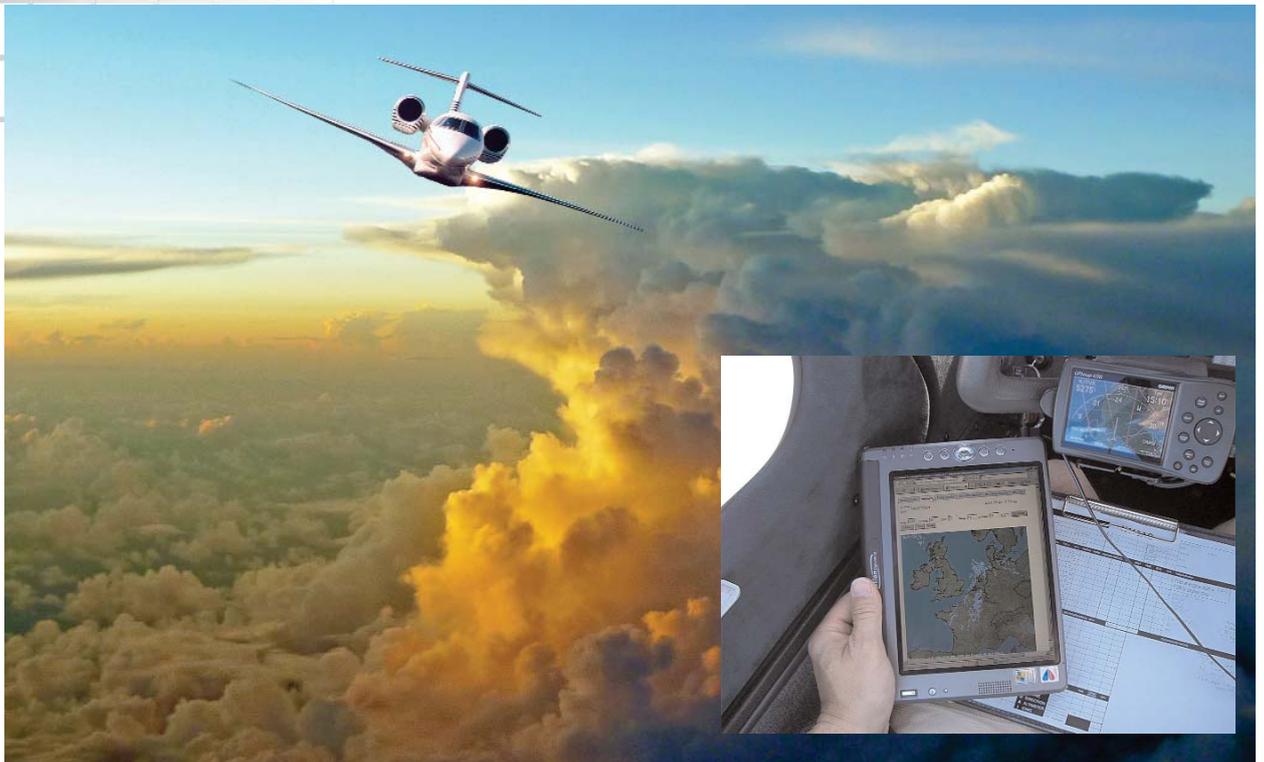


# I WISH THE COMPUTER WAS ALWAYS RIGHT

Michael Grüninger and Carl Norgren point out hard-to-spot errors in flight planning systems and how they may result in inappropriate decision-making putting the flight at risk



## Something is Wrong Here

The crew had settled into the cruise at FL360. They were on a short flight from Berlin to London. Before starting the passenger announcement, the commander requested a weather update for their destination. The ACARS printer sprang into action and soon he held the METAR and TAF for destination and three destination alternates in his hands.

The weather seemed to have changed markedly. Or was his memory of the early morning briefing playing a trick on him. It had been an early check-in and two hours had passed since he had reviewed the weather reports in the briefing room with his first officer.

He asked the first officer for the flight documents folder. The weather reports for London Heathrow still contained his hand written highlights. The

reports and forecasts were as he remembered them. But the freshly printed ACARS weather report told a completely different story. The visibility was better, the cloud base higher, the wind direction and the temperature were markedly different. Such changes in such a short time frame were highly unusual and unlikely. He checked the date stamp of the METAR and the TAF on both reports. They were correct.

The commander brought the discrepancy to the attention of his first officer. Together they could both not resolve this discrepancy and decided to cross-check the weather report with Volmet. The first officer tuned VHF2 to the Volmet frequency and waited for their destination to be reported. He wrote down the weather as transmitted and handed it to the commander. The Volmet weather report matched the ACARS report. By elimination, they decided to use the

ACARS reports and to disregard the weather reports contained in the flight briefing package.

The commander was concerned about the obviously incorrect weather report in the flight briefing package and decided to send a short message via ACARS to operations informing them of the discrepancies found.

At operations, the report of erroneous weather briefing information created a stir. A number of weather briefing packages were cross-checked. Some were correct and some were erroneous. The pattern seemed random and there was no way to know which weather briefing package was correct and which was erroneous. The system vendor was contacted and started investigating. In the meantime, all flight crews were alerted to double-check their weather briefing packages with weather information from other sources until further notice.

## CROSSCHECK

*Pilots detect errors by comparing computer-produced flight plans to their notes from briefing.*

The system vendor, whose head office was in a different time zone, soon discovered the source of the error. As with most flight planning system vendors offering flight planning and weather briefing data, the vendor pulled weather data from a single provider, the National Oceanic and Atmospheric Administration (NOAA) in the US. A misconfigured access link in the software of the vendor had caused the vendor to extract data from a database which the NOAA thought was no longer in use and hence was no longer updated. It therefore contained both 'outdated' and current weather reports and forecast.

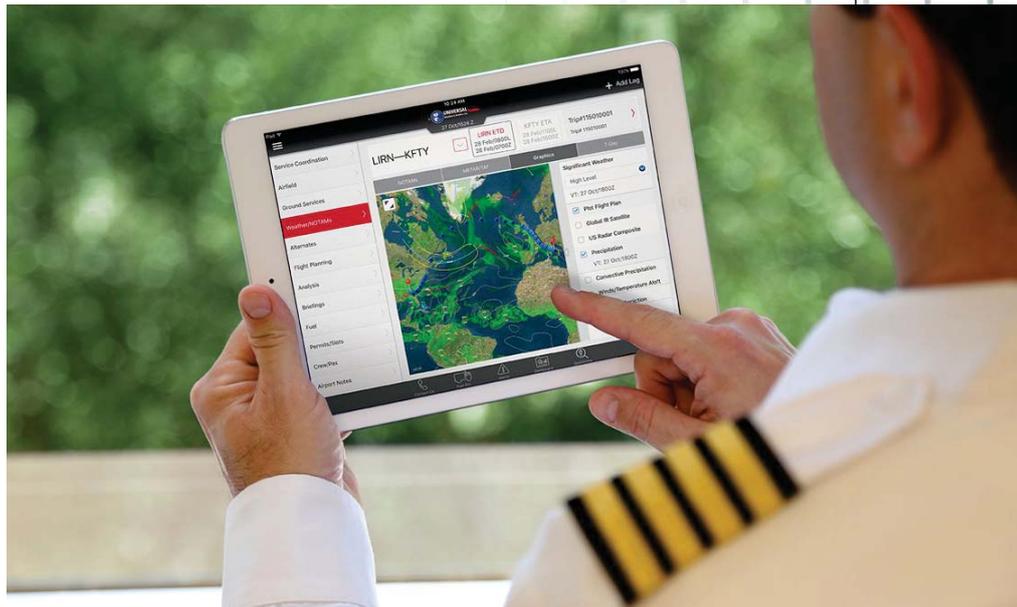
The story described above is based on an actual occurrence at a major European carrier. Had it not been for a vigilant crew, no one might have recognized this latent systemic risk and mitigated it before it impacted the safety of flight.

#### Hard-to-spot Errors

The more flight planning and crew briefing systems are interconnected, the more interfaces exist. Each interface has the potential to induce errors. Flight planning systems often have numerous interfaces to different databases and hence have numerous potentials for erroneous data to be transmitted from one system to another.

Computer systems are not inherently smart. They do not actually 'know' things. They only process information. If incorrect information is fed in, then the output will also be incorrect. We all know about this weakness of computerized products. And yet, we often forget about it and tend to trust what is provided by smart-looking hardware and fancy graphics.

Sometimes the future failure of the system is designed into the actual output. In our current weather data mix-up case, both METAR and TAF contained a date stamp. The date stamp consisted only of 'day of the month' and time. The weather report supplied to the crew had the correct 'day of the month'. The data, though, was from the previous month. Had the month been included in the date stamp, the error would have been quickly spotted by the crew.



#### Safety-relevant Data

The integrity of data, be it weather data, navigation data, obstacle data, weight and balance data etc. is vitally important for the safety of flight.

Most operators, both airlines and business aircraft operators, procure such data from a number of different third party providers. Such providers must be qualified according to the standards laid down in DO-178C (FAA) / ED-12C (EUROCAE) containing software considerations in airborne systems and equipment certification.

In the case of navigation data stringent regulatory requirements (EASA: CAT.IDE.A.355) ensure that the operator actually verifies the integrity, consistency, completeness and correctness of such data. Due to the dynamic nature of such data and the volume of data, any integrity check cannot cover 100 percent of the data at all points in time. Instead, such checks are usually based on sporadic or regular sampling of the data to discover gross errors. The operator, however, is not legally required to systematically check other data - such as weather data, obstacle data and terrain data.

To sum it up; any data used to plan and execute a flight is safety critical. Using erroneous data at the outset of a flight may well result in inappropriate decision-making and may well put the flight at risk.

#### Beware of Data

No pilot can assume that data used is 100 percent correct. In the case of the erroneous weather data case described in this Safety Sense, the crew did cross-check the quality of the data received.

Luckily, the weather data procured via ACARS did not come from the same source as the weather data in the flight briefing package. A third independent data source (Volmet) helped to assess which data was correct.

The computer is not always right. It is unavoidable that discrepancies in data will occur. Any discrepancy found between data from various sources must be reported. It takes mindfulness to discover discrepancies and it takes self-discipline to write and submit a report. Without flight crew vigilance and feedback, errors might go undetected and jeopardize flight safety.



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**KEY**  
Flight planning involves mapping out all of the criteria, materials and routes of a flight.