Giving to pilots some backup methods to address risks that could affect control of the flight. Could such backup be provided by training?
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*

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

*crews get little exposure to variability during normal flights*

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

**Engines failures rate : less than** 
3/ 1000 000 flight hours
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
CBT - EBT: Objectives

- Repetitive & foreseeable
- Evidence
  - What we know

- Unique & unforeseeable
- No evidence
  - What we don’t know

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.
A full EBT program induces the withdrawal of LPC/OPC
Philosophy

Manage Time Criticality

...such that the crew has time to ...

Manage Uncertainty

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

Plan for Contingencies and Changes
The consortium proposed a procedural concept close to the one already used by Delta and included in the AF ATQP project.

- 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.
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.
Next step will be the introduction of the assertiveness steps

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

- 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 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.**
Startle effect - Training

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.
To conclude

- 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
Thank you !!!