The Five Non-Negotiables of Command Decision-Making: Turning Large-Scale Behavioural Observation into Operational Practice

Katherine Lamb
University of Liverpool
katherine@klambassociates.com

Ian Greatbatch
1. Aston University
2. University of Portsmouth
Ian.greatbatch@port.ac.uk

Arthur Perlini
Algoma University
arthur.perlini@algomau.ca

Cecilia Hammar Wijkmark
University of Skövde
Cecilia.hammar.wijkmark@his.se

ABSTRACT

Public inquiries consistently show that emergency response failures stem less from technical limitations than from breakdowns in command decision making under pressure. Although incident command systems provide structural clarity, the behavioural foundations of reliable command remain insufficiently defined.

This paper proposes a theory informed behavioural framework—the Five Non-Negotiables of command decision making— which organises the core behaviours that underpin each stage of the command cycle. Drawing on 30,843 structured assessments conducted across 43 UK Fire and Rescue Services between 2017 and 2024, we examine five interdependent capabilities: anticipatory situational awareness, adaptive strategy selection, objective based planning, communicative coordination and control, and dynamic review of decisions.

Descriptive cross level patterns reveal persistent vulnerabilities in anticipation, communication, and review across all command tiers. These findings indicate that command reliability depends not on experience alone, but on the consistent enactment of key behavioural capabilities under uncertainty.

Keywords

Incident command, behavioural reliability, fire and rescue, high-reliability organisations, emergency management

INTRODUCTION

Emergency response practitioners make decisions in dynamic, ambiguous, and high-risk environments characterised by uncertainty, evolving conditions, and incomplete information (Butler et al., 2024; Rimstad & Sollid, 2015). Public inquiries and operational reviews consistently show that failures in such contexts stem less from technical deficiencies than from breakdowns in command decision making under pressure (Deeming, 2018; Moore Bick, 2019). Although incident command systems provide structural clarity and procedural guidance, behavioural vulnerabilities persist. Training programmes often emphasise procedural compliance and experience accumulation, yet these alone do not ensure reliable judgement, communication, or adaptability during complex incidents.

Research in naturalistic decision making (NDM) demonstrates that experienced practitioners rely on recognition primed strategies, pattern matching, and mental simulation when operating under time pressure (Klein et al., 1993; Zsambok & Klein, 1997). These strategies depend heavily on well-developed situational awareness, including cue recognition, comprehension, and projection (Klein, Moon, & Hoffman, 2006; Endsley, 1995). Importantly, these capabilities do not reliably emerge from experience alone.

Situational awareness theory differentiates between perception, comprehension, and projection, highlighting projection as the most cognitively demanding and fragile component—especially for less experienced decision makers (Endsley, 1995; Endsley & Garland, 2000). Cognitive load theory further explains why decision behaviours degrade under pressure: high tempo incidents impose heavy demands on working memory, increasing the likelihood of attentional narrowing and reversion to familiar patterns (Sweller, 1988). Under these conditions, communication clarity, pacing, and structured review often deteriorate, even among senior commanders.

These pressures are amplified in multi-agency environments, where effective interoperability requires clear communication, shared situational awareness, and coordinated decision making (JESIP, 2021; Davidson et al., 2025). Yet major incident reviews repeatedly document interoperability failures, indicating that many challenges are behavioural rather than structural (Moore Bick, 2019; Boin et al., 2017).

In response, emergency services have increasingly adopted behavioural assessment frameworks, such as the THINCS marker system, which emphasise observable behaviours as more reliable indicators of competence than procedural recall (Butler, Honey, & Cohen-Hatton, 2019; Flin, O'Connor, & Crichton, 2008). High reliability organisation (HRO) theory similarly foregrounds behavioural principles—such as sensitivity to operations and preoccupation with failure—as essential to resilient performance (Weick & Sutcliffe, 2007; Bigley & Roberts, 2001). However, these principles are not consistently embedded within training or assessment systems (Boin et al., 2017).

Across international command frameworks—including those used in the UK, Canada, Australia, and the United States—roles and responsibilities are well defined, yet behavioural expectations remain implicit. Structural clarity alone does not ensure behavioural reliability under pressure (Bigley & Roberts, 2001; Weick & Sutcliffe, 2007).

Despite substantial theoretical insight from NDM, situational awareness research, and HRO scholarship, large-scale empirical evidence on how behavioural vulnerabilities manifest in structured command systems remains limited. This study addresses that gap by analysing 30,843 structured command assessments conducted across 43 UK Fire and Rescue Services between 2017 and 2024, within the Effective Command (EC) framework (Lamb et al., 2021). These assessments capture observable decision behaviours across command levels and contexts, providing a uniquely large behavioural evidence base for examining reliability in practice.

STATE OF THE ART

Research on incident command performance draws on several established fields, including naturalistic decision making, situational awareness (SA), high reliability organisation theory, and behavioural assessment. Together, these literatures have advanced conceptual understanding of how emergency responders make decisions under uncertainty, but empirical analyses of large-scale behavioural assessment data remain scarce.

NDM research provides substantial insight into recognition primed decision strategies and adaptive expertise in time pressured environments (Klein et al., 1993; Zsambok & Klein, 1997). Complementing this, SA theory distinguishes between perception, comprehension, and projection, emphasising the fragility of anticipatory reasoning under cognitive load (Endsley, 1995; Endsley & Garland, 2000). HRO scholarship identifies behavioural principles—such as sensitivity to operations, preoccupation with failure, and deference to expertise—as central to reliability in complex sociotechnical systems (Weick & Sutcliffe, 2007; Bigley & Roberts, 2001).

These theoretical developments align with the emergence of behavioural marker systems, such as THINCS, which operationalise non-technical skills for structured assessment in emergency response contexts (Butler, Honey, & Cohen-Hatton, 2019; Flin et al., 2008). However, empirical research using these systems has largely been limited to small samples, experimental simulations, or qualitative analyses of isolated incidents. As a result, national-scale behavioural datasets have remained virtually unexplored.

Studies examining incident command behaviours illustrate this limitation. For instance, the development and early evaluation of the THINCS behavioural marker system relied on interviews, workshops, and scenario-based exercises rather than large-scale operational data (Butler, Honey, & Cohen-Hatton, 2019). While this work provides valuable insight into command behaviours, it does not offer national-scale, cross-service behavioural evidence comparable to the 30,843 assessments analysed in the present study.

Prior work has validated specific behavioural indicators and explored components of command competence, but no published research has examined behavioural patterns across tens of thousands of assessments spanning multiple organisations, contexts, and command levels. Existing studies provide valuable conceptual insight but do not offer systematic evidence of how behavioural strengths and vulnerabilities manifest at scale.

This study extends the state of the art by providing one of the first large N, cross-service behavioural analyses of incident command performance. By integrating established decision science theory with 30,843 structured assessments across 43 UK Fire and Rescue Services, it provides empirical evidence of persistent behavioural

vulnerabilities and contributes a theory informed operational model—the Five Non-Negotiables—that clarifies how command reliability is enacted in practice.

METHODS

Context and Assessment Framework

UK National Operational Guidance requires all Fire and Rescue Service (FRS) incident commanders to undergo formal competence assessment at least every two years (National Fire Chiefs Council [NFCC], 2020). To support consistency and standardisation, the Effective Command (EC) framework was developed as a sector wide behavioural assessment system (Effective Command, 2025; Lamb et al., 2021). EC provides a structured approach to evaluating and developing command competence and is aligned with UK FRS role maps, Joint Emergency Services Interoperability Programme (JESIP) principles, and national accreditation standards (JESIP, 2021; SFJ Awards, 2025).

The UK FRS operates a nationally standardised four tier incident command structure (ICL1–ICL4), with each level defining expected responsibilities, decision authority, and incident complexity. Although terminology varies internationally, this is broadly comparable to supervisory, tactical, operational, and strategic command tiers used internationally; United States Incident Command System/National Incident Management System (ICS/NIMS), the Australian Inter-service Incident Management System (AIIMS), and Canadian Incident Management System (IMS).Table 1 summarises the command levels and their conceptual equivalents in other systems.

Table 1. Comparison of UK Incident Command Levels (ICL1–ICL4)

UK	Role Title	Responsibility	Type of Incidents	Equivalent in Other Systems
ICL1 – Initial Command	Crew Manager / Watch Manager	First-in command; establishes initial SA: implements immediate actions; manages first-arriving resources.	Small, localised, non-complex incidents; early phase of larger incidents.	**ICS/NIMS:** Single Resource / Initial IC **AIIMS:** Level 1 – Initial Response **IMS Canada:** Initial Attack / First-Arriving IC
ICL2 – Intermediate Command	Station Manager	Coordinates multiple resources; establishes sectorisation; manages tactical decision-making; establishes command structure	Medium-scale, multi-unit incidents requiring structured command and tactical planning.	**ICS/NIMS:** Division/Group Supervisor or evolving Incident Commander **AIIMS:** Level 2 – Sector/Sector Commander **IMS Canada:** Operations/Tactical
ICL3 – Advanced Command	Group / Area Manager	Leads major or multi-sector incidents; oversees inter-agency coordination; manages high-risk or prolonged operations; formalises command structure.	Large, complex, multi-agency or prolonged incidents requiring coordinated tactical and operational leadership.	**ICS/NIMS:** Incident Commander (Type 2/3) **AIIMS:** Incident Controller (Complex Incidents) **IMS Canada:** Incident Commander (Tier 2/3)
ICL4 – Strategic Command	Principal Officer	Provides strategic direction; prioritises organisational resources; engages at multi-agency strategic level (e.g., Gold Command); handles politically sensitive or cross-jurisdiction incidents.	Large-scale emergencies requiring strategic management, cross-government coordination, or national-level implications.	**ICS/NIMS:** Agency Executive / MAC Group / Unified Command (Strategic) **AIIMS:** State/Territory Strategic Controller **IMS Canada:** Senior Agency Executive / Strategic Coordination Group

Dataset and Assessment Contexts

The dataset comprises routine competence assurance records collected by UK FRS organisations between 2017

and 2024. Because reassessment is mandated under national guidance, these data represent recurring, systematised observations of command performance across career stages, thereby reducing selection bias associated with voluntary participation or post incident review samples.

EC assessments take place across three structured operational contexts (Lamb et al., 2021); scenario-based training, live incident observation, and formal summative assessment. Together, these contexts capture behavioural performance under both simulated and operationally authentic conditions. Assessment outcomes are recorded using a standardised toolkit evaluating performance across eight behavioural domains:

- Information Gathering
- Information Understanding
- Anticipation
- Decision Making
- Planning
- Communication
- Command
- Review

These domains encompass both technical and non-technical skills (Flin, O'Connor, & Crichton, 2008) and represent the behavioural foundations required to maintain situational awareness, manage risk, coordinate resources, and lead effectively in dynamic environments (Endsley, 1995; Klein, 1998). The framework is aligned with National Operational Guidance (NFCC, 2020) and JESIP principles, ensuring consistency with established doctrine and interoperability standards.

Assessment Process

Assessments were carried out by qualified assessors within FRS organisations or by accredited third party providers operating under the governance standards of the EC framework. All assessors completed formal standardisation and quality assurance procedures—including annual calibration exercises, moderated scoring reviews, and peer benchmarking—to enhance inter rater consistency and minimise subjective scoring variation.

Candidates were observed directly while operating in one of the three EC assessment contexts. Where continuous live observation during an incident was not feasible, assessors supplemented their observations with structured post incident professional discussions, using predefined behavioural criteria to ensure scoring validity.

Each EC domain comprises nine assessment criteria (72 total), scored on a five-point scale (1 = unsatisfactory/unsafe; 3 = satisfactory/safe; 5 = exceeding expected behaviours). Domain scores were converted into mean percentage values. To achieve an overall pass, candidates were required to attain a domain average above 55.5% and avoid multiple critical safety failures.

Although specific behavioural expectations increase with command level, a set of "golden threads" of core competencies is maintained across ICL1–ICL4. Criteria are scaled to reflect expected proficiency at each tier. For this reason, cross tier comparisons focus on relative behavioural strengths and weaknesses within levels, rather than on direct numerical comparison of raw scores across levels.

Formal inter rater reliability coefficients could not be recalculated retrospectively for this study; however, the use of standardised behavioural descriptors, calibrated assessors, and structured scoring rubrics provides strong procedural safeguards against excessive assessor variance. Given the size of the dataset and repeated assessments across multiple organisations and contexts, aggregate patterns are unlikely to reflect idiosyncratic scoring.

Theory-Informed Development of the Five Non-Negotiables

The Five Non-Negotiables were developed through a theory informed synthesis of three well established bodies of research describing how decision makers operate under uncertainty: situational awareness (SA), naturalistic decision making (NDM), and high reliability organisation (HRO) theory. SA, NDM, and HRO were selected because they offer empirically established behavioural accounts of operational decision-making under uncertainty and align directly with the observable behavioural domains assessed within EC, while several alternative theories considered focused on team-level cognitive processes rather than individual command behaviours, system-level adaptation rather than specific behavioural markers, or provided conceptual constructs lacking assessable behavioural indicators within the FRS competence systems. Situational awareness models distinguish between perception, comprehension, and projection, with projection consistently identified as the most vulnerable cognitive process under time pressure (Endsley, 1995; Endsley & Garland, 2000). NDM research highlights recognition primed strategies, adaptive expertise, and mental simulation as mechanisms that enable practitioners to act effectively in dynamic environments (Klein, 1998; Klein et al., 1993; Zsambok & Klein, 1997). HRO

scholarship emphasises behavioural principles—such as sensitivity to operations, preoccupation with failure, and deference to expertise—as foundations of reliable performance in high-risk contexts (Weick & Sutcliffe, 2007; Bigley & Roberts, 2001).

Across these traditions, five behavioural capabilities consistently emerge as essential to reliable decision making in complex, high stakes environments:

1. Anticipatory situational awareness
2. Adaptive strategy selection
3. Objective-based planning
4. Communicative coordination and control
5. Dynamic review of decisions

Together, these capabilities span the major behavioural demands of the operational decision-making cycle—from perceiving and interpreting cues, to selecting strategies, coordinating actions, and reassessing decisions. The rationale for adopting "five" is therefore both substantive (comprehensive coverage of the command loop) and pragmatic (a parsimonious, observable set of behaviours that can be integrated into doctrine, training, and assessment). These five capabilities provide a pragmatic, theory informed organising structure that captures key behaviours assessed in the EC system. They are not presented as exhaustive or definitive. Instead, they offer a coherent framework for describing how core command behaviours are enacted in practice, while remaining open to refinement as further empirical evidence emerges.

The Five Non-Negotiables are not presented as a statistically validated factor structure. Instead, they constitute a theory guided organising framework that aligns widely recognised constructs with the behavioural domains assessed within the EC system. The framework is intended to provide conceptual coherence and practical applicability—rather than to assert that these five capabilities represent the only or optimal latent configuration of command behaviour. Formal statistical validation and exploration of alternative structures remain important directions for future research.

The development of the Five Non-Negotiables followed three guiding principles:

1. Cross theoretical convergence: Each capability reflects behavioural requirements repeatedly emphasised across SA, NDM, and HRO literatures.
2. Behavioural observability: Only constructs that could be directly mapped onto behaviours assessed within the EC framework were included (e.g., information gathering, communication, decision making).
3. Coverage of the command cycle: The capabilities collectively represent the operational sequence of decision making, from sense making through planning, coordination, and review.

On this basis, the Five Non-Negotiables offer a coherent and integrative framework for articulating the behavioural foundations of reliable command performance. They support alignment across doctrine, assessment, and training, while remaining open to refinement as further empirical evidence emerges.

Operationalisation: Mapping to the Five Non-Negotiables

To examine behavioural reliability systematically, the eight EC behavioural domains were conceptually mapped onto the Five Non-Negotiables. This mapping embeds the theory driven constructs within an established operational assessment framework and provides the analytical structure used in this study (Table 1). The mapping was undertaken at the domain level, rather than at individual behaviour or criterion level. As each EC domain represents a validated behavioural construct, assigning one domain to several Non-Negotiable would artificially inflate its influence and distort the structure of the assessment system. Each domain was therefore assigned to one category based on its primary behavioural purpose.

The decision rules for mapping:

1. **Theoretical alignment:** Domains were matched to the Non-Negotiable whose theoretical definition (from SA, NDM, or HRO scholarship) best captured their behavioural intent.
2. **Functional role in the command cycle:** Domains were grouped by their position within the operational decision-making process (perception → strategy → planning → communication/ coordination → review).
3. **Behavioural clarity:** Each domain was assigned to a single category to ensure analytic consistency and avoid double counting.

Table 2. provides the analytical structure used to interpret the dataset and connect assessment outcomes to behavioural development priorities. Each EC domain was mapped to a single non-negotiable; individual data points were not double coded.

EC Domain	Alignment	Operational Meaning
Information Gathering	Situational awareness and anticipation	Collecting critical cues
Understanding	Situational awareness and anticipation	Building an accurate mental model
Anticipation	Situational awareness and anticipation	Projecting likely developments
Decision-Making	Decision strategy selection	Matching decision approach to risk
Planning	Objective-based planning	Setting and adapting objectives
Communication	Communication, coordination and control	Clarity of intent and tasking
Command	Communication, coordination and control	Leadership presence and coordination
Review	Dynamic review of decisions	Reassessing objectives and risk

The mapping process is theory informed rather than statistically derived. Its purpose is conceptual integration and pattern identification within a large behavioural dataset, not psychometric model testing. Future research will examine structural relationships among domains using multivariate modelling and explore the stability of the five-capability configuration across contexts and command levels.

Dataset and Analytical Approach

This study analysed assessment data from 43 UK Fire and Rescue Services implementing the EC framework between April 2017 and March 2024. The dataset comprises 30,843 individual assessments collected across three operational contexts: scenario-based training, live incident observation, and formal summative assessment. These assessments span all four UK incident command levels (ICL1–ICL4) and include both wholetime and on call officers.

All data were anonymised and aggregated at the domain level prior to analysis. The analytical focus was on identifying recurring behavioural patterns, strengths, and capability gaps across command levels and assessment contexts. Patterns were examined both within and, cautiously, across tiers in order to identify developmental trends and systemic consistencies.

Given the scale and structure of the dataset, the analytical emphasis is descriptive rather than causal. The study does not aim to test hypotheses or infer statistical differences between groups. Instead, it seeks to identify stable, cross context behavioural vulnerabilities observable at scale. The volume and standardisation of assessments support the identification of persistent behavioural tendencies rather than isolated anomalies.

The EC system produces aggregated mean percentage scores derived from criterion based behavioural assessments recorded on a five-point scale. Crucially, individual level scores and full score distributions are not retained in the operational outputs provided to participating services. As a result, distributional metrics such as standard deviations cannot be reconstructed, and inferential statistical tests (e.g., ANOVA, regression, variance modelling) are neither possible nor appropriate. The analysis presented here therefore focuses on pattern-based interpretation of domain level means rather than statistical comparison across groups.

The purpose of the analysis is to characterise behavioural patterns within each command level, reflecting the design and intended use of the EC framework as a competence assurance tool rather than a psychometric measurement instrument. Because the system is not designed to produce parametric distribution data, the findings should be interpreted as evidence of recurring behavioural tendencies across large aggregates rather than differences in statistical magnitude.

Ethical and Methodological Boundaries

The dataset comprises anonymised organisational competence assurance records. No personal identifiers were accessed, and all findings are reported in aggregate form to prevent attribution to individuals or specific services.

Several methodological boundaries should be acknowledged. The dataset reflects UK FRS command structures and doctrine, which may limit generalisability to differently structured emergency response systems. The mapping of eight EC domains onto five capability categories was theory informed rather than statistically factor analysed.

Formal inter rater reliability coefficients could not be recalculated retrospectively. Furthermore, live incident assessments inherently reflect contextual variability that may not be fully captured through structured scoring alone.

Despite these limitations, the dataset's scale, longitudinal coverage, and cross level structure provide a uniquely robust behavioural evidence base within contemporary emergency command research.

FINDINGS

Overview of Analytical Approach

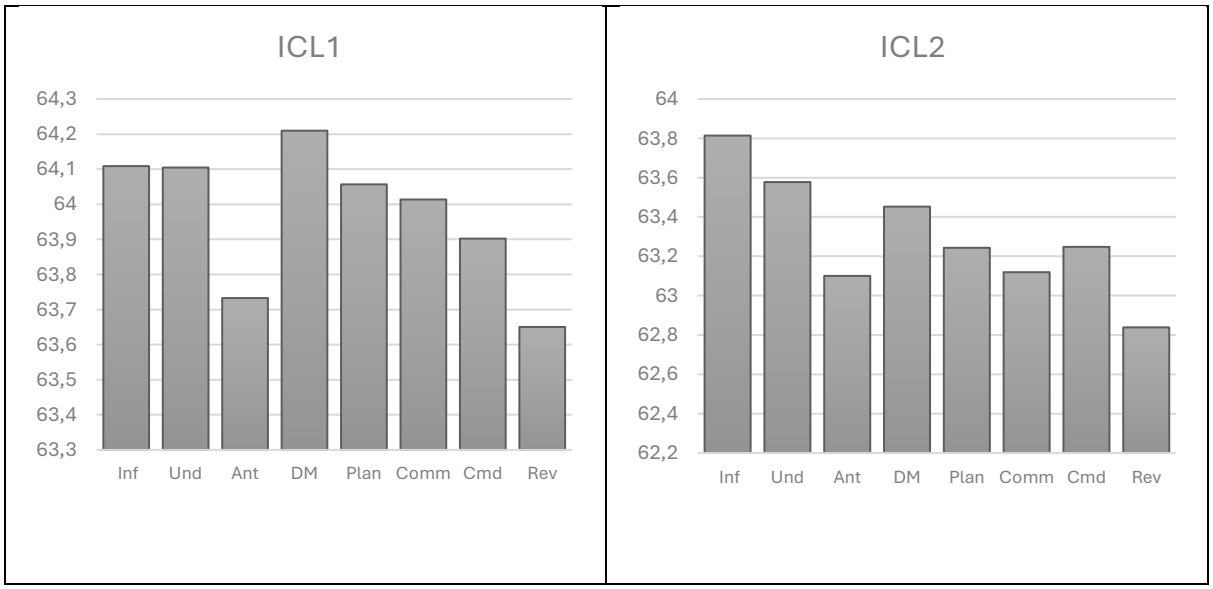
The analyses presented here are descriptive rather than inferential. The EC assessment system produces aggregated, domain-level percentage scores rather than individual-level datasets or statistical variance measures. As a result, standard deviations, score distributions, and hypothesis-test comparisons cannot be reconstructed. The purpose of this section is therefore not to test statistical differences between command levels, but to identify recurring behavioural patterns that emerge consistently across a large, standardised dataset.

Because the dataset contains mean scores only, the findings reflect behavioural tendencies rather than parametric distributions. This aligns with the design intent of the EC system, which captures the presence and consistency of observable behaviours rather than treating competence as a continuous psychometric trait. Consequently, the figures illustrate relative strengths and weaknesses within each command level, rather than statistical comparisons across levels.

The overall numeric range across behavioural domains (approximately 62–65%) is intentionally narrow. Such constrained score dispersion is typical of competence-assurance frameworks calibrated around threshold-based criteria, where aggregated output values cluster tightly above minimum safe-performance levels. Within this context, even modest shifts in scores (approximately 0.5–1.5 percentage points) can indicate meaningful behavioural variation when observed across thousands of assessments. These small but consistent differences are therefore behaviourally consequential, even though they should not be interpreted as evidence of statistical separation.

Figure 1 – Domain Level Patterns

Figure 1 summarises mean percentage scores across the eight EC domains for each Incident Command Level (ICL1–ICL4). Each subplot uses an independent y axis to preserve within level interpretive resolution. The intention is to illustrate behavioural relationships within each ICL—not absolute differences between levels. Because distribution metrics are not available, Figure 1 represents domain level means only and should be interpreted as depicting within level behavioural profiles, not statistical contrasts.



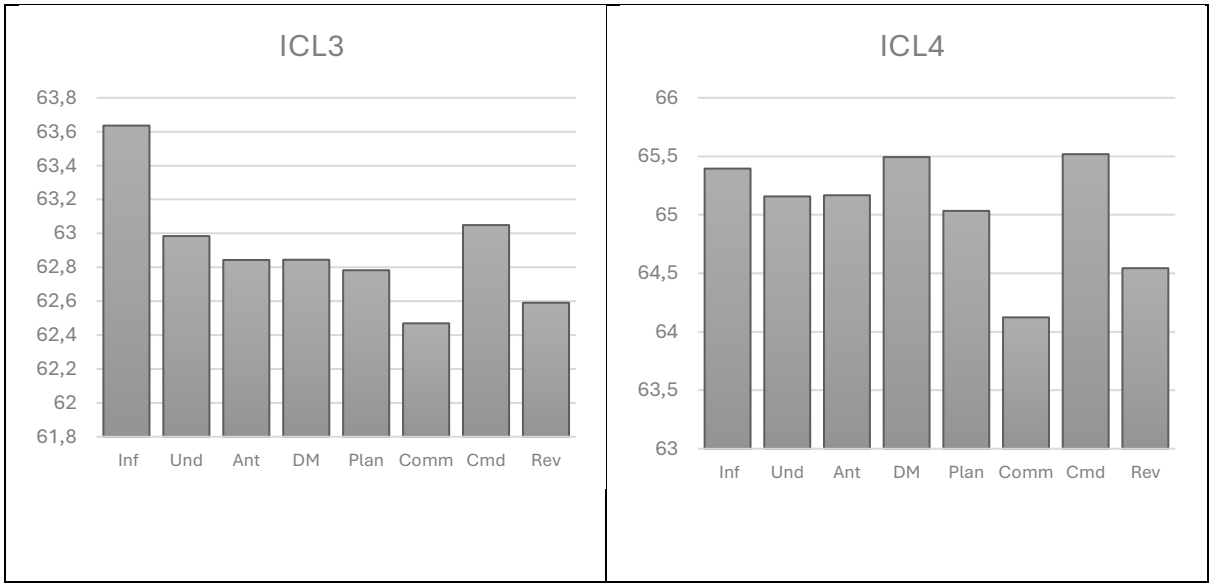


Figure 1. Average domain scores (%) for Information Gathering, Understanding, Anticipation, Decision-Making, Planning, Communication, Command, and Review across command levels (ICL1 n = 24,103; ICL2 n = 4,713; ICL3 n = 1,576; ICL4 n = 453). The EC assessment system does not generate statistical dispersion measures (e.g., standard deviations); accordingly, the figure presents domain-level mean patterns within each command level rather than statistical comparisons across levels. Y-axis scales differ intentionally between panels to preserve within-level interpretive resolution and to illustrate domain-to-domain behavioural variation rather than absolute score differences across levels.

Across all four command levels, three consistent behavioural patterns emerge:

1. Anticipation and Review are consistently lowest

These domains show the least stable performance, indicating fragility in projection and dynamic reassessment—two behaviours closely associated with forward looking situational awareness and reflective decision making in action.

2. Communication and Command show system level weaknesses

Lower scores in these domains reflect recurring issues such as unclear tasking, insufficient confirmation of understanding, inconsistent prioritisation, and variable delegation or oversight. These weaknesses point to systemic challenges in coordinating teams and maintaining operational coherence under pressure.

3. Information Gathering and Understanding are consistently strongest

These domains show the highest and most stable performance, reflecting the proceduralisation of early-stage situational awareness and the strong emphasis placed on these behaviours in FRS training and doctrine.

These patterns do not represent formal statistical differences but rather behaviourally meaningful regularities observed across a large, uniform dataset. They show that certain capabilities—particularly Anticipation, Communication, Command, and Review—are enacted with less consistency across the command system, while others—Information Gathering and Understanding—are comparatively robust.

Taken together, these descriptive patterns form the empirical foundation for the Five Non-Negotiables model. The framework is therefore a theory informed synthesis of capabilities that appear most consistently vulnerable or important in practice—not a statistically derived factor structure.

Rationale for Presenting Results by Command Level

Results are presented by Incident Command Level (ICL1–ICL4) because the EC system is designed to assess competence within each tier, reflecting distinct operational roles, spans of control, and decision responsibilities. Domain profiles are therefore best interpreted within each level, in alignment with how command competence is developed, assessed, and enacted in practice.

Why the Eight Domains Are Displayed Together Within Each Level

Displaying all eight domains within each subplot provides a coherent view of the internal behavioural profile of

each command level. This structure highlights which behaviours are comparatively stronger or weaker among practitioners at the same tier and enables interpretation focused on relative behavioural patterns, rather than magnitude differences across levels.

Why Cross Level Plots Were Not Used as Primary Visualisations

Although plotting each domain across command levels (with ICL on the x axis) is theoretically possible, such visualisations imply inferential comparison, which is inappropriate given the absence of variance data. To avoid over interpretation, domain level patterns are shown within levels as the primary analytic structure.

Aggregated Findings for the Five Non-Negotiables

Given that the eight EC domains map onto the Five Non-Negotiables, we computed aggregate capability scores for each command level by averaging the domains aligned to each capability. These aggregated values represent the overall behavioural expression of each Non-Negotiable within each ICL.

The aggregated patterns mirror the domain level findings:

- Anticipatory situational awareness and
- Communicative coordination and control

are consistently lower than

- Objective-based planning, and
- Decision strategy selection,

while

- Dynamic review of decision remains the least consistently enacted capability across all levels.

These aggregated findings demonstrate how domain level vulnerabilities translate into broader capability level profiles and highlight the relevance of the Five Non-Negotiables as an integrative behavioural framework.

Behaviour Specific Insights

1. **Situational Awareness and Anticipation** - Information gathering is consistently strong, but anticipation—projecting how incidents may evolve—remains a recurring weakness. Less experienced commanders often describe current conditions rather than anticipating future developments. Even at higher levels, anticipatory reasoning shows variability, indicating a need for deliberate cognitive reinforcement.
2. **Decision Strategy Selection** - ICL1 commanders perform well in routine or rule-based situations but show fragility in ambiguous or rapidly evolving contexts. Senior officers demonstrate greater adaptability but inconsistently articulate risk reasoning. Over reliance on procedural templates or intuitive judgement indicates that strategy shifting remains underdeveloped.
3. **Objective Based Planning** - Planning strengthens with seniority (ICL4 highest), although ICL2–ICL3 often struggle to revise objectives as incidents evolve. Overcommitment to initial plans can reduce tactical flexibility, highlighting uneven development of intent articulation and plan adaptability.
4. **Communication, Coordination, and Control** - Communication is the weakest domain across levels. Deficiencies include unclear intent, incomplete tasking, and limited confirmation of understanding, particularly at ICL3 where coordination complexity increases. Control related weaknesses—such as inconsistent sectorisation or insufficient monitoring—further undermine operational coherence.
5. **Dynamic Review of Decisions** - Dynamic review is the least consistently enacted capability. Commanders often prioritise action over reflection, reducing opportunities to reassess objectives or detect emerging risks. Effective review—deliberate pausing, checking assumptions, integrating new information—was inconsistently observed across all tiers.

Integrating Domain Level and Aggregate Findings

Presenting both domain level profiles and Five Non-Negotiable aggregates provides complementary perspectives. Domain profiles reveal the internal behavioural structure of each command level, while aggregated capability scores capture broader patterns. Together, these visualisations strengthen understanding of systemic behavioural tendencies within UK incident command and the areas where reliability is most vulnerable.

DISCUSSION

This study analysed a large dataset of aggregated behavioural assessments to identify stable patterns in command decision-making performance across UK Fire and Rescue Services. Because the dataset is descriptive rather than inferential, conclusions are based on the consistency of behavioural patterns rather than on statistical differences between groups. Even within these constraints, the findings reveal recurring tendencies that illuminate how core elements of command behaviour are enacted in practice.

Systemic Patterns of Behavioural Fragility

Across all command levels, the same behavioural domains—Anticipation, Communication, Command, and Dynamic Review—consistently appear at the lower end of performance profiles. Their underperformance across roles and scenarios indicates systemic behavioural fragility rather than isolated skill deficits.

From a high-reliability organisation (HRO) perspective, this pattern is significant. Anticipation, coordination, and reassessment are central to sensitivity to operations and preoccupation with failure. Their variability suggests that reliable command performance depends not only on structural or procedural design but on the consistent enactment of behavioural principles under pressure.

The Perception–Projection Gap in Situational Awareness

A second pattern is the gap between perception/comprehension, which is relatively strong, and projection, which remains consistently weaker. Commanders generally recognise and understand current conditions but enact anticipatory reasoning less reliably.

This aligns with situational awareness theory, which identifies projection as the most cognitively demanding component. Within naturalistic decision-making (NDM), the finding highlights a limitation of recognition-primed strategies: they support rapid action but provide limited scaffolding for forward-looking reasoning. The data suggest that anticipatory cognition does not reliably develop through experience alone and requires intentional cultivation.

Underdeveloped Strategy Selection and Dynamic Review

Decision-making and review behaviours, while not the weakest domains, are enacted less consistently than procedural information-processing skills. Strategy selection—shifting between intuitive, rule-based, or analytical modes—is particularly fragile in ambiguous or evolving contexts. Dynamic Review similarly emerges as one of the least consistently demonstrated behaviours. Although HRO theory emphasises reassessment as a safeguard against fixation, the data indicate that structured review is not yet habitual in command practice.

Interpreting the Five Non-Negotiables in Light of the Findings

Taken together, these descriptive patterns support a behavioural-operational model in which five interdependent capabilities underpin reliable command performance:

- Situational awareness and anticipation
- Decision strategy selection
- Objective-based planning
- Communicative coordination and control
- Dynamic review of decisions

The Five Non-Negotiables do not represent a statistically validated model, nor an exhaustive taxonomy. Rather, they offer an integrative, theory-informed synthesis of the behavioural capabilities that appear most vulnerable and consequential across the dataset. Their value lies in consolidating constructs from SA, NDM, and HRO theory into an observable and assessable framework aligned with EC assessment practice.

Implications for Theory and Practice

The findings indicate that improving command reliability requires targeted development of the behavioural domains least consistently enacted. Training should emphasise anticipatory reasoning, communication clarity, explicit decision-strategy selection, and disciplined review. Scenario designs incorporating uncertainty, evolving risk, and ambiguity are likely to better support these capabilities than those centred on procedural recall.

Theoretically, the study reinforces that reliability in emergency response is behaviourally enacted rather than

structurally assured. Command doctrine provides essential scaffolding, but its effectiveness depends on how consistently key behaviours are enacted under pressure. This large-scale descriptive evidence clarifies where those behaviours are most vulnerable and identifies priorities for training, assessment, and organisational development.

SUMMARY

The Five Non-Negotiables of Command Decision-Making articulate a mid-range behavioural theory of command reliability grounded in large-scale empirical observation. They translate established decision-science and high-reliability principles into observable, trainable, and assessable behavioural capabilities. In doing so, they move beyond descriptive accounts of command failure toward a behavioural-operational explanation of how reliability is enacted—and how it can be improved—in complex emergency environments.

KEY PRACTITIONER TAKEAWAYS

Command failure most often reflects behavioural decision gaps rather than a lack of experience. Across all command levels, anticipation, communication, and dynamic review emerge as the most fragile behavioural capabilities, indicating that these skills require deliberate development rather than passive accumulation through operational exposure. Although experience improves performance, it does so unevenly, and key vulnerabilities persist even at senior ranks.

Training and assessment systems should therefore prioritise:

- Judgement and anticipatory reasoning
- Clarity of communication and tasking
- Adaptability in decision strategy selection
- Disciplined, structured review of decisions under pressure

The Five Non-Negotiables provide a practical, behaviourally grounded framework to align training, assessment, and operational expectations around these priority areas.

FUTURE WORK

This study provides a large-scale empirical foundation for understanding behavioural reliability in incident command. Several directions for further research could extend both its theoretical contribution and practical relevance.

1. Structural and comparative validation of behavioural models

Future work should examine whether the Five Non-Negotiables represent a stable latent structure using exploratory and confirmatory factor analysis. This should include testing alternative theoretical or data-driven models, comparing factor configurations, and assessing structural invariance across command levels. Such analyses would determine whether empirical clustering supports, refines, or challenges the current five-capability framework.

2. Longitudinal development of behavioural capabilities

Tracking individual commanders across multiple assessment cycles would clarify developmental trajectories, identify performance plateaus, and illuminate transition challenges between command levels. This approach could establish whether capabilities such as anticipation and dynamic review improve organically with experience or require targeted intervention.

3. Linking behavioural performance to operational outcomes

Further research should examine how specific behavioural deficits—such as weak anticipation, unclear communication, or limited review—relate to incident escalation, near misses, resource inefficiencies, or delays in tactical adaptation. Demonstrating these links would strengthen the case for sustained investment in behavioural training and assessment.

4. Cross-agency and cross-system validation

Evaluating the Five Non-Negotiables across police, ambulance, emergency management, and industrial response settings would test the model's generalisability. Comparative studies could identify universal behavioural requirements as well as sector-specific adaptations, supporting a shared behavioural language for multi-agency response.

5. Experimental research on scenario and training design

Simulation studies that systematically manipulate uncertainty, workload, or ambiguity could test how specific stressors affect behavioural performance. This work would provide insight into how scenario design influences behavioural development and transfer to operational practice.

6. Technology-enabled behavioural assessment

Emerging tools—such as automated analysis of radio communications, decision logs, or simulation telemetry—offer opportunities for scalable and objective behavioural assessment. Integrating these technologies with expert judgement could support continuous feedback and reduce reliance on episodic evaluation.

Collectively, these research directions reinforce a central conclusion: behavioural reliability in command must be deliberately cultivated. Advancing longitudinal, outcome-linked, cross-context, experimental, and technology-enabled research will help refine the behavioural architecture of the EC framework and strengthen the resilience of complex emergency response systems.

REFERERNCES

Australian Institute for Disaster Resilience. (2017). *AIIMS 4: A doctrine for incident management in Australia*. Australian Institute for Disaster Resilience.

Bigley, G. A., & Roberts, K. H. (2001). The incident command system: High-reliability organizing for complex and volatile task environments. *Academy of Management Journal, 44*(6), 1281–1299. https://doi.org/10.2307/3069401

Boin, A., ’t Hart, P., Stern, E., & Sundelius, B. (2017). *The politics of crisis management: Public leadership under pressure* (2nd ed.). Cambridge University Press.

Butler, P. C., Hayes, P., Gyles, D., & Bearman, C. (2024). Emergency management decision-making in a changing world: Three key challenges. *Australian Journal of Emergency Management*. Advance online publication.

Butler, P. C., Honey, R. C., & Cohen-Hatton, S. R. (2019). Development of a behavioural marker system for incident command in the UK fire and rescue service. *Cognition, Technology & Work, 21*(3), 443–455. https://doi.org/10.1007/s10111-019-00539-6

Davidson, L., Carter, H., Drury, J., Amlôt, R., & Haslam, S. A. (2025). How the social identity approach can improve interoperability in multi-agency emergency response teams. *Journal of Contingencies and Crisis Management, 33*(2), e70050. https://doi.org/10.1111/1468-5973.70050

Deeming, H. (2018). The Grenfell Tower fire: Social policy and disaster politics. *Journal of Social Policy, 47*(3), 513–529. https://doi.org/10.1017/S004727941700060X

Effective Command. (2025). *Effective Command framework handbook*. Effective Command Ltd.

Endsley, M. R. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors, 37*(1), 32–64. https://doi.org/10.1518/001872095779049543

Endsley, M. R., & Garland, D. J. (Eds.). (2000). *Situation awareness analysis and measurement*. Lawrence Erlbaum Associates.

Federal Emergency Management Agency. (2017). *National incident management system* (3rd ed.). U.S. Department of Homeland Security.

Flin, R., O’Connor, P., & Crichton, M. (2008). *Safety at the sharp end: A guide to non-technical skills.* Ashgate.

Joint Emergency Services Interoperability Programme. (2021). *Joint doctrine: The interoperability framework.* JESIP.

Klein, G. (1998). *Sources of power: How people make decisions.* MIT Press.

Klein, G., Orasanu, J., Calderwood, R., & Zsambok, C. E. (Eds.). (1993). *Decision-making in action: Models and methods*. Ablex.

Klein, G., Moon, B., & Hoffman, R. R. (2006). Making sense of sensemaking. *IEEE Intelligent Systems, 21*(4), 70–73. https://doi.org/10.1109/MIS.2006.75

Lamb, K., Farrow, M., Olymbios, C., Launder, D., & Greatbatch, I. (2021). Systematic incident command training and organisational competence. *International Journal of Emergency Services, 10*(2), 222–234. https://doi.org/10.1108/IJES-05-2020-0029

Moore-Bick, M. (2019). *The Grenfell Tower inquiry: Phase 1 report*. HM Government.

National Fire Chiefs Council. (2020). *Incident command: National operational guidance for the UK fire and rescue service.* National Fire Chiefs Council.

Public Safety Canada. (2019). *Incident management system doctrine for Canada*. Government of Canada.

Rimstad, R., & Sollid, S. J. M. (2015). Decision-making in prehospital emergency medicine: A systematic review. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 23*, 100. https://doi.org/10.1186/s13049-015-0180-5

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*(2), 257–285. https://doi.org/10.1207/s15516709cog1202_4

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty* (2nd ed.). Jossey-Bass.

Zsambok, C. E., & Klein, G. (Eds.). (1997). *Naturalistic decision-making*. Lawrence Erlbaum Associates.