

## **The human factor in aviation safety: Moving from talking to doing**

The aviation industry offers one of the safest ways to travel, and one of the safest workplaces. However, aviation accidents garner more than their fair share of media coverage. I suppose that's understandable given the nature of what we do, but it imposes a huge onus of all of us involved in the aviation industry to focus relentlessly on safety—and, as the theme of this symposium suggests, to move from talking about and researching safety to integrating it into the way we do business.

Research has shown that one of the biggest contributors to aviation accidents is the human factor—up to 75 percent of all accidents and incidents within aviation can be linked to human error. That fact has led to the development of a discipline within aviation relating to how humans perform within aviation and, more importantly, how to improve their performance.

When the man in the street thinks about aviation, he tends to think about the amazing machines and technology that make it possible to propel huge metal pods through the air. The technology truly is amazing, but if one thinks about it, aviation actually depends on something even more remarkable: the integration of humans, organisation and technology to enable the whole complex business of aviation.

It thus follows that if we are to address the question of human error effectively, we have to consider the entire context, including organisational and systemic issues, as well as the interface between humans and the increasingly sophisticated technology that underpins the planes themselves and the equally complex business of managing the skies—the business in which my own organisation is involved.

Everything we can do to enhance human performance across each component of the entire aviation system must be considered, and is receiving ever-greater attention from all of us. One thing we need to avoid is focusing too narrowly on managing cabin crews and maintenance teams, important though those are. We need to do much more: it's essential to enhance our broader understanding of the abilities and shortcomings of humans, as well as all other factors that impact on the way they interact with tools, machines, systems, tasks, jobs and the environment.

In other words, no matter how sophisticated and reliable our machines and technology become—and there are new developments on this front all the time—the aviation industry is ultimately a business that relies on people and their judgement.

An important point needs to be made in relation to the sometimes startling velocity of technological development. The sheer speed at which technology continues to develop means that we can rely less and less on experience and intuition to guide our approach to managing and improving human performance. Rather, we need to focus on gaining a sound theoretical and scientific basis for understanding the factors that drive human performance, and integrating that understanding into the design of the technology itself, into the organisational structures and processes that govern how we work, and, of course, in how we train our people.

To do this, all players within the aviation industry are relying more and more on experts who do not just have experience and expertise in flying or mechanics, but also in cognitive psychology, human performance, physiology, visual perception, ergonomics and the design of human-computer interfaces.

In other words, every component of aviation needs to be structured with the human in mind—how can a process, a new computer programme or whatever enhance natural, innate human abilities while overcoming humanity's innate limitations.

To explain what I mean, let me focus in on the sector of the aviation value chain that I know best: air traffic control.

We all know that air traffic controllers need to be people of high intelligence and high motivation, able to work in a highly stressful environment in which they are responsible for the safety of thousands of people—in real time. They need strong nerves. In addition, of course, they have to combine excellent spatial abilities, great attention to detail, the ability to work in teams and excellent communication skills. You don't want an air traffic controller who can't find the right words to get an aircraft onto a new flightpath in the crowded skies above JFK!

Obviously, as air traffic continues to grow in volume in line with the trend of globalisation, the job of the air traffic controller becomes increasingly more difficult—

and the stakes are higher. These factors make it correspondingly much more important to understand how to help these men and women to do their job. The technology available to them, and the processes they follow, all have to be integrated into a system that enhances their natural, human abilities and helps them to overcome their human limitations. It's only when this integration occurs that the full safety and efficiency benefits are realised because it is only then that the insights and advances of science become embedded into the way people do their jobs.

When the study of human factors in air traffic control began, it focused on equipment and workplace design. These remain important, of course, but a more integrated and sophisticated approach is required. One researcher talks about a "socio-technical" approach, one that focuses more on the dynamics of the interaction between the controller and the technology.

A key development in this area has been the development of simulation programmes that allow controllers to build up their knowledge and experience in a safe situation, and also to permit the gathering of data that will influence technology and process design in the future. Another has been the growing focus on seeing aviation not as a set of fairly distinct parts, but as a complex social-technical system. Thus, in the context of air traffic control, there has been a very useful focus on how the flight deck interacts with the air traffic control.

I also want to mention the welcome way in which, over the past years, the academic study of human factors in air traffic control has paid growing attention to practical results, with concomitant improvements in aviation safety.

To summarise, my brief overview of the role of human factors thinking in air traffic control highlights some important insights that I am sure will inform our discussions over the course of this symposium. They are:

- The need to put the understanding of human abilities and limitations at the centre of everything we do in aviation. The human is not a factor, but the pivot of our industry.
- Technology and organisations, specifically, must be designed with humans in mind.

- Aviation needs to be understood as a system in which technology and humanity interact.

When these insights are turned into action, advances in technology and process design will truly become integrated into the way we all work—and we will move from simply talking about and understanding safety to doing it automatically.

I want to make two final, general points relating to safety and the human factor, and particularly about how to ensure that safety is a part of how aviation works.

One is that humans are, by their very nature, subject to change. It's thus important in air traffic control to ensure that training is ongoing. This approach enables managers to ensure that their staff's skills remain current, and also to assess their capabilities. The same principle, I believe should be applied across the entire aviation value chain. It is a matter of life and death that all our people are operating at their fullest potential.

My final point is the way in which we investigate incidents where safety was compromised. Too often, such investigations are focused on apportioning blame. This is a short-sighted approach because it prevents us from understanding the root causes for the failure, and thus from implementing the changes needed to prevent the same lapse from occurring again. Humans are fallible, as we all know, and everything we can do understand the exact anatomy of that fallibility constitutes an advance in our common journey to make aviation safer—in African skies as well as everywhere else.

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