

HOW MUCH ARE WE AWARE OF SITUATIONS?

by Florence-Marie Jégoux

“Passengers ending up in Rodez instead of Rhodes!” “In Italy, tourists found themselves more than 400 miles off track when, instead of entering Capri in their car GPS, they typed in Carpi, which is in the North of Italy!”

Who has never got lost while looking for a specific place? When I learned to fly, I was told that “there are only two kinds of private pilots: those who got lost, and... those who will!” And I think that it is the same for an ATCO: getting lost in a traffic situation in which there is something wrong, something they no longer understand.

The basis of Situational Awareness is the Endsley model (Figure 1).



PERCEPTION:
the continuous extraction of environmental information

Some problems can occur in this phase: if we get too much data at a time, we get overloaded. We focus on just part of the information (tunnel vision) and miss the part that matters...

In the program at our last HF training workshop, we not only focused on visual and auditory illusions but also on the “blind spot”. When trying to provide a definition for “blind spot”, we came up with several different meanings:

■ **The medical blind spot:** part of the retina that does not get any information, which leads the brain to « reconstruct a reality » based on surrounding available data. We performed a test to demonstrate it to controllers during the workshop. All of them were amazed to realise that we do not really “see” reality, instead our brain recreates what we think is real...

■ **The driving blind spot,** which depends on the vehicle you use. Now panoramic wing mirrors us help a lot in our cars but certainly not that much when driving a mechanical digger... or during push back operations from specific stands for instance.

■ **The flying blind spot:** put a descending low-wing aircraft above a high-wing aircraft flying level and you'll get the picture...

■ **The radar blind spot:** in some areas, radars do not provide information: controllers usually know that in some specific areas, they lose radio and radar contact if pilots fly too low.

■ **The personality blind spot:** blind spot even exists within ourselves, as in the Johari Window Model: other people might know things about ourselves that we don't.

■ **The cultural blind spot:** we only become aware of the characteristics of our national culture when we go abroad, or in the control centre or team culture we may only see its characteristics when we change workplaces or teams.



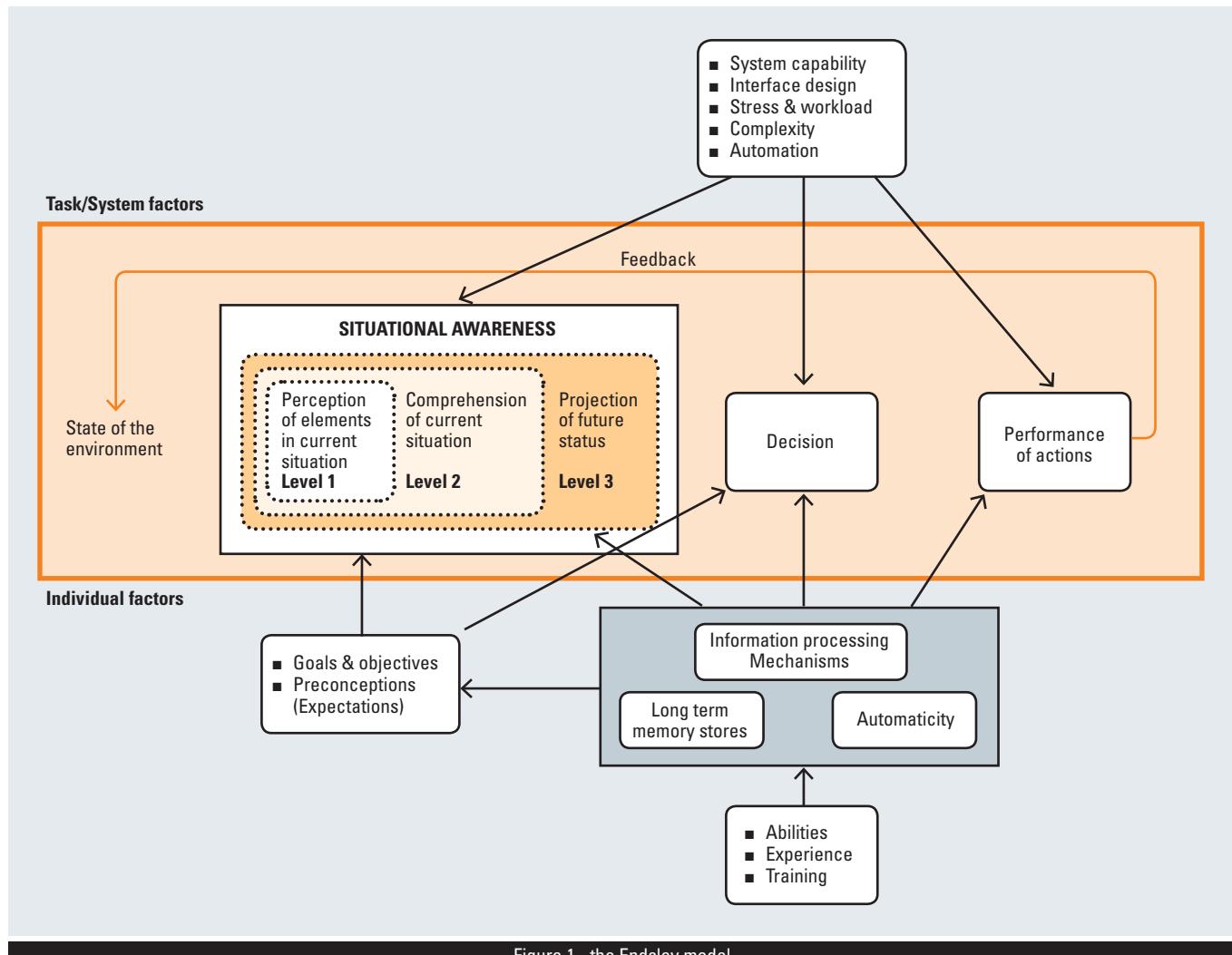


Figure 1 - the Endsley model



■ **And the general meaning we found is “non-perception zone”:** meaning that in some situations, we do not perceive information is relevant or we do not even perceive it is there.

So, what can we do about it, knowing that in some situations we won't get the whole picture? Well, in systemic studies, it is interesting to get the opinion of a consultant or a coach to resolve problems: the outside view sometimes helps to reveal what we cannot see from the inside. It's the same in ATC: a team member can give additional information or raise a doubt which may help to realise that we've missed something.

We shouldn't be scared all the time by the fact of imperfect or partial perception but being aware of it can lead us to adapt, i.e. to change plans, to build in more margins, or to realise more quickly that we are on the wrong path, when comprehension is not that easy...

COMPREHENSION:
integration of information with previous knowledge to form a coherent mental picture

What is interesting in HF is that we learn things we had no idea it existed before, although we use them on a daily basis... I didn't know that we could have different views of a situation, although I already had a glimpse of that, for example when friends or colleagues convinced me about their opinion. They put forward their arguments, we reasoned together and I sometimes had to admit that their arguments were much more valid and more interesting than mine. In such cases, I accepted their opinion and abandoned mine.

As you surely know, we are often quite reluctant to do that...

In a SA course I discovered that one person may also have many SA's. We weigh the pros and cons and we select the one that we prefer based on our experience and our trials and errors. So there is a very valid question: is our brain democratic? With time pressure and workload as a context, we may make up our mind according to the loudest voice, and get drawn into bias.

This could be the "recency effect", in which we tend to choose the most recent idea we got or the primacy effect, in which we even stop searching for the meaning at the first possibility we find, disregarding pertinent clues or meaningful data. Of course, this all happens within seconds or less: in air traffic control, during busy traffic sequences we certainly do not have time for years of academic research...

Instead, we tend to stick to the comprehension of a world in which we find ourselves right whilst projecting our best role in the play...

PROJECTION: use of the mental picture in directing further perception and anticipating future events

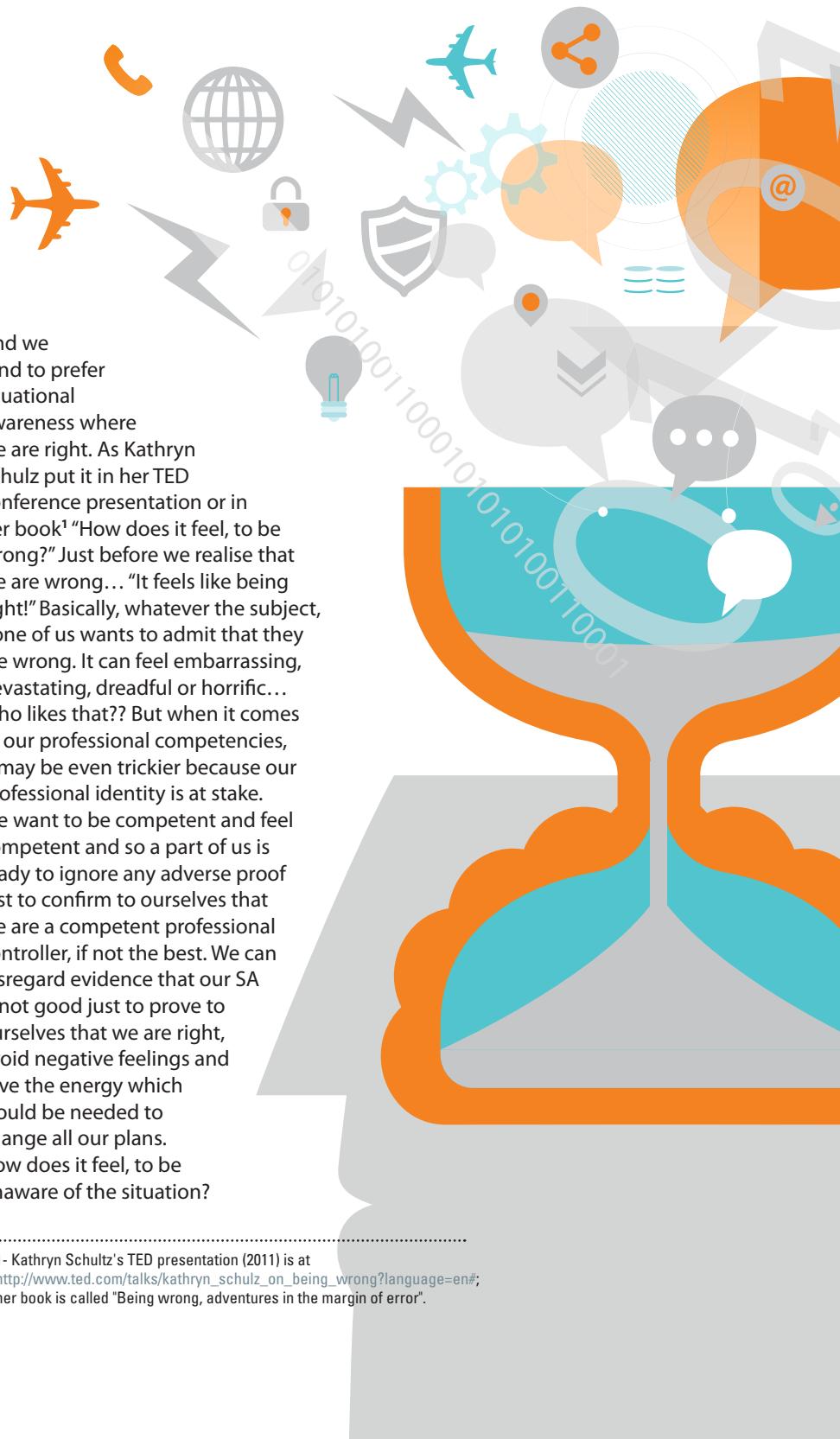
We usually imagine scenarios about the traffic, for example: "If he continues at this speed, he will end up catching up the aircraft ahead". It is like writing a theatre piece while figuring out what all the characters will do if they play the role we write for them. This part is crucial for decision-making and for supervising after acting. "If he's catching up the previous plane, I'd better ask him to reduce at 180kt when he passes overhead NEMOT". The script for acting and monitoring is then triggered. We gain many resources when we act and monitor automatically. It saves energy for what's left in the shift, which cannot be known for sure.

This automatic monitoring can get alarms when the parameters are not usual. It allows us to take them into account during the feedback loop. For

instance, when airline companies started to use the "cost index" and asked pilots to fly accordingly, we got some very unusual speeds to deal with. As we were not aware of that policy, we were not looking for those parameters and made a projection which turned out to be wrong.

Yes, it feels like being aware...

Our inner movie theatre likes to play a very beautiful movie where planes land safely, performance is at its maximum and everything is all right. And luckily for us, unlike the illustrations above, 99,99% of the time, it's the right movie!



And we tend to prefer situational awareness where we are right. As Kathryn Schulz put it in her TED conference presentation or in her book¹ "How does it feel, to be wrong?" Just before we realise that we are wrong... "It feels like being right!" Basically, whatever the subject, none of us wants to admit that they are wrong. It can feel embarrassing, devastating, dreadful or horrific... Who likes that?? But when it comes to our professional competencies, it may be even trickier because our professional identity is at stake. We want to be competent and feel competent and so a part of us is ready to ignore any adverse proof just to confirm to ourselves that we are a competent professional controller, if not the best. We can disregard evidence that our SA is not good just to prove to ourselves that we are right, avoid negative feelings and save the energy which would be needed to change all our plans. How does it feel, to be unaware of the situation?

1- Kathryn Schulz's TED presentation (2011) is at http://www.ted.com/talks/kathryn_schulz_on_being_wrong?language=en#; her book is called "Being wrong, adventures in the margin of error".

Risk management

The question was "How much are we aware of the situations?" But another interesting one would be "How much can we be?"

We receive hundreds thousands of pieces of information every second from our environment and from our own body via our senses.



In the perception part of the SA, our brain has to filter them and pick out the most important ones, the ones that will be relevant to comprehension. If this selection does not work properly or if there are too much relevant data, we would end up with tons of data overloading our brain. This is typically what happens

on a beautiful sunny day with VFR traffic all over the coast looking like bees around a honey pot. If you control low level coastal airspace, you will know what I mean: after working your shift, you don't even remember where you live or what colour your car is... We cannot use that mode for too long. We have to get some cognitive rest to "reset" it.

The imperative to "be aware" is not enough to counter a brain function that was not designed for controlling such a complex system

without errors and thereby being right 100% of the time. Our brain does not function perfectly. It operates in a probabilistic way, which means that it does not seek to be exhaustive or perfect. It needs to make sense of the information it gets, be approximately right in most situations and quick enough to make timely decisions. So we can be aware up to the limits of our brain. And our brain is lazy or thrifty, depending on how we perceive it.

But its great advantage is that it is adaptive and creative: it can find solutions in unprecedented situations. This automatically happens in ATC, more than often. Have you ever experienced the creativity of VFR pilots? After more than 30 years in air traffic control, one of my colleagues told me that many times every year she carries on spotting new "procedures" and is amazed by this discovery: "I've never seen that one before!!"

Controllers who realise that they cannot be aware of everything may anticipate, set barriers, dispel doubts, take more margins and find other creative and adaptive ways to mitigate the risk. The system as a whole also has a strong role to play - managers, ATSEP, system designers and all the ancillary services are meant to support ATC and share risk management on an integrated basis.

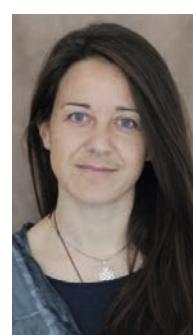
However, the 99,99% times when we are right trigger another risk: that of becoming overconfident and losing sight of the 0.01% of remaining risk: "Oh, no, it never happens! No worries"... And this is why taking the experience of others into account is so important. It can help us avoid making the same mistakes, allow us to take advantage of their best practices and save time and energy so that we do not reinvent the wheel every day.

An airline pilot told us that his 12500 flying hours are just 2.5 days of his company flying experience ... We tried to gather such data for

ATCOs, but we found that it would be far too complicated. Anyway, it gave us food for thought. We surely cannot pretend to have a complete SA when a whole career includes only 2.5 days of company's experience...

Whatever our intelligence or experience, we will always make mistakes, we will always overlook important data one day. Zero-risk is a bias, not a possibility. Our responsibility is to build a system in which risk does not result in harmful consequences. This is why we work in teams and rely on others just as they rely on us - we help our colleagues and they help us. Team work makes it easier to combine all our SA's, getting more detection of our blind spots.

This is also why we use feedback and communicate lessons learned from experience. Our inner GPS sets the good target 99,99% of the time and the very few times we say or hear a wrong heading, our inner error detector is efficient enough to immediately correct it and put us back on one of the right tracks. Our professional experience, which is a kind of 'tracks library', is then enriched by our trials and errors as well as other's experience. 



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