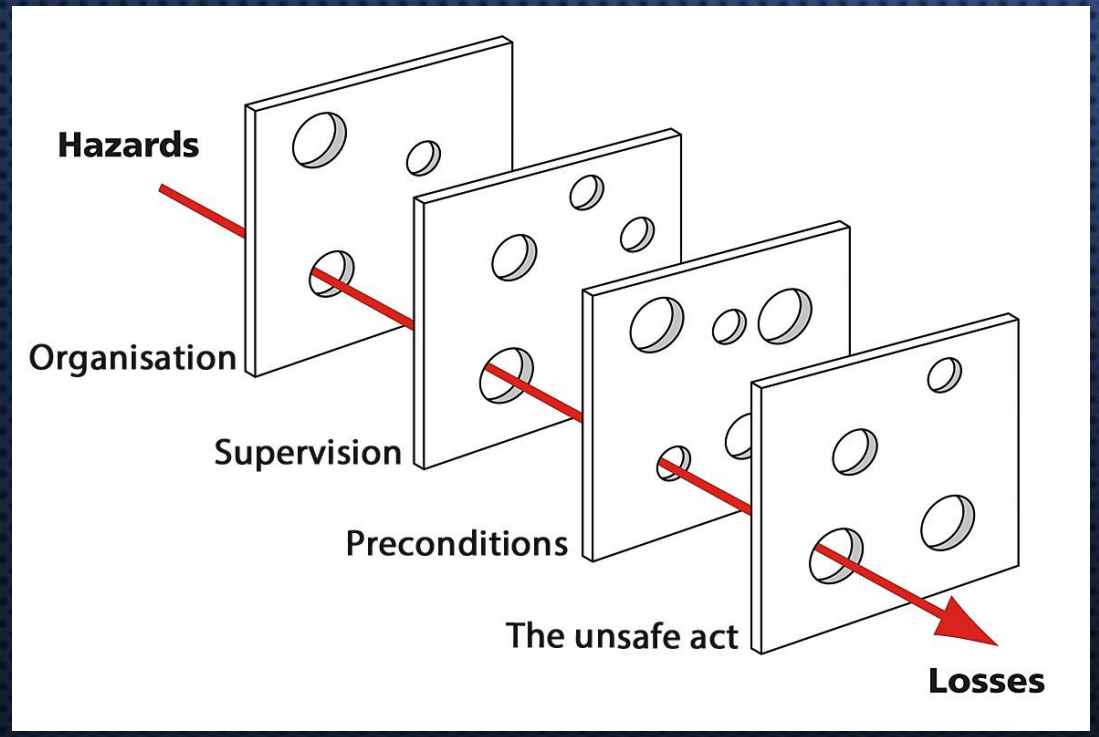
ANDERS ELLERSTRAND

SAFETY II I PRAKTIKEN

SAFETY I

ICAO – Chicago Convention; 19 Annexes



International Standards
and Recommended Practices

Annex 19
to the Convention on
International Civil Aviation

Safety Management

The first edition of Annex 19 was adopted by the Council on 25 February 2013 and becomes applicable on 14 November 2013.

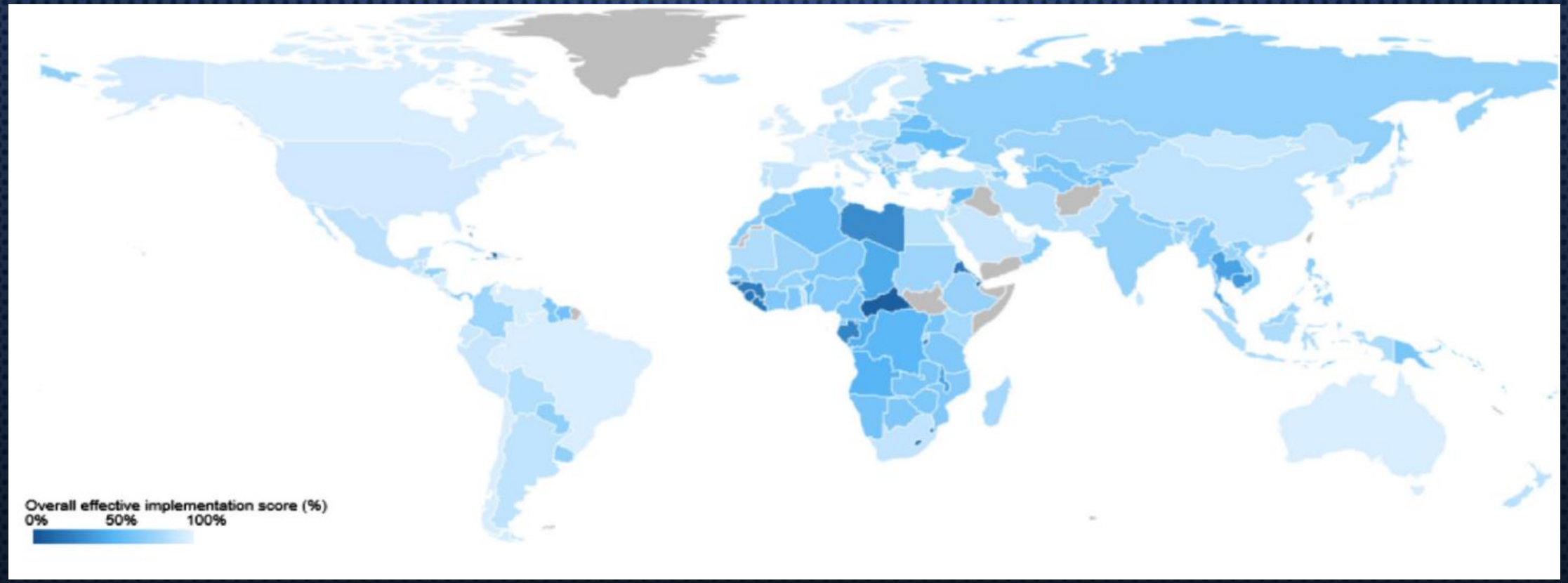
For information regarding the applicability of the Standards and Recommended Practices, see Chapter 2 and the Foreword.

First Edition
July 2013

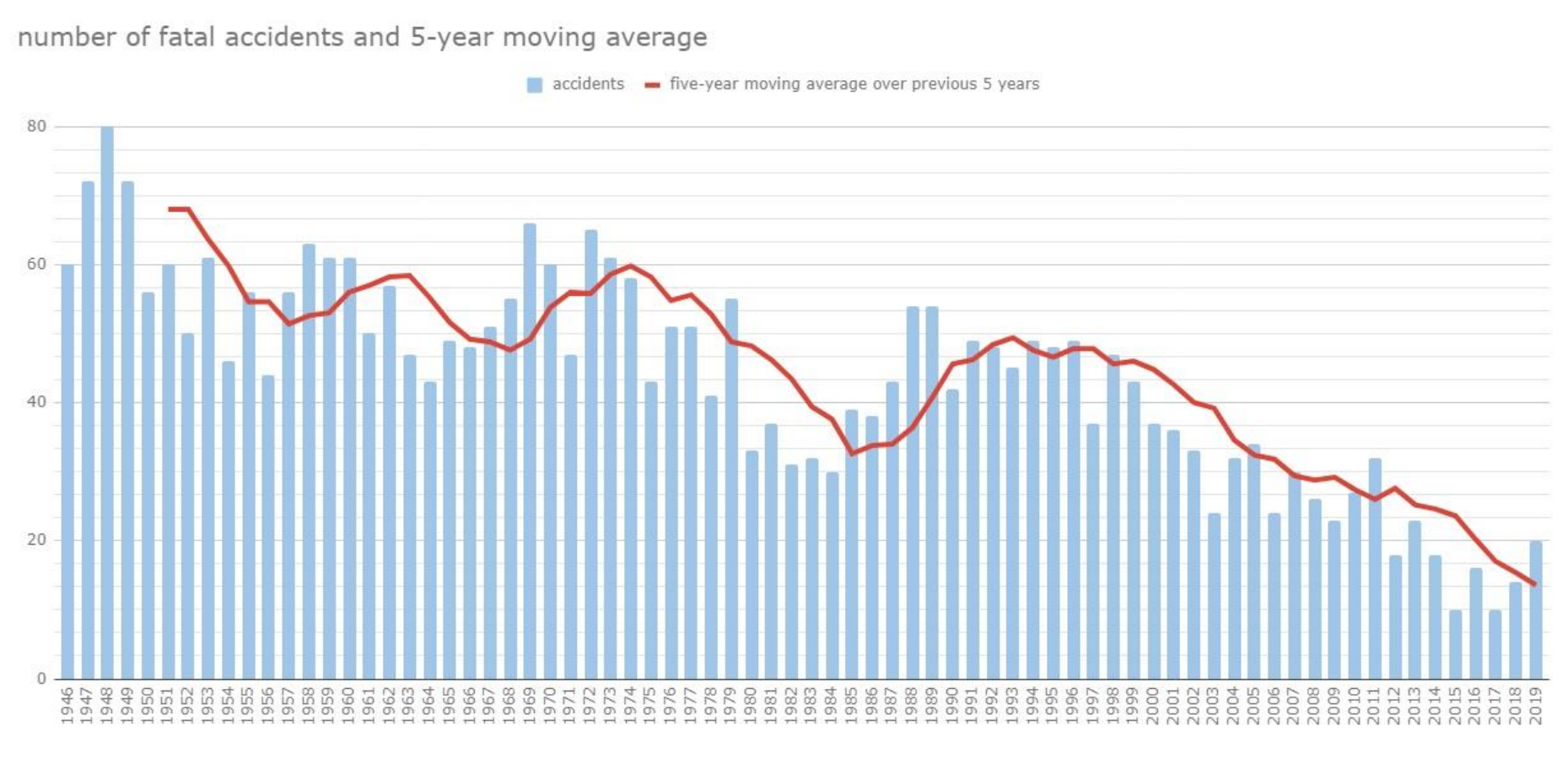
International Civil Aviation Organization

SAFETY I

ICAO – Chicago Convention; 19 Annexes



SAFETY I



FLIGHT SAFETY FOUNDATION

AVIATION-SAFETY.NET

SAFETY I

"A person would have to fly on average once a day every day for 22,000 years before they would die in a U.S. commercial airplane accident according to recent accident rates."

-Dr. Arnold Barnett, MIT

SAFETY I

Traffic Casualties By Mode

- Highway: 37,133
- Rail (Trains): 761
- Marine (Boats & Other Water Craft): 694
- Commercial Airlines: 0

Source: National Transportation Safety Board

SAFETY I

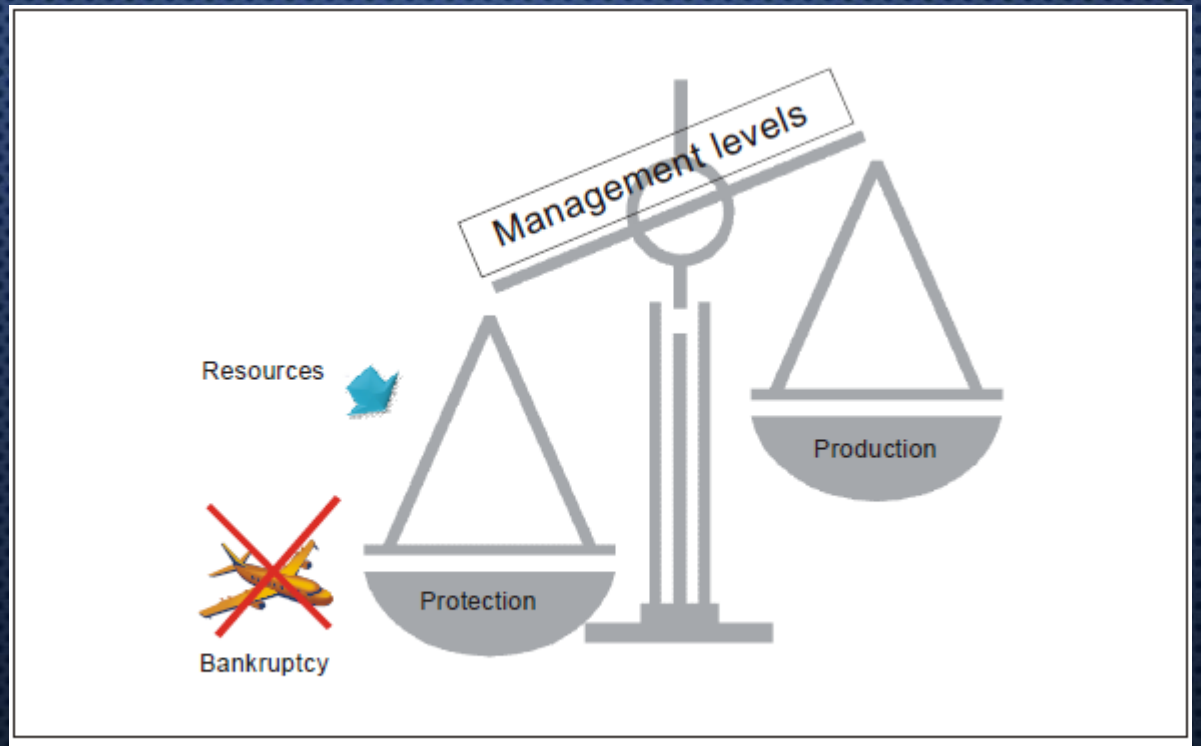
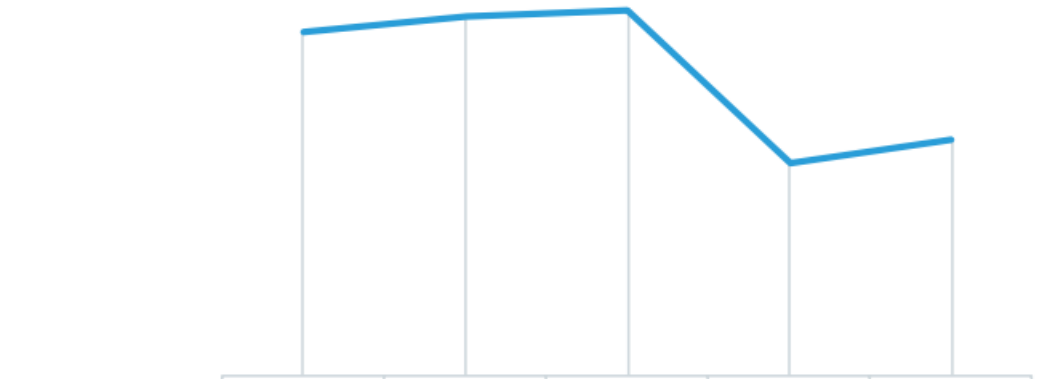


Figure 3-1C. The management dilemma

RÄCKER DET INTE MED "COMPLIANCE"?

SAFETY I

ICAO Safety Report 2022 Edition



	2017	2018	2019	2020	2021
Traffic (million)	36.50	38.09	38.79	22.47	24.92

Chart 1. | Global traffic of flight departures

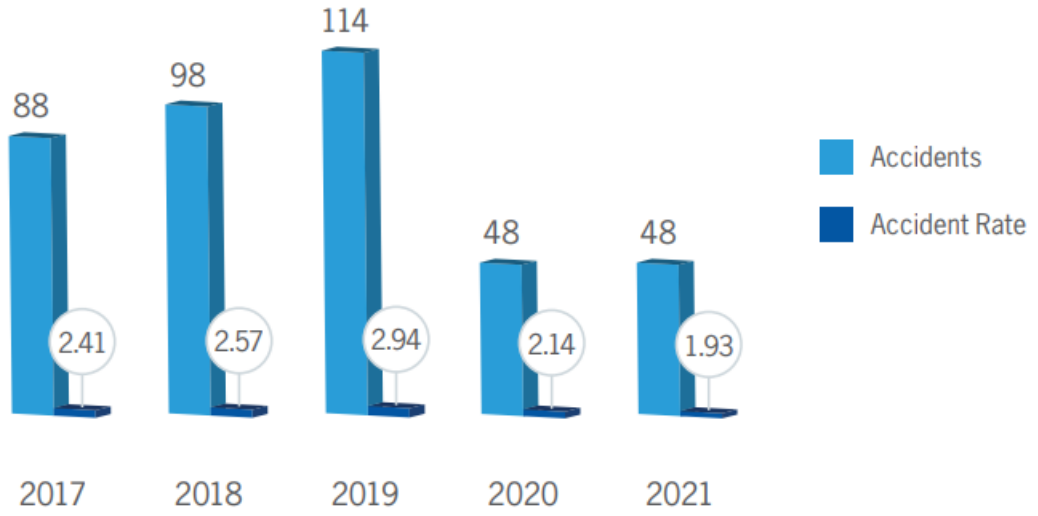


Chart 2. | Accident records: 2017-2021 scheduled commercial operations

SAFETY I

ICAO has identified five high-risk categories of occurrences (HRCs) as global safety priorities in the 2020-2022 edition of the GASP:

- controlled flight into terrain (CFIT);
- loss of control in-flight (LOC-I);
- mid-air collision (MAC);
- runway excursion (RE); and
- runway incursion (RI).

ICAO Safety Report 2022 Edition

SAFETY I

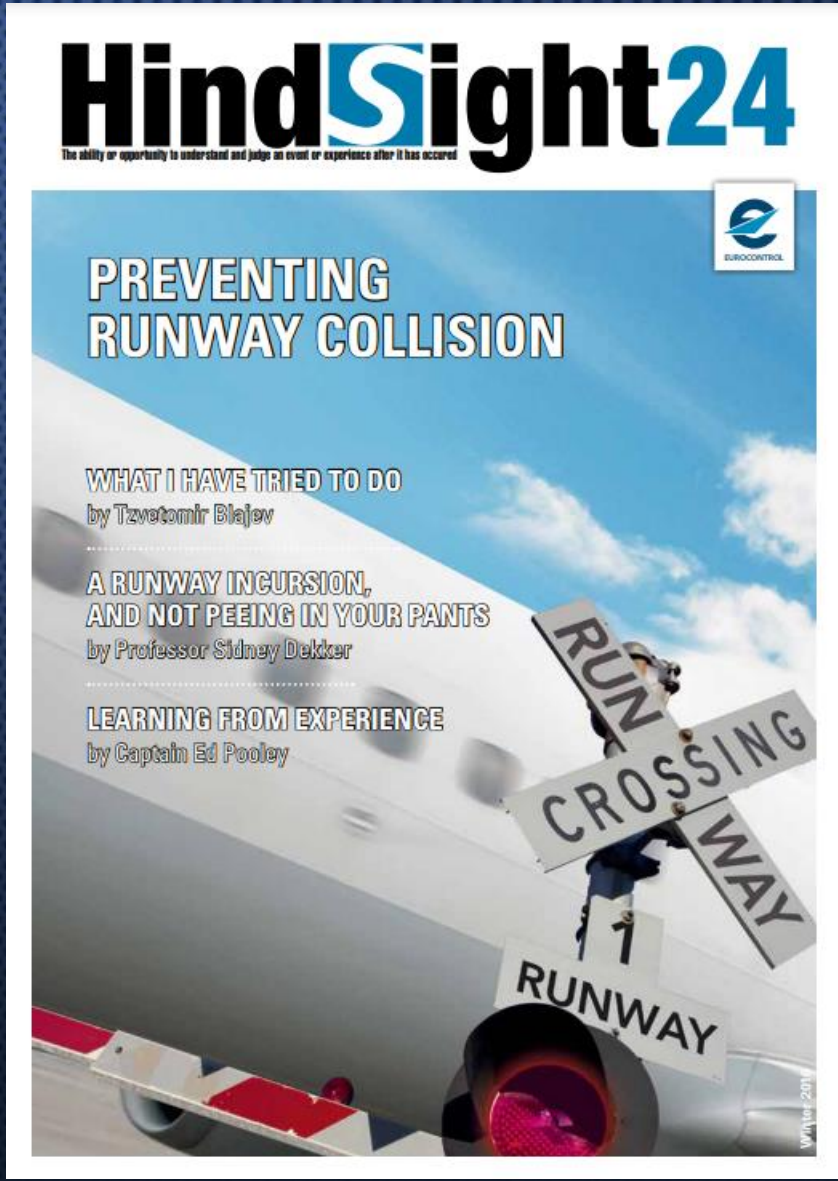
Based on an analysis of accident data covering the 2006–2011 time period, ICAO identified three high-risk accident occurrence categories:

- runway safety-related events
- loss of control in-flight (LOC-I)
- controlled flight into terrain (CFIT)

ICAO Safety Report 2013 Edition

SAFETY II

EUROCONTROL HINDSIGHT MAGAZINE DEC 2016



SAFETY II

EUROCONTROL HINDSIGHT MAGAZINE DEC 2016

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?

MARIA **LUNDAHL**

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 occurrence reports provided us with many good examples on situations that could have led to a Runway Incursion, but did not ...

SAFETY II

- 2014 startade LFV ett projekt för att förebygga ”Runway Incursion”
- Maria Lundahl ledde projektet
- Samarbete med LFV, ACR, FM, Swedavia, SRF
- Valde en Safety II inriktning
- ”När, var och varför inträffar INTE en runway incursion?”

SAFETY II

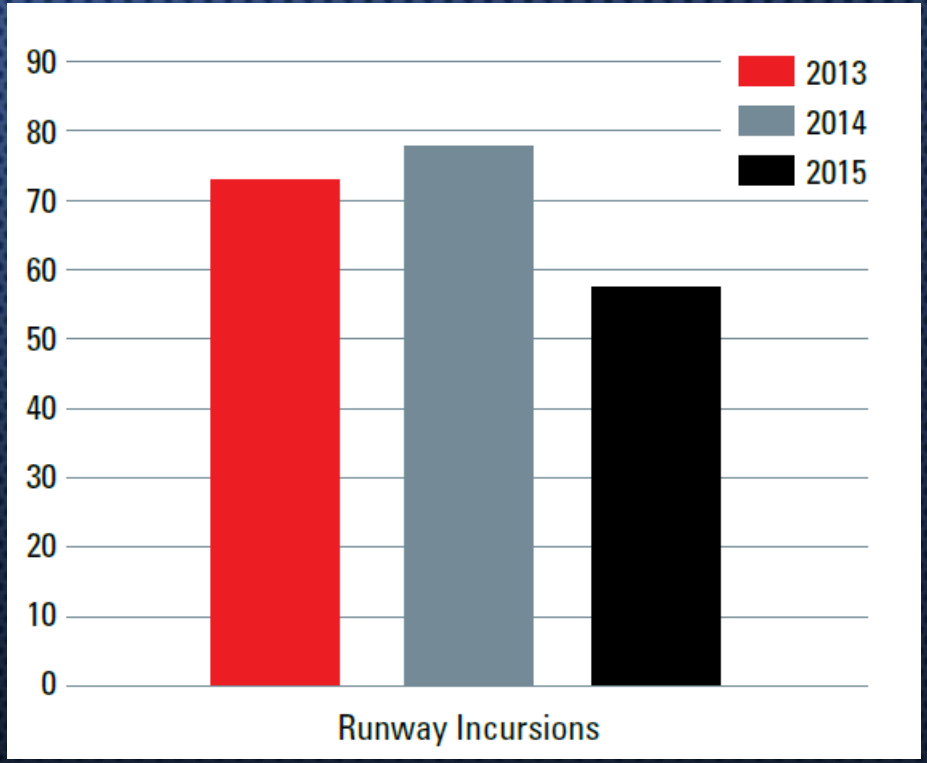
- Observationer
- Intervjuer
- Workshops
  - Tänk på en situation som kunde lett till en incident men inte gjorde det
  - Exempel från verkliga incidenter som ”pausades” – vilka strategier finns?
  - Välj ut strategier som kan bli rekommendationer

SAFETY II

- Rekommendationer, exempel:
  - Tekniska lösningar
  - Utbildning med fokus på Human Factors
  - Fraseologi, med fokus på flygplatspersonal
  - Flygplatsens infrastruktur, skyltar och signaler

SAFETY II

- THIS GRAPH SHOWS THE DECREASE IN RUNWAY INCURSIONS AT AIRPORTS WHERE LFV PROVIDES ATS:



SAFETY II

TRANSPORT STYRELSEN

Runway Incursion - en ökande trend

2017-04-25

Aktuell statistik visar att Runway Incursion är en fara som fortsatt måste motverkas på flera olika sätt. Trots justering mot en ökande trafik, stiger index för RI.

Bekräftande underlag på internationell nivå finns även i European Plan for Aviation Safety (EPAS) 2017-2021, moment 3.2. Med denna information vill vi belysa frågan och presentera ny dokumentation som tagits fram för ert bruk. Dokumentationen är avsedd att användas i ert säkerhetsledningssystem, för information till er personal (efter er bearbetning) samt som underlag i ert utbildningsprogram. Ta del av underlaget, bedöm hur ni bäst nyttjar det, inkludera i er Safety Review Board. Samma underlag har presenterats för våra flygplatser.

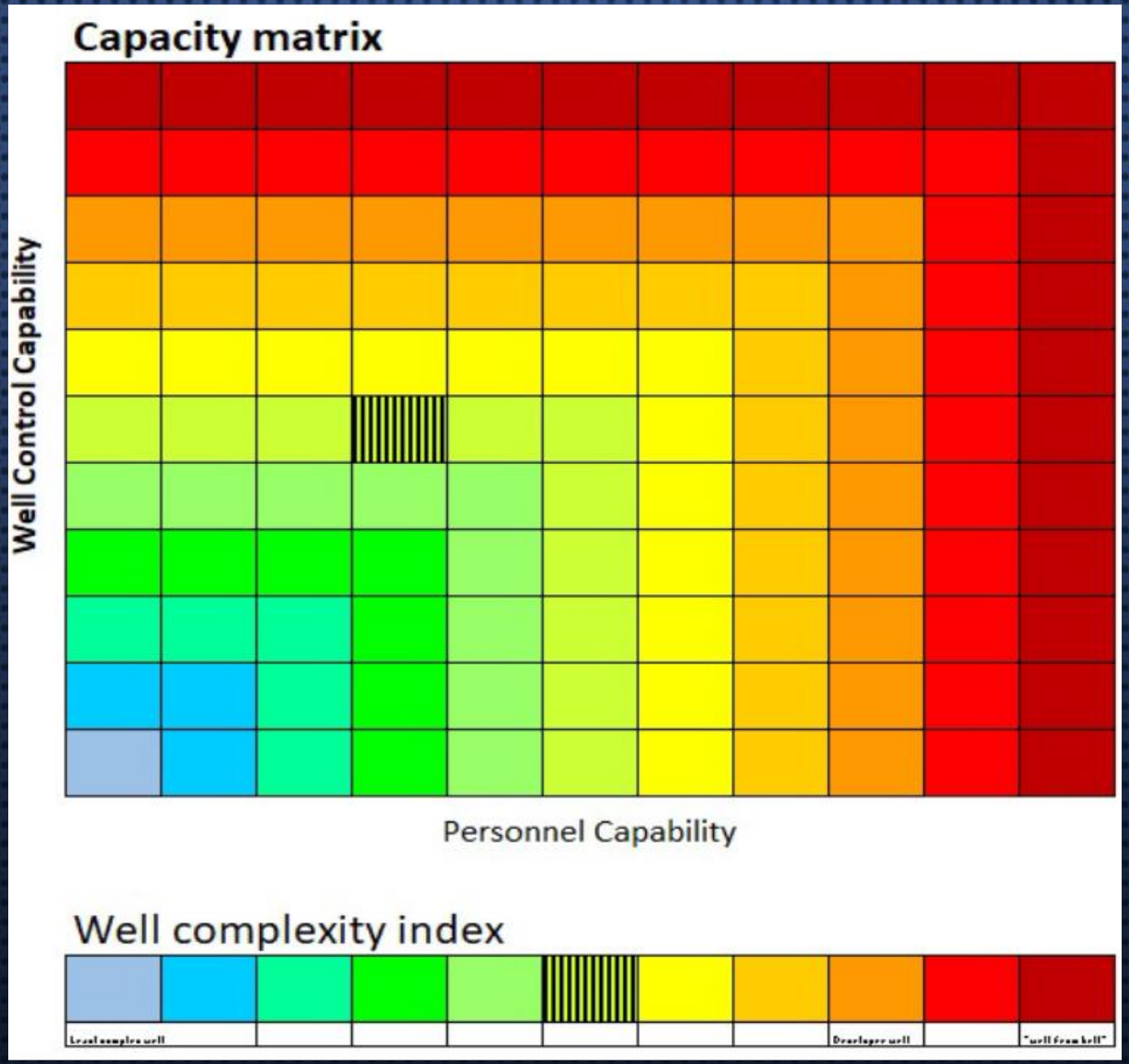
TSL 2014-1436 - Motverkande av intrång på bana (RWY-I)
Intrång på bana (power point)

Uppföljning genomförs i kommande tillsynsaktiviteter.

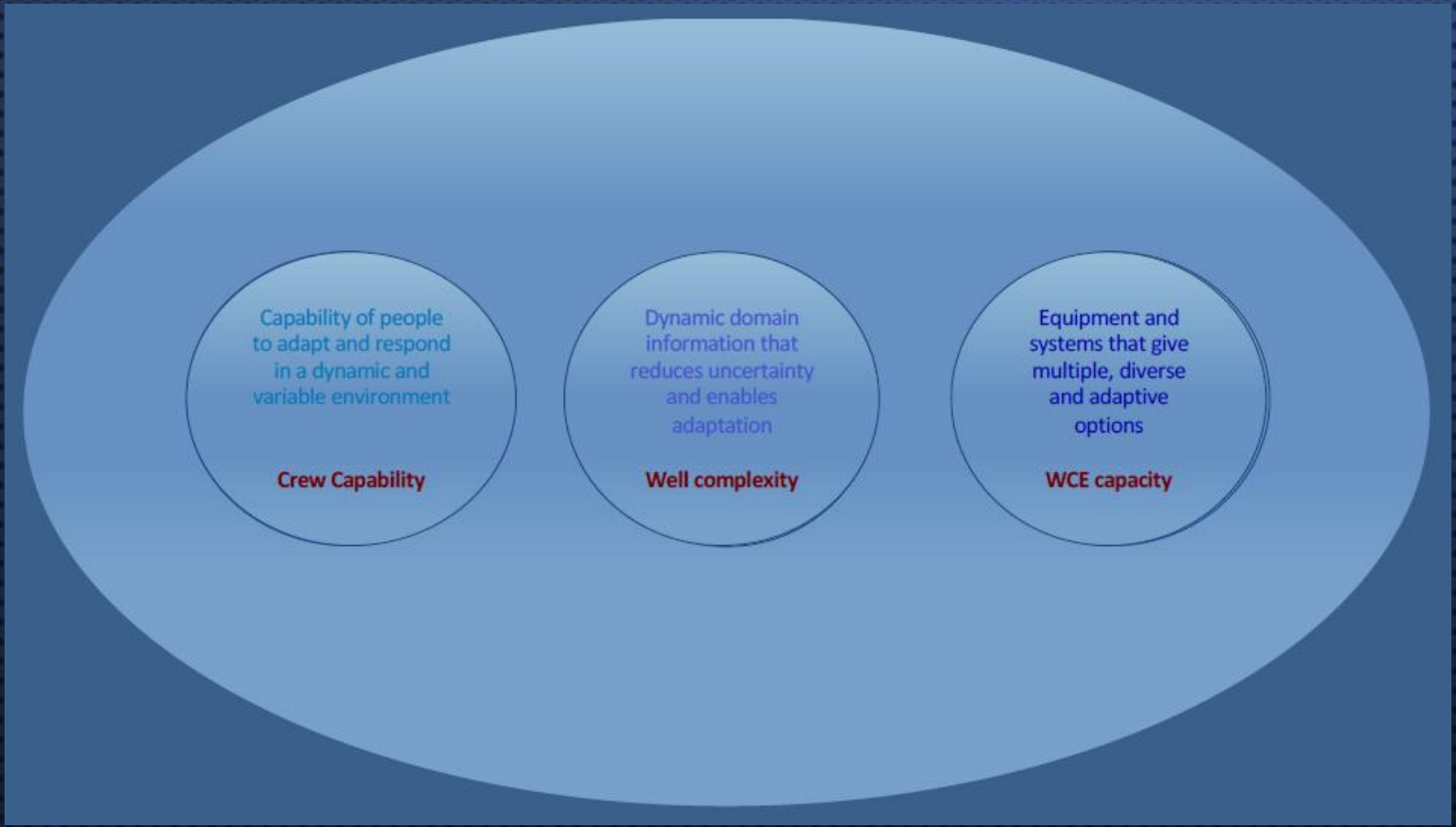
SAFETY II

Capacity Index –a different twist
on managing operational exposures
MAERSK
DRILLING

SAFETY II


Capacity matrix
Well Control Capability
Personnel Capability
Well complexity index

SAFETY II



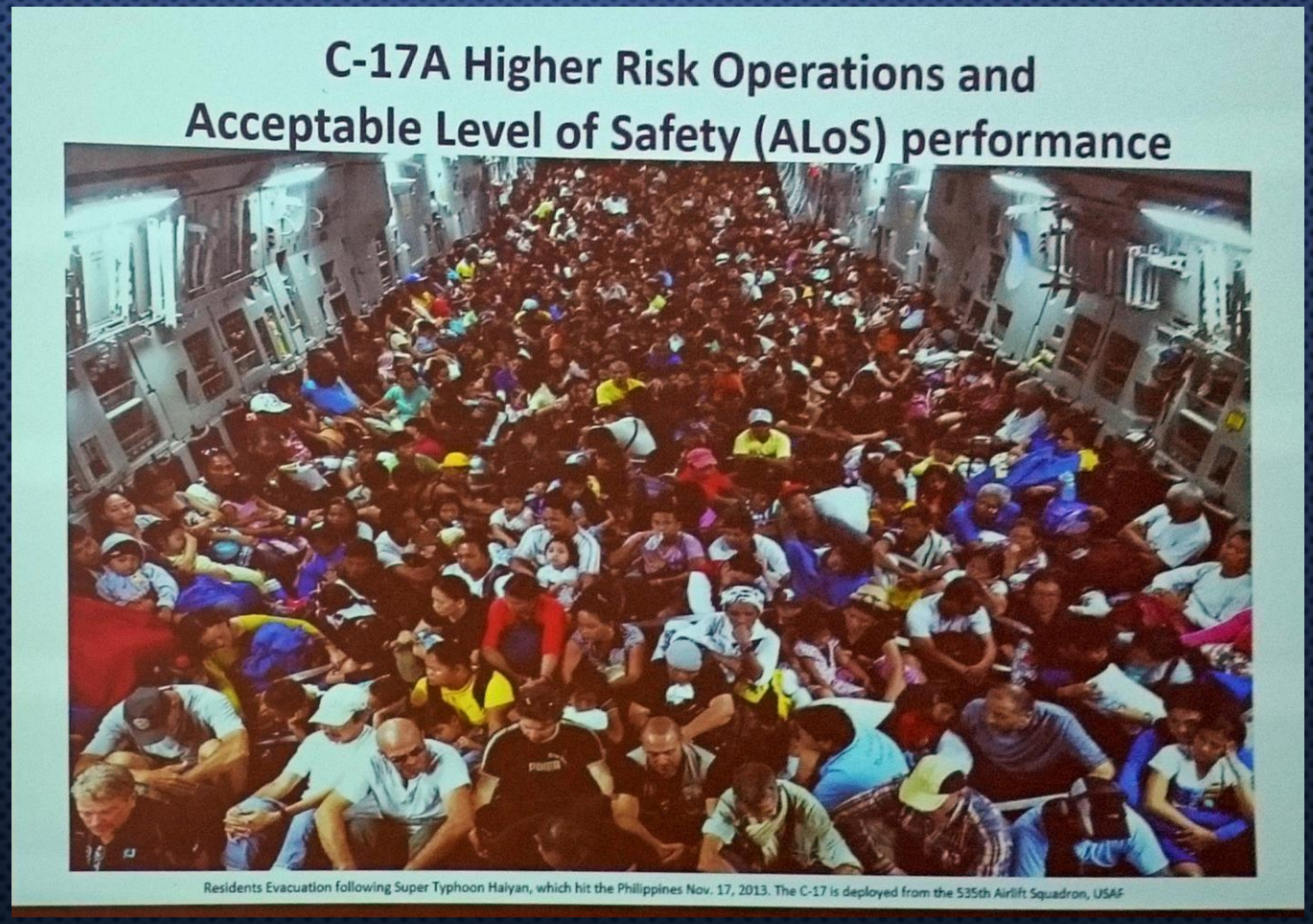
We see capacity as an attribute that is rarely examined for its own merit, and

- Puts focus on enablers rather than "failures" and

- is "holistic", dynamic and adaptive

The theory that we nurture is, that if a unit or an organisation has capacity, it is enabled to adapt, even if it has to master shortcomings in rules and procedures, in integrity and in robustness.

SAFETY II


C-17A Higher Risk Operations and
Acceptable Level of Safety (ALoS) performance
Residents Evacuation following Super Typhoon Haiyan, which hit the Philippines Nov. 17, 2013. The C-17 is deployed from the 535th Airlift Squadron, USAF

SAFETY II

Amsterdam University of Applied Sciences
Aviation Academy

RISK VALIDATION & ACCEPTANCE: THE FINAL STAGE

FLIGHT NUMBER RISK ASSESSMENT (Comprehensive): INDICATIVE *EXAMPLE* *Red2Red concept*				
DRMD	RISK FACTOR POINT SCALE			
	RAC 4	RAC 3	RAC 2	RAC 1
Departure Aerodrome				
Destination Aerodrome		Due weather conditions		
Assigned Aircraft - Registration			EAD is pending implementation	
Pilot Flying (PF)				
Pilot Monitoring (PM)		<1500 FH in type		
Additional /Augment Air Crew				
Air Traffic Route			World Region- ATM efficiency	

Acceptable Level of Safety (ALoS) Performance

RISK VALIDATION AND ACCEPTANCE				
Risk Validated by	CAPTAIN	CAPTAIN or NPH	NPH or SM	AM
Risk Accepted?	YES	UNDER CONDITIONS	POSTPONE	NO / CANCEL
Additional Remarks				

Ilias Panagopoulos, 2nd International Cross-industry Safety Conference (ICSC 2017), Amsterdam, NL, November 1-3, 2

SAFETY II

American Airlines

JUN 2020

Trailblazers into Safety-II: American Airlines' Learning and Improvement Team

A White Paper Outlining AA's Beginnings of a Safety-II Journey

SEP 2021

Charting a New Approach: What Goes Well and Why at American Airlines

A white paper outlining the second phase of AA's Learning and Improvement Team (LIT)

SAFETY II

Resilience Assessment Grid - Hollnagel's RAG model consists of four capabilities:

- Respond - Knowing what to do, or being able to respond to regular and irregular variability, disturbances, and opportunities either by adjusting the way things are done or by activating ready-made responses.
- Monitor - Knowing what to look for, or being able to monitor that which changes, or may change, so much in the near term that it will require a response. The monitoring must cover the system's own performance as well as changes in the environment.
- Anticipate - Knowing what to expect, or being able to anticipate developments, threats, and opportunities further into the future, such as potential disruptions or changing operating conditions.
- Learn - Knowing what has happened, or being able to learn from experience, in particular to learn the right lessons from the right experience.

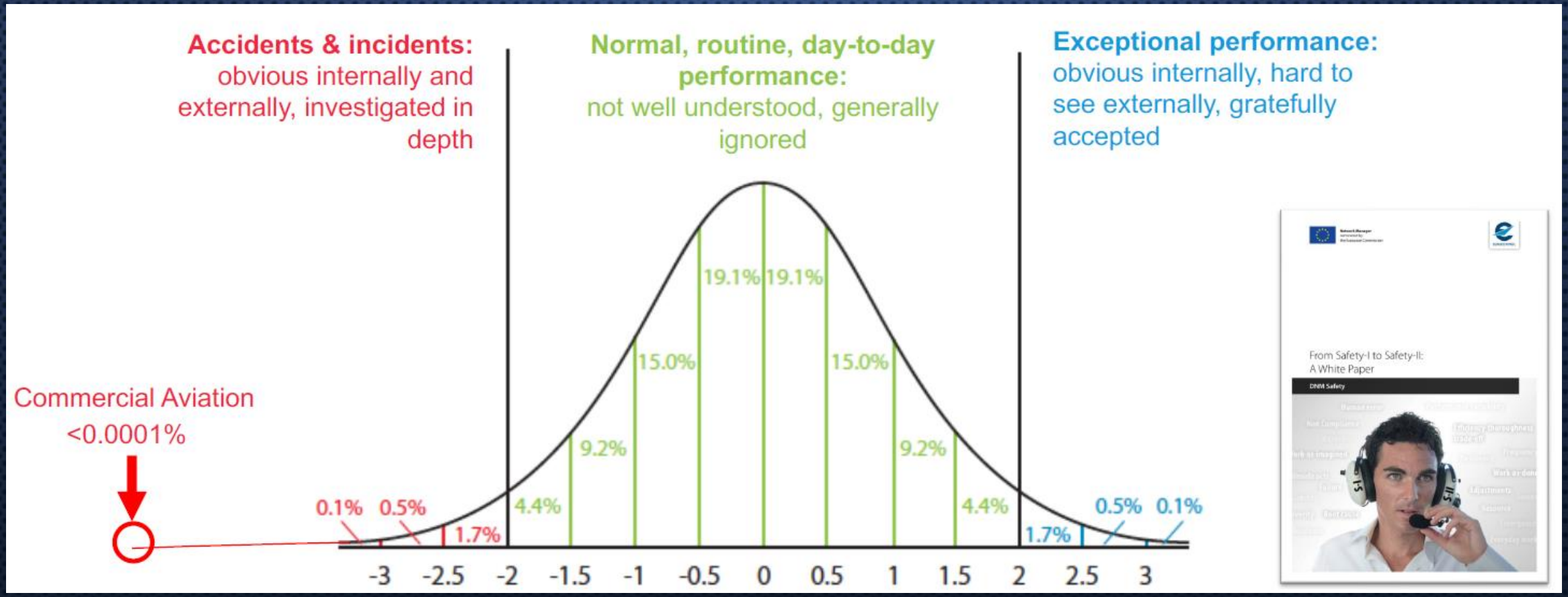
SAFETY II

- **Coordinate** was added to better capture the inherently cooperative aspects of safe airmanship, both within the flightdeck and outside of it. It also reflects the understanding that the LIT is rooted in the front-line work of pilot crews. (Monitor was removed as a potential in its own right, as it was recognized as a vital component of Coordinate.)
- **Adapt** replaced Respond. Respond implies reactivity, a product behavior which is less considered and less deliberate. Adapt more accurately describes pilot performance, particularly as it relates to the active management of multi-factor trade-offs.
- **Plan** replaced Anticipate. While anticipation is an expert skill, recognizing the proficiencies demonstrated by pilots who leverage anticipation to devise plans that create resilient potential better encapsulates the work and mission of all pilots.
- **Learn** remained

SAFETY II

- 100 observations collected throughout 2019 and early 2020
- LIT is a Safety-II data stream and long-term contributor to AA's SMS process
- The primary aim of LIT remains to learn and share expertise leveraged by individuals, their interactions, and the overall system, towards the ultimate goal of improving safety and efficiency during daily work on the flightdeck

SAFETY II


Accidents & incidents:
obvious internally and externally, investigated in depth
Normal, routine, day-to-day performance:
not well understood, generally ignored
Exceptional performance:
obvious internally, hard to see externally, gratefully accepted
Commercial Aviation
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9.2%
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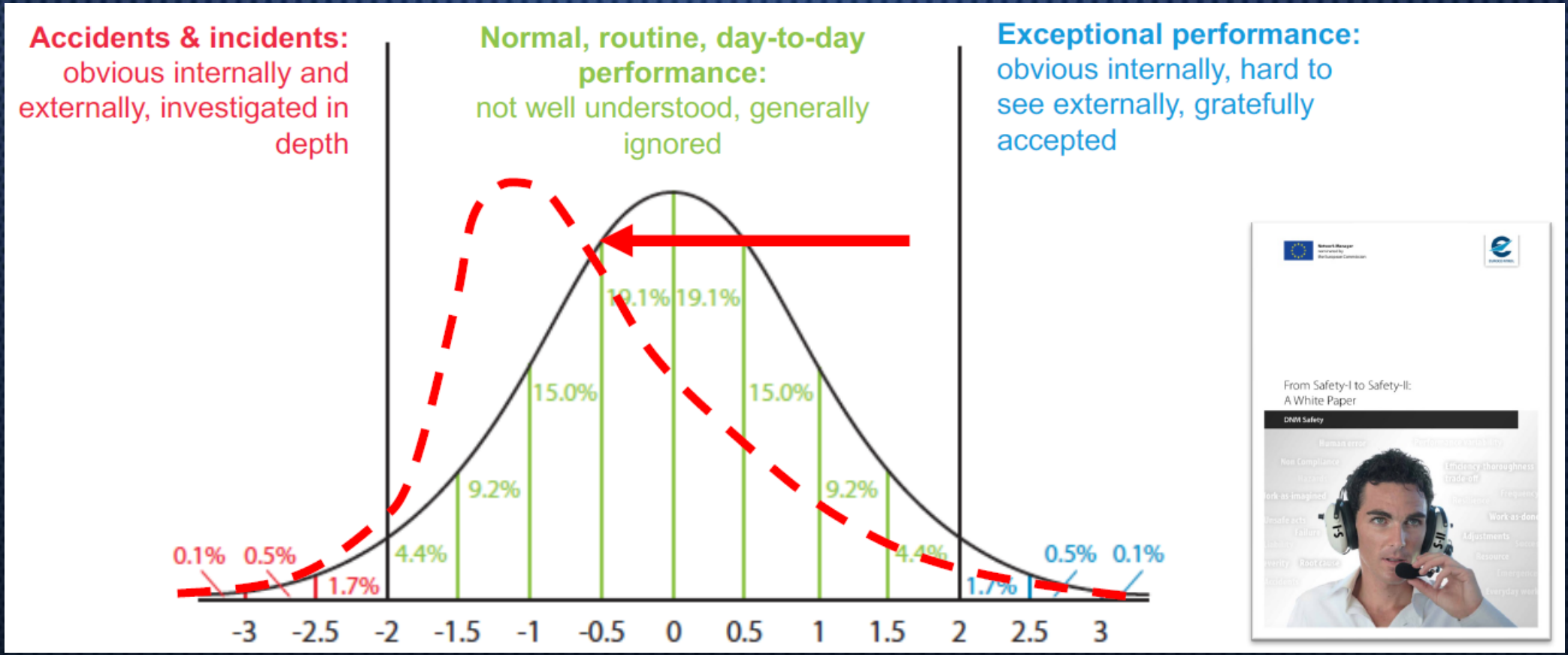
From Safety-I to Safety-II:
A White Paper
DNM Safety

SAFETY II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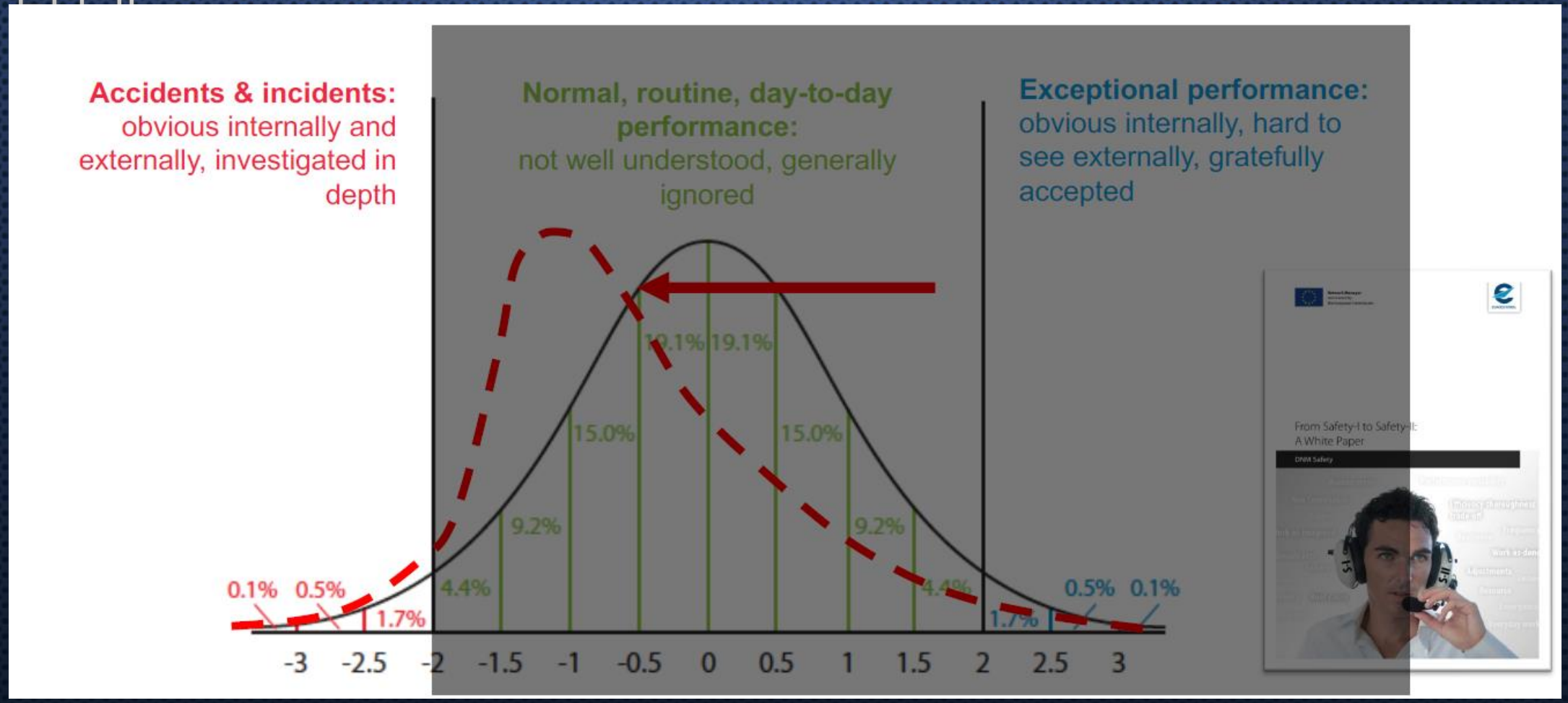
SAFETY II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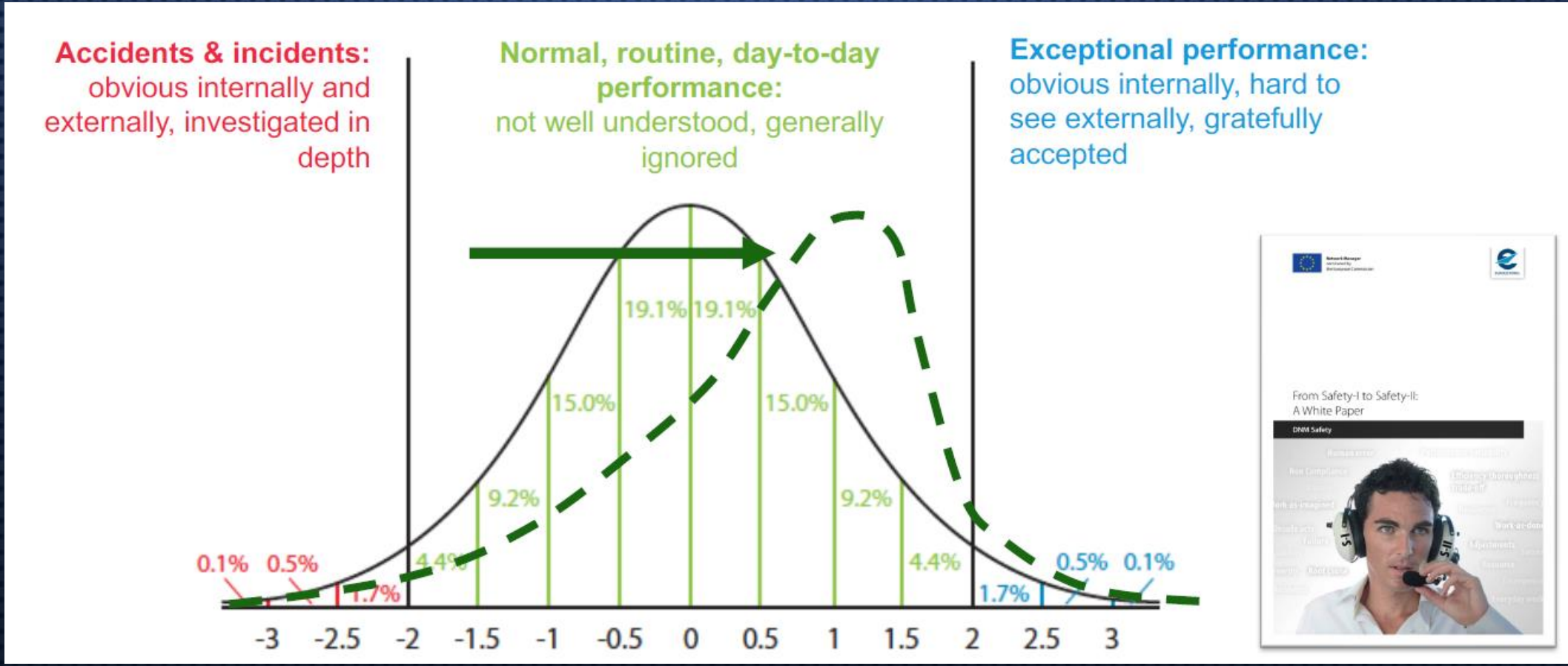
A White Paper

SAFETY II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From Safety-I to Safety-II:
A White Paper
DNV Safety

SAFETY II

Human Factors Research Thesis

THE SAFETY ENABLERS FOR IMPROVED PERFORMANCE OF THE MALMÖ ATC CENTRE

By Anders Ellerstrand

A research paper submitted in partial fulfilment of the MSc Human Factors in Aviation

in the Faculty of Engineering, Environment and Computing

Academic year 2018/19

18 August 2019

Coventry University

SAFETY II

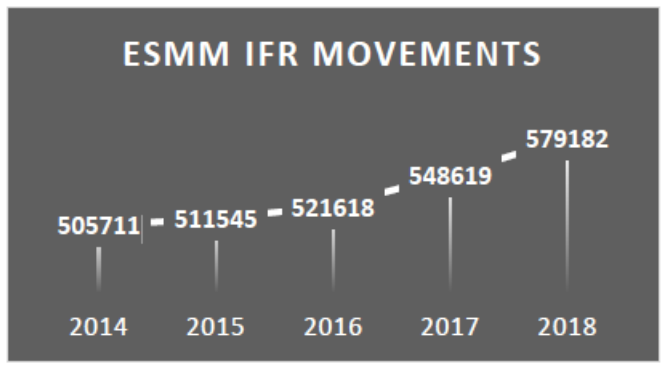


Figure 2: ESMM IFR movements

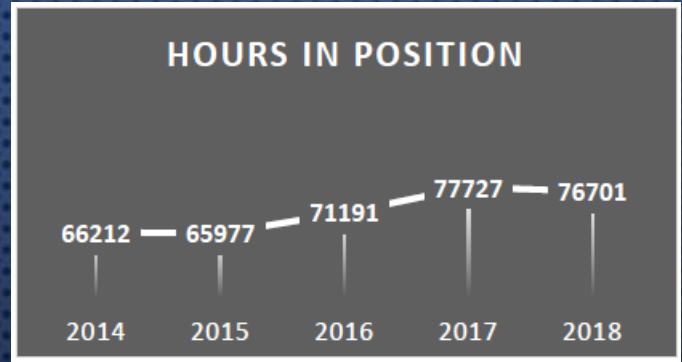


Figure 4: Hours in position

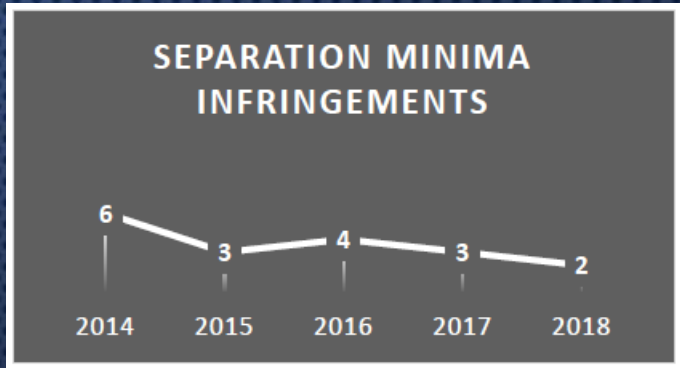


Figure 6: Separation Minima Infringements

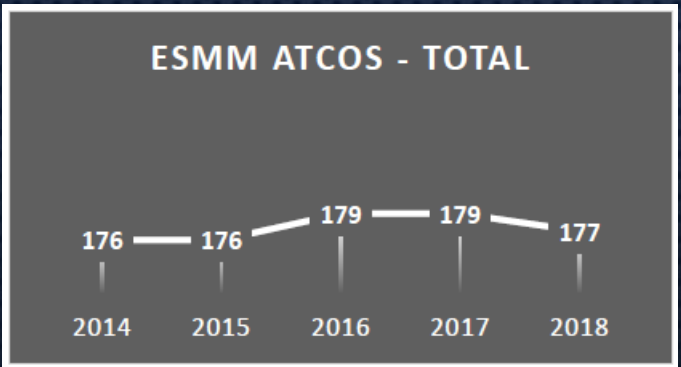


Figure 3: ESMM ATCOs - total

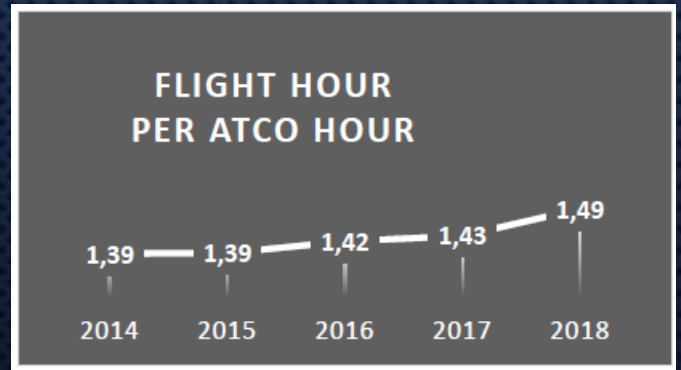


Figure 5: Flight hour per ATCO hour

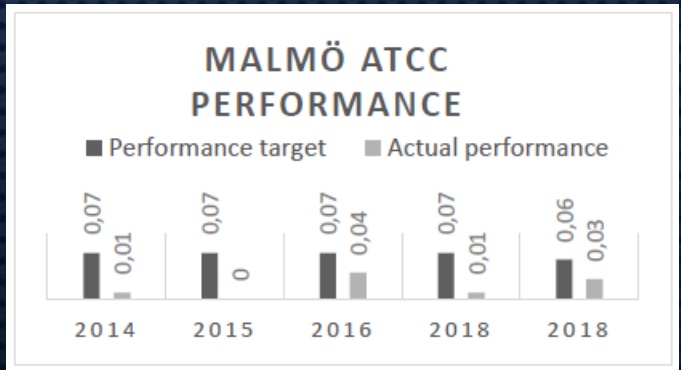
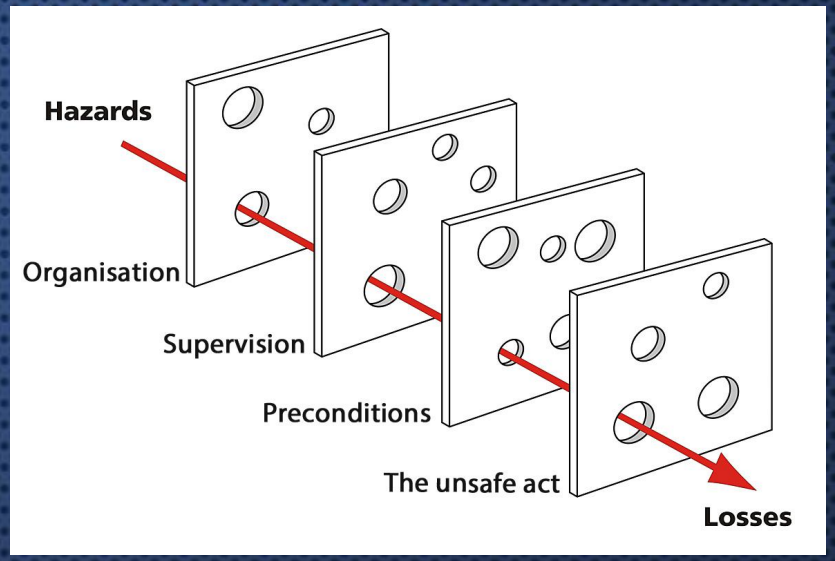


Figure 7: Malmö ATCC performance

SAFETY II

- Öppna frågor:
- 1. Berätta om en riktigt bra dag på jobbet, när du verkligen känt dig nöjd med dig själv och ditt jobb?
- 2. Vad värderar du mest hos dig själv som flygledare? Vad bidrar du med?
- 3. Vad värderar du med att vara flygledare?
- 4. Vad värderar du hos Malmö ATCC? När Malmö ATCC fungerar som bäst – vad är det som bidrar till det?

SAFETY I – SWISS CHEESE



- THE SHARP END
  - I ALLA INTERVJUER NÄMNDES ARBETET MED BRA KOLLEGOR, SAMARBETE MELLAN EC OCH PLC
- WORKPLACE (OPS ROOM)
  - SYSTEMSTÖD, BRA FYSISK ARBETSMILJÖ
- • THE BLUNT END
  - LEDARSKAP. FLERA SUPPORTFUNKTIONER (ALLA UTOM SAFETY)

SAFETY I+II

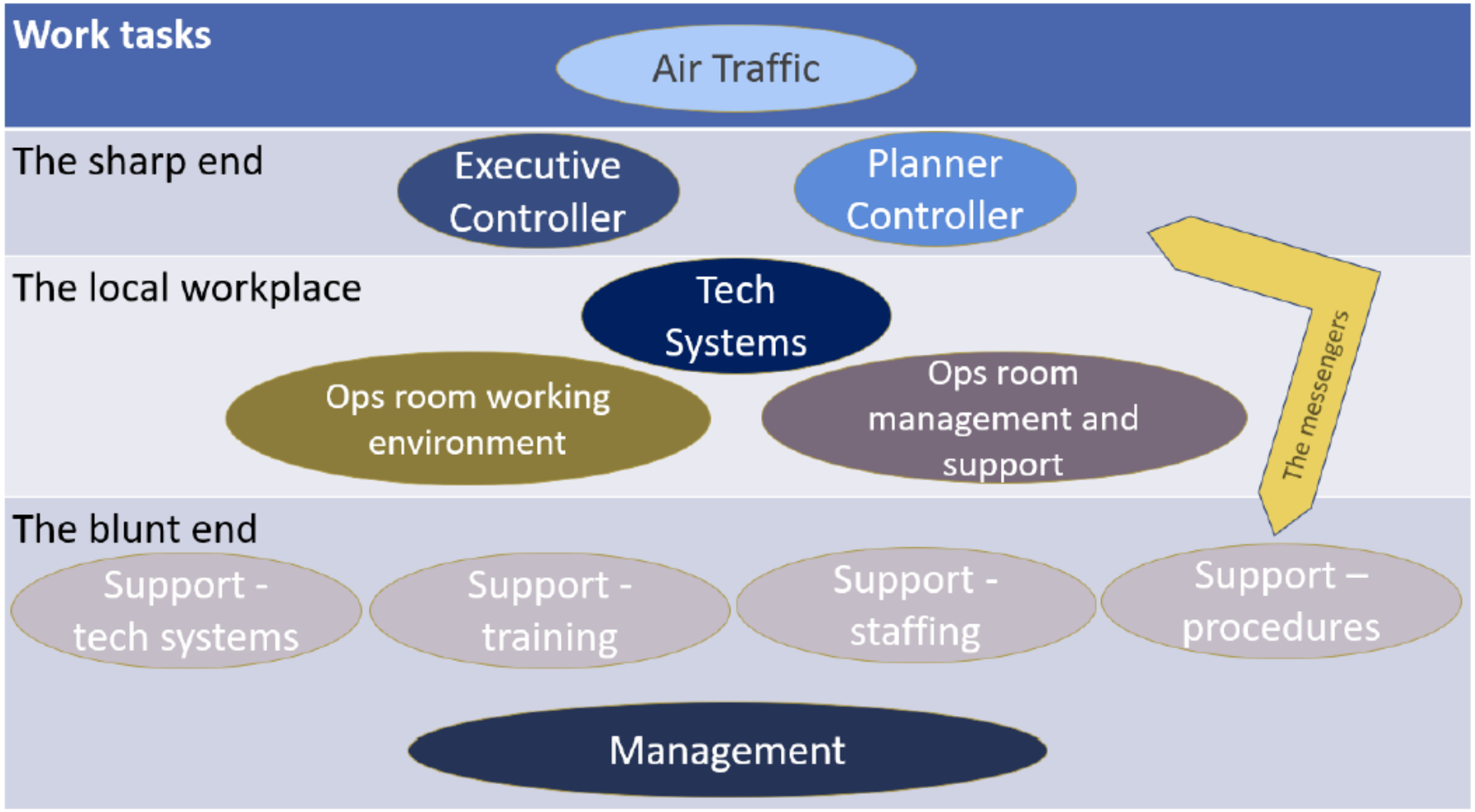
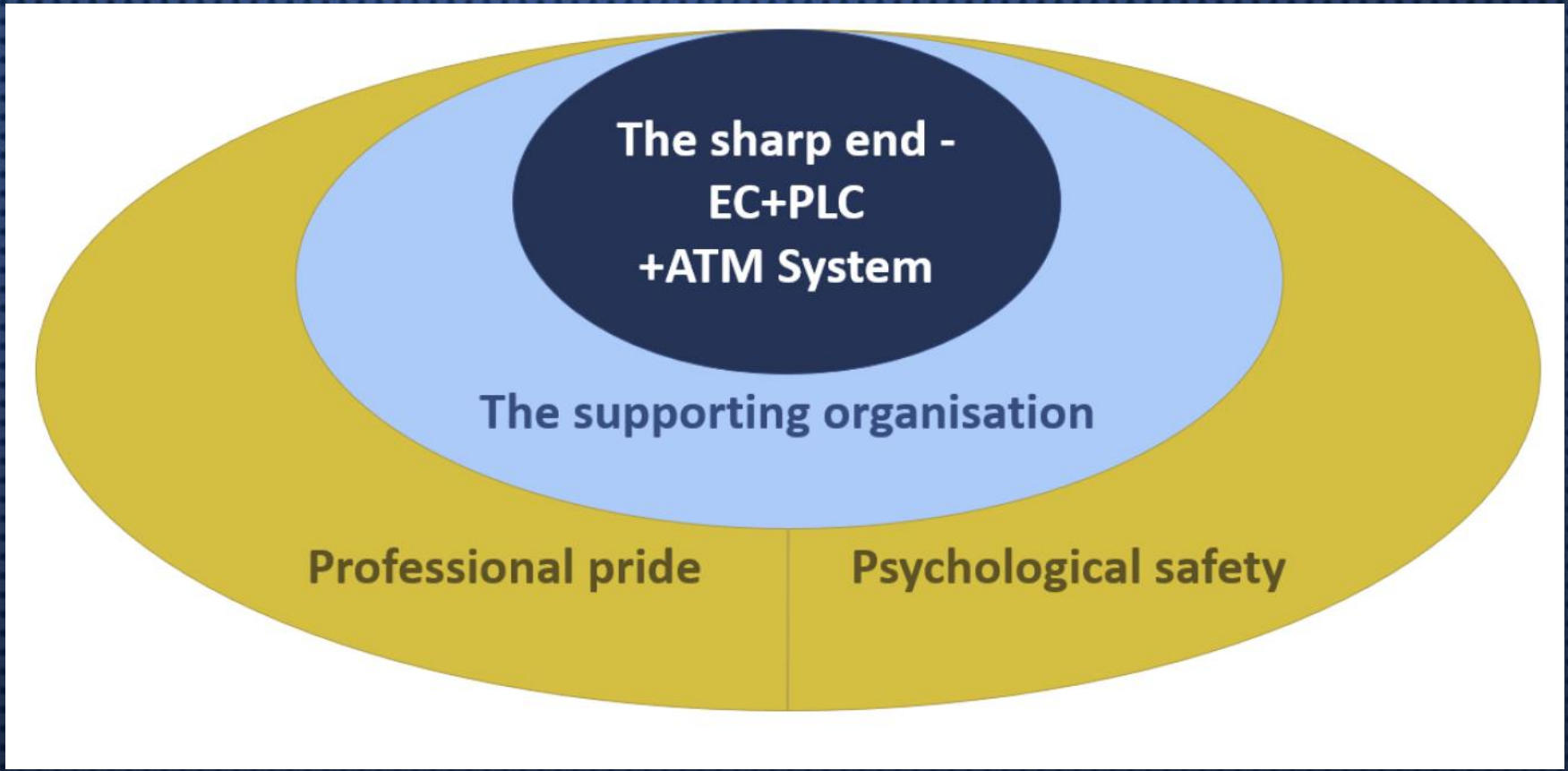


Figure 13: A model of the ATC Centre safety enablers

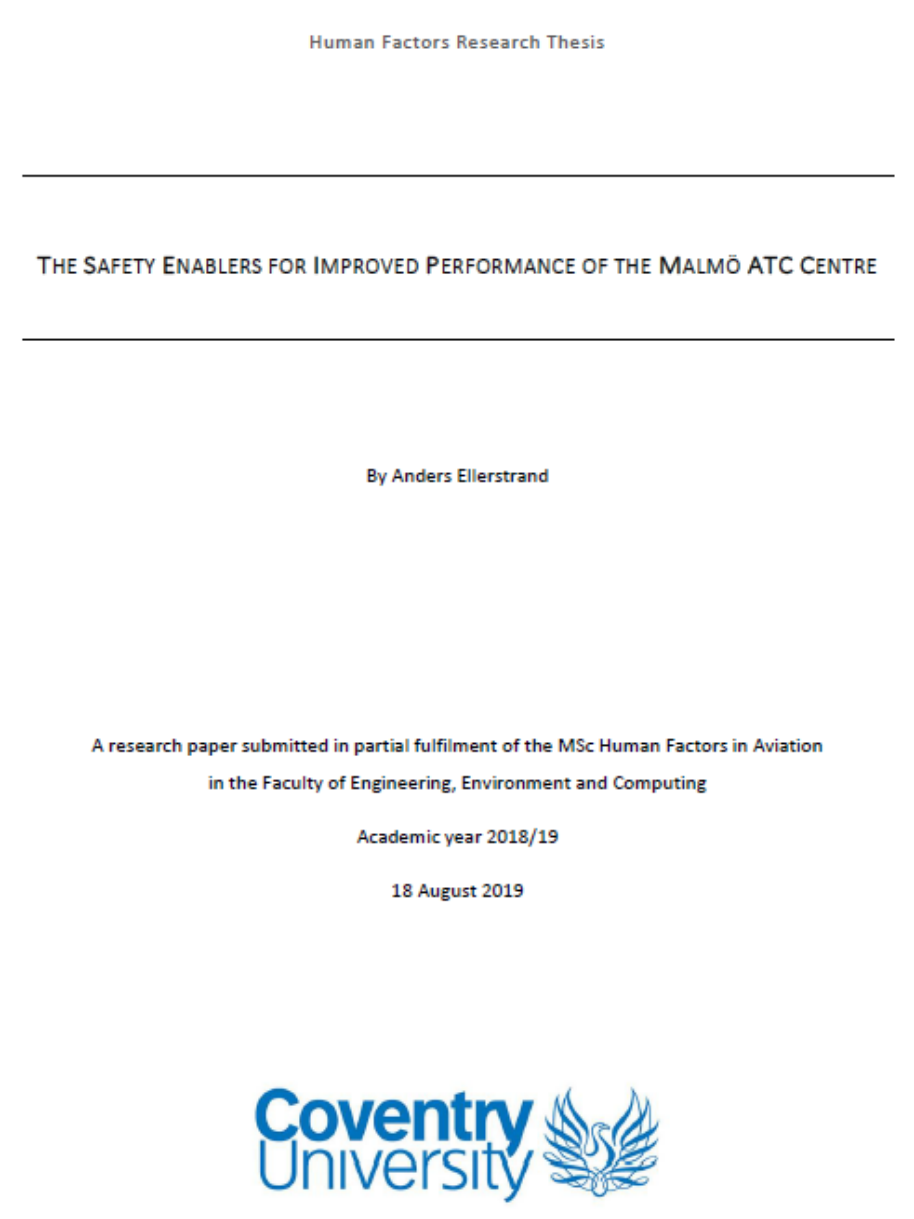
SAFETY I+II



"WELL TRAINED CONTROLLERS, WORKING WITH MODERN, WELL-DEVELOPED EQUIPMENT AND SUPPORTED BY AN ORGANISATION MIGHT STILL NOT BE ENOUGH. THIS RESEARCH STUDY FOUND TWO IMPORTANT UNDERPINNING FACTORS – PROFESSIONAL PRIDE THAT DRIVES THE WILL TO SPEAK UP AND PSYCHOLOGICAL SAFETY THAT MAKES IT POSSIBLE TO SPEAK UP."

SAFETY II

- LFV INTRESSE FÖR STUDIEN?
  - SAFETY = COMPLIANCE
  - SAFETY II I PRAKTIKEN? INTE ÄNNU…



Human Factors Research Thesis

THE SAFETY ENABLERS FOR IMPROVED PERFORMANCE OF THE MALMÖ ATC CENTRE

By Anders Ellerstrand

A research paper submitted in partial fulfilment of the MSc Human Factors in Aviation

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Safety II
i praktiken...
ANY QUESTIONS?
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