic and human recovery, and how the emergence of user and peer production will fundamentally alter the status quo of business. The Power of Us is full of pragmatic optimism – precisely at a time when we need it most." (Garry Ridge, CEO & Chair, WD-40 Company)

EUROCONTROL SAFETY NEWS

EUROCONTROL Just Culture Manifesto Launched: Join Us

EUROCONTROL has launched a Just Culture Manifesto to:

- articulate a vision of just culture that connects with people from all industrial sectors, around the world
- speak to people in all roles – front line, support, specialists, management, both in private industry, government organisations and departments, and the justice system, and
- provide a framework for other people to advance this vision of just culture.

We have distilled **five commitments** that we believe are critical for Just Culture and the need to balance safety and the administration of justice.

- Ensure freedom to work, speak up and report without fear
- Support people involved in incidents or accidents
- Don't accept unacceptable behaviour
- Take a systems perspective
- Design systems that make it easy to do the right things

These commitments will not come to life on their own. People need to commit to them and make them a reality in organisations and societies. We are committed. We hope you are too. We invite all who support these principles to join us, and to help make Just Culture a reality in all countries, industries, and occupations. Hundreds have signed up already.

If you agree and are willing to support these commitments, sign up and learn more about who else signed the Just Culture Manifesto on SKYbrary at bit.ly/JCManifesto.

Just Culture Webinar Series Available for Viewing

The Just Culture approach helps to balance safety and the administration of justice by sharing perspectives and solutions between aviation safety experts and national prosecutors. The approach helps to build trust and understanding of each other's roles, responsibilities and environments.

Almost every year, a Just Culture Conference is organised in a European capital where safety specialists from aviation, railway, maritime, healthcare join members of the European judiciary to process Just Culture principles. This year, because of COVID19, the annual conference was adapted into a series of online webinars.

The four webinars in October and November 2020 included talks from the judiciary, front-line operators, safety and human factors specialists, and academics. The webinar series attracted a record number of participants, with over 400 participants. The full programme of the conference – including full recordings and slides – can be viewed at skybrary.aero/index.php/ES2_2020.

Controller and Pilot Just Culture Expert List Released

EUROCONTROL, in cooperation with the International Federation of Air Traffic Controllers' Associations (IFATCA) and the European Cockpit Association (ECA), has designed and delivered training courses for the promotion of Just Culture principles for experts in the aviation field. The training helps to prepare experts to assist judicial authorities when there is a need for judicial investigation into aviation incidents.

The objective of the course is to train experts in the issues related to the Air Traffic Management and aviation in order to advise Public Prosecutors and Judges in case of criminal investigations, subsequent to the occurrence of aviation accidents and incidents.

The first list of experts is now confirmed by EUROCONTROL and is available for the general prosecution offices of Member States to make best use of aviation expertise when investigation aviation occurrences. The first list comprises 13 pilots and 20 air traffic controllers from 15 countries.

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IANs Courses Continue to Support Aviation

IANs, EUROCONTROL's Institute of Air Navigation Services in Luxembourg, has been pioneering online aviation learning for many years. In 2020, with the pandemic closing borders and imposing travel restrictions, our training team responded by transforming over 40 of our popular classroom training courses into virtual 'online classroom' courses, with multiple sessions and often including projects and self-study, as well as offering over 55 focused online webinar briefings.

That has translated into a significant number of aviation stakeholders continuing to maintain their professional training despite the constraints imposed by the pandemic.

Looking forward to 2021, IANs's recently published 2021 Training Catalogue envisages around 50 virtual classroom courses, 35 e-learning courses, and 115 different physically distanced classroom courses. This includes many new courses. Webinars will also be offered at shorter notice throughout the year.

EUROCONTROL Safety Unit staff have supported a range of IANs courses. Over the course of 2020, this includes 10 class courses, 23 virtual courses, and 12 webinars. More webinars and courses are being planned. Check the IANs website at trainingzone.eurocontrol.int.

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Updated Guidance on TCAS Compliance Assessment Published

An updated version of IATA/ EUROCONTROL Guidance Material on performance assessment of pilot compliance to TCAS advisories using Flight Data Monitoring (FDM) has been published and it is available on SKYbrary. See skybrary.aero/bookshelf/books/4507.PDF.

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New IANs Safety Nets Course

A new IANs online course – Introduction to Safety Nets [ATC-I-SAFNETS] has been developed. The course explains the purpose of safety nets and the difference between ground and airborne safety nets, and provides an explanation of how STCA, MSAW, APW, APM and TAWS (E/GPWS) work and what they are designed to do. Search for 'ATC-I-SAFNETS' at trainingzone.eurocontrol.int.

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CISM Quick Guide Updated

EUROCONTROL has updated a 'quick guide' on CISM Implementation. This supports ANSPs with important aspects setting up a CISM programme. More comprehensive guidelines and other support material (including two SKYclips) will be ready in early 2021. For more information about implementing CISM go to SKYbrary. See bit.ly/SKYbraryCISM for more information.

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Skilling Up for the Future

'Skill-up' (an ERASMUS+ project) is a project that aims to define the knowledge, skills and competences required by future employers in the air transport sector. The aim is to align the training offered with the requirements of different occupational profiles. The project intends to reach this aim by developing initial and continuing training programmes adapted to the evolving needs of the sector, based on effective teaching and training methodologies. The project includes 12 partners from five countries. EUROCONTROL Safety Unit specialists are helping to provide technical knowledge for the ATM domain. For further information, see www.skillup-air.eu

Would you like to write for HindSight magazine?

HindSight is a magazine on human and organisational factors in operations in air traffic management.

As such, we especially welcome articles from front-line staff, as well as others involved in supporting them.

Here are some tips on writing articles that readers appreciate.

1. Articles can be around 1500 words (maximum), around 1000 words, or around 500 words in length. You can also share your local good practice on what works well for you and your colleagues, on the theme of each Issue, in up to 200 words.
2. Practical articles that are widely applicable work well. Writing from experience often helps to create articles that others can relate to.
3. Readers appreciate simple and straightforward language, short sentences, and concepts that are familiar or can be explained easily.
4. Use a clear structure. This could be a story of something that you have experienced. It helps to write the 'key points' before writing the article.
5. Consider both positive and negative influences on operations, concerning day-to-day work and unusual circumstances, sharp-end and blunt-end.

If you have an idea for an article that might be of benefit to others, we would like to hear from you.

Please write to steven.shorrock@eurocontrol.int

HindSight

Human and organisational factors in operations in air traffic management

The theme for HindSight 32 will be

THE NEW REALITY

HindSight is a magazine for front-line and other practitioners in air traffic management on human and organisational factors in operations.

We welcome articles and short contributions, including good practice examples, by **Friday 2 April 2021**.

We especially welcome articles written by or with front-line operational staff on any aspect of adjusting and adapting to the new reality of work in the context of COVID-19, for example:

- preparation and planning
- new or changed risks
- managing and handling risk
- competency and expertise
- collaboration
- change
- wellbeing.

Articles may include, stories and lessons from operational experience, including what has worked for you, and what has not.

Draft articles (1500 words maximum, but may be around 1000 or 500 words) and short examples of experiences or good practice (that may be helpful to other readers) (200 words maximum) should:

- be relevant to human and organisational factors in operations
- be presented in 'light language' keeping in mind that most readers are front-line staff in ATM
- be useful and practical.

Please contact
steven.shorrock@eurocontrol.int
if you intend to submit an article,
to facilitate the process.

If you are interested in downloading back issues of the **HindSight** collection
http://www.skybrary.aero/index.php/HindSight_-_EUROCONTROL



In the next issue of HindSight: **"THE NEW REALITY"**



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