
50 shades
of LOSA
Myth Busters!
Pat Murray

What is LOSA?

Line **O**perations **S**afety **A**udit

- *LOSA is a non – jeopardy "Peer to Peer" observational methodology that provides managers with information to assist them in managing risk in flight operations*
- *LOSA is NOT a compliance audit. It is a source of information that provides "lead indicator" information in safety management terms.*
- *It can detect procedural "drift" in operational practices, perhaps towards less safe practices, or by adaptation towards safer practices and outcomes.*
- *Looks at aspects of organisational resilience through the ability of pilots to manage both their own errors and disturbances to the system*
- *<u>LOSA is Defined by ICAO</u> through 10 x characteristics (ICAO Doc 9803)*

LOSA Operating Characteristics

1. Jump-seat observations during regular operations
2. Anonymous, confidential, and non-punitive data collection
3. Voluntary crew participation
4. Trusted and trained observers
5. Joint management / pilots association sponsorship
6. Systematic observation instrument based on TEM
7. Secure data collection repository
8. Data verification roundtables
9. Data-derived targets for enhancement
10. Feedback of results to line pilots

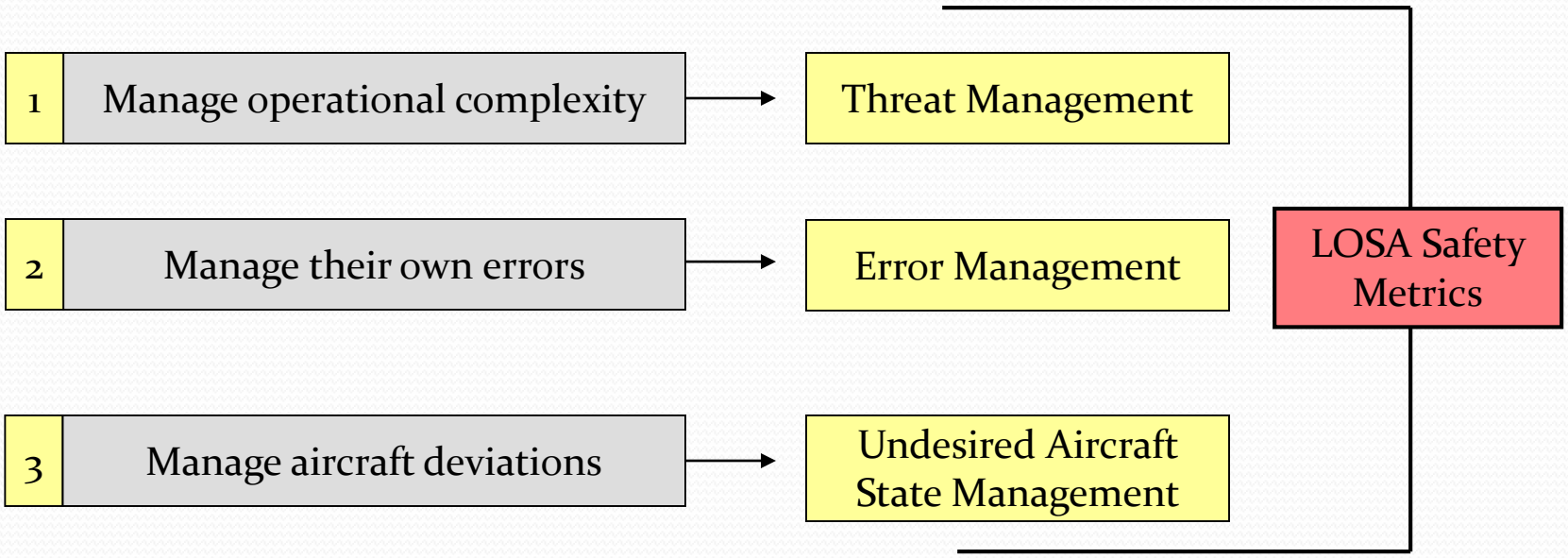
If your project does not meet all 10 characteristics, it is not a LOSA

Background

The University of Texas
Human Factors Research Project

- Early LOSA / EM / TEM Research
- FAA funded (AAR-100) (presentations and publications)
- Early research on LOSA & TEM
- Publications on LOSA
- Formation of The LOSA Collaborative
- ICAO Document 9803 and FAA Advisory Circular 120.90)

LOSA Safety Metrics - TEM



The LOSA archive is a data – base of over 20,000 flight observations across more than 120 LOSAs

LOSA Collaborative

LOSA is an open standard

The LOSA Collaborative is a user network of researchers and airlines collaborating to provide:

- Implementation of LOSA
- A forum for LOSA information exchange
- Safety benchmarking of flight operations
- Continuing development of TEM
- Support for Evidence Based Training (EBT)

EBT - Data Sources

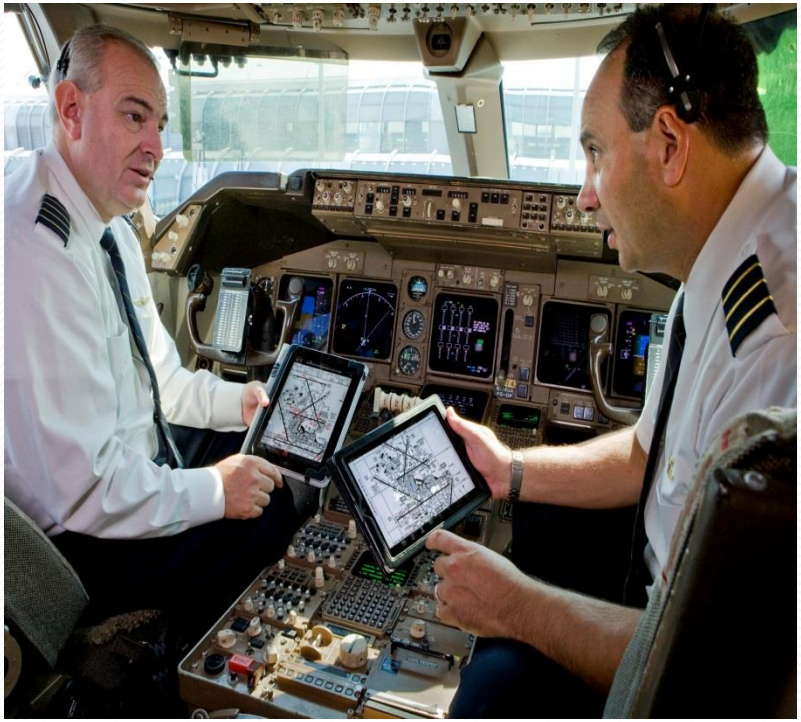
LOSA Supports EBT with Archive Findings

www.losacollaborative.org

ICAO Pilot Competencies

- Application of Procedures
- Communication
- Flight path management-automation
- Flight path management-manual
- Leadership & teamwork
- Problem solving & decision-making
- Situation awareness
- Workload management

8 Areas of Competency



Threat Management

ALL THREATS Threat Code in Descending Order of Frequency	ALL MISMANAGED THREATS Threat Code in Descending Order of Frequency
1. Terrain	1. ATC challenging clearances or tough to meet restrictions
2. Thunderstorms/turbulence	2. Terrain
3. ATC Challenging clearances or tough to meet restrictions	3. Thunderstorms/turbulence
4. Aircraft Malfunction unexpected by the crew	4. Aircraft Malfunction unexpected by the crew
5. Icing or snow	5. Icing or snow

How good is your threat management training?

Error Management

Top mis-managed Automation Errors

Error Codes	% of all Mismanaged Automation Errors
1. Wrong flight guidance altitude entered	21%
2. Failure to execute an MCP/FCU/Flt guidance mode when needed	13%
3. Omitted/wrong waypoint or route settings put in FMGC/FMS	9%
4. Wrong MCP/FCU/flight guidance mode executed	8%
5. Wrong flight guidance speed setting dialed	6%
6. Wrong speed entered into the FMC/FMGC	5%
7. Other wrong FMC/FMGC/FMS entries	5%

Error is ubiquitous - Error Management is not!

Callouts

A comparison of omitted callouts & their outcomes

Omitted Callout	% of all Observed Callout Errors	% of these errors that were Inconsequential	% of these errors leading to Added Error or UAS
Altitude Callouts (e.g., 1000 to level off calls)	55%	99%	1%
Descent/Approach Callouts (e.g., FAF call)	17%	92%	8%
Transition Callouts	2%	58%	42%
Deviation Callouts (Speed and Vertical)	2%	35%	65%

How would you use this information?

Message!

- Error is ubiquitous so we need to have robust procedures to detect and manage it

- Adherence to sound SOPs such as verbalising automation changes and mode changes result in fewer automation errors and fewer mismanaged automation errors

(What does “verify” mean?)

Intentional non -compliance

- Pilots discussed they were going to deviate from SOP
- Procedural shortcut observed to save time and / or effort
- Increasing risk when more conservative options or time was available
- Same error repeated multiple times within one phase of flight

Intentional non - compliance

	Error Code
1.	(Intentional) Checklist performed from memory / Use of nonstandard checklist protocol
2.	(Intentional) Omitted altitude callouts
3.	(Intentional) Failure to execute a mandatory missed approach
4.	(Intentional) PF makes own changes
5.	(Intentional) Taxi duties performed before leaving runway

What are the risks associated with a culture of non – compliance?

Intentional Noncompliance

TEM Indicator	Flights with zero Intentional Noncompliance	Flights with one Intentional Noncompliance error	Flights with two or more Intentional Noncompliance errors
% of observations	51%	24%	25%
Average number of threats per flight	4.5	4.7	4.8
Average number of errors per flight	2.1	3.9	7.5
% of flights with a mismanaged threat	26%	40%	54%
% of flights with a mismanaged error	29%	47%	67%
% of flights with an UAS	27%	43%	60%

Message!

- Crews with intentional non-compliance errors are much more likely to mismanage threats and errors
- As a manager how would you use information on levels of intentional non-compliance?

Unstable Approaches

Event	Outcome of the Event
4% of flights in LOSA Archive have an Unstable Approach	87% continued the approach and landed without issue
	10% continued the approach and landed long, short, or significantly off centerline
	3% executed a missed approach (9 of 337 unstable approaches observed)

Virtually all airlines have a mandatory go – around policy from an unstable approach. Why aren't crews going around?

Message!

There is a paradox associated with
go - arounds

The majority of (all engine) go - arounds are mishandled leading to errors and UAS

Why?

Error Detection

Error Type Caused By	Detected with Action By		
	Captain	First Officer	Both Pilots at the Same Time
Aircraft Handling Errors - caused by Captains	9%	24%	17%
Aircraft Handling Errors - caused by First Officers	39%	8%	10%
Procedural Errors - caused by Captains	3%	12%	39%
Procedural Errors - caused by First Officers	17%	4%	34%
Communication Errors - caused by Captains	4%	27%	14%
Communication Errors - caused by First Officers	37%	3%	8%

Observer narratives are data-rich

….The crew arrived at the aircraft at STD - 40 as the cleaners were just finishing up. The pre-flight setup was conducted thoroughly with the FO (PF) loading the FMC. There were two ground crew interruptions during the time that the Capt was outside conducting the walk - around period, both handled well by the FO, finishing the particular task before responding to the ground-crew, without getting them offside. The Capt returned and said that there was a problem with a hydraulic leak and the engineers were capping a brake line. He told the FO to delay take-off calculations as these would need to be done using 1 brake inop…

The Capt cross checked the FMC route while the engineers completed the MEL paperwork. Both pilots reviewed the MEL and agreed on the procedure. The FO completed the take-off data for 1 brake inop as per the MEL but used figures for a dry runway despite the heavy rain. This was caught by the Capt on his SOP cross check. He made a comment that this was “easily done” when using the EFB as the wet / dry choice was a box tick rather than a different paper chart ……..

Crew Interviews

(Examples)

"... the use of EFB for charts. Compared to paper charts, the airport charts and taxi routing charts cannot be used concurrently. Both pilots have to look in more often to change the chart displayed on the EFB during taxi, especially at complicated airports. This results in both pilots spending more time "heads down" and also can result in disorientation during taxi ..."

"…the EFB is a great tool most of the time. However, finding info quickly can be difficult and it is very easy to put in the wrong figures. We have had them for nearly 6 months now and my figures disagree with the Captain's about 50% of the time due to one of us screwing up the entries…"

Areas of note

- EFB introduction & use
- PF / PM (Flying and taxiing)
- Interruptions
- Briefing during descent
- Runway change after TOD
- “Abbreviated” briefings
- Visual Approach

New challenges

The same devices can be used for many purposes

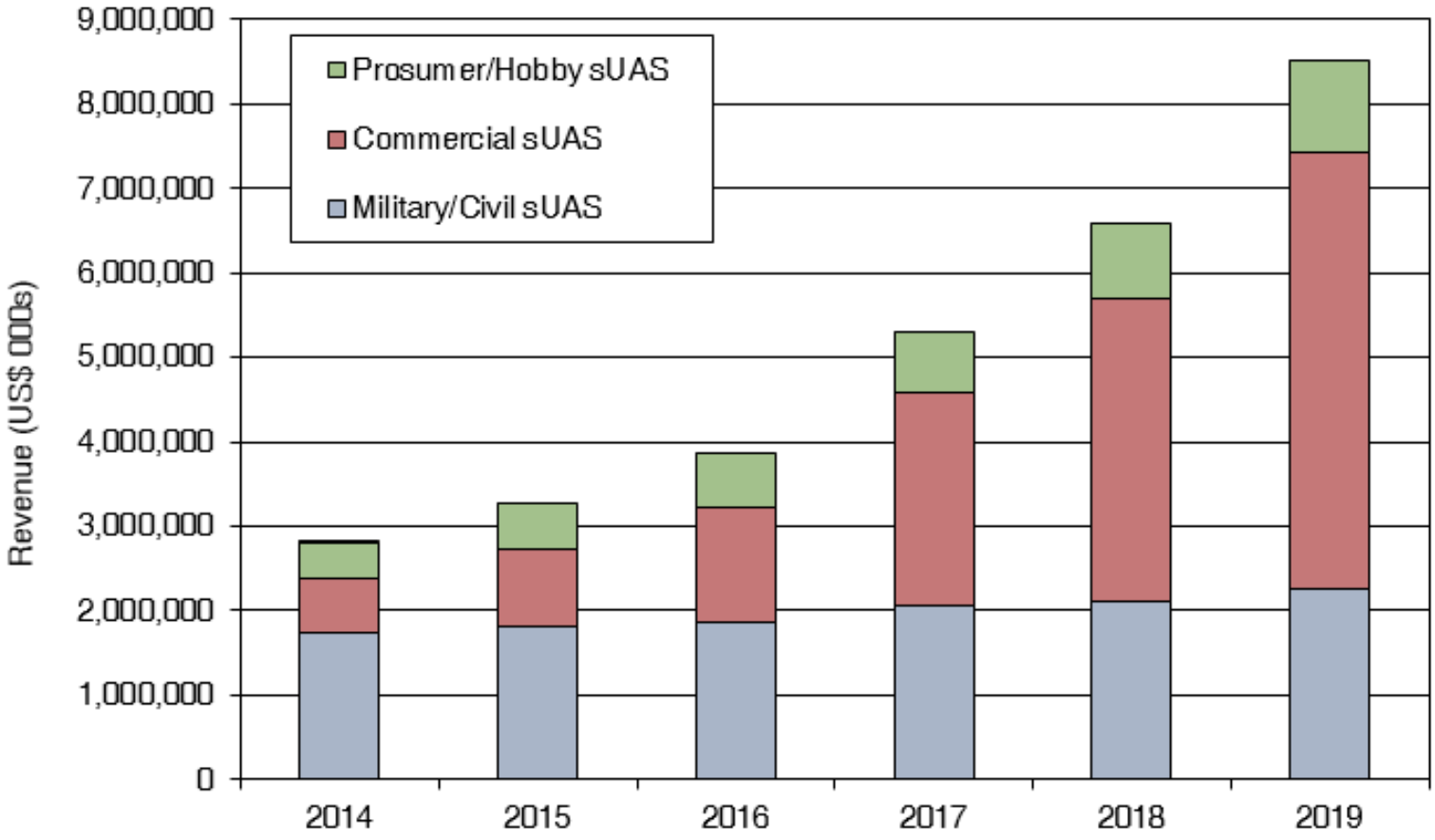
New challenges

Unmanned (RPAS) LOSA?

Unmanned Aerial Vehicles (UAV)
Remotely Piloted Aircraft systems (RPAS)

RPAS Growth

RPAS World Market Forecast 2014 – 2019



Source: ABI Research

The “system”