



# PILOT TRAINING ON THE STARTLE FACTOR

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Florence BURATTO  
Michel RICHARME

AIRBUS



**Startled?**



# Startled?

Traffic Alerts?

System Alert?

Lightning?

Loud Noise?

Bird Strike?

Turbulence?

# Agenda

1 Let's Define

2 What Do the Pilots Tell Us?

3 Some Startle Effects

4 Manufacturer Data for EBT

5 Manufacturer Analysis for  
Training Recommendations

6 Conclusion

# Surprising Event

Human exposure to a sudden, intense event that violates the pilot's expectations



In 1 second:

## Startle Bodily Response

Spontaneous and uncontrollable physiological and cognitive reactions

If insidious danger

If danger confirmed



## Stress/Fear

Strong and unpleasant emotion caused by a real or imagined danger

Stress,  
Light Apprehension

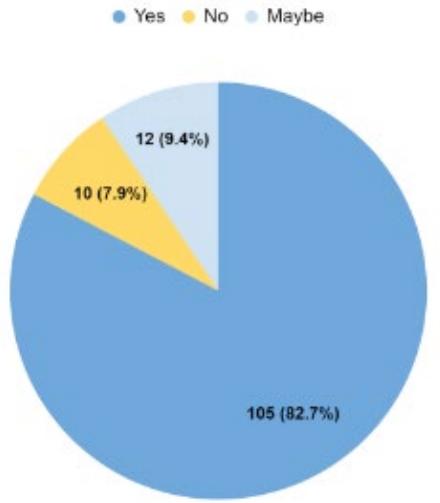
0 ← No Survival Risk

Fear, Panic and  
Petrification

10 → Perceived Survival Risk

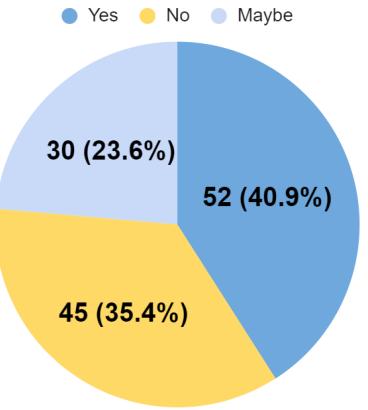
# First Results from Our Survey (in Progress)

Have you ever experienced surprising events during operations?

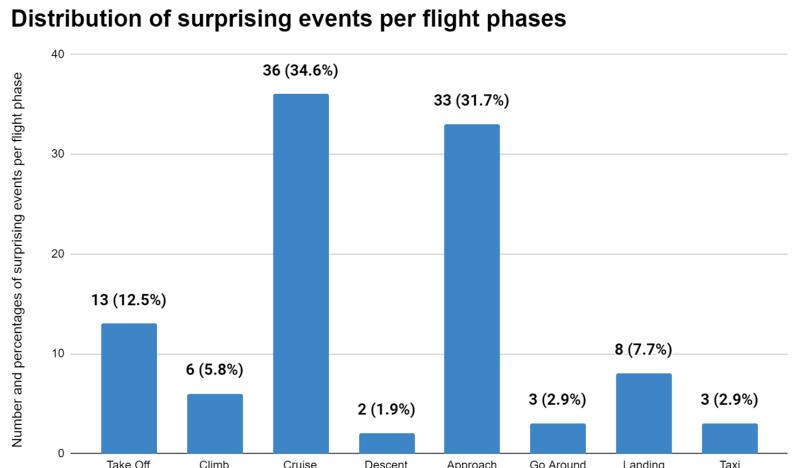


In this (these) event(s), did you detect you were startled?

Percentage of pilots who have detected being startled

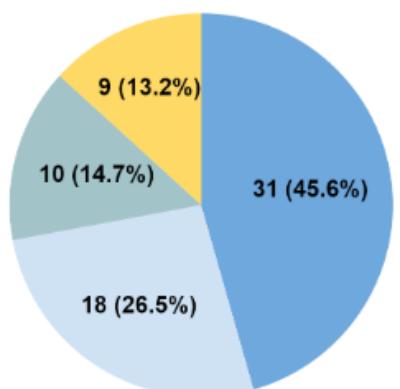


In which flight phases?



How did you recognize the startle effect on you?

● Physiological ● Cognitive ● Emotional ● General



On the experienced surprising events

On the recognition of the startle effects

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# SOME STARTLE EFFECTS

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# Examining Startle

Why?

## Precipitated Reaction

Act quickly without thought

## Preservation Reaction

Duck attitude/Back-forward reaction

**Body mobilized** to react quickly and prior to understanding (muscle constrictions, breathing, heart rate,...)



# Examining Startle

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## Overreaction

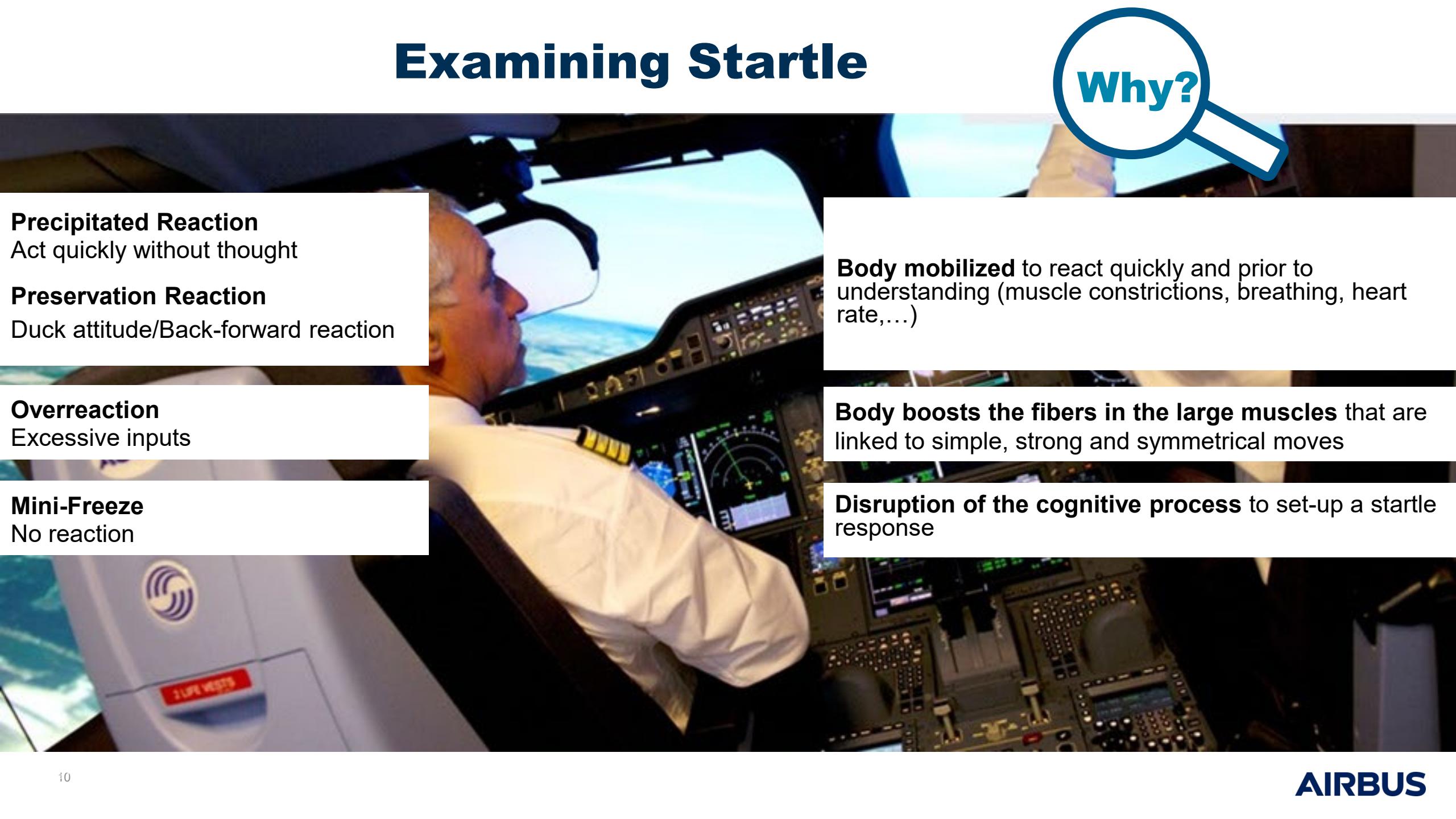
Excessive inputs

**Body mobilized** to react quickly and prior to understanding (muscle constrictions, breathing, heart rate,...)

**Body boosts the fibers in the large muscles** that are linked to simple, strong and symmetrical moves



# Examining Startle



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## Mini-Freeze

No reaction

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**Disruption of the cognitive process** to set-up a startle response

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Scream

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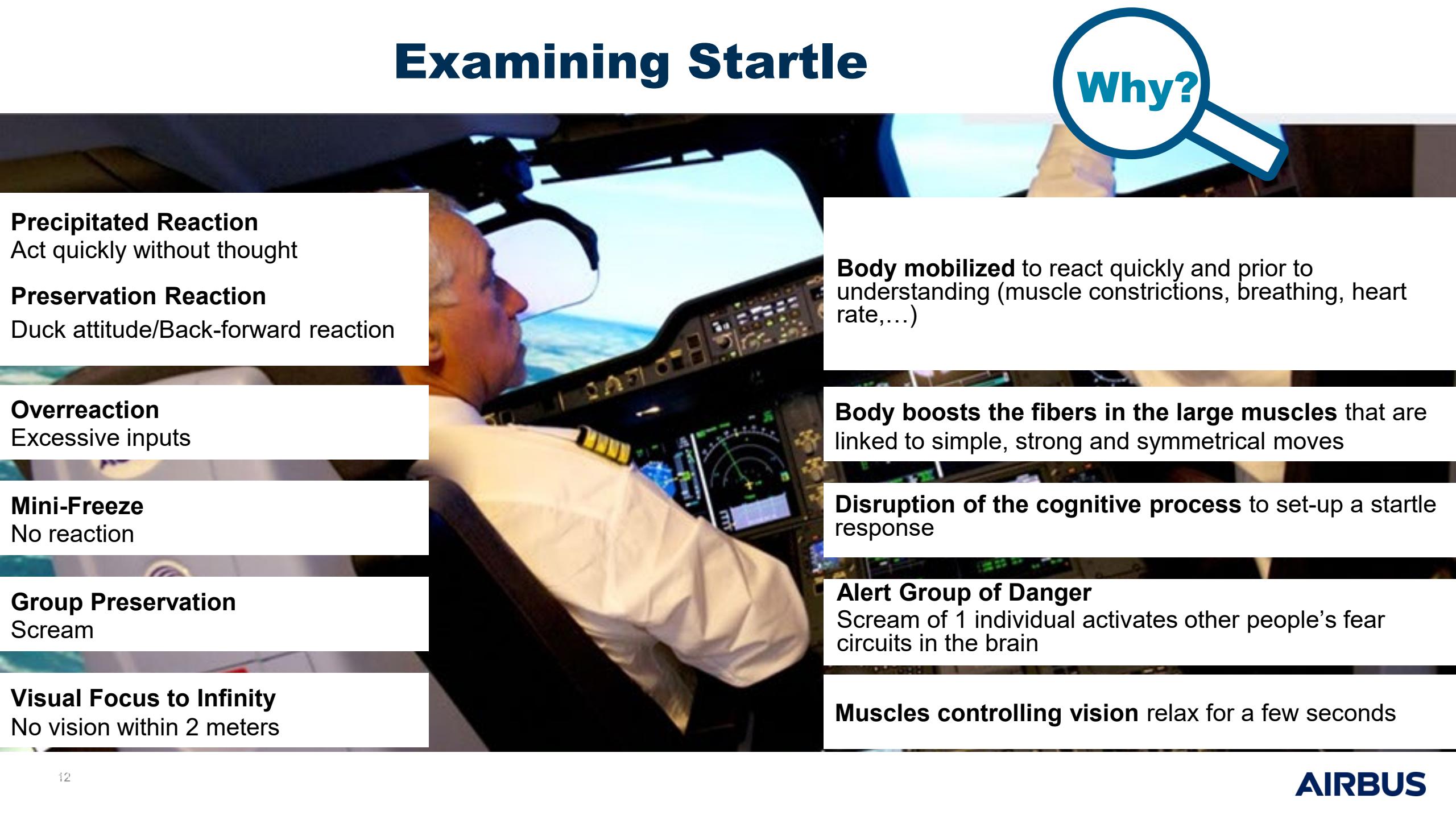
**Disruption of the cognitive process** to set-up a startle response

## Alert Group of Danger

Scream of 1 individual activates other people's fear circuits in the brain



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## Visual Focus to Infinity

No vision within 2 meters

**Body mobilized** to react quickly and prior to understanding (muscle constrictions, breathing, heart rate,...)

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**Disruption of the cognitive process** to set-up a startle response

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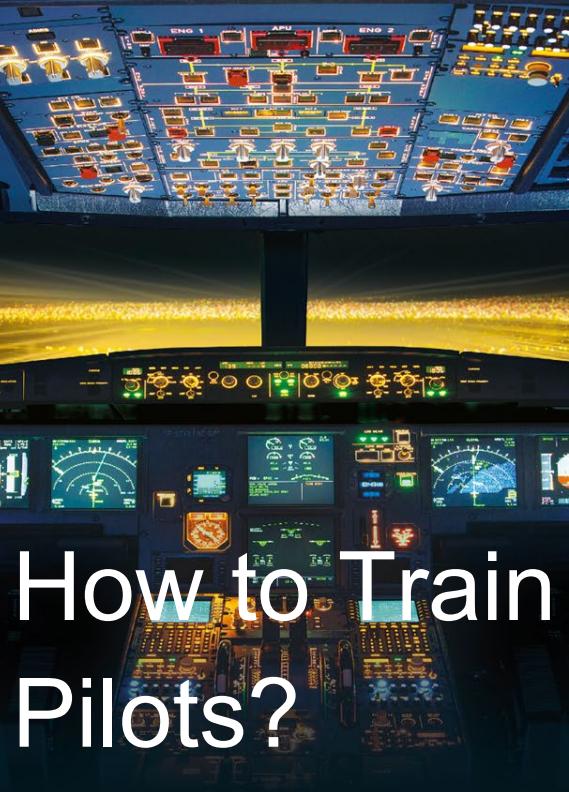
**Muscles controlling vision** relax for a few seconds



**Pilots are humans first**

**Difficult to go against DNA**

**People react differently to the same danger or situation**



**How to Train  
Pilots?**

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# Evidence Based Training (EBT): A Data-Driven Training

- An EBT program is based on:
  - Operator's operational data (FDA)
  - Training data (ATO)
  - Other data (Pilot population...)



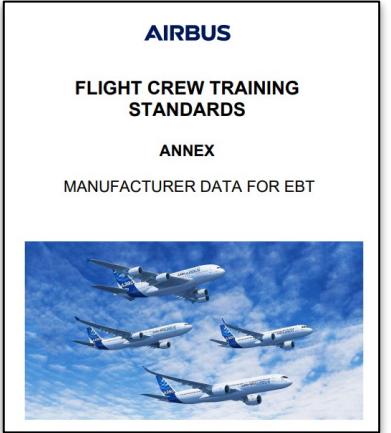
From  
Operator  
Experience  
to Training

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Manufacturer Data for  
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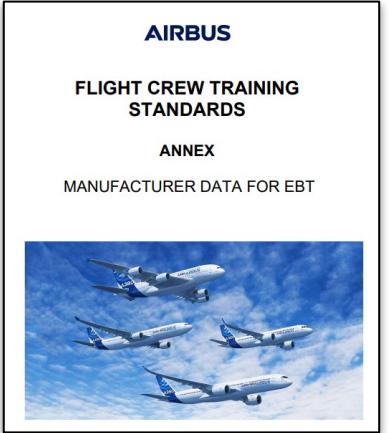
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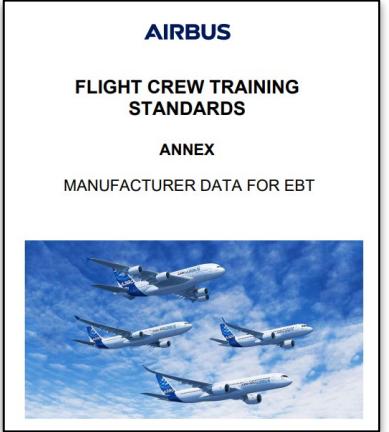
- The experience of numerous operators
- Different contexts of operations (short/long range flights, low costs carriers, etc.)
- Variety of environment (high terrain, specific weather conditions) in worldwide operations.



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- Multiple sources of data:
  - Enrich the variety of training items and scenarios
  - Expose pilots to various and non expected training scenarios.

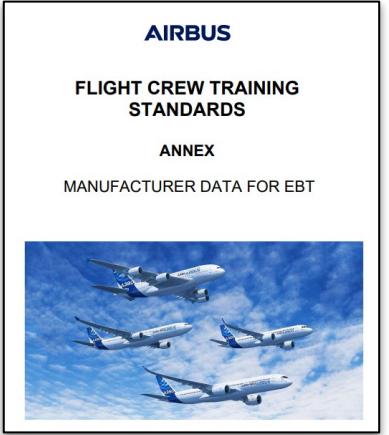


## From Operator Experience to Training

Manufacturer Data for EBT

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**Reinforcement of pilot's confidence to cope with unexpected events**



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# Training Analysis of Events with Startle and Surprise Factors

- Example of data received from operators:



From  
Operator  
Experience  
to Training

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Manufacturer analysis for  
training recommendations

# Training Analysis of Events with Startle and Surprise Factors

- Example of data received from operators:
  - Overspeed events associated with not appropriate pilot reactions:
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**Manufacturer analysis for training recommendations**

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Manufacturer analysis for training recommendations

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  - Crosswind landings associated with:
    - Moderate crosswind value (15 to 20 knots)
    - Important wind changes on final (300 feet above airport)
    - Degraded lateral control during the flare and the rollout (e.g. not appropriate application of the decrab technique)
    - Excessive aircraft attitude during the flare (airframe contact).

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**Manufacturer analysis for training recommendations**

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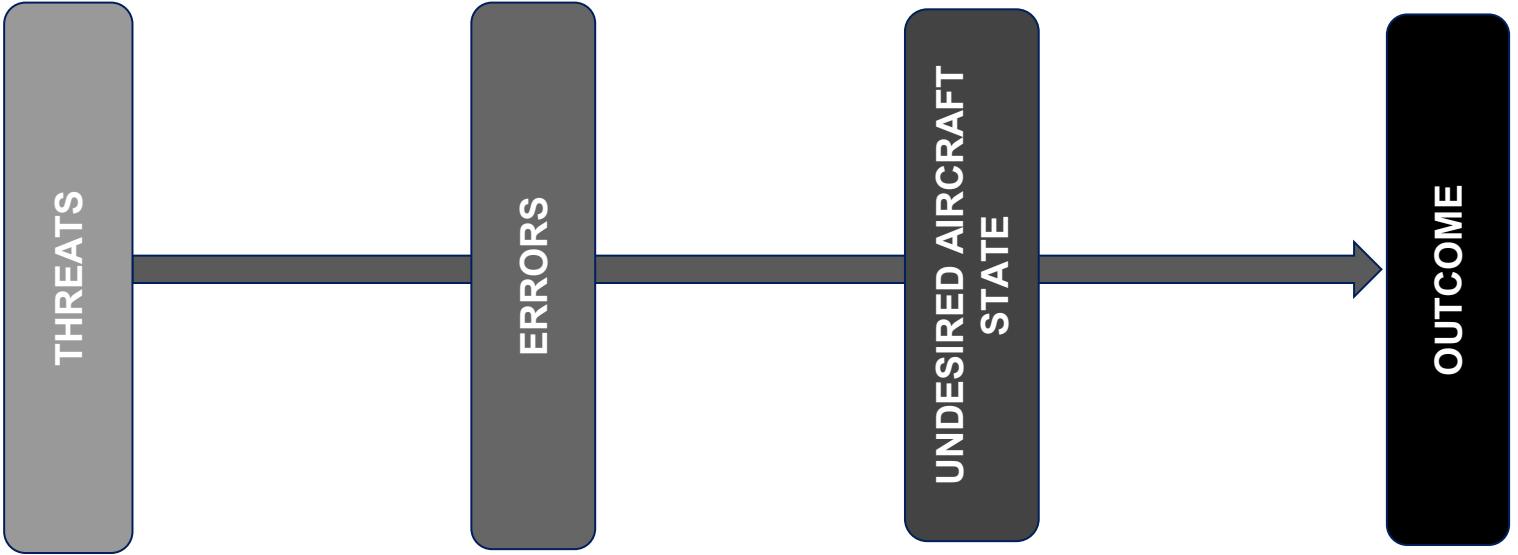
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Manufacturer analysis for  
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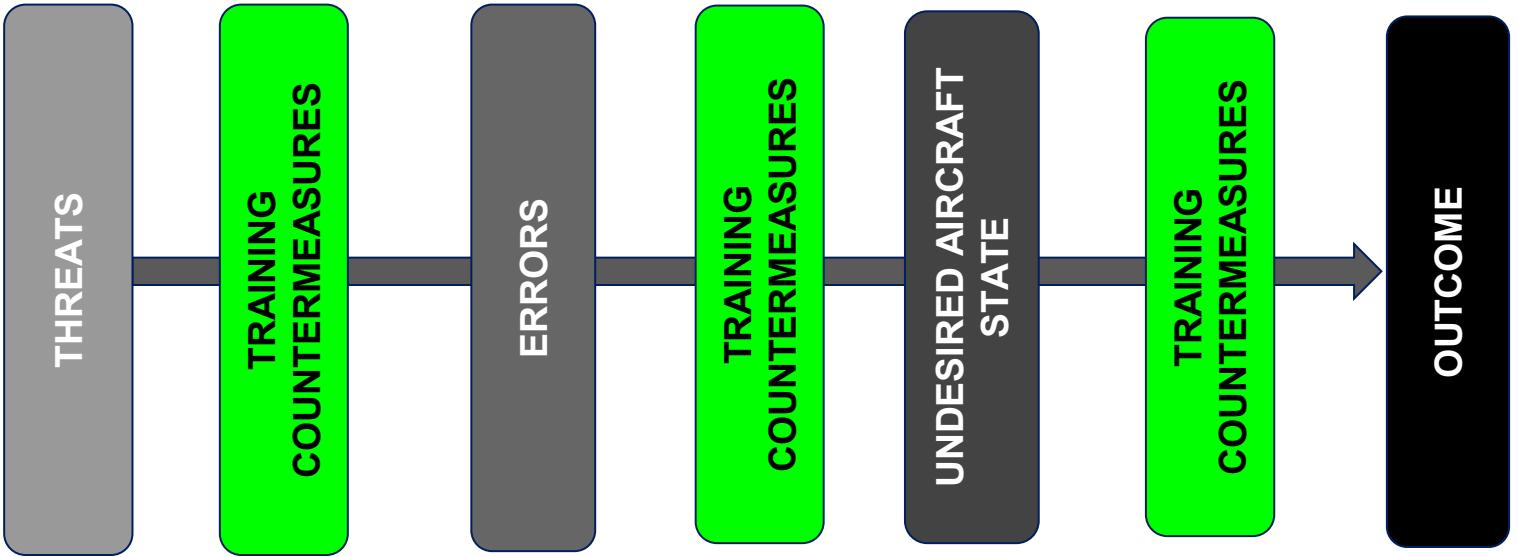
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Manufacturer analysis for training recommendations

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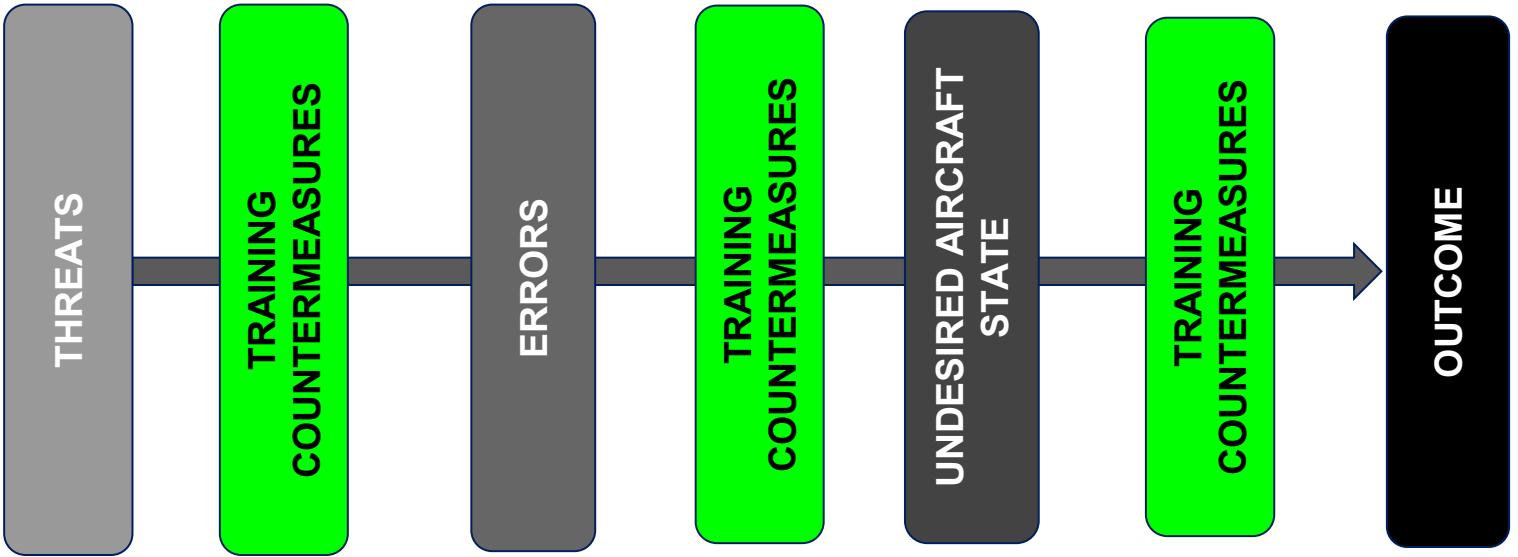


From  
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Manufacturer analysis for  
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# Training Analysis of Events with Startle and Surprise Factors

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## PILOT COMPETENCIES (CBTA)

- Knowledge
- Situation Awareness
- Workload Management
- Communication
- Leadership and Teamwork



From  
Operator  
Experience  
to Training

Manufacturer analysis for  
training recommendations



From  
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**Manufacturer analysis for  
training recommendations**

# Training Recommendations: Knowledge

- Reinforcement of the pilot knowledge

		<p>Reinforce pilot knowledge on startle effect. Recall the possibility for pilots to be surprised or startled by an overspeed event.</p>	<p>Review definitions and typical reactions associated to surprise and startle effects. This knowledge about surprise and startle effect should help to improve pilots awareness and capacity to perform as expected facing a surprising event such as an overspeed situation associated with overspeed warning.</p> <p>Review:</p> <ul style="list-style-type: none"><li>- The importance to develop as PF or PM effective contingency plans based on the risks associated with surprise or startle effect</li><li>- How to respond to indications of reduced situation awareness that affect the other crewmember due to surprise or startle effect (FCTM/ PR/ AEP/ MISC/ FLIGHT CREW INCAPACITATION).</li></ul> <p>Explain the importance for pilots to accept assistance when they are surprised or startled.</p>
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- For a better **recognition** of startle or surprise effects in the cockpit
- Theoretical classroom training, or during briefing before a simulator session



**Manufacturer analysis for training recommendations**

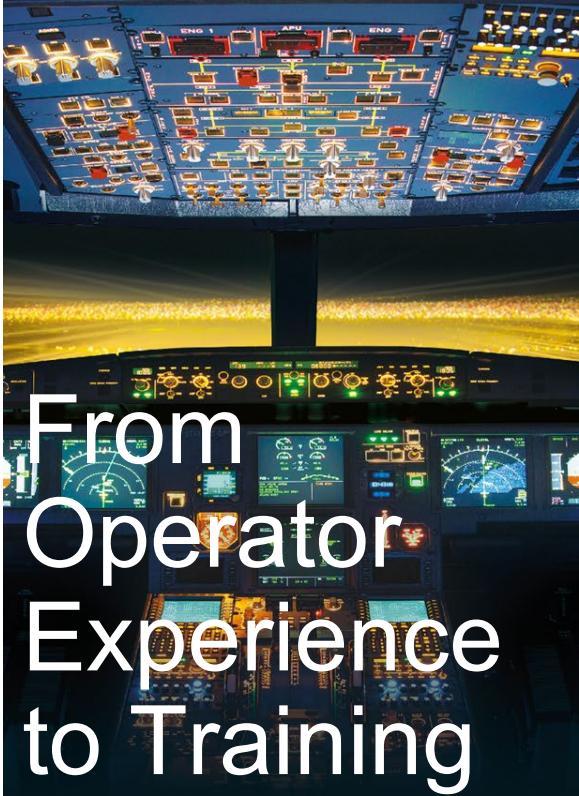
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- For a better **recognition** of startle or surprise effects in the cockpit
- Theoretical classroom training, or during briefing before a simulator session
- Available resource:

Airbus Win video: *“The Two Sides of Fear”*



## From Operator Experience to Training

**Manufacturer analysis for training recommendations**

## Training Recommendations: Skills



From  
Operator  
Experience  
to Training

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training recommendations**

## Training Recommendations: Skills

- Apply and develop the relevant skills to efficiently cope with startle or surprise situations



From  
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# Training Recommendations: Skills

- Apply and develop the relevant skills to efficiently cope with startle or surprise situations

Startle / surprise effect in the case of an overspeed event	E	Unanticipated overspeed warning. - Trigger an overspeed event type 2 while pilots are managing other tasks than only flying (e.g. approach briefing at the end of the cruise, ECAM management).	Exercises self-control in a situation of unexpected overspeed (OB 8.1).  PM applies effective intervention strategies to resolve identified deviations (OB 5.10).
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- Ensure realistic training conditions (based on operational data analysis)
- Respect the simulator training envelop
- Avoid negative learning.



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Training scenarios enable pilots to have experience  
on startle and surprise situations, in controlled conditions



Manufacturer analysis for  
training recommendations

# Conclusion

- Identified as a contributing factor in several events, the startle factor must be part of the pilot training



# Conclusion

**Knowledge and skills for  
an increased resilience**

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- Training recommendations are based on:
  - Manufacturer data analysis
  - Human factors expertise.

These training recommendations aim to reinforce knowledge, and to develop pilot competencies in validated training scenarios.



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**Reinforce pilot resilience to safely respond to startle events**



# Conclusion

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**Knowledge and skills for an increased resilience**



# Thank you

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