

# AI and Accident Investigation

 by David Clarke

Chief Commissioner

Transport Accident Investigation Commission

Te Kōmihana Tiroiro Aitu ā Waka



# Overview of AI Technologies in Accident Investigation



## Computer Vision

Analyzes imagery to reconstruct accident scenes. Identifies damage patterns instantly. Creates 3D models from photographs.



## Natural Language Processing

Transcribes witness statements. Flags inconsistencies in testimonies. Extracts key information from reports/documents. Produces draft reports.



## Machine Learning

Identifies patterns across similar accidents. Predicts likely causes based on evidence. Suggests investigative approaches.



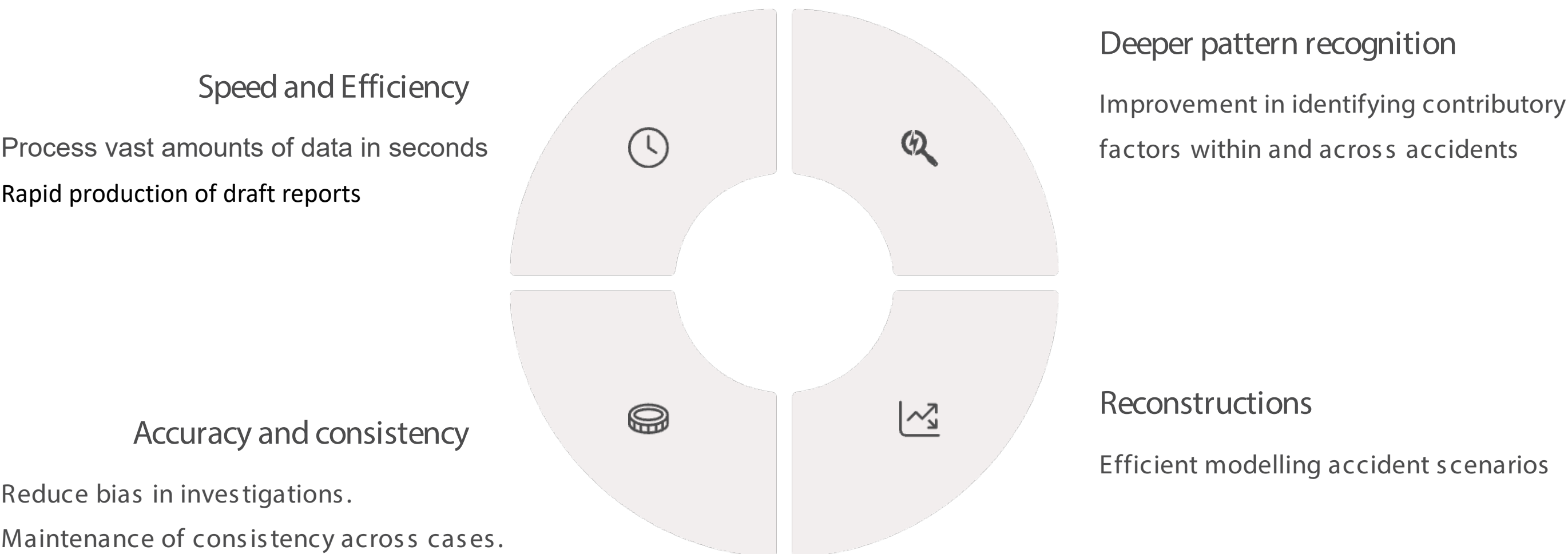
## Autonomous Systems

Deploys drones to survey inaccessible areas. Uses robots in hazardous environments. Collects evidence without human risk.





# Benefits of AI in Accident Investigation



# Challenges and Limitations of AI in Accident Investigation

## Technical Limitations

AI struggles with unprecedented scenarios. It cannot fully replicate human intuition. Some accident contexts confuse algorithms.

- Limited adaptability to novel situations
- Difficulty with ambiguous evidence
- Computational resource requirements

## Implementation Barriers

Organizations face challenges adopting AI systems. Integration with existing protocols is difficult. Staff require extensive training.

- High initial investment costs
- Resistance from traditional investigators
- Complex regulatory compliance issues

## Ethical Considerations

AI raises important ethical questions. Algorithms may perpetuate existing biases. Responsibility becomes unclear with automated analysis.

- Data privacy concerns
- Potential for algorithmic discrimination
- Balancing human judgment with AI recommendations

# Pak'nSave's AI meal planner suggests recipe for deadly chlorine gas

**Trained AI models exhibit learned disability bias, IST researchers say**

**'Aggressive and riskier' A.I. — and bureaucracy — caused the Boeing crashes, report says**

**Warriors' Klay Thompson accused of 'brick-vandalism spree' by Elon Musk's confused AI**

**AI-Controlled Camera Follows Bald Referee's Head Instead of the Ball**

**CNET's AI Journalist Appears to Have Committed Extensive Plagiarism**

CNET's AI-written articles aren't just riddled with errors. They also appear to be substantially plagiarized.

**Amazon's AI Cameras Are Punishing Drivers for Mistakes They Didn't Make**

OpenAI Defamation Lawsuit: The first of its kind

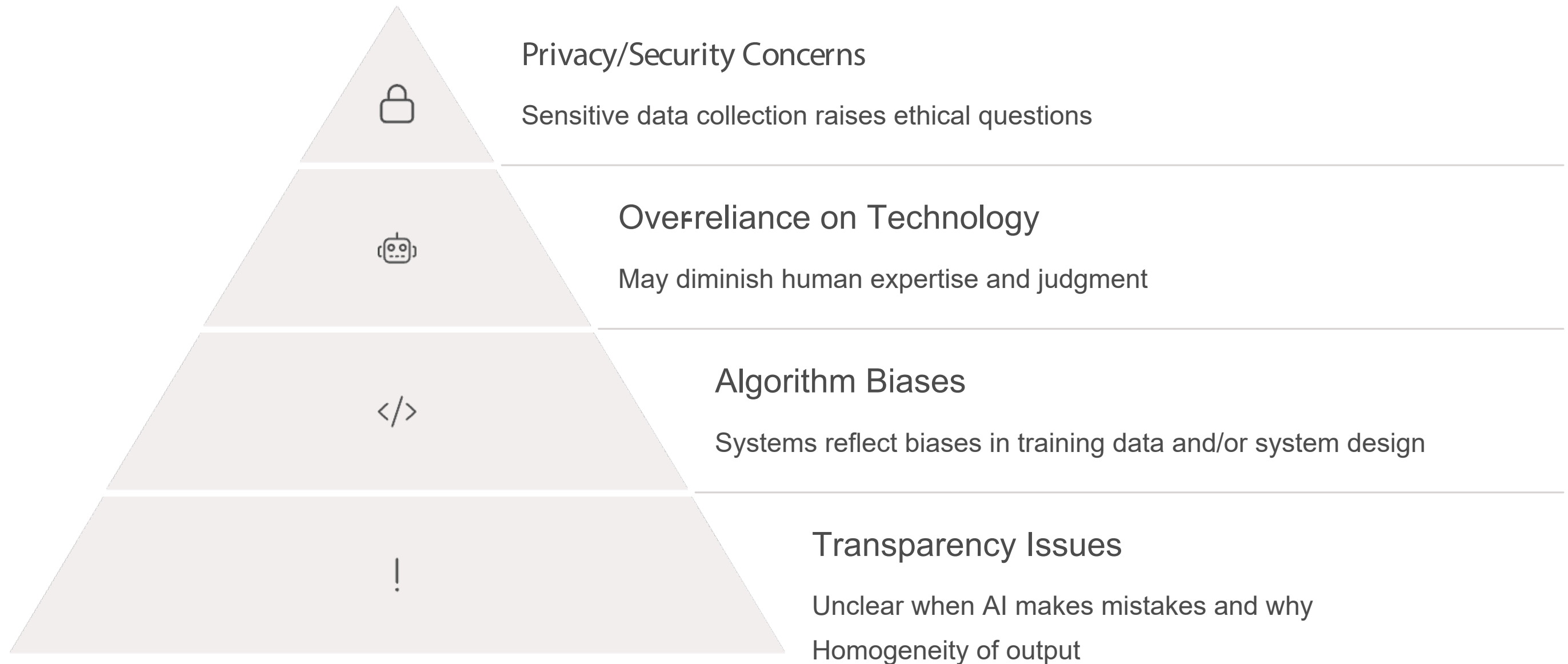
**Insight - Amazon scraps secret AI recruiting tool that showed bias against women**

**Robodebt: Illegal Australian welfare hunt drove people to despair**

**Samsung Bans Staff's AI Use After Spotting ChatGPT Data Leak**

- Employees accidentally leaked sensitive data via ChatGPT
- Company preparing own internal artificial intelligence tools

# Risks of AI



# Human-AI Collaboration



Higher-quality AI reduces human effort and attentiveness and decreases performance.



Lower-quality AI elicits more human effort and improves performance.



More experienced personnel benefit from lower quality AI.

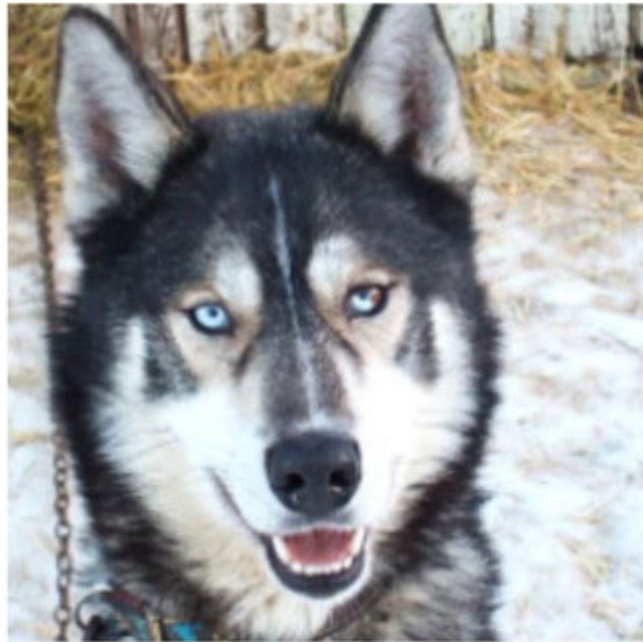


High-quality AI impairs experience personnel performance.

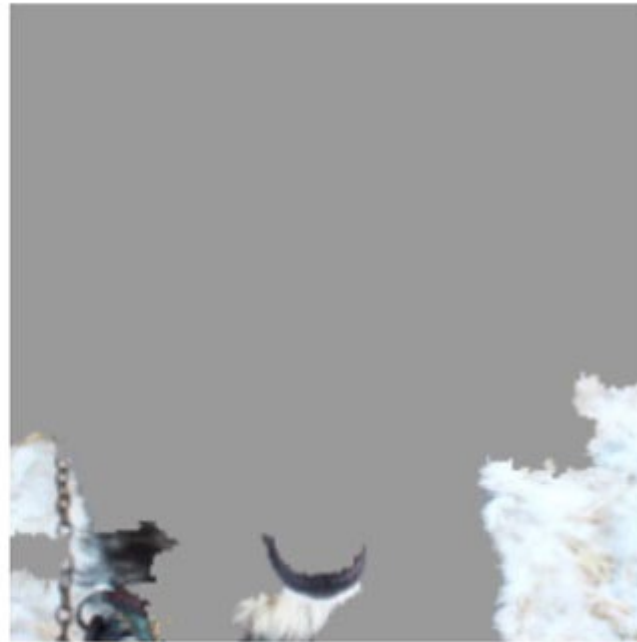




# Spurious correlations and generalisations



(a) Husky classified as wolf



(b) Explanation



# Best Practices for Introducing AI



## Start with clear objectives

Define specific goals and policies for AI implementation



## Maintain human oversight

AI should augment rather than replace investigators



## Invest in comprehensive training

Ensure staff understand AI capabilities and limitations



## Implement continuous validation

Regularly verify AI findings against expert analysis

# What is TAIC doing?



## AI Document Search

Unlocking knowledge in over 500 inquiry reports since 2000 by employing advanced artificial intelligence to quickly retrieve relevant data points and cross-reference findings.

This system enables investigators to access historical information efficiently, helping identify patterns and lessons learned from past incidents.



## AI Interview Transcription

Developing innovative tools to accurately transcribe recorded interviews, reducing manual transcription time and minimizing errors.

These tools help preserve the integrity of witness statements and support a more thorough analysis during investigations.



## Improved Efficiency

Making information access easier for investigators and freeing up staff to focus on higher-value analytical and decision-making tasks.

This leads to faster case resolutions while maintaining investigative quality and depth.

Over the last five years, what are common safety issues seen across aviation inquiries? I'd like to know especially about pilot training and competency.



Searching database for more information

Reading 16 results

Common safety issues related to pilot training and competency identified in TAIC aviation inquiries over the past five years include:

1. Inadequate systems for verifying pilot competency, particularly for specialized operations (e.g., ridge soaring) – see Report ID: TAIC\_a\_2020\_002.
2. Failure to fully implement instructor training procedures and detection of these gaps during audits – also in TAIC\_a\_2020\_002.
3. Pilot inexperience and lack of familiarity with specific aircraft handling characteristics (e.g., Fenestron tail rotor) leading to loss of control – see TAIC\_a\_2020\_003.
4. Insufficient monitoring of key flight parameters (airspeed/groundspeed), especially during challenging conditions, highlighting the need for operational awareness – TAIC\_a\_2020\_003.
5. Ambiguity and inadequacy in rules and guidance regarding instrument and night VFR currency, potentially exceeding pilot capabilities – see TAIC\_a\_2021\_003.
6. Occasional lapses in ensuring pilots receive updated operational information (e.g., weather forecasts/flight plans), which can affect decision-making and safety – TAIC\_a\_2022\_005.

These highlight organizational, procedural, and regulatory aspects affecting pilot competency, as well as the importance of robust training systems and oversight. Let me know if you would like to review specific reports or need more detail.



Please type your message here...

Send



# Are these safety issues similar to safety issues seen in the previous five years, or are different safety issues emerging over time?



Searching database for more information

Reading 72 results

The safety issues related to pilot training and competency in the previous five years (2015–2020) are similar to those seen more recently. Key recurring issues include:

- Non-compliance with Civil Aviation Rules for pilot training systems and lack of adequate preparation for pilots (TAIC\_a\_2015\_007)
- Inconsistent or inadequate training effectiveness between instructors (TAIC\_a\_2015\_002)
- Weaknesses in flight authorization and lack of supervision for pilots (TAIC\_a\_2019\_003)
- Gaps in crew resource management (CRM) training and guidelines (TAIC\_a\_2019\_005)
- Reliance on self-regulation for non-commercial participants, leading to non-compliance (TAIC\_a\_2017\_002)
- Pilots operating beyond license privileges, or without proper qualifications (TAIC\_a\_2017\_002)
- Inadequate manufacturer or operator support for training in specialized aircraft operations (TAIC\_a\_2018\_005)

The same fundamental issues—insufficient verification of competency, incomplete training implementation, inadequate regulatory oversight, and lack of supervision—remain prevalent over time. Some specific issues (e.g., night VFR, balloon operations) have emerged or gained focus recently, but the core problems persist.

Let me know if you'd like a detailed comparison using specific report IDs or further analysis.



Please type your message here...

Se

How does this compare with the findings from ATSB inquiries over the past 10 years?  
Are the safety issues identified similar or different from TAIC?



Searching database for more information

Reading 100 results

ATSB’s findings on pilot training and competency over the past 10 years closely mirror those seen in TAIC inquiries. Common issues identified by ATSB include:

- Inadequate or incomplete training for recognizing and managing in-flight pilot incapacitation (ATSB\_AO-2023-026-SI-02)
- Gaps in initial and recurrent proficiency checks, especially relating to instrument skills for VFR pilots (ATSB\_AO-2022-016-SI-01)
- Insufficient post-training consolidation/supervision for pilots operating new aircraft types (ATSB\_AO-2018-026-SI-01)
- Operator training that does not cover specific risks (e.g., degraded visual environments, cockpit workload, specialized roles) (ATSB\_AO-2018-022-SI-005; ATSB\_AO-2021-023-SI-01)
- Weaknesses in procedures for ongoing assessment, oversight, or operator review (ATSB\_AO-2017-005-SI-05; ATSB\_AO-2020-007-SI-07)
- Regulatory oversights or unclear/inadequate CASA requirements for training and competency assessment (ATSB\_AO-2022-016-SI-05, ATSB\_AO-2017-013-SI-01)

Like TAIC, ATSB also highlights organizational, procedural, and regulatory shortcomings, a need for better supervision/verification after type changes, and issues in the thoroughness and real-world applicability of training. In summary, the safety issues identified are broadly similar between ATSB and TAIC. Operators on both sides of the Tasman tend to struggle with ensuring practical pilot competency, oversight, and up-to-date skills for the conditions pilots may face.

If you need details on specific report findings or want a tabular comparison, let me know the focus.



Please type your message here...

Send



# What about TSB findings over the same 10 years? Are they also the same?



Searching database for more information

Reading 100 results

TSB (Canada) findings on pilot training and competency over the past 10 years are consistent with those from TAIC and ATSB. Common TSB-identified safety issues include:

- Training not meeting applicable standards, risking gaps in pilot skills needed for solo/operational flight (TSB\_a\_2018\_Q0186\_3, TSB\_a\_2022\_P0057\_2)
- Authorizing solo/revenue flights without fully accounting for pilot experience, weather, or specific risks (TSB\_a\_2018\_Q0186\_1, TSB\_a\_2019\_C0038\_3)
- Lack of recurrent or specialized training in areas such as mountain, instrument, or night flying, leading to unpreparedness (TSB\_a\_2023\_W0091\_3, TSB\_a\_2023\_O0028\_2, TSB\_a\_2019\_Q0128\_2)
- Fatigue management, supervision, and oversight inadequacies, including regulatory gaps for flight instructors (TSB\_a\_2019\_Q0091\_0, TSB\_a\_2016\_P0078\_1)
- Unsafe practices accepted under operational pressure or as cultural norms within organizations (TSB\_a\_2021\_Q0097\_3, TSB\_a\_2023\_O0028\_0)
- Lack of hands-on or scenario-based training, check flights before operational duties, or dedicated Pilot Decision Making (PDM) instruction (TSB\_a\_2015\_C0005\_0, TSB\_a\_2016\_P0078\_1)

In summary, the core issues TSB finds—such as inadequate initial or recurrent training, insufficient oversight, regulatory gaps, lack of formalized risk assessment, and operational pressures—are essentially the same as those seen in New Zealand and Australia. The nature of the safety issues is global: gaps in real-world pilot competency, the need for robust oversight, and ensuring the training system keeps pace with operational risk and reality.

If you want a more detailed comparison or references to specific TSB report IDs, let me know.



Please type your message here...

Send



# Are there any safety issues related to pilot training and competency that are unique to New Zealand? Please look at the same 10 year period.



Using these parameters to search the database: {"query":"pilot training and competency unique","type":"vector","year\_range":[2015,2025],"document\_type":["safety\_issue"],"modes":[0],"agencies":["TAIC"]}

Here are some safety issues related to pilot training and competency identified by TAIC that may be unique or have particular emphasis in New Zealand over the past 10 years:

- 1. **Cultural integration and oversight in flight training schools:** New Zealand has a diverse range of international pilot trainees. Challenges arise in integrating diverse cultural understandings of safety, communication, and operational norms within training establishments. This could have implications for oversight specifically focused on cultural integration and language proficiency.
- 2. **Recreational and non-commercial aviation oversight:** The New Zealand regulatory approach relies more heavily on self-regulation in non-commercial aviation sectors. This can lead to differences in safety outcomes due to variability in adherence to best practices across clubs or non-commercial entities, especially when compared with more tightly regulated commercial sectors.
- 3. **Gliding and soaring operations:** New Zealand's unique geography and popular gliding areas (such as the Southern Alps and around Taupo) have highlighted specific training needs and risks not as commonly discussed in other jurisdictions with less complex terrain or fewer gliding operations.
- 4. **Ballooning and adventure aviation:** As a hub for adventure tourism, New Zealand faces distinct challenges in managing safety for operators and pilots in ballooning and similar sectors, emphasizing differences in training structures and regulatory oversight for these unique industry segments.

These areas reflect unique aspects of New Zealand's aviation environment where specific cultural, geographical, and operational factors might drive particular attention to pilot training and competency that might not be as pronounced in other countries. If you want specific report details or further elaboration, let me know!



# Conclusion

AI is transforming accident investigation. The benefits outweigh the challenges. Organizations must adapt thoughtfully to this technology.

The future will bring even more advanced AI capabilities. Human expertise remains essential. The best approach combines both.

AI will not replace humans - it will replace humans who cannot work with AI.

AI does things right. Humans do the right thing.

