

DSAC

GESTION DES RISQUES & MAÎTRISE DU VOL

Giving to pilots some backup
methods to address risks that
could affect control of the flight.

Could such backup be
provided by training ?

direction générale
de l'Aviation civile

direction
de la sécurité
de l'Aviation civile



BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile



AIRFRANCE

HOP!

GRFH
Groupe de Réflexion Facteurs Humains



ATR

Ministère de l'Environnement, de l'Énergie et de la Mer

www.developpement-durable.gouv.fr

STATEMENT :

- Aviation is safe...but..they are still too many accidents.
- Accidents often result of complex situations where pilots should return to basic manual handling.
- During normal flights crews get little exposure to demanding situations.
- Legacy training system do not answer the challenge.



Study to improve the management of these situations, on three axis (training, procedures, *instrumentation : not developed here*).



TRAINING :

- Importance of "competencies" and associated training models.
- To cope with "unforeseen" or "complex" (philosophy)
- To deal with surprise and startle effect - (URP)
- Monitoring expectancy (PM)



Aviation is extremely safe...

- 4 accidents per million departures
- More than 30 million flights per year
- Advanced 4th generation aircraft

- **However....**

- *What about when the systems fail ?*
- *What if something unexpected happens?*
- *.....We rely on the pilot !*

- **Is the pilot ready to take control ??**



The pilot's task is changing from flying by means of manual control, to increased automation management and monitoring.

→ *change in tasks, roles and cognitive demands in the cockpit*



**Full Manual Handling : on Long Range
less than 30^{mn} per year / Pilot**

Advanced systems increase reliability, reduce variations, minimize faults and disturbances during normal operation

→ *crews get little exposure to variability during normal flights*



**Engines failures rate : less than
3/ 1000 000 flight hours**



Manual Operation of 4th Generation Airliners

From prescriptive to comprehensive
A new strategy for complex situations



Training Concepts

[Click here for main conclusions](#)



Flight Deck Concepts

[Click here for main conclusions](#)



Procedural Concepts

[Click here for main conclusions](#)



**IMPROVING CREW RESPONSE TO
UNEXPECTED AND CHALLENGING
SITUATIONS**

Each one
had a
specific task :



- DLR :
- **validation of new training forms** (CBT – EBT)
 - proposal for cockpit evolution
- NLR :
- **procedural recommendations**
- LiU :
- analyzing task performance of pilot-automation
- ViU :
- Improving Situational Awareness, **PM training**
- Airbus:
- to develop industry guidances

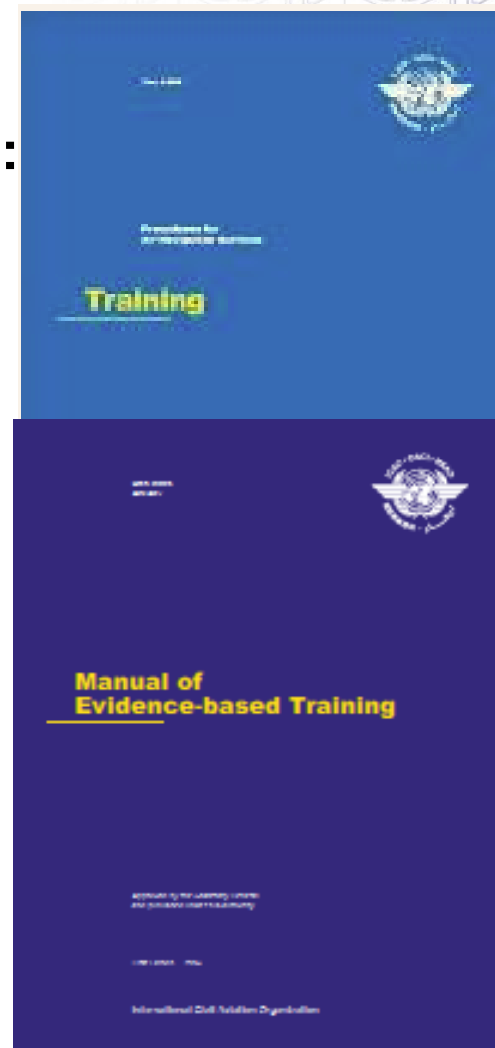
Training Concepts :

Can we assist crews to cope with events which are :

- Unforeseen,
- With no evident solution, but need :
 - Clear decisions,
 - Rapid reactions about :
 - Using a lower level of automation
 - Revert to Manual control

“Man4Gen” studies demonstrate:

- Competency proficiency transfers between scenarios with similar competency weights.
- **CBT or EBT are the good training tools.**



Main results of the study :

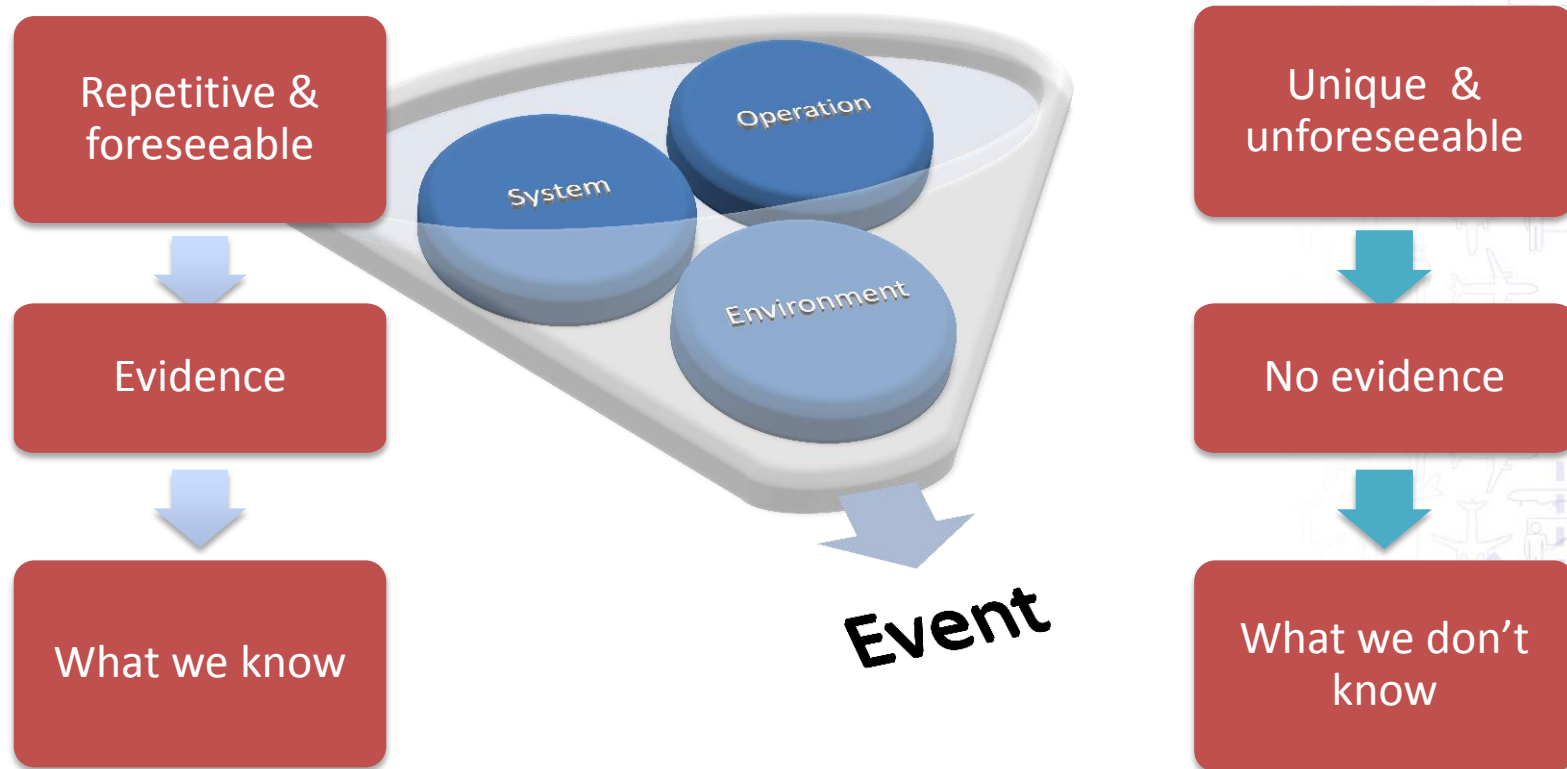
High-performing were strong in :

- Leadership and Teamwork
- Workload Management
- Problem Solving and Decision Making
- Communication

Low-performing showed weaknesses in :

- Manual Flying
- Application of procedures under low-workload





**COMPETENCY TO MANAGE BOTH
FORESEEN AND UNFORESEEN**

- Traditional Training programs are like the game “Whack a Mole”; **Reactive, Repetitive, Inefficient.**
- Programs (mainly checks) are saturated with items that may not **necessarily** enhance safety in modern air transport operations.
- ATQP offered the first possibility to adapt training to modern air transport operations, while reducing the amount of checking, but competencies were not compulsory.
LPC/OPC - (Training) and later in the year **LOE - Training**
- GM1 ORO.FC230 (a);(b);(f) Recurrent Training and checking.
Evidence-based Training and checking.
Allows now to initiate EBT (with competencies) in the current FCL/OPS regulation.



2018 - Typical Recurrent EBT Module

	1	1	2
	Evaluation Phase	Maneuvers Training Phase	Scenario Based Training Phase
Objective	<ul style="list-style-type: none"> Assess competence Identify training needs Validate training system performance 	<ul style="list-style-type: none"> Train maneuver skills to proficiency Validate system performance and skill decay. 	<ul style="list-style-type: none"> Manage the critical threats according to evidence Improve competency to manage foreseen/unforeseen threats
Conduct	<ul style="list-style-type: none"> Line orientated One or more occurrence Assessment of one or more KSA competency Elements 	<ul style="list-style-type: none"> Sequence of deliberate actions to achieve a prescribed flight path E.g. RTO, EF V1, OEI APP, OEI GA, Emer. Descent 	<ul style="list-style-type: none"> Line orientated flight scenarios One or more predictable or unpredictable threats

A full EBT program induces the withdrawal of LPC/OPC

EBT
RMT 599



EBT workshop
KÖLN - 01/02/2017
Save the date !!!

Recurrent

EBT
module

training

EBT
module

year

Administrative
revalidation



Philosophy



Manual Operation of 4th Generation Airliners

*From prescriptive to comprehensive
A new strategy for complex situations*

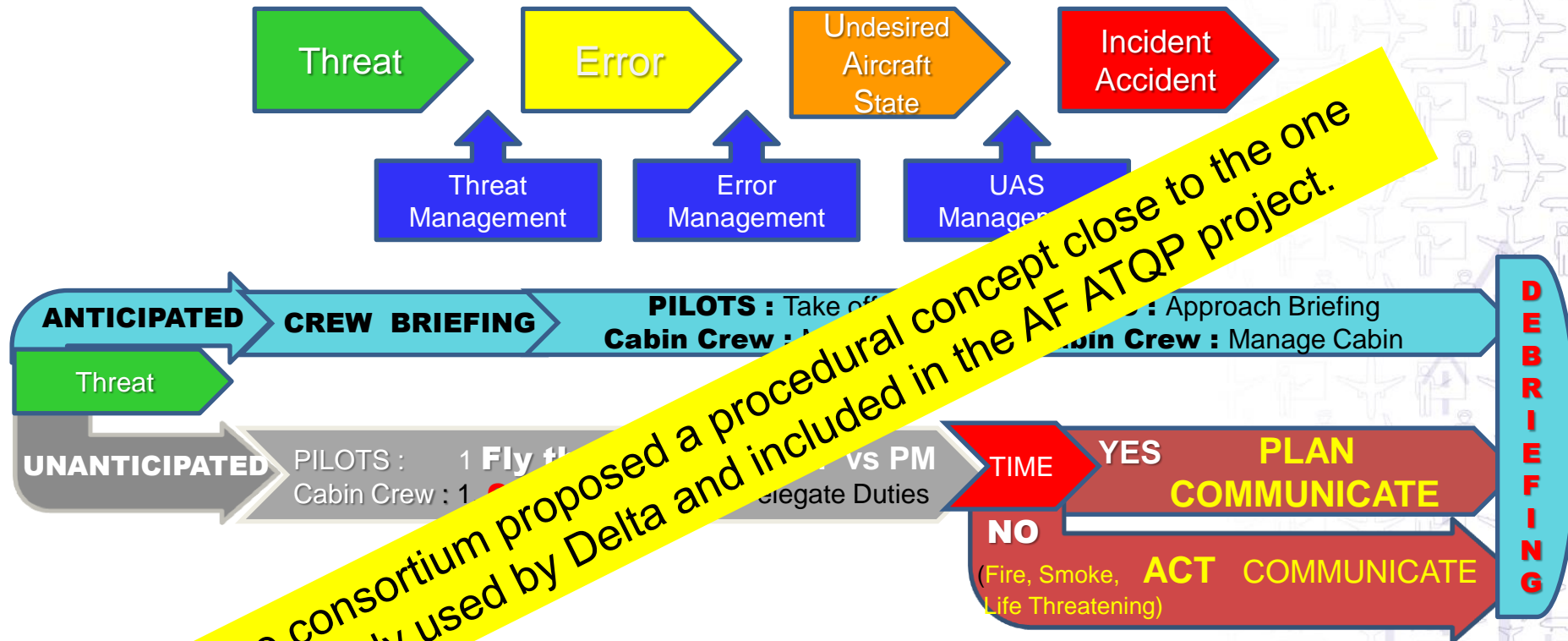
MANAGE TIME CRITICALITY

....such that the crew has time to

MANAGE UNCERTAINTY

....such that the crew can effectively....

PLAN FOR CONTINGENCIES AND CHANGES



- Training pilots on main risks areas anticipating unforeseen situations.
- TEM implementation : threats, errors and UAS are every day normal events and crews need to know how to manage them in order to assure aircraft safety.

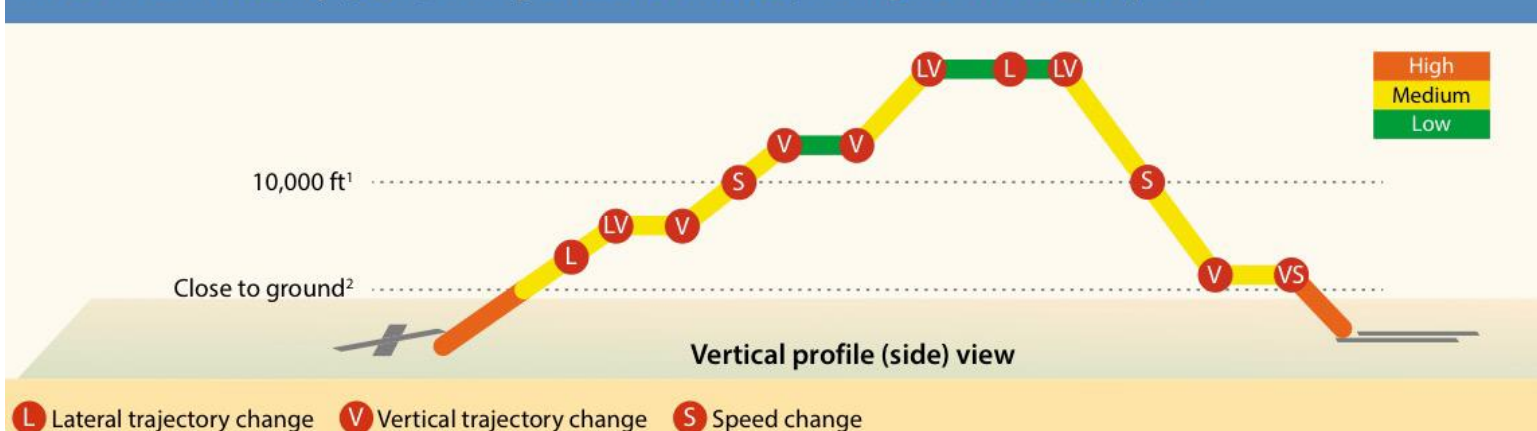
MONITORING MATTER

FDM shows that Monitoring efficiency is lower under heavy workload.



- **Challenging and surprising events lead to a decrease in empathic accuracy in both pilot flying and pilot monitoring.**
- **Deviations callouts aren't used enough by the PM. They shouldn't be seen as a judgement, but as a normal task.**

Areas of Vulnerability (AOV) to Flight Path Deviation, In-Flight Profile Examples



- New definitions of **PF / PM (+ AOV*)** have been introduced in **AFR OM**, (**areas where awareness might be adapted*).

Next step will be the **introduction of the assertiveness steps**

- And then, to develop **specific training exercises to improve monitoring** (e.g. Role played, use of standard call outs)





GIGN, RAID, SEALs members, top athletes are preparing themselves to cope with startle effect and surprise, in order to avoid inappropriate reaction.

What about flight crews ?



The training goal is to **teach pilots to apply a technique that enables them to control their emotions in all surprising situations where some time is available.**

THE STARTLE
RESPONSE

Learn to recover
fast after being
startled and
reduce your
ongoing stress

The consortium (via NLR) proposes a methodology

URP : Unload, Roll, Power

This acronym is already use by some operators for Aircraft upset recovery. An existing acronym was chosen because an **aircraft upset recovery** and **mental upset recovery** share similarities.



Unload (recover) : recognize the emotion, and so control the effects.

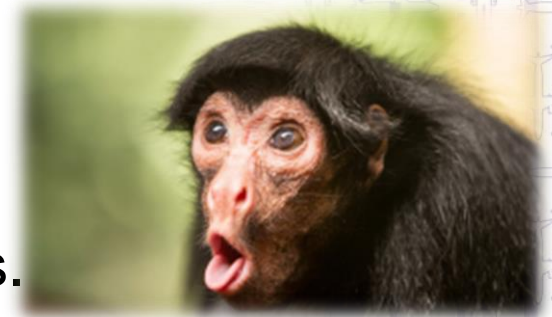
- **Sit back**, “**enjoy the failure !!!**”
- **Breathe** to ventilate your brain and give time for any initial “fight, freeze or flight” reaction.



Roll (observe) : make observations :
what do you see, hear, feel, smell?

The pilot monitoring is assigned this task.

Power (confirm) : analyze in Crew the observations and decide on the required actions.



Startle and Surprise training is not about the scenario :

- Intense startle and surprise will not provide a good learning environment.
- Pilots in the simulator are expecting things to happen with already a **high level of awareness**.

The scenarios to be used (in simulator) are only means to enable pilots to practice relaxation, observation and action steps, **the actual (technical) content is not important.**

**KLM is about to implement this training.
Air France is thinking how to integrate such a training.**



- UPRT must be managed by applying a procedure.
- To prevent this situation **"Training" helps** with :
 - competencies, (enforcing the basic ones ; **Man handling, Procedures application**),
 - developing the "monitoring role",
 - learning to **handle the startle effect**,
 - LOE where crews may deal with complex situations.



And...
challenges
continue

- Keeping pilots engaged
- Increasing auto flight mode awareness
- Maintaining pilot manual handling skill



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Thank you !!!