Austrian Aviation Technology Days „Safe Flight! – Digitalization & beyond"

Fachpanel „Environment & Human Factors" Impuls Talk: Human Factors in Air Traffic Management

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Austro Control Safety, Security & Quality Management

Integrated Management Systems / Human Factors

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SAFETY IS IN THE AIR

Speaker Profile

Academic Title	**Dr. rer. nat.**
Name	Michaela Schwarz

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Education	• Doctoral Degree in Organisational Psychology and Human Factors
Relevant Licences	• Aviation Psychologist (www.eaap.net)
	• Just Culture Trainer (https://www.justculture.org/)
	• CISM Basic Course Instructor (www.icisf.org)
Current Position:	• Senior Expert Integrated Management Systems /Human Factors
Previous	• Qantas Airways - Senior Adviser Human Factors
Employment:	• Open Solutions/ EUROCONTROL – Human Factors Adviser
Relevant international projects	• EUROCONTROL/ FAA Human Performance Standard of Excellence
	• SESAR/ NORACON 16.06.01.2b Application of Resilience Engineering Guidance to Multiple Remote Tower (MRTWR)
	• SESAR/ NORACON 16.01.02 Resilience Guidance Material for Safety Reference Material
Associations	• President of European Association for Aviation Psychology (President)
	• Austrian Aviation Psychology Association (Vice-Chair)
	• International Critical Incident Stress Foundation (Certified Trainer)
	• Berufsverband Österreichischer Psychologen (Member)

HUMAN FACTORS IN AIR TRAFFIC MANAGEMENT

Controller Working Position Area Control Centre Vienna
Source: Austro Control GmbH
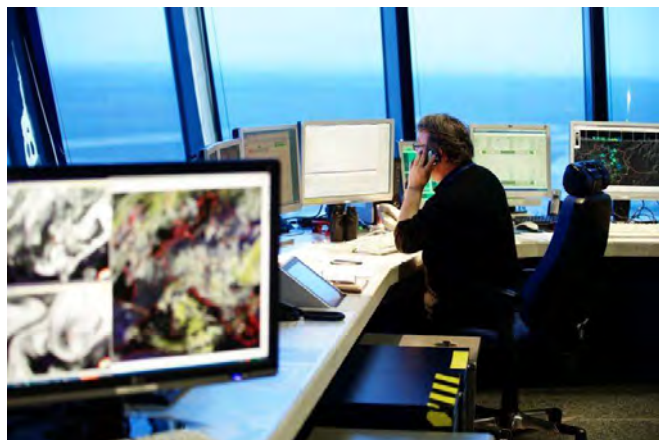
Aeronautical Meteorologist, Tower Vienna
Source: Austro Control GmbH
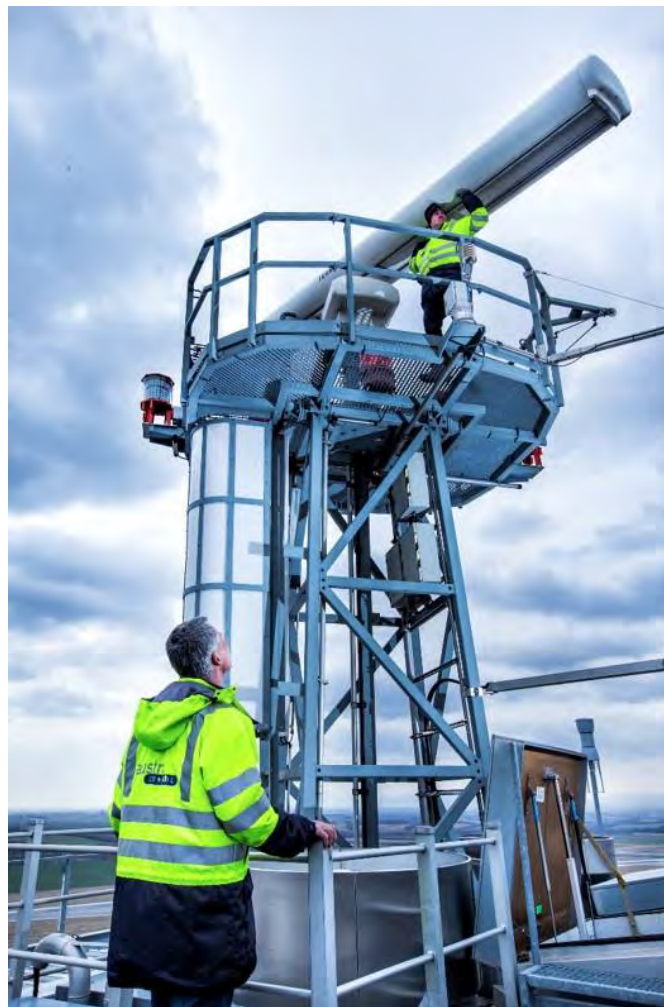
Air Traffic Safety Electronics Personnel
Source: Austro Control GmbH

Human Performance in ATM

Human Performance =
all **job-related factors** at individual, group and organizational level

Human Factors =
discipline applying **scientific knowledge** to **optimize well-being** and **system performance**.

(EUROCONTROL/FAA (2015). A Human Performance Standard of Excellence.)

Non-technical skills =
the **mental, social, and personal-management abilities** that complement the technical skills of workers and contribute to safe and effective performance in complex work systems.

(CASA (2011). Non-Technical Skills Training and Assessment for Regular Public Transport Operations, CASA CAAP SMS-3(1))

≠ Human Resource/ People Management:
a strategic approach to the management of an organisation's most important assets – the people working there.

≠ Human Capital Management:
an approach to obtaining, analyzing and reporting on data which informs the direction of value-adding people management)

≠ Personnel Management:
obtaining, organizing and motivating human resources

(Armstrong, M. (2006). A Handbook of Human Resource Management Practice, 10th Edition.)

Human Performance Management-
The Human-System-Interface

1. Human/Person
→ help people to detect and
   respond to errors

Source: Swiss Freddy Nock walking
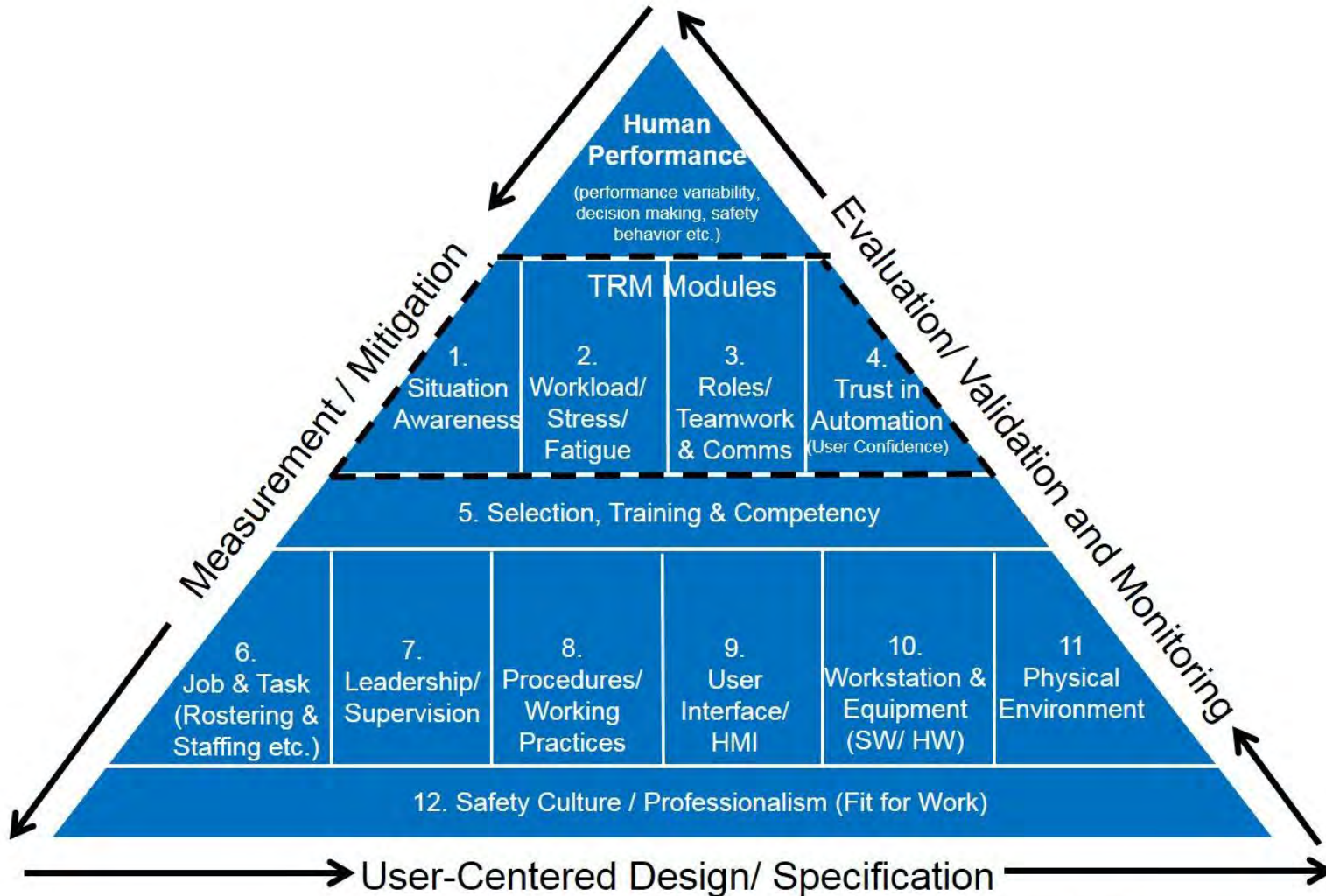a tightrope at Zugspitze (Germany)

2. System
→ build error tolerant systems
   (trap, manage and defend
   against error causes)

Source: Standard safety net

Human Performance Assurance @ Austro Control
More than the "dirty dozen"

Source: Adapted from UK NATS Human Factors Triangle (2012)
in line with EUROCONTROL Common Core Content/ Team Resource Management (TRM) Requirements (2008/2009)

10 Levels of Automation
(Sheridan & Verplank, 1978)

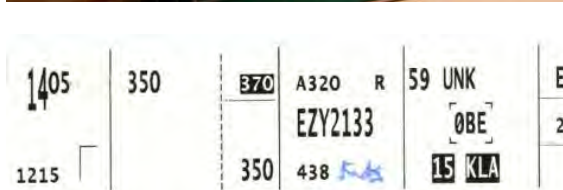| Level	Description
1	Computer offers no assistance, human must take all decisions/actions.
2	The computer offers a complete set of decision/action alternatives, or
3	Narrows the selection down to a few, or
4	Suggests one alternative, and
5	Executes that suggestion if the human approves, or
6	Allows the human a restricted veto time before automatic execution
7	Executes automatically, then necessarily informs the human, and
8	Informs the human only if asked, or
9	Informs the human only if it, the computer, decides to
10	The computer decides everything, acts autonomously, ignores the human

Thomas B. Sheridan

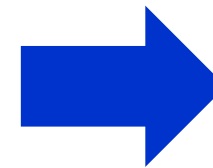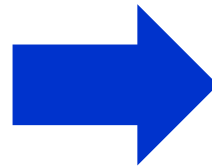William (Bill) L. Verplank

Papierstreifen → Elektronische Flugstreifen → Automatische Sektorlisten & System Coordination

Example 2a.
From regular tower to remote tower

Sundsvall Tower (2014)

Sundsvall Remote Tower Centre (2018)

Example 2b.
Multiple remote tower

Source: Sundsvall remote tower centre (Sundsvall ESNN & Örnsköldsvik ESNO)

Example 3.
Automated Safety Monitoring (Big data)

Source: EUROCONTROL ASMT User Forum April 2018

Example 3
Automated Safety Monitoring

▸ developed by EUROCONTROL

▸ used for recording of safety-related events by using radar track data, flight plans and ATC system alert messages (STCA, AIW, MTCD etc.)

▸ modules include automatic detection of:

- separation minima infringements (proximity between aircraft)
- aircraft that do not comply with cleared levels (altitude deviation)
- unauthorised penetration of segregated airspace
- Infringements of vertical and horizontal distances (rate of closure)

▸ Analytics/statistics:

- Geographical/ density maps of occurrences (hot spots)
- Time-based series & trends
- Correlations between metrics

▸ Main challenges:

- Data quality/ integration in local ATC systems
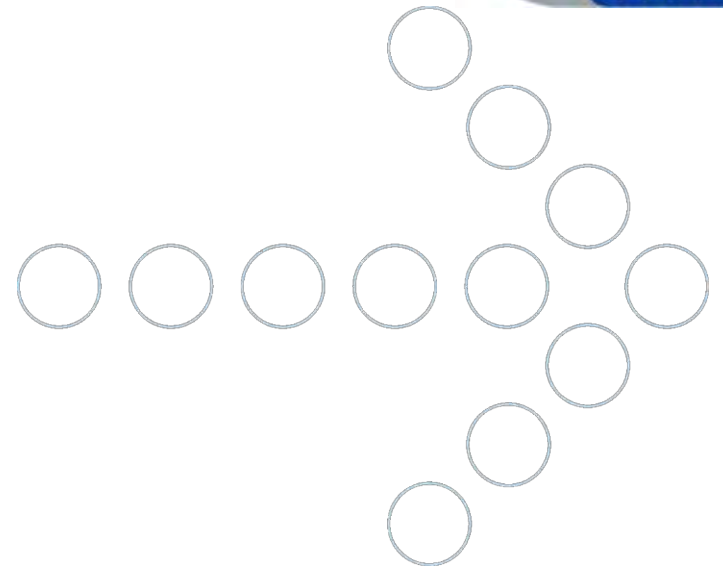- Interpretation of data
- Potential misuse of data (just culture)

CONCLUSIONS

▶ Automation is the prerequisite for digitalisation.

▶ Technology is fascinating, but …

▶ … the human operator still remains at the heart of the ATM system.

▶ Human aspects should be considered to get the user's buy-in.

▶ Trust into automation / digital data/ processes is an issue.

▶ Over-reliance on automation is an-issue/ false sense of control.

▶ Automation/ digitalisation is complex.

▶ If designed right, it can enhance human performance, but …

… what do you think?

Thank you for your attention!

Questions, Ideas, Concerns?

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