EUROPEAN ROTORS | THE VTOL SHOW AND SAFETY CONFERENCE

Cologne, Germany
17–20 Nov 2025
Exhibits Open 18–20 Nov
europeanrotors.eu

EMERGENCIES – TRAINING THE BRAIN

JONATHAN GREENALL, CHIEF PILOT, BALEARIC HELICOPTERS

organised by EHA European Helicopter Association | EASA European Union Aviation Safety Agency

produced by VERTICAL AVIATION INTERNATIONAL

supported by AIRBUS | BELL | LEONARDO | SAFRAN

Threat Error Management

Anticipated

- Managed by:
- MATED Brief
- Preflight Planning
- Mitigation

Threat Error Management

Unanticipated

- Managed by:
- Training
- Experience
- But – susceptible to Startle Effect

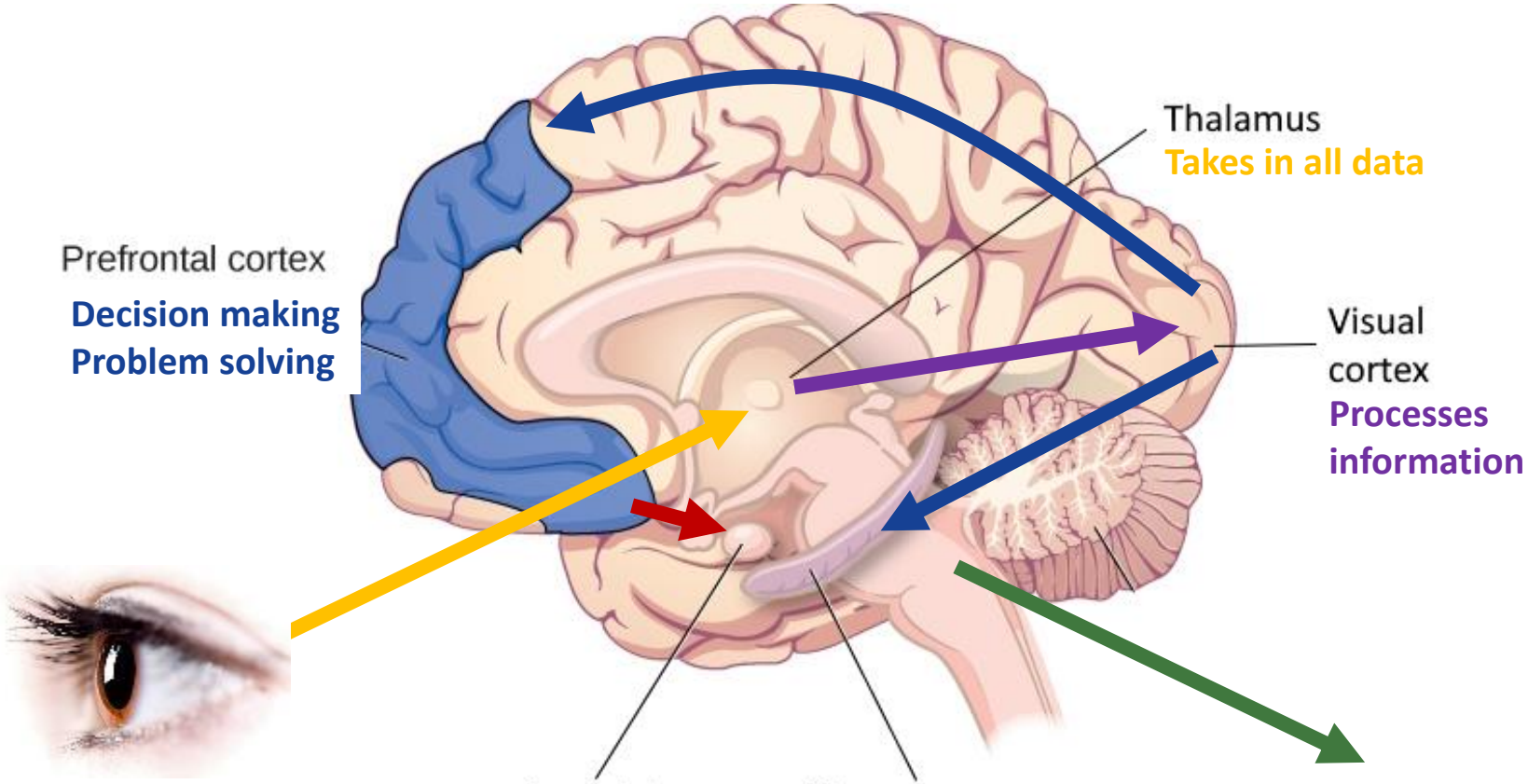
Threat Error Management

Latent

- Managed by:
- SOP’s,
- Safety Culture - reporting
- Training

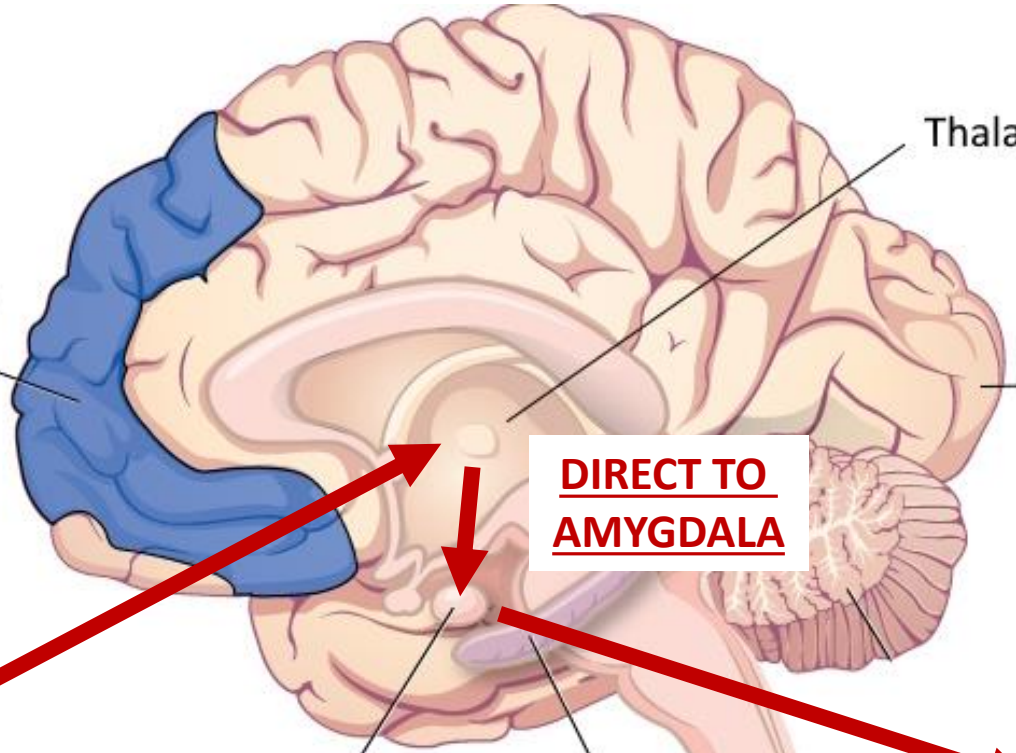
Threat Error Management

Normal brain processing in flight



Startle processing in flight

Amygdala Hijack



AMYGDALA HIJACK

STARTLE

- HEARTBEAT & BLOOD PRESSURE RAPIDLY INCREASES
- BREATHING INCREASES
- EYES FOCUS INTO DISTANCE – TUNNEL VISION
- ADRENALINE RUSH
- GLUCOSE RUSH
- (DIGESTIVE SYSTEM STOPS)…

AMYGDALA HIJACK

STARTLE

FIGHT FLIGHT FREEZE

You WILL immediately:

Act without rational thought

- No cognitive responses
- Move backwards and duck – “away from the danger”
- Shout or Scream – warning the “pack of danger”
- Overreact with excessive inputs or…

- No reaction at all (FREEZE)

STARTLE - Birdstrike Video

Note the reaction

https://youtube.com/shorts/JoDAIaN5tj0?si=BGFFMg-rS6NKX8Tg

Recovery from STARTLE

THIS IS AN AUTOMATED RESPONSE

- PHYSICAL TIME TO RECOVER CAN LAST UP TO 3 SECONDS

- COGNITIVE TIME TO RECOVER CAN LAST BETWEEN 30 – 60 SECONDS!

B206-L VH-ZMF

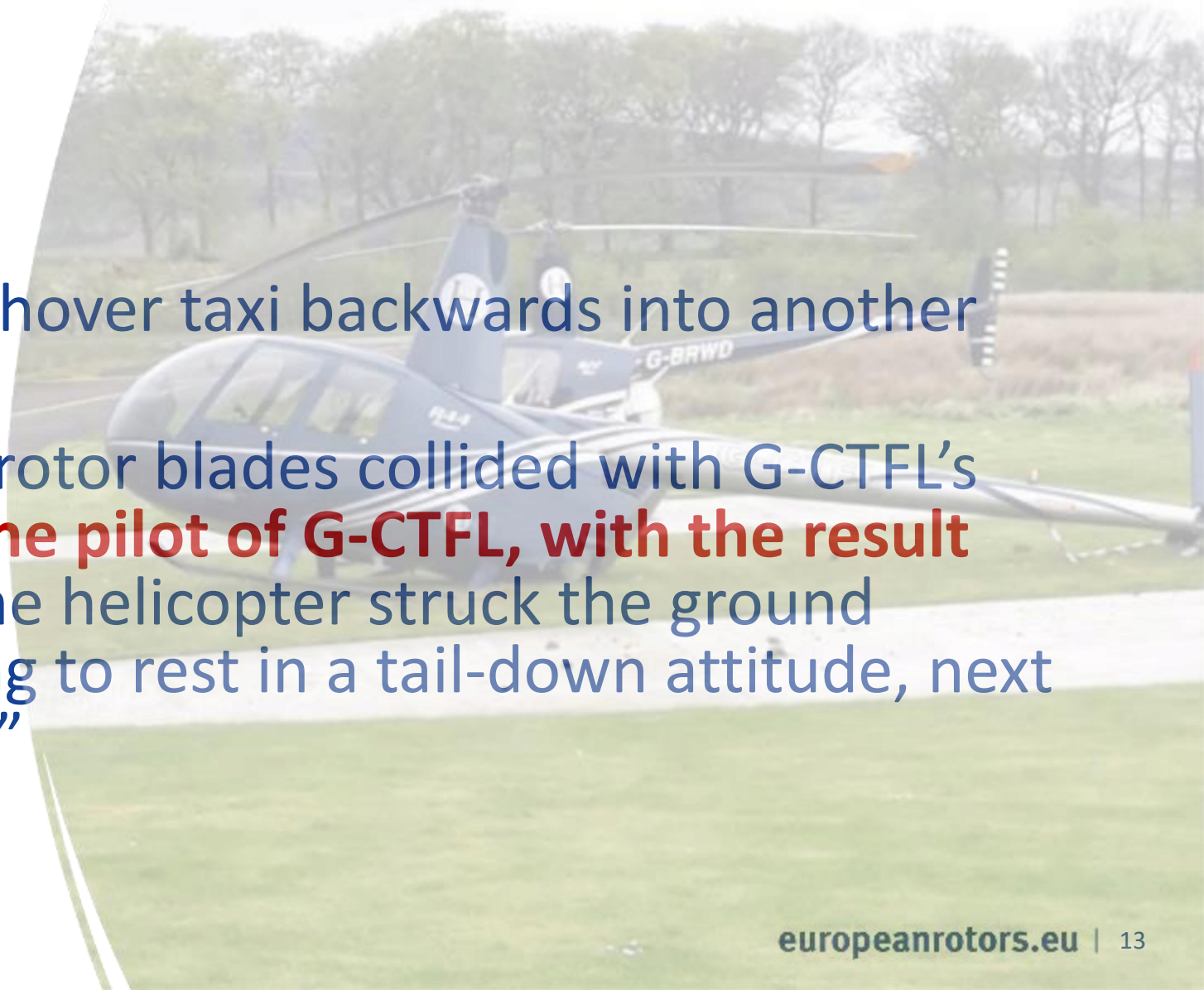
Fatal, 1 POB, 09 July 2022

- Inflight Break up
- Pilot over controlling after bird strike
- Report: “The pilot was likely **startled and initiated abrupt control inputs leading to the main rotor severing the tail boom**. This led to an inflight break-up of the airframe and collision with terrain.”

R44 G-CTFL

Non-fatal, 05 May 2018

- Hard landing
- Pilot over controlling after hover taxi backwards into another R44 shutting down behind
- Report: “One of G-HYND’s rotor blades collided with G-CTFL’s engine housing, **startling the pilot of G-CTFL, with the result that he lost control**, and the helicopter struck the ground several times before coming to rest in a tail-down attitude, next to a parked Robinson R22..”



The Brain will then move into the next phase:

SURPRISE

- Surprise:
- An unexpected event
- Normally the emergency will be both startle and surprise however,
- It is possible to have a startle event with no surprise
- It is possible to have a surprise event with no startle

SURPRISE EVENT

Automated Response

- Interrupt any ongoing task
- Increased heart rate & blood pressure
- Breathing increases
- Inability to comprehend/analyse
- Not remembering appropriate operating procedures
- Increased error rate
- Impairment of problem-solving and decision-making
- Loss of situation awareness

SURPRISE – Actual Engine failure during training

https://youtu.be/TBVZagh6c3U?si=9BU_uHOkkDgte-Hs

SURPRISE – Actual Engine failure during training

NOTES

- WHEN DID THE ENGINE ACTUALLY FAIL?
- “ALTERNATOR LIGHT” CONFUSION?
- “GOVERNOR ON” CONFUSION?
- INCREASED BREATHING
- OVER CONTROLLING – HIGH & LOW RRPM
- REALISATION OF ACTUAL ENGINE FAILURE

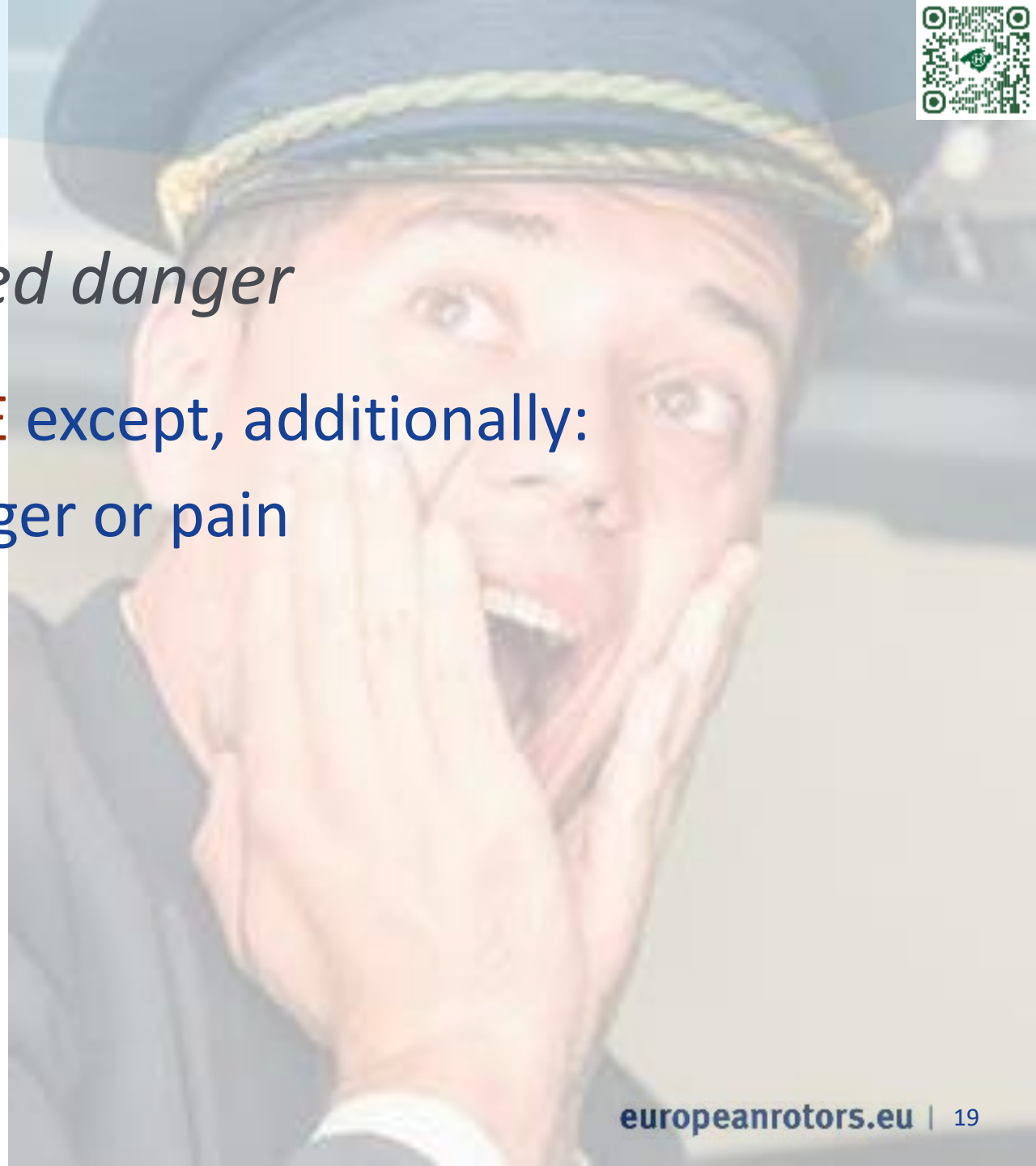
SURPRISE – Actual Engine failure during training

https://youtu.be/TBVZagh6c3U?si=9BU_uHOkkDgte-Hs

FEAR RESPONSE

Emotion triggered by perceived danger

- The same response as SURPRISE except, additionally:
- Negative feelings of threat, danger or pain
- Usually due to:
- lack of awareness
- lack of experience
- or not understanding the event



Overcoming Fear

“Facing your fear”

- Understanding Standard Operating Procedures
- Understanding Emergency Procedures
- Understanding Systems
- Understanding Aerodynamics

- Train accordingly…

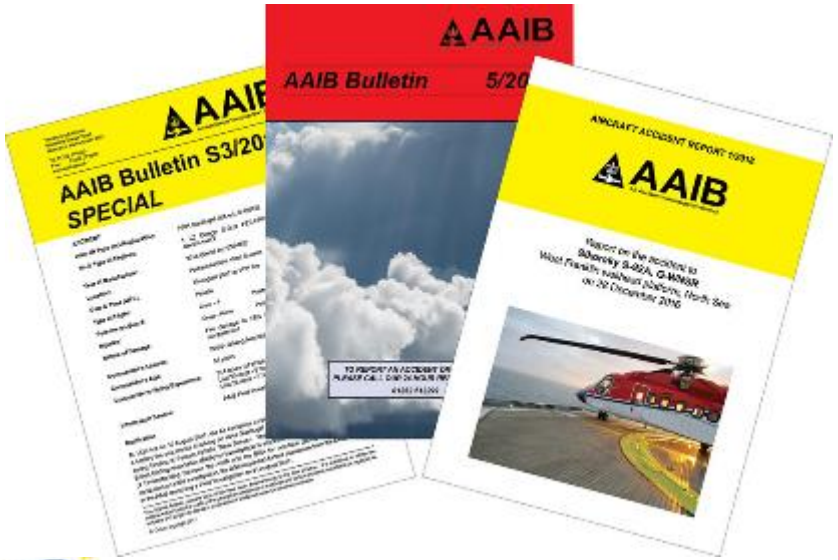
Overcoming Startle & Surprise

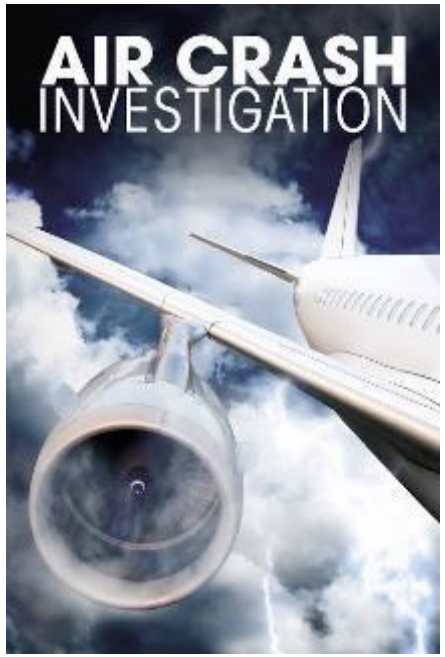
- Teaching and training the effects of startle and surprise
- Understanding the effects
- Ways to mitigate the effects

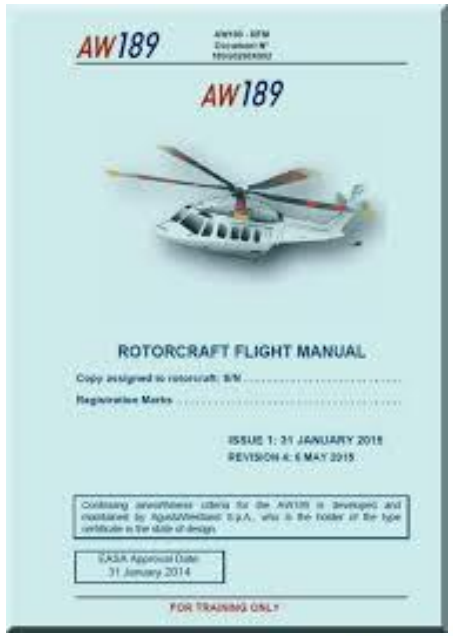
MITIGATION - Learning

Watching and reading about past events

Flight Manual Procedures







MITIGATION - Doing

Flight Training Scenario Based Training

Sim Training Scenario Based Training

MITIGATION - Mental Visualisation

“What would I do?”

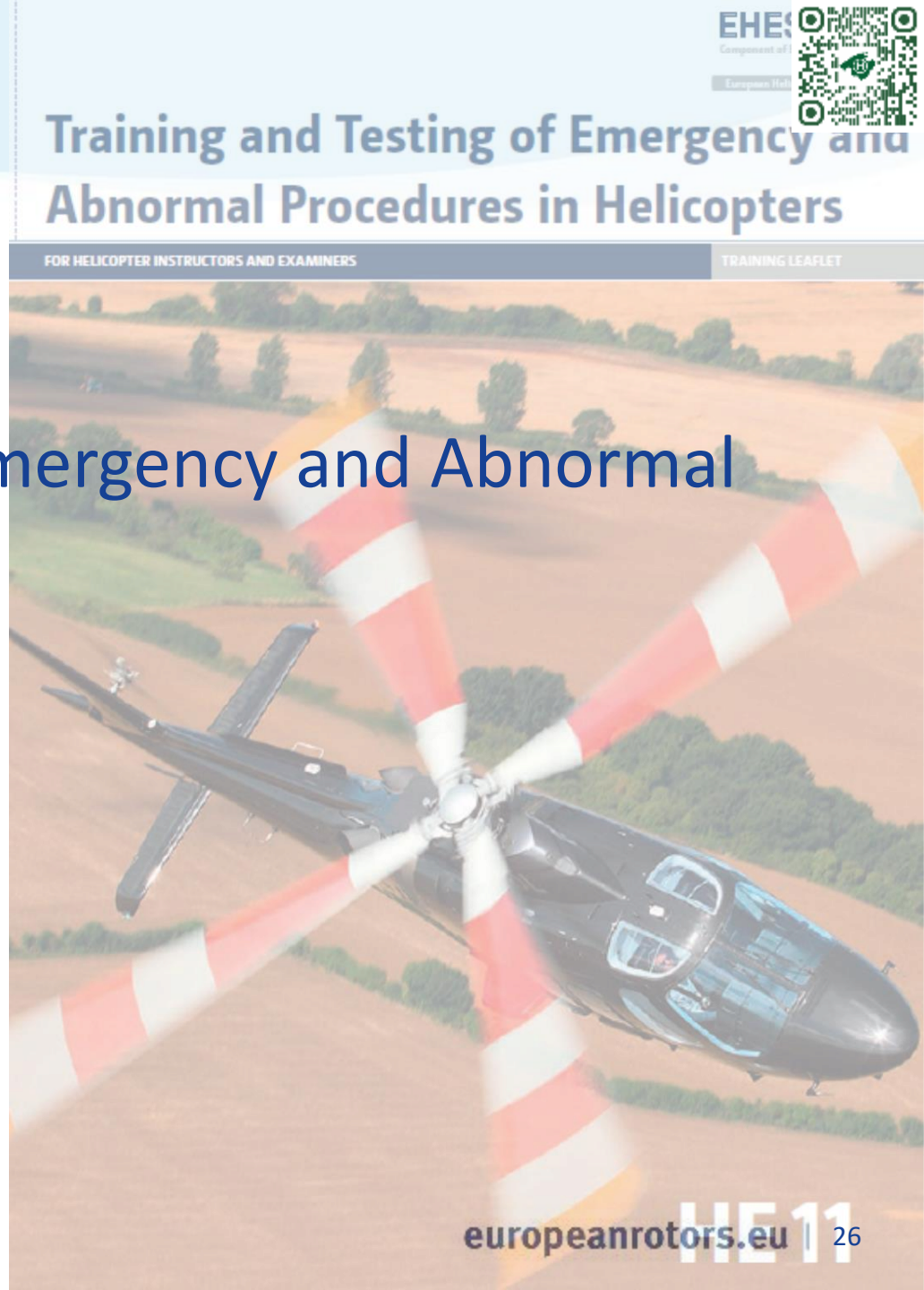
Current Training Dangers

Current training philosophy is to focus teaching on engine failures

- This leads to pilots being overly conditioned to entering autorotation – regardless of event
- This causes accidents due the pilot mis-handling a benign emergency
- Maybe training should be more focussed on other dangers?
- DVE, Birdstrikes, Cascading Emergencies

Further Reading

- EHEST HE11 - Training and Testing of Emergency and Abnormal Procedures in Helicopters



EUROPEAN ROTORS | THE VTOL SHOW AND SAFETY CONFERENCE

WWW.BALEARIC-HELICOPTERS.COM