A DAY WHEN (ALMOST) NOTHING HAPPENED: A PERSONAL PERSPECTIVE

What we would do in the event of a major surprise is not always known to us until it happens. **Tom Laursen** gives an example of how operational and technical staff coped with a total loss of flight data.

As an air traffic controller, I experienced a number of surprises throughout my career. Thinking back, I can put them into two categories: the ones that happen every day, that are hardly noticed by anyone, and the rare events that sometimes cost sleepless nights, and that leave a trace in your memory. The everyday surprises are hardly noticed because the air traffic control system is well calibrated to respond to them. They range from adjusting to unexpected changes due to weather (e.g., wind and clouds), to different cultures and accents, and different airline policies (e.g., fuel policies). These changes or surprises are dealt with smoothly and without any disturbances of the safe and orderly flow of air traffic.

The surprises that have left a trace in my mind are rare and usually had an impact on the orderly and safe flow of traffic. Just to mention a couple, in the beginning of my career, when we worked with very little safety net support, I forgot an aircraft and climbed another one through its level. How the two aircraft passed each other is still a mystery to me. I never reported the incident, because I feared the consequences. Another type of event that left a trace were situations that involved military aircraft. The difference in nature between civil and military operations is significant and leads to many situations that evolve in high-tempo and lead to close encounters.

I also worked in skyguide when the Überlingen accident happened. The accident gave months of sleepless nights and left a significant mark for life.

In this article, I will focus on an event that happened not so long ago in a control centre in Europe. It was an incident that was, like many technical glitches that I have experienced, not supposed to be possible. Because of what I have experienced as an ATCO over a 33-year career, I am suspicious when decision makers and companies

promise that breakdowns of new technical equipment will only happen once every 100 years. If this were true, there will be few or no future technical surprises in the European aviation system.

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It was also an event where the involved operators were very surprised and worked hard to maintain a safe and orderly flow of traffic, but this effort was not visible, since the orderly flow of traffic was hardly affected. These events are fortunately rare, but not as rare as many people think. The reason for that (in my view) misconception, is that many of these events do not show up in any incident statistics, although they are the events that I think we should pay most attention to. We need to study how we manage these events, mainly to understand why we are good at responding, but also because it's those events where the ATM system is pushed towards its limits.

The Event

During an afternoon shift in an air traffic control centre, everything was as usual with only little traffic. The centre makes use of a computerised air traffic control and management solution with a distributed computing architecture that integrates geographically dispersed air traffic control units in a Flight Information Region (FIR) into a single coherent air traffic control system. At about 13:10, the screens at the operator working positions suddenly turned 'black', meaning that all tracks of the aircraft disappeared. After a few seconds the tracks reappeared, but without the labels that contained information about the call-sign, route, destination, type of aircraft, speed, etc.

The air traffic controllers (ATCOs) did not know what had happened, except that some kind of system breakdown had occurred. They soon realised that there was no flight plan information in the system, which meant that the ATCOs were unable to correlate the tracks. The Mode S downlink provided information about call-sign and flight level of the aircraft that were Mode S equipped. (Mode S is a Secondary Surveillance Radar process that allows selective interrogation of aircraft according to a unique 24-bit address assigned to each aircraft. It had recently been introduced in the control centre.) The information was, however, not displayed as it normally would be and the ATCOs decided against relying on Mode S as it's not mandatory for all aircraft.

The ATCOs began to use Modes S information to identify aircraft and manually to make an abbreviated flight plan as a substitute for what should have been provided automatically. All aircraft on the frequency were asked about their destination and aircraft type. Furthermore, all adjacent centres were advised to perform manual radar hand-over (a function that works seamlessly under normal operations), just as departures out of domestic airports were advised to stay on the ground to lighten the traffic load. All spare personnel were called and a procedure to find information and coordinate with adjacent positions and centres was soon established. This happened within a very short time – approximately five to eight minutes after the technical failure. When it was felt that an acceptable level of service again could be provided, departures from domestic airports were released.

After the Event

The ATCOs began to reflect on what had happened and discuss what they were actually allowed or advised to do according to existing rules and guidelines. The control centre has a backup system with its own screen next to the main controller screen. The backup system is to be used to evacuate the airspace in situations like the one that happened, when all information about the aircraft has been lost. The ATCOs, however, did not do that because the situation quickly had been brought under control.

While the ATCOs had found a way to handle the situation, the technical department had simultaneously analysed the breakdown and identified the technical source of the problem. After about 30 minutes the computerised control system was therefore up and running again.

Unfortunately, two more breakdowns took place because of the same technical problem. In both cases the situation was quickly recognised as a repetition of what had happened earlier, and the same recovery actions were carried out. It was decided to revert to the previous software release during the night, when traffic density was low.

My Take-away

Erik Hollnagel signs his emails with this quote: *"The difference between what you can imagine and what can happen, is larger than you can imagine."* Based on my experience, this quote is very useful for the organisation and design of today's aviation system. We are quite good at predicting and we spend a lot of resources predicting what can happen. But we will never be able to fully predict and anticipate all scenarios. Therefore, we have spent decades designing the aviation system to be well prepared through highly qualified experts, procedures, airspace design, technical support, and many other measures. These enable operators to respond to many situations, including surprises.

Because we are good at responding to many challenges, we often forget why we are good at responding to the challenges that sometimes come as major surprises. In my view, the reason why we are good at it is because we have a system that balances formally designed procedures (thorough preparation) with the ability to respond in real-time to the difference that we can't imagine, as Erik puts it. The importance of the ability to respond is becoming more accepted and incorporated in our thinking.

But we still have a long way to go before the thinking is used and incorporated

in how we organise and design the aviation system. Too many, especially decision makers, still believe that the designers of today's aviation system can predict all situations and therefore the goal of many bigger projects are to get rid of, or minimise, the presence of resources that can respond in real-time – people. This is, in my view, the wrong way to go. We need to design systems that can use the combined strengths of the human and the technology to be able to maintain the ability to respond, as well as was done in this example, to surprises.

Reference

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Tom Laursen is an Air Traffic Controller (ATCO) and has worked with three different Air Navigation Service Providers in Denmark, Bahrain, and Switzerland. During his career as an ATCO he held different positions, has participated in different technical projects and has built in-depth knowledge within safety, complex systems and investigations. Tom has a Master's Degree in Human Factors in Aviation from Linköping University, Sweden.

tom.laursen.dk@gmail.com

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