

safety bulletin

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Is there something wrong?



Dear readers,

These last months some emphasis was put on the reporting. First the company implemented an exhaustive confidential reporting, which supports the ideas of a just culture (a just culture can be defined as a culture in which people feel comfortable to report on system shortcomings). Besides skyguide, FOCA also made some efforts in order to make just culture more than an empty concept. The aviation ordinance has been amended and a system of non punitive reporting has been implemented on the 1st April 2007. The legal provision ensures the author of the voluntary report that he will not be legally harassed following the report. It is to be understood here that the procedure does not apply in case of intentional violation of aeronautical norms or in case of gross negligence. This new reporting system (called SWANS: Swiss Aviation Notification System) is available to anybody to use it. At skyguide, however, we have the OIR report that is already enabling the communication to our authorities about occurrences. The OIR makes the use of another form unnecessary.

Skyguide's safety management welcomes the initiative from FOCA. But as we have explained several times in the controllers' refresher courses, the border between «gross negligence» and «omissions or mistakes» is hardly definable. However most of us do understand which behaviours will certainly not be excused (alcohol, drugs, etc).

Another issue that is often discussed is the violation of rules. This is much more problematic in my view. Who would dare to think that a complex system like ATC could be managed without pending or even violating rules? Everybody relies on the controller for taking the appropriate decision to «violate» when it is required for safety or other reasons. The human flexibility makes the system work everyday in the whole world ! People create safety through practice as they have the wonderful ability to adapt to their environment, the animal species which could not do it were condemned to disappear...Therefore it could be contraproductive to «punish» controllers (or any other practitioner



who have been, with the benefit of hindsight, judged to have violated a rule. It is a little bit like if to avoid an accident you decide not to respect a traffic light, if it works, you're the hero, if not, you will be responsible for the accident.

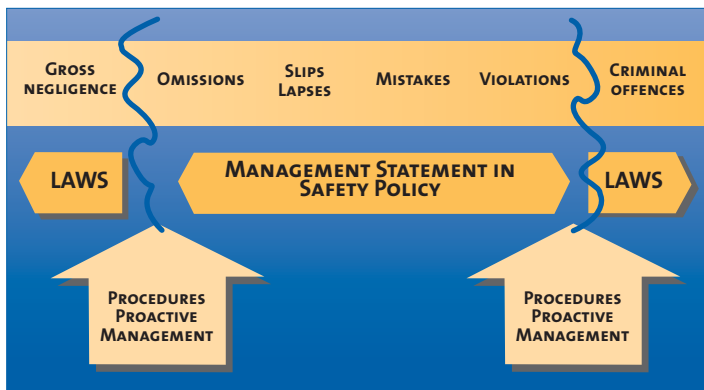
So to say, the new legislation does make steps in the right direction, however I believe that there is still some room for improvement. It is still a deeply embedded belief that people can choose to fail or not to fail (probably inherited from milleniums ago when Eve chose to eat the apple). This is called the illusion of free will. When taken in the course of action (especially when it «burns») controllers do not have this binary

choice appearing in their mind, but this can however easily be reconstructed afterwards with hindsight. Anyway some efforts made in the previous safety bulletin, a company information and refresher courses were given in order to explain how the OIR and SIR processes work within skyguide, and in particular the possibility to fill in reports on line seems to show some positive effects.

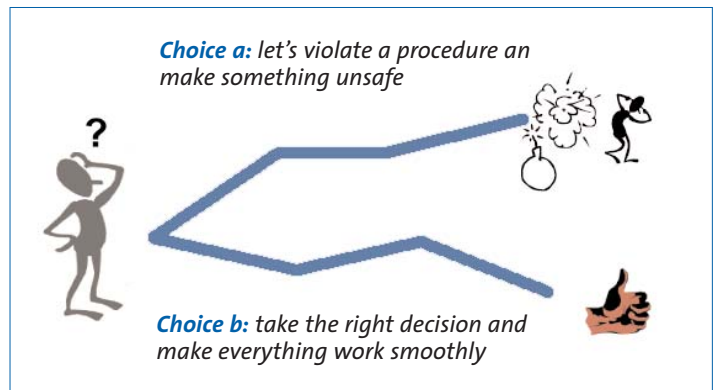
For the last 3 months (March to May) the OIRs increased from 220 to 359 (63%) and the SIRs from 29 to 40 (38%), compared to previous year.

I would like here to warmly thank all the people who took a few minutes of their time to fill in a report to inform the company about the problems it has. We still have a lot to do to build trust but the reporting culture seems to go in the right direction.

THOMAS NOVOTNY
editor safety bulletin



Pic 1: the border between fair mistakes and gross negligence or criminal acts is highly interpretable



Pic 2: if this choice represents reality, who would ever think about taking choice a ?

Safety Nets in Skyguide

Part 1 - STCA harmonization

Let us start from the end – how about this for the beginning?

By the time you will be reading this article, the harmonization of STCA parameters and performance above FL 245 in skyguide will be a new reality in our company. One reality – one operation.

This new, one reality came to be following several years of enormous

effort. As simple as typing this article on the virtual blank sheet of paper as it might appear to be - just remember that when the first man was sent to the moon in the previous century, the overall computing power enabling such an achievement was inferior to what you have today in a single 3G mobile phone... Just a simple, virtual blank sheet of paper...

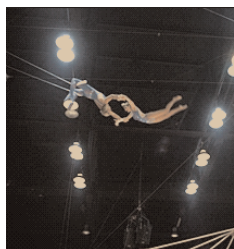
Pretentious? Comparing harmonization of STCA in skyguide with «one

small step for man»? Of course it is - still, there are some analogies. It took the Americans less than nine years to get to the moon from the moment JFK announced this as an official strategic goal, but the actual work had started much earlier.

A little more than two years have passed since O declared harmonization of STCA parameters as one of his objectives.

The message is, by the time the leader(ship) is ready to put its integrity at stake by publicly declaring certain goals, they had better be sure that most of the work has already been done.

Almost true...?
STCA comparative history:



Not only ATC needs safety nets...

Year	World	skyguide
1976	9 January FAA implements a «Conflict Alert System»	
1978/80	MUACC – Maastricht develops STCA	
1998	Eurocontrol publishes EATCHIP Phase III Operational Requirements Document for Safety Nets	
1999		Initial deployment of Thales ATM software (CANAC origin) on swisscontrol DG MV9800 (within the ASSURE programme)
2001	ICAO Doc 4444 PANS-ATM publishes STCA related provisions	RVSM adaptation
2002	Überlingen catastrophe. Creation of High Level European Action Group for ATM Safety - AGAS	Creation of STF–STCA Task Force
2002		Substantial revision of STCA parameters and shift in ZH philosophy.
2003	Eurocontrol Provisional Council approves the AGAS recommendation SRC Policy Document 2 - SNET	STF becomes Safety Nets Task Force – SNTF expanded to all safety nets - SNET
2003	Strategic Safety Action Plan (SSAP) activity field four adopts SNET related activity	Commissioning of the STCA Analyzing Tool – ALANIS
2004	Creation of the Safety nets: Planning Implementation or eNhancements (SPIN) Task Force - Eurocontrol	PRIMUS/ARTAS adaptation and deployment
2005		End of «trial & error» method, development of STCA Test-Bed begins.
2006	SPIN releases Eurocontrol Specifications for STCA (replacing the EATCHIP Phase III ORD)	First STCA Test-bed results delivered. STCA ready for UAC implementation.
2007		STCA performance fully harmonized above FL 245 for all of the skyguide AoR. Shift in GE philosophy.

► Part 1 - STCA harmonization

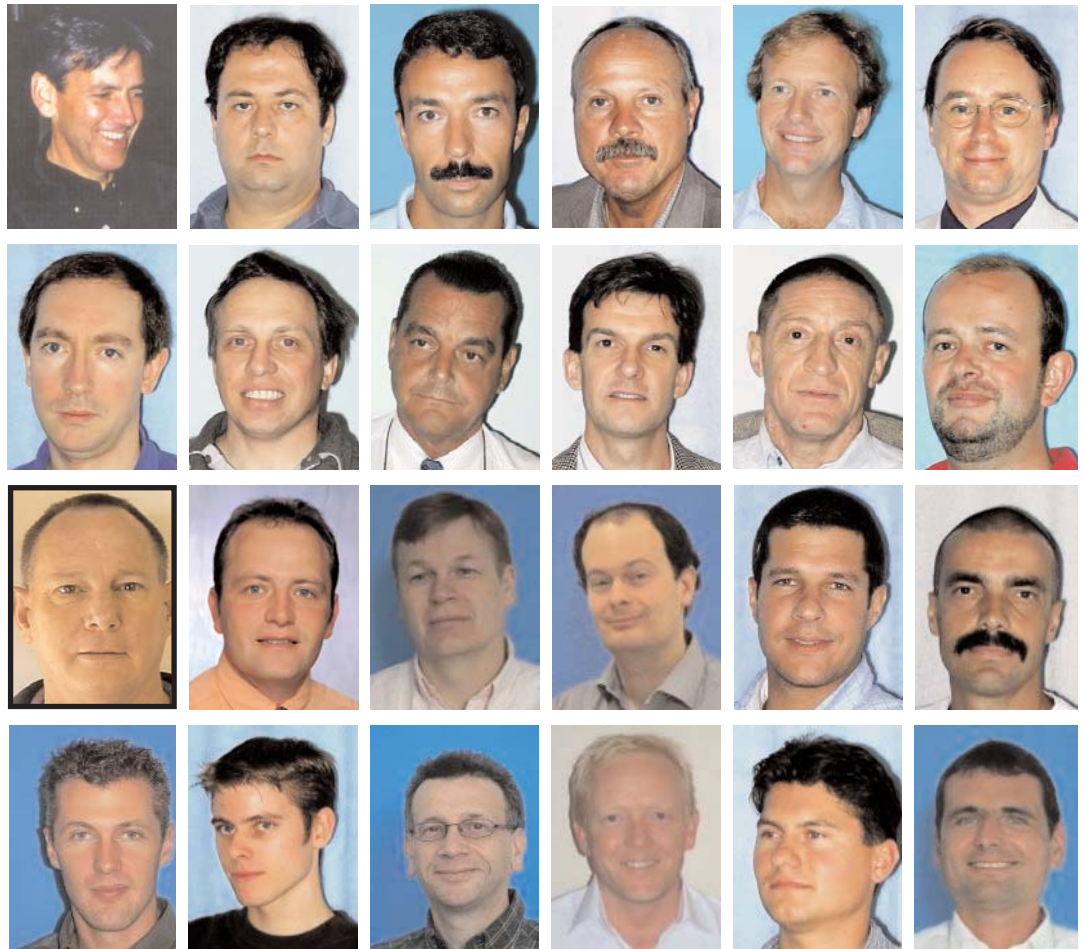
So here we are in the year 2007, the season is in full swing and... is STCA better than it was in 1999 when it was commissioned?

That's really up to the reader to judge - I will just make a humble attempt to present you with some of the factors, discussions and thought processes that led to certain decisions being made.

People have faces – so here are the ones featured by the Safety Nets Task Force saga – in order of appearance:

Now, why the hell did we change the STCA everyone was so happy with - first in Zurich a few years ago and now in Geneva?

Was everyone really so happy with it? In order to answer this somewhat subjective/emotionally-based question, we need to answer a huge number of very non-emotional ones. Here are just a few of them:



- Was it safe enough?
- Was it compliant with ICAO and Eurocontrol guidelines and requirements?
- Was it compliant with the SRC Policy document?
- At the end of the day, what is the role of STCA?
- Does it have only one role?
- Can we provide safe operations while keeping the same amount of traffic without STCA?
- Do we really need the audible announcement of STCA?
- Can we get alarms only when the aircraft busts the level?
- Can we get two-degree alarms – «crescendo effect»?
- What about TCAS?
- Does our STCA provide enough warning time before a TCAS RA is deployed onboard?
- Is every aircraft carrying an operating TCAS?
- Why do we sometimes get a TCAS RA before STCA or very close to it?

- Why is a TCAS RA sometimes announced and no STCA is triggered, or vice versa?
- What is an acceptable ratio of nuisance alerts to desired alerts?
- What are desired alerts?
- What are nuisance alerts?
- Can we have the Cleared FL calculated into our STCA?
- Can we have the selected FL calculated into our STCA?
- Which of the FLs selected in the cockpit should we have in our STCA?
- When will the new generation STCA be deployed in skyguide (this one is from the previous century)?
- Why? What? When?...

But perhaps it's better to leave that discussion to the next edition of the «Safety Bulletin» – look for it at your nearest newsagent!

ISA ALKALAY / OOTP
SNTF Chairman

A KONIL story follow-up

In the Safety Bulletin of last September, I was telling you about a problem the Tower and Departure Operations of Geneva had encountered where several IFR flights were not flying the SID KONIL 3C & 1D as published. Thomas Buchanan, Pascal Hochstrasser and I had found a solution we thought might solve the problem. Thinking this solution was going to reduce the amount of these deviations, I pompously named my article «Problem addressed!»

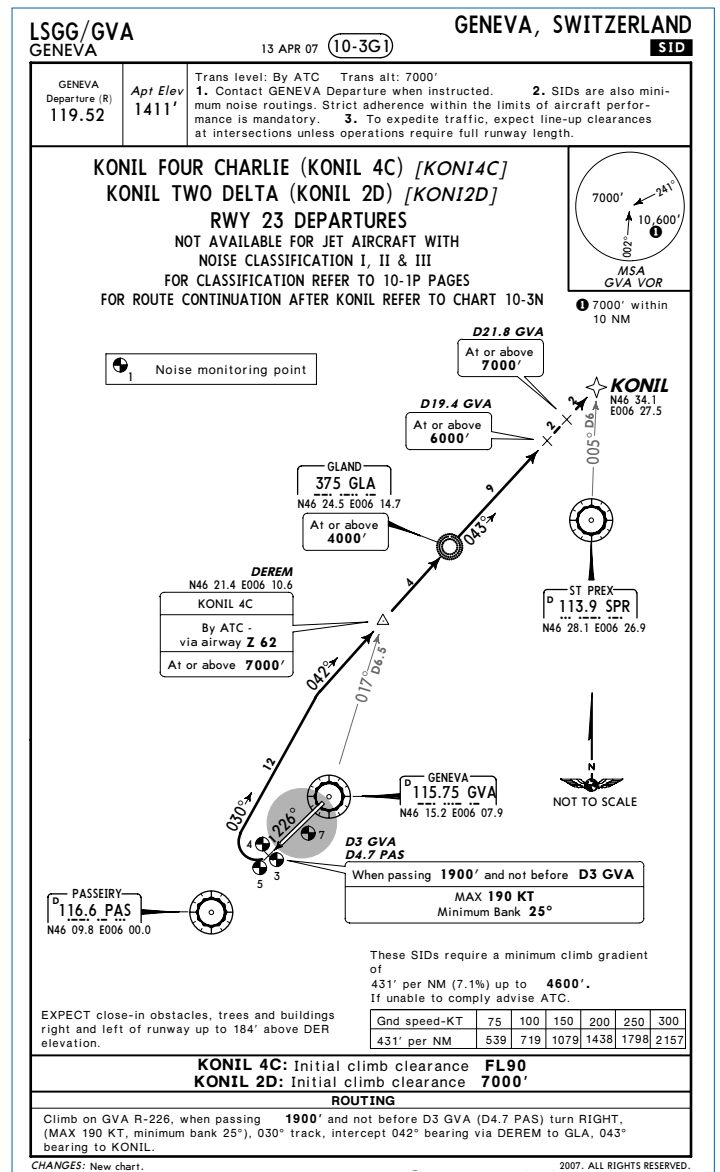
Experience made, I've had to reconsider my affirmation and be more moderate. Indeed, what seemed like a good solution didn't last very long. End of November the same year, we started to observe new deviations from the SID KONIL 4C & 2D (the names were changed after the publication of the SO OG 2006-037E SID and STAR changes LSGG).

Still believing the implemented correction with the Data Provider was effective, we tried a different approach and started writing to the companies to ask them and their crew what could, in their view, be improved or changed to solve this problem. We received quite a number of constructive answers, but no tangible element explaining the deviation was expressed.

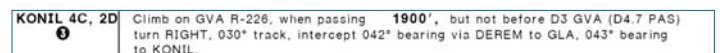
However, quite a few pilots mentioned the maps they were using and that were all published by the same Data Provider. This led Pascal Hochstrasser and I to go back to the map and realised that indeed, the routing description displayed at the bottom of it was lacking the bank angle and speed restriction (see picture 1). Contact was taken with Laurent Dick who gave us his full assistance in order to have the omission corrected as fast as possible by the Data Provider. Following the suggestion of a crew member, we also asked to have a separate map published containing just the SID KONIL 4C and 2D (see picture 2). The reason expressed by the pilot was to make it more readable. We must keep in mind that these maps are printed in A5 format and that if too much information is crammed into them, it becomes more and more difficult to work out which piece of information belongs to which departure route.

Following the recent history of this problem, the best lesson learnt is to never assume...

IVAN ROCHAT
DSO Geneva



Picture 1: New map displaying the SID KONIL 4C & 2D (note the speed restriction and bank angle)



Picture 2: Routing description (not featuring the speed restriction and bank angle) displayed at the bottom of the map.

The Human Factor: conflict detection and human-machine coordination

The following text is a courtesy from the Eurocontrol HINDSIGHT magazine and was written by **Professor Sidney Dekker, Ph.D.**

Sidney Dekker is Professor of Human Factors & Aviation Safety at Lund University in Sweden. He gained his PhD in Cognitive Systems Engineering at The Ohio State University in the US. His books include «The Field Guide to Human Error Investigations» and «Ten Questions about Human Error».

In our search for ways to improve controller conflict detection, we have often turned to technology. From short-term conflict alerts with relatively simple logic, we have moved to vastly more complex computational algorithms in the application of, for example, medium-term conflict detection tools. These tools introduce new capabilities, but also new complexities. The basic issue with conflict detection tools is a classic one in human factors, and is captured in signal detection theory (SDT). SDT uses two possible states of the world: either a conflict is coming up or it isn't. The conflict detector (either a human or a machine)

then makes judgments about the world, based on the data it has available. This may include data from past experience, algorithmic calculations, radar picture, and so forth. But the judgment may be right or wrong. If there is indeed going to be a conflict and the detector says that there is, then SDT calls that a «hit»; if the detector says there is not, then that's called a «miss». If there is not going to be a conflict and the detector says there is, SDT calls that a «false alarm» and a «correct rejection» if the detector also says there is going to be no conflict.

So far, so good. Now the power of SDT is that it handles the inherent trade-off in detection tasks so elegantly. It does so by introducing two separate features of the conflict detector (again, either human or machine). Together, these features determine how many of each of those four you are going to get. They are response criterion and sensitivity.

Let's take the response criterion first. This is the threshold that the detector sets, above which she or it will say «yes, this is going to be a

conflict». You can see it as a matter of data. Some detectors need a lot of data to say «yes, trouble ahead». Others need very little data. SDT says that the latter have a conservative response criterion (they'll have a bunch of false alarms but very few misses). The former have a more risky response criterion (they'll have few false alarms, but they'll miss things too). SDT correctly says that as a detector, you can't win. Wherever you set your response criterion, it's going to cost you somehow (either you miss things, or you'll generate many false alarms). There is of course a good compromise somewhere. This, in SDT language, is about payoffs and probabilities. If the probability that the detector has it right in particular traffic situations is low (which may be known from previous experience), then the response criterion must be set conservatively. This ensures that nothing will be missed. If the payoff for a hit is very high, the response criterion will be set conservatively too. But if the cost

for a false alarm is very high at the same time too, then this puts pressure on the response criterion to be set more risky.

What about sensitivity then? Sensitivity refers to the resolution of the detector. Some are very blunt: they are not very sensitive to subtle, small variations in the data they use for seeing whether it all reaches over the response threshold. Sensitivity is changed by other things than probabilities and payoffs. For a machine detector, sensitivity is baked deeply in the algorithms it uses, or in the kind and amount of data it relies on (which, many engineers will acknowledge, can or should always be more for conflict detection tools than is currently the case). For a human detector, sensitivity can vary with for example daytime: a fatigued detector is not a very sensitive detector anymore (and may therefore want to adjust his or her response criterion accordingly!)

	Conflict Detector is right, there is going to be a conflict	Conflict Detector is wrong, there is not going to be a conflict
Controller says: «Yes, the Conflict Detector is right»	HIT	FALSE ALARM
Controller says: «No, the Conflict Detector is wrong»	MISS	CORRECT REJECTION



► conflict detection and human-machine coordination

The picture with SDT becomes really interesting when we set several detectors in series, as with medium term conflict detection (MTCD) systems and a human controller. Then the two features of each will start interacting in interesting ways. Low sensitivity in MTCD, for example, will have to be compensated by a more risky response criterion in the latter (otherwise the joint human-machine system will generate a lot of false alarms). Indeed, in situations where a controller intervenes on the basis of an MTCD alert, then this may generate additional conflict alerts (false alarms, given the context) since the system now no longer can really anticipate the human controller's next steps. This is low sensitivity generated as an unintended by-product from the joint interaction between human and machine—something that is very difficult to engineer around.

Generally though, it is said that MTCD has very high «accuracy»—the joint product of its own sensitivity and response criterion—creating up to 99.9% hits. But that is still one miss per 1000. So controllers are instructed or advised «not to rely on the MTCD». This is problematic for those centres that are stripless, as an MTCD is basically a precondition for making a stripless environment work. How exactly to interpret the injunction not to rely on a tool that you need to do your stripless job, and a tool that you probably come to rely on to some extent anyway, is anybody's guess of course. And the controller's burden to figure out.



But there is another side effect. Larry Hirschorn calls it a fundamental law of systems: each system will naturally be used at its capacity. As soon as somebody has found a new source of slack, the system will gradually use up that slack to produce more. MTCD is a source of new slack. And now it may become a factor in asking the system to produce more. Here's how: if MTCD is so «accurate», then it can also be used as an argument for increasing sector capacity. And it probably has been used for exactly that argument already. After all, with MTCD, the controller doesn't need to primarily detect all on-coming conflicts him- or herself, because of the sophistication of the electronic cocoon now woven around him or her. So then we have a situation where the controller gets more airplanes, because MTCD will help in detecting conflicts in time. Which means the controller will need to rely on MTCD.

But the controller cannot rely on MTCD because it's not 100% accurate. That's what the instruction says. This is a fundamental double bind.

Where does that leave us? Perhaps we should consider, just as a little thought experiment, calling MTCD something else. It is not entirely accurate, so controllers «can't rely on it». But then they are sort of expected to rely on it otherwise a stripless system or capacity increase won't work. Also, detecting conflicts for the controller is not necessarily what it is about: recall the complexity that ensues once the controller starts making an intermediate intervention on the basis of one MTCD alert, only to get a bunch of false MTCD alerts in return for his proactive efforts. Perhaps MTCD should be called a form of «attention-getter». It suggests to the controller: «Hey, look here, I believe

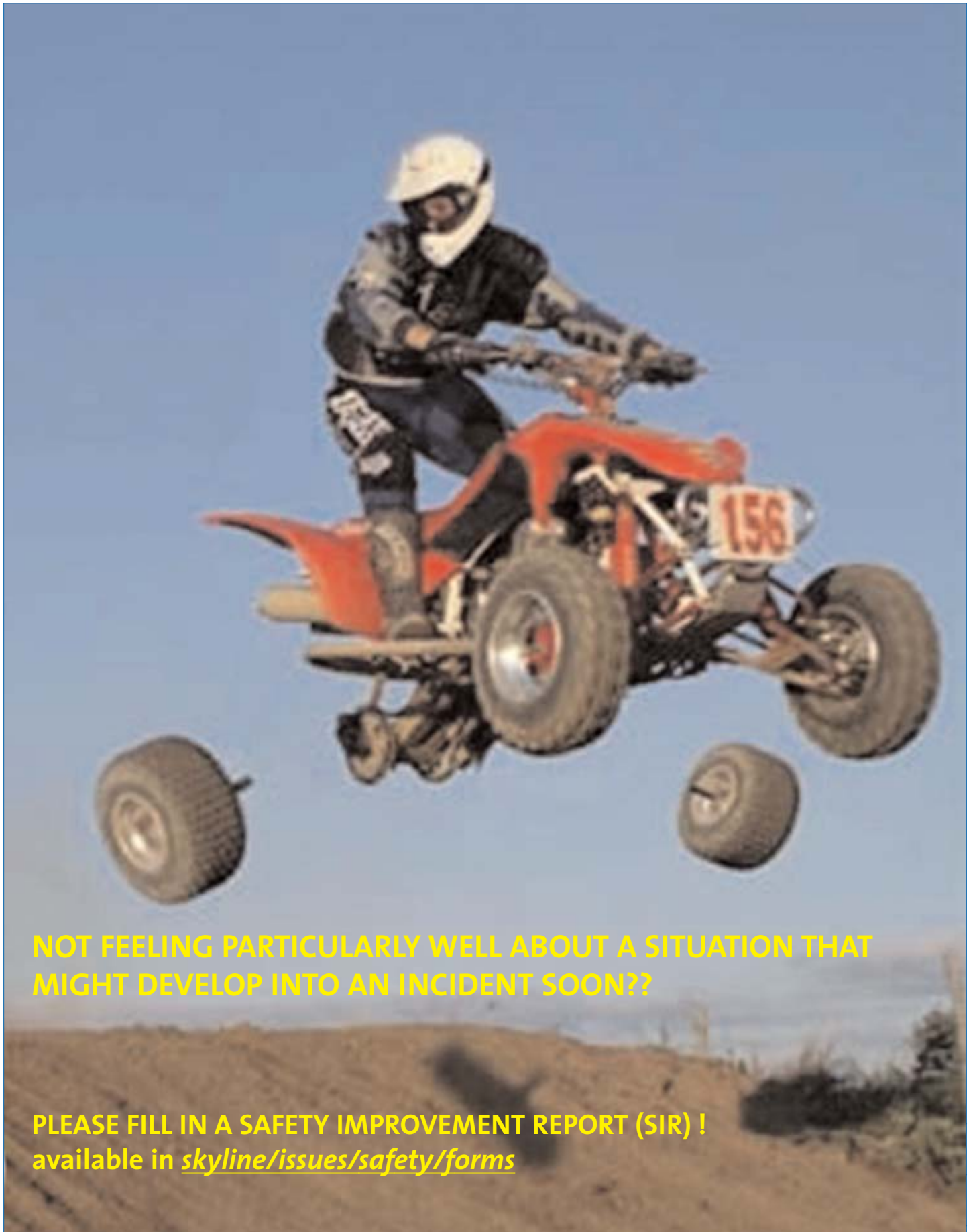
this is something you'll find interesting, something that you may want to start thinking about». That's the kind of interaction we'd expect with our planning controller, for example. A dialogue. So why not with the machine attention-getter? There is plenty of distance to go to a more humane human-machine future, even in conflict detection.

Acknowledgment

I am indebted to Marcian Tessin for helping me decode some of the intricacies of MTCD.

Extracted from Eurocontrol HINDSIGHT #4 magazine, January 2007





NOT FEELING PARTICULARLY WELL ABOUT A SITUATION THAT MIGHT DEVELOP INTO AN INCIDENT SOON??

**PLEASE FILL IN A SAFETY IMPROVEMENT REPORT (SIR) !
available in skyline/issues/safety/forms**