Whether Report:

A Study on Voluntary Reporting Factors Among Professional Groups in Aviation

Dispatch & Maintenance Breakout

Infoshare Pittsburgh, 2021

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2020 Edinburgh 3rd International Workshop on Safety-II in Practice

Beyond Reason: Revealing Resilience in Flight Data Applying Safety-II Principles

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Abstract—To date, flight data monitoring programs hav
exclusively focused on adverse events—exceedances, undesire
states, and negatively trending aggregate data. Recently, howeve
programs such as aircraft health monitoring and data fusion ha
explored the capabilities of leveraging flight data proactiv
Opportunities exist for flight data to be used to identify resil
"near miss" behavior flight crews employ when facing adver
The study of "what goes right" during "work as done" has rec
been coined Safety-II. Leveraging qualitative and quantit
flight data in this manner will create new knowledge i
advancement of predictive flight safety. A mixed m
research design is proposed to investigate the efficacy of a b
use of flight data monitoring programs.

*Keywords—Safety-II, resilience engineering, flig
monitoring, just culture, functional resonance analysis
(FRAM).*

Long Haulers: The US Airline Industry and Moving Forward From the Covid-19 Pandemic

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—As a subset of the global aviation industry, the
has endured similar challenges as other countries,
ontinual adaptation during the Covid-19 pandemic.
hall highlight aspects of the pandemic recovery
e US aviation sector, acknowledging the nature of
tedness as an industry. All stakeholders have
learn from each other and gain future agility as
mpts to recover from the direst crisis in its

*cargo, aviation safety, Covid-19, ICAO,
, SMS, sustainability*

I. Introduction

e Covid-19 pandemic is the most
efall human society in modern times.
y is affected in some manner. Because
re of the virus, the disruptive nature of
resiliency and brittleness across all
gistics, and interconnectedness on a

ore affected—and will be affected relating to access of medical care, vaccines, personal health surveillance, and habitation of the social space—issues that are entwined with, but also transcend the aviation industry.

This article will offer a US perspective. Given the general uniformity of the global aviation industry, the majority of issues that the US will face going forward are the same as the rest of the world. Therefore, the aim of this contribution is to raise issues that may be of particular significance or consequence as it pertains to the US, acknowledging that the nature of global commercial aviation is inextricably intertwined. First, a brief discussion about past historical disruptive events will be addressed, followed by an assessment of issues raised during the pandemic. Finally, future considerations will be discussed and recommendations to the industry put forth.

II. Historical Context

The majority of disruptive events the aviation industry has experienced have been induced by way of accidents. The lessons learned from accident causal factors have helped to drive current aviation safety standards to an unprecedented level. However, events with political genesis extraneous to the

FLIGHT SAFETY FOUNDATION

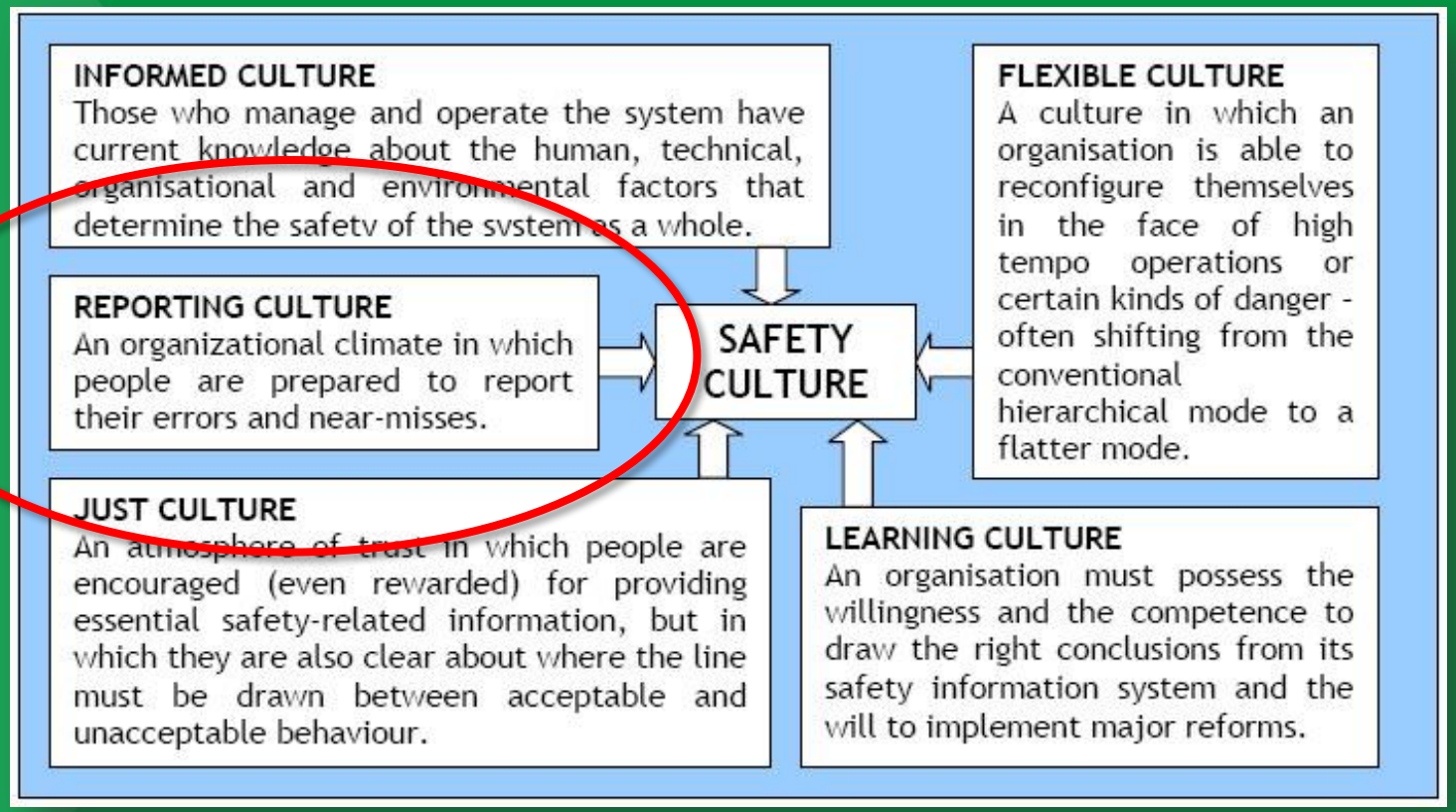
FLIGHT SAFETY FOUNDATION WHITE PAPER

Learning From All Operations:
Expanding the Field of Vision to Improve Aviation Safety

JULY 2021

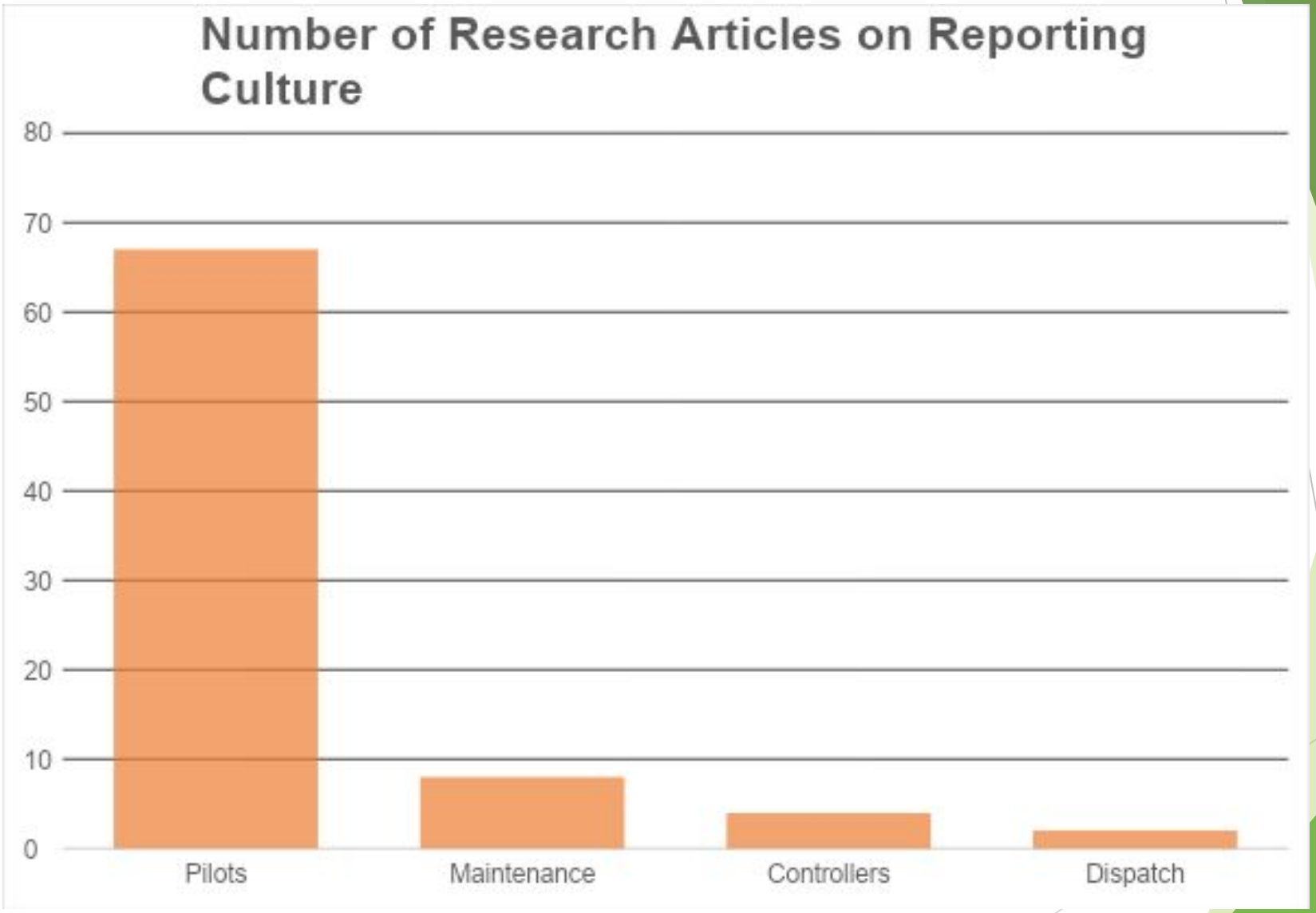
Sidney Dekker
Brisbane
2 weeks before Covid!

Erik Hollnagel
Copenhagen


INFORMED CULTURE
Those who manage and operate the system have current knowledge about the human, technical, organisational and environmental factors that determine the safety of the system as a whole.
REPORTING CULTURE
An organizational climate in which people are prepared to report their errors and near-misses.
JUST CULTURE
An atmosphere of trust in which people are encouraged (even rewarded) for providing essential safety-related information, but in which they are also clear about where the line must be drawn between acceptable and unacceptable behaviour.
SAFETY CULTURE
FLEXIBLE CULTURE
A culture in which an organisation is able to reconfigure themselves in the face of high tempo operations or certain kinds of danger - often shifting from the conventional hierarchical mode to a flatter mode.
LEARNING CULTURE
An organisation must possess the willingness and the competence to draw the right conclusions from its safety information system and the will to implement major reforms.

The problem(s)

- ASAP perception of robustness
- Safety culture research **does not exist** into the specific factors that either promote or discourage reporting among different frontline groups (Ashley, 2020; Bermudez, 2017; Munro & Mogford, 2018; Sieberichs & Kluge, 2018).
- The relationship between safety culture and voluntary reporting remains **unexplored** (Yang & Liu, 2021).
- Safety climate has been shown to vary across professional groups, and cross-sectional research across multiple airlines **does not exist** when it comes to near-miss, voluntary reporting (Gao et al., 2015; Lu et al., 2019; Madsen et al., 2016).


Number of Research Articles on Reporting Culture
80
70
60
50
40
30
20
10
0
Pilots
Maintenance
Controllers
Dispatch

Professional Group Identity

Social Identity Theory

- Pilots
- Maintenance
- Dispatch
- ATC

Safety Culture / Climate

Voluntary / near-miss reporting

Professional Group Identity

Social Identity Theory

- Pilots
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Pilots

- More solidarity to profession than organization (Warnock-Smith, 2020)
- Occupational identity as anchor in hardship (Fraher, 2014)
- “Invisiblized dirty work” – vast expansion of duties post 9/11 (Fraher, 2017)

Dispatchers

- Critically understudied - “the unknown profession”
- Management pressure with economic concerns (fuel, routing, etc.) (Sheremeta, 2015)
- Role has stayed relatively similar; prevented accidents (Sailer, 2005)
- Shortage debate – 2,745 total in 2019! (FAA, 2019)

Maintenance Technicians

- Flexibility subculture (McDonald et al., 2000)
- *Blame culture* – Proximity, immediacy, autonomous nature of work (Hobbs, 2014)
- Outsourcing influence (Quinlan et al., 2013)
- Practical knowledge > SOPs (Pettersen, 2008)

Controllers

- Mgmt has better perception of safety culture than frontline (Tear et al, 2020)
- SC predicts safety behavior, but not accidents (Tear et al., 2020)
- High rates of stress

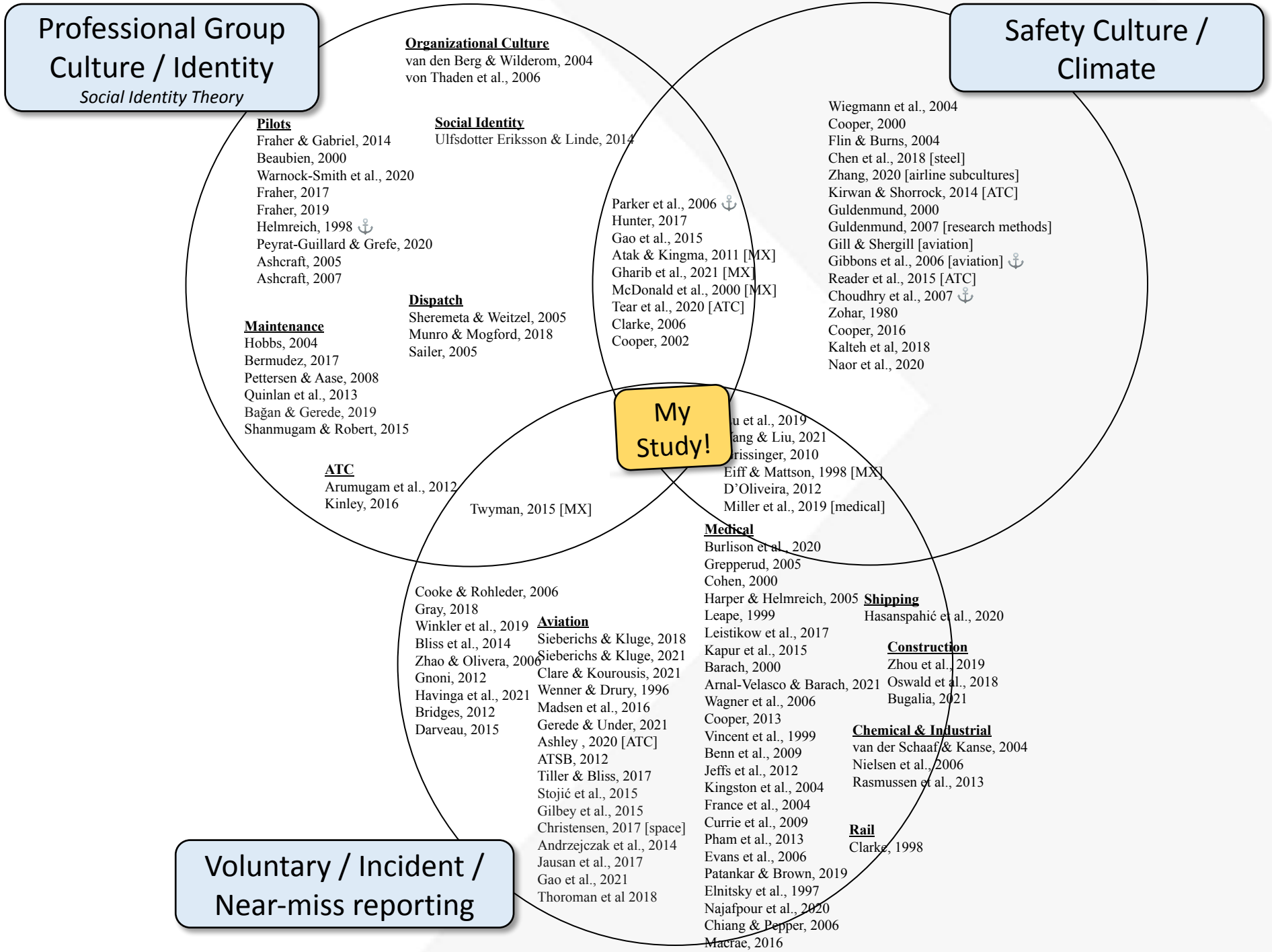
Professional Group Identity

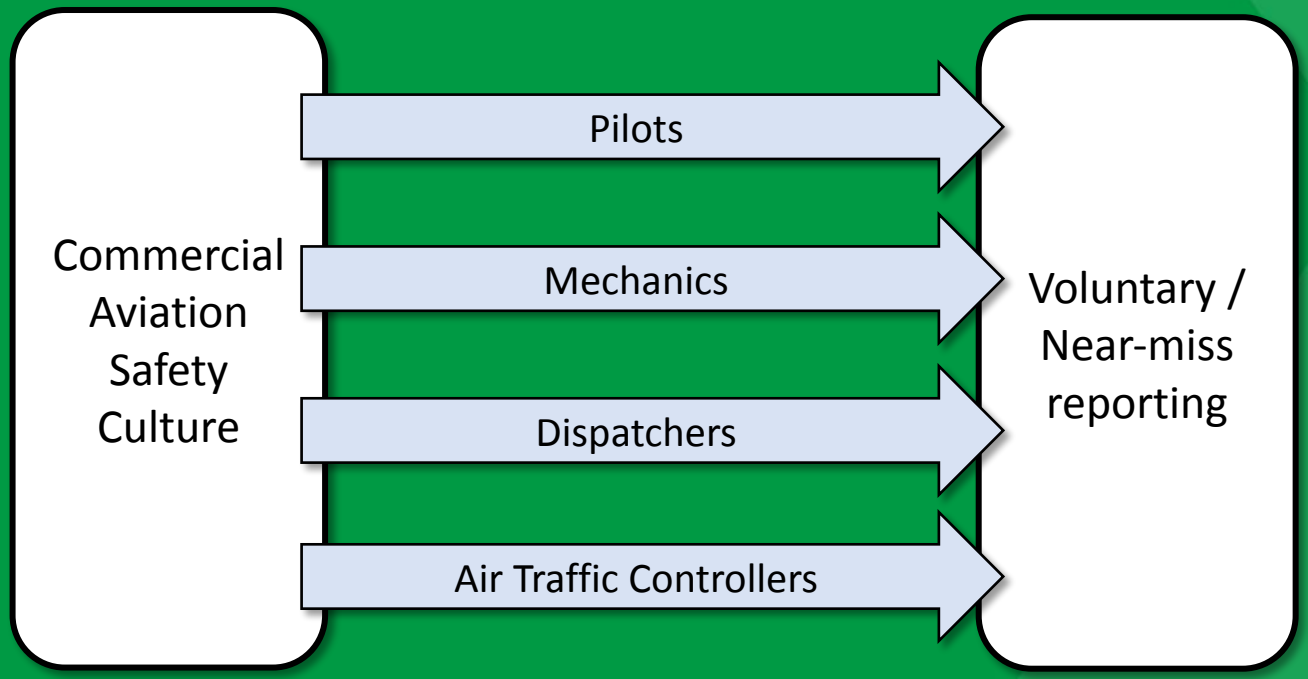
Social Identity Theory

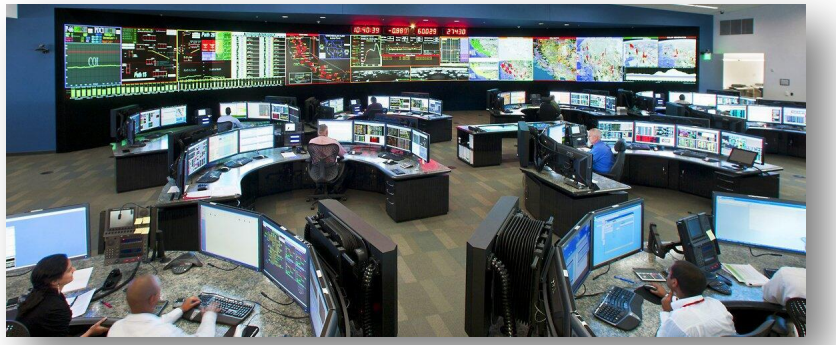
- Pilots
- Maintenance
- Dispatch
- ATC

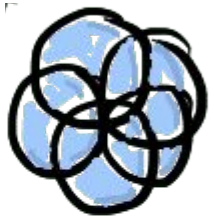
Safety Culture / Climate

Voluntary / near-miss reporting

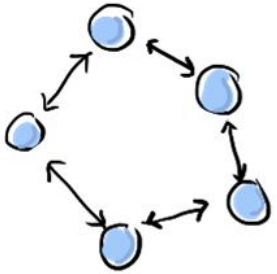

Professional Group Culture / Identity
Social Identity Theory
Safety Culture / Climate
Voluntary / Incident / Near-miss reporting
My Study!
Organizational Culture
van den Berg & Wilderom, 2004
von Thaden et al., 2006
Pilots
Fraher & Gabriel, 2014
Beaubien, 2000
Warnock-Smith et al., 2020
Fraher, 2017
Fraher, 2019
Helmreich, 1998
Peyrat-Guillard & Grefe, 2020
Ashcraft, 2005
Ashcraft, 2007
Social Identity
Ulfsdotter Eriksson & Linde, 2014
Dispatch
Sheremeta & Weitzel, 2005
Munro & Mogford, 2018
Sailer, 2005
Maintenance
Hobbs, 2004
Bermudez, 2017
Pettersen & Aase, 2008
Quinlan et al., 2013
Bağan & Gerede, 2019
Shanmugam & Robert, 2015
ATC
Arumugam et al., 2012
Kinley, 2016
Parker et al., 2006
Hunter, 2017
Gao et al., 2015
Atak & Kingma, 2011 [MX]
Gharib et al., 2021 [MX]
McDonald et al., 2000 [MX]
Tear et al., 2020 [ATC]
Clarke, 2006
Cooper, 2002
Wiegmann et al., 2004
Cooper, 2000
Flin & Burns, 2004
Chen et al., 2018 [steel]
Zhang, 2020 [airline subcultures]
Kirwan & Shorrock, 2014 [ATC]
Guldenmund, 2000
Guldenmund, 2007 [research methods]
Gill & Shergill [aviation]
Gibbons et al., 2006 [aviation]
Reader et al., 2015 [ATC]
Choudhry et al., 2007
Zohar, 1980
Cooper, 2016
Kalteh et al, 2018
Naor et al., 2020
u et al., 2019
ang & Liu, 2021
rissinger, 2010
Eiff & Mattson, 1998 [MX]
D'Oliveira, 2012
Miller et al., 2019 [medical]
Twyman, 2015 [MX]
Medical
Burlison et al., 2020
Grepperud, 2005
Cohen, 2000
Harper & Helmreich, 2005
Leape, 1999
Leistikow et al., 2017
Kapur et al., 2015
Barach, 2000
Arnal-Velasco & Barach, 2021
Wagner et al., 2006
Cooper, 2013
Vincent et al., 1999
Benn et al., 2009
Jeffs et al., 2012
Kingston et al., 2004
France et al., 2004
Currie et al., 2009
Pham et al., 2013
Evans et al., 2006
Patankar & Brown, 2019
Elnitsky et al., 1997
Najafpour et al., 2020
Chiang & Pepper, 2006
Macrae, 2016
Shipping
Hasanspahić et al., 2020
Construction
Zhou et al., 2019
Oswald et al., 2018
Bugalia, 2021
Chemical & Industrial
van der Schaaf & Kanse, 2004
Nielsen et al., 2006
Rasmussen et al., 2013
Rail
Clarke, 1998
Cooke & Rohleder, 2006
Gray, 2018
Winkler et al., 2019
Bliss et al., 2014
Zhao & Olivera, 2006
Gnoni, 2012
Havinga et al., 2021
Bridges, 2012
Darveau, 2015
Aviation
Siebericchs & Kluge, 2018
Siebericchs & Kluge, 2021
Clare & Kourousis, 2021
Wenner & Drury, 1996
Madsen et al., 2016
Gerede & Under, 2021
Ashley , 2020 [ATC]
ATSB, 2012
Tiller & Bliss, 2017
Stojić et al., 2015
Gilbey et al., 2015
Christensen, 2017 [space]
Andrzejczak et al., 2014
Jausan et al., 2017
Gao et al., 2021
Thoroman et al 2018


Commercial Aviation Safety Culture
Pilots
Mechanics
Dispatchers
Air Traffic Controllers
Voluntary / Near-miss reporting

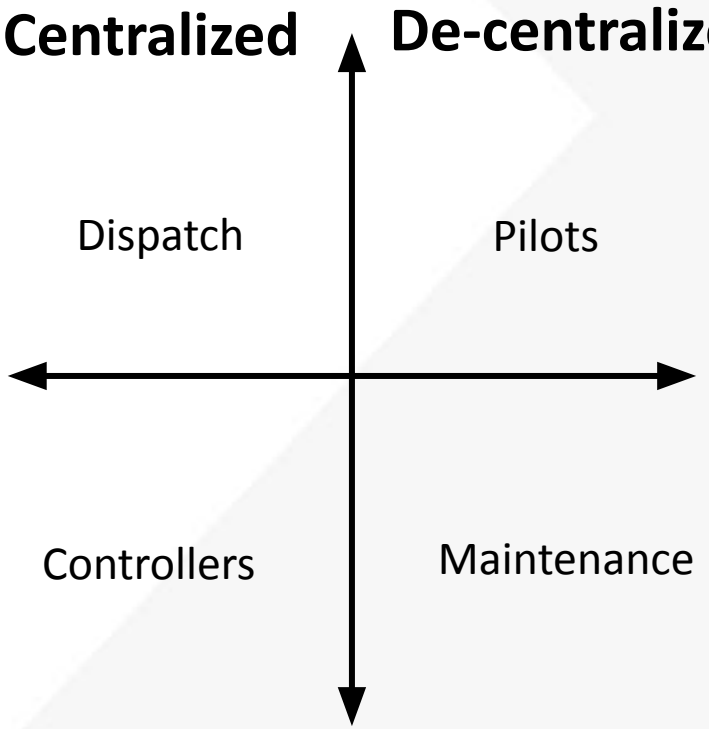




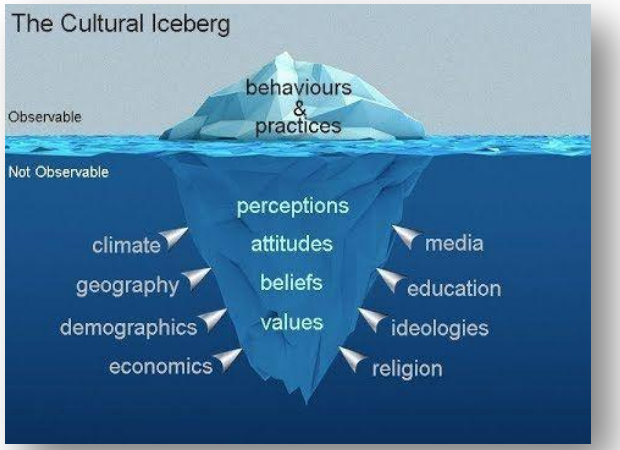
Tightly coupled



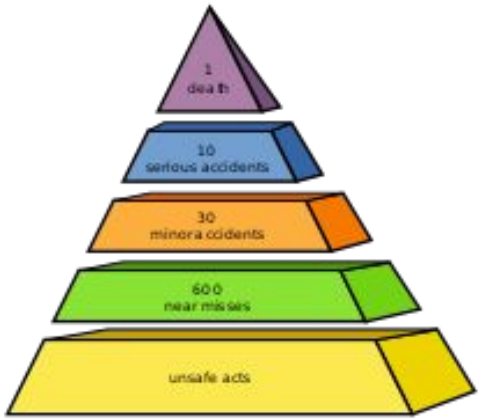
Loosely coupled



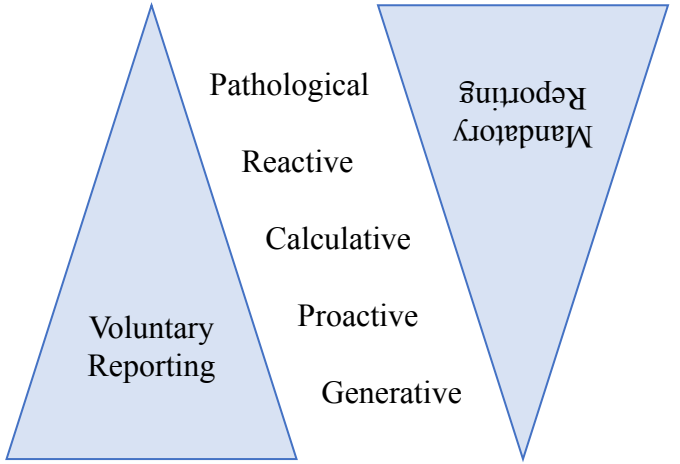
The developed model



General “iceberg” theory



The Heinrich Safety Pyramid, 1931



Norman (2021) hybrid reporting culture model. Adapted from Hudson (2003), Parker (2006) and Reason (1997).

Organizational safety values

Trust

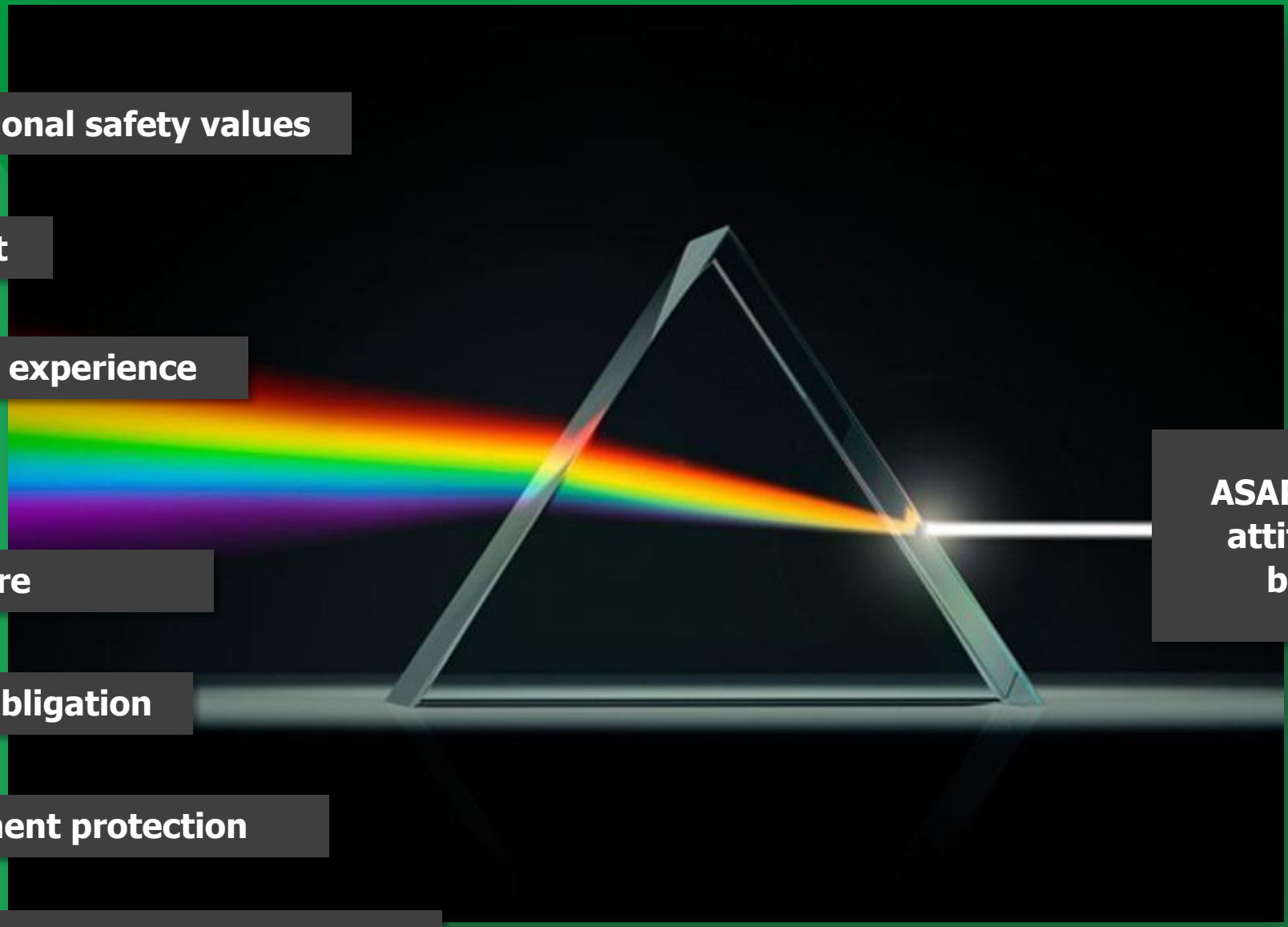
Previous reporting experience

Just culture

Professional obligation

Enforcement protection

Access and time



ASAP reporting attitudes and behavior

Research questions

#1: What **primary factors** contribute to voluntary reporting of near-miss events, as compared to mandatory reporting among four frontline aviation professional groups: pilots, dispatchers, mechanics and air traffic controllers?

#2: To what extent does employee **reporting protection** mediate the effect of voluntary near-miss reporting behavior?

#3: Does reporting **confidentiality** mediate the likelihood to report near-miss events?

#4: What **ancillary factors** contribute to the facilitation of voluntary safety reporting among employee groups (technology access, time availability, severity, etc.)?

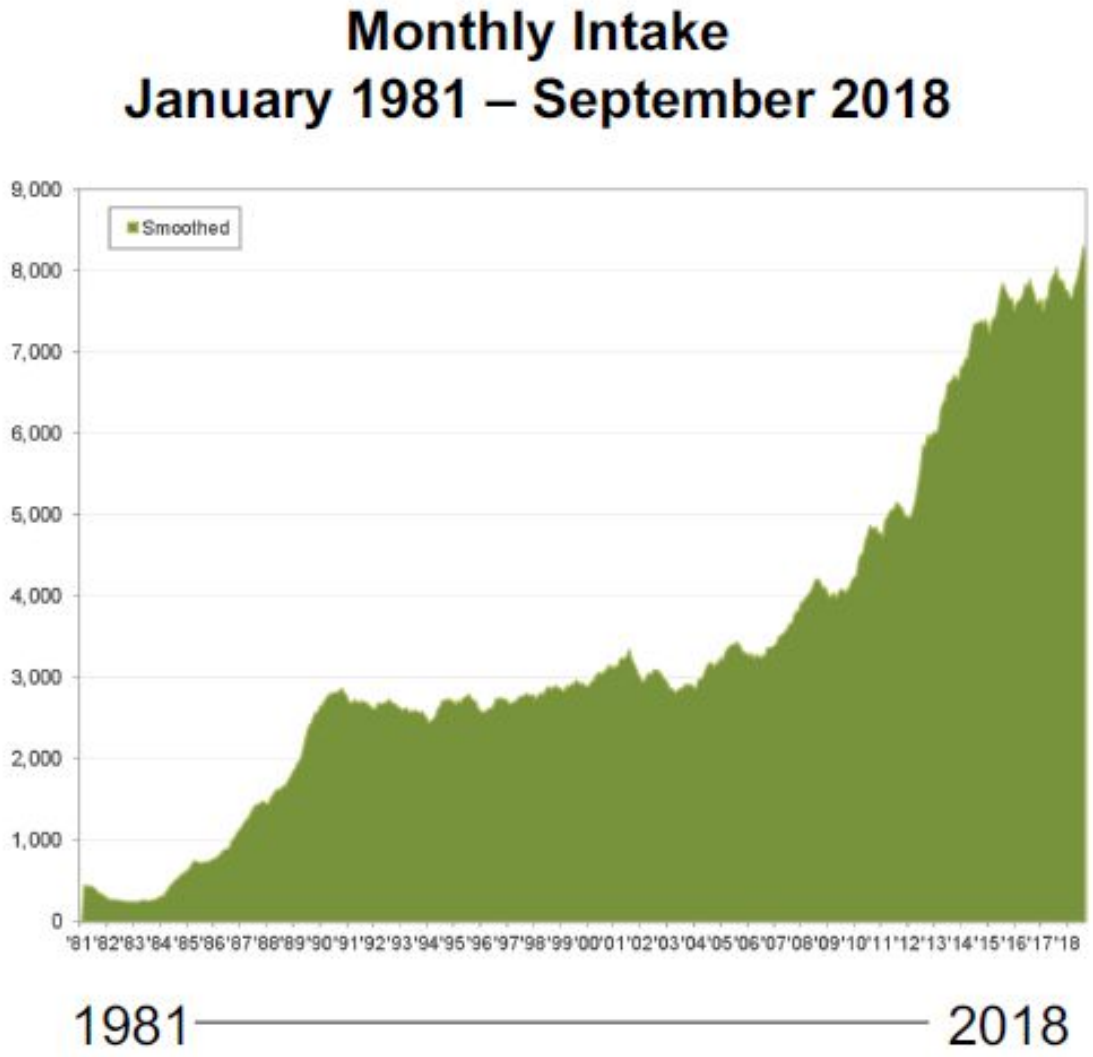
How this research benefits NASA

- NASA ASRS database
  - Independent 3rd party
  - Safety reporting database for all general and commercial aviation
  - Voluntary, confidential, non-punitive

NASA ASRS

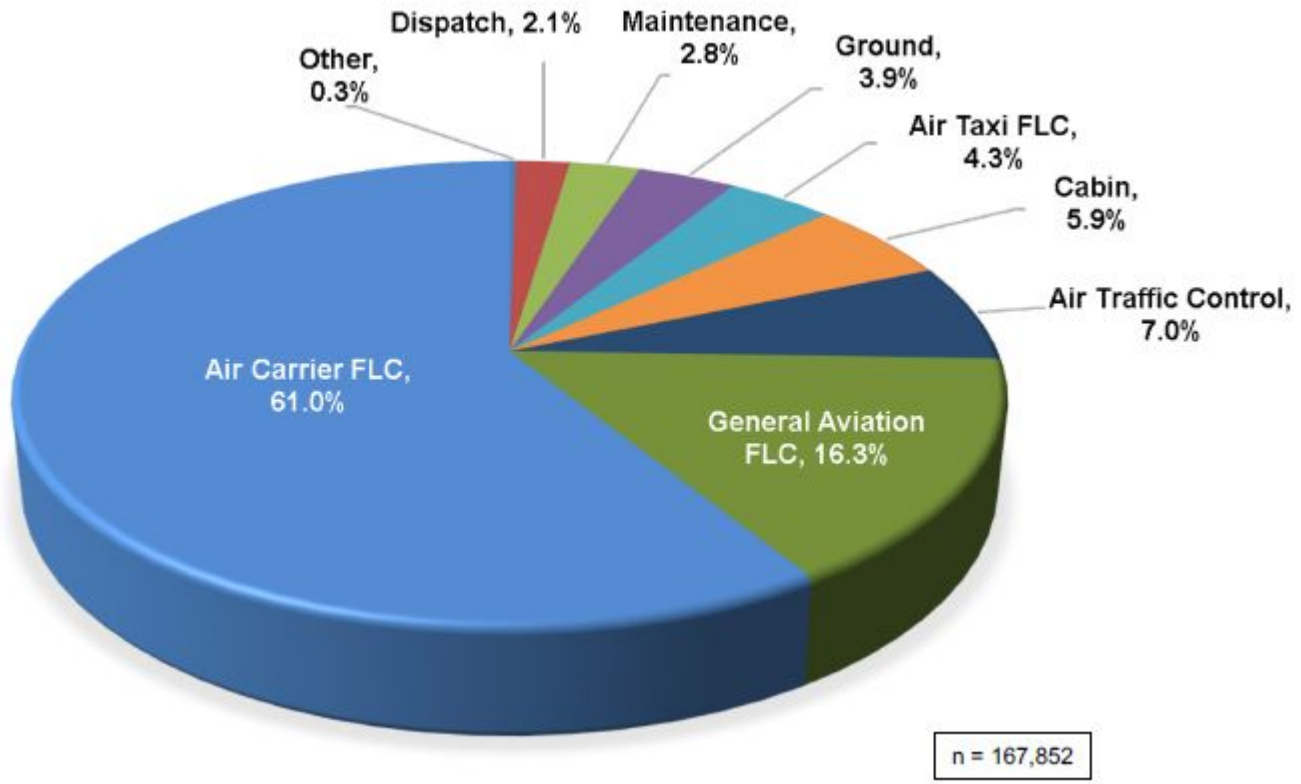
~400 reports per day

+1.6M reports total



Source: NASA, 2018

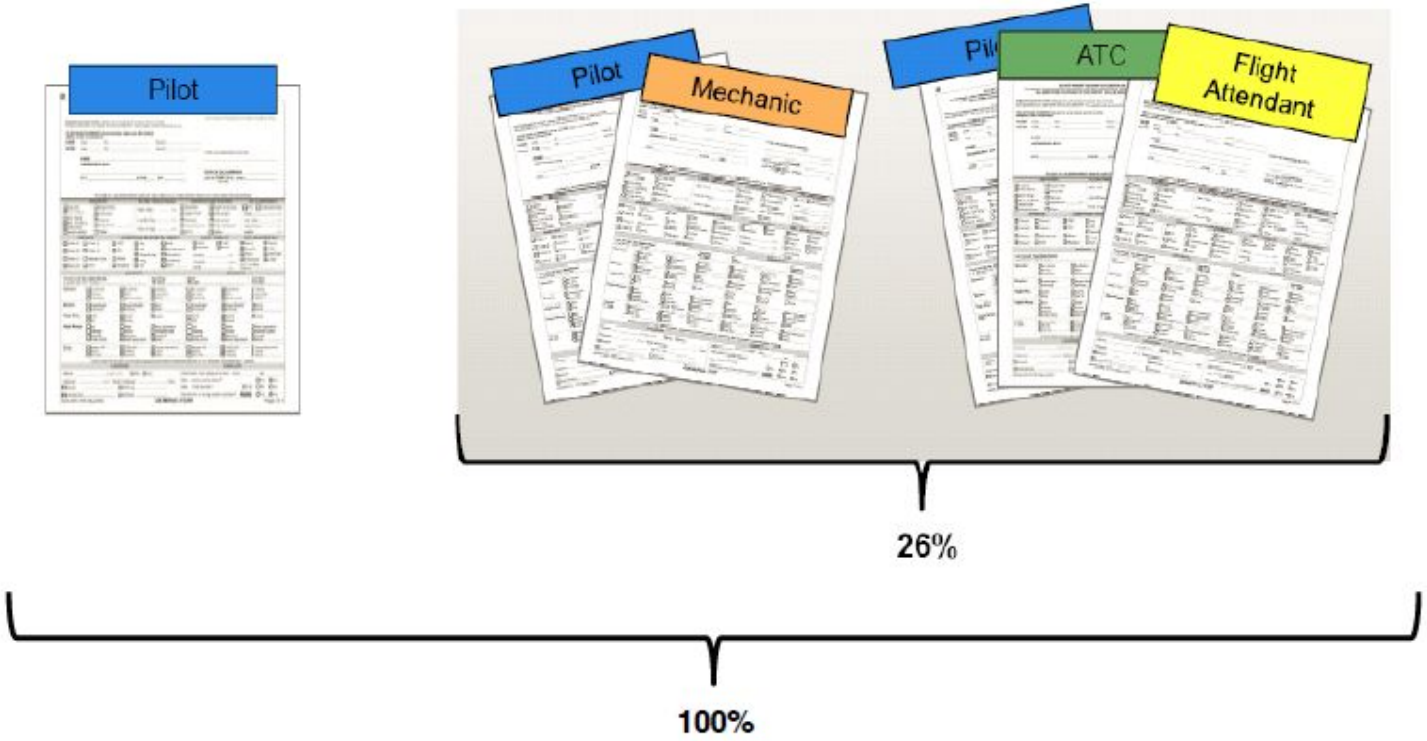
NASA ASRS Reporting distribution



Source: NASA, 2018

Report Matching

- NASA ASRS fuses reports
- Goal = all employees report
  - **Barrier** = different levels of safety culture and trust
- This research will help to understand upstream motivations for reporting



Source: NASA, 2018

Answering NASA's call…

Credibility: Encouraging Reporting

ASRS has been building credibility for over 42 years through:

- Flight Schools and Flight Instructors
- Aircraft Owners and Pilots Association (AOPA)
- Airlines
- Labor Organizations (ALPA, APA)
- Promotional Events (Flight Shows, Airport Open Houses and Aviation Safety Seminars)

It is an on-going process.

Challenges: General Aviation, Cabin, Maintenance, Ground, Dispatch

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Link to register for survey…thank you!

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