Collaborating to address

LOSS OF CONTROL IN-FLIGHT

Upset Prevention and Recovery Training Workshop

Module 5 – Day 2

Effectiveness of UPRT in Preventing LOC-I Events

Overview

- LOC-I contributing factors
- Measuring LOC-I risks from contributing factors
- Monitor UPRT effectiveness using SPIs
  - Regulators
  - Commercial air transport operators
  - Approved training organizations

LOC-I contributing factors

Events	THEMES: Lack of External Visual References	Flight Crew Impairment	Training	Airplane Maintenance	Safety Culture	Invalid Source Data	Distraction	Systems Knowledge	Crew Resource Management	Automation Confusion / Awareness	Ineffective Alerting	Inappropriate Control Actions	Total
Formosa Airlines Saab 340	x	x			x		x	x	x		x		7
Korean Air 747-200F	x			x		x	x		x		x		6
Flash Airlines 737-300	x		x		x		x		x	x	x	x	8
Adam Air 737-400	x		x	x			x	x	x	x	x	x	9
Kenya Airways 737-800	x		x				x		x	x	x	x	7
Aeroflot-Nord 737-500	x	x	x	x	x		x	x	x	x	x	x	11
Gulf Air A320	x		x				x		x		x	x	6
Icelandair 757-200 (Oslo)	x						x		x	x	x	x	6
Armavia A320	x	x			x		x		x	x	x	x	8
Icelandiar 757-200 (Baltimore)	x				x	x	x	x	x	x	x	x	9
Midwest Express 717	x				x	x	x		x		x	x	7
Colgan Air DHC-8-Q400	x	x	x		x		x	x	x	x	x	x	10
Provincial Airlines DHC-8	x		x				x			x	x	x	6
Thomsonfly 737-800	x		x	x	x		x			x	x		7
West Caribbean MD-82	x	x			x		x	x	x	x	x	x	9
XL Airways A320		x	x	x	x	x	x	x	x	x	x		10
Turkish Airlines 737-800	x			x	x	x	x		x	x	x		8
Empire Air ATR-42	x	x			x		x		x	x	x		7
Overall	17	7	9	6	12	5	18	7	16	14	18	12	

Source: CAST ASA JSAT

LOC-I contributing factors

- CAST proposed 11 new design, training and operational safety enhancements
- One key safety enhancement was “upset prevention and recovery training, including stalls”, which is addressed directly by ICAO Doc 10011

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Measuring LOC-I risks from contributing factors

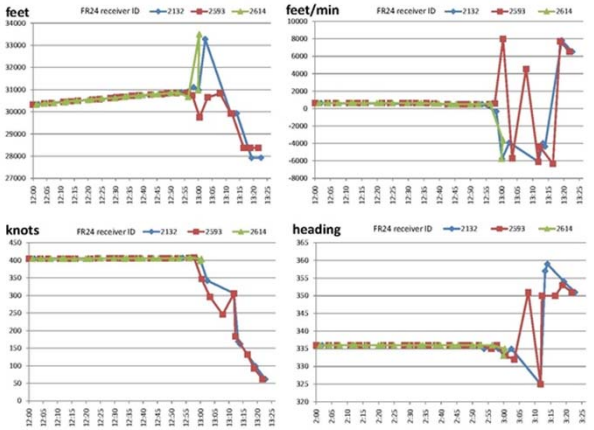
- LOC-I hazard identification through SMS
- Monitoring aircraft system and components reliability:
  - Autoflight system (malfunctions/disconnects)
  - Flight controls
  - Anti-ice systems
  - Pressurization system
  - Instruments (airspeed, attitude, TAT,…)
  - Warning systems

Measuring LOC-I risks from contributing factors

- Flight data analysis (FDA = FOQA)
  - Define parameters to monitor and their threshold
  - Analysts review each event

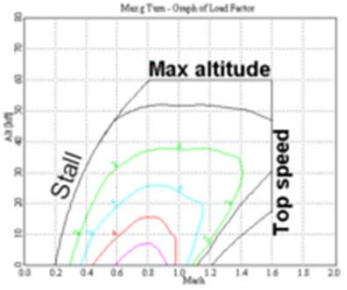
Let us look at some examples of parameters and thresholds (many will be type-specific)

Key questions
- Which parameters to use?
- What are the thresholds?
- How to filter out nuisance from legitimate activations?



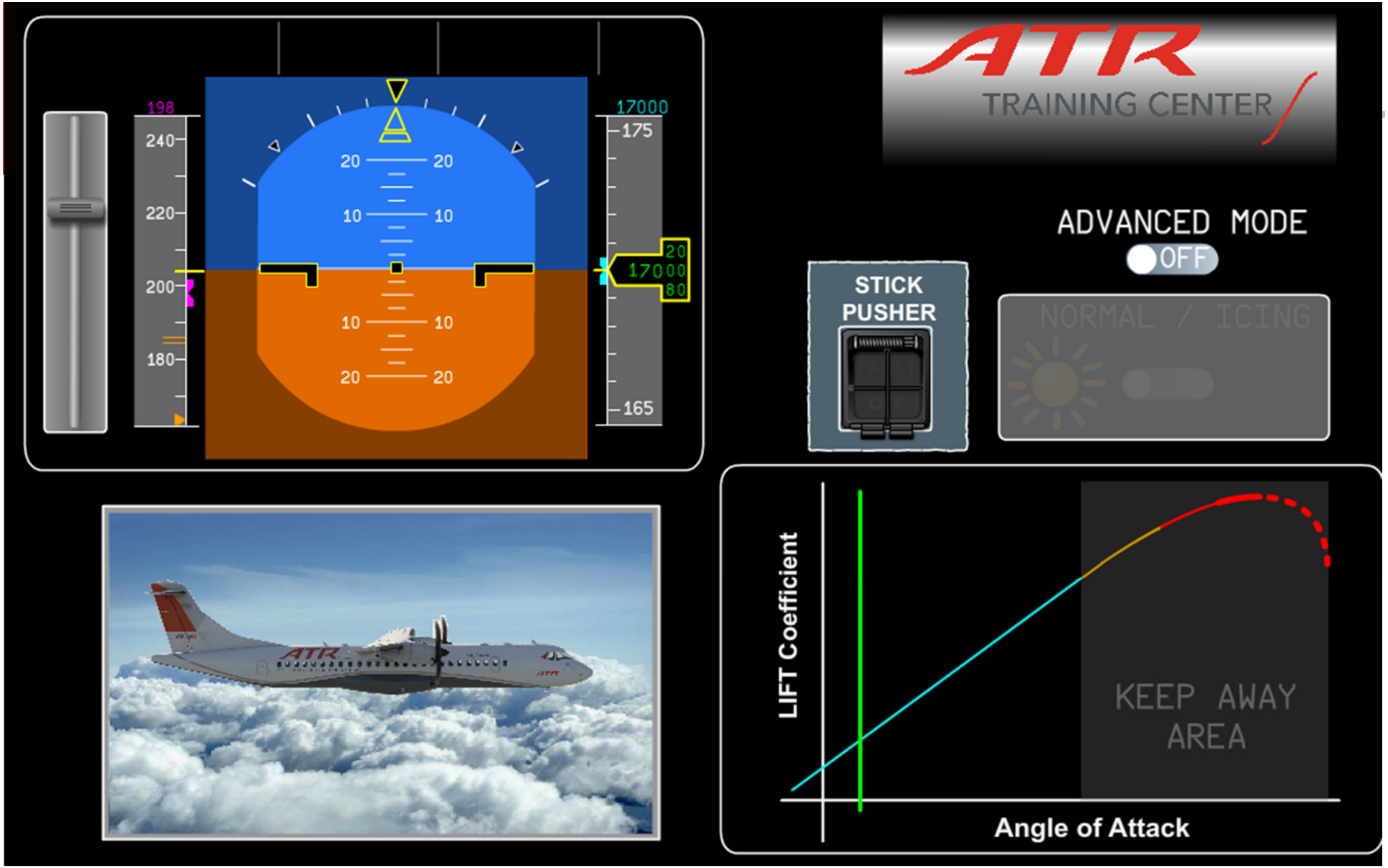
Measuring LOC-I risks from contributing factors

- Excessive bank angle (xx° for more than y sec)
- Excessive pitch angle (e.g. <-ww° or >zz°……y sec)
- Legitimate stall warning activation
- Legitimate overspeed warning
- Inappropriate cruise altitude (higher than normal)
- Inappropriate RoC
- Autopilot self-disconnect events
- Inappropriate use of rudder in jet aircraft



Measuring LOC-I risks from contributing factors

- Animation that illustrates some of the parameters to monitor:


198
240
220
200
180
20
10
10
20
17000
175
165
20
17000
80
ATR
TRAINING CENTER
ADVANCED MODE
OFF
STICK
PUSHER
NORMAL / ICING
LIFT Coefficient
KEEP AWAY
AREA
Angle of Attack

Measuring LOC-I risks from contributing factors

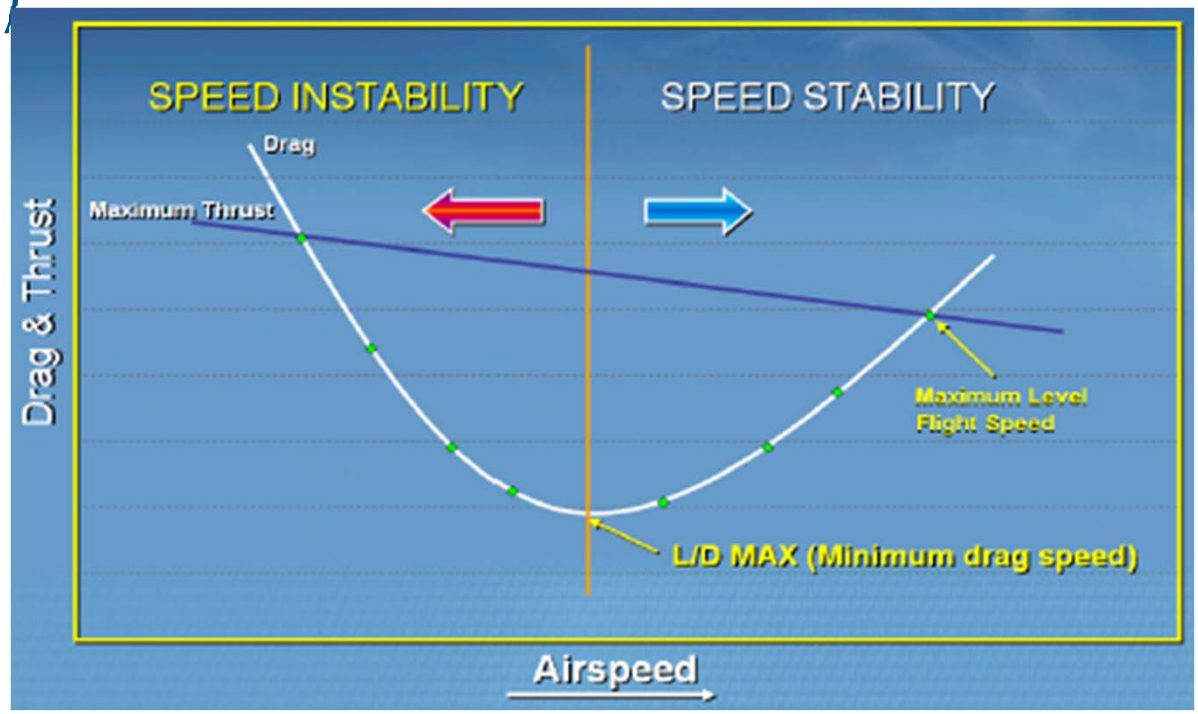
- Animation that illustrates an inappropriate RoC:
  - CSeries climbing at 1500 fpm

Measuring LOC-I risks from contributing factors

- Video of CSeries PFD

Measuring LOC-I risks from contributing factors

- Inappropriate cruise speeds (⚠ slower than normal)



Measuring LOC-I risks from contributing factors

- Windshear encounter
- Excessive cabin altitude (> 10,000 ft)
- Inconsistencies of engine parameters (EPR vs N_1)
- Height loss during take-off or go-around
- Performance of ACAS RA manoeuvres (rate of climb/descent, altitude deviation, ….) ….

Measuring LOC-I risks from contributing factors

- Pilot performance
  - In manoeuvre-based training
  - In scenario-based training
    - Crew assessment critical!
  - Line training and line checks
  - Recurrent training knowledge needs assessments
  - Monitoring manual flight opportunities and skills

Measuring LOC-I risks from contributing factors

- Air safety, incident and accident reports
  - Analysis of voluntary reports that involve pre-LOC-I conditions, e.g.:
    - Report of aircraft system malfunctions that affect aircraft control
    - Report of autopilot misuse
  - Analysis of mandatory reports that involve pre-LOC-I conditions
  - Other relevant safety, incident and accident reports, including ATC incident reports

Overview

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Monitor UPRT effectiveness using SPIs – Regulators

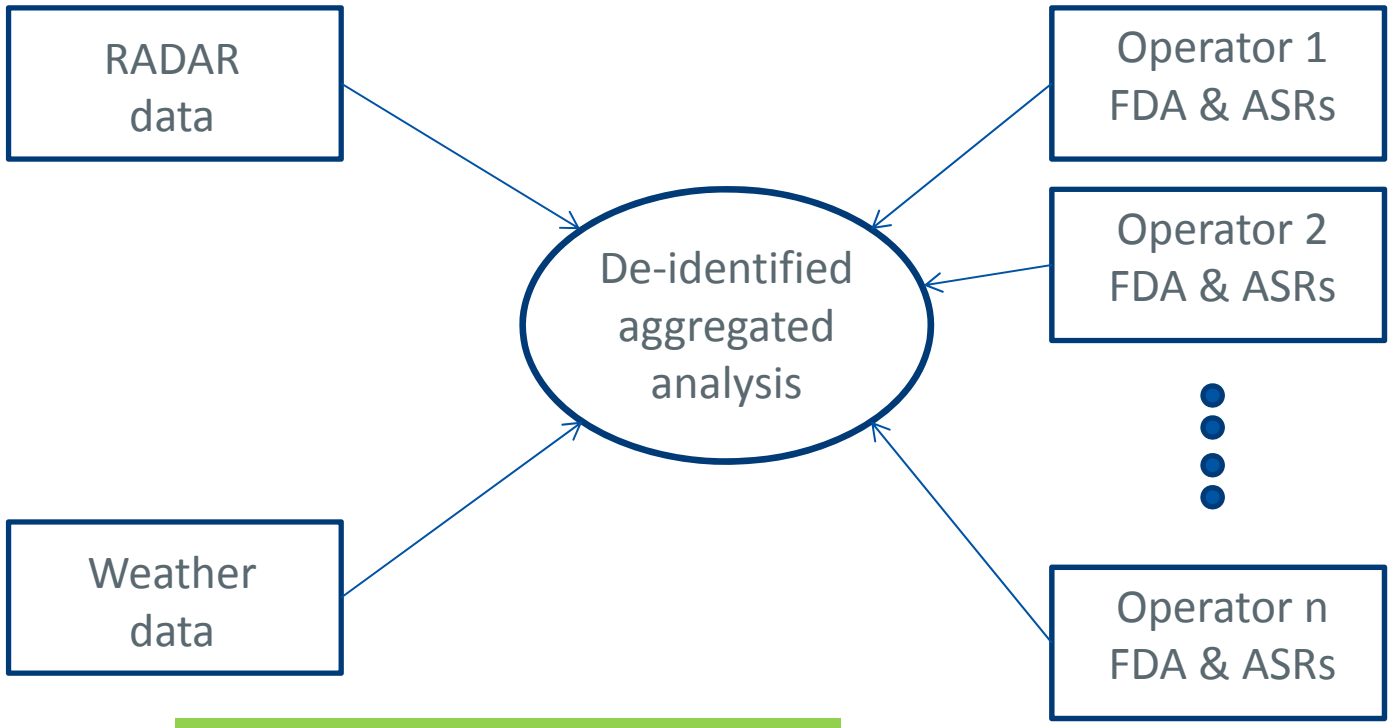
- Monitor SMS of air operators and approved training organizations (ATO):
  - LOC-I is identified as a risk to be managed on the risk register
  - Reporting behaviour is effective
  - Trend analysis of SPIs for LOC-I
  - Adequate response to unacceptable trends in SPIs

Monitor UPRT effectiveness using SPIs – Regulators

- Assess UPRT implementation:
  - Inspection: observe UPRT to assess:
    - Training facilities, equipment, environment, … for adequacy
    - Approved lesson plan
    - Instructor performance (NOT trainee performance)
  - Check instructor UPRT qualifications for compliance
  - Assess whether UPRT is conducted as per approval and up to proficiency
  - Monitor FSTD updates to qualify for the UPRT tasks

Monitor UPRT effectiveness using SPIs – Regulators

Voluntary collaborative data sharing



E.g.: IATA GADM and FAA ASIAS

Monitor UPRT effectiveness using SPIs – Commercial air transport operators

- Proper UPRT policy & programme implementation
- UPRT instructor qualification
- UPRT instructor calibration*
- FSTDs are qualified for UPRT tasks

* = Large air operators

Monitor UPRT effectiveness using SPIs – Commercial air transport operators

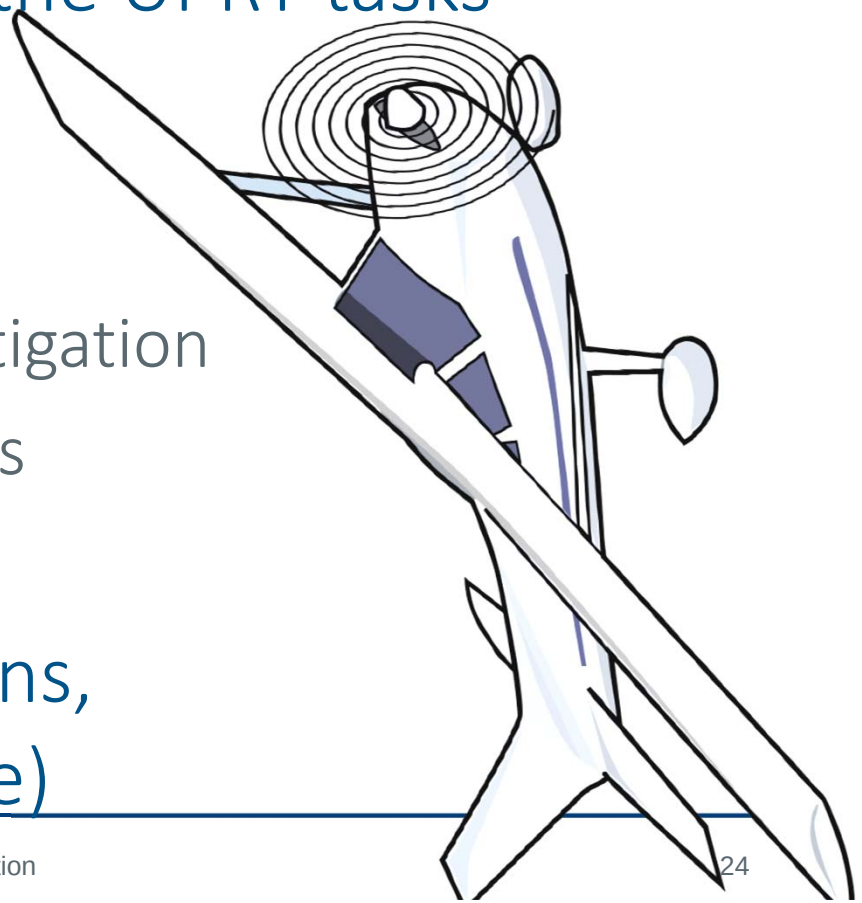
- Trend analysis of SPIs identified through different data sources:

  * = Large air operators

  – FDA*
  – Voluntary reports
  – Accident and incident reports
  – Pilot performance
    - In manoeuvre-based and scenario-based UPRT
    - During line checks
    - Knowledge needs assessments
  – Feedback for continuous UPRT improvement

Monitor UPRT effectiveness using SPIs – ATOs conducting on-aeroplane training

- Proper UPRT policy & programme implementation
- Suitability of aeroplane for the UPRT tasks
- Operational control
- SMS
  - Hazard identification and mitigation
  - Accident and incident reports
  - Voluntary reports
- Instructor UPRT qualifications, and calibration (if applicable)



Monitor UPRT effectiveness using SPIs – ATOs conducting on-aeroplane training

- Suitability of FSTD for the UPRT tasks (if using FSTD)
- Trainee performance
  - In manoeuvre-based and scenario-based training
  - Proficiency of graduates ☑
- Feedback for continuous UPRT improvement

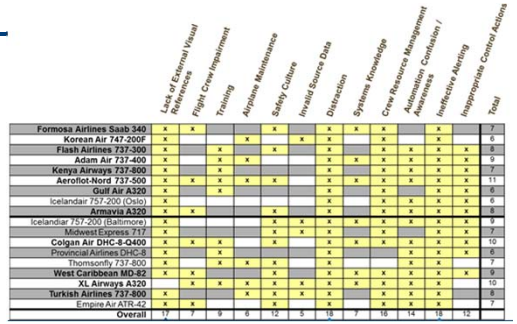
Monitor UPRT effectiveness using SPIs – ATOs conducting type rating training

- Proper UPRT policy & programme implementation
- Suitability of FSTD for the UPRT tasks
- Instructor UPRT qualifications, and calibration
- Trainee performance
  - In manoeuvre-based and scenario-based training
  - Proficiency of graduates

- Feedback for continuous UPRT improvement

Take-home messages

- Prevent the occurrence of one or more LOC-I themes to save life!



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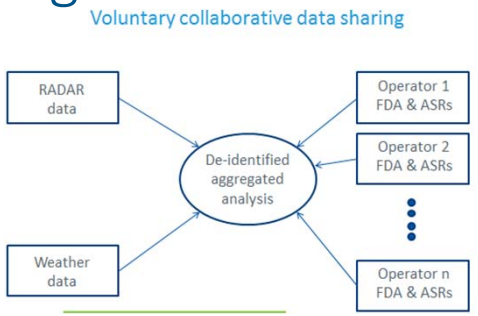
- You need to collect data and measure/identify LOC-I risks/hazards
- SMS: the LOC-I risk must be on the risk register
- Share safety data



- UPRT instructor qualifications are key to success

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