NORDIC JOURNAL
of Science and Technology Studies

BEYOND ERROR DETECTION

The Performative Role of Checklists in Shaping Forensic Practices

by Nina Sunde

This study explores the performative role of checklists in enhancing the quality of digital forensic analysis and reporting within the criminal justice system. By drawing on theoretical frameworks such as Science and Technology Studies (STS) and Actor-Network Theory, the research examines how checklists extend beyond their procedural use and actively shape forensic practices. The study utilises the experiences of digital forensic practitioners during peer reviews within the Quality Control Project (Sunde & Dahl, 2023), revealing how checklists enact professional, ethical, and legal standards and thus shape forensic reports. The findings demonstrate that checklists do not merely guide actions, but function as dynamic actants, co-producing forensic outcomes through influencing both the content and quality of forensic reporting. Additionally, the research advocates for the public availability of checklists to enhance transparency, accountability, and trust in the credibility of digital forensic evidence. This study contributes to a deeper understanding of the transformative capacity (Asdal, 2015) of checklists in forensic practices and invites further investigation into the sociomaterial impact of comparable devices in other fields.

Keywords: Digital Forensics, Checklists, Sociomateriality,

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1. Introduction

The digitalisation of society and technological development have significantly influenced the investigation of crimes, and a report by the National Police Chief's Council (2020) suggested that 90 per cent of cases in England and Wales contained a digital element. The availability of digital evidence has not only created new opportunities for criminal investigations, but also introduced challenges such as backlogs, complexity, and novel technology (Cervantes Mori et al., 2021; Reedy, 2020, 2023; I. M. Sunde, 2021; Vince, 2016). In Norway, advanced digital investigations are conducted by specialised digital forensics practitioners (DFP) working in police district units or at the national level. These practitioners possess high expertise and utilise advanced technology to acquire and analyse data using methodologies universally recognised as forensically sound within the discipline. Typically, they collect data from mobile phones, personal computers, and online spaces, processing it with custom-made software.

The analysis is typically a shared task, where general investigators review the data for relevant evidential findings, and the DFPs perform a deeper technical analysis of the findings or search for additional relevant traces through more technically advanced methods (Sunde & Dahl, 2023). DFPs at national level assist the local DFPs with more advanced tasks for acquisition and analysis of data when they lack the skills or tools to adequately perform the tasks. Digital evidence holds considerable value due to its ability to illuminate critical investigative aspects such as intent and motive and is becoming increasingly influential in the criminal investigators' sensemaking due to the credibility they assign it (Innes et al., 2021:714, 718). However, the potential for flaws or misleading presentations of digital evidence exists, often attributed to suboptimal practices or mistakes (Cohen, 2013:30-32, 47-48; Stoykova et al., 2022). Therefore, the implementation of robust procedures to detect and rectify flawed digital evidence is imperative to prevent miscarriages of justice.

Despite the high-tech nature of digital forensics, documents and texts remain crucial in practice. When digital evidence is sought in a criminal case by seizing mobile phones, computers, or social media content, the evidence is not the digital carrier itself but within the information it contains. The evidential findings within this information are presented in reports as text, images, screenshots, and tables, alongside a thorough description of the procedures, tools, and methods used. The report plays a pivotal role in presenting relevant evidence to investigators or the court and in underpinning evidence reliability through the detailed presentation of these procedures and methods. Two studies exploring the quality of digital forensic reports revealed significant issues, such as one-sidedness and vague, incoherent formulations regarding evidential value (N. Sunde, 2021) or insufficient chain of custody documentation, weakening evidence reliability (Stoykova et al., 2022).

Research by Jahren (2020) and Bauge (2023) indicates that, contrary to best practices, quality control during the digital forensic process and at the reporting stage was neither systematic nor mandatory among Norwegian DFPs. Instead, it was sporadic, initiated at the discretion of DFPs, and primarily focused on language, grammar, and spelling errors rather than the presentation of findings. Although checklists are frequently used in other branches of police work, for example, patrolling, they were not commonly utilised in digital forensics casework at the time of the study.

The Quality Control Project was established in 2022 in response to research findings on report deficiencies and the lack of systematic quality control (Sunde & Dahl, 2023). The project aimed to explore a quality control approach based on the Peer Review Hierarchy for Digital Forensics (the 'Hierarchy'), as proposed by Horsman and Sunde (2020). The Hierarchy is an integral part of a broader quality assurance framework, the Phase-oriented Advice and Review Structure (PARS), detailed by Sunde and Horsman (2021). Tailored specifically for DFPs, the Hierarchy facilitates the quality control process for advanced technical analyses and reports. Comprising seven levels, the Hierarchy operates on a tiered system, progressively advancing in complexity and depth of assessment. Checklists are central in the PARS framework, supporting the peer reviewers during the review process and Reijers et al. (2017) describe checklists as follows "A checklist is typically a list of action items or criteria arranged in a systematic manner, allowing the user to record the presence/absence of the individual items listed to ensure that all are considered or completed" (p. 5774).

The inception of the Quality Control Project involved translating the PARS framework, the Hierarchy, and the associated checklist for digital forensic reporting (the 'DFR Checklist') into Norwegian (Sunde & Dahl, 2023:16). To enhance clarity, a comprehensive guideline (the 'Guideline') explaining each DFR Checklist item was also developed. Subsequently, workshops were organised, inviting all digital forensic units in the Norwegian police (Sunde & Dahl, 2023:17-21). The workshops provided training in the PARS framework and its underlying rationale. Following the workshops, the digital forensic units were invited to participate in a six-month trial phase of conducting quality control according to Hierarchy Level 4 (Conceptual review). Six (of twelve) local units and one (of three) national unit agreed to participate. After the trial, digital forensic leaders (n=7) and DFPs (n=13) from the participating units were interviewed to gather insights into their experiences. Anonymised checklists used during peer review were also collected. These interviews and checklists form the empirical foundation of this paper. A detailed account of the project and its preliminary findings have been published in a project report (Sunde & Dahl, 2023).

Perspectives from STS and Actor-Network Theory, outlined in Section 2, are employed to analyse the empirical data. In particular, the concepts of sociomateriality (Barad, 2007), sociomaterial practices (Orlikowski, 2007) combined with performative texts

and genres (Akrich, 1992; Aasdal, 2015, Aasdal & Reinertsen, 2022), are applied to examine the agency of checklists in triggering both intended and unintended actions and in the emergence of matters.

By studying the development and implementation of the DFR Checklist from a sociomaterial perspective, this study contributes novel insights into performative checklists, adding to research on performative documents, texts, and genres, and provides empirical insights into the conditions necessary for their effective functioning. The context of police investigations and digital forensics is also novel, as is the researchers' active role in implementing the checklist-based peer review.

2. Theoretical concepts

Central to this study is the DFR Checklist, a document designed to describe work routines and guide decisions within those routines (Reijers et al., 2017). Analytically, the DFR Checklist is interpreted through the lens of Actor-Network Theory, which attributes agency to both human actors and non-human actants (Latour and Woolgar, 1979/1986). The study also draws on the concept of sociomateriality, which acknowledges the inseparability of matter and meaning (Barad, 2007: 30) and emphasises that materiality is integral to organisational life (Orlikowski, 2007:1436). Orlikowski states that "there is no social that is not also material, and no material that is not also social" (Orlikowski, 2007:1437), and Cooren (2020) reminds us that materiality or matter should not be reduced to something tangible or visible, but rather viewed as a property of all organisational phenomena, where the study of materialisation - the process of 'becoming a matter' - is at the core. The performativity of specific sociomaterial devices, such as documents and texts, has been explored in foundational works like Cooren (2004) and Orlikowski (2007), and with more recent contributions such as Asdal (2015), Asdal and Reinertsen (2022), Douglas-Jones (2019), Druglitrø (2022), and Weber (2022).

According to Reijers et al. (2017:3), a checklist should ideally provide a purposeful and relevant representation of a particular real-world domain, meaning that the checklist's objectives and tasks must be carefully designed into it. Akrich (1992:208) describes the relationship between the designer and user as mediated by a set of instructions, behaviours, and expectations that are inscribed into the technology as a "script" or "scenario". These scripts dictate how users are expected to interact with the technology, thereby shaping social behaviours and interactions. The DFR Checklist can thus be understood as a document that materialises knowledge from the digital forensics field and seeks to offer guidance on best practices from moral, legal, and digital forensic science perspectives in documentation and reporting. In line with Akrich's (1992:209) notion of "de-scription", the success of this inscription process is best explored through the lived experiences of those using the technology, with any misalignments providing valuable insights into the agency of checklists.

Reijers et al. (2017) found that checklists have a shared purpose and recognisable properties, supporting their classification as a distinct document genre. Miller's (1984) seminal essay on genre as social action defines rhetorical genre as "based in rhetorical practice, in the conventions of discourse that a society establishes as ways of 'acting together'" (Miller, 1984:163). In a 2015 follow-up, Miller emphasised that genre is a culturally significant type of social action that creates meaning. It mediates between private intentions and socially objectified needs (exigence), with cultural categories playing a key role in constituting society (Miller, 2015:57).

This study involves two genres: digital forensic reports and checklists. However, as the study analysed only the completed checklists and descriptions of their usage, rather than the reports themselves, the focus will be on the checklist genre. Although Reijers et al. (2017:5775) adopt an instrumental perspective, viewing the checklist as an informational artefact, their study also opens avenues for understanding the genre through a sociomaterial lens. Recent research, such as Jahn's (2018) exploration of the performative relationship between firefighters and safety rules following a new policy doctrine, contributes to understanding the performative genre and generic texts. The checklist genre, specifically, has been examined from a performative genre perspective by Bazerman (1997), and also remains central in a more recent study by Druglitrø (2022).

Affordances are employed as a theoretical perspective when exploring the DFR Checklist's social role. According to Gibson (1977:127), an affordance is what a thing offers, provides, or furnishes, either for good or ill. Thus, when exploring affordances, both possibilities and constraints should be investigated. Affordances are neither objective nor subjective properties; they are both (Gibson, 1977:129). They may be thought of as various 'abilities' (Seberger, 2018:11), such as 'read-ability' or 'note-ability' when using a checklist for peer review. Although the designer may have inscribed a specific use or interpretation, a thing such as a checklist often produces something unexpected, such as an application or interpretation other than intended, and consequently, new problems and lines of inquiry emerge (Knuuttila, 2005:1269).

The properties of checklists and checklist items identified by Reijers et al. (2017) will be utilised and further developed through the application of a sociomaterial lens to the analysis. Central to this analysis are affordances, combined with the perspective of texts as speech acts (Searle, 1979; Cooren, 2004). Concepts from visual rhetoric (Courtis, 2004) are also applied to gain a more comprehensive understanding of how aspects such as colour, font, and arrangement of elements constitute the agency of the checklist

genre, that is – the performative aspects of the DFR Checklist. Through this lens, the study investigates not only how checklists trigger or influence actions, but also their role in creating, shaping, and resolving matters.

3. Method

The study was conducted in conjunction with the Quality Control Project, a research and development project led by Olav Dahl and the author, directed at DFPs and leaders in Norway. While briefly outlined in the introduction, a more detailed description is provided here. In September 2022, an invitation was extended to all DFPs and leaders in national and local digital forensic units within the police to participate in workshops focused on quality control of digital forensic reports through checklist-based peer review. During the first workshop, attendees were presented with the Hierarchy (Horsman & Sunde, 2020; Sunde & Horsman, 2021), initially proposed as a flexible framework for systematic peer review of digital forensic findings and reported results (see Figure 1).

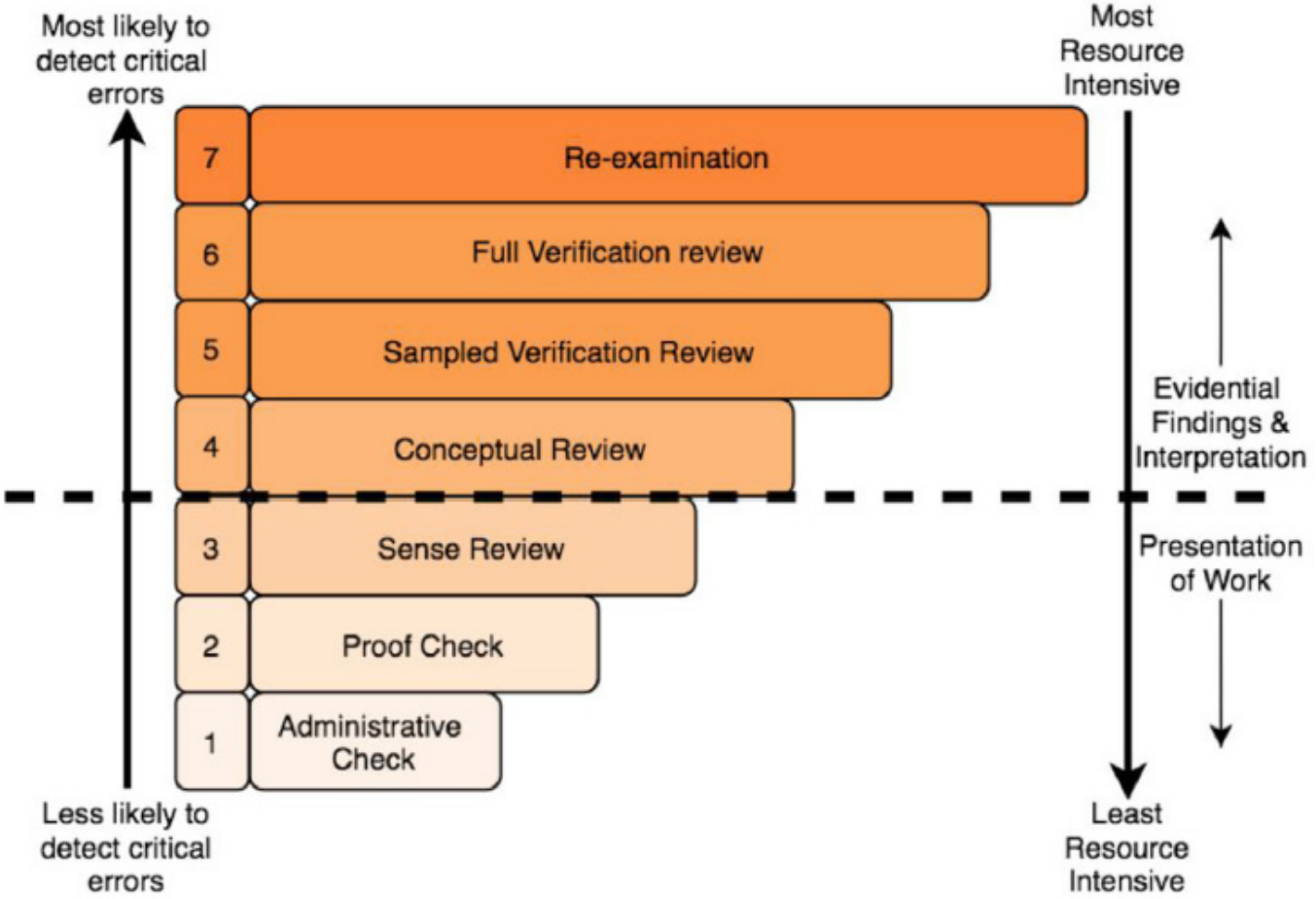

Figure 1: The Peer Review Hierarchy for Digital Forensics, as presented in Sunde & Horsman, 2021.

The Hierarchy is supplemented by the DFR Checklist designed to support the review process. Participants were also provided with a Norwegian version of the DFR Checklist and the Guideline explaining the purpose of each DFR Checklist item (see Figure 2).

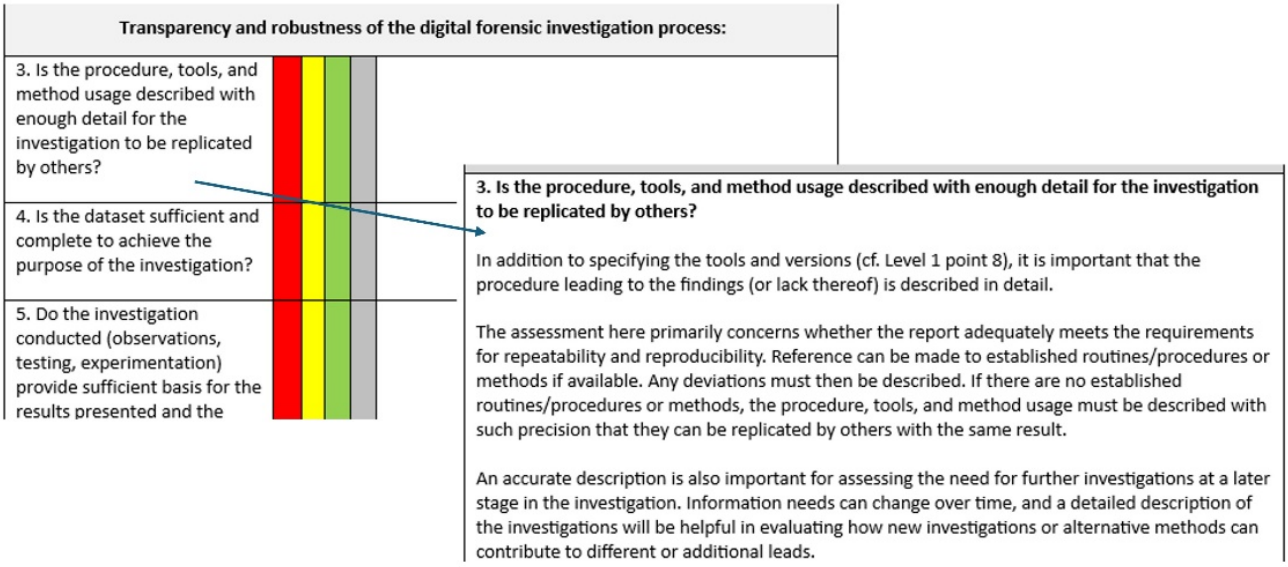

Figure 2: A DFR Checklist item and its elaboration in the Guideline (author's translation).

The Hierarchy is structured across seven levels, starting with an administrative check, followed by a spelling and grammar check, a sense review, and a conceptual review of reports. It progressively advances to include the verification of selected or all findings. The highest level involves a new comprehensive, independent analysis.

At the second workshop, the participants were invited to evaluate the DFR Checklist and provide feedback. This collaborative effort aimed to address potential challenges, such as unfamiliar concepts, ambiguities, or discrepancies from established digital forensic practices. Some minor adjustments were made based on matters raised by the practitioners. For example, a checklist item on hypotheses was revised to reflect that practitioners typically receive mandates or questions rather than predefined hypotheses. Consequently, the DFR Checklist item was modified from 'Are the overarching hypotheses forming the basis of the analysis described?' to 'If the analysis is hypothesis-driven, are the overarching (at the offence level) hypotheses forming the basis of the analysis described?' (author's translation). Redundant items were removed, and some new ones were added to enhance the DFR Checklist's comprehensiveness. After this process, all digital forensic units involved in the workshops were invited to participate in the trial phase of the Quality Control Project, which was designed to test the DFR Checklist in actual digital forensic casework. This initiative aimed to provide participants with hands-on experience in the roles of peer reviewer and reviewee, fostering a deeper understanding of the DFR Checklist dynamics. Additionally, digital forensic leaderswere given the opportunity to enhance their proficiency in coordinating and facilitating these activities. The application of the DFR Checklist and associated Guideline was considered an important step to examine and *de-scribe* (Akrich, 1992) whether its social motive of enhancing the quality of digital forensic analysis and reporting within the criminal justice system was realised, and to identify any misalignments.

After the workshops, seven digital forensic units, representing national (n=1) and local levels (n=6), agreed to participate in a trial aimed to implement the DFR Checklist for structured peer review of digital forensic reports. Participants were instructed to focus their peer reviews on Conceptual review, corresponding to Level 4 in the Hierarchy, which incorporates Levels 1-3. The trial lasted for six months, during which a total of 28 digital forensic reports underwent review. DFPs serving as peer reviewers (n=11) reviewed between one and five reports each during this period (Sunde & Dahl, 2023:24). Of these, five had acted as both reviewers and reviewees, receiving feedback on their own reports, while one had exclusively acted as a reviewee.

After the trial phase, semi-structured interviews were conducted with the digital forensic unit leaders (n=7) and DFPs (n=13) participating in the trial, with informed consent. The interviews, lasting 50 to 70 minutes, covered their experiences with quality control before and during the trial phase, with a particular focus on how they utilised the DFR Checklist and Guideline, their familiarity with mistakes and near-mistakes in cases involving digital traces from their own districts or special bodies (Norwegian: særorganer), and their attitudes towards digital evidence, quality, and legal security. The interviews were transcribed and analysed using a reflexive thematic analysis approach as outlined by Braun and Clarke (2006; 2019). To explore the different interpretations, two interviews were independently coded by two researchers, followed by a review and discussion to assess whether independent coding enriched the interpretations and insights from the data, in line with the concept of

'member reflections' (Tracey, 2010). The interviews were first coded with thick descriptions, which were then condensed into themes. The themes, which included checklist use, feedback, prior peer review experience, error detection, practice modification, identified development needs, items of tension, and time/resources were merged into broader themes such as document use, becoming of matters, and misalignments, which are also reflected in the structure of the analysis (Section 4). Quotes from DFPs are annotated as (P), and quotes from leaders as (L).

3.1 Reflexivity

The research was driven by the author's strong commitment to enhancing the quality of digital forensic reporting practices. The author was directly involved in translating and adapting the DFR Checklist and Guideline to the Norwegian language and context, as well as playing a central role in the workshops and interviews. It was therefore important to carefully consider the potential tendency to emphasise positive experiences and outcomes while underrepresenting constraints and unintended consequences during the analysis of the trial phase of the Quality Control Project. To address this, Akrich's recommendation to focus on misalignment and breakdowns proved invaluable. This approach facilitated a more balanced understanding of the Checklist's social role by critically examining both its potential benefits and limitations.

4. Analysis

The first part of the analysis focuses on the DFR Checklist as a document, examining its properties in Section 4.1 and its embedded moral, legal, and professional motives in Section 4.2. The analysis then shifts perspective from the checklist itself to the sociomaterial practice, exploring interviewees experiences with how the DFR Checklist functioned as a tool for raising matters in Section 4.3. This is followed by an analysis of misalignments between the checklist's intended purposes and actual outcomes, along with their consequences in Section 4.4. The final part of the analysis in Section 4.5 adopts a broader perspective, discussing the role of the DFR Checklist within the wider justice system. Finally, a conclusion is offered.

4.1 From informational artefact to performative genre

Reijers et al. (2017:5775) identify common properties of checklists, including representation, prescriptiveness, scope, abstraction, and audience, along with type and behavioural relation as common properties of checklist items. These properties form the basis of the first part of the analysis, assessing whether the DFR Checklist characteristics align with Reijers et al.'s findings.

TABLE 1

Scope	Property	Selected values
Entire checklist	Representation	Paper, poster, mechanical, electronic, vocal
	Prescriptiveness	Do-list, call-do response
	Scope	Systems engineering, human performance
	Abstraction	Normal, abnormal, emergency
	Audience	Individual, group
Checklist items	Type	Check, score, multiple choice, branched, interrogative
	Behavioral relation	Arbitrary, strongly sequential, weakly sequential, parallel

Table 1: Checklist properties identified by Reijers et al. (2017:5775).

As noted, the Hierarchy included the DFR Checklist covering each Hierarchy level, with between three and eighteen items to assess. The DFR Checklist was accompanied by the Guideline explaining the purpose of each item and providing examples of how information should be presented in the report. The DFR Checklist items addressed matters such as the investigative process, the recommended format, structure and naming conventions, the presentation of findings, and any insufficient, erroneous, or potentially misleading information in the report. The primary objective of the DFR Checklist was to assist the peer reviewer in conducting effective quality control, identifying insufficient documentation, flaws, or misleading information, and providing an opportunity to correct these issues before the report was forwarded to the investigation team and potentially influenced the subsequent investigative decision-making (Sunde & Dahl, 2023).

In light of the property typology identified by Reijers et al. (2017) (Table 1), the DFR Checklist was *represented* as a digital Word document. This allowed multiple usage options for the DFPs: it could be printed completed in writing, or kept on the computer, and filled out digitally. The interviews revealed that this flexibility enabled the reviewers to adopt it according to their personal preferences for conducting reviews.

The DFR Checklist's prescribed use followed a *do-verify* approach, where actions were first done and then checked, as opposed to a *call-do* approach, where actions are first called and then performed (Reijers et al, 2017:5776). The DFR Checklist items prompted the reviewer to assess the report by asking questions, as shown in Figure 2, a speech act classified as directives (Cooren, 2004:384). Examples of DFR Checklist items were:

- Is the dataset adequate and complete to achieve the purpose of the analysis?
- Does the analysis conducted (e.g., observations, testing, experimentation) provide a sufficient basis for the results presented and the conclusions drawn from them?
- Are any reservations, uncertainties, or limitations related to the methods and/or tools described?

For the complete list of items in the DFR Checklist at Hierarchy level 4 (Conceptual review), see Appendix.

A checklist's *scope* can be categorised into two approaches: a comprehensive systems engineering approach, resulting in a detailed list with a high number of items, versus a shorter, less-detailed human performance approach (Reijers et al, 2017). This property reflects the values and expectations of a checklist's power – its inscribed *imaginaries* (Kaufmann, 2023: 35, further examined in Section 4.3.1). The systems engineering approach assumes that human error can be avoided by checking all aspects of the task, while the human-centric approach acknowledges that human error cannot be entirely eliminated and that an overly extensive list may lead to improper use or rejection of a checklist altogether. The DFR Checklist leaned towards the human-centric approach, lacking the detail to cover all reporting aspects and inviting the peer reviewer to use professional discretion in evaluating the gravity of issues.

The *abstraction* property concerns whether real-world phenomena are explicitly addressed through a checklist, with Reijers et al. (2017) identifying normal, non-normal, or emergency situations as key values. The DFR Checklist aligns with the non-normal abstraction value, as it was designed for all reports resulting from a digital forensic analysis. Feedback from workshops and interviews indicated that DFPs produce very few analysis reports, with many analysis tasks, including reporting, now largely handled by general investigators. This combination of a task that is both complex and infrequent increases the risk of mistakes, thereby highlighting the DFR Checklist's utility as a safety net that aids memory and ensures that important aspects are included in the report to achieve a sufficient level of quality.

Concerning the *audience* property, the DFR Checklist was designed for individual use rather than group use, as each item includes one scoring box and one comment field. However, the DFR Checklist retains the inserted text and scoring for the reviewer when providing feedback and for the reviewee when implementing suggested changes in the report.

Reijers et al. (2017) identified type and behavioural relation as properties specific to checklist items. They found that a checklist could comprise multiple item *types*. The DFR Checklist was designed as a combined *scoring* and *interrogative* checklist, prompting a series of actions. First, the peer reviewer is invited to evaluate and score the matter reflected in the item. According to Reijers et al. (2017:5777), this item type is commonly used for evaluation, which aligns with the purpose of the DFR checklist. This property prompts the user to assess certain aspects of the report and classify them by severity.

The DFR Checklist used a colour-based classification system with criteria explained in text. *Red* indicated critical error, *yellow* indicated a less severe error or an issue needing improvement, and *green* indicated sufficient quality. The *grey* option signified an issue that was not evaluated or deemed irrelevant (Figure 3). The DFR Checklist introduction provided guidance on how to use this colour-based annotation system.

	The report contains critical errors or misleading information that must be corrected.
	The report contains ambiguities, minor errors, or deviations from applicable templates, procedures, principles, and methods that should be corrected.
	The report is assessed to maintain a proper and sufficient quality (level 5-6: the findings are verified).
	Not evaluated or not applicable.

Figure 3 Excerpt from the DFR Checklist providing guidance to the colour coding (author's translation, Sunde & Dahl, 2023, Appendix 1:1).

Scoring based on categories of gravity not only raises issues but also conveys *exigence* (Miller, 1984:158). The score classifies the severity of the error and the urgency for correction. Colour carries stereotypical associations and is used for persuasion: red signifies danger, yellow caution, and green clearance (Courtis, 2004:269). The colours red, yellow, and green were deliberately chosen due to the association with traffic lights, a familiar system, as confirmed by interviewees who frequently referenced this analogy.

Each DFR Checklist item included a field for reviewer comments, corresponding to the *interrogative* item type, which is used for offering feedback (Reijer, 2017:5777). This field allowed reviewers to justify their scoring and elaborate on what needs to be done, serving as an extension of the reviewer's memory. When forwarded to the reviewee, it ensures that the matters remain 'lively' until resolved through adjusted reporting. An additional interrogative item at the end of the checklist prompted reviewers to summarise the report's strengths and weaknesses, providing overall feedback to the reviewee.

The final checklist item property is *behavioural relation*, which refers to an affordance that dictates the order of checklist use. The item properties in the DFR Checklist were strongly sequential by level, meaning that a Level 4 Conceptual review also includes Levels 1-3. However, within each level, items could be assessed in any order, as long as all were eventually assessed. Interviews and discussions during the workshops indicated a low level of standardisation in the digital forensic reports due to the lack of a common template, so the checklist was not ordered according to an expected report structure (see also Section 4.4.2). Allowing flexible item use was thus a crucial affordance for the checklist's applicability in the

current non-standardised state of digital forensic work. For example, some reports placed conclusions at the beginning, while others placed them near the end, making a strictly sequential checklist impractical.

In summary, the DFR Checklist aligns with the genre-specific properties identified by Reijers et al. (2017). From the performative genre perspective, the DFR Checklist is more than just an instrument or information artefact; it is a document with agency that influences the actions and behaviour of the peer reviewers. The DFR Checklist affords certain behaviours and restricts others by directing questions to reviewers, inviting them to score and justify both good and inadequate reporting practices, and summarising the overall evaluation for the reviewee. It retains the evaluation for both the reviewer and reviewee, supporting the delivery of precise feedback while ensuring all issues are addressed in the report. Designed as a matter-raising device, the DFR Checklist is intended to prompt evaluative activities by peer reviewers and to play a crucial role in co-producing the review process. Its aim is to foster more coherent reports and minimise errors and miscommunications.

4.2 Governing moral, legal, and professional matters

The DFR Checklist's items not only reflect central professional principles in digital forensics, but also incorporate moral values, legal requirements, and key human rights principles. Bazerman's (1997) work illustrates how checklists function not only as procedural tools but also as frameworks for enforcing accountability, communication, and compliance. He demonstrates this through an analysis of airline pilots' checklists:

> The airline pilot's checklist before takeoff structures talk with the copilot, navigator, and ground crew; enacts directives from the legal and regulating bodies overseeing flight; establishes a record of actions taken by the flight crew; and provides a task oriented frame for interpreting other recordings of conversation and instrument readings. (Bazerman 1997:296)

Similarly, in digital forensics, the DFR Checklist structures tasks and guides adherence to ethical and legal standards. Akrich (1992:816) explains that designers' choices in technology development involve decisions about what is delegated to a machine (or checklist, in this case) versus human judgement. This delegation, termed the "script," shapes not only user actions but also moral behaviour.

The Checklist was designed to safeguard compliance with ethical and legal frameworks as well as widely accepted digital forensic methodologies, guiding reviewers to identify potential biases and knowledge gaps. While some issues are classified through set criteria, others require the reviewer's discretion, combining both technical and ethical judgment.

For example, the universal human right to the presumption of innocence is operationalised in DFR Checklist item 4.13: "If the analysis is hypothesis-driven, are the results described in light of at least two competing hypotheses, including one that supports innocence/non-criminal activity?" (author's translation, Sunde & Dahl, 2023, Appendix 1:6). This item *directs* (Cooren, 2004:384) the reviewer to ensure the report respects this principle by providing clear and actionable criteria. Similarly, ethical considerations are addressed in item 4.16: "Has the investigation and report writing been conducted in line with relevant criminal procedural rules and ethical guidelines?" (author's translation, Sunde & Dahl, 2023, Appendix 1:7). This underscores the reviewer's responsibility to verify compliance. The DFR Checklist also enforces digital forensic methodology, as exemplified in item 4.3: "Is the procedure, tools, and method application described in sufficient detail to enable replication of the analysis by others?" (author's translation, Sunde & Dahl, 2023, Appendix 1:5). This reflects the principle of repeatability (e.g. International Organization for Standardization, 2015). Items such as these underscore the need for co-production between the DFR Checklist and the reviewer's domain-specific expertise. The DFR Checklist can serve as a prompt, but it cannot encapsulate all necessary knowledge.

Furthermore, the DFR Checklist emphasises comprehensive descriptions, transparency in procedures and practitioners' expertise, and the assurance provided by a second opinion from a qualified reviewer. These values align with what Koehler et al. (2023:1) describe as an evolution within forensic science, from trust in the examiner to trust in the scientific method, where peer scrutiny and review is a central part.

4.3 The checklist as a matter raiser

By examining the checklist properties identified by Reijers et al. (2017), alongside the concepts of affordances, speech acts, and visual rhetoric, we gain insight into what the DFR Checklist can do and the behaviours, reflections and interactions it can trigger. Further analysis aims to understand the role of the DFR Checklist in the emergence of issues beyond their formal properties, or, as Asdal and Reinertsen (2022:152) put it, "how they matter for practice – and in practice".

4.3.1 Steering the evaluation focus

As Kaufmann (2023:35) explains, "imaginaries refer to explicit or implicit preconceptions and expectations about matter." This concept applies directly to the DFR Checklist's role in digital forensic reports, where it steers their evaluation focus towards specific issues. For example, a recent study demonstrated that checklists guide the peer reviewers of child interviewers' performance by structuring their observations and shaping the feedback they provide (Brubacher et al., 2024:10, 13).

The DFR Checklist similarly directs the reviewer's analysis by prompting questions, scoring, and comments. By doing so, it ensures a thorough assessment of present report content and highlights any absent but relevant information. As a practitioner noted, assessing absent but relevant information had not previously been common practice:

> In terms of feedback as we practice it, we typically receive the report as a Word document, and then we go through and insert comments on the issues that are in the report. Issues that are not there, such as a bit more specificity about hypotheses, or one's own knowledge about the case, or expertise - if it's not there, we haven't had a tradition of - hey, shouldn't there have been a point here? (P3)

Without the structure provided by a checklist, and as supported by cognitive psychology's *feature positive effect* (Sainsbury, 1971), reviewers may focus on present information to the detriment of noting crucial omissions. A practitioner illustrated this issue:

> For example - this relates to the mandate, purpose, and mission. Yes, people usually write the purpose, but the mandate should perhaps have been much clearer and should have been brought forward. I've noticed myself - can you just look at this computer, and then the mandate isn't clear, and you end up doing... and it just becomes a mess. So, the mandate is important to be clear, and maybe it's not something that has been used so much generally in the places I have worked. So, throughout the process, I have highlighted many issues that I myself have not thought about, but which I see are extremely important, that should be included. (P1)

This aligns with findings from Jahren (2021) and Bauge (2023), which indicate that, before the Quality Control Project, peer review was primarily limited to grammar and spelling corrections. The interviews in this study reflect a similar trend, with a practitioner noting: "It's quite a standard read-through, with abbreviations, grammatical errors, and phrasing. So, I think it's very good. And it's something we already do" (P7).

The DFR Checklist's structured criteria enabled reviewers to evaluate essential aspects beyond language issues. Participants noted that this shift allowed them to assess more substantive elements, such as methodology, tools, and inferential validity. Yet, participants also noted that this expansion introduced social challenges, especially when critiquing colleagues' expertise or judgement, as illustrated by a practitioner:

> I think I would have had a knot in my stomach. Also, first of all, I would have thought, is it my technical competence that judges this as wrong or is it actually the other person. Because then it becomes, I don't know, it would have been a bit scary, I think. (P6)

The interviews showed that the DFR Checklist and Guideline provided explicit criteria that reviewers could use to justify their assessments, which alleviated the social challenge and discomfort of giving critical feedback. It also legitimised evaluations by prompting questions that might otherwise be avoided, enabling more robust feedback on substantive aspects of the report. The study suggests that checklists may help reviewers overcome social boundaries, legitimising the evaluation and feedback.

4.3.2 Classification of error

The study showed that the DFR Checklist played a crucial role in triggering the classification of deficiencies and flaws in reports. According to Bowker and Star's (1999) framework, classification systems like the DFR Checklist are designed to organise knowledge and influence how information is interpreted within specific domains, reflecting the power dynamics and cultural norms of the institutions that create them. During the trial phase, interviews revealed a pattern: while 'green' ratings were common, no reports avoided scoring in the 'red' or 'yellow' categories. Most issues fell within the 'yellow' category, highlighting areas for improvement, such as unclear distinctions between evidential findings and their interpretations or insufficient detail in mandate descriptions. A practitioner explained the interpretation of this grading distinction:

> Green means that no changes are needed, and it can be done the same way in future reports. Yellow, however, is somewhat in-between, it indicates something I would like to see changed or that isn't explained clearly enough. Ideally, I would want it improved in future reports, or, if this report isn't yet final, I would recommend changing that part by adding more information, removing something unnecessary, or clarifying points that aren't well explained. (P8)

In contrast, 'red' scores identified severe issues, including incorrect conclusions, missing information about the origin of findings within the dataset, and lack of verification of dataset authenticity. When critical errors like these were identified and annotated in the checklist, the reviewee was required to take corrective actions before finalising the report, as described by a practitioner:

> You can mark it in yellow and still let it pass. [...]. My impression was that if something is marked in yellow, you can, if you don't have the chance to improve it or can't investigate further, consider yellow as perhaps good enough, whereas anything marked in red needs to be addressed and changed to green regardless. (P4)

Both reviewers and reviewees emphasised that resolving critical errors is imperative, which underscores the value of a classification system aiding in identifying such errors. However, while most flaws were manageable on a case-by-case basis, systemic-level issues, such as methodological errors or software defects, required broader action. These issues extend beyond individual report corrections, necessitating systemic-level corrective actions to prevent further propagation. The interviews indicated that software errors were common, and a practitioner highlighted this challenge:

> Yes, the software can have errors. [Anonymised software], particularly in relation to phone locations, decodes and presents a lot of location data incorrectly because an iPhone retrieves location data from areas the phone hasn't actually been in. These locations show up in the software, and some investigators rely on this data, which leads to completely inaccurate results. (P1)

When such flaws were discovered, practitioners typically alerted all DFPs, as described by a practitioner: "We have channels on [Anonymised] and [Anonymised], which are direct and nationwide" (P5). This underscores how the DFR Checklist not only brings attention to individual report deficiencies but also highlights issues with implications for the whole digital forensic community in the Norwegian police.

In summary, the study shows how the DFR Checklist, when applied in digital forensics, raises key issues beyond procedural guidance, shaping evaluative practices by drawing attention to both available and missing information. By structuring the review process, the DFR Checklist helps identify and address significant methodological, legal, and ethical concerns, thereby ensuring higher standards in forensic reporting. It serves not only as a practical tool but also as a mechanism for enforcing professional and legal norms.

4.4 Identifying misalignments

Following Akrich's (1992:207) advice, the identification of disagreement, negotiation, and the potential for breakdown offered insights into the Checklist's performativity. The further analysis focuses on instances where checklist usage diverged from its intended purpose.

4.4.1 Mediator of transparency

The interviews reinforced findings from Jahren (2021) and Bauge (2023), indicating that digital forensic examinations are largely conducted by individual examiners without a standardised procedure guiding technical analysis or reporting. This autonomy results in reports that represent a curated version of events as perceived and mediated by the DFP, incorporating their specific terminology and preferred level of detail (N. Sunde, 2022). Although DFPs are expected, due to professional principles, to document their investigative practices transparently, research shows these descriptions are often inadequate (N. Sunde, 2021; Stoykova et al., 2022).

Without a standard, *transparency* in reporting becomes a matter of negotiation during peer review, and the interviews revealed divergent attitudes towards this matter. Some practitioners limited report detail, particularly regarding tools, methods, and qualifications, due to concerns about report length and the risk of creating opportunities for 'noise' by defence attorneys in court. Others valued thorough documentation, arguing that detailed descriptions are necessary for effective scrutiny and to demonstrate their expertise. The following account illustrates transparency practices in negotiation at one unit:

> What we found was that I was generally bad at documenting the tools I had used, how to document version numbers, and how I presented it. And it goes back to [...], you shouldn't just present tables and results. This was illuminated to us through the checklist, that there were insufficient descriptions that made it unclear what I had done. At level 4 item 3, are the procedures for tools and method usage described? I had described a little, but definitely not enough for it to be understandable or reproducible. So, we talked a bit about how we should present it, how much, so we start discussing - yes, is it necessary in this report, and then we naturally concluded that yes, it is necessary in any report because you never know when problems may arise later. If there's a tool that has an issue in a specific version, you need to know which one it is regardless of how big and heavy the report is or if it's a small and light one. (P4)

Through reaching a shared understanding, practices can align, and the DFR Checklist becomes what Akrich (1992:221) refers to as "instruments of knowledge" for the DFPs. Discussions among reviewers and reviewees are essential for stabilising the knowledge needed to classify deficiencies and errors in reports, and the DFR Checklist seems to help stabilise the transparency matter during the trial. However, as reporting standards and legal requirements evolve, transparency practices may require continual renegotiation.

4.4.2 Triggering development

The behavioural flexibility (see Section 4.1) allowed for an adaptive review order within the DFR Checklist levels, a critical affordance for reviewing non-standardised reports. However, the lack of a cohesive report template also hindered efficiency in the review process, as described by one participant:

> If we had had a template, it would have been easier and much quicker because then we could have gone directly to the item where something should have been placed. For example, the conclusion and how it's written. Instead of having to search for conclusion points throughout the entire report, we could have gone directly to that item. (P8)

This need for standardisation was noted in the checklists, with remarks like "no current template or report structure" highlighting areas for improvement. Consequently, the necessity for a standardised template became evident, leading some units to develop local template versions. As one practitioner explained: "But we're actually in the process of picking and gathering the best elements from several reports to create a template. That's what we're working on now" (P5).

Interviews showed that in one police district, the ability to uncover flaws through checklist-based review had led to a procedural change, systematically reminding report authors to request a review. This procedure had been integrated into the existing system for organising criminal investigations, with the aim of making peer review the norm rather than the exception.

The trial also revealed development needs for expertise. Conducting peer review requires expertise that extends beyond digital forensic skills. The feedback meeting emerged as a crucial social space for ensuring that the reviewee fully understood the issues and for discussing optimal solutions, and some interviewees expressed a desire to learn how to cultivate a strong feedback culture that promotes learning and continuous improvement. Several interviewees emphasised the

importance of training in delivering feedback, recognising that poor communication or inadequate responses could strain professional relationships. A practitioner explained:

> We don't receive adequate training in either giving or receiving feedback effectively. So, I mean, there was some training a while back, but I think it's something we could all benefit from refreshing and focusing on a bit more. (P9)

A scoping review by Dahl et al (2023) showed that peer feedback conducted in relation to workplace learning programs can be used to improve individual performance, motivation, and job satisfaction among police officers. Given that feedback skills typically fall outside the scope of standard digital forensic training, incorporating targeted training to develop these competencies would be a crucial step towards improving peer reviewers' ability to meet the objectives of the review process. These developments underscore the transformative capacity (Asdal, 2015) of the DFR Checklist if implemented in the peer review process, not only in improving digital forensic reports but also its potential in triggering and driving systemic change.

4.4.3 Systems integration

As previously noted, the checklist *representation* property offered users flexibility, allowing them to either print it for manual annotation or complete it digitally. However, interviews revealed concerns about its integration with existing systems. Poor integration with established workflows is a common issue with checklist representation and scope (Reijers et al., 2017:5779). In one unit, the DFR Checklists detachment from their standard peer review workflow led to a misalignment. Participants in this unit did not score or comment directly on the DFR Checklist; instead, they used it as a reference while relying on the 'track changes' feature in their word processor to suggest adjustments and place comments. Interviews revealed that in this context, the DFR Checklist was seen as a more tedious and less valuable add-on compared to units without an established peer review process prior to the trial. Their evaluation focus remained on the report itself, with the DFR Checklist only serving as a backup tool, as noted by one practitioner:

> I've basically just used it as a kind of cross-reference, something to check if there's anything I should look for when reviewing the report, or if there's something I might have missed that the checklist can remind me to consider (P2).

Consequently, the DFR Checklist lost its ability to categorise errors by severity. This demonstrates that established workflows become actants that shape user behaviour. Effective checklist integration would require a re-scription of the workflow, which interviews indicated was not fully achieved during the trial.

This example underscores the importance of recognising established workflows as integral organisational matters that must be carefully mapped and considered when introducing a new procedure. Integrating the DFR Checklist into existing document-handling systems could streamline the digital forensic process by eliminating the need to manage an additional standalone document, enhancing both efficiency and usability.

4.4.4 Positive outcomes of audience misalignment

Not all misalignments with intentions lead to negative outcomes. Regarding the *audience* property (Reijers et al., 2017), the peer review process was expected to uncover flaws in the reports and facilitate improvements. It was also anticipated that the review process would enhance individual reports and promote learning among the reviewees, improving future reports based on peer feedback. However, a notable discovery was the impact on the reviewers themselves. Several reviewers reported that using the DFR Checklist in the review process encouraged them to reflect on their own investigative and reporting practices, leading to adjustments in their approach for future work. Some even used the DFR Checklist while composing reports during the trial phase, ensuring compliance and pre-empting potential feedback. One practitioner explained: "This has in a way given me a bit more guidance for the reports I have written after I joined this project, where I have now incorporated it into my reports" (P1). Another stated:

> Yes, I've actually revised my own report template after reviewing this checklist. What I've done now is to divide the conclusion into two parts. The first part presents the objective findings, where I summarise the evidence found, and in the next part, I clarify that this is my interpretation based on the objective findings and what I believe they convey to us. (P8)

This illustrates that an unexpected use of the DFR Checklist led to positive change. The reviewers' use of the DFR Checklist as a reminder signifies their belief in it as a change agent.

In summary, the study reveals how checklists in digital forensics, while useful, can misalign with their intended purpose if not properly integrated into workflows. Staffing issues and a lack of peer reviews in some units underscore the challenges of adopting new procedures. The DFR Checklist, designed to ensure transparency and accuracy in reporting, also highlighted the need for additional competencies like feedback delivery. While the DFR Checklist aided in uncovering deficiencies and prompted systemic changes in some units, it was underutilised in others due to workflow misalignment, demonstrating the need for better integration and standardised templates.

4.5 Checklist's role in the justice system

The Quality Control Project focused on enhancing the internal mechanisms of the digital forensic discipline, aiming to elevate the quality of digital forensic analysis and reporting practices. In a broader context, digital forensics is one of several key entities within the criminal justice system that influence the outcomes of criminal investigations and protect the legal rights of parties involved. This

study demonstrates that implementing a checklist-based peer review process not only highlighted errors and miscommunications in real casework but also sparked important discussions on digital forensic investigation and reporting practices.

However, while the DFR Checklist has proven effective in many respects, it is not without limitations. As Bowker and Star (1999) argue, classification systems like checklists are inherently situated and shaped by the context of their creation. This means that they may inadvertently reflect and reinforce certain assumptions, values, or biases embedded in the discipline. For instance, while a checklist can standardise practices and foster accountability, it might also constrain flexibility, leading practitioners to prioritise compliance over critical thinking or innovation. Additionally, checklists risk being interpreted as comprehensive or authoritative, potentially masking areas of ambiguity or uncertainty in forensic science.

The DFR Checklist is publicly available in the project report (Sunde & Dahl, 2023), which invites broader scrutiny and input from both internal and external police stakeholders. This availability can contribute to mitigating these risks. Increased scrutiny was anticipated by practitioners, and one noted:

> And I think we'll encounter this more in the future, counter-experts in court, for sure. So having that support, knowing that the work has actually been reviewed by someone with equivalent or higher expertise, provides reassurance that it's solid. I believe that's important. (P9).

Also, leaders shared this view:

> I think the time is coming to an end when you can present a report and expect it to just go through. […]. But now, many defence lawyers or hired consultants are coming in to quality-assure the reports that are submitted. For any doubt is good doubt, and it should be eliminated. But it's not just that, it's also crucial that if work is conducted, it safeguards legal security, because the trust we have from the public relies on legal security and the fact that we're doing high-quality work. (L3)

However, this openness also necessitates ongoing evaluation and revision to ensure that the DFR Checklist remains relevant and reflective of evolving standards and expectations within both digital forensics and the wider criminal justice system. The DFR Checklist must navigate diverse stakeholder perspectives, which can lead to tensions between universality and adaptability. Acknowledging these challenges is essential to leveraging the checklist as a tool for both quality assurance and critical discourse.

Publicising the DFR Checklist and extending its availability beyond the digital forensic discipline could empower stakeholders to scrutinise and challenge digital forensic results that might otherwise remain opaque. This broader circulation enhances insight into what a digital forensic report should include and improves the capacity to critically evaluate practices and outcomes. The transition from blind trust in experts to trusting the scientific method (Kohler et al., 2023), necessitates societal understanding not only of the method itself but also of its practical application. By being publicly available, the DFR Checklist can act as a means for the co-production of legal security, fostering mutual engagement between stakeholders and the forensic community.

5. Conclusion

This study enhances the understanding of digital forensic practice by offering a nuanced case study of how the DFR Checklist shapes forensic practices within the justice system. Drawing on perspectives from STS and Actor-Network Theory, the research demonstrates how the DFR Checklist, as a sociomaterial device, functions not merely as a procedural tool but as an actant in the co-production of transformation and development. The findings highlight that checklists do more than guide actions; they performatively enact the standards, values, and norms inscribed within them, thereby exerting agency in the production and shaping of forensic knowledge.

The DFR Checklist materialises professional, ethical, and legal standards, embedding them into the daily practices of DFPs. This performative role demonstrates the capacity of checklists to bridge the gap between abstract principles of forensic science and the concrete realities of forensic report writing, aligning output with broader institutional and societal expectations. This framing challenges the view of checklists as static, neutral instruments, positioning them as dynamic agents serving an important role in co-producing forensic outcomes.

While the DFR Checklist effectively guided actions and directed the evaluation focus of reviewers, the study revealed that its utility was constrained by systemic factors, including the necessity for standardized templates, consistent procedures, and seamless integration into existing workflows. On the human side, the checklist depends on the expertise and professional judgement of reviewers. As a result, it cannot guarantee quality but serves as a valuable tool to foster a systematic and focused evaluation of critical aspects essential for achieving sufficient quality.

A notable limitation of this study is that it did not directly examine whether and to what extent the peer review led to improved quality of the reports. This limitation arises because the study relied on the accounts and perceptions of the interviewees rather than an independent evaluation of the reports themselves. As a result, while the findings provide valuable insights into how the peer review process was experienced and its perceived impact, they do not offer objective evidence of measurable improvements in report quality. Moreover, since the interviews were conducted shortly after the trial period, they do not confirm the checklist's continued use beyond the

trial. Future studies are needed to assess whether the implementation of the peer review process is sustained over time, and whether the checklist-based peer review led to improved reporting quality.

Limitations notwithstanding, this study contributes to the literature on performative texts and genres by showing how the DFR Checklist functions as a genre that shapes interactions, decisions, and the very production of forensic evidence. Its ability to raise matters - to make visible what might otherwise remain obscured - reinforces its critical role in the sociomaterial assemblage of digital forensic practices. Through this lens, checklists are not just tools but sites of negotiation where professional discretion, legal requirements, and organisational norms converge and are enacted.

In conclusion, examining the role of the DFR Checklist in digital forensic work has advanced the understanding of the performative nature of checklists and offers a nuanced perspective on their transformative capacity (Asdal, 2015) in forensic practices. The study invites further exploration through research into how other sociomaterial devices function within forensic and broader organisational contexts, opening new avenues for understanding the interplay between technology, materiality, and human agency in professional settings.

Acknowledgements

I thank Olav Dahl for his contribution to the Quality Control Project and invaluable contribution to collecting and transcribing material for this paper. I also thank the Special Issue Editors and the anonymous reviewers for their insightful comments and feedback, which greatly improved the manuscript.

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Appendix

DFR Checklist items for Level 4, Conceptual review (author's translation, Sunde & Dahl, 2023).
1) If the analysis is hypothesis-driven, are the overarching (at the offence level) hypotheses forming the basis of the analysis described?
2) If the analysis is hypothesis-driven, have relevant sub-hypotheses (at the activity and source levels) been developed based on the overarching hypotheses or the mandate/assignment?
3) Is the procedure, tools, and method application described in sufficient detail to enable replication of the analysis by others?
4) Is the dataset adequate and complete to achieve the purpose of the analysis?
5) Does the analysis conducted (e.g., observations, testing, experimentation) provide a sufficient basis for the results presented and the conclusions drawn from them?
6) Are any reservations, uncertainties, or limitations related to the methods and/or tools described?
7) Is there a clear distinction between descriptions of findings and interpretation/evaluation of those findings?
8) Are the findings described accurately?
9) Is it clearly indicated: - which specific seizure the findings are associated with? - where within the dataset the findings logically point to, making it clear where in the dataset the findings are located?
10) Are the findings related to the substantive context in which they were discovered?
11) Are negative findings (i.e., what was searched for but not found) described?
12) Are visual aids, such as tables, figures, or other objects aligned with the purpose of the report?
13) If the analysis is hypothesis-driven, are the results described in light of at least two competing hypotheses, including one that supports innocence/non-criminal activity?
14) If the report contains a conclusion: - are the results, circumstances, and rationale behind the concusion described? - is there consistency between the conclusion's strenght and findings it is based upon? - if terms indicating evidential strenght are used, are these adequately explained, or is a recognised framework for such descriptors referenced?
15) If an assessment of the evidential strength of findings has been conducted, is it in accordance with an applicable standard/framework for evaluative opinions?
16) Has the investigation and report writing been conducted in line with relevant criminal procedural rules and ethical guidelines?
17) Does the report specify whether, or to what extent, the digital forensic investigator can be considered independent in conducting the analysis and reporting?
18) Has information potentially supporting innocence or mitigating circumstances for the suspect been actively sought, and is the result described in the report?