Leveraging Artificial Intelligence for enhanced lessons management: The RAID Model

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Abstract

This article examines the integration of artificial intelligence (AI) into lessons management processes in emergency management, focusing on the Real-time Artificially Intelligent Doctrine (RAID) model. Drawing on insights from post-event inquiries, organisational culture research and collaborative frameworks, this paper evaluates how AI can address systemic challenges in translating lessons into practice. By synthesising findings from research across 20 years, this paper demonstrates how RAID's AI-driven approach complements existing lessons management frameworks while overcoming barriers to implementation.

Introduction

Emergency management organisations globally face a recurring challenge: while lessons are often identified following a disaster event they are rarely institutionalised nor effectively applied in subsequent events (Donahue and Tuohy 2006; Glassey et. al. 2020; Savoia et al. 2012). This systemic failure perpetuates avoidable mistakes and inefficiencies, resulting in unnecessary harm to communities and wasted resources. The issue is particularly acute in animal disaster management, where challenges such as inadequate training and unclear roles are repeatedly documented but seldom addressed.

Traditional lessons management processes typically involve producing after-action reports (AARs), sharing findings with stakeholders and updating policies or training program. However, these processes frequently break down due to inconsistent documentation formats, political influences that obscure critical findings and organisational silos that prevent knowledge sharing across agencies. For example, analysis of declared emergencies in New Zealand between 1960 and 2010 by Glassey (2015) revealed that fewer than 25% had accessible documentation detailing lessons learnt. This lack of institutional memory leaves emergency managers ill-equipped to build on past experiences (Glassey 2014; 2023).

The Real-time Artificially Intelligent Doctrine (RAID) model offers a novel solution to these challenges by integrating AI into lessons management systems. Initially conceptualised as a non-AI framework known as *Evidence-Based Dynamic Doctrine* in 2014 (Glassey 2015), the model has since evolved into an AI-enhanced system that facilitates real-time learning during emergency operations. By creating comprehensive knowledge bases and enabling real-time access to insights from past events through AI-driven tools like Dante AI, RAID aims to transform how emergency organisations learn and adapt.

Lessons lost: the Edgecumbe flood case study

The consequences of ineffective lessons management are starkly illustrated by the Edgecumbe flood in New Zealand. In April 2017, a stopbank failure caused widespread flooding in the township of Edgecumbe prompting the evacuation of approximately 600 households. While no human lives were lost, over 1,000 animals were left behind, leading to New Zealand's largest companion animal rescue operation (Glassey et al. 2020). Despite this unprecedented effort, after-action reports revealed significant issues with training capabilities, role clarity among responders, information-sharing mechanisms between agencies and deployment strategies.

Two years later, during another disaster in the same country (a large-scale fire at Nelson) similar issues resurfaced. A study by Glassey et al. (2020) concluded that only 7% of lessons identified in the Edgecumbe flood were applied at the Nelson fires. This underscores a broader issue. While lessons may be identified through post-event analyses, they are seldom institutionalised or sustainably learned.

This phenomenon is not unique to New Zealand. It reflects a global pattern identified by Donahue and Tuohy (2006), who argued that disasters often reveal the same organisational failures repeatedly due to a lack of accountability mechanisms for implementing lessons identified. Political pressures and resource constraints often deprioritise long-term improvements in favour of immediate recovery efforts.

The RAID Model: AI-enhanced lessons management

The Real-time Artificially Intelligent Doctrine (RAID) model (Figure 1) represents a significant advancement in how emergency services organisations manage lessons learnt from past events. At its core, the RAID model develops comprehensive knowledge bases using AI platforms like Dante AI. These knowledge bases serve as repositories for diverse types of documents, including after-action reports, academic research papers, operational guidelines, inquiry findings and other relevant materials. By training on these datasets, the AI system identifies patterns and recurring themes across incidents and provides a robust foundation for organisational learning and improvement.

Unlike traditional approaches that focus on post-incident analysis, RAID enables the real-time application of lessons during all phases of emergency management: preparedness, response, recovery and mitigation. Through user-friendly interfaces such as chatbots linked to AI

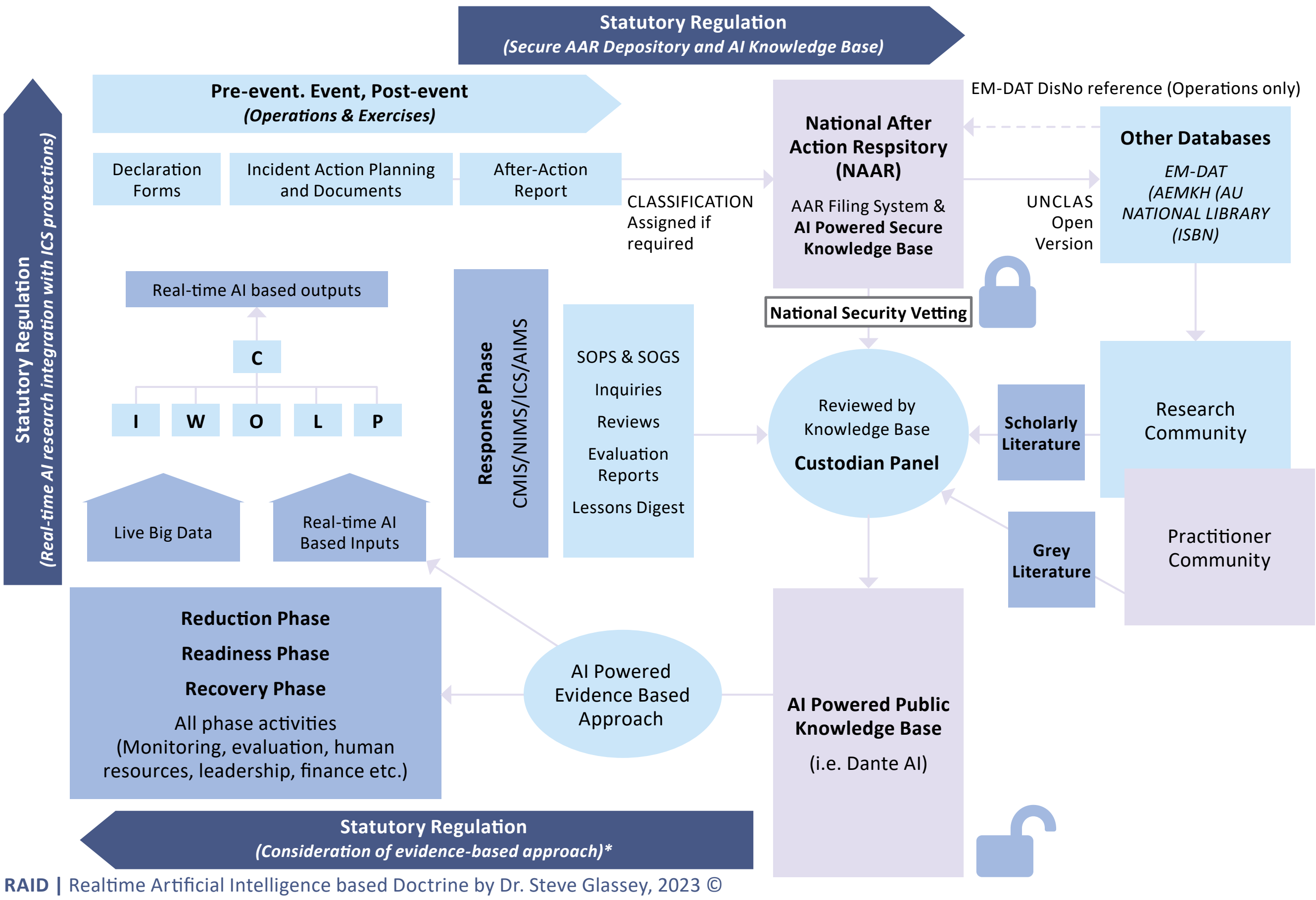

Figure 1: Real-time Artificially Intelligent Doctrine (RAID) model.

Source: Glassey (2023)

knowledge bases, emergency managers can query specific challenges or scenarios during active operations and receive evidence-based recommendations derived from validated sources. This capability ensures that lessons are not only identified but also applied when they are most needed—during live emergencies.

RAID addresses key limitations of traditional lessons management systems by automating the analysis of large volumes of qualitative data. This automation reduces reliance on human memory and mitigates political or organisational biases that often influence lesson prioritisation. By systematically analysing multiple reports simultaneously, RAID enables the identification of recurring issues that might not be apparent when reviewing individual documents in isolation. For example, during its application in animal disaster management contexts in New Zealand, RAID identified systemic challenges such as unclear roles among responders and inadequate training for animal rescue operations (Glassey et al. 2023). These insights allow organisations to prioritise areas for improvement and allocate resources more effectively.

The model's design aligns with existing frameworks for lessons management while enhancing their effectiveness through technological innovation. For example, Lessons Management Life Cycle (Jackson 2016) emphasises observation, analysis and implementation as critical steps for organisational learning. RAID complements this framework by automating the observation and analysis phases while providing actionable insights to support implementation in real time. Similarly, it builds on collaborative models like the EM-LEARN framework used in Victoria, Australia that facilitates cross-jurisdictional knowledge sharing through its centralised repository (Jackson and Shepherd 2018).

The RAID model operates dynamically across all phases of emergency management by integrating real-time interaction capabilities with its knowledge base. Emergency managers can use the system to query specific scenarios or challenges during active operations (e.g. seeking guidance on coordinating multi-agency responses during a flood evacuation). The AI processes these queries and provides actionable recommendations based on lessons from similar events documented in its database. This real-time functionality addresses critiques by Savoia et al. (2012) who noted that after-action reports often lack mechanisms for rapid implementation during emergencies.

Another critical feature of RAID is its ability to preserve institutional memory despite staff turnover or organisational restructuring. These issues are frequently cited as barriers to effective lessons management (Donahue and Tuohy 2006). By capturing knowledge in a centralised repository accessible through AI tools, RAID ensures that valuable insights are retained and available for future use. Furthermore, it incorporates feedback mechanisms that allow new data from ongoing operations to be added to the knowledge base. This iterative process ensures that the system evolves over time, continually refining its recommendations based on the latest evidence and experiences.

The RAID model's integration of advanced AI technologies with comprehensive data repositories represents a paradigm shift in emergency management practices. By enabling real-time access to validated lessons from past events and automating the analysis of complex datasets, RAID enhances decision-making processes and supports continuous organisational learning. Its ability to address both technical and cultural barriers to lessons implementation makes it a powerful tool for creating resilient and adaptive emergency management systems capable of responding effectively to increasingly complex challenges.

Organisational culture as a barrier to learning

While RAID offers technological solutions to many challenges in lessons management, organisational culture remains a significant barrier to its effective implementation. Jackson (2016) highlighted how cultural factors such as leadership commitment to learning and accountability influence whether organisations act on identified lessons. Resistance to change is common in hierarchical emergency management agencies where established practices may take precedence over innovation.

Victoria's EM-LEARN framework provides an example of how cultural shifts can support collaborative learning across agencies (Jackson and Shepherd 2018). By fostering a 'just culture' that balances accountability with psychological safety for staff reporting errors or failures, Victoria has created an environment conducive to sharing lessons without fear of blame or retribution. This cultural foundation is essential for ensuring that technological tools like RAID are embraced rather than resisted within organisations.

Donahue and Tuohy's (2006) findings underscore the importance of leadership buy-in for overcoming cultural inertia. They argue that without visible commitment from senior leaders to prioritise learning processes, backed by adequate resources, lessons will continue to be sidelined by competing priorities during crises.

Applications beyond animal disaster management

Although initially demonstrated within animal disaster management contexts in New Zealand, RAID has broader applications across all domains of emergency management globally. For example, Cole et al. (2018) analysed major post-event inquiries and found recurring themes such as deficiencies in interagency coordination during bushfires or vaccine distribution challenges during pandemics. These are issues that could be addressed through RAID's cross-jurisdictional data-sharing capabilities.

Victoria's EM-LEARN initiative illustrates how collaborative frameworks can enhance multi-agency engagement during emergencies (Jackson and Shepherd 2018). RAID extends this concept by enabling real-time integration of insights from diverse regions or sectors into active operations elsewhere (e.g. applying flood response strategies developed in one region to wildfire evacuations occurring simultaneously elsewhere).

Expanding multilingual capabilities would further enhance global applicability by allowing analyses across diverse datasets regardless of language barriers. This feature is particularly relevant given increasing cross-border cooperation during emergencies driven by climate change effects.

Benefits and challenges

Benefits

The RAID model offers significant advantages over traditional approaches to lessons management. By enabling real-time access to comprehensive insights from past events during active operations, it supports evidence-based decision-making under time-critical conditions (Glassey 2023). Automated analysis reduces political influences that may minimise inconvenient findings, addressing a key barrier identified by Cole et al. (2018) who found that post-event inquiries often avoid criticising policymakers or agencies. RAID also increases accountability for implementing improvements by highlighting recurring issues over time, countering observation by Donahue and Tuohy (2006) that lessons are frequently ignored due to shifting priorities.

AI systems can process large volumes of qualitative data much faster than human researchers. This is an efficiency that enables pattern recognition across hundreds of documents simultaneously. This capability aligns with the call by Jackson and Shepherd (2018) for collaborative frameworks that aggregate lessons across jurisdictions. For example, RAID's ability to synthesise insights from bushfire responses in Australia and flood protocols in New Zealand could help agencies adopt best practices more effectively.

Challenges

Despite its potential, RAID faces implementation barriers. The effectiveness of AI analysis depends heavily on data quality. Poorly documented or inconsistent records limit its utility (Public Safety Institute 2023). Savoia et al. (2012) and Glassey (2014) note that many after-action reports lack standardised formats or measurable outcomes that would complicate AI training processes.

Furthermore, determining which sources should be included in knowledge bases is challenging due to varying documentation standards worldwide. Within the RAID model, this challenge is addressed by a Custodian Panel composed of both practitioners and academics — rather than solely government appointees — who work together to decide which documents and data are suitable for inclusion. Cultural resistance within organisations may also impede adoption. Jackson (2016) emphasised that lessons management requires a 'learning culture' where staff feel safe reporting failures; a prerequisite often absent in hierarchical emergency agencies. Leadership commitment is critical. As Donahue and Tuohy (2006) found, lessons are deprioritised without sustained advocacy from senior decision-makers. Building comprehensive knowledge bases demands significant time and resources, which may deter underfunded agencies despite RAID's long-term benefits.

Future directions

Future developments should focus on enhancing RAID's interoperability and accessibility. Cole et al. (2018) advocate for cross-jurisdictional knowledge-sharing frameworks, which RAID could operationalise through shared repositories accessible to international partners. Expanding multilingual capabilities would improve global applicability, allowing analyses of non-English documents during cross-border emergencies such as pandemics or climate-driven disasters.

Integrating RAID with existing collaborative frameworks like Victoria's EM-LEARN could strengthen its cultural relevance. Jackson and Shepherd (2018) demonstrated that multi-agency engagement fosters trust and knowledge exchange; factors essential for ensuring AI recommendations are actioned. Improving after-action report quality through standardised templates, as suggested by Savoia et al. (2012) and Glassey (2014), would enhance RAID's analytical accuracy.

Conclusion

The RAID model represents a paradigm shift in lessons management, addressing systemic challenges documented over decades of research. By automating pattern recognition across historical data, it reduces political biases and institutional inertia that hinder traditional. However, technological solutions alone cannot overcome cultural barriers. Emergency agencies must pair RAID with initiatives that foster transparency, leadership accountability and psychological safety for staff. Victoria's EM-LEARN framework provides a blueprint for this integration, showing how collaborative learning cultures enhance policy outcomes. As climate change intensifies

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disaster risks globally, RAID's ability to synthesise lessons across borders and contexts will prove invaluable. Ultimately, its success hinges on balancing technological innovation with cultural adaptation; a dual focus that ensures lessons identified become lessons applied.

View an online presentation on RAID at www.youtube.com/watch?v=dUWSGTQAhJk.

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