Safety Management Systems (SMS) Implementation and Future Safety Benefits of an Industry-Wide Safety Information Sharing and Exchange System

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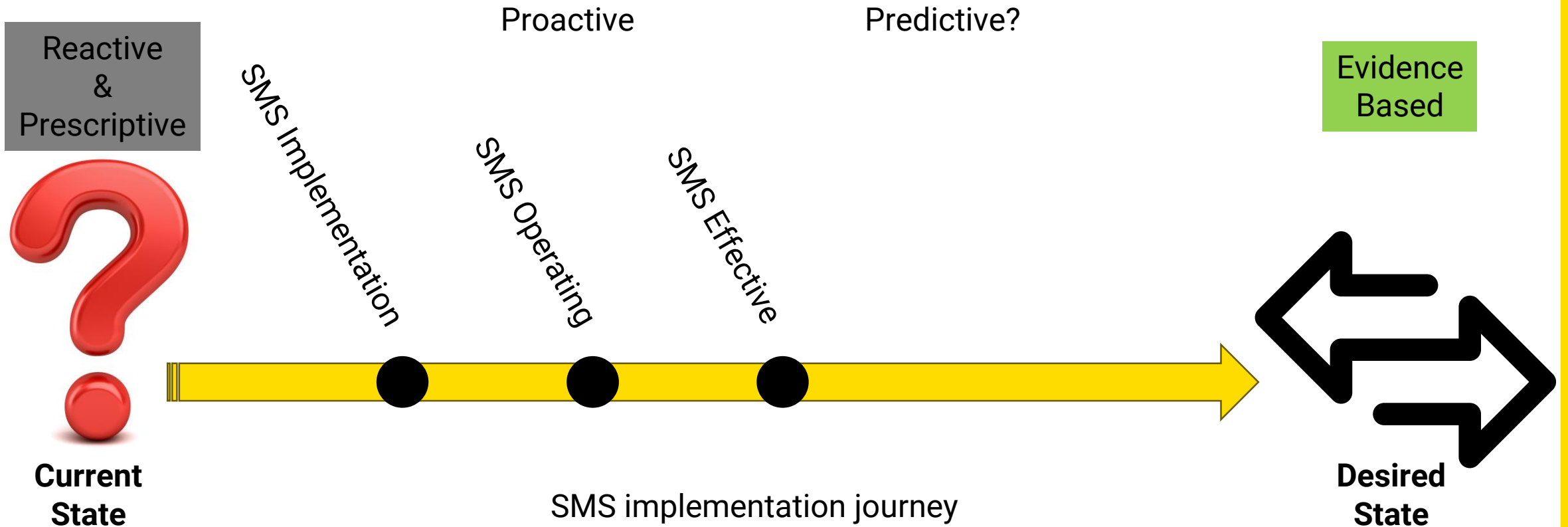- Senior Flying Operations Inspector – CASA
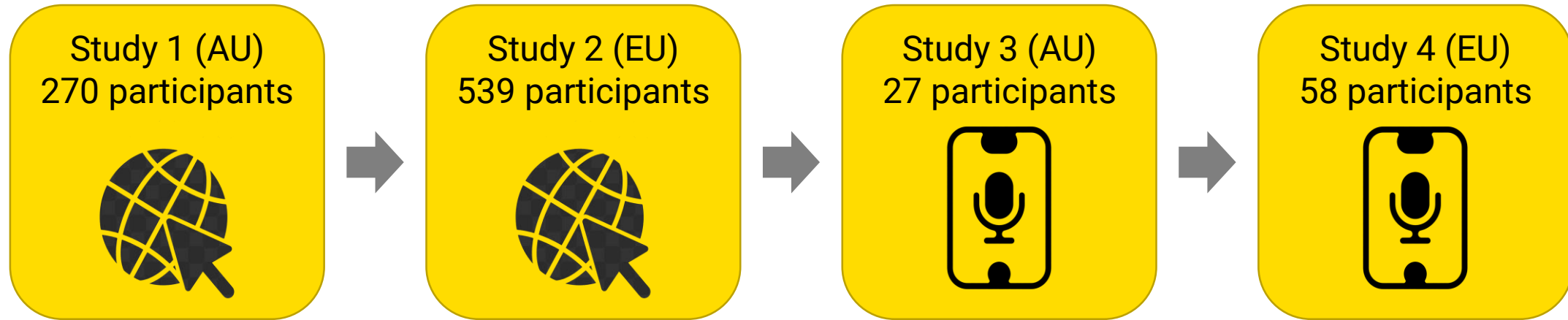
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Presentation overview

- Safety management – the current state and the desired state
- Examination of reporting attitudes and behaviours
- Opportunity for improving safety performance
- ICAO safety management obligations, recommendations, goals
- Industry-wide safety information sharing and exchange system
- Future safety benefits
- Considerations for future implementation

The views expressed by and attributable to the researcher are his own and do not necessarily reflect those of the Civil Aviation Safety Authority.

Safety Management - The current state and the desired state

Reactive & Prescriptive

Proactive

Predictive?

Evidence Based

SMS Implementation

SMS Operating

SMS Effective

Current State

SMS implementation journey

Desired State

Examination of reporting attitudes & behaviours[1,2]

Study 1 (AU)
270 participants

Study 2 (EU)
539 participants

Study 3 (AU)
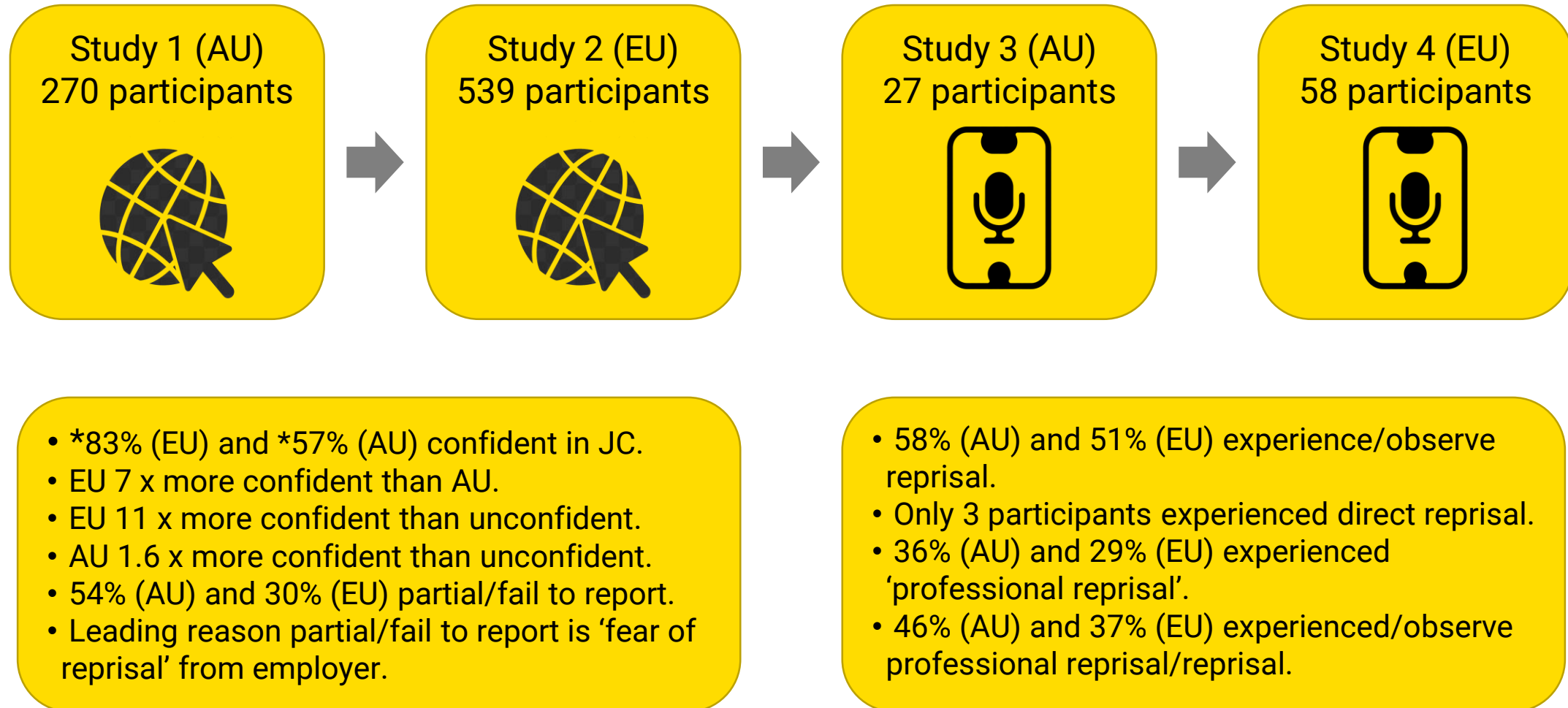27 participants

Study 4 (EU)
58 participants

- Confidence in 'Just Culture' at airline?
- Do pilots selectively report – and why?

- If participants (or someone else) had experienced reprisal for reporting, and type of reprisal (if any)?

[1]McMurtrie, K. (2020). *Influences on flight crew reporting behaviour: Trust and fear of reprisal.* (Doctoral dissertation). University of New South Wales, Sydney, Australia

[2]McMurtrie, K.J., & Molesworth, B.R.C. (2021). The impact of a legally defined just culture on voluntary reporting of safety information. *Aviation Psychology and Applied Human Factors, 11*(2), 88-97.

Results

Study 1 (AU) 270 participants	Study 2 (EU) 539 participants	Study 3 (AU) 27 participants	Study 4 (EU) 58 participants

- *83% (EU) and *57% (AU) confident in JC.
- EU 7 x more confident than AU.
- EU 11 x more confident than unconfident.
- AU 1.6 x more confident than unconfident.
- 54% (AU) and 30% (EU) partial/fail to report.
- Leading reason partial/fail to report is 'fear of reprisal' from employer.

- 58% (AU) and 51% (EU) experience/observe reprisal.
- Only 3 participants experienced direct reprisal.
- 36% (AU) and 29% (EU) experienced 'professional reprisal'.
- 46% (AU) and 37% (EU) experienced/observe professional reprisal/reprisal.

Note:
*$p < .01$ (n = 234 AU; n = 428 EU)

Opportunity for improving safety performance

Systematic-based safety management principles under-developed in Australian aviation system[3]

- 10-15% air operator SMS implementation[4]

- CASR 119.190 and 138.145 (1 December 2021)

- Approximately 400 air transport and aerial work operators to implement SMS[4]

[3]McMurtrie, K.J., & Molesworth, B.R.C. (2022). Confidence and Trust in the 'Just Culture' Construct. *Transportation Research Procedia, 66*, 214-225.

[4]CASA (2023) SMS implementation data, flight operations regulations transition and CASA Annual Report 2021-2022

We are part of a global safety system

Annex 19 – Safety Management

Global Aviation Safety Plan (GASP) 2023-2025

Regional Aviation Safety Plan (AP-RASP) 2023-2025

National Aviation Safety Plan (NASP) 2021-2023

State Safety Programme (SSP) 2021

ICAO Safety Management Obligations, Recommendations and Goals

- Annex 19
  1. Service providers implement SMS (ss3.3, 4.1)
  2. Establish a safety data collection and processing system (SDCPS) ss5.1
  3. Promote establishment of safety information sharing/exchange networks among users of system (ss5.4.2)

- Global Aviation Safety Plan (GASP)
  1. Goal 5: Expand safety information sharing by service providers.
  2. Address 5 Global High Risk Categories (G-HRCs) ss3.4.2

GASP 2023-2025 Global High-Risk Categories

Prioritise action in addressing identified global high-risk category of occurrences (G-HRCs):

- Controlled flight into terrain (CFIT)

- Loss of control in-flight (LOC-I)

- Mid-air collision (MAC)

- Runway excursion (RE)

- Runway incursion (RI)

G-HRC Accidents – Australia 2021-2023[5]

G-HRC	Date	ATSB Report	G-HRC	Date	ATSB Report
LOC-I / CFIT	13/04/2021	AO-2021-016	CFIT	24/12/2022	AO-2022-067
CFIT	26/05/2021	AO-2021-020	CFIT	06/02/2023	AO-2023-008
CFIT	23/06/2021	AO-2021-025	CFIT	04/04/2023	AO-2023-014
CFIT	04/12/2021	AO-2021-052	RE	30/11/2021	AO-2021-051
CFIT	14/12/2022	AO-2022-006	RE	26/11/2021	AO-2021-001
CFIT	23/02/2022	AO-2022-008	RE	23/05/2022	AO-2022-031
CFIT	28/02/2022	AO-2022-009	RE	30/01/2022	AO-2022-064
CFIT	11/03/2022	AO-2022-012	RE	06/04/2023	AO-2023-016
CFIT	03/03/2022	AO-2022-011	RI	26/10/2021	AO-2021-046
LOC-I / CFIT	31/03/2022	AO-2022-016	RI	09/05/2023	AO-2023-023
CFIT	29/08/2022	AO-2022-041	MAC	09/11/2022	AE-2022-005
CFIT	06/10/2022	AO-2022-048	MAC	02/01/2023	AO-2023-001
CFIT	30/11/2022	AO-2022-063			

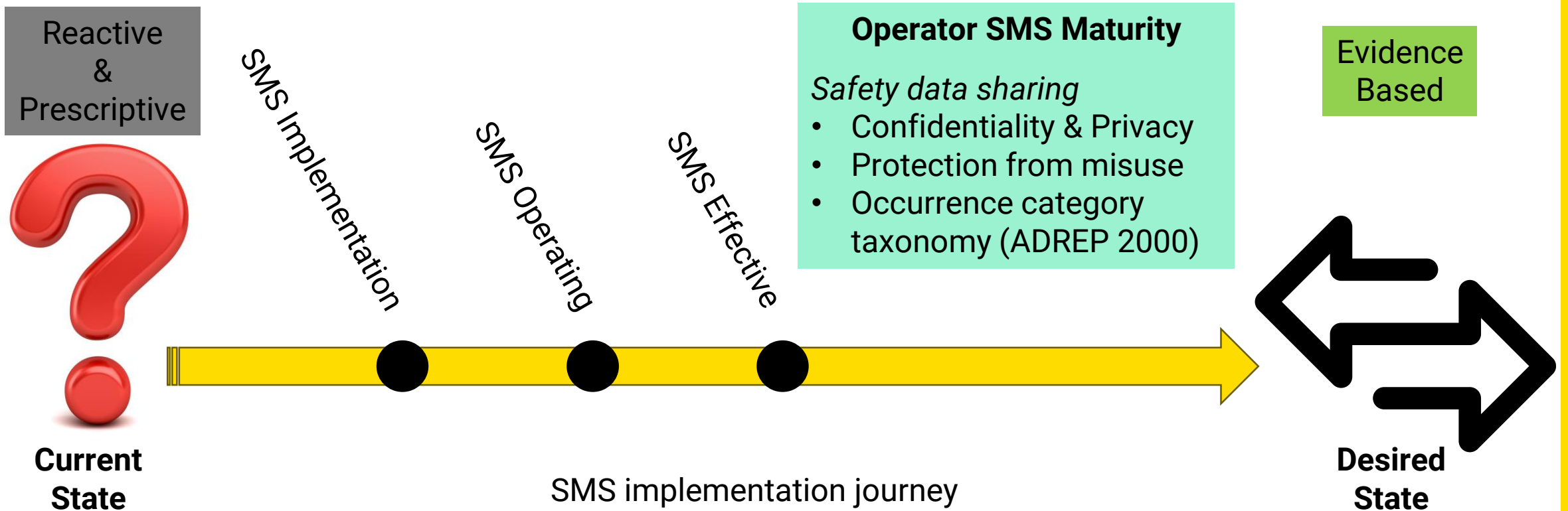[5]ATSB (2023) Aviation Investigations (all commercial operations)

What would a industry-wide safety information sharing and exchange system look like?

What do we have?

- ATSB National Aviation Occurrence Database (a SDCPS)

- REPCON

- Aviation Self Reporting Scheme (ASRS)

- Report a safety concern (CASA)

Maturity of operator SMS – Safety data resource

Reactive & Prescriptive

SMS Implementation

SMS Operating

SMS Effective

Operator SMS Maturity

Safety data sharing
- Confidentiality & Privacy
- Protection from misuse
- Occurrence category taxonomy (ADREP 2000)

Evidence Based

Current State

Desired State

SMS implementation journey

What would a industry-wide safety information sharing and exchange system look like?

Collect safety data from industry SMS

Analyse safety data

Exchange safety information

Improve safety performance

Management of the system
- ATSB?
- CASA?
- Contracted?

Future safety benefits

- View broader aviation system to an evidence-based perspective
- Facilitate risk analysis at an industry sector level
- Identify industry sectors that would benefit from targeted support/intervention

- Utilise de-identified safety information to support future trend analysis
- Assist to identify emerging aviation safety hazards

RISK

- Support operators develop awareness of risks from other's experiences
- Manage safety risks for the broader Australian aviation system

NASP

SSP

- Support evidence-based planning, actions, safety enhancement initiatives to be included in Australia's State Safety Programme & National Aviation Safety Plan

- Transparency and accuracy to inform the travelling public safety performance of the Australian aviation system

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Considerations for future implementation

Effective change management

- Look beyond the 'business as usual' approach of safety performance monitoring and safety oversight

- Collaboration between NAA and industry

- If not considered, the realities of inherent safety issues cannot be suitably understood or addressed

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Considerations for future implementation

Industry confidence and trust in the system

- Clear understanding purpose of information operators share is to maintain and improve aviation safety

Considerations for future implementation

Legally legitimised 'Just Culture'

- Confidentiality & identity protection

- Just culture clearly defined and legitimised

- Defined principles of protection & exception of safety information (e.g., Appendix 3, Annex 19)

- Defined legal consequences for entities that infringe principles of protection, misuses safety information.

Conclusions

Raises more questions than conclusions:

- In use elsewhere?
- Industry willingness to share SMS data?
- Supporting legislation?
- Administration?
- Feasibility study, cost-benefit?

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Questions
?

Leading through Science

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Group * Attitude_Dimension	607	100.0%	0	0.0%	607	100.0%

Group * Attitude_Dimension Crosstabulation

			Attitude_Dimension		Total
			Confident	Unconfident	
Group	AU	Count	133	83	216
		Expected Count	175.1	40.9	216.0
		% within Group	61.6%	38.4%	100.0%
		% within Attitude_Dimension	27.0%	72.2%	35.6%
		% of Total	21.9%	13.7%	35.6%
		Adjusted Residual	−9.1	9.1	
	EU	Count	359	32	391
		Expected Count	316.9	74.1	391.0
		% within Group	91.8%	8.2%	100.0%
		% within Attitude_Dimension	73.0%	27.8%	64.4%
		% of Total	59.1%	5.3%	64.4%
		Adjusted Residual	9.1	−9.1	
Total		Count	492	115	607
		Expected Count	492.0	115.0	607.0
		% within Group	81.1%	18.9%	100.0%
		% within Attitude_Dimension	100.0%	100.0%	100.0%
		% of Total	81.1%	18.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2–sided)	Exact Sig. (2–sided)	Exact Sig. (1–sided)
Pearson Chi–Square	82.865[a]	1	.000		
Continuity Correction[b]	80.907	1	.000		
Likelihood Ratio	80.060	1	.000		
Fisher's Exact Test				.000	.000
Linear–by–Linear Association	82.728	1	.000		
N of Valid Cases	607				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 40.92.

b. Computed only for a 2x2 table

Odds-ratio calculations derived from 2x2 chi-square test:

AU Odds
= count confident/count unconfident
= 133/83
= 1.60

EU Odds
= count confident/count unconfident
= 359/32
= 11.21

Odds Ratio
= EU Odds/AU Odds
= 11.21/1.60
= 7.01 times more confident

Table 42
Participant confidence in their organisation's Just Culture policy.

Licence Type and Rank	Confident (%)	Unconfident (%)	Don't Know (%)
	AU Group		
ATPL	120 (56.33%)	79 (37.08%)	14 (6.57%)
CPL	13 (61.90%)	4 (19.04%)	4 (19.04%)
Total	133	83	18
Captain	88 (57.14%)	54 (35.06%)	12 (7.79%)
First Officer	45 (56.25%)	29 (36.25%)	6 (7.50%)
Total	133	83	18
	EU Group		
ATPL	298 (84.18%)	30 (8.47%)	26 (7.34%)
CPL	61 (82.43%)	2 (2.70%)	11 (14.86%)
Total	359	32	37
Captain	214 (85.94%)	16 (6.43%)	19 (7.63%)
First Officer	145 (81.00%)	16 (8.94%)	18 (10.05%)
Total	359	32	37

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