

# HANDLING AUTOMATION & FLIGHT PATH MANAGEMENT

- *WORKSHOP* -

Rotorcraft Symposium  
11th of December, 2019, Köln  
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**Together4Safety**

SRH University of Applied Sciences, Heidelberg  
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- Diplome Psychology & Doctor Degree in Engineering Psychology
- Commercial Helicopter Pilot
- Quality and Safety Manager for Part-145 and Heli Operators
- Consultant, Coach and Trainer (e.g. Human Factors, CRM)
- Member of European Association of Aviation Psychologists, European Safety Promotion Network Helicopter (ESPN-H) and German Helicopter Association (DHV)

# Goals for today

- > Gain general awareness and understanding of how **automation** is related to human perceiving, thinking, feeling and behaviour and how these **human factors** can contribute to the safe outcome of a helicopter flight..
- > Sharing experiences with the usage of automation and helicopter flying



Awareness &  
reflection

# Agenda



- What are “human factors”? How are they related to technology, automation and safety?
- Different perspectives on human factors, automation and flight path management
- Conclusions

With interactive  
parts – via sli.do

# Topic of this session

Handling

automation and

flight path management

..... for a safe (and fun) flight



Awareness &  
reflection



# Human Factor(s) ..

How do you define *human factors*? What role do they play in helicopter operations?



Time for  
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# Human Factor(s) ..

... are the CORE of every helicopter operation and all tasks related to it (e.g. maintenance).

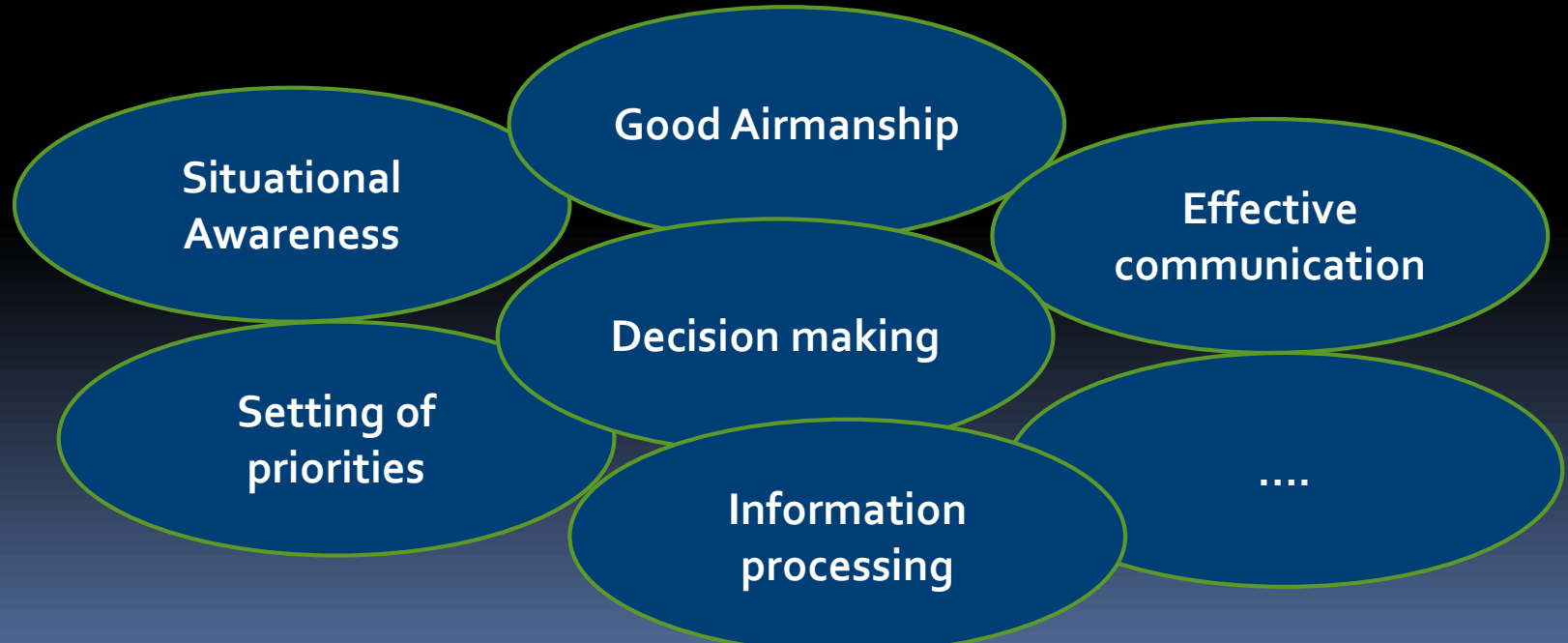
Perceiving, thinking, feeling and acting of the human being over the whole helicopter lifecycle with all involved tasks like flying, maintaining, designing..  
- in interaction with other people, technology and embedded in an organisation (e.g. processes)

=> In interaction with a (more or less) complex socio-technical system

# Beyond Human Factors

Optimising the relationship within systems between people, activities and equipment"

(Australian Government, Civil Aviation Safety Authority)





# Spot on..





Spot on..



# The big picture..

Personality,  
Experiences,  
Knowledge,  
Competencies

Processes &  
Organisation

Tasks



Environment:  
Nature & Social

Technology &  
Automation

# Automation needs to be thought of not only in the helicopter...

Definition of Requirements

Product planning

Design & Construction

Production

Operation

Maintenance

Recycling

... but also along the lifecycle of a helicopter..

=> Individuals in different roles,  
with different tasks and goals..

# Human Factor(s) & Automation

What are your experiences with automation (and flight path management)?

*e.g.: Can you remember a situation where automation played an essential role for the safe outcome of your operation?*



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# Human Factor(s) that contribute to accidents/incidents I (extraction)

- Intimidation (i.e., non-interaction with or late takeover from automation when needed)
- Overconfidence / overreliance (i.e., excessive delegation)
- Complacency (i.e., passive attitude, lack of active supervision)
- Inadvertent arming or engagement of an incorrect mode
- Selection of an incorrect target (e.g. altitude ALT, speed IAS, heading HDG, radial )on Autopilot Control Panel PCP and failure to confirm the selected target by cross-checking the related target symbol on the Primary Flight Display and/or NAVD

Source: HEg, EHEST training leaflet on Automation and Flight Path Management, EASA

# Human Factor(s) that contribute to accidents/incidents II (extraction)

- Insertion of an erroneous waypoint on the FMS
- Focusing on the FMS during a critical flight phase, with consequent loss of situational awareness
- Untimely override action interfering with automation
- Inadequate task sharing and/or CRM practices preventing the PF from monitoring the flight path and airspeed (e.g., both pilots being engaged in the management of automation or in solving an unanticipated situation or abnormal condition)

Source: HE9, EHEST training leaflet on Automation and Flight Path Management, EASA

# Degrees of Automation

Step 0	Step 1	Step 2	Step 3	Step 4	Step 5
Pilot only / no automation	Assisted	Partly automated	Highly automated	Fully automated	Autonom
<p>Pilot controls all functions and flies „hands on“.</p> <p>-&gt; HIGH WORKLOAD</p>	Pilot controls all functions and is assisted by the system	Pilot must monitor the system permanently and has the overall responsibility	<p>Pilot must not monitor the system permanently anymore. He can take away attention in special situations from the flying task.</p> <p>Pilot must potentially be able to take over control</p>	<p>Pilot needs to be fit to fly.</p> <p>In special cases the pilot is asked to take over control.</p>	Pilot = Pax
No intervening system active	Assisting systems support the pilot, they do not take over control	System controls e.g. speed and direction	System controls e.g. speed and direction. It detects limitations and asks the pilot to take over with sufficient time reserve	The system flies predominantly autonomous.	The system takes over all flight related functions.





# Human Factor(s) & Automation

What are for you key success factors regarding automation and helicopter flying?



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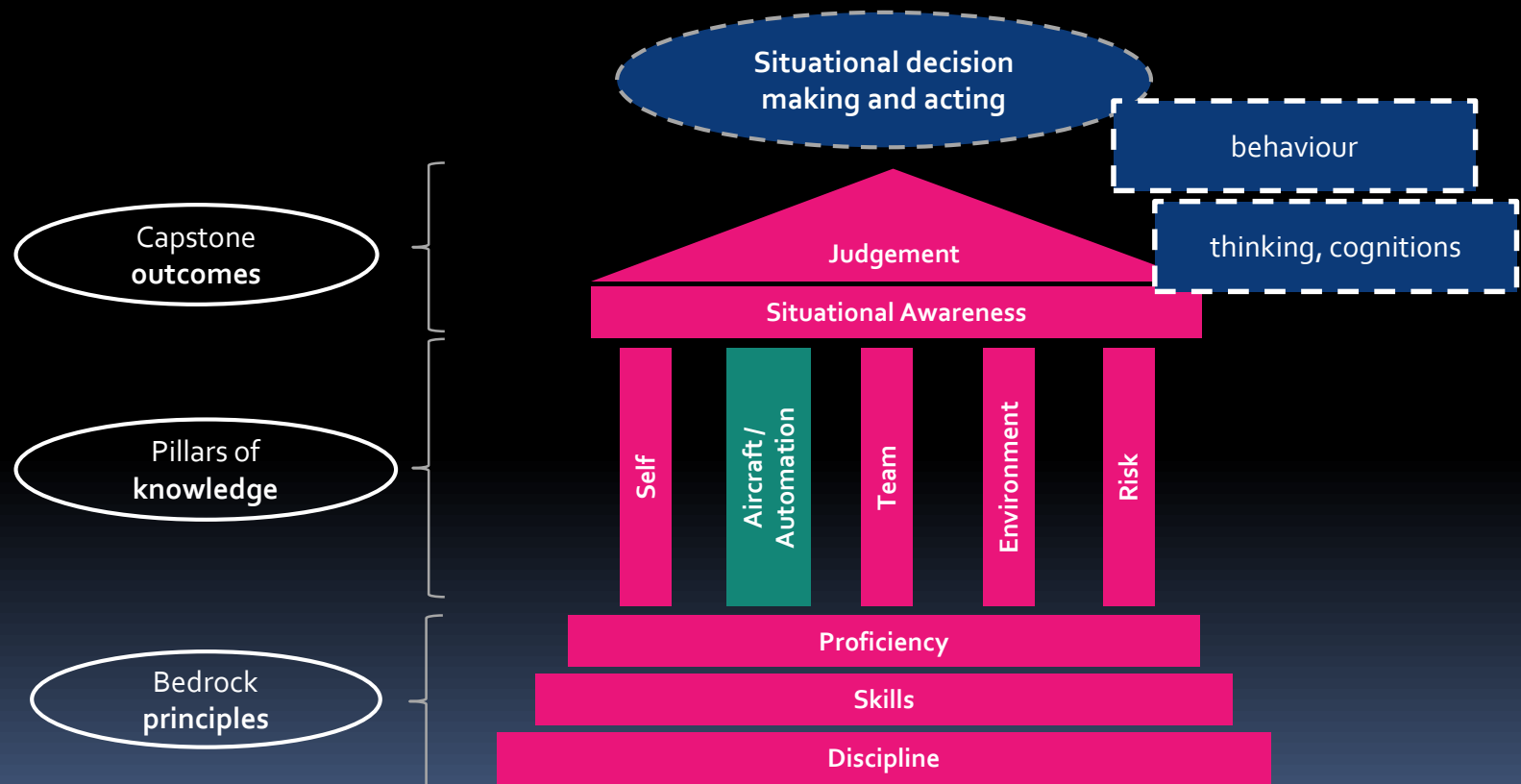
# Some Success Factors

1. Automated helicopter can be flown like any other helicopter -> Knowledge of the system is crucial!
2. Fly, Navigate, Communicate (SOPs), Manage the flight/operation
3. One head up at all times
4. Cross check of the accuracy of the FMS
5. Know your Flight Mode Annunciator (FMA) at all times
6. When things don't go as expected – take over!
7. Use the proper level of automation for the task
8. Practice task sharing and back-up each other (CRM)

Source: HE9, EHEST training leaflet on Automation and Flight Path Management, EASA

# A Model for Airmanship

(Kern, 2009)



Source: Civil Aviation Authority 2009 „Safety Behaviours“, aus Kern, Tony

# Human Factor(s) & Automation

If you had one wish free regarding the future of automation and helicopter flying.. What would this wish be?



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# Conclusions & Summary

- Helicopter flying, maintaining, designing... is all about human factors – as all of these activities are mainly (and still!) driven by human perception, thinking, feeling and behaviour.
- The goal oriented design and use of technology and automation can be a big success factor in flying a helicopter safely.
- Until we rely on the pilot flying the helicopter (all degrees of automation other than autonomous flying): the system has to follow the human factors (and its limitations).



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