# RUNWAY INCURSION PREVENTION
# A SAFETY II APPROACH

**by Maria Lundahl**

In 2014 the Swedish ANS provider LFV initiated a project with the aim to reduce the risks involved in Runway operations – the Runway Incursion Prevention Programme. As the Safety coordinator for LFV operations, I got the task of chairing the project and below I will share some of our experiences and results.

## INVOLVED PARTIES

To facilitate the spreading of potential learning effects, LFV decided to invite a number of strategically important stakeholders to be part of the project. All of them accepted and were happy to be part of this project. The work began in November 2014 with participation from:

- LFV – ANS provider
- ACR, Aviation Capacity Resources – ANS Provider
- The Swedish Armed Forces – airport and aircraft operator, training organisation
- Swedavia – Airport operator, owned by the Swedish State
- SRF, Swedish Regional Airports – a network of airport operators with different ownership[1].

Our first task was to decide on how to attack the problem. We had read numerous reports of actions already taken and knew that Runway Incursion is a subject which has already been thoroughly analysed. We also understood that most (if not all) previous reports and action plans are based on learning derived from incident and occurrence reports. So, how could we make our project contribute with new learning?

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is an Air Traffic Controller who has worked for LFV, Swedish ANS provider, for more than 25 years. She has worked in ATC training for many years, mainly within the Human Factors domain, has experience from Occurrence and Incident Investigation and currently holds the position as Safety Coordinator. Outside of work Maria has studied System Safety at Lund University, combined with courses in Psychology and Education.

## SAFETY II

The project group was introduced to the theory of Safety II, Professor Erik Hollnagel's theory of how both safety and risk emerge from the same source of performance variability and adaptive strategies, often called "work as done". We agreed to let Safety II form our project philosophy, based on a belief that operators' adaptive strategies more often ensure safety than give rise to risk and agreed that we should look for examples of normal work by asking questions like "when, where and why does a Runway Incursion NOT occur?"

All through the project our objective was to try to understand how normal work is done. Meanwhile we made an effort to make Safety II a well-known concept all through the participating organisations; we developed a leaflet with an "Introduction to Safety II" (to be used in one of our activities) and published articles in an LFV magazine.

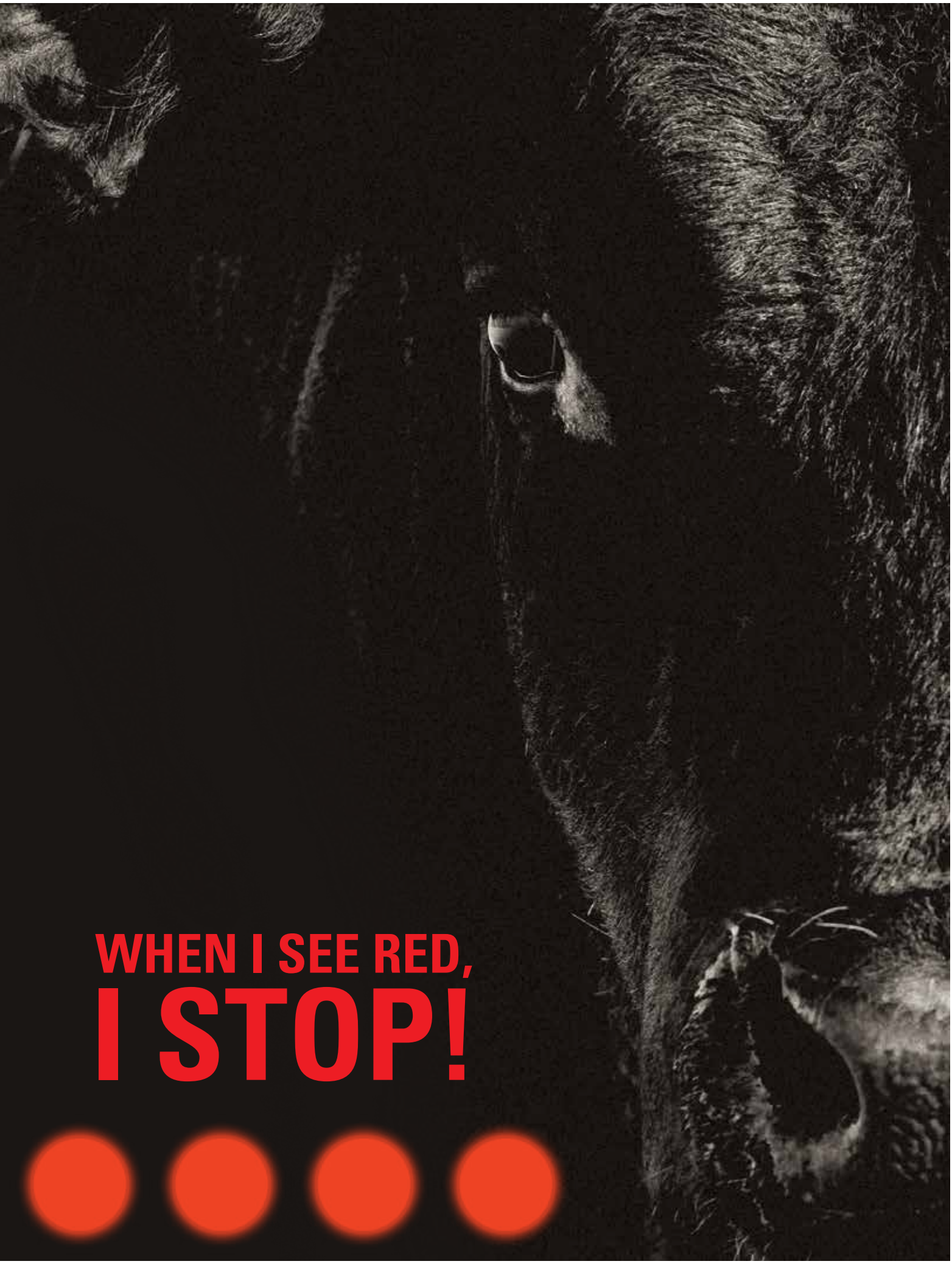
## ACTIVITIES

Now that we had agreed to focus on studying "normal work" we realised that we would have to search for data in other sources than the traditional source for lessons learned – occurrence and incident reports[2]. We decided to perform a number of different activities in order to find examples of normal work:

- Observations
- Interviews
- Workshops

All the project participants were asked to perform observations and/or interviews in their own organisations. We agreed that focus should be on normal work and on trying to find out when, where and why a Runway Incursion does not happen.

1- SRF was not part of the project initially but was invited to join later on.
2- In fact, even the occurence reports provided us with many good examples on situations that could have led to a Runway Incursion, but did not …


WHEN I SEE RED,
I STOP!

In addition we arranged a number of workshops for different professional categories. The workshops were mainly aimed at controllers and pilots, but we were also given the opportunity to run a workshop for a mixed group, with participants from all parts of the aviation industry, at a Runway Safety Team meeting at Stockholm Arlanda Airport.

In these workshops we gave the participants a number of tasks all aimed at discovering examples of normal work and good practices:

1. First the participants were asked to think of a situation they had been involved in that could have led to some kind of incident but did not. They were then asked to try to think of what it was that stopped the situation from turning into an incident or accident.

2. In the second group discussion, the participants were presented with cases from real life. All these cases did, in reality, end in Runway Incursions, but in this exercise we "paused" the course of events just before it developed into an incident. The idea was to let the participants use their experience and come up with strategies to prevent the situation from developing into a Runway incursion.

3. In the third exercise, we asked the participants to picture themselves in a different job to their normal one. They were then asked to come up with good ideas that they would have liked to share with the other party had they been given the chance.

4. In the last exercise we presented a number of strategies on the walls of the workshop room. These strategies were products of discussions in the aftermath of incidents or had been offered to us as suggestions on good practices. The idea was to ask our workshop participants if they should be added to our list of recommendations.

## RESULTS

With all the data collected, we went into the second phase of the project, analysis of the material. For this phase we formed an analysis group consisting of myself and my operational LFV colleague, supported by another operational TWR-controller who helped us by using a thematic analysis approach. A large number of possible actions or recommendations were identified and further investigated in several steps. All-in-all, the analysis resulted in 53 recommendations that were presented to the rest of the project participants. The project group unanimously decided to deliver these 53 recommendations to the following six groups of aviation stakeholders:

- The Swedish Transport Agency, Transportstyrelsen (13)[3]
- ANS Provider organisations (7)
- Local ATS organisations (11)
- Airports (15)
- Airlines (6)
- Training organisations (1)

The recommendations spanned a large variety of areas for example:

- technical solutions for ATCOs, pilots and airport drivers,
- training – with special focus on Human Factors,
- phraseology and clearances – with special focus on airport staff, Example:
  - Introducing a tool for marking and monitoring clearances to enter the Runway in airport vehicles. The project found that vehicle drivers at airports often lack this kind of tool and the participants agreed that introducing such a tool would enhance runway safety.
- airport infrastructure – with special focus on signs and signals, Example:
  - Painting a red box with the runway number as a warning on taxiways that connect directly to a runway. After a number of runway incursions at a Swedish airport during the summer, the airport took the decision to paint such a box on the taxiway. Since then no runway incursions have occurred at this very position. The airport has now decided to mark all taxiways that connect directly to the runway the same way.

- increased sharing of experience between pilots & ATCOs and ATCOs & drivers,
- joint analysis of incidents – TWR & Airport Operator,
- implementation of a Safety II and learning-from-normal-work approach as a basis for investigation & analysis of incidents as well as for dissemination of lessons learned,
- operational methods and clearances for ATCOs, Airport staff and pilots,
- seasonal meetings – airport & TWR,
- TWR environment and FPB[4], Example:
  - Introducing a flow-model for TWR FPB. The flow model for FPB was developed many years ago, by an LFV-project group[5], with the aim to enhance focus on the runway as well as TWR controllers' ability to monitor and detect conflicts on ground. For some reason only a few TWRs had up until then introduced the concept, but now the ideas behind the flow model have spread and several TWRs have introduced the model into their FPBs.

The project group agreed on pitching the recommendations at as high a level as possible, which meant that if we wanted a certain recommendation to spread to different aviation categories we aimed this recommendation at the safety regulator. It is our belief that this will contribute to harmonisation across organisations.

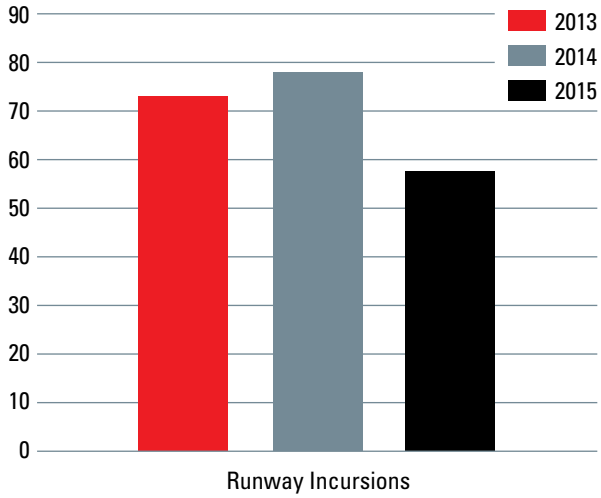
The recommendations have been presented organisations other than just those who participated – another couple of ANS Providers, to an ATS Training Academy and to the Swedish Transport Agency.

3- The Swedish Aviation Authority
4- Flight Progress Board
5- Change Management and Harmonization in ATC Ground Operations – Non-technical safety and efficiency improvements (LFV 2009)

## LESSONS LEARNED

Our first, and very positive lesson learned was that it is extremely beneficial to do this kind of work across organisational and professional borders. The wide range of expertise and competencies provided by the participants in the project gave us an amazing opportunity to look into this area from many different perspectives; the roles of tower controller, military pilot, airport safety coordinator, incident investigator, safety manager, civilian pilot, operational manager and more.

Another positive outcome is that both the ANS Providers involved experienced a significant decrease in the number of Runway Incursions during the course of the project. This graph shows the decrease in Runway Incursions at airports where LFV provides ATS:




We hope that this is a first and positive signal that raised awareness and focus on the risks involved in Runway operations has contributed in a positive way. We will continue to monitor these figures in order to prevent a drift into failure scenario.

It is our belief that additional observations, workshops and interviews would have got us even further and it would have been interesting to see if the same results would show up again. Throughout the data collection phase, we kept learning new things and saw additional strategies up to the point where we had to stop conducting data collection and initiate the analysis. Even though no formal decision has been taken on when to perform a follow-up, the project plan includes an ambition of some kind of follow-up one year after the implementation of the recommendations.

## INTEREST IN THE PROJECT

There has been a lot of interest in the project, partly because Runway Incursions continue to be one of the main safety concerns in the aviation business so that attempts to address this risk are of course of great interest to all those involved. But a lot of the interest has come because of our focus on the Safety II concept in the project and learn from normal work.