

Ein Piff mit grosser Wirkung

Turbulenzen vorbeugen – Analogien aus der Aviatik



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Burgdorf 8.3.2024

HFsolutions 

Gliederung

1. Einleitung
2. Herausforderung an den Menschen in der Aviatik
3. Ansätze zum Management von Menschlicher Leistung
4. Risiken und Gegenmassnahmen
5. Fragen

1. Einleitung

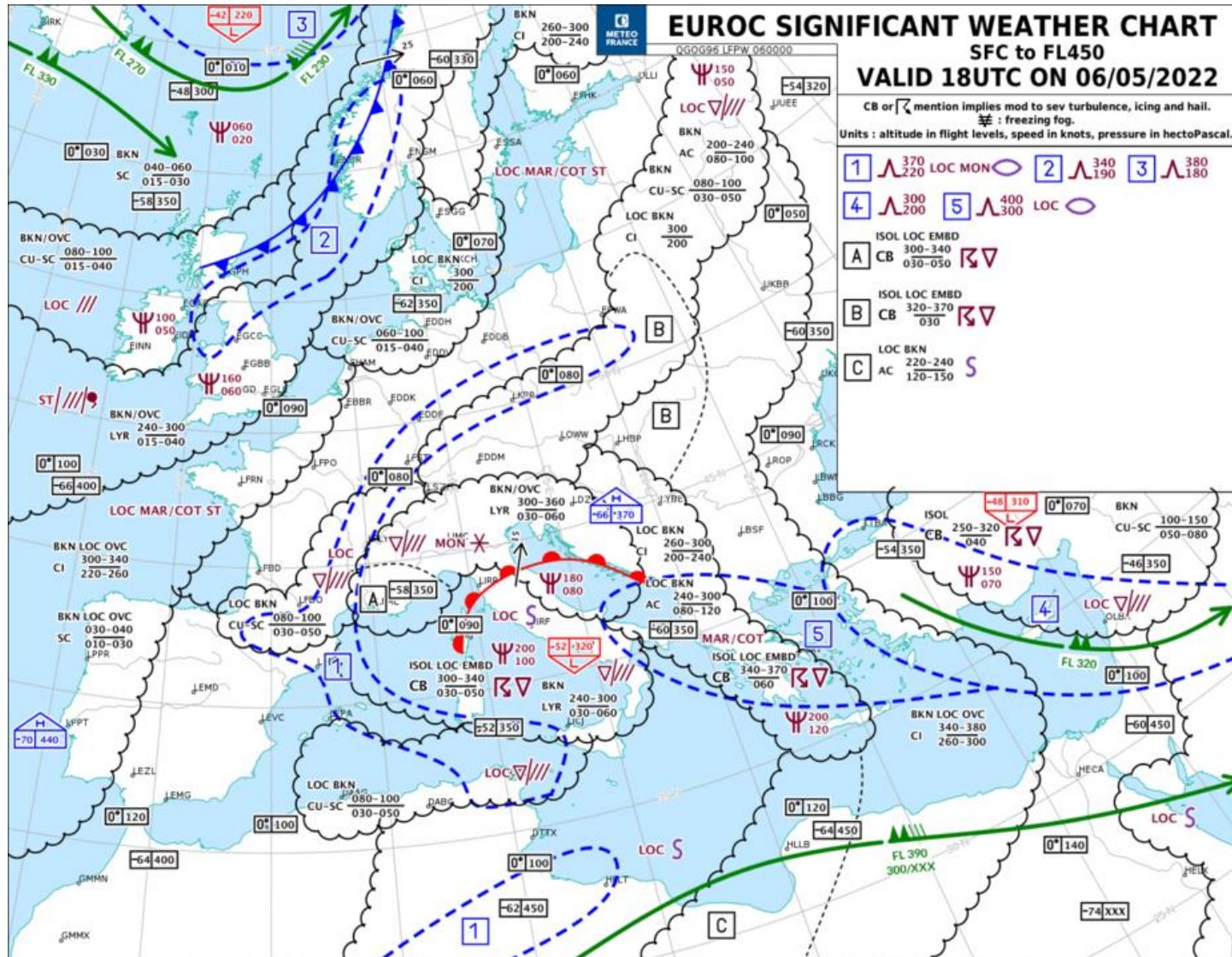
Turbulenzen vorbeugen – Analogien aus der Aviatik Risikomanagement und Sicherheitsstrategien sind in der Luftfahrt weit entwickelt und von grosser Bedeutung.

Trotz viel Technik im Alltag bleibt der Fokus auf den Menschen. Mit welchen Instrumenten und Modellen wird gearbeitet? Und was ist davon auf die Schule übertragbar?

Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect.



Turbulenzen und Luftlöcher



Wie sicher ist Fliegen heute?

There were no hull losses or fatal accidents involving passenger jet aircraft in 2023. However, there was a single fatal accident involving a turboprop aircraft, resulting in 72 fatalities.

There were 37 million aircraft movements in 2023 (jet and turboprop), an increase of 17% on the previous year.

The all accident rate was 0.80 per million sectors in 2023 (one accident for every 1.26 million flights), an improvement from 1.30 in 2022 and the lowest rate in over a decade....

At this level of safety, on average a person would have to travel by air every day for 103,239 years to experience a fatal accident.

<https://www.iata.org/en/pressroom/2024-releases/2024-02-28-01/>

2. Herausforderung an den Menschen in der Aviatik

- ✓ Rolle des Menschen
 - ✓ Operator vs Überwacher
- ✓ Dynamisch, komplexes Umfeld
- ✓ «Left over strategy» im Umgang mit Automation
- ✓ Teure Ausbildung => Return of investment

Menschlicher Fehler als Unfallursachen





344

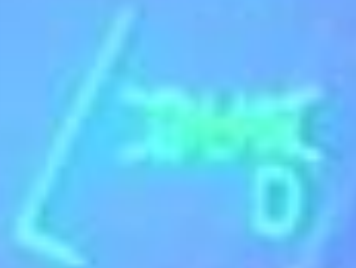
116400

α 6.2
M 0.69
G 2.5

10VC
800 FT
RABER

0.2

14:07:34E1



710

75

75

S/S

75

Safety focus:
accidents & disasters

Normal, routine, day-to-day
performance: unknown and
generally ignored

Exceptional performance:
gratefully accepted

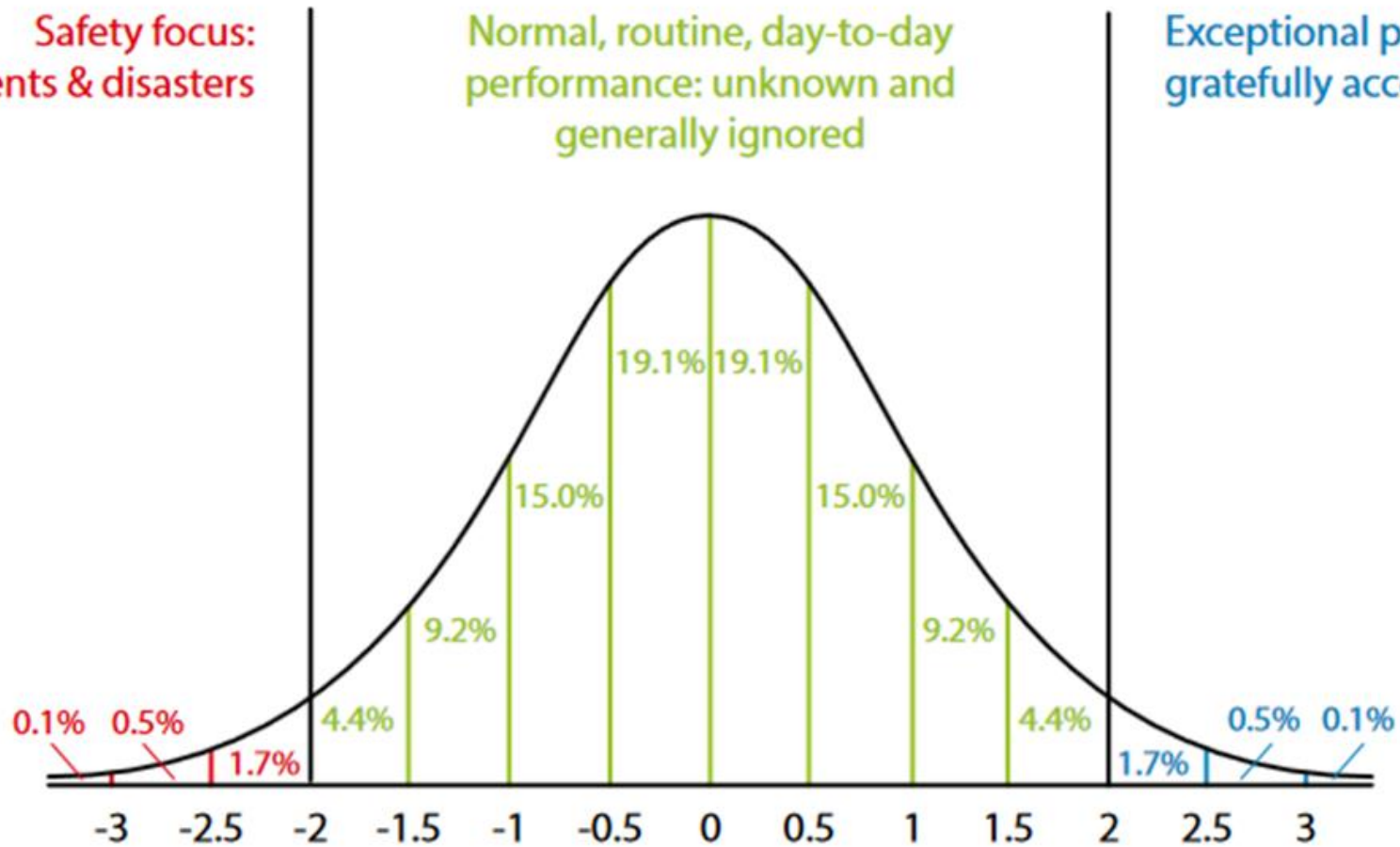


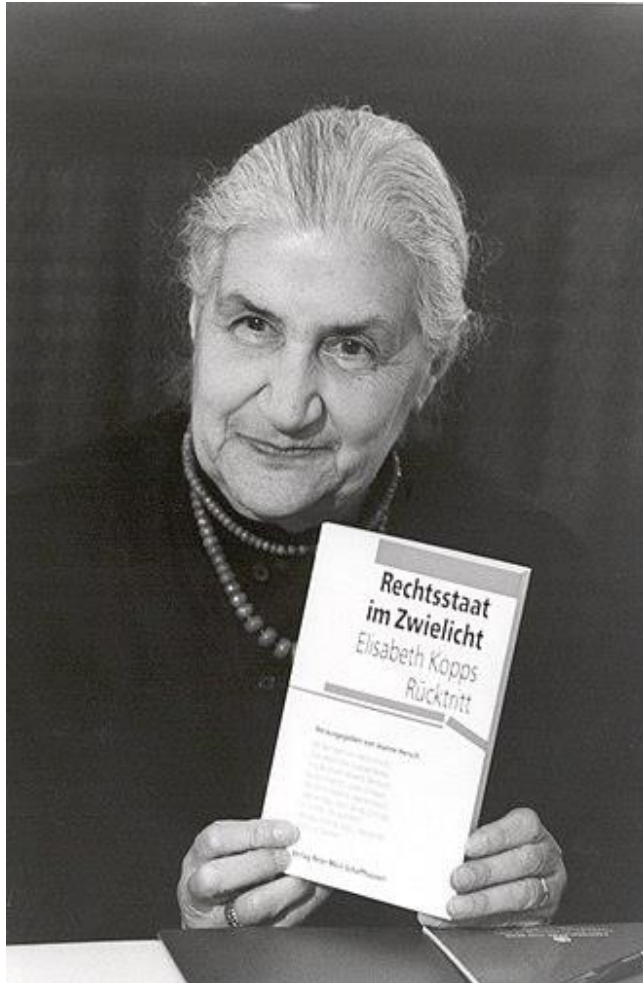
Figure 15: Event probability and safety focus



1978 – 1992- 2007



Jeanne Hersch



**“The essence of the
pilot is
responsibility”**

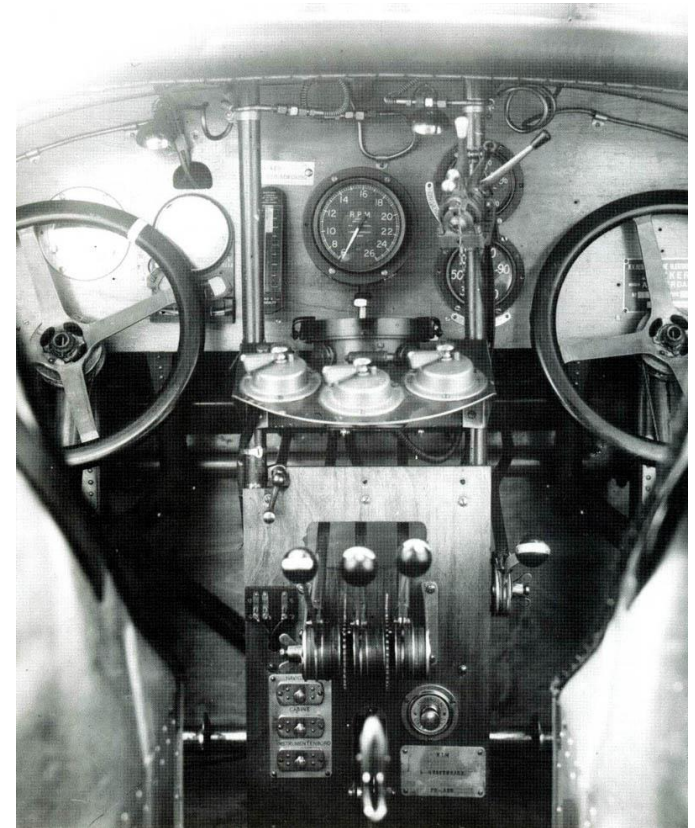
**Born 13. July 1910 in Geneva;
died 5. Juni 2000**

Left over strategy

Daten Wahrnehmung und Verarbeitung

- ✓ Von Quantität zur Qualität
- ✓ Veränderungen im Mensch – Maschine Interface

Fokker VII





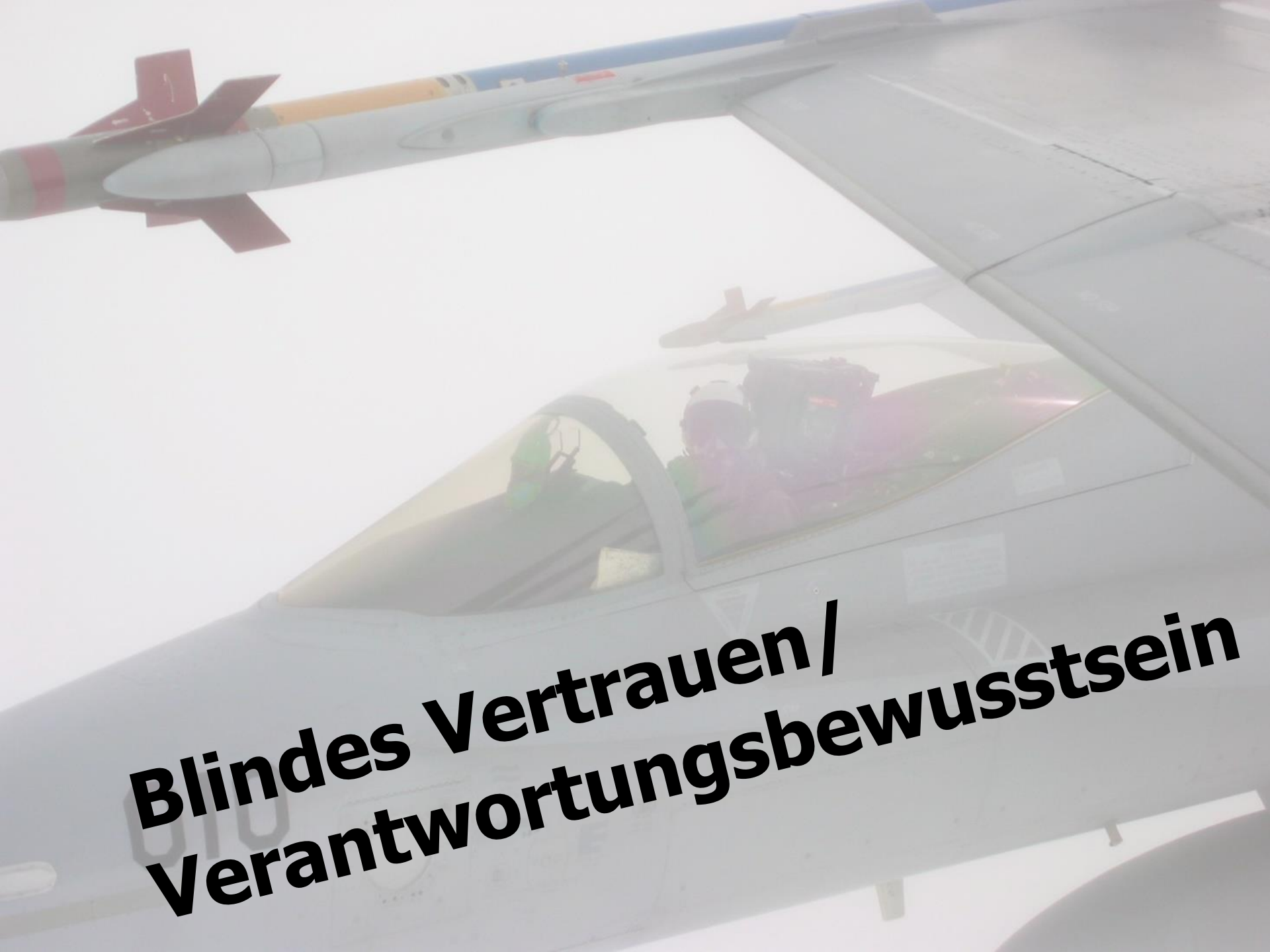




Fliegen ist Teamwork







**Blindes Vertrauen/
Verantwortungsbewusstsein**



Zeitaufwand 4 v 4

Vorbereitung Einsatz

2 Stunden am Vortag

Meteo

Briefing Gegner

Briefing Partner

Briefing EZ

0715
0730

0730
0750

0750
0845

0845
0900

FDL

FLZ Übern.

Auftrag

0900
0915

0915
0940

0940
1055

Abgabe / Vorb Debrief

Auswerten Tapes

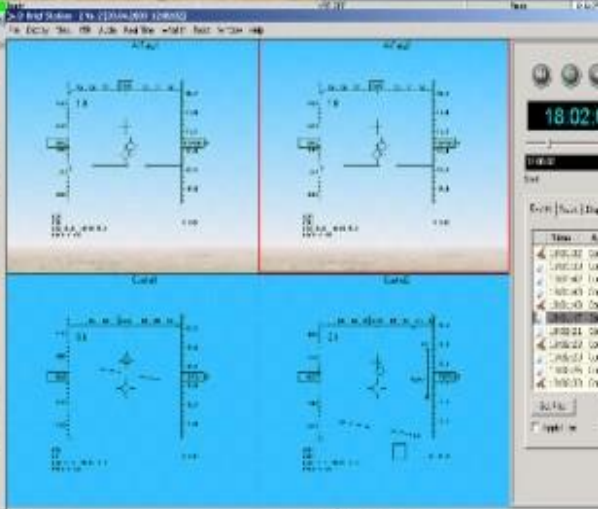
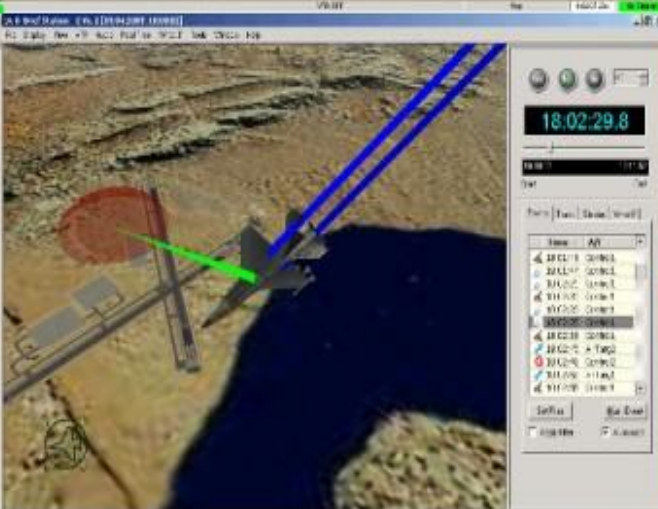
1055
1125

1125
1210

Debrief Partner / Gegner

1210
1310

1 Einsatz dauert total 8 Stunden



S-0 Red Station (No. 1) [12943825-12943830]

File Edit View +F10 Help +F11 Tools +F12 Windows +F13

Time	Alt.	Speed	Heading	Roll	Pitch
18:02:37	Ground	0.00	0.00	0.00	0.00
18:02:38	Ground	0.00	0.00	0.00	0.00
18:02:39	Ground	0.00	0.00	0.00	0.00
18:02:40	Ground	0.00	0.00	0.00	0.00
18:02:41	Ground	0.00	0.00	0.00	0.00
18:02:42	Ground	0.00	0.00	0.00	0.00
18:02:43	Ground	0.00	0.00	0.00	0.00
18:02:44	Ground	0.00	0.00	0.00	0.00
18:02:45	Ground	0.00	0.00	0.00	0.00
18:02:46	Ground	0.00	0.00	0.00	0.00
18:02:47	Ground	0.00	0.00	0.00	0.00
18:02:48	Ground	0.00	0.00	0.00	0.00
18:02:49	Ground	0.00	0.00	0.00	0.00
18:02:50	Ground	0.00	0.00	0.00	0.00

Full Screen | Help | About

0.000000 1.000 1.000 1.000

S-0 Red Station (No. 1) [12943831-12943836]

File Edit View +F10 Help +F11 Tools +F12 Windows +F13

Time	Alt.	Speed	Heading	Roll	Pitch
18:02:41	Ground	0.00	0.00	0.00	0.00
18:02:42	Ground	0.00	0.00	0.00	0.00
18:02:43	Ground	0.00	0.00	0.00	0.00
18:02:44	Ground	0.00	0.00	0.00	0.00
18:02:45	Ground	0.00	0.00	0.00	0.00
18:02:46	Ground	0.00	0.00	0.00	0.00
18:02:47	Ground	0.00	0.00	0.00	0.00
18:02:48	Ground	0.00	0.00	0.00	0.00
18:02:49	Ground	0.00	0.00	0.00	0.00
18:02:50	Ground	0.00	0.00	0.00	0.00

Full Screen | Help | About

0.000000 1.000 1.000 1.000

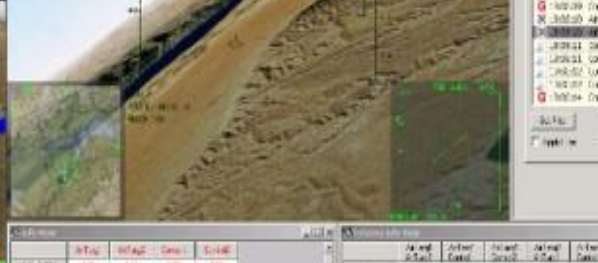
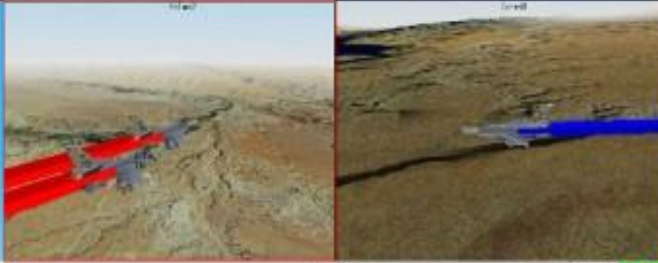
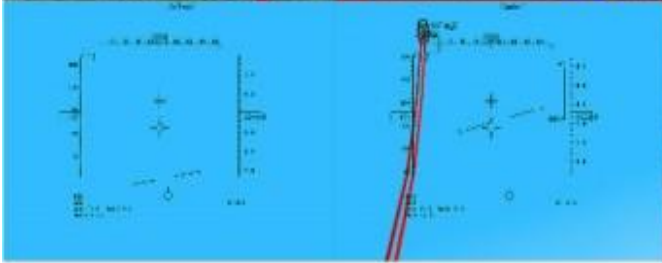
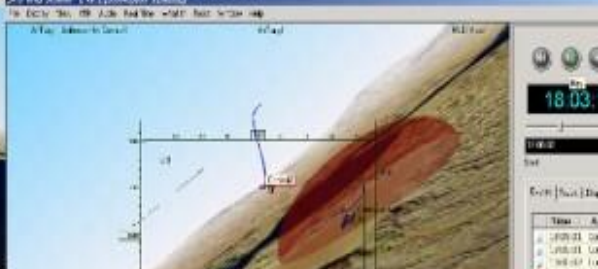
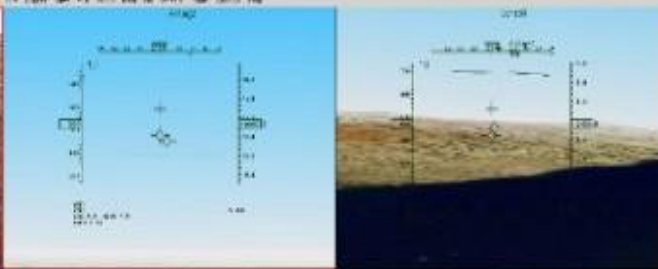
S-0 Red Station (No. 1) [12943837-12943842]

File Edit View +F10 Help +F11 Tools +F12 Windows +F13

Time	Alt.	Speed	Heading	Roll	Pitch
18:02:41	Ground	0.00	0.00	0.00	0.00
18:02:42	Ground	0.00	0.00	0.00	0.00
18:02:43	Ground	0.00	0.00	0.00	0.00
18:02:44	Ground	0.00	0.00	0.00	0.00
18:02:45	Ground	0.00	0.00	0.00	0.00
18:02:46	Ground	0.00	0.00	0.00	0.00
18:02:47	Ground	0.00	0.00	0.00	0.00
18:02:48	Ground	0.00	0.00	0.00	0.00
18:02:49	Ground	0.00	0.00	0.00	0.00
18:02:50	Ground	0.00	0.00	0.00	0.00

Full Screen | Help | About

0.000000 1.000 1.000 1.000



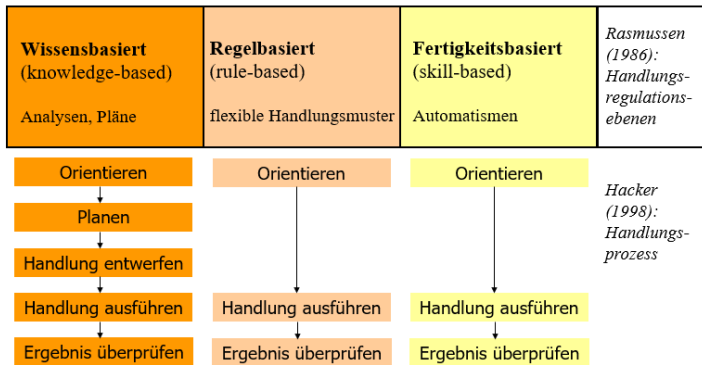


3. Ansätze zum Management von Menschlicher Leistung

- ✓ Verständnis zu Menschlicher Leistung
 - ✓ Crew Ressource Management
- ✓ Standards in der Operation
 - ✓ Checklisten und Procedures als Tools von WLM /Stress Management
- ✓ Selektion: Auswahl und Ausbildung ausgerichtet auf erforderliche Kompetenzen
 - ✓ Fleischmann/
- ✓ Safety/Risk Management
- ✓ Ziele/Fehler: Bedeutung im täglichen Operieren

Ausbildung zu Menschlicher Leistung

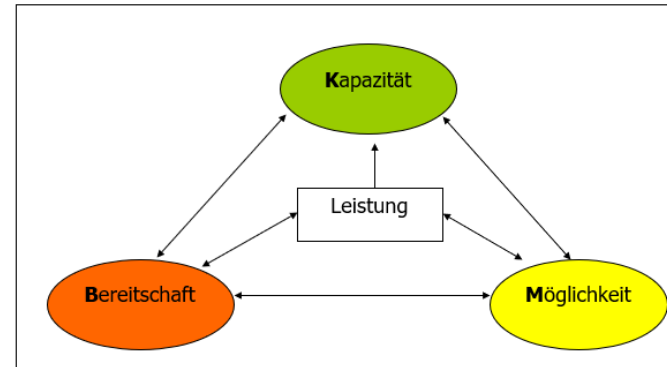
Ebenen der Handlungsregulation und Handlungsprozess



05.03.2024

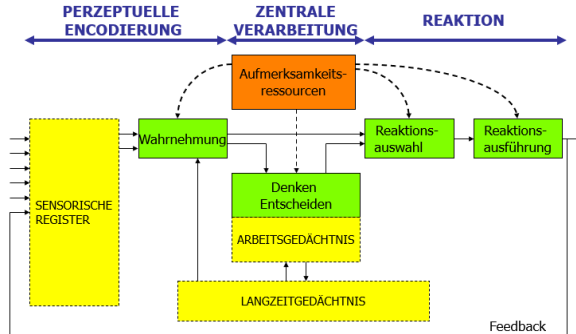
124

$$\text{Leistung} = f(\text{M} \times \text{K} \times \text{B})$$



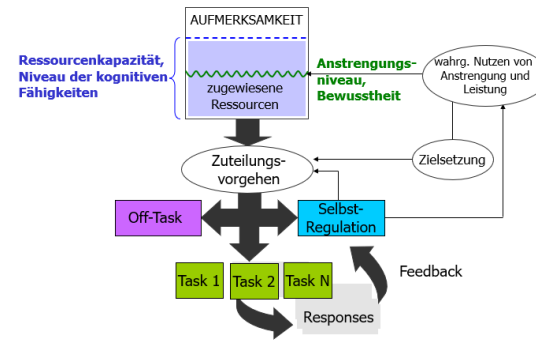
aus: Matthews, G., Davies, D.R., Westermann, S.J. & Stammers, R.B. (2000). Human performance. Cognition, stress and individual differences. Philadelphia, PA: Taylor & Francis.

Generisches Modell der Informationsverarbeitung

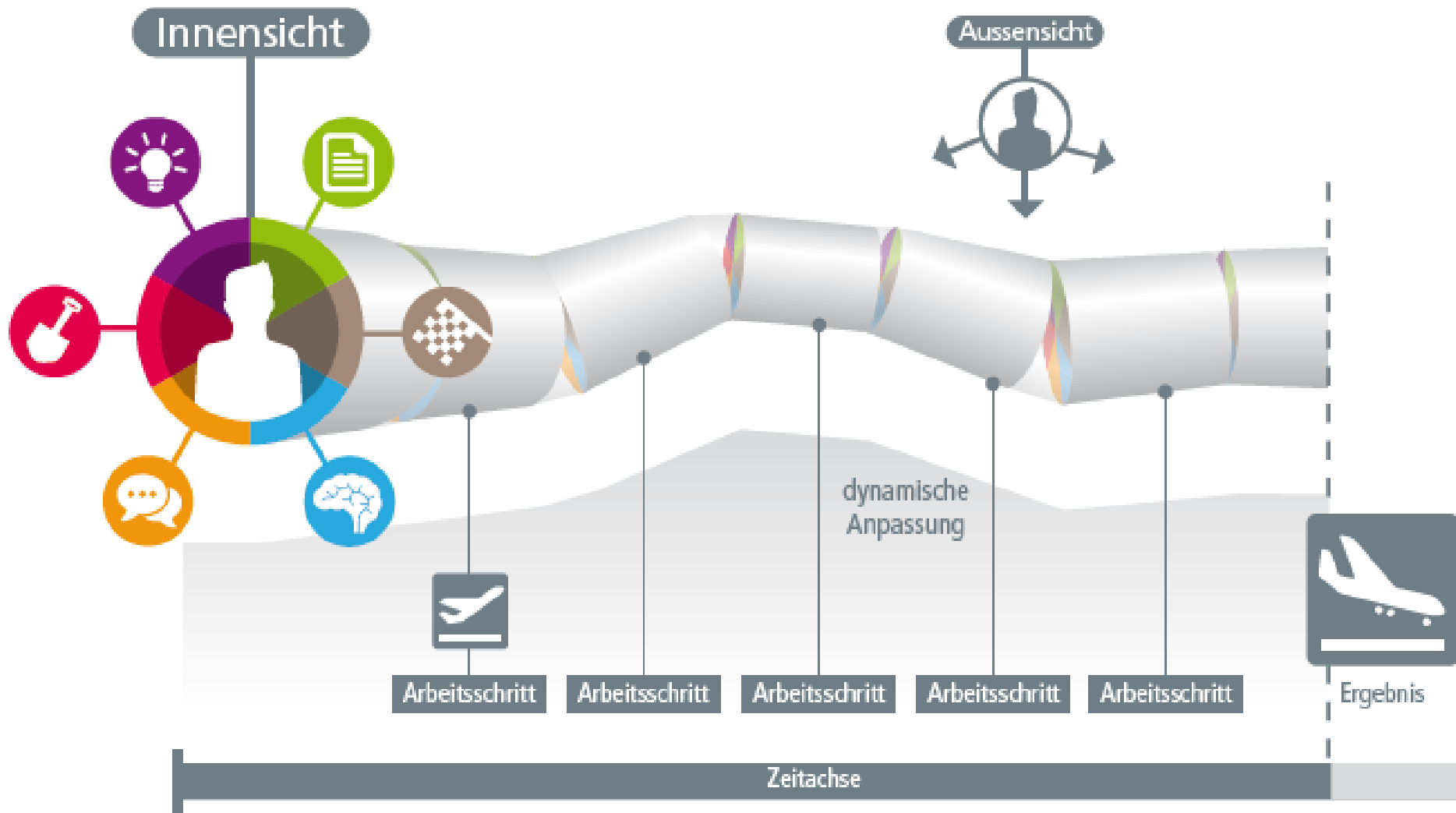


05.03.2024 Wickens, C. D., Gordon, S. E., & Liu, Y. (1998). An introduction to human factors engineering (p. 147). New York (etc.): Longman. 13f

Kapazitätsmodell der Aufmerksamkeit



05.03.2024 Kanfer, R., & Ackerman, P. L. (1989). Motivation and cognitive abilities: An integrative/aptitude-treatment-interaction approach to skill acquisition. Journal of Applied Psychology, 74(4), 657-690. 153



Fleishman Job Analyse



F-JAS

Martin Kleinmann
Dietrich Manzey
Sandra Schumacher
Edwin A. Fleishman

Fleishman Job Analyse System für eigenschaftsbezogene Anforderungsanalysen

Deutschsprachige Bearbeitung des Fleishman Job
Analysis Survey by Edwin A. Fleishman

MANUAL



GÖTTINGEN · BERN · WIEN · PARIS · OXFORD · PRAG · TORONTO · CAMBRIDGE, MA · AMSTERDAM · KOPENHAGEN · STOCKHOLM

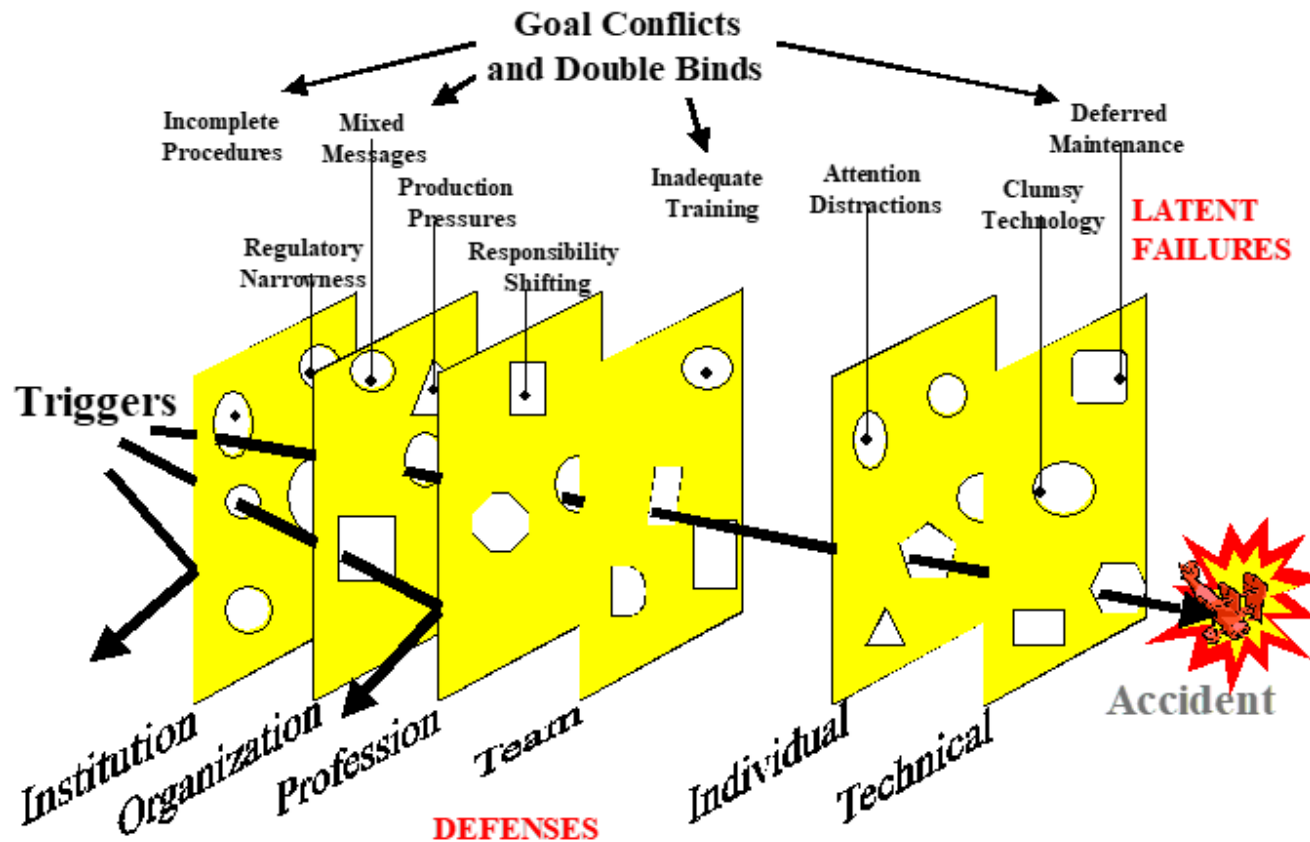
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Beiz.-Nr. 01 342 02

HOGREFE 

Bei der Selektion, Grundausbildung und der Weiterausbildung werden die Leistungen nach Kompetenzen beurteilt.

Modelle zu Sicherheitsmanagement

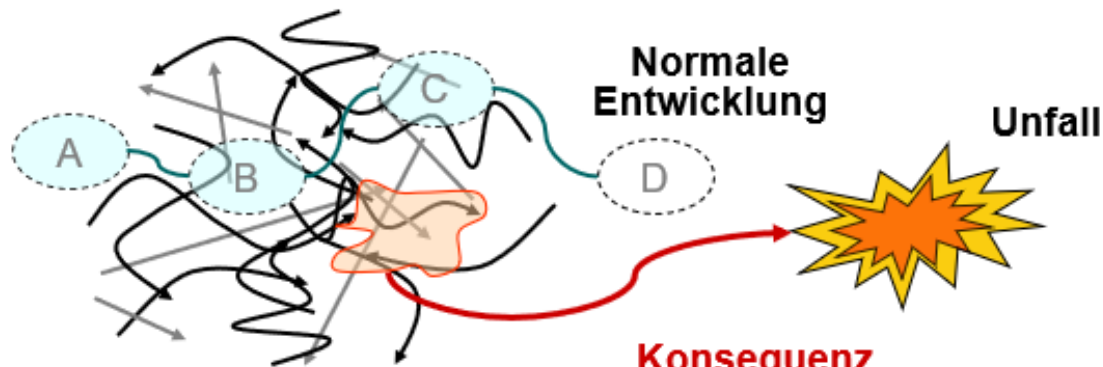
Swiss Cheese Model



Integration von Kultur ins Safety Management

Modell des systemischen Risikos

Annahme - Unfälle sind ein Resultat unerwarteter Kombinationen (Resonanz) von üblichen Leistungsschwankungen (performance variability)



Unerwartete Kombination von Ereignissen

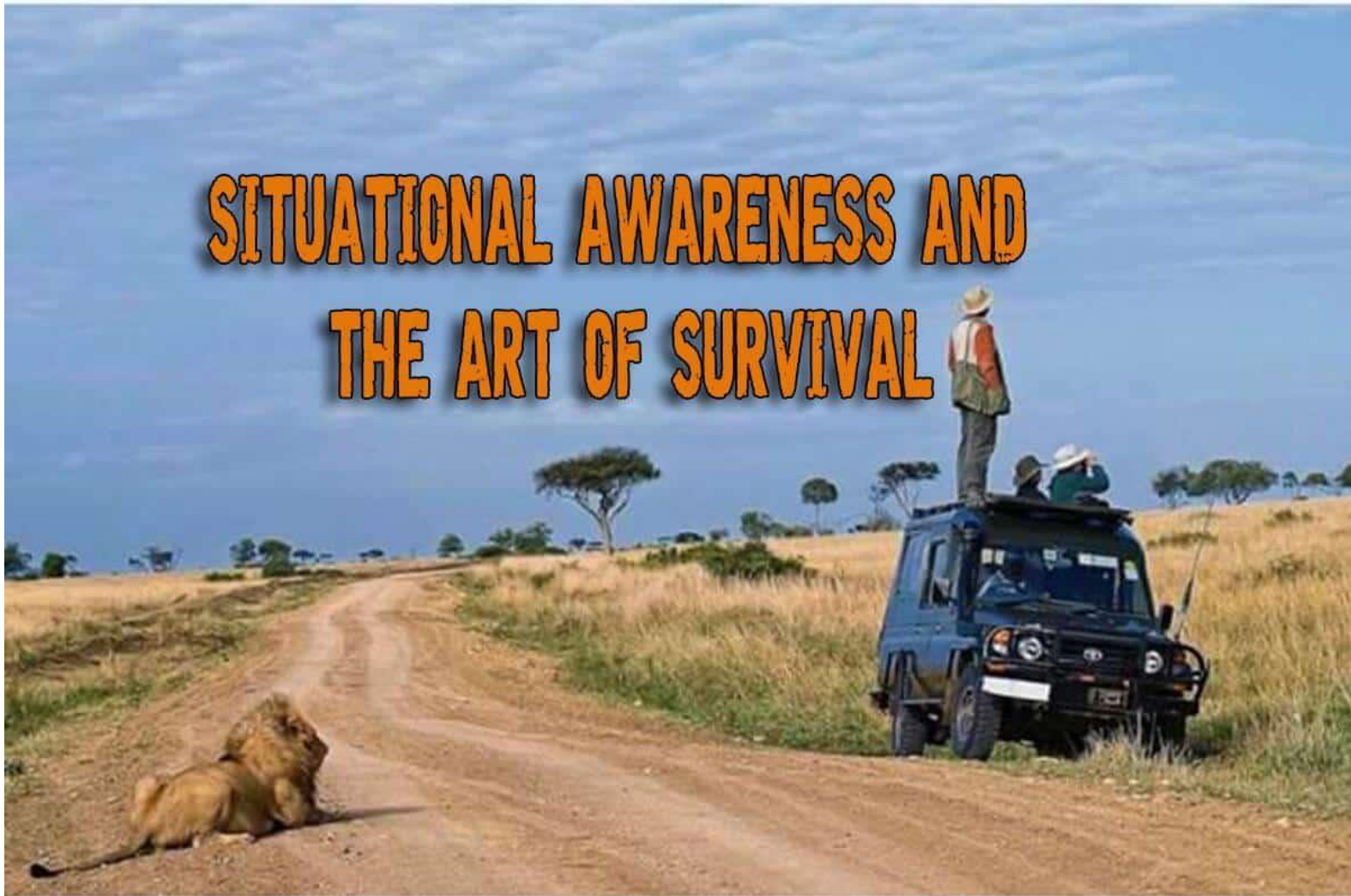
Konsequenz

Unfälle werden durch Kontrolle und Dämpfung der Schwankung verhindert. Die Sicherheit setzt eine konstante Fähigkeit voraus, künftige Ereignisse zu antizipieren.

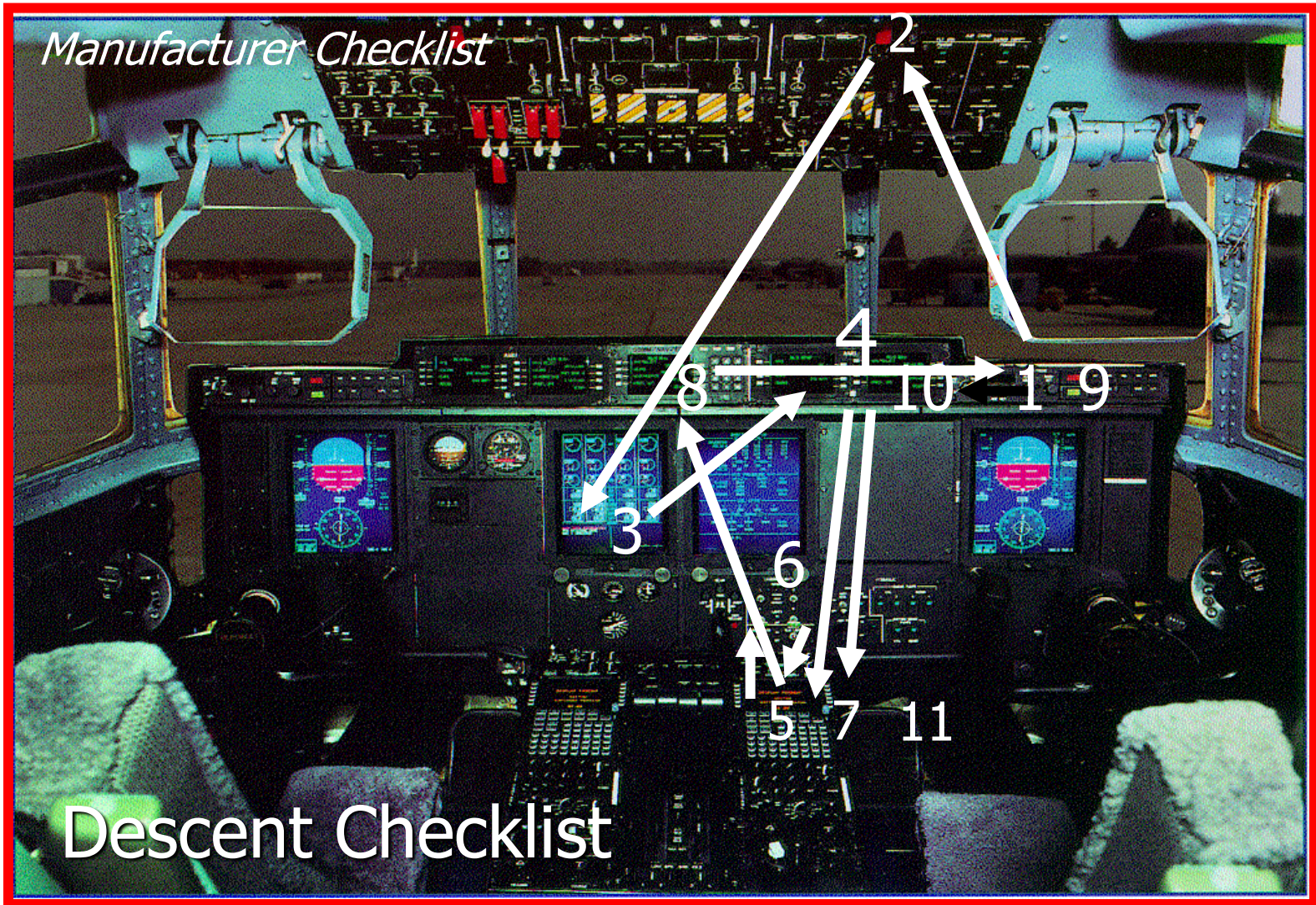
4. Risiken und Gegenmassnahmen

- ✓ Fokus auf Information-verarbeitung
Workload-/ Stressmanagement
- ✓ Leistung und Ziel
- ✓ Procedures and Standards
- ✓ Normal OPS Monitoring
- ✓ ORM
- ✓ Kultur Management

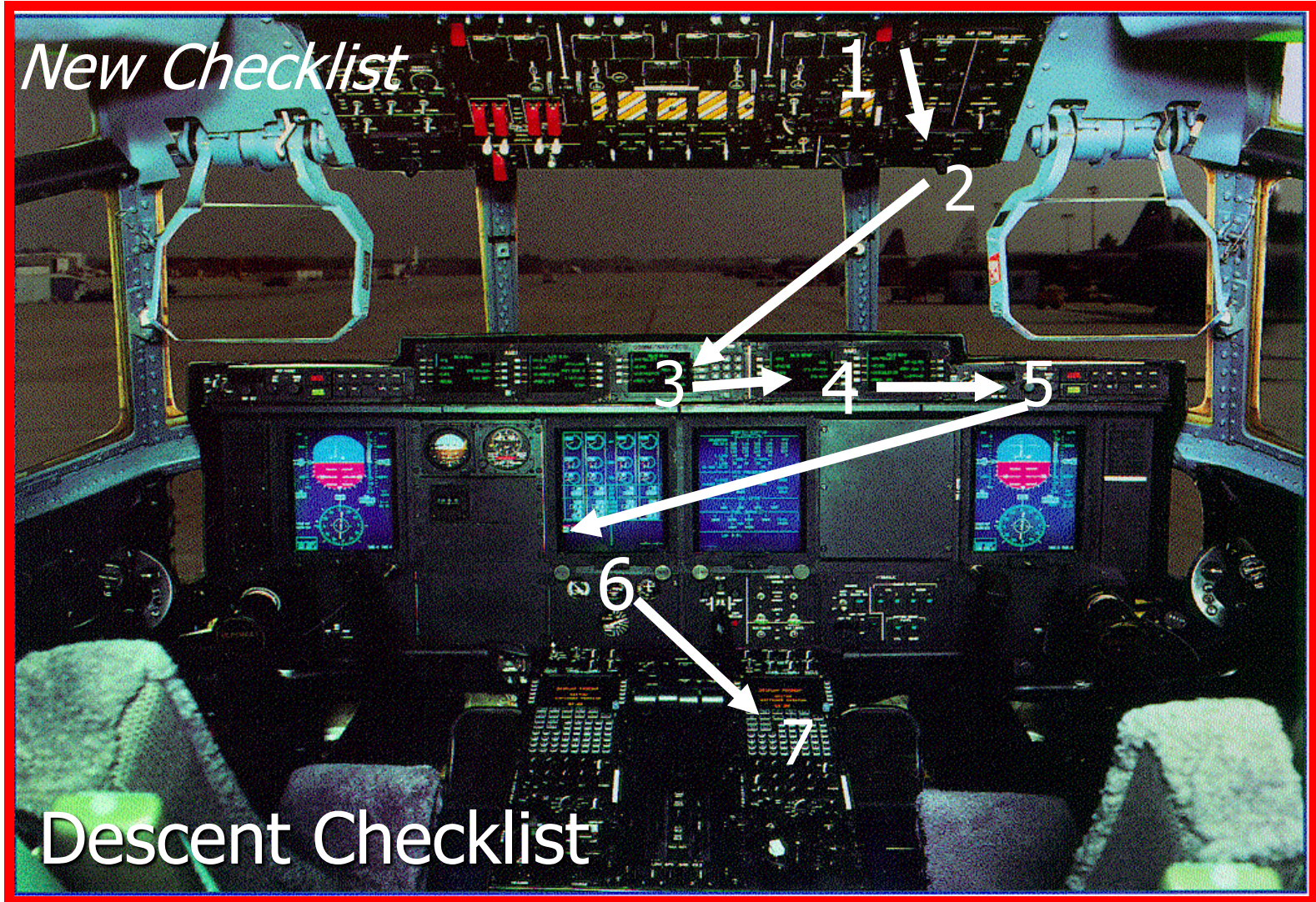
SA Situational Awareness



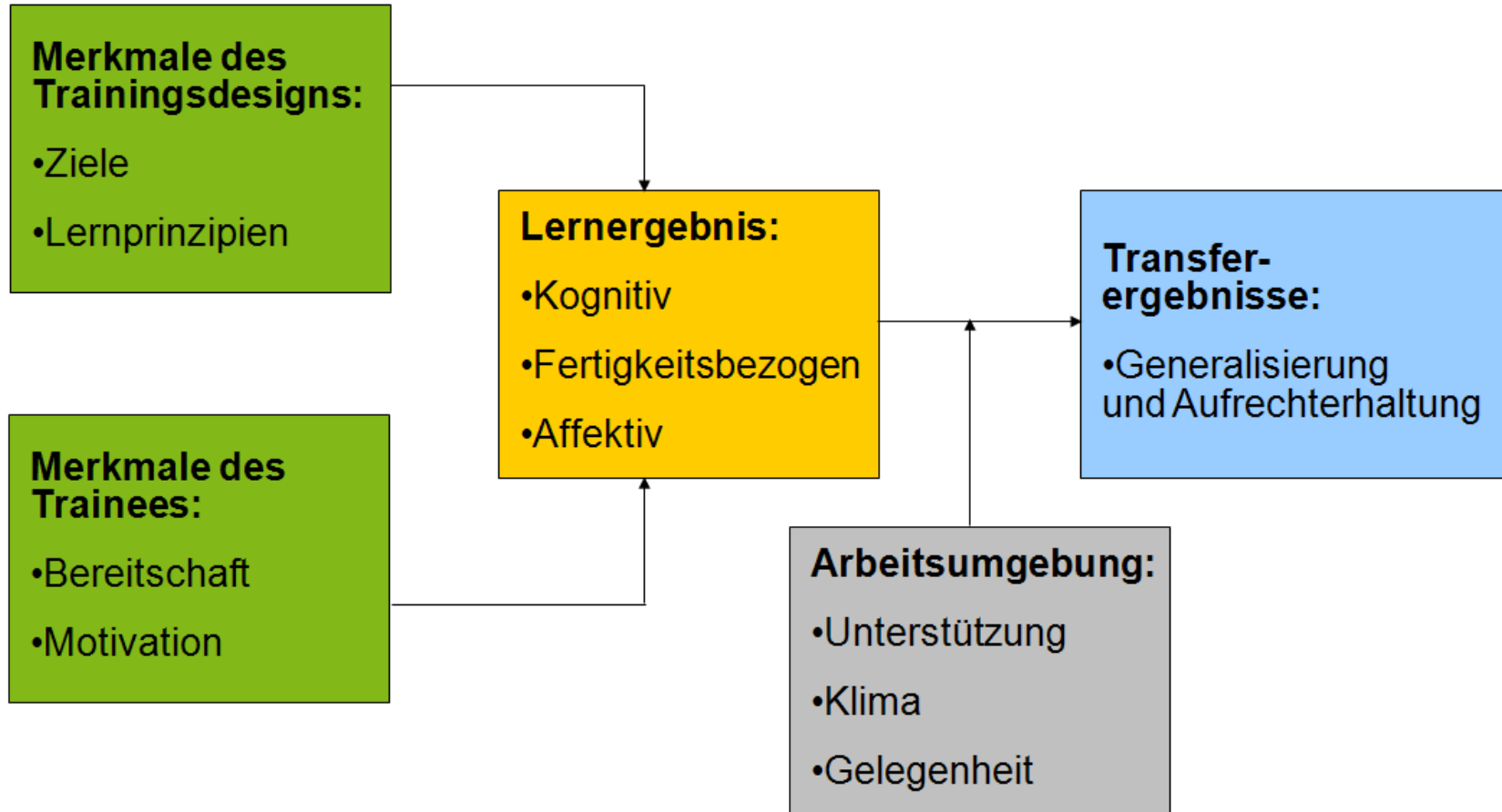
Situational Awareness und Scanning



Checklist Flow-Patterns

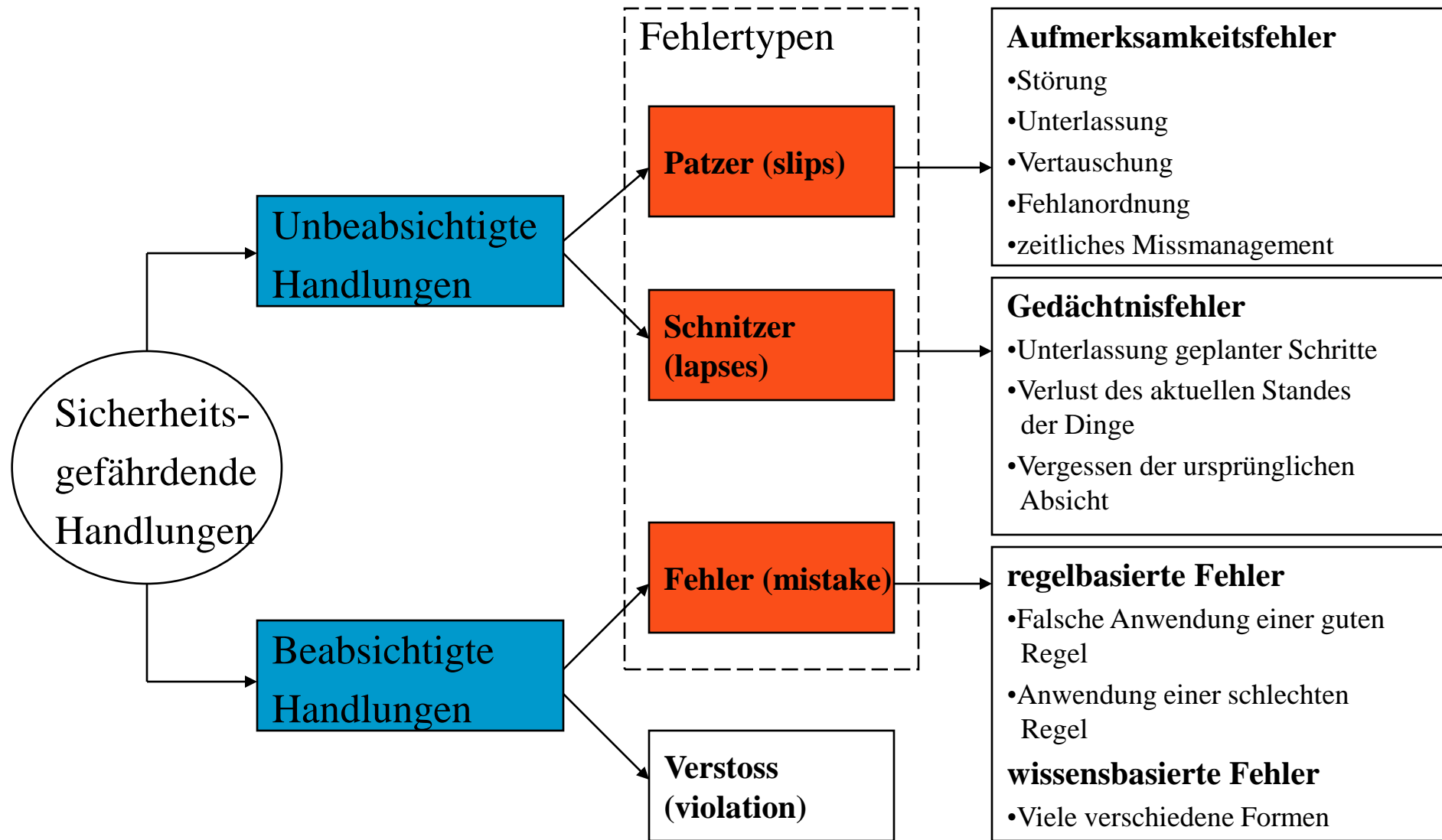


Merkmale in Bezug auf das Lernen und Transferergebnisse



Quelle: Baldwin & Ford (1988)

Sicherheitsgefährdende Handlungen





Simulator Training



Qualitätssicherung mit Checkflügen

Realistisches Pannentraining in modernen Simulatoren

Procedures and Standards



USE TOGETHER WITH THE "MENTOUR AVIATION" APP - FULL SETUP PLAYLIST

NORMAL

Flight Crews must complete both Safety Inspection and Engineering checks before the aircraft during a turnaround

SAFETY INSPECTION

SURFACES & CHOCKS.....CHECKED
 MAINTENANCE STATUS.....CHECKED
 BATTERY.....ON
 ELECTRIC HYDRAULIC PUMPS.....ON
 LANDING GEAR LEVER.....DOWN
 SHIPS LIBRARY.....CHECKED

BEFORE START

IRS MODE SELECTORS.....NAV
 *GEAR PINS.....REMOVED
 LIGHT TEST.....CHECKED
 *OXYGEN.....TESTED, 100%
 *YAW DAMPER.....ON
 NAV TRANSFER &
 DISPLAY SWITCHES.....NORMAL, AUTO
 *FUEL.....REQ'D, ONBOARD, PUMPS ON
 CAB/UTIL, IFE/GALLEY POWER (as installed).....ON
 EMERGENCY EXIT LIGHTS.....ARMED
 *FASTEN BELTS.....ON
 *WINDOW HEAT.....ON
 *AIR COND & PRESS.....PACKS, BLEEDS ON, SET
 *PRESSURIZATION MODE SELECTOR.....AUTO
 *INSTRUMENTS.....X-CHECKED
 *AUTOBRAKE.....RTO
 HYDRAULICS.....NORMAL
 *SPEEDBRAKE.....DOWN DETENT
 *PARKING BRAKE.....SET
 *STAB TRIM CUTOFF SWITCHES.....NORMAL
 WHEEL WELL FIRE WARNING.....CHECKED
 *RADIOS, RADAR & TXPDR.....SET & STBY
 *RUDDER & AILERON TRIMS.....FREE & ZERO
 *TAKEOFF BRIEFING.....DISCUSSED
 *PA.....COMPLETE
 *FMC/CDU.....SET
 *N1 & IAS BUGS.....AUTO / SET
 *STAB TRIM.....SET
 *EFB AND PHONES.....AIRPLANE MODE, STOWED
 *FLIGHT DECK WINDOWS &
 COCKPIT DOOR.....LOCKED
 *DOORS.....CLOSED
 *PASSENGERS.....SEATED

*AIR COND PACKS.....OFF
 *ANTICOLLISION LIGHT.....ON
 *PARKING BRAKE.....SET
 *TRANSPONDER.....ALT OFF

Normal Operation Monitoring

LOSA/Audit

Reporting Systems/SMS

Flight Data Monitoring



Touch Down Distances

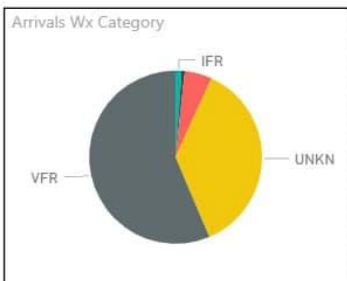
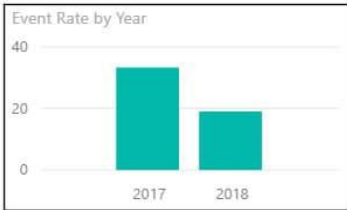
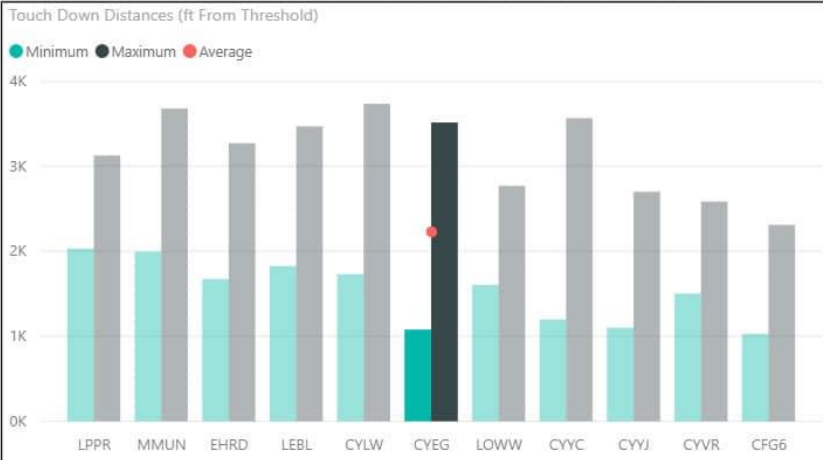
AType: B737-900ER

Date: Last 2 Years 25/07/2016 - 24/07/2018



60
Total Flights

17
Long Landings



Mission						
Mission Complexity						
Mission	2 v X	1	4 v X	2	> 4 v X	3
Special Mission (VIP, Fly-By, Film, etc.)						2
EKLL						1
NAV Low Level						2
EW						2
NVG						2
MFFO (Foreign)						3
AAR						3
Hot Mission						3
Non Swiss Opponents						2
Not in Swiss Airspace / Cross-Border						2
Environment						
Visibility NAV/EK		< 8 km	1	< 5 km		2
IMC Fight / Haze / Bad References (Horizon)						2
High Top (> FL 280)						1
Low Minimum (ILS Min +300)						2
X-Wind			15-30 kts			2
Thunderstorms/Turbulence						1
Night						2
RWY Conditions: Snow/Ice/Flooded						2
Airbase Familiarization						2
Aircraft						
Other than Clean or FE						2
Departure Prone Config						2
Miscellaneous		1		2		3

Crew				
Crew Rest	< 12 h	1	< 10 h	2
Experience (Hornet)			< 250 h	2
In Qualification/Upgrade				2
OPS Tempo: 1 or less/ >7				2
Training for current Mission				2
Day Night Switching				1
Duty Day at Engine Shutdown	> 8 h	1	> 10 h	2
Side Jobs: A lot of Work in the last few days (multi-or overtasking)				2
Planning				
Last Minute Change / Schedule Notification (<4h)				2
Personal Preparation			minimum	2
Miscellaneous				
		1	2	3

Total Mission	
Total Crew	
Total	

0-12 Green / Low Risk no further action required
 13-20 Yellow / Medium Risk consider measures to reduce risk
 >20 Red / High Risk contact MISMO / CO



NOTES :
Mission > Pilot :
 Think about Reducing Risk
Pilot > Mission :
 Think about Personal SA-Loss Caution Lights:
 Poor Comm, Fixation, Confusion, Wingman Syndrome, Busting Limits,
 Undocumented/Unbriefed Procedures or A/C Handling, Behind the A/C, ect.

**«Humans give their very best to achieve
thier goals »**



Nobody comes to work with the intention to perform badly...

Airmanship corner values

Safety minded
Manage resources
DM

Feedback open
communication

Slow down
step by step



Time
management
Balance and make
1 step back

Follow the rules

Awareness
Be ahead of the ac
and your personal
performance

Shirley Slade WWII Pilot

Darf ich Fragen beantworten?



Herzlichen Dank für Ihre Aufmerksamkeit

