

Incident command competence in UK fire and rescue services: characterising patterns to guide training and development

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Abstract

Purpose – This study investigates patterns of strengths and weaknesses in incident command performance across UK Fire and Rescue Services (FRS) and explores how these insights can support the development of evidence-informed training and development strategies.

Design/methodology/approach – Assessment data from 43 UK FRSs were analysed, incorporating formal exercises, real-incident monitoring and structured training events across four command levels (ICL1–ICL4). Using behavioural markers from the Effective Command framework, the study examined competence profiles and recurring performance themes.

Findings – Strengths were consistently observed in early situational information gathering, while deficits in anticipation, communication and risk assessment were common, particularly among less experienced commanders. Novice officers tended to rely on procedural checklists, whereas experienced commanders demonstrated more intuitive, adaptive decision-making. These patterns indicate the need for differentiated, level-specific training interventions.

Practical implications – Findings show how documented assessment data can strengthen both individual development plans and organisational strategies for enhancing and sustaining command competence.

Originality/value – The study provides empirical evidence on variations in incident command competence and demonstrates how structured assessment data can be used to inform organisational learning and guide training priorities in emergency services.

Keywords Fire and rescue service, Training, Emergency management, Incident command

Paper type Research article

Introduction

Emergency response practitioners operate in high-stakes, time-constrained environments where they make decisions under conditions that are dynamic, ambiguous and often hazardous. These situations are characterised by evolving circumstances, incomplete or conflicting information and significant uncertainty (Butler *et al.*, 2024; Centre for Army Leadership, 2021; Hayes *et al.*, 2022; NARU, 2019; Rimstad and Sollid, 2015; St George, 2012). Decision-making in these contexts is increasingly subject to public and media scrutiny, with practitioners held legally, morally and socially accountable to both political actors and the communities they serve.

Moreover, critical decisions are frequently reviewed through post-incident investigations and inquiries (Bosomworth *et al.*, 2017; Royal Commission into National Natural Disaster Arrangements, 2020; Steen and Pollock, 2022). Major reviews, including the Grenfell Inquiry and the Manchester Arena investigations, have highlighted persistent gaps in both the training and competence of incident commanders (Davidson *et al.*, 2025; Deeming, 2018; Moore-Bick, 2019).



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The aim of this paper is to identify patterns of strengths and weaknesses across the four Incident Command Levels (ICL1–ICL4) by analysing the assessment data generated by 43 UK Fire and Rescue Services (FRSs) using the Effective Command (EC) framework. Furthermore, the paper suggests that these patterns of training need could inform the development of evidence-based training and development strategies.

While grounded within the UK FRS context, many of the command functions and behavioural competencies examined in this study are common across international emergency response organisations. The findings may therefore offer cautious insight into broader incident command training and competence development within fire and allied emergency service sectors.

Background and literature

The UK FRS operates under a structured Incident Command System (ICS), a national framework designed to ensure effective decision-making, coordination and control during emergency incidents (Hanlon, 2008; JESIP, 2021). ICS in the UK is stratified into four Incident Command Levels (ICL1–ICL4), each aligned to the complexity and scale of an incident and reflecting a corresponding level of organisational risk. At the operational level, ICL1 commanders take initial control on scene. ICL2 commanders oversee multiple crews or sectors. Tactical command is delivered at ICL3, where coordination of resources and inter-agency working becomes critical. At the strategic level, ICL4 commanders provide organisational oversight, prioritisation and formal liaison with external agencies. Command level mobilisation parameters are determined locally but guided by national doctrine (Operational Guidance, 2020). In addition, officers at all command levels are expected to implement Joint Emergency Services Interoperability Principles (JESIP) at all incidents. JESIP is a UK initiative designed to improve the way the police, fire and ambulance services work together during major incidents. It provides a framework, training and doctrine to enhance interoperability, ensuring that multi-agency responses are coordinated, efficient and safe.

The pathway to command typically follows a career progression model, whereby officers gain experience at the operational level before advancing to more complex command roles. However, the pace and nature of this progression can vary between FRSs, as can the number and complexity of overall incidents faced by a FRS, influencing exposure to critical incidents and opportunities for development.

The role of the incident commander

Incident management is a complex socio-technical activity involving distributed teams operating under pressure in high-risk environments (Bearman *et al.*, 2023; Rimstad *et al.*, 2014).

Incident command also operates within a broader collaborative environment, where situational awareness and decision-making are often distributed across teams, agencies and organisational systems rather than residing solely within individual commanders (Salmon *et al.*, 2009).

The incident commander holds responsibility for situational assessment, risk-based decision-making and coordination of resources to protect life, property and responders. Command decisions are shaped by training, experience, doctrine and cognitive processes such as perception, memory and attention (Penney *et al.*, 2022). Research shows that decision-making styles vary significantly across different levels of command within emergency response and organisational hierarchies. Operational and tactical commanders, who are directly engaged with rapidly evolving incidents, tend to rely more heavily on naturalistic, intuitive approaches to decision-making, drawing on experience, pattern recognition and rapid mental simulation to respond effectively under time pressure and uncertainty (Klein, 1993).

In contrast, strategic commanders, who operate at a higher organisational level and focus on long-term objectives, resource allocation and multi-agency coordination, typically adopt a more analytical and structured approach to decision-making. These strategic decisions often involve systematic evaluation of options, weighing risks and benefits and considering broader organisational or political implications, although they remain influenced by uncertainty, incomplete information and the necessity for judgement-based reasoning (Bhushan and Rai, 2004). This distinction highlights how command level, situational urgency and the scope of responsibility shape the cognitive strategies and decision-making processes employed by leaders in complex operational environments.

Critically, incident commanders operating at all levels remain vulnerable to decision errors, particularly within dynamic and high-pressure operational environments. Misjudgement can result in operational inefficiencies or serious safety risks (Sallis *et al.*, 2022). Effective training and assessment should therefore support both technical and behavioural command competencies across all levels.

Training, assessment and the need for strategic alignment

UK National Operational Guidance (Operational Guidance, 2020) recommends that all FRS incident commanders undergo a formal assessment of competence at least every two years, and that they maintain a log of practical command experience or training activity to support ongoing operational readiness. While this establishes a baseline requirement, it does not define how assessments should be designed or how training strategies should be structured across services. Each FRS is left to determine its own approach to training, assessment and assurance of command competence. This lack of standardisation creates variability in development pathways and raises questions about the alignment between assessed performance and training interventions.

The Effective Command framework

The *Effective Command* (EC) framework (Effective Command, 2026; Lamb *et al.*, 2021) was developed to address the gap of assessment standardisation in the UK. It provides a structured, behavioural approach to assessing and developing command competence, mapped to UK FRS role maps, Joint Emergency Service Interoperability Principles (JESIP) and sector-accredited standards (SFJ Awards, 2025). EC includes three structured contexts; scenario-based training, live incident observation and formal summative assessment. Assessment results are recorded using a standardised toolkit that allows detailed analysis of performance across eight assessment sections capturing both technical and non-technical elements (Flin and O'Connor, 2008) of incident command; Information Gathering, Information Understanding, Anticipation, Decision-Making, Planning, Communication, Command and Review. These domains form the core non-technical skills that enable incident commanders to maintain situational awareness, manage risk, coordinate resources and lead effectively in dynamic, high-pressure environments (Endsley, 1995; Flin and O'Connor, 2008; Klein, 1998). These behaviours also reflect well-established principles in ICSs, ensuring clear communication, effective coordination and continuous learning that improve response performance and operational safety (Bigley and Roberts, 2001; JESIP, 2021). The framework is aligned with the UK National Operational Guidance (Operational Guidance, 2020) and the Joint Emergency Services Interoperability Principles (JESIP, 2021).

The assessments are conducted by qualified assessors, either internal to the FRS or from accredited third-party training providers, having undergone the formal standardisation processes, including annual calibration and performance reviews, in line with EC protocol requirements (Effective Command, 2026; Lamb *et al.*, 2021). An assessment is performed by direct observation of the candidate performing in one of the three contexts, using a structured assessment rubric. In some real incidents, where live observation was not possible for all phases, scoring was supported by post-incident professional discussions.

Within the EC assessment, each of the eight sections contains nine assessment criteria (72 in total), scored on a five-point scale (1 = unsatisfactory/unsafe, 3 = satisfactory/safe, 5 = exceeding expected behaviours) and an overall section score was derived as a mean percentage score. An overall pass required a section average above 55.5% and the absence of multiple critical safety failures. The four command levels share similar, though not identical, assessment criteria, all of which are aligned with the relevant professional standards for each tier. Core competencies, or “golden threads,” run consistently through all tiers, with each criterion scaled appropriately to reflect the expected skill level within its assessment section. As such all-criteria level data analysis is limited to within command tiers, identifying strengths and weaknesses of performance.

Behavioural marker systems and competency-based assessment frameworks are widely used within high-risk industries to support structured evaluation of non-technical skills and operational decision-making. However, existing literature also highlights limitations associated with assessor subjectivity, contextual variability and the challenge of fully capturing operational competence within simulated or structured assessment environments (Flin and O'Connor, 2008). These considerations are particularly relevant within complex socio-technical emergency response settings.

The research gap and rationale for this study

Despite national recommendations for routine assessment and structured development, there is limited empirical research examining whether training strategies are aligned with observed command performance. Studies by McLennan *et al.* (2024) identify a broader lack of evaluation in emergency management training. They emphasise the fact that attendance alone does not confirm competence and call for systematic assessment data to guide training needs and programme design. Similarly, Goldstein and Ford (2002) advocate for recursive training systems that begin with needs analysis and integrate evaluation into every phase.

In a UK context, Lamb *et al.* (2021) argue that validation of command competence should provide assurance that officers are capable of delivering assertive, safe and EC in dynamic and unpredictable environments. However, evidence on how training translates into operational performance remains limited. Despite widespread use of assessment frameworks, there remains a limited and inconsistent connection between observed performance data and the design of training strategies, with few mechanisms in place to systematically link the two. Existing research on incident command competence has typically focused on small-scale observational studies, simulation environments or single-service evaluations. Large-scale cross-service analyses of structured operational assessment data remain comparatively limited within the fire and rescue literature.

This study responds directly to that need by exploring how structured assessment data could be used to identify patterns of strength and weakness in command performance and suggest targeted areas of development and adaptive training strategies.

Emergency management structures, the role of FRS and incident commander competencies are similar internationally, making these findings broadly applicable. While this study focuses on the FRS, future research could examine competency assessment across other agencies to inform training, development and multi-agency response.

Methodology

This study analysed incident command assessment data from 43 UK FRSs that implemented the EC framework between April 2017 and March 2024. The dataset included 30,843 individual assessments drawn from three contexts: formal assessment exercises, monitored real emergency incidents and structured training events. Data were collected across all four UK incident command levels (ICL1–ICL4), and each record represented the performance of either a wholetime or on-call officer.

The study proceeded in three distinct analytical phases:

Phase 1: identification of strengths and weaknesses by assessment section

For each command level, the average section scores were calculated and compared across all report types (training, incident monitoring and formal assessments). This descriptive analysis aimed to highlight variation and performance outliers.

Phase 2: ranking of assessment section-level criteria

For each assessment section, the individual assessment criteria were ranked from highest to lowest, based on the scores, to identify the main (top and bottom five) individual criteria influencing the scores, for all commander levels separately.

Phase 3: comparative analysis between command levels and report types

Results were compared across command levels (ICL1–ICL4) to explore how competence varies with seniority. Where relevant, scores were disaggregated by report type to assess consistency across learning and operational contexts.

Based on the analysis, the study highlights how structured assessment data and identified training needs can inform training and professional development.

A univariate General Linear Model (GLM) was used to test whether the mean scores for the eight assessment sections differed within each command level. The GLM allows comparisons across several related means and accounts for the error variance within groups, which makes it more suitable than ANOVA or ANCOVA for this dataset, where no covariates were required and the assumptions of a multivariate model were not necessary (Field, 2013; Tabachnick and Fidell, 2019).

Where the GLM identified statistically significant differences, Tukey's Honestly Significant Difference (HSD) test was used as a post hoc procedure to compare all possible pairs of section means while controlling the familywise error rate. The test identifies which sections form statistically homogeneous subsets by determining which mean differences are unlikely to be due to chance (Hayter, 1984). All analyses were conducted in SPSS version 29 with a significance threshold of $p < 0.05$.

Results

A total of 30,843 reports from the four command levels ICL1–ICL4 were included in the analysis. The results presented in Table 1 show that 78.1% ($n = 24,103$) of the reports pertained to ICL1, 15.3% ($n = 4,713$) to ICL2, 5.1% to ICL3 ($n = 1,576$) and 1.5% ($n = 453$) to ICL4. Data were captured from monitored real emergency incidents (41.6%), training events (27.7%) and formal assessments (30.7%).

Table 1. Number of effective command reports analysed at ICL1–4, from formal assessments, training events and live incidents. Columns 6–9 show the number of assessments resulting in a pass or fail outcome, all assessment types or (formal assessments only) and the average scores achieved for each group

Assessment type	Formal assessment	At incident	Training	Total	Pass total	Pass Ave score %	Fail total	Fail Ave score %
ICL1	7,381	10,761	5,961	24,103	23,142 (6,837)	64.40 (63.85)	961 (544)	53.67 (53.59)
ICL2	1,291	1,683	1,739	4,713	4,324 (1,205)	64.15 (62.50)	389 (86)	53.86 (52.61)
ICL3	610	322	644	1,576	1,461 (593)	63.55 (63.29)	115 (17)	54.59 (53.51)
ICL4	190	56	207	453	442 (187)	65.22 (64.42)	7 (3)	54.56 (54.07)
Total	9,472	12,820	8,551	30,843	29,367 (8,822)	64.33 (63.63)	1,472 (650)	53.79 (53.6)

As the number of ICL1 and ICL2 officers was higher than that of ICL3, ICL4, the largest proportion of data was obtained from ICL1 and ICL2 reports. Pass mark criteria were met in the formal assessments in 93% of the ICL1 reports, and 93% of the ICL2 reports. When including all three report types, the pass mark criteria was reached in 96% of the ICL1 reports and 91.7% of the ICL2 reports. For ICL3, the formal assessments pass mark criteria was met by 97% and by 98% of the reports in the ICL4 group, while including all report types, the pass rate was 92.7% (1461/1576) for ICL3 and 97% for ICL4.

Identified strengths and weaknesses in command

When the average pass scores for all officer levels were examined, for all report types, it revealed that the ICL3 officers recorded the lowest scores (63.55). However, when the formal assessment data were examined in isolation, ICL2 officers demonstrated the lowest scores (62.5). Notably, assessment fail data, from all report types, indicated that ICL1 officers were the lowest-performing group (53.67), but when just formal assessment data was analysed ICL2 officers had the lowest score (52.61). Across all groups and report types, ICL4 officers consistently achieved the highest scores.

The average score for each of the eight assessment sections for ICL1-ICL4, all report types, is presented distinctly within each group rather than between groups in [Figure 1](#). At ICL1, Anticipation phase of Situational Awareness and incident Review were identified as the weakest areas, while Decision-Making was shown a stronger area. At ICL2, weaker areas were recorded in Anticipation, Communication and Review, while strengths were observed in Information Gathering and Understanding. At ICL3, an obvious strength was seen in Information Gathering and the weakest area in Communication. The ICL4 data highlighted notable weaker areas in Communication and Incident Review.

The statistical analysis was intended primarily to identify whether observable differences between assessment section scores were present within command levels, rather than to establish the operational magnitude of those differences ([Table 2](#)). As such, the findings should be interpreted as descriptive indicators of variation within the dataset rather than definitive measures of practical performance impact.

Statistical significance does not indicate practical importance, and the GLM results show only that differences between mean section scores are unlikely to be due to chance rather than how large or meaningful these differences may be in operational practice. The present analysis did not include effect size measures, which would have helped to judge the magnitude of any differences. Given the exploratory and descriptive purpose of the analysis and the very large sample size, emphasis was placed on identifying patterns of variation rather than estimating effect magnitude. Future work should include effect size estimates and confidence intervals. Furthermore, interpretation should also take account of the unequal sample sizes between command levels. The larger ICL1 sample is, of course, more suitable for detecting small differences, while the smaller ICL4 sample has reduced statistical power. The absence of statistically significant differences at ICL4 should therefore be interpreted within this context ([Button et al., 2013](#); [Cumming, 2014](#)).

Criteria affecting the assessment scores

Following the analysis of the assessment sections, further investigation was conducted to determine whether specific criteria influenced assessment outcomes. All 72 criteria were analysed across the entire dataset (all report types) for each command level, with average scores used to rank the criteria from highest to lowest. This table presents the five highest- and five lowest-scoring assessment criteria at each command level ([Table 3](#)).

The data from the assessment sections were examined further to determine if the relationships between the assessment sections were prevalent in the distinct assessment types of formal assessment, training and live incident monitoring ([Figure 2](#)). The graphs presented at ICL1 and ICL2 clearly show consistent relationships between assessment sections,

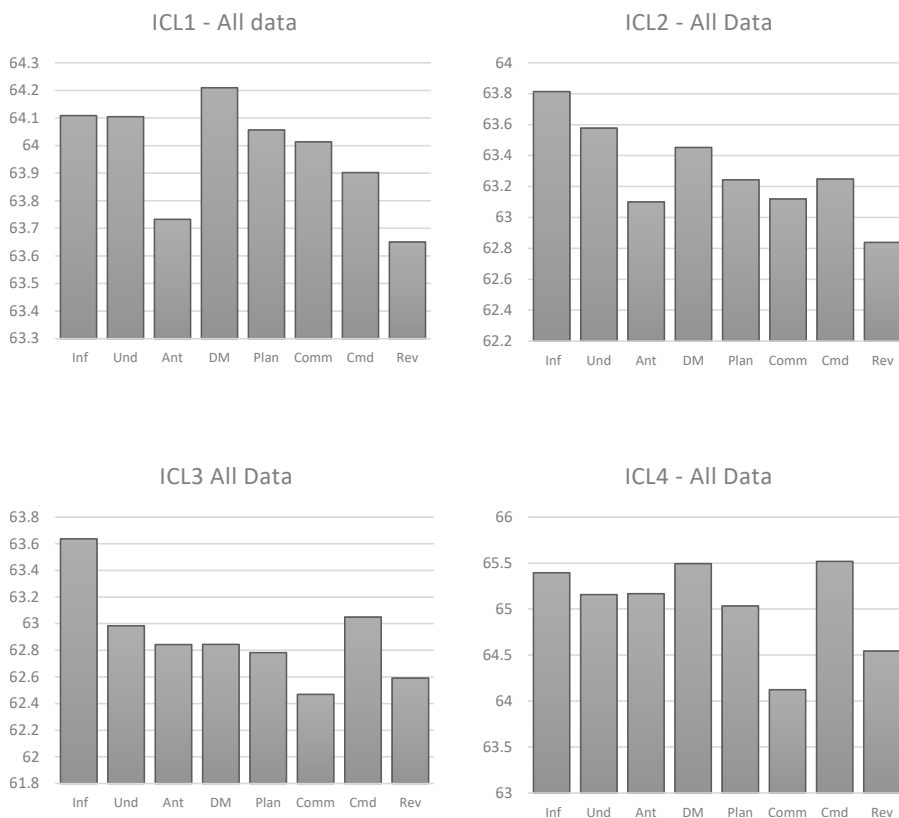


Figure 1. Mean percentage scores across the eight Effective Command assessment sections for ICL1–ICL4 commanders. Assessment sections include Information Gathering (Inf), Understanding (Und), Anticipation (Ant), Decision-Making (DM), Planning (Plan), Communication (Comm), Command (Cmd) and Review (Rev). To facilitate visual comparison of relatively small differences between assessment sections, the y-axis has been intentionally restricted in scale. The compressed range is used solely to enhance discrimination of sectional variation and does not represent large absolute differences in performance. Sample sizes: ICL1 $n = 24,103$; ICL2 $n = 4,713$; ICL3 $n = 1,576$; ICL4 $n = 453$

irrespective of individual scores for each report type, although assessments based on real incidents produced the highest scores.

Further analysis of the data into pass/fail assessment outcome groups was conducted to identify variations within specific criteria (Table 4). The strengths and weaknesses for the pass and fail subgroups were distinct, with minimal overlap suggesting there are different areas to prioritise for development in each group. Weaknesses in fail assessments for both ICL1 and ICL2 highlighted skill deficiencies in the application of Risk Assessment-dependent (RA) behaviours, suggesting prioritisation of RA-dependent (RA) skills in follow-up training.

The observations presented in Table 4 were further evaluated through an examination of the application of RA- within the 72 assessment criteria at each command level, with each criterion classified as RA-dependent or non-RA (non-RA). Risk Assessment-dependent criteria evaluate what decisions the officer makes, and these are only appropriate if a risk assessment justifies them. Non-Risk Assessment-dependent criteria evaluate how the officer performs core command, communication and leadership behaviours, which should be present at every incident, independent of risk.

Table 2. Homogenous groups and significant differences in mean between elements across ICL1–ICL3. The superscript letters refer to the homogenous groups for each IC level

	Mean for homogenous groups			Significantly different to		
Element	ICL1	ICL 2	ICL 3	ICL1	ICL 2	ICL 3
Information Gathering	63.87 ^{bc}	63.57 ^c	63.37 ^b	Anticipation and Review	Anticipation, Communication, Review	Communication, Review
Understanding	63.89 ^{bc}	63.35 ^{bc}	62.75 ^{ab}	Anticipation and Review	Review	
Anticipation	63.53 ^a	62.88 ^{ab}	62.62 ^{ab}	Information Gathering, Understanding, Decision Making, Planning and Communication	Information Gathering	
Decision Making	64.01 ^c	63.24 ^{bc}	62.61 ^{ab}	Anticipation, Command and Review	Review	
Planning	63.86 ^{bc}	63.03 ^{abc}	62.55 ^{ab}	Anticipation and Review		
Communication	63.81 ^{bc}	62.90 ^{ab}	62.23 ^a	Anticipation and Review	Information Gathering	Information Gathering
Command	63.70 ^{ab}	63.024 ^{abc}	62.82 ^{ab}	Decision Making		
Review	63.49 ^a	62.64 ^a	62.37 ^a	Information Gathering, Understanding, Decision Making, Planning and Communication	Information Gathering, Understanding, Decision Making	Information Gathering

Figure 3 illustrates ICL1 and ICL2 data, categorised into Risk Assessment-dependent (RA) and non-RA behaviours across eight assessment sections. At ICL1, lower RA behaviour scores were recorded in the Plan, Communication and Review sections, whereas RA was identified as an area of strength in the Command phase. Further differentiation into pass and fail subsets revealed distinct variations. Candidates who passed exhibited RA weaknesses in the Plan and Communication behaviours, whereas those who failed recorded the lowest scores within the Situational Awareness phase of incident command.

At ICL2, weaker RA areas were evident across all assessment reports in the Plan and Command sections. However, further differentiation into pass/fail groups revealed additional variations. Those who failed assessments recorded strengths in RA criteria across all sections except for Communication, Plan and Review.

At ICL3, average scores were slightly lower than at ICL1 and ICL2, and a wider variability was evident in the Communication and Review sections. Strengths were observed in Command behaviours such as assertive leadership and situational control, while weaknesses included effective media management and post-incident documentation. Pass/fail subgroup data showed modest differences, suggesting that performance at this level may be influenced more by consistency across a broader skill set than by isolated criteria.

ICL4 results were more stable. With high average scores and minimal spread across assessment sections, strategic-level commanders showed consistent competence across the board. Strengths included clear leadership, rationalised decision-making and high-level situational understanding. Weaknesses, though less pronounced, appeared in multi-agency

Table 3. Strengths & weakness: criteria reference no. (column 1&3) and criteria text (columns 2&4), top 5 strengths, bottom 5 weaknesses for ICL1 – ICL4 commanders during all report types, % scores.
Inf = Information Gathering; Und = Understanding; Ant = Anticipation; DM = Decision-Making;
Comm = Communication; Cmd = Command; Rev = Review

Strengths			Weaknesses	
ICL1	Inf:1	Collection of initial information using relevant channels	Inf:9	Communication of the incident situation to other responders via fire control using the METHANE message protocol
	Plan:1	Appropriate incident objectives	Plan:9	Recording of essential information
	Comm:2	Clear and concise	Ant:9	Consideration of wider incident implications – cover moves, road closures, weather etc
	DM:4	Decisions are timely	Cmd:9	Proactive anticipation of the appropriate Command and Control needs of the incident
ICL2	DM:5	Rationalised decision making	Cmd:8	Clear leadership and direction
	Inf:1	Collection of initial information using relevant channels	Cmd:5	Control of information flow to the Incident Management team and other stakeholders/public
	Plan:1	Appropriate incident objectives	Comm:7	Effective Communication with local community – warn and inform
	Und:1	Size/scope	Plan:9	Recording of essential information
	Inf:4	Identification of appropriate information – critical incident factors	Ant:9	Anticipation of wider incident implications – cover moves, road closures, early joint media strategy
	Und:5	A clear understanding of the benefits of activities versus risks to those involved – Risk Assessment process	Und:9	Consideration of wider issues – environment/community
ICL3	Cmd:7	Use of assertive, effective and safe command skills at the operational incident	Und:9	Consideration of the broad effect of the incident on the organisation and further afield
	Inf:2	Handover from Incident Commander	Cmd:5	Ability to control effective information flow to incident management team and other stakeholders/public
	Und:1	Demonstration of a good understanding of incident progress including size, scope, complexity and impact	Comm:7	Effective wider incident media management
	Inf:1	Collection of initial information using relevant channels	Cmd:9	Provision for ongoing safety, sustainability and welfare (and incident recovery)
ICL4	DM:5	Rationalised decision making	Plan:9	Recording of essential information
	Cmd:7	Apply assertive, effective and safe command skills at all operational incidents	Plan:9	Essential information is recorded
	Und:1	Consideration of wider issues – environment/community/ reputation	Comm:3	Deliver clear, concise and timely briefings to crews, command support functions, organisational support sectors and other agencies
	Inf:1	Collection of initial information using relevant channels	Comm:4	Safety briefs, FRS, multi-agency and organisational
	DM:5	Rationalised decision making	Rev:7	Review incident information to assess effectiveness and sustainability of resources and capabilities
	Cmd:6	Apply the most appropriate leadership behaviours, technical knowledge and command skills to resolve an incident	Und:4	Presence of risks/hazards and hazard area clearly communicated and understood throughout other responding agencies and support staff

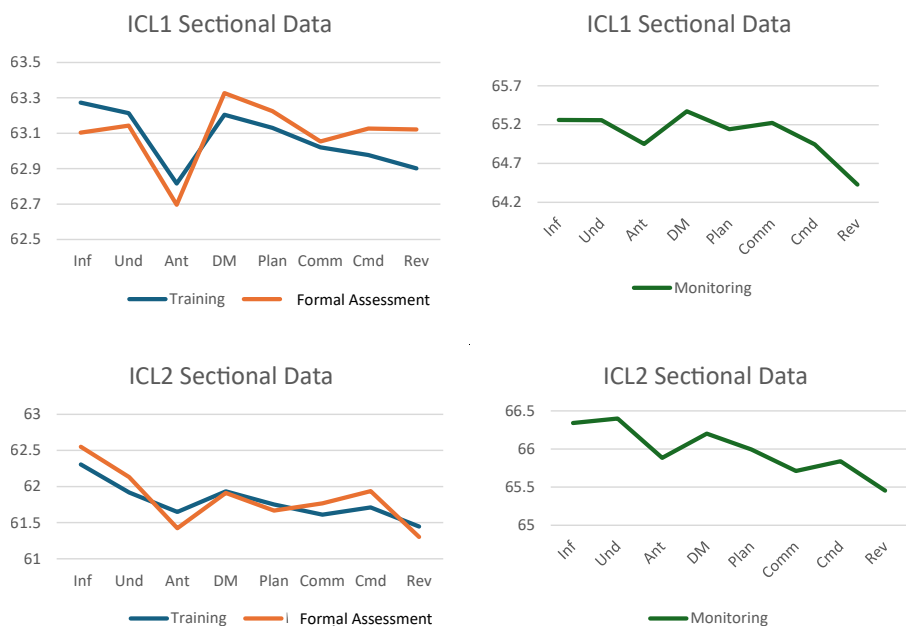


Figure 2. Mean percentage scores across the eight effective command assessment sections for ICL1 and ICL2 commanders by assessment context (training, monitored incident and formal assessment). Assessment sections are displayed from left to right as Information Gathering (Inf), Understanding (Und), Anticipation (Ant), Decision-Making (DM), Planning (Plan), Communication (Comm), Command (Cmd) and Review (Rev). Separate y-axes were used to improve visualisation of small score differences, with the left axis representing training and formal assessment data and the right axis representing monitored incident data. Sample sizes: ICL1—Training ($n = 5,961$), monitored incident ($n = 10,761$), formal assessment ($n = 7,381$); ICL2—Training ($n = 1,739$), monitored incident ($n = 1,683$), formal assessment ($n = 1,291$)

communication and reflective review behaviours. The limited variation between pass and fail profiles suggests that ICL4 assessments differentiate more subtly, possibly reflecting the more developed judgment and experience typically present at this level.

Limitations

While this study draws on a substantial dataset of over 30,000 assessments across 43 UK FRSs, several limitations should be acknowledged. Firstly, although the assessment process is standardised across the EC framework, variability in assessor interpretation and local implementation practices may introduce some variation in the data. The EC framework requires assessor standardisation and annual revalidation, but differences in organisational culture or operational exposure may still influence scoring.

Secondly, in some real-incident assessments, scores were supported by professional discussion rather than direct observation of all incident phases. This may affect the completeness and reliability of the evidence base for those assessments.

Thirdly, the analysis assumes that assessment scores accurately reflect operational competence, yet real-world performance can be shaped by external factors not captured in structured evaluations. In addition, the study analyses competence data generated through the same operational assessment framework used within participating FRS, which may limit the extent to which findings can be interpreted independently of the assumptions and behavioural constructs embedded within the EC model itself. As the assessment framework analysed forms

Table 4. Strengths & weakness: criteria ref (column 1&3) and criteria (columns 2&4), top 5 strengths, bottom 5 weaknesses for ICL1 pass & fail, ICL2 pass & fail, all EC report types % scores

Strengths			Weaknesses	
ICL1 Pass	Inf:1	Collection of initial information using relevant channels	Rev:9	Collation of relevant points for the debrief or possible investigation
	Plan:1	Appropriate incident objectives	Cmd:9	Proactive anticipation of the appropriate Command and Control needs of the incident
	Comm:2	Clear and concise	Ant:9	Consideration of wider incident implications – cover moves, road closures, weather etc
	DM:4	Decisions are timely	Cmd:8	Clear leadership and direction
	DM:5	Rationalised decision making	Inf:9	Communication of the incident situation to other responders via fire control using the METHANE message protocol
ICL1 Fail	Rev:9	Collation of relevant points for the debrief or possible investigation	Ant:1	Identification of appropriate situational cues and information
	Inf:2	Initial positioning of the Incident Commander	Und:4	Appropriate safety culture on the incident ground through safe systems of work, adequate supervision and effective communication
	Comm:7	Appropriate use of communication methods	Und:6	Presence of risks/hazards. Understood risk information and shared with other responding agencies
	Und:9	Capabilities – any additional agencies or specialists needed	Inf:5	Gathering of information from available sources to gain accurate situational awareness and understanding
	Cmd:8	Clear leadership and direction	DM:2	Decisions are based on accurate situational awareness of hazards and the risks present
ICL2 Pass	Inf:1	Collection of initial information using relevant channels	Cmd:5	Control of information flow to the Incident Management team and other stakeholders/public
	Plan:1	Appropriate incident objectives	Rev:4	Review effectiveness of multi-Agency actions
	Inf:4	Identification of appropriate information – critical incident factors	Ant:9	Anticipation of wider incident implications – cover moves, road closures, early joint media strategy
	Cmd:7	Use of assertive, effective and safe command skills at all operational incidents	Comm:7	Effective Communication with local community – warn and inform
	DM:5	Rationalised decision making	Plan:9	Recording of essential information

(continued)

Table 4. Continued

	Strengths		Weaknesses	
ICL2 Fail	Inf:3	Ensuring that a scene survey is carried out at the earliest opportunity (in person or appropriately delegated)	DM:9	Multi-Agency decision-making consideration in line with local protocols
	Inf:6	Confirmation of previous actions	DM:2	Accurate situational awareness of hazards and the risks present in decision-making
	Rev:9	Collation of relevant points for the debrief or possible investigation	Und:6	Presence of risks/hazards: Understanding of risk information shared with other responding agencies
	Inf:1	Collection of initial information using relevant channels	Ant:9	Anticipation of wider incident implications – cover moves, road closures, early joint media strategy
	Cmd:4	Control of the access to the inner cordon using methods proportionate to the size and complexity of the incident	Und:9	Consideration of wider issues – environment/community

part of the operational system under study, some degree of circularity may exist between the behavioural constructs measured and the resulting performance findings.

The dataset may include repeated assessments of individual officers across different operational, training or assessment contexts. As the data were anonymised prior to analysis, repeated measures could not be identified or controlled for statistically, which may introduce some degree of non-independence within the dataset.

In addition, the unequal sample sizes across command levels and the absence of effect size measures also limit the strength of between-group comparisons, particularly for the smaller ICL4 cohort where reduced statistical power may obscure real differences. Formal inter-rater reliability statistics were not available for this study, although the EC framework incorporates operational assessor standardisation, annual revalidation and internal quality assurance processes intended to support consistency across services and assessors.

Finally, while the General Linear Model provides a robust mechanism to test for score differences, it does not account for individual assessor effects or inter-rater reliability, which may affect statistical inference. These limitations do not diminish the value of the findings but should be considered when interpreting the broader applicability of the results.

Discussion

This study aimed to explore variations in performance across the four levels of incident command using structured assessment data gathered through the EC framework. The analysis revealed consistent strengths in situational awareness, particularly in the early stages of information gathering, across all command levels. However, recurring weaknesses were observed in anticipation, risk assessment behaviours, communication and post-incident review. These findings suggest that while certain competencies are well embedded, others may require more deliberate attention in training design.

Performance variations across the command levels were broadly consistent with existing research on the development of decision-making expertise. Lower command levels within the dataset demonstrated greater variability in scores and more pronounced deficiencies in key decision-making behaviours. Previous research in naturalistic decision-making suggests that more experienced practitioners may be better able to filter relevant cues and integrate

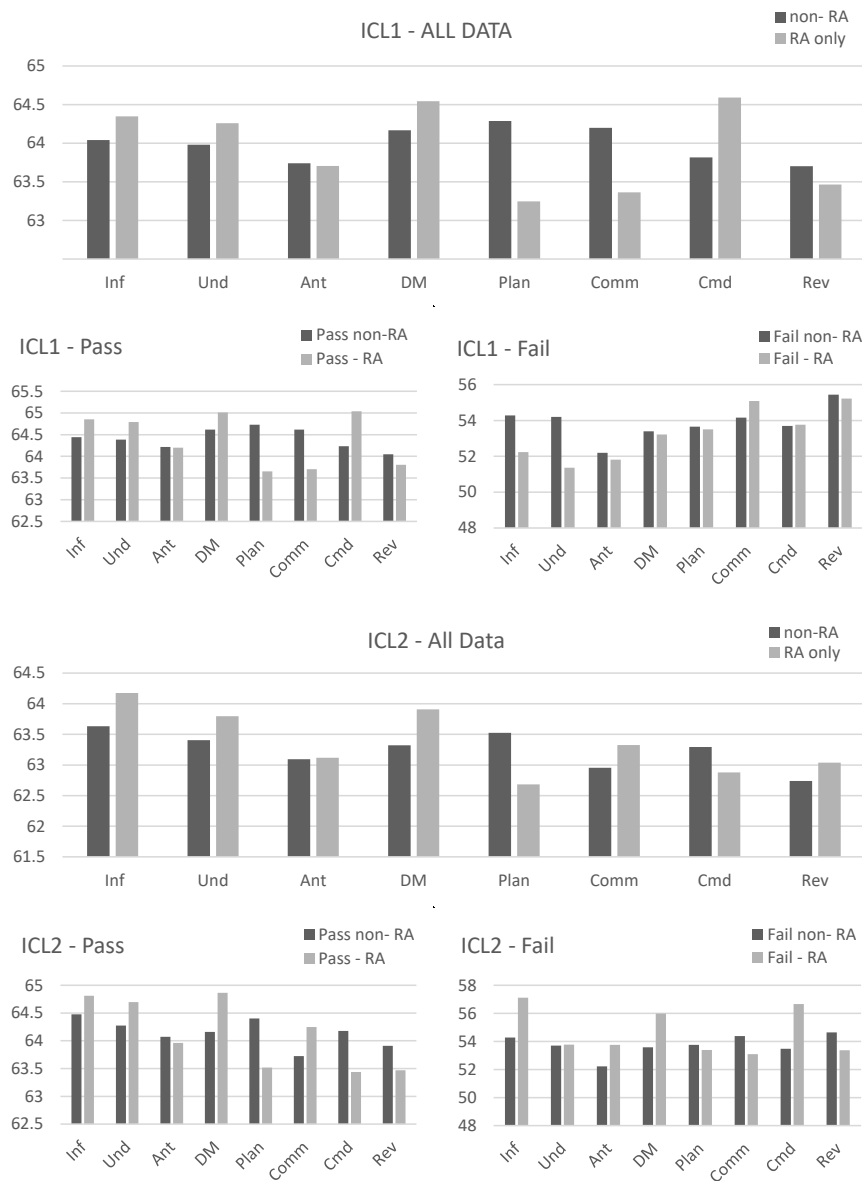


Figure 3. Mean percentage scores across the eight effective command assessment sections risk assessment-dependent (RA) and non-risk assessment (non-RA) criteria for ICL1 and ICL2 commanders across all assessments and pass/fail outcomes. Assessment sections are presented from left to right as Information Gathering (Inf), Understanding (Und), Anticipation (Ant), Decision-Making (DM), Planning (Plan), Communication (Comm), Command (Cmd) and Review (Rev). RA criteria represent behaviours requiring a risk assessment to support operational decisions

information rapidly within dynamic operational environments (Cohen-Hatton *et al.*, 2015; Klein, 1993). In contrast, less experienced practitioners are more likely to rely on structured rule-based approaches or external cognitive aids (Perona *et al.*, 2019). While the present study

did not directly measure cognitive processes or operational experience, the findings may reflect behavioural differences consistent with these established models, reinforcing the importance of structuring development and training strategies appropriately across command levels.

At the higher command levels, particularly ICL4, performance was more consistent, with fewer statistically significant differences across assessment sections. This may reflect a stabilisation of decision-making competence at the strategic level but could also indicate a limitation in the sensitivity of the assessment process for distinguishing higher-level analytical performance. The presence of fewer distinct strengths or weaknesses at ICL4 warrants further investigation, particularly regarding how strategic-level competence is assessed and maintained. Future research could explore whether the limited differentiation observed at ICL4 reflects a true convergence of strategic competence, a limitation in the current assessment framework's ability to capture higher-order decision-making or simply an artefact of fewer assessments at that level.

Some current training strategies may remain general in scope and are not explicitly linked to documented performance trends, which represents a missed opportunity to target known areas of weakness through evidence-informed interventions. The structured data generated by a framework such as EC offer a valuable feedback mechanism, capable of informing both individual development and organisational training priorities.

The findings suggest a shift toward performance-informed training cycles, where assessment data inform future learning to create a more adaptive and responsive approach to command development. This is particularly important in high-risk, time-pressured environments, though implementation may be constrained by resources, operational demands or resistance to change. Aligning training with demonstrated performance reinforces risk-based assurance and continuous professional development, core principles of UK Fire and Rescue Service doctrine (Lamb *et al.*, 2021; Operational Guidance, 2020).

Future research should explore longitudinal trends in assessment performance across services and time periods to assess whether the identified variation persists, changes or respond to new training interventions. It would also be valuable to investigate assessor reliability and calibration across services, particularly for high-inference judgements such as anticipation or command leadership. Additionally, extending this analysis to, for example Civil defence command training, or other agencies within the emergency response system may support improved interoperability and shared training practices across multi-agency environments.

Conclusions

This study analysed assessment data from 43 UK FRSs using the EC framework to identify common areas of strength and weakness across all four incident command levels (ICL1–ICL4). The findings highlight both shared strengths, particularly in initial situational information gathering, and widespread deficiencies in anticipation, risk assessment, communication, review and behaviours relevant to multi-agency interoperability. These gaps were most pronounced within the lower command levels represented in the dataset (Kahneman and Klein, 2009).

The data revealed differences in performance across the command levels represented within the dataset, which are broadly consistent with established research on situational awareness and decision-making under pressure. Existing literature suggests that less experienced incident commanders are more likely to rely on structured rule-based approaches and cognitive aids, while more experienced commanders may demonstrate greater use of intuitive and integrated decision-making processes. This aligns with earlier findings by Launder and Penney (2023). The results support the potential value of differentiated training approaches, where developing commanders may benefit from structured and repetitive learning environments, while more advanced commanders may

require regular reinforcement and scenario-based practice to maintain complex decision-making skills.

The detailed structure of the assessment tool may support earlier identification of individual and organisational risks. This supports a shift toward more targeted and evidence-informed training strategies. Priority areas for development include commander level role clarity and maintenance, decision logging, risk awareness, post-incident review and the practical application of interoperability principles such as JESIP.

Generic training frameworks may meet baseline compliance requirements. However, they are unlikely to drive operational improvement unless tailored to real performance needs. This study highlights the potential value of embedding assessment data into training design. Doing so can help ensure that decision-making and incident command skills are both sustained and developed. Maintaining these competencies may benefit from ongoing practice, high-quality feedback and a learning culture that treats assessment as a driver of professional growth (McLennan *et al.*, 2024; Wiliam, 2011).

Declaration of interest

Dr Katherine Lamb is the founder and Chief Executive Officer of EC, the behavioural marking and assessment framework analysed within this study and used operationally throughout participating UK FRS. Dr Ian Greatbatch and Dr Cecilia Hammar Wijkmark have no financial or ownership interest in EC and contributed to the study in independent academic capacities. The authors acknowledge the potential limitations associated with analysing data derived from an operational assessment framework connected to one of the authors and have sought to address these through transparent reporting and critical discussion of methodological limitations within the manuscript.

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Further reading

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