



**MAYDAY!  
MAYDAY!  
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**Learning from aviation  
to prevent disaster**

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International Flight School

**Preservation and Archiving Special Interest Group**  
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**Zen Master Seung Sahn**

**“Master, what is wisdom?”**

**“Never make mistakes”**

**“And how can I become wise?”**

**“By making mistakes!”**

**4 February 2015. 10:55 LT - Republic of China**

**Aircraft type:** ATR 72-600

**Operator:** TransAsia Airways

**Flight origin:** Taipei Songshan Airport. SongSahn. Taipei (Taiwan)

**Destination:** Kinmen Airport, Kinmen (Taiwan)

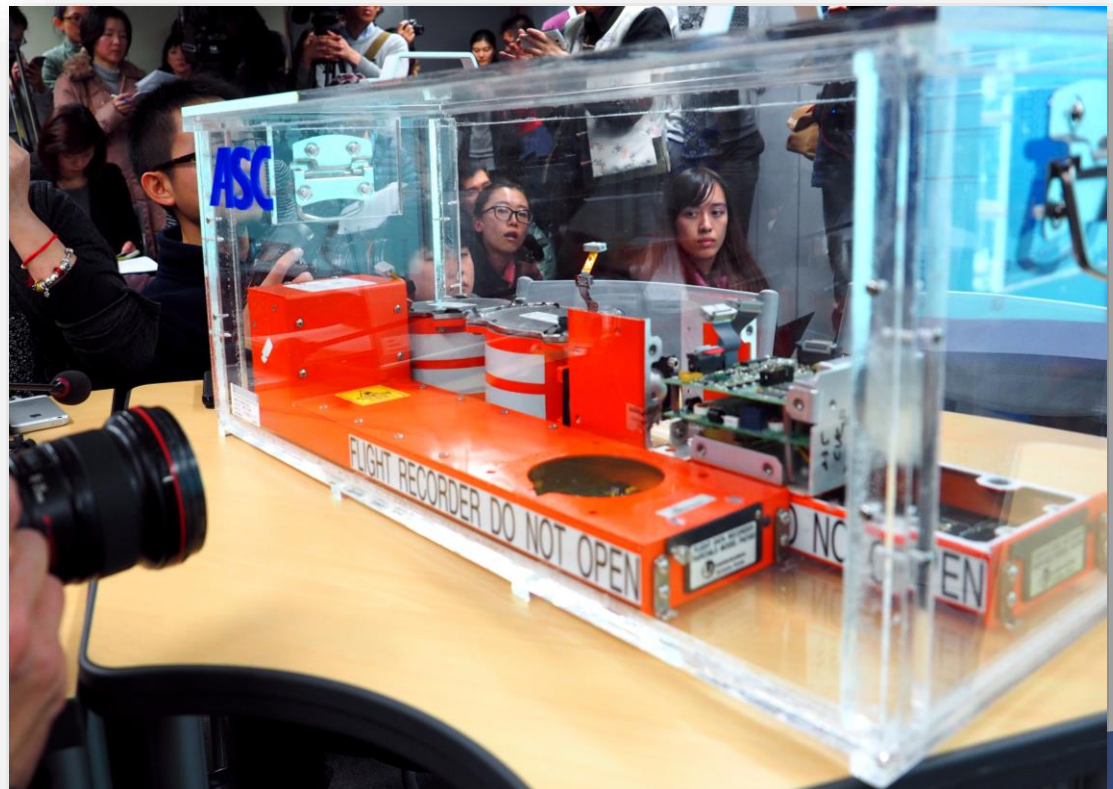
**Passengers:** 53

**Crew:** 5

**Fatalities:** 43

**Survivors:** 15

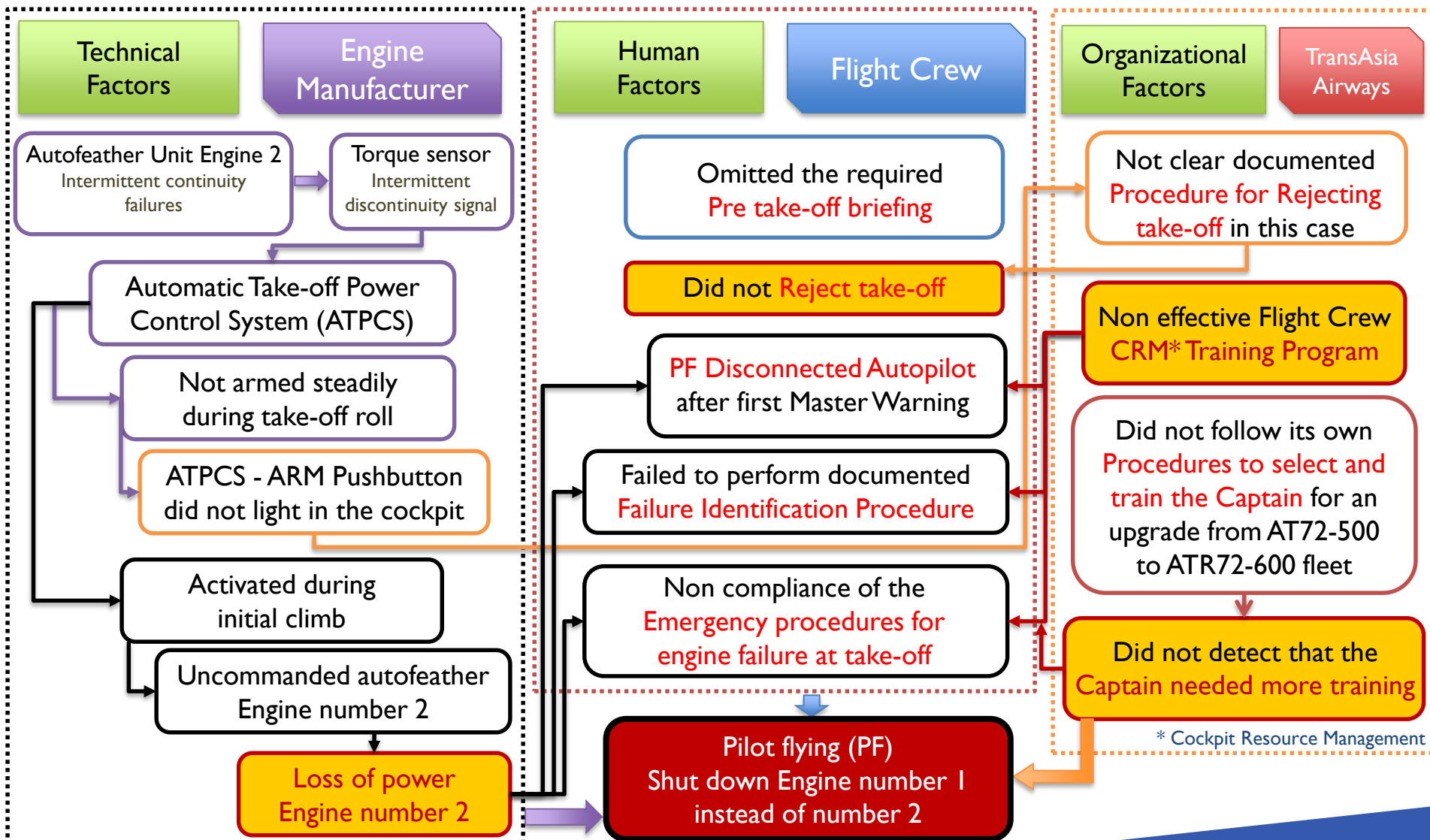
**Ground injuries:** 2



# Causes of the accident

Every accident, no matter how minor, is a failure of the organization

Jerome F. Lederer



# What is Safety?



**Risk management** is a more realistic term than safety.  
It implies that **hazards are ever-present**, that they must be

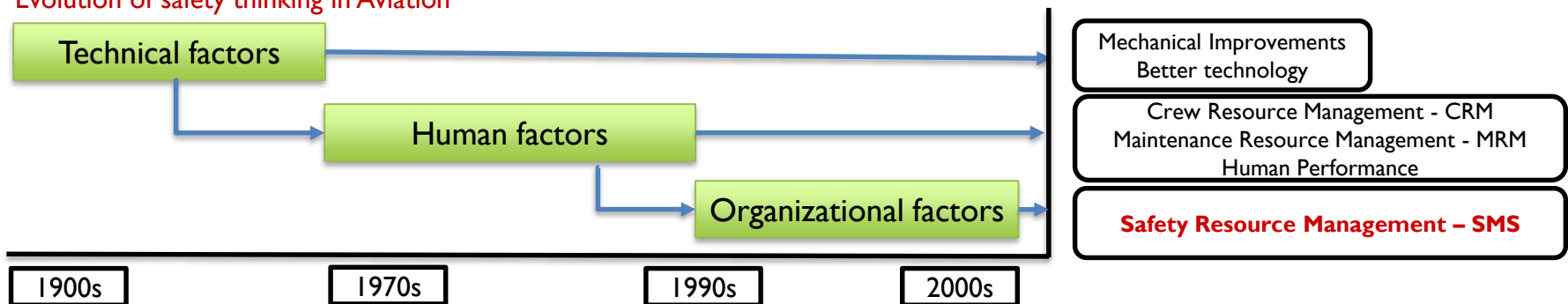
- Identified
- Analysed
- Evaluated
- Controlled or rationally accepted

**Jerome F. Lederer**

NASA director of the Office of  
Manned Space Flight Safety for  
the Apollo Program

**Right now the odds of any one flight  
being your last one is remote:  
1 to 11,000,000**

## Evolution of safety thinking in Aviation<sup>1</sup>



<sup>1</sup> ICAO. (2013). *Doc 9859 Safety Management Manual (SMM)*. Quebec, Canada: ICAO.

FAA. (2016). *Safety Management System*. Washington, USA: U.S. Department of Transportation  
Retrieved from <https://www.faa.gov/about/initiatives/sms/explained/basis/>



# Safety Management System - SMS

SMS is the formal, top-down, **organization-wide approach to managing safety risk** and assuring the effectiveness of **safety risk controls**. It includes **systematic procedures, practices, and policies** for the management of safety risk.

## 4 SMS COMPONENTS<sup>2</sup>

### 1. SAFETY POLICY

Establishes senior management's commitment to continually improve safety; defines the methods, processes, and organizational structure needed to meet safety goals

### 2. SAFETY RISK MANAGEMENT SYSTEM

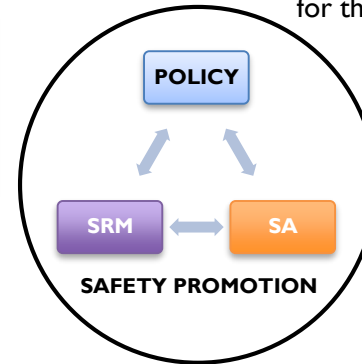
Determines the need for, and adequacy of, new or revised risk controls based on the assessment of acceptable risk

### 3. SAFETY ASSURANCE

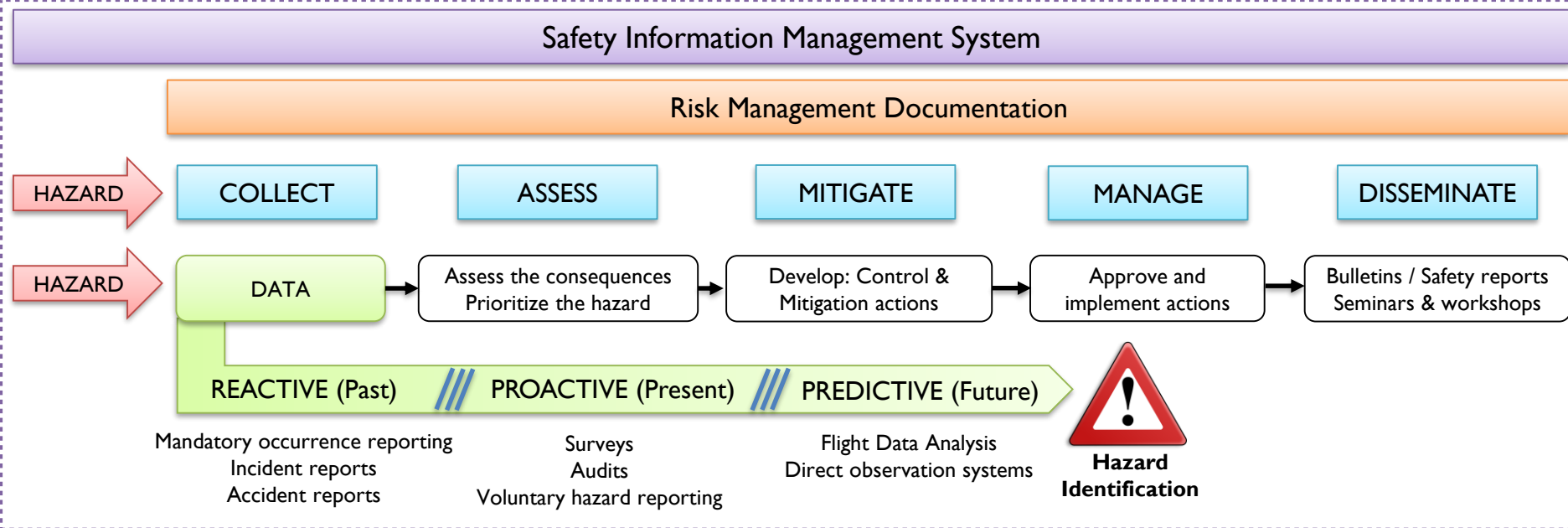
Evaluates the continued effectiveness of implemented risk control strategies; supports the identification of new hazards

### 4. SAFETY PROMOTION

Includes training, communication, and other actions to create a positive safety culture within all levels of the workforce



## 2. Safety Risk Management - SRM: Hazard documentation and follow-up risk management process



<sup>2</sup>ICAO. (2013). *Doc 9859 Safety Management Manual (SMM)*. Quebec, Canada: ICAO.

LIBNOVA offered  
LIBDATA storage arrays.  
UIB rejected the offer



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2015

**LIBSAFE  
ACQUISITION**

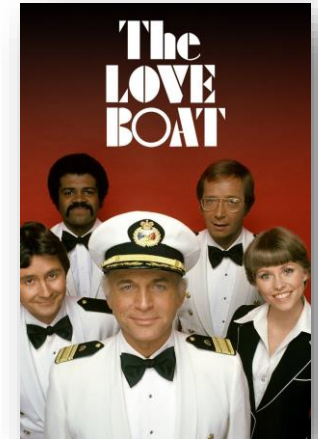
2017

**LIBSAFE  
OPERATIVE**

2019



LIBNOVA detects a risk  
in our system:  
Our 2 Storage Disks  
could be of the same provider  
and manufacturing batch



**LOSS OF DATA**  
3.281 Files: 248 GB

University of the  
Balearic Islands - UIB

Migration from an old  
Tape Backup System  
to a new one

2016

**LIBSAFE  
INSTALLED**

2 Storage Disks  
acquired by UIB

2018

## Are we safe?

The 2 storage disks could fail at the same  
time in case of a manufacturing defect

## ONE MORE STEP IS NECESSARY

### NDSA Levels of Digital Preservation

LIBSAFE + 2 UIB Storage Disks



Same provider &  
manufacturing batch

Categories	1. Protect	2. Know	3. Monitor	4. Repair
Storage and Geographic Location	Green	Red	Red	Red
File Fixity and Data Integrity	Red	Red	Red	Red
Information Security	Green	Red	Red	Red
Metadata	Green	Red	Red	Red
File Formats	Green	Green	Red	Red

LIBSAFE + 3 UIB Storage Disks



Same provider &  
manufacturing batch

Categories	1. Protect	2. Know	3. Monitor	4. Repair
Storage and Geographic Location	Green	Green	Green	Green
File Fixity and Data Integrity	Green	Green	Green	Green
Information Security	Green	Green	Green	Green
Metadata	Green	Green	Green	Green
File Formats	Green	Green	Green	Green

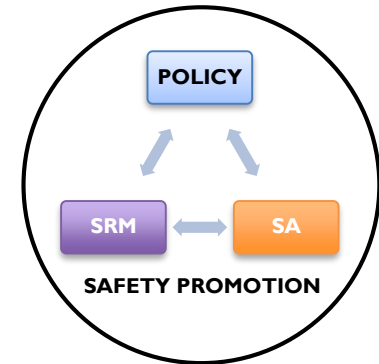


What is interesting here is to observe how the  
**NDSA Levels are not designed to manage safety risk and, therefore,  
to detect potential risks associated with technical,  
human and organizational factors**

## NDSA Levels of Digital Preservation

Categories	Level 1	Level 2	Level 3	Level 4
Storage and Geographic Location	●	●	●	●
File Fixity and Data Integrity	●	●	●	●
Information Security	●	●	●	●
Metadata	●	●	●	●
File Formats	●	●	●	●
<b>SAFETY &amp; RISK MANAGEMENT</b>	<b>SAFETY POLICY</b>	<b>SAFETY PROMOTION</b>	<b>SAFETY RISK MANAGEMENT SYSTEM</b>	<b>SAFETY ASSURANCE</b>

## NEW NDSA CATEGORY BASED ON SAFETY MANAGEMENT SYSTEMS



**Safety Management System**  
a dynamic *Risk Management System*  
based on *Quality Management Systems* (QMS)  
principles in a structure scaled appropriately  
to the operational risk, applied in a  
*safety culture environment*.<sup>3</sup>

### 1. SAFETY POLICY

- 2.1 Management commitment and responsibility
- 2.2 Safety accountabilities
- 2.3 Appointment of key safety personnel
- 2.4 Coordination of emergency response planning
- 2.5 SMS documentation

### 2. SAFETY PROMOTION

- 1.1 Training and education
- 1.2 Safety communication

### 3. SAFETY RISK MANAGEMENT SYSTEM - SRM

- 3.1 Hazard identification
- 3.2 Safety risk assessment and mitigation

### 4. SAFETY ASSURANCE - SA

- 4.1 Safety performance monitoring and measurement
- 4.2 The management of change
- 4.3 Continuous improvement of the SMS



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Collaborate to implement Safety Management Systems (SMS)  
structures, using the Aviation Know-How,  
to the field of Digital Preservation

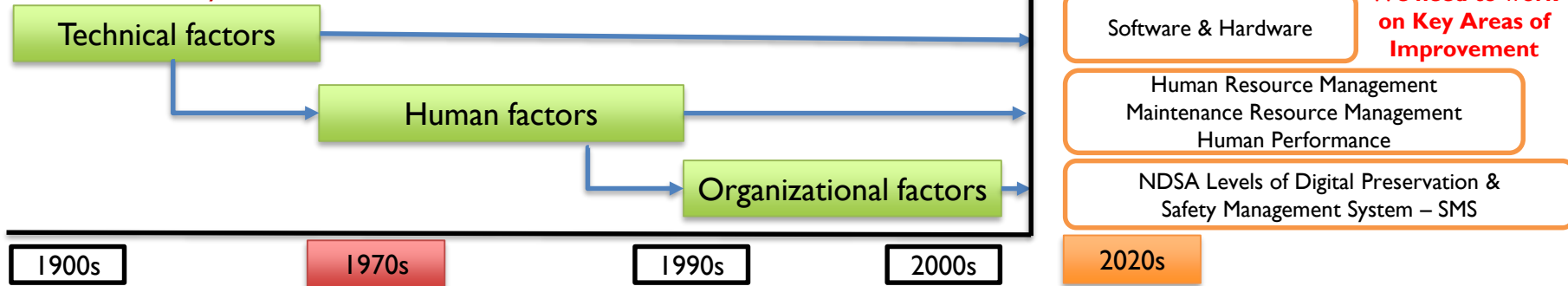
<sup>3</sup>Stolzer, Alan J.. (2015). *Safety Management System*. Farnham, England: Ashgate Publishing Limited.



# Where are we in Digital Preservation?

**We are in the 1970s in terms of safety compared with the Aviation and Aerospace industry**

Evolution of safety in Aviation



**We are in the 1970s**



**SKY IS THE LIMIT**





**THANK YOU!**

PASIG 2019 Mexico