C²Q Care to Quality

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Practical Risk Management: The Risk Challenger Program at TAP M&E

15/Nov/2016

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FLIGHT SAFETY FOUNDATION

CARE²AIRFRAME CARE²ENGINES CARE²COMPONENTS CARE²ENGINEERING

TAP MAINTENANCE & ENGINEERING

1. Overview

TAP Portugal – the Airline

1945

1970

2000

2017

Source: TAP Portugal

178 destinations
88 with TAP operation
107 Europe (10 Portugal)
42 Americas
21 Africa
8 Middle East and Asia

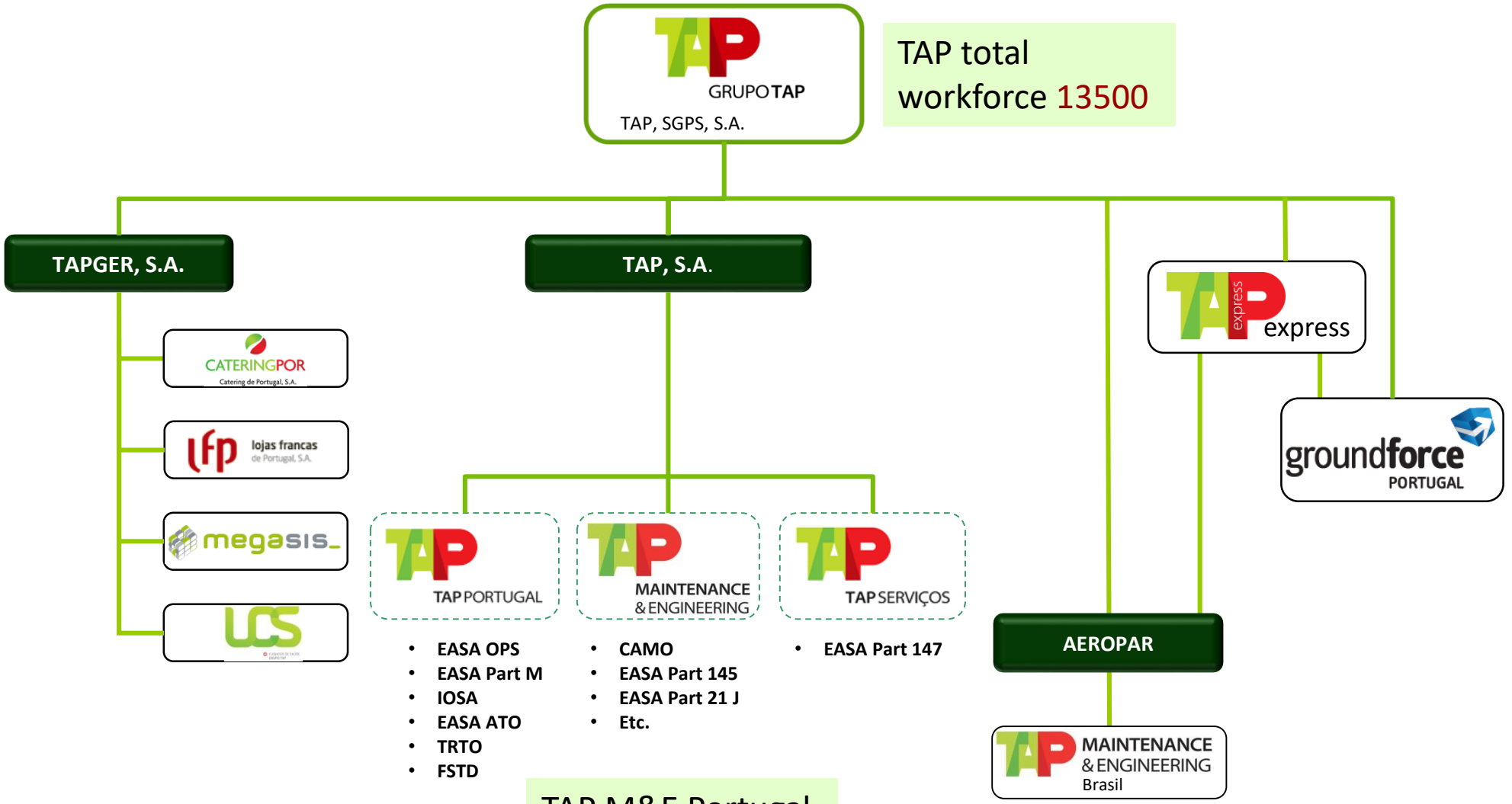
77 aircraft
18 long-haul operation
43 medium-haul operation
16 regional operation (Portugália)

11.4 million Passengers

85.1 thousand tons Cargo and Mail

37 Third Party Customers Maintenance
29 airline companies

TAP Group



Source: TAP Portugal

TAP Maintenance & Engineering

Source: TAP Maintenance & Engineering

Lisbon

Airframe Maintenance (3 hangars, 26380 m^2)

B737, A300, A310, A320Fam, A330, A340

Engine Overhaul Shop

CFM56-3/-5A/-5B/-5C/-7B, CF6-80C2/-E1, PW4000

Components Shops

Rio de Janeiro

Airframe Maintenance (1 hangar, 14500 m^2)

B727, B737, B767, B777, MD11, A300, A310, A330, A340

Porto Alegre

Airframe Maintenance (5 hangars, 12500 m^2)

B727, B737, BBJ, B767, A320Fam, EMB 120, ERJ 135/145, E-JET 170/175/190/195, Legacy

PWC Engine Shop

APU Overhaul Shop

Landing Gear Overhaul Shop

Components Shops

2. SMS Implementation

SMS Roadmap at TAP M&E

2015
- ERP, Management of Change
- Safety Assurance procedures

2014
- Risk Management System
- Safety Audits

2013
- Proactive and Predictive analysis
- SPIs and Safety Improvement Plans

2012
- SMS Manual, Safety Office, Reactive analysis
- Reporting, MORs, Investigations

2011
- Gap Analysis + Safety Culture Survey
- Safety Training, Safety Promotion campaign

2010
- Safety Policy + Safety Objectives
- Safety Commitment from Top Management

2009
- Risk Assessment procedures
- TAP Corporate Risk Management Manual

2008
- Safety Reports and Technical Incidents analysis
- Transition from WinBASIS to SENTINEL

2007
- Analysis of ICAO Doc. 9859 Ed. 1
- Outreach Presentation to Top Management

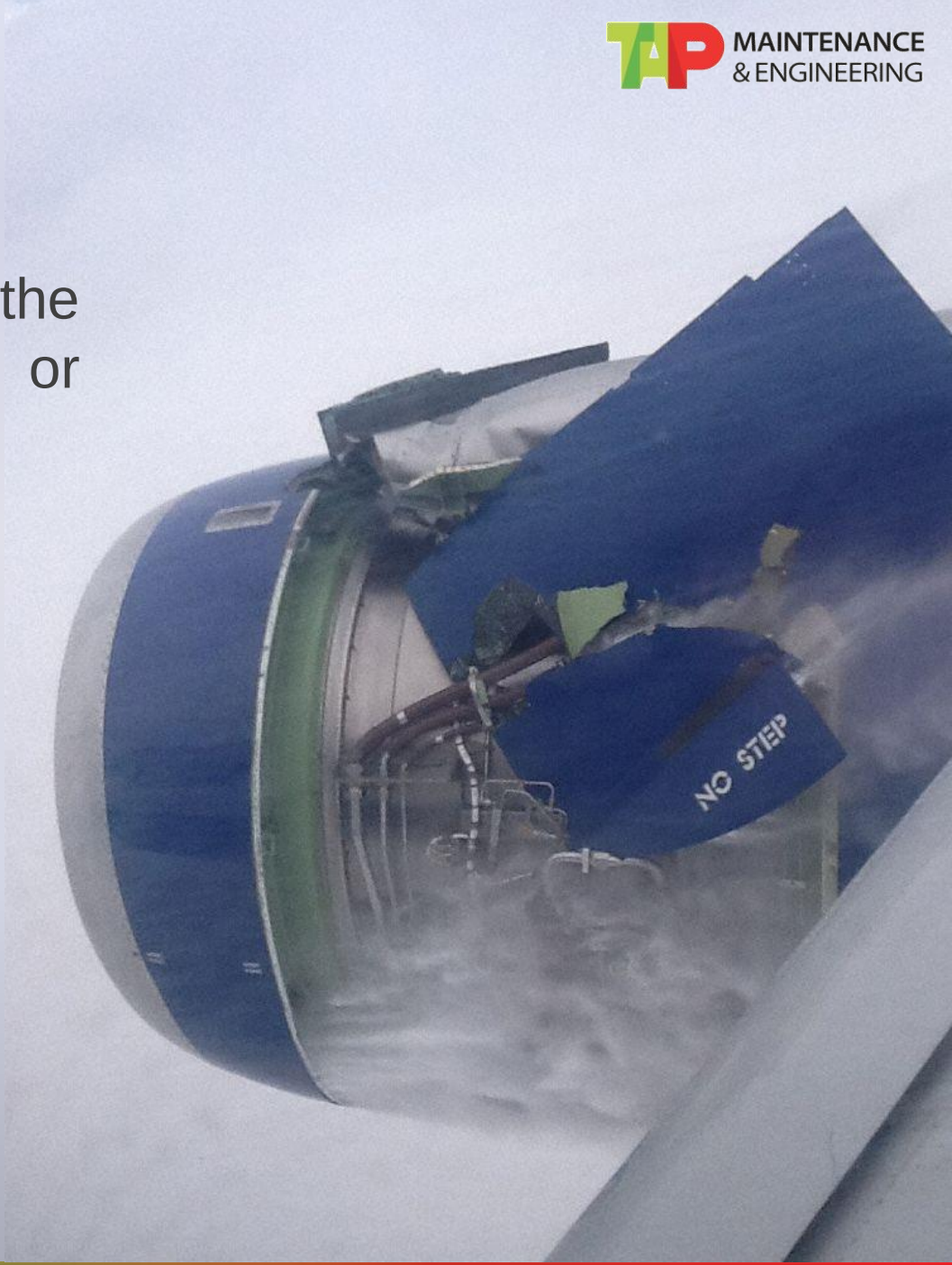
Source: TAP Maintenance & Engineering

The 4 Pillars of SMS

Adapted from ICAO Annex 19

Safety Management System

1. What is most likely to be the cause of your next accident or serious incident ?
2. How do you know that ?
3. What are you doing about it ?
4. Is it working ?

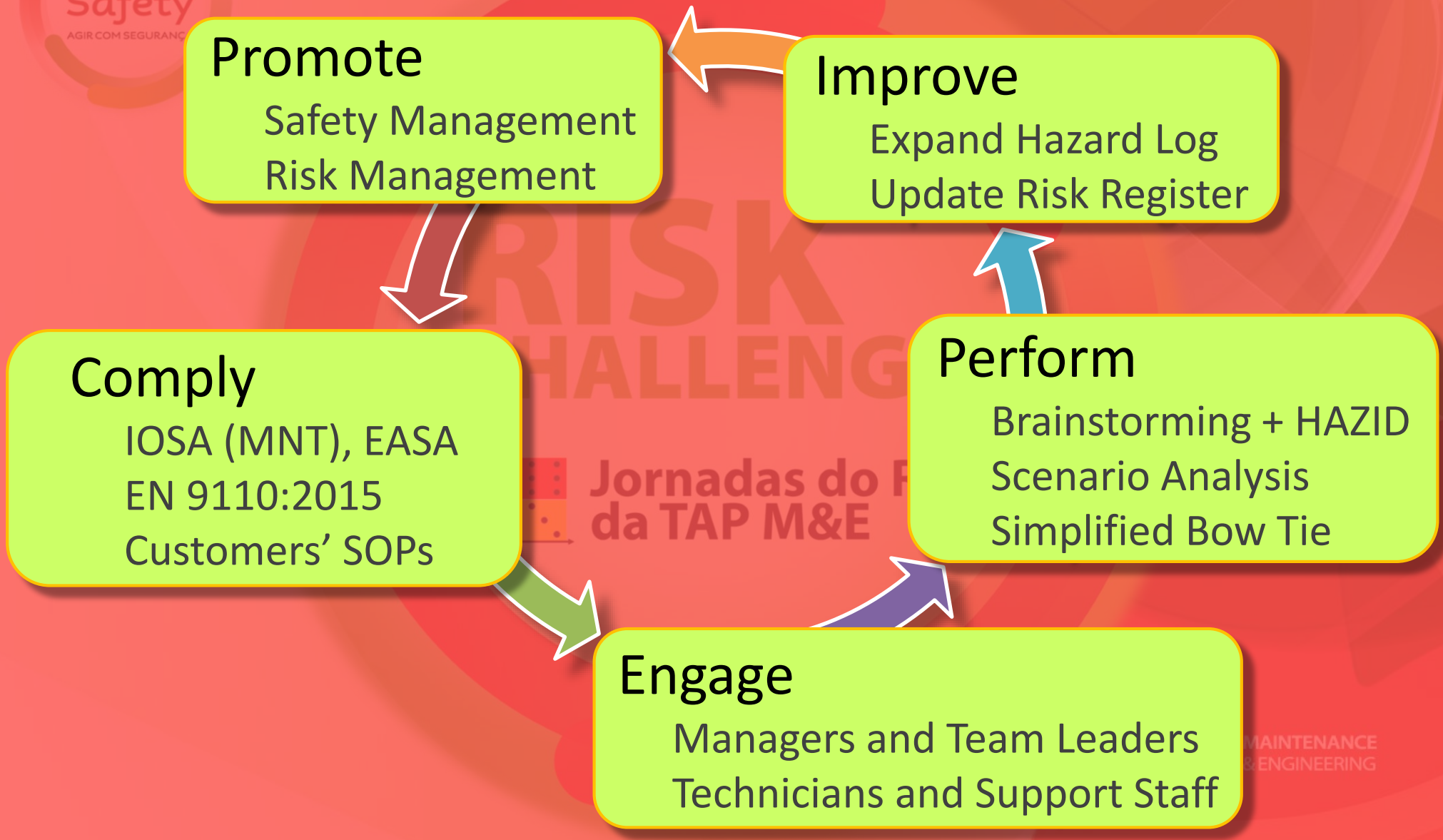


Safety Risk Management

- Risk Management is the SMS engine
- A robust SMS needs an effective Risk Management Process
- Developing an effective Risk Management Process has taken as much time and resources as building the other 3 SMS pillars

3. Practical Risk Management

WHY?


Promote
Safety Management
Risk Management
Improve
Expand Hazard Log
Update Risk Register
Comply
IOSA (MNT), EASA
EN 9110:2015
Customers' SOPs
Perform
Brainstorming + HAZID
Scenario Analysis
Simplified Bow Tie
Engage
Managers and Team Leaders
Technicians and Support Staff

WHAT?

- Context:
  - **CAMO**

    EASA Part M Subpart G

    Continuing Airworthiness

  - **AMO**

    EASA Part 145

    Maintenance

Future: (DOA) Part 21 Subpart J
(MTO) Part 147

WHAT?

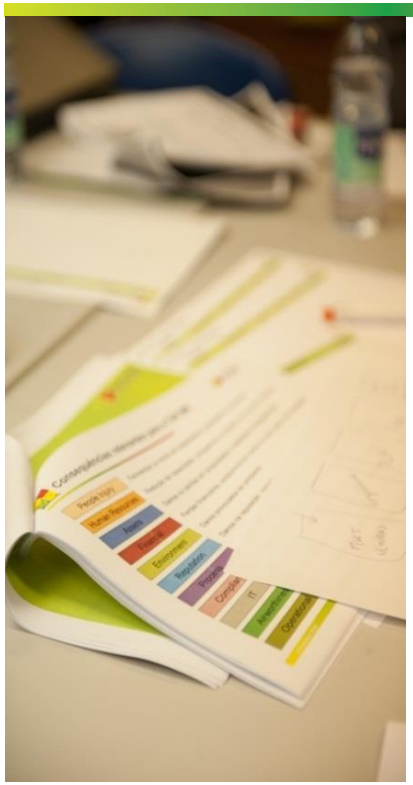
WHEN?

Time	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	• Event Logistics • Initial Setup	**Masterclass** • HAZID Methodology • Case Studies	**Group 2** • Brainstorming • HAZID • Prioritization	**Group 2** • Analysis of Top 5 • Hazard Register	Team Work Presentation
Afternoon	**Workshop** • Introduction • Risk Management	**Group 1** • Brainstorming • HAZID • Prioritization	**Group 1** • Analysis of Top 5 • Hazard Register	HAZID for Top Managers Validation of Results	Team Work Presentation

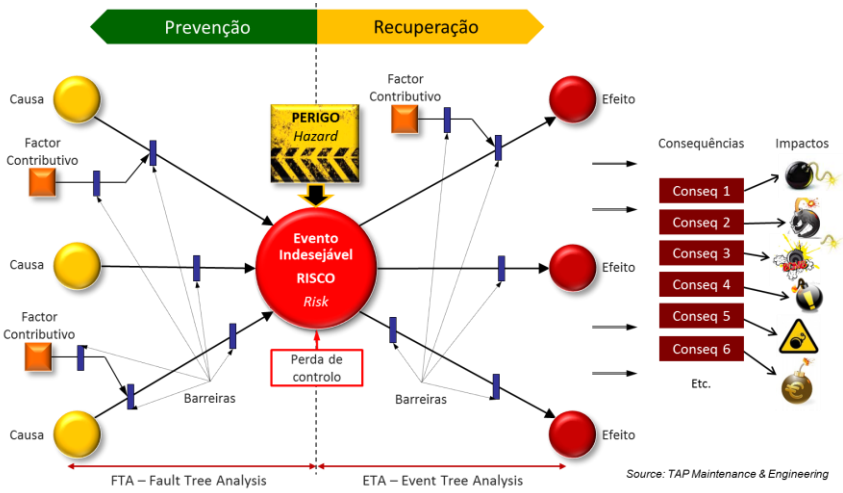
WHO?

- Participation:
  - 24 participants (typical), 60 máx
  - Diverse skills and functions
  - 4 hrs
- Contents:
  - Risk management
  - Incident and accident analysis
  - Case studies
- Results:
  - Knowledge consolidation
  - Risk oriented mindset

WHAT-IF?



- Interactive method consisting of:
  - Multi skill team brainstorming
  - Scenario mapping in defined contexts
  - Inclusion of *what-if* change scenarios
  - Prioritization of top risks in the organisation
  - Simplified Bow Tie diagramatic analysis
  - Evaluation of existing controls and effectiveness
  - Identification of mitigation strategies



HOW?

- Methodology:
  - 4 teams, 6 people per team (typical)
  - HAZID training (2 hrs)
  - Hazard ID + Risk Prioritization (2 hrs)
  - Top 5 Bow Tie analysis (4 hrs)

HOW?

- Discussion of results:
  - Presentation to top management
  - Team elements and leaders
  - 3 hrs
  - Hazard Log & Risk Register update

For example purposes

HAZARD LOG - RISK REGISTER EXAMPLE

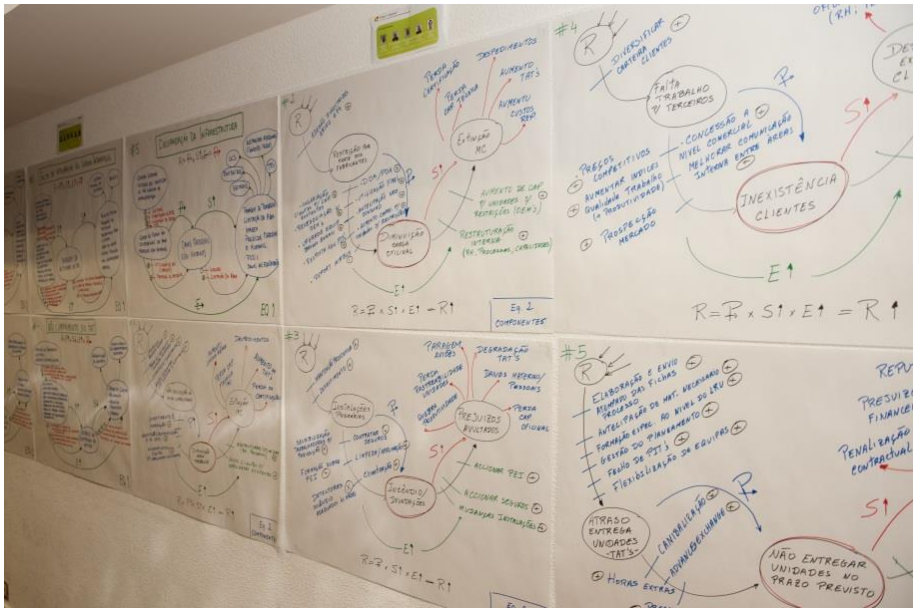
Hazard no.	Revised on	Description of Safety Event	Specific nature of hazard	Preventive Barriers	Undesirable Event (UE)	Recovery Barriers	Likelihood	Severity	Exposure	Result	Mitigation measures	Likelihood	Severity	Exposure	Result	In place Y/N	Documented	REF Documentation	Additional actions or comments
TAE-01		Failure to hold a qualification to declare an approval for return to service (AFRS) (or equivalent for non-EASA country or governmental aircraft).	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								Ensure that the staff have a current licence								
TAE-02		Maintenance qualification or licence expired	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								In addition to the item above, put in place a training and training Tafferesh up plan								
TAE-03		Lack of maintenance staff	The lack of staff leads to an increase in the workload of the other technicians, which is a source of errors and infractions.								The company has a Part 145 approval, this guarantees this standard.								
TAE-04		Work documentation not understood by maintenance staff (translation, etc.)	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								Ensure that the maintenance staff have a good knowledge of the language in which the maintenance documents are written. Train them if necessary.								
TAE-05		Work documentation not up-to-date	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								ensure that the maintenance staff use up-to-date work documentation. If the company has a Part 145 approval, this should guarantee this standard.								
TAE-06		Delay in the application of the CMM recommendations	A delay in the application of recommendations or instructions from the CMM can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								Ensure that the maintenance staff apply the recommendations of the CMM. If the company has a Part 145 approval, this should guarantee this standard.								
TAE-07		Technical log book incorrectly com-pleted, incomplete	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								Ensure before the start of the flight that the aircraft log book is correctly completed and counter-signed by the person responsible for the take-off.								
TAE-08		Airworthiness certificate or equivalent not up-to-date or missing	Maintenance of the aircraft can legitimately constitute a source for hazards (failure of a system, component during flight, etc.)								Ensure that the aircraft has an up-to-date airworthiness certificate (CAN) (or equivalent)								
TAE-09		MEL incomplete or missing	Inaccuracy with regard to the choice of action in the event of the failure of a component or system may lead to a potentially hazardous situation								Ensure that the aircraft has an up-to-date MEL								
TAE-10		No flight manual on board the aircraft, flight manual not up-to-date	Inaccuracy with regard to the determination of the flight performances, normal and emergency procedures to be applied may lead to a potentially hazardous situation								Check that an easily accessible and up to date flight manual is present on board the aircraft								
TAE-11		Body on aircraft not insured	The staff may be blamed in the event of an accident/incident								Ensure that the aircraft is insured for the activity concerned								
TAE-12		Maintenance premises unsuitable (insufficient lighting, heating, protection against weather conditions, no soundproofing)	May be a contributing factor to a maintenance error								Ensure that the safety of the premises is of an Acceptable standard. If the company has a Part 145 approval, this should guarantee this standard.								
TAE-13		Foreign Object Damage	May lead to a loss of engine in flight, deterioration of hydraulic assemblies								Ensure that the body has an FOD prevention program. If the company has a Part 145 approval, this should guarantee this standard. Before the flight, ensure that the start up area is clean and clear. Pay particular attention to the pre-flight inspection.								

For example purposes

4. Typical Results

Risk Portfolio Update

- Top Risks



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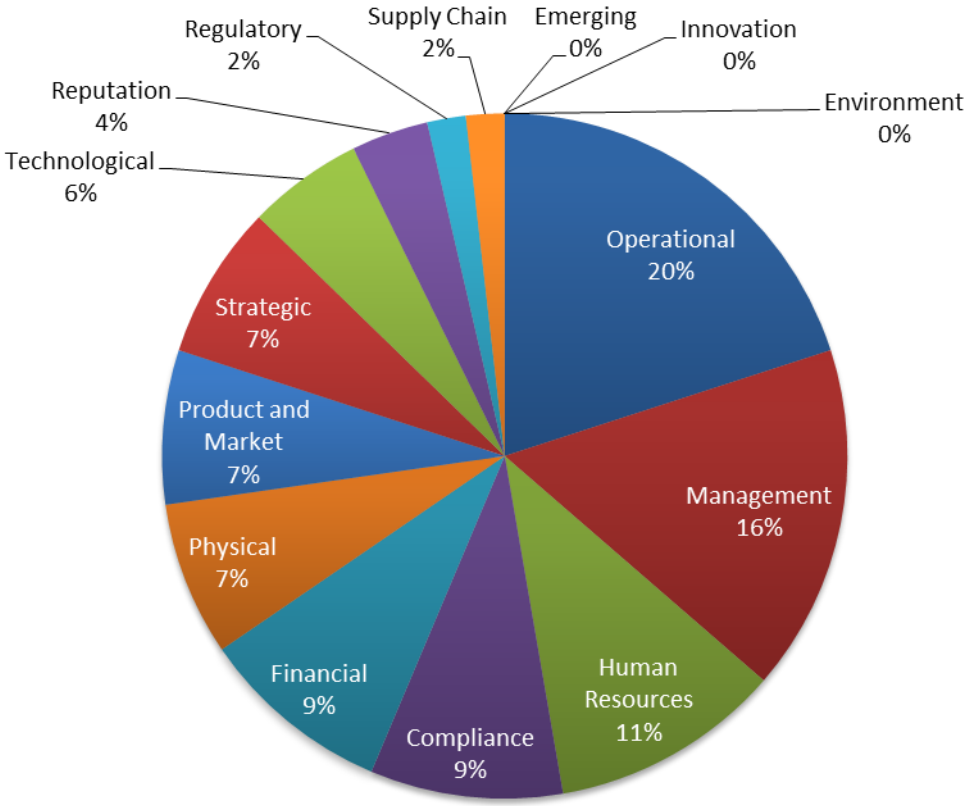

- Top 10 (Risk Challenger + Voting among managers)

At Reduced Cost

- Internal
  - Graphic media developed in-house
  - Documents preparation
  - Give-aways
  - Sessions' work space preparation
  - Image and sound
  - Pins and cards

…and some external cost…!

Thank you !

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