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**AIR TRAFFIC CONTROLLER:WORKING IN HRO BETWEEN
EFFICIENCY AND SAFETY**

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1. Partners



2. Objectives

- Analitical and descriptive objectives:
 - ✓ Describe ATCO job specifications,highlighting reliability,safety and unexpected events solutions;
 - ✓ Describe and analize cognitive and organizative complexity in ATCO's job.

- Practical and improvement objectives:
 - ✓ Improve operator awareness;
 - ✓ Improve personnel selection, ab initio and continuos training;
 - ✓ Make other people understand the complexity of ATCO's job (judiciary,media)



3. Method

- Analyzed units:
 - ✓ Milan ACC
 - ✓ Rome ACC
 - ✓ Milan Malpensa TWR
 - ✓ Rome Fiumicino TWR

- How:
 - ✓ Shadowing
 - ✓ Interviews
 - ✓ Focus Group (10/15 maximum)
 - ✓ 450 TOTAL HOURS



4. Main results

4.1 HROs

4.2 Non-Technical Skills

4.3 Inferential processes



HROs principles

Being proactive:

- Concern for the failures
- Reluctance to adopt simplifying interpretations
- Sensitivity for job activities (front-line operations)

Contain the unexpected:

- Commitment to resilience
- Respect for the expertise



Concern for the failures

- **Reporting culture:**

- Great attention to slight differences from what expected and development of ad hoc strategies to recognize these deviations (use of standard scenario to compare with on-going situation);
- Attention to "weak signals" beyond the formal reporting system ("bad feelings")

- **Analysis oriented culture:**

- Importance of informal dynamics

- **No Blame and Just Culture :**

- No blame: great change with the past, focus on attribution of guilt
=> possible improvement: well known added value but not really implemented in "real life";
- Just Culture: well known but it's not crystal clear which kind of events, if noticed, will be tolerated and which will not be tolerated



Reluctance to adopt simplifying interpretations

■ Air Traffic Control Cornerstone:

- Little discrepancies may point out critical scenarios
- Every little discrepancy needs to be verified and clarified (radar echo in TWR)

■ "Social redundancy":

- Grants double checks and multiple points of view
- Constant monitor of running activities
- Not limited only to one team (PLN-EXE) but extended to all the ACC or TWR.



Sensitivity for job activities

- **Situational awareness:**

- Very important element in all daily duties

- **Management role:**

- Some improvement needed
- ATCOs feel like management is far from daily operations and not able to understand enough their needs.



Commitment to resilience

■ **Be ready:**

- Front line operator act constantly as if "something" is about to happen
- If an error occurs, and it will occur, act quickly to correct that

■ **Bounce back:**

- Immediate reaction to anomalies
- Quick action in normal situations gives you time to act in unexpected situations.



Respect for the expertise

■ Hierarchy:

- Overcoming the hierarchical element: importance of the authority
- Informal hierarchy: new controllers may be stressed working with a very skilled old controller



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What are NTS ?

NTS are cognitive skills , personal and social that applied with the technical skills contribute to assure safe and reliable performance:

- Situational awareness
- Decision-making
- Communication
- Teamwork
- Leadership
- Stress management
- Fatigue management



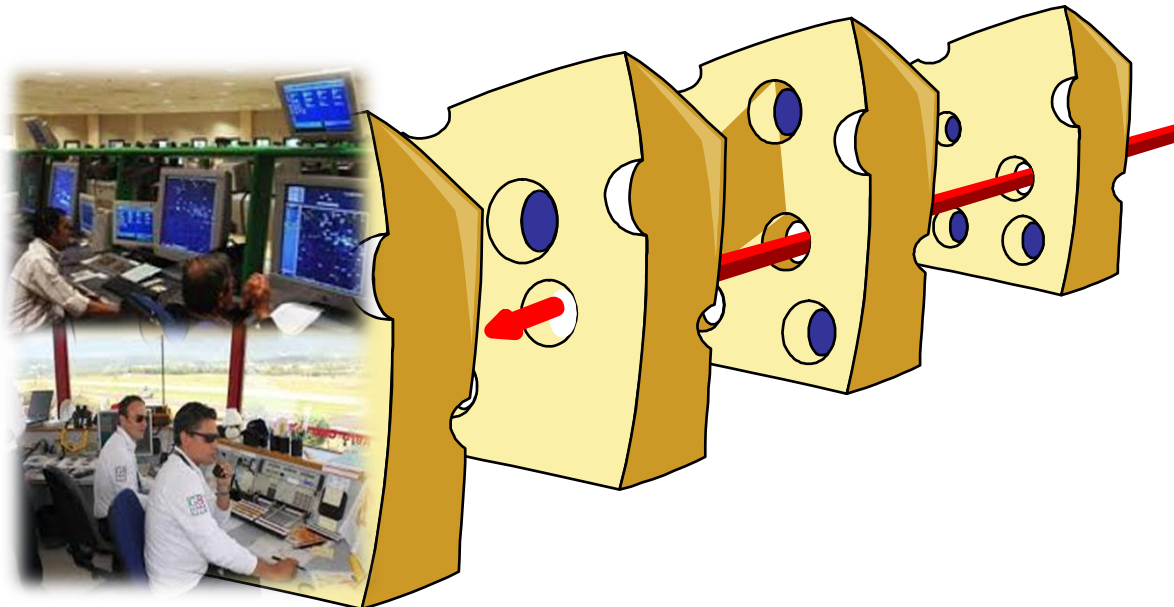
Human Factor

Errors
Violations

Danger

Hero

Compensation
Recovery



4. Main results

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4.3 Inferential processes



Inferential processes

- **Deduction:**

Rule – Event – Result (certain)

- **Induction:**

Event – Result – Rule (probable)

- **Abduction:**

Event – Rule – Result (plausible)



Inference-Situation

<i>Type of inference</i>	<i>Situation</i>
Deduction	Certain
Induction	Uncertain
Abduction	Ambiguous



Standardization vs. adaptation

Two different kinds of behaviour:

- **Standardization:** act according completely to best practice recognized by the provider (standards, procedures, accepted rules, etc.).

FOLLOW THE RULES

- **Adaptation:** tendency to adjust the professional background to the multiplicity of events encountered.

MANAGE THE UNEXPECTED



Standardization vs. adaptation

	Standardization	Adaptation
Positive	<ul style="list-style-type: none">• Safety• High degree of consistency of some activities	<ul style="list-style-type: none">• New operative strategies and problem solving;• Improved reliability
Negative	<ul style="list-style-type: none">• Rigidity in solving the unexpected• Regulatory overload-conflicting laws	<ul style="list-style-type: none">• Overconfidence• Hubris• Possible Error Traps



5. Main findings (1)

- Social redundancy
- Importance of colleagues relationships to guarantee high level of liability and efficiency
- NTS play a significant role in safety culture in ATM
- Communication is both a technical and non-technical skill
- Inferential processes are affected by ambiguity and uncertainty
- Induction and abduction represent cognitive strategies of variability



5. Main findings (2)

- Inferential processes are influenced by standardization and adaptation
- Significant trade-off found between safety, fluency and traffic efficiency
- There are restricted " circles of reference " where ATCO build very strong relationships of mutual trust
- Ab-initio and recurrent training have a key role
- The vision of the environment as a challenge and opportunity for improvement



Thank you

