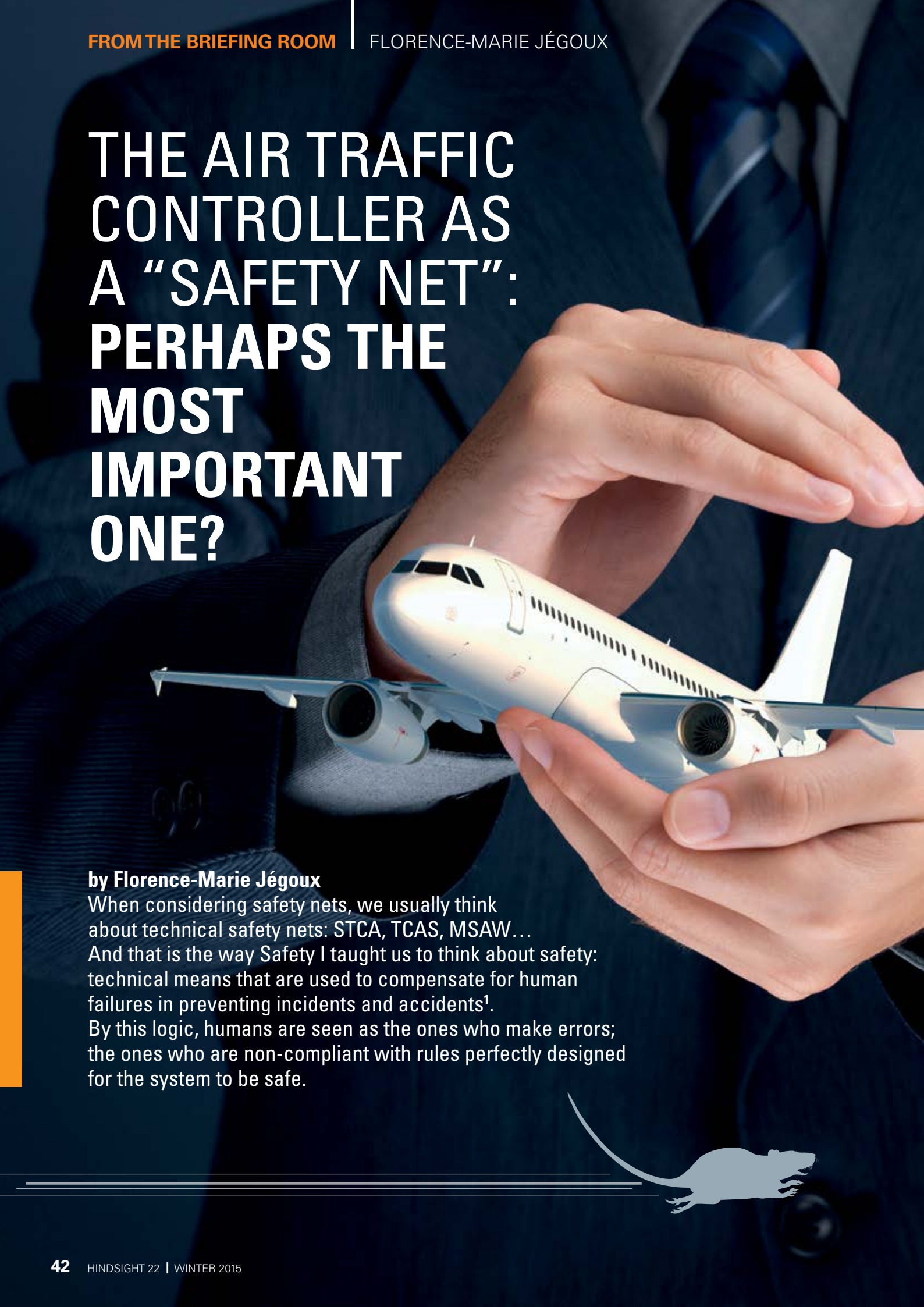
THE AIR TRAFFIC CONTROLLER AS A "SAFETY NET": PERHAPS THE MOST IMPORTANT ONE?



by Florence-Marie Jégoux

When considering safety nets, we usually think about technical safety nets: STCA, TCAS, MSAW… And that is the way Safety I taught us to think about safety: technical means that are used to compensate for human failures in preventing incidents and accidents[1].

By this logic, humans are seen as the ones who make errors; the ones who are non-compliant with rules perfectly designed for the system to be safe.

Years ago, a controller in a Human Factors training workshop told me: *"HF appear only when something goes wrong, and when the controller has done something wrong"*. That started me thinking … He was right. As HF facilitators we only showed control examples where the controller had not chosen "the" best solution, and where, with hindsight bias, it is pretty easy to recalculate everything, in the comfort of an office with loads of time to rewrite the entire story, and find better options.

After the Hudson River ditching the findings led me to redesign the introduction of our HF workshop, to give an example of an incident where things went right, where pilots and controllers did the right things, where the human element saved the day. Yet, the challenge was to take things further.

In the French HF National Group, we design and build new HF training programs that are deployed over three-year periods. So for the following period, we decided to highlight the role of controllers as "safety nets", or "double checking elements", our French "safety loops", and to find examples of what they do "right".

We then asked controllers to tell us about events that had gone well, but they did not seem to understand what we were getting at. I was told *"You can't study that! That's just everyday work!"* Nothing to say, nothing to see, move along please.

And move we did. Our HF team studied how the controller is an asset in rectifying control situations, and after research, we managed to find exceptional cases where they sorted out tricky situations, such as in hub peak hours amid horrible thunderstorms.

However, these correcting loops do not solely occur during exceptional situations. Basically, in everyday tower or centre life, controllers sort out situations ***before*** things go awry, even before a technical safety net triggers an alarm signal.

We then came across the notion of a "weak signal" ("Informal and Ambiguous Information", Diane Vaughan, 2009). In a control position, weak signals are by definition not strong enough to trigger an immediate reaction. They are quiet warnings, subjective, intuitive, and difficult to identify. In a nutshell: nothing much to talk about. How a weak signal is interpreted depends on each controller's mindset, thus rendering the notion somewhat abstract and difficult to incorporate into regular training sessions.

In practice, weak signals can be heard as an internal dialogue: "Uh-uh, this doesn't look good", "I really don't like that". They can be felt as emotions: "hey, that's pretty scary", "I don't feel like doing that", " I don't know why, something bothers me". A weak signal may also manifest itself as a faster heartbeat, an impression of stress when checking particular data (speed, altitude, a slow response to a clearance modification …), a feeling of preoccupation, of concern, of annoyance, etc. These small intuitive perceptions can cause controllers to pay more attention to a particular situation, rectify a situation or act with foresight to a slowly changing one. The weak signal may be the stimulus which subconsciously encourages the ATCO to double-check more often, i.e. the uneasiness which is triggered by a VFR pilot's unsure tone of voice or the feeling of discomfort before noticing a slow catch up between 2 aircraft.

A weak signal, when heeded, can help trigger controller action, which may prevent the situation from deteriorating ***before*** it gets out of hand and the radar screen lights up like a Christmas tree!

Weak signals may help controllers to adjust their cognitive trade-off[2] and their ETTO: Efficiency-Thoroughness Trade-Off[3]. Through this constant real-time adaptation and flexibility, they can adjust their actions, reactions and situational awareness to all ATC situations.

The internal assessment of particular situations is an integral part of the decision-making process and is based on experience which heavily relies on implicit, automated skills. In HF training workshops, we render them explicit by talking about these weak signals. We debate about how they work and discuss the possibility that every controller has his very own set of signals. We explain that weak signals may be heard or ignored, as we all remember control situations where we told ourselves "I don't like doing that", but did it anyway, and then found ourselves in quite a predicament.

Control situations often raise doubts, and these doubts are precious tools in helping us to readjust situations. Disregarding them may lead to potentially dangerous outcomes. To be more aware and accepting of those signals can help the controller to assess a situation more clearly. Weak signals can be a useful tool in dispelling doubts: "Did I really hear the correct readback for the frequency change? I'd better ask him again…"

According to the pilots in charge of Human Factors training at one French airline, doubt dispelling is a helpful tool for pilots too. In many companies, pilots are expected to ask for a cross-check if only one pilot has heard the clearance given

1- For more information, please read "From Safety I to Safety II: A White Paper
2- Amalberti, 2001
3- Hollnagel, 2009; and the White Paper: Systems thinking for safety: ten principles, Moving towards Safety II

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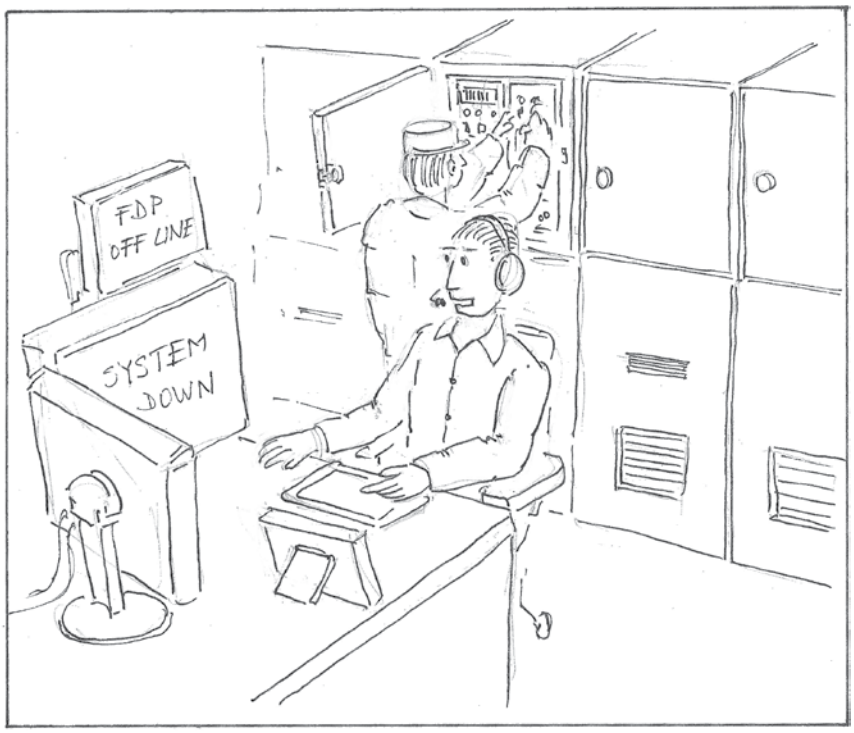
became an air traffic controller in 2004 working in the ANSP of Western France for the French Civil Aviation Authority (DGAC). For the last 6 years, she has been working as a Human Factors coordinator and specialist for their training department. She also works for the French HF National Group and is trained in systems theory. She was a private pilot for 10 years.



JetBus 210 our radar is down and technicians are working on it...
However, I am following you on Facebook from my tablet...

by the controller. Better double-check than be sorry!

And flight attendants, ground staff, operations, company assistants, firefighters, refuellers, etc., are all part of the bigger aeronautical network, and therefore an integral part of safety.

On a smaller scale, the working team is definitely a safety net: TRM and CRM are completely centered on safety in teamwork. In control centers and bigger approach centers, the team as such is clearly seen as an asset to safety, with team members helping each other to stay ahead of the traffic, resolving blind spots and providing support when it is needed, notwithstanding the fact that it can be delicate to bring a colleague's attention to a seemingly dangerous situation.

The situation is very different in remote towers, where controllers work away from the rest of their team. The "team" is then spread out over different places and different jobs. This extended team can also be seen as a safety net, in spite of the fact that the team members are not physically in the same room. Here the systemic perspective takes on its full significance: understanding that disparate discrete activities are interrelated within a system where each part influences and interacts with the whole. In a complex world there's a bigger picture to one's personal work.

Thus, bearing in mind the controller's cognitive and collective work, let us consider the men and women in the aeronautical operational field as human safety nets, human safety nets which can take action in different situations:

- **before** technical safety nets are triggered. Before the red button flashes and screams "Do something about me! Do something about me! Don't you hear me? DO SOMETHING ABOUT ME!"
- **after** an incident, to get the situation back on track. In our HF workshops, we analyze a very tricky thunderstorm situation where 4 STCA flashed simultaneously. The controller came up with an innovative solution, in the nick of time to prevent the crashes!
- **when** technical safety nets do not "work-as-imagined", just because we live in a complex system where it is highly impossible for safety net specialists to describe and anticipate ***every*** ATC situation.

An exhaustive array of possibilities must be incorporated into a system's programs for it to respond safely in any and every situation and there will always be isolated cases which are not covered. In our HF training, we analyse a "work-as-done" situation where the STCA did not flash, and the controller in the position had a hard time figuring out what was happening. Speaking of overconfidence in technical systems… Technical safety nets are designed to be safety loops for human error. We should recognise that the reverse is equally important. The ATCO should be considered as a resource of the system, if not the most important and valuable one, as is recommended and encouraged by the Safety II approach.

Situational awareness, permanent Efficiency-Thoroughness Trade-Off, adaptability and flexibility to demands are the controller's everyday bread and butter. ATCOs, pilots, field experts, managers and all co-workers alike are part of this very complex system and fulfill their role as everyday safety designers.

Our Group favours an approach where controllers are acknowledged for their everyday positive actions, instead of being singled out when things go wrong. We also believe that it is high time we more thoroughly researched controllers' handling of everyday situations. The rapidly advancing field of neuroscience is likely to prove more than profitable in this area of study. The slap-on-the-fingers approach to safety has been the flavour of the month for too long. Let us move on to the Safety II perspective.

EDITOR'S NOTE:

A copy of the referenced document "From Safety I to Safety II: A White Paper" published by EUROCONTROL in 2013 may be accessed at:
http://skybrary.aero/bookshelf/books/2437.pdf