

Forensic Evidence Integrity in Jordan: Strengthening Prosecutorial Oversight and Digital Governance

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Abstract: This study examines whether the Jordanian public prosecutor's supervisory powers are sufficient to protect forensic evidence from contamination, undocumented handling, technical error, and chain-of-custody weaknesses, and asks how contemporary forensic standards and digital technologies can be incorporated into prosecutorial oversight without shifting scientific decision-making from forensic specialists to legal authorities. Using qualitative doctrinal, comparative, and standards-based analysis, the study analyses Jordanian criminal-procedure regulations and assesses them against international forensic and digital-evidence standards using six analytical dimensions: legality, identity, continuity, scientific reliability, traceability, and accountability. The findings indicate that Jordanian law provides meaningful prosecutorial authority and recognizes the evidentiary value of scientific expertise. Nonetheless, the legal and institutional materials examined reveal deficiencies in standardized lifecycle documentation, digital chain-of-custody controls, technical traceability, validation records, exception reporting, and auditable prosecutorial review. Drawing on these legal and forensic findings, the study proposes the Prosecutorial Integrity and Digital Evidence Governance (PIDEG) Model, which integrates unique evidence identification, digital chain-of-custody documentation, technical metadata, validation controls, exception alerts, access restrictions, audit trails, and defined prosecutorial review. Academically, the study contributes a legal-technological governance framework for Jordan that integrates prosecutorial oversight, forensic quality assurance, and digital evidence governance within a coherent evidentiary framework. Under this model, prosecutors function as procedural and governance overseers responsible for legality, documentation, accountability, and review, while forensic scientists remain independent professionals responsible for scientific validation and interpretation.

Keywords: Digital Governance; Evidence Integrity; Forensic Evidence; Jordanian Law; Prosecutorial Oversight.

INTRODUCTION

Forensic evidence has legal probative value only when it is lawfully identified, accurately documented, properly collected, protected against contamination or tampering, maintained within a verifiable chain of custody, examined by qualified experts, and fairly presented to the court.¹ Accordingly, crime-scene management forms part of the legal framework through which physical and digital traces are transformed into admissible evidence.² Regional scholarship has examined the handling of physical evidence, the role of scientific police and forensic medical examination, and emerging technologies for crime-scene documentation, including holographic and three-dimensional methods.^{3,4,5}

Forensic integrity therefore requires preserving biological, digital, and physical evidence throughout the evidentiary lifecycle, from collection to courtroom presentation, so its reliability can be assessed. Biological evidence may be contaminated by investigators, laboratory personnel, equipment, consumables, secondary DNA transfer, or improper packaging. Unauthorized access can compromise digital evidence, while inadequate documentation can weaken the evidentiary context of physical exhibits. Incomplete chain-of-custody records may also create uncertainty regarding who handled the evidence, when it was handled, and where it was transferred or stored.

Modern forensic science standards are beginning to include a lifecycle approach. ISO 21043-2:2018 covers recognition, recording, collection, transportation, and storage of forensic items. ISO 21043-1:2025, ISO 21043-3:2025, ISO 21043-4:2025, and ISO 21043-5:2025 cover vocabulary, analysis,

¹ United Nations Office on Drugs and Crime, *Crime Scene and Physical Evidence: Awareness for Non-Forensic Personnel* (United Nations, 2009), https://www.unodc.org/documents/scientific/Crime_scene_awareness__Ebook.pdf.

² Mahrus Ali et al., "Philosophical Foundation, Application, and Controversies of Judicial Pardon in Islamic Criminal Law, Indonesian Penal Code, and the Criminal Justice System of Kuwait," *De Jure: Jurnal Hukum Dan Syar'iah* 17, no. 2 (2025): 624–648, <https://doi.org/10.18860/j-j-fsh.v17i2.32629>.

³ I. Ben Khelifa, "Physical Traces Scattered at the Crime Scene: Their Concept, Types, and How Technical Experts Deal with Them," *Majallat Al-Nadwa Lil-Dirasat Al-Qanuniyya*, no. 1 (2013): 25–37, <https://doi.org/10.12816/0006270>; F. Beneddine, "The Role of the Scientific Police at the Crime Scene," *Majallat Al-Huquq Wa Al-Ulum Al-Insaniyya* 15, no. 4 (2022): 667–86.

⁴ Y. Mihoub and A. Rittab, "The Doctor's Analysis of the Crime's Scene," *Dirasat Wa Abhath* 7, no. 21 (2015): 480–493, <https://doi.org/10.35157/0578-000-021-031>.

⁵ I. A. M. Abdel Wahab, "Implications of Using Hologram Technology at the Crime Scene to Reduce the Phenomenon of Crime Reenactment," *Al-Majalla Al-Qanuniyya* 22, no. 1 (2024): 127–228, <https://doi.org/10.21608/jlaw.2024.393340>.

interpretation, and reporting for forensic evidence.⁶ Digital evidence also has unique requirements, but they are similar to those above. ISO/IEC 27037:2012 deals with identification, collection, acquisition, and preservation. ISO/IEC 27041:2015 examines whether the investigative techniques employed are suitable. ISO/IEC 27042:2015 involves the analysis and interpretation of digital evidence. ISO/IEC 27043:2015 sets out principles and practices for conducting an investigation.⁷ Laboratory proficiency and contamination control are addressed in ISO/IEC 17025:2017 and ISO 18385:2016.⁸ Together, these standards show that evidentiary reliability depends on coordinated technological and administrative controls throughout the forensic process.

Jordan has a robust legal framework that gives the prosecutorial branch oversight of criminal investigations. The Public Prosecutor's Office can order specific types of investigative activities under Article 48 from trained Judicial Police Officers who are responsible for the interrogations of the defendant; and Articles 160 and 161 acknowledge the admissibility of specific scientific evidence

⁶ International Organization for Standardization, *ISO 21043-1:2025: Forensic Sciences—Part 1: Vocabulary* (ISO, 2025), 2025, <https://www.iso.org/standard/87128.html>; International Organization for Standardization, *ISO 21043-2:2018: Forensic Sciences—Part 2: Recognition, Recording, Collecting, Transport and Storage of Items* (ISO, 2018), 2018, <https://www.iso.org/standard/72041.html>; International Organization for Standardization, *ISO 21043-3:2025: Forensic Sciences—Part 3: Analysis* (ISO, 2025), 2025, <https://www.iso.org/standard/72040.html>; International Organization for Standardization, *ISO 21043-4:2025: Forensic Sciences—Part 4: Interpretation* (ISO, 2025), 2025, <https://www.iso.org/standard/72039.html>; International Organization for Standardization, *ISO 21043-5:2025: Forensic Sciences—Part 5: Reporting* (ISO, 2025), 2025, <https://www.iso.org/standard/73896.html>.

⁷ International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27037:2012: Guidelines for Identification, Collection, Acquisition and Preservation of Digital Evidence* (ISO, 2012), 2012, <https://www.iso.org/standard/44381.html>; International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27041:2015: Guidance on Assuring Suitability and Adequacy of Incident Investigative Method* (ISO, 2015), <https://www.iso.org/standard/44405.html>; International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27042:2015: Guidelines for the Analysis and Interpretation of Digital Evidence* (ISO, 2015), 2015, <https://www.iso.org/standard/44406.html>; International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27043:2015: Incident Investigation Principles and Processes* (ISO, 2015), <https://www.iso.org/standard/44407.html>.

⁸ International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 17025:2017: General Requirements for the Competence of Testing and Calibration Laboratories* (ISO, 2017), 2017, <https://www.iso.org/standard/66912.html>; International Organization for Standardization, *ISO 18385:2016: Minimizing the Risk of Human DNA Contamination in Products Used to Collect, Store and Analyze Biological Material for Forensic Purposes—Requirements* (ISO, 2016), 2016, <https://www.iso.org/standard/62341.html>.

and Government Laboratory Reports, subject to set conditions.⁹ In addition, scholarly research on Jordanian and Arab jurisprudence shows that science-based evidence, such as DNA, electronic data/evidence, expert analysis, and advanced investigative techniques, will become increasingly important in the future.¹⁰ Jordanian scholarship has also shown greater progress toward a rights-based criminal justice system than ever before.¹¹

Therefore, Jordan's major issue is not simply the prosecutor's legal authority, but whether that authority translates into an institutionalized process for ensuring integrity and accountability through the use of forensic technologies. While the prosecutor may have lawful authority to direct an investigation, the prosecutor may be unaware of undocumented events, including unauthorized digital access, expired equipment calibration, outdated software, contamination events, or other issues that could negatively affect result accuracy. As technology continues to evolve and expand in three-dimensional imaging, laser scanning, mobile LiDAR, virtual reconstruction, forensic software, electronic evidence-management systems, and digital custody records, these issues will become more complex and harder to address.^{12,13} The studies discussed above can be grouped into three

⁹ Code of Criminal Procedure No. 9 of 1961, as Amended (1961), https://moj.gov.jo/AR/ListDetails/%D8%AE%D8%AF%D9%85%D8%A7%D8%AA_%D9%85%D8%AD%D8%A7%D9%83%D9%85/2303/5.

¹⁰ M. A. R. Al Naghi, "Authenticity of Scientific Proof in Criminal Evidence: A Comparative Study," *Police Thought* 28, no. 109 (2019): 179–223, <https://doi.org/10.12816/0052945>; A. A. M. Arab, "Authentic Modern Scientific Evidence in Penal Evidence (A Comparative Study)" (Master's thesis, Isra University, 2020), https://www.iu.edu.jo/iuthesis/search/thesis_details.php?id=739; S. Ramdaoui and M. E. A. Mounni, "Genetic Evidence between Effectiveness of His Evidentiary Function and Practical Problems in Criminal Proceedings," *Majallat Al-Qanun Wa Al-Ulum Al-Siyasiyya* 9, no. 1 (2023): 727–44; K. Ait Hamouda, "Search and Criminal Investigations in Electronic Crime Scene," *Majallat Al-Fikr Al-Qanuni Wa Al-Siyasi* 7, no. 1 (2023): 180–201.

¹¹ O. M. Emar et al., "Internal Protection of Persons from Enforced Disappearance: An Analytical Study on Jordan's Non-Ratification of the International Convention for the Protection of All Persons from Enforced Disappearance," *International Journal of Public Law and Policy* 9, no. 1 (2023): 17–36, <https://doi.org/10.1504/IJPLAP.2023.127315>; M. S. I. Bani Taha and F. M. A. Musleh, "Community Service as One of the Alternatives to Freedom-Depriving Penalties in Jordanian Legislation (A Comparative Study)," *Arab Researcher Journal* 4, no. 3 (2023): 1–21, <https://doi.org/10.57072/ar.v4i3.105>.

¹² R. M. Carew et al., "3D Forensic Science: A New Field Integrating 3D Imaging and 3D Printing in Crime Reconstruction," *Forensic Science International: Synergy* 3 (2021): 100205, <https://doi.org/10.1016/j.fsisyn.2021.100205>; G. Galanakis et al., "A Study of 3D Digitisation Modalities for Crime Scene Investigation," *Forensic Sciences* 1, no. 2 (2021): 56–85, <https://doi.org/10.3390/forensicsci1020008>.

¹³ A. Ehjelah and B. Al-Qawasmeh, "Extent of Criminal Liability of the Manufacturer of Medical Robots for Crimes Caused by Them Under Jordanian and Emirati Law," *Manchester Journal of Transnational Islamic Law & Practice* 22, no. 1 (2026): 20–31.

relevant strands, but none independently addresses the full governance relationship examined in this study. The first focuses on crime-scene collection practices and documentation technologies, clarifying how evidence is initially collected and recorded but giving limited attention to continuing legal oversight after the crime-scene stage. The second examines the probative value and admissibility of scientific evidence, including DNA, digital evidence, and expert analysis. However, it concentrates primarily on proof and courtroom use rather than on the institutional mechanisms needed to preserve evidentiary integrity throughout the case lifecycle. The third addresses rights-oriented criminal procedure and legal accountability in Jordan, strengthening the normative foundations of criminal justice without explaining how prosecutorial authority should interact with forensic quality assurance, digital chain-of-custody governance, and the scientific independence of forensic professionals.

This study therefore examines three interrelated questions. First, to what extent does the Jordanian legal framework provide the public prosecutor with authority capable of protecting the integrity of forensic evidence? Second, what gaps emerge when Jordanian prosecutorial supervision is evaluated against contemporary forensic, digital-evidence, contamination-control, and quality standards? Third, how can a digital governance model translate prosecutorial authority into auditable safeguards throughout the evidentiary lifecycle? The argument is that reform should focus not on expanding prosecutorial power for its own sake, but on operationalizing existing authority through technical controls that preserve scientific independence. The principal contribution is the Prosecutorial Integrity and Digital Evidence Governance (PIDEG) Model, which links legal supervision to digital custody, technical validation, exception reporting, accountability, and judicial transparency.

METHOD

This study employs a qualitative doctrinal legal research design combined with comparative and standards-based analysis. The doctrinal component systematically examines and interprets applicable legal rules, institutional responsibilities, and evidentiary provisions to determine the scope of prosecutorial authority and the legal status of scientific evidence in Jordanian criminal procedure. Articles 48, 160, and 161 of the Code of Criminal Procedure No. 9 of 1961, as amended, were selected because they directly address prosecutorial delegation of investigative functions and the recognition and use of scientific and laboratory evidence. Regulation No. 96 of 2018 on the Use of Modern Technology in Criminal Procedures was included because it provides the

principal regulatory basis for the use of modern technologies in Jordanian criminal proceedings.¹⁴

The source base was organized into four categories according to function and normative weight. First, Jordanian legislation and regulations were treated as the primary legal sources for determining the applicable domestic legal framework. Second, international technical standards and professional guidance were used as non-binding analytical benchmarks for assessing evidence integrity, contamination control, digital-evidence management, quality assurance, and traceability. These materials included ISO and ISO/IEC standards, ILAC and ENFSI publications, NIST materials, OSAC standards, United Nations guidance, and U.S. Department of Justice crime-scene guidelines.¹⁵

Third, comparative case law and evidentiary rules were used only to illustrate alternative approaches to judicial oversight of scientific reliability and were not treated as sources of Jordanian law. Fourth, peer-reviewed scientific and forensic literature was selected where it directly addressed the evidentiary risks and technical issues examined in the study, including contamination and DNA transfer, chain-of-custody weaknesses, digital-evidence integrity, three-dimensional documentation and reconstruction, and human factors affecting forensic decision-making. Institutional guidance and professional standards were selected where they provided recognized operational criteria relevant to evidence handling, quality assurance, digital integrity, or forensic traceability. These materials were analyzed according to their relevance to the six analytical criteria and to the corresponding stage of the forensic evidence lifecycle. The analytical weight assigned to each category depended on its function: domestic legislation established legal authority, technical standards supplied operational benchmarks, comparative legal materials illustrated reliability-control approaches, and scientific literature provided evidence concerning forensic risks and practices.

The comparative component was structured around specific dimensions rather than a general review of foreign law. Materials from *Frye*, *Daubert*, *Kumho Tire*, and the 2023 amendment to Federal Rule of Evidence 702 were selected

¹⁴ Regulation No. 96 of 2018 on the Use of Modern Technology in Criminal Procedures (2018), https://moj.gov.jo/ebv4.0/root_storage/en/eb_list_page/law_no._%2896%29_of_2018_on_the_use_of_modern_technology_in_criminal_procedures.pdf.

¹⁵ International Laboratory Accreditation Cooperation, *ILAC-G19:06/2022: Modules in a Forensic Science Process* (2022), <https://ilac.org/publications-and-resources/ilac-guidance-series/>; European Network of Forensic Science Institutes, *Best Practice Manual for Human Forensic Biology and DNA Profiling*, ENFSI-DNA-BPM-03, Version 01 (2022), <https://enfsi.eu/wp-content/uploads/2022/12/ENFSI-DNA-BPM-03.pdf>.

because they illustrate distinct approaches to the judicial assessment of scientific and technical reliability, including general acceptance, methodological validity, expert qualification, standards and controls, error-related considerations, and the reliable application of methods to case-specific facts. These materials were used solely as comparative reference points for evaluating reliability-control mechanisms and were not treated as legally binding in Jordan.^{16 17} Recent Jordanian comparative criminal-law scholarship was also reviewed because it demonstrates the methodological value of cross-jurisdictional comparison for identifying differences in legal standards, criminal liability, and regulatory approaches without assuming the direct transplantation of foreign rules into Jordanian law.¹⁸

The analytical framework was based on six criteria: legality, identity, continuity, scientific reliability, traceability, and accountability. These criteria were derived from the legal and forensic requirements identified across domestic law, technical standards, institutional guidance, and scientific literature. Legality concerns whether evidence-related actions are legally authorized and procedurally compliant. Identity concerns whether an evidentiary item can be uniquely and consistently identified.¹⁹ Continuity concerns whether possession, handling, and transfer can be reconstructed throughout the evidentiary lifecycle. Scientific reliability concerns whether examination methods, personnel, equipment, validation procedures, and quality controls provide a sufficient basis for the resulting evidence.²⁰ Traceability concerns whether relevant actions, methods, modifications, and technical conditions can be independently reconstructed. Accountability concerns whether documentation and the

¹⁶ *Frye v. United States*, 293 F. United States Court of Appeals for the District of Columbia Circuit 1013 (1923); *Kumho Tire Co. v. Carmichael* (1999), <https://www.govinfo.gov/app/details/USREPORTS-526/USREPORTS-526-137>; Federal Rule of Evidence 702: *Testimony by Expert Witnesses* (2023), https://www.law.cornell.edu/rules/fre/rule_702; *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993), <https://www.govinfo.gov/app/details/USREPORTS-509/USREPORTS-509-579>.

¹⁷ Yusuf Obeidat et al., “The Jurisprudence of the Court of Cassation in Jordan: Interpreting Judicial Decisions and Case Law,” *Information Sciences Letters* 12, no. 7 (2023), <https://digitalcommons.aaru.edu.jo/isl/vol12/iss7/46>.

¹⁸ A. Ehjelah et al., “Abortion-Related Maternal Deaths: A Comparative Study of Criminal Law in Jordan, the UAE, and Europe,” *Access to Justice in Eastern Europe* 9, no. 2 (2026): 280–319, <https://doi.org/10.33327/AJEE-18-9.2-a000191>.

¹⁹ Ghazi Ayed Alghathian et al., “Contemporary Issues in Arbitration Agreements: Sharia Public Order and Civil Law Perspectives,” *MILRev: Metro Islamic Law Review* 5, no. 2 (2026): 1071–1102, <https://doi.org/10.32332/milrev.v5i2.13682>.

²⁰ Mohammed Ali Khaled Al-Shurman et al., “Rethinking the Cyber Regulatory Framework for Data Access Consent: Legal Challenges and Reform in the Hashemite Kingdom of Jordan,” *Nusantara: Journal of Law Studies* 5, no. 2 (2026): 1180–1201, <https://doi.org/10.66325/nusantaralaw.v5i2.367>.

availability of responsible actors, procedural deviations, corrective actions, and supervisory decisions allow review. These criteria were applied consistently across the principal stages of the forensic evidence lifecycle, including identification, collection, preservation, transfer, storage, examination, interpretation, reporting, and judicial presentation. The analysis proceeded in five sequential steps. First, the applicable Jordanian legal requirements and prosecutorial powers were identified. Second, relevant forensic and digital-evidence standards were mapped against the corresponding stages of the evidence lifecycle. Third, the Jordanian framework was assessed against the six analytical criteria and the selected reliability-control benchmarks. Fourth, regulatory, procedural, and institutional gaps were identified where legal authority was not accompanied by sufficiently documented or auditable safeguards. Fifth, the author synthesized findings from these stages to develop the Prosecutorial Integrity and Digital Evidence Governance (PIDEG) Model. This sequence was intended to make the analytical process transparent and reproducible.

The author's professional background in criminal justice provided contextual familiarity with evidence-governance issues but was not used as empirical data or as an independent basis for any finding. No confidential case files, interviews, surveys, personal data, or identifiable court proceedings were used. The study therefore relies exclusively on legislation, regulations, case law, technical standards, institutional guidance, and published scientific and legal research.

RESULTS AND DISCUSSION

The Results and Discussion are structured around the six analytical criteria established in the methodology: legality, identity, continuity, scientific reliability, traceability, and accountability. These criteria are applied across the forensic evidence lifecycle to assess whether Jordanian prosecutorial authority is supported by sufficiently specific procedural and technical safeguards and to identify where general legal authority is not translated into operationally auditable controls.

Forensic Evidence Integrity and Contamination

Beyond preventing fraudulent alteration, forensic integrity rests on an unbroken evidentiary history showing the item is authentic and that all treatment has been legally and scientifically justified. UNODC guidelines emphasize that proper identification, preservation, and treatment of tangible evidence at the crime scene are crucial. Scene-level errors made in collecting evidence may

ultimately jeopardize a future examination.²¹ Similarly, the National Forensic Science Technology Center defines crime-scene activities under its "scene management" category (documentation, processing, collection, packaging, and other protection and control measures).²²

ISO 21043 formally describes these same categories of crime-scene activities by defining a lifecycle model. ISO 21043-2:2018 deals with the acquisition of evidence (recognition, recording, collection, transportation, and storage); ISO 21043-3:2025 also provides safeguards during analysis (suitable methods, controls, qualified personnel, and analytical strategy); ISO 21043-4:2025 includes safeguards for interpretation (judgment or statistical models); and ISO 21043-5:2025 addresses reporting requirements (accurate, clear, transparent, complete, impartial, and useful).²³ Therefore, chain-of-custody records must be viewed as more than simply documenting possession. Modern integrity records would detail the original state of evidence; how the evidence was packaged and sealed; where the evidence was stored; who had access to the evidence; which analytical methods were used to analyze the evidence; which equipment/software was used to analyze the evidence; whether there was quality control over the process; whether there were any examinations made to the evidence; any reviews done of the evidence; and whether there were any events of deviation or contamination.

Contamination highlights the need for governance to extend beyond laboratory technique. Secondary and subsequent DNA transfer, contamination from police and laboratory settings, and ongoing, repeated pre-analytical contamination events have been documented by researchers.^{24 25} Potential

²¹ United Nations Office on Drugs and Crime, *Crime Scene and Physical Evidence: Awareness for Non-Forensic Personnel*.

²² National Forensic Science Technology Center, *Crime Scene Investigation: A Guide for Law Enforcement*, NCJ 243598 (Bureau of Justice Assistance, U.S. Department of Justice, 2013), <https://www.ojp.gov/library/publications/crime-scene-investigation-guide-law-enforcement>.

²³ International Organization for Standardization, *ISO 21043-4:2025: Forensic Sciences—Part 4: Interpretation*, 2025; International Organization for Standardization, *ISO 21043-5:2025: Forensic Sciences—Part 5: Reporting*, 2025; International Organization for Standardization, *ISO 21043-2:2018: Forensic Sciences—Part 2: Recognition, Recording, Collecting, Transport and Storage of Items*; International Organization for Standardization, *ISO 21043-3:2025: Forensic Sciences—Part 3: Analysis*, 2025.

²⁴ A. E. Fonneløp et al., "Secondary and Subsequent DNA Transfer during Criminal Investigation," *Forensic Science International: Genetics* 17 (2015): 155–62, <https://doi.org/10.1016/j.fsigen.2015.05.009>; R. A. H. van Oorschot et al., "DNA Transfer in Forensic Science: A Review," *Forensic Science International: Genetics* 38 (2019): 140–166, <https://doi.org/10.1016/j.fsigen.2018.10.014>.

²⁵ P. Basset and V. Castella, "Lessons from a Study of DNA Contaminations from Police Services and Forensic Laboratories in Switzerland," *Forensic Science International: Genetics* 33 (2018): 147–54, <https://doi.org/10.1016/j.fsigen.2017.12.012>.

sources of contamination are investigators, first responders, medical staff, equipment, packaging materials, and environmental exposure. Databases that track personnel who frequently visit crime scenes or handle evidence could be important.²⁶ ISO 18385:2016, ENFSI guidelines, and the NIST systems approach provide an integrated framework for addressing contamination through product controls, best practices, organizational policies and procedures, human factors, and quality management.²⁷ Therefore, it can be concluded that a fully developed integrity system needs to document and investigate deviations as opposed to concealing them.²⁸ Documentation, investigation, and disclosure of contamination events were emphasized by Rudin, Inman, and Nouredine.²⁹ This principle defines prosecutors' proper role regarding contamination. Prosecutors lack the scientific authority to determine whether a DNA profile is contaminated; forensic professionals have that expertise. Prosecutorial oversight ensures that prosecutors identify the integrity concern, have it technically investigated, legally assessed, and disclosed if relevant to the evidence's reliability.

Jordanian Prosecutorial Supervision and the Regulatory Gap

Jordanian law provides a substantive legal basis for prosecutorial supervision, but the relevant provisions operate primarily at the level of authority and admissibility rather than detailed evidence-integrity governance. Article 48 permits the Public Prosecutor to delegate specified investigative responsibilities to competent judicial police officers, subject to statutory limitations.³⁰ This provision supports legality and institutional accountability by identifying who may perform investigative functions, but it does not set detailed requirements for identifying evidence, authenticating transfers, documenting contamination, validating technical methods, or tracing evidence throughout its lifecycle. Articles

²⁶ M. Lapointe et al., "Leading-Edge Forensic DNA Analyses and the Necessity of Including Crime Scene Investigators, Police Officers and Technicians in a DNA Elimination Database," *Forensic Science International: Genetics* 19 (2015): 50–55, <https://doi.org/10.1016/j.fsigen.2015.06.002>.

²⁷ International Organization for Standardization, *ISO 18385:2016: Minimizing the Risk of Human DNA Contamination in Products Used to Collect, Store and Analyze Biological Material for Forensic Purposes—Requirements*, 2016; European Network of Forensic Science Institutes, *Best Practice Manual for Human Forensic Biology and DNA Profiling*; Expert Working Group on Human Factors in Forensic DNA Interpretation, *Forensic DNA Interpretation and Human Factors: Improving Practice through a Systems Approach*, NIST IR 8503 (National Institute of Standards and Technology, 2024), <https://doi.org/10.6028/NIST.IR.8503>.

²⁸ Murtada Abdalla Kheiri et al., "The Right to Digital Tranquility: A Comparative Analysis of AI Governance in Oman and Jordan from an Islamic Legal Perspective," *Justicia Islamica* 22, no. 2 (2025): 411–436, <https://doi.org/10.21154/justicia.v22i2.11259>.

²⁹ N. Rudin et al., "Documentation, Investigation, and Disclosure of Contamination Events," *Journal of Forensic Sciences* 70, no. 2 (2025): 815–19, <https://doi.org/10.1111/1556-4029.15709>.

³⁰ Code of Criminal Procedure No. 9 of 1961, as Amended.

160 and 161 likewise recognize the evidentiary role of scientific techniques and government laboratory reports. Article 160 permits reliance on fingerprints and other scientifically accepted methods based on factual evidence, while Article 161 provides for the admissibility of reports prepared by designated government laboratories and allows the Court, where justice requires, to summon the report's author.³¹ These provisions therefore regulate the legal recognition and courtroom use of scientific evidence, but they do not comprehensively govern the operational controls required to preserve evidentiary identity, continuity, scientific reliability, traceability, and accountability before the evidence is presented in court.³²

Jordan's Regulation No. 96 of 2018 reflects institutional acceptance of modern technology in criminal procedure.³³ Nevertheless, the combined legal framework does not expressly establish a comprehensive evidence-governance system covering every stage of the forensic lifecycle.³⁴ Article 48 addresses investigative delegation, Articles 160 and 161 govern the recognition and admissibility of scientific evidence, and Regulation No. 96 of 2018 provides a legal basis for the use of technology in criminal procedure. Taken together, these provisions establish legality and institutional authority, but they do not expressly prescribe standardized operational requirements for unique evidence identification, authenticated transfers, seal-status documentation, contamination-event recording, role-based digital access, cryptographic integrity verification, equipment-calibration records, software-version documentation, deviation alerts, corrective-action records, or complete judicial audit trails. The gap, therefore, lies not in the absence of prosecutorial authority, but in the lack of detailed mechanisms that translate that authority into consistently documented controls for identity, continuity, scientific reliability, traceability, and accountability throughout the evidentiary lifecycle. The legal implication is that evidence may remain formally admissible even when important information concerning its

³¹ Code of Criminal Procedure No. 9 of 1961, as Amended.

³² M. M. Irhouma, "The Evidentiary Value of DNA Fingerprint as Criminal Evidence," *Arab Journal of Forensic Sciences & Forensic Medicine* 1, no. 4 (2016): 460–75, <https://doi.org/10.12816/0033138>; Al Naghi, "Authenticity of Scientific Proof in Criminal Evidence: A Comparative Study"; Arab, "Authentic Modern Scientific Evidence in Penal Evidence (A Comparative Study)"; Ramdaoui and Moumni, "Genetic Evidence between Effectiveness of His Evidentiary Function and Practical Problems in Criminal Proceedings."

³³ Regulation No. 96 of 2018 on the Use of Modern Technology in Criminal Procedures.

³⁴ Ismael Hellwas et al., "From Administrative Function to Professional Governance: Institutionalising Functional Specialisation for Corruption Prevention in Public Procurement," *Nusantara: Journal of Law Studies* 5, no. 2 (2026): 1617–1652, <https://doi.org/10.66325/nusantaralaw.v5i2.412>.

reliability, handling history, or technical integrity is not captured through a standardized and continuously auditable process.

International Standards as Governance Benchmarks

The distinction between formal governmental authority and technical standardization is paramount. While organizations such as ISO, NIST, OSAC, ENFSI, ILAC, NIJ, and UNODC create technical standards, they do not establish formal boundaries for the Jordanian Public Prosecutor's jurisdictional authority or impose independent legal obligations on Jordanian governmental bodies. These organizations provide a common set of technical standards that may be adopted by national agencies as part of their own domestic governance systems. The selected international standards identify operational requirements that are not expressly articulated in the Jordanian provisions examined above. ISO 21043 establishes lifecycle controls for recognizing, recording, collecting, transporting, storing, analyzing, interpreting, and reporting forensic evidence, providing benchmarks particularly relevant to identity, continuity, scientific reliability, and traceability.^{35,36} For digital evidence, ISO/IEC 27037, 27041, 27042, and 27043 set requirements for identification, acquisition, preservation, suitability of investigative methods, analysis, interpretation, and investigative processes.³⁷

These requirements demonstrate that digital integrity depends not only on physical possession of a device, but also on documented acquisition procedures,

³⁵ International Organization for Standardization, *ISO 21043-1:2025: Forensic Sciences—Part 1: Vocabulary*; International Organization for Standardization, *ISO 21043-2:2018: Forensic Sciences—Part 2: Recognition, Recording, Collecting, Transport and Storage of Items*; International Organization for Standardization, *ISO 21043-3:2025: Forensic Sciences—Part 3: Analysis*; International Organization for Standardization, *ISO 21043-4:2025: Forensic Sciences—Part 4: Interpretation*; International Organization for Standardization, *ISO 21043-5:2025: Forensic Sciences—Part 5: Reporting*.

³⁶ International Organization for Standardization, *ISO 21043-2:2018: Forensic Sciences—Part 2: Recognition, Recording, Collecting, Transport and Storage of Items*, 2018.

³⁷ International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27037:2012: Guidelines for Identification, Collection, Acquisition and Preservation of Digital Evidence*, 2012; International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27041:2015: Guidance on Assuring Suitability and Adequacy of Incident Investigative Method*, 2015; International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27042:2015: Guidelines for the Analysis and Interpretation of Digital Evidence*, 2015; International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 27043:2015: Incident Investigation Principles and Processes*, 2015.

technical verification, controlled access, and reconstructable analytical actions.³⁸ Research on electronic chain-of-custody systems similarly indicates that chronological and independently verifiable custody records can strengthen continuity and accountability.³⁹ ISO/IEC 17025 and ILAC-G19 further establish requirements for competence, impartiality, consistency, quality assurance, and forensic-process controls directly relevant to scientific reliability and traceability.⁴⁰

OSAC and ANSI/ASB scene standards further reinforce structured requirements for documentation, preservation, and reconstruction.³⁵ Read against the Jordanian framework, these standards do not create domestic legal obligations; rather, they highlight the distinction between general legal authority to investigate and admit evidence and the more specific operational controls required to preserve evidentiary integrity throughout the evidence lifecycle.⁴¹ This standards-based method also offers potential regulatory advantages. Primary legislation can define authority and basic safeguards. Technical standards and accepted methodologies can be changed over time as new forensic methods, software applications, scanning technologies, contamination-control measures, and quality-assurance requirements become available.

³⁸ Fajar Sukma and Zulheldi Zulheldi, “Government Policies in Economic Empowerment of Muslim Communities in the Digital Economy Era,” *El-Mashlahab* 11, no. 2 (2021): 146–163, <https://doi.org/10.23971/elma.v11i2.3108>.

³⁹ X. Burri et al., “Chronological Independently Verifiable Electronic Chain of Custody Ledger Using Blockchain Technology,” *Forensic Science International: Digital Investigation* 33 (2020): 300976, <https://doi.org/10.1016/j.fsidi.2020.300976>; S. Nath et al., “Digital Evidence Chain of Custody: Navigating New Realities of Digital Forensics,” 2024, 11–20, <https://doi.org/10.1109/TPS-ISA62245.2024.00012>.

⁴⁰ International Organization for Standardization and International Electrotechnical Commission, *ISO/IEC 17025:2017: General Requirements for the Competence of Testing and Calibration Laboratories*, 2017; International Laboratory Accreditation Cooperation, *ILAC-G19:06/2022: Modules in a Forensic Science Process*.

⁴¹ Organization of Scientific Area Committees for Forensic Science, *Standard for On-Scene Collection and Preservation of Physical Evidence*, OSAC 2021-N-0018, Version 2.0 (2024), <https://www.nist.gov/standard/756>; Organization of Scientific Area Committees for Forensic Science, *Standard for Scene Documentation Procedures*, OSAC 2023-N-0002, Version 2.0 (2024), <https://www.nist.gov/osac/registry>; American Academy of Forensic Sciences Standards Board, *Standard for Scene Investigation and Reconstruction—Foundational Principles*, ANSI/ASB Standard 159-24 (2024), <https://www.nist.gov/osac/standards-library/ansiasb-standard-159-24>.

Digital Evidence and Three-Dimensional Documentation

Digital evidence increases custody and integrity concerns because physical changes do not always alter data.⁴² Opening a file can change its associated metadata. A live system can be changed through automated processes, and a network connection may also cause the device state to be altered. Forensic analysis usually proceeds with acquired copies rather than multiple examinations of the source. As such, regional legal scholarship documents the growing complexity and evidentiary significance of collecting and admitting both electronic and digital evidence.⁴³ Similarly, NIST's scientific foundation review emphasizes the need for science-based digital-investigation techniques.⁴⁴

Therefore, a digital evidence-governance record should extend beyond device possession. In addition to preserving the device identifier and physical condition at the time of seizure, it should also document the time of seizure, whether the device was isolated or connected to the internet/network, the type of acquisition, the type of forensic image created, cryptographic hash values when applicable, and the identity of each analyst who worked on the device. The record should also document the hardware and software used, software versions, analytical actions taken (including exported data), verification steps performed, and any procedural deviations.⁴⁵ The record should clearly distinguish the source from the forensic working copy, allowing all parties to reconstruct events and establish integrity based on fact rather than inference from the lack of physical damage.

Three-dimensional documentation offers significant forensic benefits by preserving spatial relationships, measurements, trajectories, and scene

⁴² Ika Pusparini Anindita Jayasinga et al., "Building Digital Justice: Reinterpreting *Hifz al-`Ird* in Personal Data Protection and Legal Aid for Data Breach Victims in Indonesia," *Justicia Islamica* 23, no. 2 (2026): 701–728, <https://doi.org/10.21154/justicia.v23i2.13432>.

⁴³ Ait Hamouda, "Search and Criminal Investigations in Electronic Crime Scene"; R. ElKady, "Digital Forensic Evidence in the Egyptian Legislation: In Light of the Provisions of Law No. 175 of 2018 and Its Executive Regulations, Comparative Legislation and International Covenants," *Journal of Law and Emerging Technologies* 2, no. 1 (2022): 177–246, <https://doi.org/10.54873/jolets.v2i1.9>; M. Salim and M. M. Almunjed, "The Validity of Digital Evidence in Criminal Evidence," *Journal of Legal Sciences* 40, no. 4 (2026): 760–780, <https://doi.org/10.35246/xha4w759>.

⁴⁴ J. R. Lyle et al., *Digital Investigation Techniques: A NIST Scientific Foundation Review*, NIST IR 8354 (National Institute of Standards and Technology, 2022), <https://doi.org/10.6028/NIST.IR.8354>.

⁴⁵ Imroatul Azizah et al., "Reconstructing Islamic Criminal Liability for Economic Crimes: A Maqasid-Based Framework for Indonesia's Sharia Finance," *El-Mashlahah* 16, no. 1 (2026): 41–64, <https://doi.org/10.23971/el-mashlahah.v16i1.11254>; Azizah et al., "Reconstructing Islamic Criminal Liability for Economic Crimes."

configurations that may permit subsequent re-examination.⁴⁶ Technologies such as three-dimensional imaging and printing, immersive virtual-reality reconstruction, integrated scanning, mobile LiDAR, and holographic or surface-visualization techniques demonstrate this expanding forensic capability.^{47,48} These benefits, however, also introduce corresponding integrity risks because the evidentiary representation may depend on device calibration, software processing, reconstruction parameters, manual modifications, and interpretive decisions. A visually persuasive reconstruction may therefore appear more certain than the underlying measurements or assumptions justify.

The legal implication is that evidentiary integrity cannot be established merely by demonstrating the existence of a three-dimensional representation. The record should preserve the source data, acquisition device, relevant calibration or validation information, processing software and version, processing history, manual modifications, documented limitations or uncertainties, and the relationship between measured data and reconstructed elements.⁴⁹ These requirements support identity, scientific reliability, traceability, and accountability.^{50,51} Prosecutorial oversight should ensure this information is preserved and disclosed when legally relevant, while qualified forensic specialists remain responsible for the reconstruction's scientific validity and interpretation.

⁴⁶ Helmina Helmina et al., “Compromising and Repositioning the Meaning of Corruptors as Thieves in Applying the Provisions of Shara’ into the Modern Era Context,” *Al-’Adalah* 21, no. 1 (2024): 25–52, <https://doi.org/10.24042/adalah.v21i1.21251>.

⁴⁷ Carew et al., “3D Forensic Science: A New Field Integrating 3D Imaging and 3D Printing in Crime Reconstruction”; Galanakis et al., “A Study of 3D Digitisation Modalities for Crime Scene Investigation”; J. Wang et al., “Virtual Reality and Integrated Crime Scene Scanning for Immersive and Heterogeneous Crime Scene Reconstruction,” *Forensic Science International* 303 (2019): 109943, <https://doi.org/10.1016/j.forsciint.2019.109943>; S. Kottner et al., “Using the iPhone’s LiDAR Technology to Capture 3D Forensic Data at Crime and Crash Scenes,” *Forensic Imaging* 32 (2023): 200535, <https://doi.org/10.1016/j.fri.2023.200535>.

⁴⁸ Abdel Wahab, “Implications of Using Hologram Technology at the Crime Scene to Reduce the Phenomenon of Crime Reenactment”; H. Fukuda et al., “From 3D Surface Documentation to Visualization in Forensic Practice: A Review of Current Methods and Emerging Technologies,” *APMIS* 134, no. 4 (2026): e70215, <https://doi.org/10.1111/apm.70215>.

⁴⁹ Nur Faizah, “The Spiritualization of Domestic Violence in the Digital Era: Examining the Cathartic Role of Religious Institutions in Empowering Victims,” *De Jure: Jurnal Hukum Dan Syari’ah* 15, no. 2 (2023): 251–267, <https://doi.org/10.18860/j-fsh.v15i2.23297>.

⁵⁰ Umi Enggarsasi et al., “Legal Safeguards for Victims of Data Dissemination Crimes and Cybercrime Protection,” *Jurnal Hukum* 40, no. 2 (2024): 258–277, <https://doi.org/10.26532/jh.v40i2.39974>.

⁵¹ Emiliya Febriyani and Tantimin Tantimin, “Legal Challenges of Asset Misappropriation in the Digital Era,” *Nurani: Jurnal Kajian Syari’ab Dan Masyarakat* 25, no. 1 (2025): 141–156, <https://doi.org/10.19109/nurani.v25i1.26821>.

Scientific Reliability, Human Factors, and Prosecutorial Neutrality

Comparative admissibility doctrine, as illustrated in *Frye v. United States*, demonstrates why reliable governance must begin before trial.⁵² *Frye* established that scientific evidence is associated with "general acceptance" within the relevant field. *Daubert v. Merrell Dow Pharmaceuticals, Inc.* extended this principle by requiring judges to make a flexible determination of evidence reliability under the Federal Rules of Evidence.⁵³ *Daubert* also identified considerations that courts may use when evaluating the reliability of scientific or technical evidence, including testability, peer review and publication, error rates, standards governing the use of techniques and methods, and general acceptance. *Kumho Tire Co. v. Carmichael* further established that the courts' gatekeeping function applies to technical and other specialized knowledge as well as conventionally scientific testimony.⁵⁴ In 2023, an amendment to Federal Rule of Evidence 702 clarified that the proponent must establish, more likely than not, that the expert satisfies the admissibility criteria and that the opinion reflects a reliable application of applicable principles and methods to the specific facts.⁵⁵ While these federal rules do not apply in Jordan, their comparative utility lies in focusing attention upon whether the methods used were validated; whether the examiners who conducted the examinations were qualified; whether standards and controls existed over both the method and personnel; whether limitations and errors were known and communicated; whether the correct methodology was selected and properly applied; and whether the analytical process could be reconstructed. Similarly, major scientific reviews by the National Research Council and PCAST noted concerns about the foundations of many forensic disciplines.⁵⁶ In addition, Dror, Kloosterman, and others demonstrated the challenges inherent in defining, estimating, and reporting error rates in forensic science.⁵⁷ Thus, this analysis

⁵² *Frye v. United States* (1923).

⁵³ *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993), <https://www.govinfo.gov/app/details/USREPORTS-509/USREPORTS-509-579>.

⁵⁴ *Kumho Tire Co. v. Carmichael*.

⁵⁵ Federal Rule of Evidence 702: Testimony by Expert Witnesses.

⁵⁶ National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (National Academies Press, 2009), <https://doi.org/10.17226/12589>; President's Council of Advisors on Science and Technology, *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (Executive Office of the President, 2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf.

⁵⁷ I. E. Dror, "The Error in 'Error Rate': Why Error Rates Are So Needed, Yet So Elusive," *Journal of Forensic Sciences* 65, no. 4 (2020): 1034–39, <https://doi.org/10.1111/1556-4029.14435>; A. Kloosterman et al., "Error Rates in Forensic DNA Analysis: Definition, Numbers, Impact and Communication," *Forensic Science International: Genetics* 12 (2014): 77–85, <https://doi.org/10.1016/j.fsigen.2014.04.014>.

suggests that scientific reliability must be addressed systematically before evidence is introduced in court.

Forensic integrity also has an ethical dimension. The U.N. Guidelines on the Role of Prosecutors list many ethical responsibilities, including fairness, impartiality, consistency, respect for human dignity, respect for human rights, and prosecutorial responsibility when evidence is believed to have been acquired by illegal means.⁵⁸ Similarly, the Minnesota Protocol lists several principles important to independent and impartial investigations of potentially unlawful deaths, including independence, impartiality, competence, thoroughness, and transparency.⁵⁹ Institutional protections are important in these circumstances because such cases may involve victims, bodies, minors, individuals with disabilities, victims of sexual offenses, or significant amounts of personal digital information.⁶⁰ The technical capability to access such information does not permit unrestricted access.

The importance of institutional protections for reliability is further reinforced by research on cognitive bias in forensic decision-making and ISO requirements regarding impartiality.⁶¹ As noted above, NIST views error prevention in forensic DNA interpretation as an outgrowth of institutional policies and practices, the decision environment, and quality control.⁶² This same type of reasoning applies to the entire forensic lifecycle under Kessler's governance perspective.⁶³ These materials provide benchmarks for assessing whether prosecutorial responsibilities relating to transparency, integrity, and accountability have been

⁵⁸ United Nations, *Guidelines on the Role of Prosecutors*, Eighth United Nations Congress on the Prevention of Crime and the Treatment of Offenders (Havana, Cuba, 1990), <https://www.ohchr.org/Documents/ProfessionalInterest/prosecutors.pdf>.

⁵⁹ Office of the United Nations High Commissioner for Human Rights, *The Minnesota Protocol on the Investigation of Potentially Unlawful Death (2016)* (United Nations, 2017), <https://www.ohchr.org/Documents/Publications/MinnesotaProtocol.pdf>.

⁶⁰ Trianah Sofiani et al., "Violence Against Women in Pre-Marital Relationships: The Ngemblok Tradition among the Muslim Community in Rembang," *Journal of Islamic Law* 5, no. 2 (2024): 147–69, <https://doi.org/10.24260/jil.v5i2.2680>.

⁶¹ L. J. Curley et al., "Assessing Cognitive Bias in Forensic Decisions: A Review and Outlook," *Journal of Forensic Sciences* 65, no. 2 (2020): 354–60, <https://doi.org/10.1111/1556-4029.14220>; I. E. Dror and M. L. Pierce, "ISO Standards Addressing Issues of Bias and Impartiality in Forensic Work," *Journal of Forensic Sciences* 65, no. 3 (2020): 800–808, <https://doi.org/10.1111/1556-4029.14265>.

⁶² Expert Working Group on Human Factors in Forensic DNA Interpretation, *Forensic DNA Interpretation and Human Factors: Improving Practice through a Systems Approach*.

⁶³ M. P. Kessler, "From Bias Awareness to Governance Control: Regulating Human Factors across the Forensic Science Evidence Lifecycle," *Journal of Forensic Sciences* 71, no. 4 (2026): 1547–1555, <https://doi.org/10.1111/1556-4029.70319>.

adequately fulfilled.⁶⁴ Prosecutors may therefore be held accountable for compliance with both substantive legal requirements and applicable procedural obligations. Their governance role in the use of forensic science should extend to ensuring that appropriate procedures are followed, that relevant documentation is obtained and preserved, that procedural or integrity concerns arising during collection and examination are identified and addressed, that reliability information is available for judicial scrutiny, and that disclosure obligations are satisfied. This role, however, should not extend to scientific interpretation. Prosecutors should neither determine forensic conclusions nor direct experts toward a particular result. Qualified forensic professionals remain responsible for selecting and applying scientific methods, conducting forensic examinations, and interpreting findings.

The Prosecutorial Integrity and Digital Evidence Governance Model

Introducing specialized governance mechanisms also requires a clear Jordanian legal framework; scholarship in other specialized fields has similarly emphasized the importance of defining the relationship between specialized mechanisms and the jurisdiction of ordinary courts.⁶⁵ In this context, PIDEG should therefore operate as a governance and oversight mechanism within the existing criminal-justice structure, not as an alternative source of adjudicative authority. This study's principal contribution is the development of the PIDEG Model. PIDEG is a conceptual digital-evidence governance framework derived from doctrinal analysis of Jordanian criminal-procedure law and the subsequent standards-based assessment. It should therefore be understood as a theoretical governance model rather than an empirically validated or operationally tested system. Its six control layers are designed to address the identified gaps relating to legality, identity, continuity, scientific reliability, traceability, and accountability.

Table 1. Prosecutorial Integrity and Digital Evidence Governance (PIDEG) Model

PIDEG control layer	Legal basis	International benchmark	Required control	Identified gap	Analytical criterion	Rationale
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⁶⁴ Deni Setiyawan et al., “Law Enforcement of Sexual Violence on Social Media: An Islamic Restorative Justice Perspective,” *De Jure: Jurnal Hukum Dan Syar’iah* 17, no. 1 (2025): 90–111, <https://doi.org/10.18860/j-fsh.v17i1.28185>.

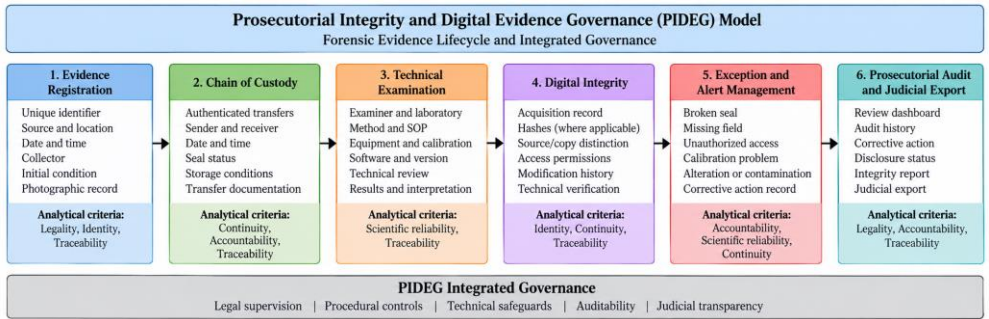
⁶⁵ A. Jararweh and Y. M. G. Obeidat, “Judicial Jurisdiction in Resolving Disputes Arising from Professional Sports Contracts,” *Legality: Jurnal Ilmiah Hukum* 34, no. 1 (2026): 321–341, <https://doi.org/10.22219/ljih.v34i1.43700>.

Evidence Registration	Articles 48, 160-161	ISO 21043-2; OSAC	Unique identifier; source; location; date/time; collector; initial condition; photographs	No uniform lifecycle-registration requirement identified	Identity; legality; traceability	Establishes verifiable identity and provenance
Chain of Custody	Article 48	ISO 21043-2; chain-of-custody literature	Authenticated transfers; sender/receiver; date/time; seal status; storage; digital authentication	General authority does not specify standardized authenticated transfer records.	Continuity; accountability; traceability	Permits independent reconstruction of possession and transfer
Technical Examination	Articles 160-161	ISO 21043-3; ISO/IEC 17025; ILAC-G19	Examiner; laboratory; method/SOP; equipment; calibration; software/version; review	Scientific evidence is recognized without detailed technical traceability requirements.	Scientific reliability; traceability	Documents the technical basis and reviewability of examination
Digital Integrity	Regulation No. 96 of 2018	ISO/IEC 27037, 27041, 27042, 27043	Acquisition record; hashes where applicable; source/copy distinction; permissions; modification history	Technological use is recognized without a complete digital-integrity lifecycle.	Identity; continuity; traceability	Protects digital provenance and reveals unexplained alteration
Exception and Alert Management	General prosecutorial authority	ISO 21043; ISO/IEC 17025; contamination guidance	Broken seal; missing field; unauthorized access; calibration problem; alteration;	No standardized system identified for documenting and escalating	Accountability; scientific reliability; continuity	Converts irregularities into documented and reviewable events

			contaminati on	deviations .		
Prosecut orial Audit and Judicial Export	Articles 48, 160- 161	Lifecycle and quality- assurance benchmar ks	Review dashboard; audit history; corrective action; disclosure status; integrity report	No consolidat ed lifecycle audit requireme nt identified	Legality; accountabi lity; traceability	Links operationa l governanc e with judicial scrutiny

Source: Author's analysis based on Jordanian criminal procedure and international forensic standards.

Figure 1 depicts the PIDEГ Model as part of an integrated digital evidence-management system that supports evidence collection, processing, and analysis by providing chain-of-custody status, integrity verification, case information, exception alerts, and prosecutorial review. This is a conceptual prototype, not a working version, of what the Government of Jordan could use to implement its evidence-management processes. The PIDEГ Model separates responsibilities. Specifically, it requires prosecutors to ensure that procedures are followed lawfully and that any exceptions have been properly identified. Qualified forensic scientists ensure the scientific validity and accuracy of their interpretations.



Source: Author's conceptual design.

Figure 1. Illustrative Digital Interface for the Prosecutorial Integrity and Digital Evidence Governance (PIDEГ) Model

Evidence Registration and Digital Chain of Custody

The first step is to assign each piece of evidence a unique identification number as soon as possible after it has been collected. Next, link this ID to all other details: where the evidence was found, when it was located, who collected it, its original condition, and all photographs taken immediately upon collection. Using barcode or QR code technology can minimize transcription errors by

automatically creating a field for the ID. If an item enters the system without authenticating documentation, such as proof of integrity, the user cannot complete the information entry. During every handoff or transfer of items, documentation must be created to record the individuals transferring and accepting the items, the time and date of the exchange, where the items were stored, whether they were sealed, and previous transfers. None of these prior records should be capable of being altered or deleted. Any corrections must create new records to maintain an accurate record of all events and preserve the original chain-of-custody history. The chain of custody can then evolve from a series of signatures to a documented timeline of events.

Technical Validation and Exception-Based Supervision

Every analysis must include the technical data needed to establish traceability. What those data include depends on the field, for example, the method or standard operating procedure, qualifications of the analyst/examiner, laboratory ID, equipment ID, calibration status, software name/version, quality-control parameters, and/or technical or peer review. PIDEG's structure aligns with international requirements in ISO 21043-3:2025, ISO/IEC 17025:2017, and ILAC-G19, as well as discipline-specific requirements. A prosecutor's review does not confirm the correctness of a scientist's results. It confirms whether the proper, documented procedures were followed and, if so, whether any procedural deviations raise sufficient concern about the evidence's legal reliability to warrant further technical review, corrective action, independent examination, disclosure, or other legal action.

Audit Trail and Judicial Transparency

The purpose of this Model is not simply administrative efficiency in terms of judicial procedure, but also greater judicial transparency. The System will provide an Integrity Report that traces key activities, from the crime scene to the Court, including evidence handling, custody, examinations, deviations from standard procedures, corrective measures taken, and disclosure status.⁶⁶ In addition to knowing who had the physical evidence at any time and any transfers of evidence that occurred, judges and parties need to know which examinations were performed and whether any irregularities were identified and corrected. A better-organized System for Prosecution can improve the quality of its case by providing a solid procedural record, while also allowing Defense Attorneys to identify real errors.

⁶⁶ Khoiruddin Nasution et al., "The Judicial Interpretation of 'Very Urgent Reasons': Child Protection, Family Morality, and Marriage Dispensation in Indonesia," *Journal of Islamic Law* 7, no. 2 (2026): 329–360, <https://doi.org/10.24260/jil.v7i2.4295>.

Proposed Legislative and Institutional Reform

The reforms proposed below are normative recommendations derived from the regulatory and institutional gaps identified in the preceding doctrinal and standards-based analysis. They should not be interpreted as empirical findings concerning the operational performance of Jordanian institutions. Each recommendation is linked to a specific gap identified earlier in the study.

National Forensic Evidence Integrity Protocol

Because the analysis identified a lack of standardized lifecycle requirements linking prosecutorial authority with evidence identification, continuity, scientific reliability, traceability, and accountability, Jordan should establish a National Forensic Evidence Integrity Protocol for public prosecution offices, judicial police, crime-scene units, forensic laboratories, and evidence-storage facilities. It is essential to distinguish minimum legal safeguards from discipline-specific technical requirements. This would allow operational standards to be updated without amending primary criminal-procedure legislation each time.

Digital Evidence-Management Architecture

Although Regulation No. 96 of 2018 recognizes the use of technology in criminal procedure, it does not establish a comprehensive framework for digital evidence integrity. This gap supports the need for a national digital evidence management system. It should include authenticated identity verification, role-based access rights, mandatory evidence fields, secure timestamping, digital custody records, audit trails, backup and cybersecurity controls, and exception alerts.⁶⁷ This system should manage digital and physical evidence through distinct technical workflows, preserving requirements for digital-data acquisition, forensic copies, cryptographic integrity, and software-dependent examination.

Prosecutorial Training, Audit, and Quality Review

The analysis identifies a gap between general prosecutorial authority and the technical knowledge required to recognize integrity risks and procedural deficiencies, indicating that prosecutorial training should extend beyond the basic principles of evidence admissibility. Prosecutors need sufficient scientific literacy to recognize contamination risks, understand validation, assess custody problems, identify limitations of digital evidence, and determine when independent technical assistance is required. Internal audit and quality review

⁶⁷ A. Ehjelah et al., "IT Audit and the Legal Responsibilities of Digital Platformo Managers: A Comparative Study," *EDPACS*, 2026, 1–10, <https://doi.org/10.1080/07366981.2026.2688576>.

should also become part of evidence-integrity governance so that recurring deviations are identified as indicators of systemic weakness rather than isolated mistakes.

Regional Cooperation

Cross-border cybercrime and transnational investigations may require evidence to move between jurisdictions with different procedural and technical standards. Regional cooperation should therefore promote compatible minimum safeguards for evidence identification, secure transfer, digital custody, documentation, technical validation, and auditability without requiring the harmonization of substantive criminal law. A future Arab forensic-integrity framework could improve interoperability while allowing each country to retain its own rules of criminal procedure and admissibility.

CONCLUSION

This study found that Jordan's principal issue is not a lack of prosecutorial authority, but a gap between existing criminal procedure provisions and the need for an integrated, continuously auditable mechanism to protect forensic evidence throughout the evidentiary lifecycle. Articles 48, 160, and 161 of the Code of Criminal Procedure, together with Regulation No. 96 of 2018, provide a legal basis for investigative supervision, scientific evidence, and the use of technology in criminal proceedings. However, the analysis showed that these provisions do not establish sufficiently detailed operational requirements for evidence identification, continuity, scientific reliability, traceability, accountability, digital integrity, exception management, or lifecycle auditing. To address these gaps, the PIDEG Model proposed in this study integrates several evidence-governance mechanisms, including registered evidence, authenticated chain-of-custody documentation, technical examination records, digital-integrity controls, exception and alert management, prosecutorial audit, and judicial export functions. Its purpose is to translate general supervisory authority into specific lifecycle governance processes while preserving institutional competence. Prosecutors would remain responsible for ensuring compliance with applicable legal and procedural requirements relating to legality, procedural integrity, accountability, disclosure, and oversight, while qualified forensic specialists would retain responsibility for scientific validation, examination, and interpretation. From an academic perspective, the study brings together prosecutorial oversight, forensic evidence integrity, digital governance, quality assurance, and scientific independence within a single lifecycle-based analytical framework. Its contribution, however, is limited by its reliance on legislation, comparative legal materials, technical standards, institutional guidance, and

published scientific literature. It does not provide empirical evidence concerning the operational effectiveness of Jordanian institutions and therefore cannot establish whether the PIDEG Model would be effective, usable, or generalizable in practice. Future research should therefore pilot the model in operational settings, evaluate its effects on documentation and chain-of-custody errors, assess cybersecurity and usability, and obtain structured feedback from prosecutors, judges, defense lawyers, forensic scientists, digital investigators, and crime-scene personnel.

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AUTHOR CONTRIBUTIONS STATEMENT

MB conceived the study, conducted the doctrinal, legal, and comparative analysis, and developed the conceptual framework and the proposed PIDEG Model. MH contributed to the critical review and refinement of the legal analysis and manuscript. DN contributed to the critical review, interpretation of the legal framework, and revision of the manuscript. MB, MH, and DN reviewed and approved the final version of the manuscript.

AI USAGE STATEMENT

The authors declare that no artificial intelligence tools were used in the conception, preparation, analysis, writing, editing, or revision of this manuscript.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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