I AM NOT A MACHINE

Software is playing a bigger role in all aspects of aviation operations. But software cannot always take into account the real world of operations. In this article, **Julie Baltet** describes some of the limitations and implications of flight planning software for controllers and pilots.

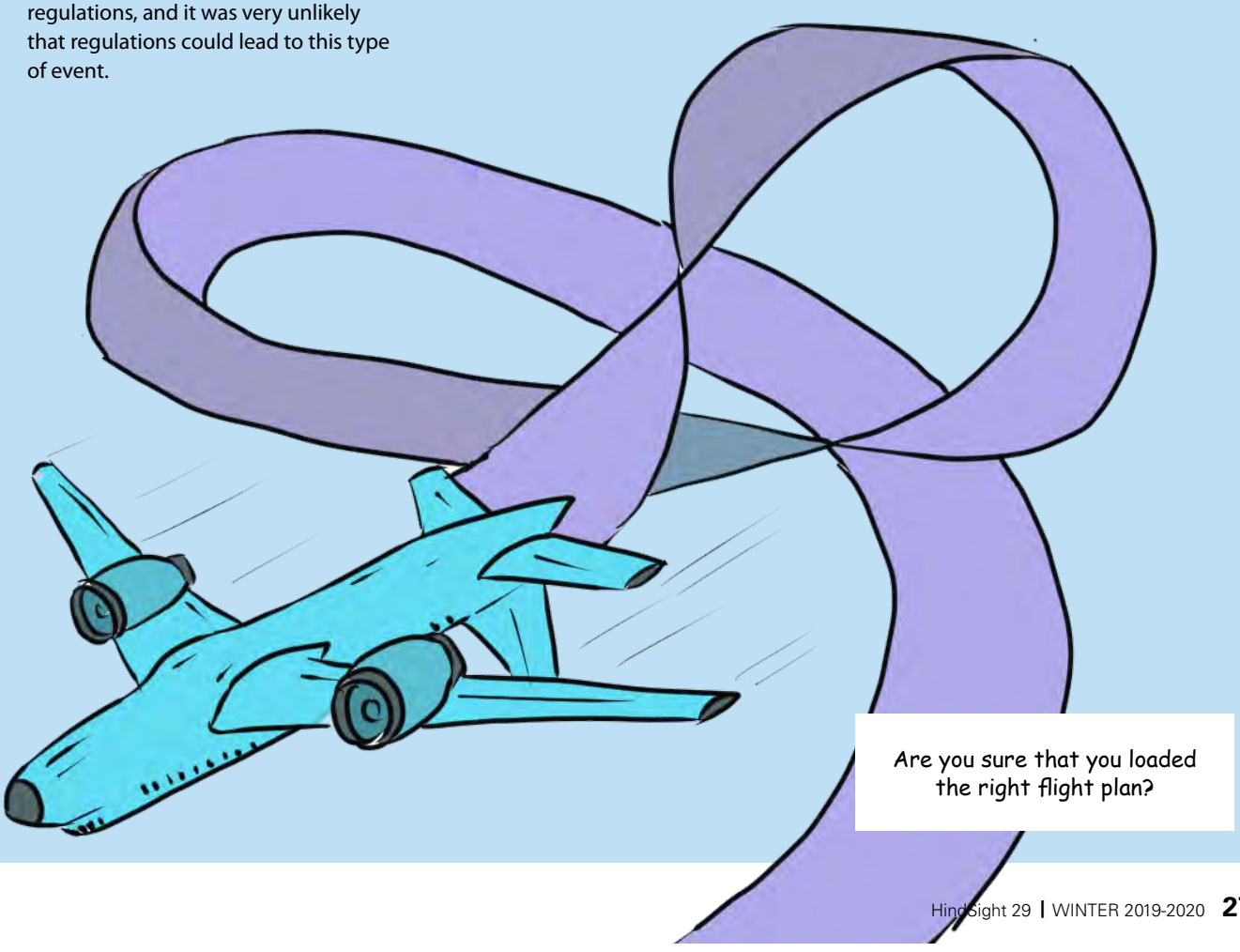
KEY POINTS:

- **The use of algorithms changes the working methods of every actor (airlines, ATC, ATFM, pilots) resulting in lack of understanding.**
- **Inventing working methods without cooperation between actors leads to instability.**
- **Training via crossovers sections helps to regain on trust and understanding between actors.**
- **Post-analyses and regulations have to take into account advice of the operational actors to improve the system.**

On 30 June 1956, two aircraft collided above Grand Canyon in the United States of America. Yet pilots and controllers had respected the rules and regulations, and it was very unlikely that regulations could lead to this type of event.

At the time, air traffic controllers were more like flight assistants. Separation provision was more the responsibility of the pilot, by visual contact.

ATCOs now provide separation for traffic that is increasing each year in number and complexity. This has led to the creation of networks and constraints. Pilots no longer choose their route. As the amount of flights and complexity of flight planning increased, companies delegated that job to planning operators. More recently, they integrated flight planning software that can deal with a huge amount of information, including cost data, to shift data, and meteo data. Even cruise flight levels are calculated in advance. Operational personnel in different functions have had to adapt to this software, from airlines to air traffic flow management (AFTM), and air traffic control.

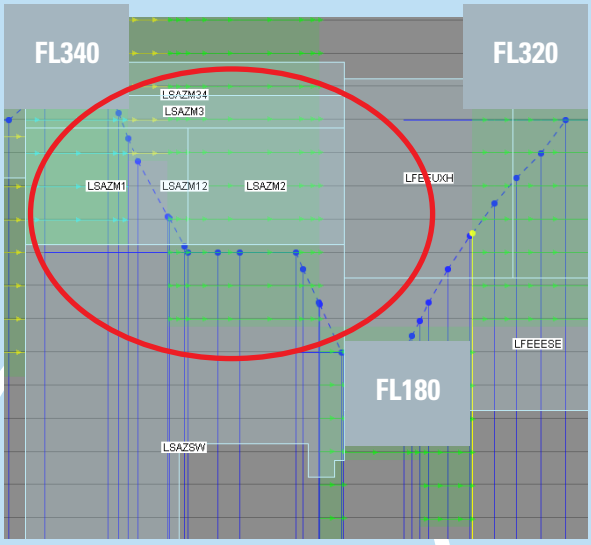


Airlines took flight planning software as a real improvement. They could take all data into account in their planning while reducing the costs for flight planning. The software allowed organisations to respect all route availability document (RAD) measures without having to learn them, and to find new routings that companies would not have considered. The software was so perfect that aircraft could zigzag across large areas of airspace while avoiding regulations.

It seemed the perfect match for airlines: fewer constraints and employees. Pilots just had to respect their flight plans. But sometimes it is unrealistic.

Here is an example of a flight plan requesting a steep descent and then a return to the original level in the middle of the route. This sort of flight plan involves more work for ATCOs and usually results in discussions or even arguments between pilots and ATCOs.

Route: N0452F360 LARKI G18 URNIL UL609 MES UG18 FSK UN128 RUGAS DCT LONTA UL608 DOLEV DCT VRANA DCT ULPIN DCT ROTAR DCT TAGIP/ N0439F320 P131 RESIA/N0444F340 UP131 ARGAX/N0400F240 UL613 HOC/ N0377F180 G4 HR/N0433F320 G4 LUL UT60 GIVOR UN853 SORAL/N0369F180 UN853 DIK N852 GOPAS/N0369F180 N852 LNO



In this case, pilots did not stick to their flight plan and became intruders in an ATC sector that was not filed. It resulted in so many overloads in ATC sectors that ATFM had to react. They tried to implement a RAD amendment to stop these sector intrusions. With the huge traffic increase, ATFM had to adapt to variability in the figures used to anticipate the traffic. In response, they invented methods to adapt and absorb the traffic. Yet, the algorithm is so sharp and reactive that it always finds the flaws in the system. ATFM and airlines engaged a race against each other: one trying to implement overload protection, the others trying to avoid them and their constraints.

Controllers and pilots are observers and guardians of the system, dealing with the flaws of it. They balance between multiple constraints generated by multiple stakeholders.

Instead of cooperating, they reacted without really understanding each other, which led to instability but mostly lack of understanding for pilots and ATCOs. Pilots did not understand flight plans made by algorithms and did not trust their efficiency. However, airlines asked them to comply even though the algorithm was wrong. As airlines had decreased their number of planning operators, the software left flaws unseen. Meanwhile, ATFM developed more measures and asked controllers to understand each of these measures. RAD measures were introduced to forbid flight plans that bring complexities into our area, such as descents due to wind efficiency at entry to new sectors. Measures were introduced to monitor intruders and to cap levels. ATCOs were asked to become 'intruder hunters', sometimes forgetting their first priority and even creating disputes between ANSPs.

After 10 years of racing, companies and ATFM finally took a step towards each other. To solve the problem of instability, companies and ATFM decided the only way to secure the system was to change the practices of ATCOs and pilots. The answer was 'fly as filed'. Every actor tried to do their best, but to solve a complex problem like this one requires time, understanding and trust, which in turn requires communication and training.

During these 10 years, methods changed every year. Training had to adapt continuously. In Reims ACC, for instructors, it meant having to interact with unmotivated and tired ATCOs. To create effective training requires a step back to clarify the new working methods. The best way to reduce the gap between the two worlds is crossover training. In Reims ACC, we decided to implement discussions between Air France pilots or Reims ATFM department with our ATCOs. It allows them to interact and discuss with each other. ATCOs and pilots were not the only ones to harvest the fruit of these debates.

During these sessions, ATCOs were able to explain the flaws that they see every day in the regulations. An air traffic controller provides separation, eases the flow of traffic, and tries to work in compliance with the policies, rules and procedures for all aircraft in his or her sector. All priorities and objectives are considered and controllers try to find the best balance. The problem is that each ATCO decision faces a pilot decision, which can originate from these constraints. The same for pilots who have to manage their flight: they have to deal with complex real life (passenger needs, fuel savings, and time for connections, etc). The type of flight plan shown above can result in many questions for ATCOs, as you can see in the drawing below.

Finding the right balance between all those considerations is as intricate as the flight planning system. And all of this affects controller decision-making. Controllers and pilots are observers and guardians of the system, dealing with the flaws of it. They balance between multiple constraints generated by multiple stakeholders. ATCOs and pilots need to be heard and understood by airlines and ATFM. 'Fly as you file' is a good way of creating stability. To integrate operational actors in post analyses and regulations will improve it. To trust them will help to erase the flaws of the system, even if sometimes it requires a clean sweep of some regulations, like in 1956. Time spent in discussions with front-line operators is never wasted time.

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Julie Baltet has been working as an air traffic controller in Reims ACC since 2006. Feeling the need to learn more about HF, she became an HF facilitator for controllers in 2011. She joined the French HF team recently.

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