

Ordinal 15: Proof-of-Unchanged Zero-Custody Audit Reproducibility Trial

Anchoring software: AuditLog.AI

Auditing software: QMSv5 Auditor

Mode: Zero-custody | Human-verified | Machine-deterministic

Version: v5 (International audit trial public deployment)

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Description

Ordinal 15 is a pre-registered, time-bounded audit reproducibility trial evaluating whether exported clinical and regulatory evidence can be proven unchanged over time using hash-only, zero-custody verification.

It addresses a fundamental audit question:

After evidence is exported and statistical analyses are completed, how can one prove—rather than assume—that the analysed data have not changed, and that errors or misconduct have not been silently introduced?

The audit trial addresses a fundamental audit question:

After evidence is exported and statistical analyses are completed, how can one prove, rather than assume, that the analysed data have not changed, and that errors or misconduct have not been silently introduced?

For a defined verification window (10 weeks in Q2 2026), eligible institutions will be granted access to:

1) Anchoring software: AuditLog.AI

2) Auditing software: QMSv5 Auditor

No evidence files, filenames, directory paths, or metadata are transferred at any point.

Objective

To determine whether Proof-of-Unchanged can function as a system-independent, institution-agnostic audit primitive under real-world regulatory and governance conditions.

Verification Arms

1) Stage IV audit reproducibility (hash-only)

Hash-only QMS verification outputs for the complete Stage IV audit, comprising:

- 230,253 evidence file verifications; and
- 21,966 Evidence Set Fingerprint (ESF) membership verifications.

The full analysis dataset is publicly available as:

Telles, Fernando (2026), "Stage IV Audit Reproducibility Dataset (HVT-A): Deterministic Hash-Based Verification and Human Verification Time Outputs", Mendeley Data, V1, doi: 10.17632/fzw4pzkd83.1

2) Pre-registered falsification test of post-export disclosure integrity

A deterministic comparison between:

- Baseline evidence states cryptographically frozen and time-anchored at study completion; and
- Post-analysis datasets independently time-anchored following statistical analysis.

Participants may use QMSv5 Auditor to perform hash-only comparison between these anchored states, yielding either:

- 1) Proof-of-Unchanged, or
- 2) Explicit byte-level enumeration of divergence.

This test serves as a concrete audit analogue to post-export verification in clinical trials and regulatory submissions.

Included verification artefacts:

The machine-deterministic Human Verification Time (HVT-A) reports generated for this test are included in full at the end of this Ordinal record:

- Node_02_HVT_A_REPORT_QMSv5_20260201T204200Z.pdf
- Node_03_HVT_A_REPORT_QMSv5_20260201T205658Z.pdf

These reports contain the complete hash-only verification outputs and are sufficient to independently verify disclosure integrity against the publicly released Supplementary Material:

Telles F. Supplementary Materials for Stage IV Cryptographic Audit Validation: Methods, Protocols, and Reproducibility Outputs. Zenodo; 2026.

<https://doi.org/10.5281/zenodo.18446261>

Independent re-execution (optional):

Registered institutions may alternatively reproduce the verification de novo with the released hash-only packets corresponding to this disclosure integrity test, using QMSv5 Auditor software.

Zero-custody export packets to enable third-party verification without access to raw evidence or execution environments are available as:

Telles, Fernando (2026), "Ordinal 15 Zero-Custody Disclosure Integrity Verification Packets", Mendeley Data, V1, doi: 10.17632/wjj674twb4.1

Independent Verification

Eligible participants are invited to independently:

- Recompute cryptographic identifiers from their retained evidence exports;
- Verify equivalence or divergence against pre-anchored reference states; and
- Assess whether Proof-of-Unchanged holds under their own custody, infrastructure, and governance constraints.

All verification outcomes are reproducible without continued system participation.

Eligibility

Participation is restricted to:

- Contract Research Organizations (CROs); and
- Accredited academic or research institutions.

Participants must have custodial responsibility for regulated, inspectable, or compliance-relevant evidence.

Constraints

- Participation requires registration and is limited to a pre-specified 10-week verification window (April – July 2026)
 - No PHI/PII ingestion. Proof-only, hash-based zero-custody data flow.
 - No clinical diagnosis/therapy. Software does not inform medical decisions.
 - No overwriting of audit history. Append-only ledgers. Immutable cryptographic blockchain anchoring.
 - Software access, induction, and operational support are provided by Cardiovascular Diagnostic Audit & AI Pty Ltd (Melbourne, Australia)
-

This record is intentionally limited to machine-deterministic verification outputs and anchored lineage, and does not describe system architecture, intended use, or regulatory positioning, which are documented separately.

HVT-A Report – QMS v5 (Zero-Custody, Hash-Only)

Compare dir: C:\IV\Integrity_Assurance\NODE02_SOURCE_VS_COMPLETED

Generated (UTC): 2026-02-01T20:42:00Z

1) Machine compare summary

```
{
  "ts_utc": "2026-02-01T20:39:34Z",
  "inputs": {
    "source_run_root": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node02_HVT_A_SOURCE",
    "windows_run_root": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node02_HVT_A_COMPLETED",
    "source_global_path": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node02_HVT_A_SOURCE\\\\02_AUDIT_HASHES\\\\HASHES_GLOBAL.ndjson",
    "windows_global_path": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node02_HVT_A_COMPLETED\\\\02_AUDIT_HASHES\\\\HASHES_GLOBAL.ndjson"
  },
  "counts": {
    "source_total_rows_read": 498,
    "windows_total_rows_read": 492,
    "source_valid_rows": 498,
    "windows_valid_rows": 492,
    "source_invalid_rows": 0,
    "windows_invalid_rows": 0,
    "distinct_pairs_union": 404,
    "missing_count": 10,
    "extras_count": 4
  },
  "fingerprints": {
    "source": {
      "sha256_fingerprint": "f90870549d834fc83a9a17cc82-bea144d96a6a22049ff3411343903c097d537c",
      "ripemd160_fingerprint": "c0d4d40e935133dc8b52e07461892103afc5a1e3"
    },
    "windows": {
      "sha256_fingerprint": "8f8ceb827881ded8307d396282d3c7add0a32aa6e60cb6e-b539c3c5b985e060",
      "ripemd160_fingerprint": "0cece979c94f7039d84951f2bbb67f65161dc10f"
    },
    "match": false
  },
  "duplicates": {
    "source": {
      "keys_with_duplicates": 24,
      "duplicate_instances": 98
    },
    "windows": {
      "keys_with_duplicates": 24,
      "duplicate_instances": 98
    }
  },
  "policy": {
    "source": {
      "keys_with_duplicates": 24,
      "duplicate_instances": 98
    },
    "windows": {
      "keys_with_duplicates": 24,
      "duplicate_instances": 98
    }
  }
}
```

```

    "comparison_key": "(sha256,ripemd160) multiset",
    "paths_ignored": true,
    "names_ignored": true,
    "strict": true,
    "fail_on_invalid": true,
    "invalid_rows_quarantined": true,
    "diff_output_sorted": true,
    "diff_rows_include_samples": true
},
"result": "HASH PARITY FAIL",
"artifacts": {
    "summary": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE02_SOURCE_VS_COMPLETED\\\\COM-
PARE_SUMMARY.json",
    "missing": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE02_SOURCE_VS_COMPLETED\\\\MISS-
ING_GLOBAL.ndjson",
    "extras": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE02_SOURCE_VS_COMPLETED\\\\EX-
TRAS_GLOBAL.ndjson",
    "invalid_source": null,
    "invalid_windows": null
}
}
}

```

2) Evidence hash-set diff (canonical)

- Missing hash pairs: 10
- Extra hash pairs: 4

| # | diff_type | sha256 | ripemd160 |
|---|-----------|---|--|
| 1 | missing | 49726ba5d5907528b4f fc8020f4b25b4b66a0c 66239f6cf1c5843ec14 1e7e905 | 2d56c0663ce8f604570 663a030d39b- d0e0af9bb0 |
| 2 | missing | 4d- d3a552cec2851da4699 f3c0f1468703bad2489 ab5231deed10036882a 4aa4d | 9b1f5bc53e4d91cbd- f97b- b9e247988a54266cb8 7 |
| 3 | missing | 4e29de01bad24b- f2b1a428752ca11da44 8ad- d2121ec69be75acb- f9f54bf83d18 | 8eec3ab7de- fe834c1f21c4- fa7e10cf253a6e6bd2 |
| 4 | missing | 4e53f546d42d5651d9d 385384c1fe9d607f6f7 39335e66e9b604842be 1b1a140 | 78ead3c3409e58f02ac 3e435784adb5- fae366b91 |

| # | diff_type | sha256 | ripemd160 |
|----|-----------|---|---|
| 5 | missing | 6e673723bfcecd- fa0a57286c3b7b49474 3c602f- beae70f57a6f7a3d4b4 a1f082 | 4d3b7e43e0c412cf058 64295194750e16d2501 2c |
| 6 | missing | 77f9f2f34c3093129b4 2de9dc9918014ae- f2f1f08c0212f14e- f128ae9ab7dc0a | 9f41aba69c97fee6c71 5c- cc24642c717e54bacb f |
| 7 | missing | 90804e154c7483da131 8d60d766fd- d4f1d573e751ffd4b- b7b612a95551573a68 | 5f61d6e5a919ed- d4b461b49d955b73f8e 5cf6669 |
| 8 | missing | 9572d5bba86- fa48030bf8746e3cd- b0ad- ff0cac88d486ff17651 9f7d2867c7b0d | 1ea24b0a47b5011ba8c a7ac2f- b5e1c772825011b |
| 9 | missing | b0b9032374427875f52 322999b92- cedaee67b4e51c94479 0946f900de4e6fde9 | 170b743b7d949a257a7 ab2a3d7cf7e- b8b8786c1e |
| 10 | missing | da088f1c1109b5cb451 718442f1de6ed891583 cdab- d3f9f85253aa4624e7a be4 | fe3ff86da6a6ad046ea 33d78170da76d3e7a91 e4 |
| 1 | extra | 00c7279c9552e83f189 2b91c81699e7431b- dac09de19dfd5b5484- ab3a04862c6 | a935c9fbe013097205- fa189896a748463e503 9f9 |
| 2 | extra | 1e3257e49a6abe9465a 0a4d31183c491ffd9e- ba0ba5017ecf1c11d53 9ab4917f | aef6c- cd2a6b7583c58180ff2 25829b90e11fb4d4e |
| 3 | extra | 67e0ed9ff5f- b267b7a9fe5430d6213 d8800ac572590648ada 40b73674cf5753d | bb8513728ae2da3fcba- de39d- f9c2299e4697c42d7 |

| # | diff_type | sha256 | ripemd160 |
|---|-----------|---|--|
| 4 | extra | 7103116aa0-fa4a82d43c6c02cecda335e76457117c07b360f0f0aa7db1935ccd | 6555fb0bfd- cb01353f7f17b72fe3e e87a66b196 |

3) Manifest container divergence (ESF set)

```
{
  "ts_utc": "2026-02-01T20:39:55Z",
  "result": "ESF SET NOT EQUIVALENT",
  "baseline_esf_rows": 84,
  "audit_esf_rows": 84,
  "baseline_distinct_esf": 84,
  "audit_distinct_esf": 84,
  "baseline_only_count": 4,
  "audit_only_count": 4,
  "baseline_esf_packet": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_ESF_Node02_HVT_A_SOURCE\\\\ESF_SET_QMS.ndjson",
  "audit_esf_packet": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_ESF_Node02_HVT_A_COMPLETED\\\\ESF_SET_QMS.ndjson",
  "out_diff_ndjson": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE02_SOURCE_VS_COMPLETED\\\\ESF_SET_DIFF_QMS.ndjson",
  "policy": {
    "qms_safe": true,
    "container_identity": "(esf_sha256, row_pairs) multiset",
    "paths_ignored": true,
    "names_ignored": true
  }
}
```

| # | side | esf_sha256 | row_pairs |
|---|---------------|--|-----------|
| 1 | BASELINE_ONLY | 43b86a2c1928c3414a41ad30c6fd63d-fab8ee6301f4ecd6d-b685ce9153537b67 | 13 |
| 2 | BASELINE_ONLY | 83b-d4f9f23f95079b8a582d5d5559d030fd75b12920298d-d3493ec975f2e03e6 | 2 |
| 3 | BASELINE_ONLY | 8df065f297eefed9184e7ee0301d98f3bb16801de-f8e7e805f3ff69bc5280df4 | 2 |

| # | side | esf_sha256 | row_pairs |
|---|---------------|--|-----------|
| 4 | BASELINE_ONLY | e4528c4f316716bd- f38ca30ed009d- b3d435d9e945f- b053a23f9d- f9c367aa1783 | 13 |
| 5 | AUDIT_ONLY | 310e5d117028198d023 98b- b4784f2314595f18674 53e5c124d- ccc1102c1815fe | 9 |
| 6 | AUDIT_ONLY | 4a125800e85350c1177 a551c9b97371cbacab6 c9e51565c- ccc39c37b5b294950 | 2 |
| 7 | AUDIT_ONLY | 85b27b6a64d239c8ce4 31a6b48b9cf2f0c83f3 28425e982ae155e80b8 fd34f55 | 11 |
| 8 | AUDIT_ONLY | da6ec3e26e209a16c5d 51b4d26e405a91e26d5 1d5b82acb688ae90f07 3c36143 | 2 |

4) HVT-A completion statement

Completion of this report (hash-set diff + ESF divergence) constitutes **HVT-A complete**. No file-names, paths, or raw evidence are required for HVT-A.

HVT-A Report – QMS v5 (Zero-Custody, Hash-Only)

Compare dir: C:\IV\Integrity_Assurance\NODE03_SOURCE_VS_COMPLETED

Generated (UTC): 2026-02-01T20:56:58Z

1) Machine compare summary

```
{
  "ts_utc": "2026-02-01T20:20:59Z",
  "inputs": {
    "source_run_root": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node03_HVT_A_SOURCE",
    "windows_run_root": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node03_HVT_A_COMPLETED",
    "source_global_path": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node03_HVT_A_SOURCE\\\\02_AUDIT_HASHES\\\\HASHES_GLOBAL.ndjson",
    "windows_global_path": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_PACKET_Node03_HVT_A_COMPLETED\\\\02_AUDIT_HASHES\\\\HASHES_GLOBAL.ndjson"
  },
  "counts": {
    "source_total_rows_read": 433,
    "windows_total_rows_read": 433,
    "source_valid_rows": 433,
    "windows_valid_rows": 433,
    "source_invalid_rows": 0,
    "windows_invalid_rows": 0,
    "distinct_pairs_union": 328,
    "missing_count": 0,
    "extras_count": 0
  },
  "fingerprints": {
    "source": {
      "sha256_fingerprint": "73acf88dbd3184090644f2b12fd5be2b70f8884907a1c-c8d6752d89774775f1a",
      "ripemd160_fingerprint": "cf1d9b39d940c421fdaf7749fc1ec359d2557b64"
    },
    "windows": {
      "sha256_fingerprint": "73acf88dbd3184090644f2b12fd5be2b70f8884907a1c-c8d6752d89774775f1a",
      "ripemd160_fingerprint": "cf1d9b39d940c421fdaf7749fc1ec359d2557b64"
    }
  },
  "match": true
},
  "duplicates": {
    "source": {
      "keys_with_duplicates": 18,
      "duplicate_instances": 105
    },
    "windows": {
      "keys_with_duplicates": 18,
      "duplicate_instances": 105
    }
  },
  "policy": {
}
```

```

    "comparison_key": "(sha256,ripemd160) multiset",
    "paths_ignored": true,
    "names_ignored": true,
    "strict": true,
    "fail_on_invalid": true,
    "invalid_rows_quarantined": true,
    "diff_output_sorted": true,
    "diff_rows_include_samples": true
},
"result": "HASH PARITY PASS",
"artifacts": {
    "summary": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE03_SOURCE_VS_COMPLETED\\\\COM-
PARE_SUMMARY.json",
    "missing": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE03_SOURCE_VS_COMPLETED\\\\MISS-
ING_GLOBAL.ndjson",
    "extras": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE03_SOURCE_VS_COMPLETED\\\\EX-
TRAS_GLOBAL.ndjson",
    "invalid_source": null,
    "invalid_windows": null
}
}
}

```

2) Evidence hash-set diff (canonical)

- Missing hash pairs: **0**
- Extra hash pairs: **0**

| # | diff_type | sha256 | ripemd160 |
|---|-----------|--------|-----------|
| | | | |

3) Manifest container divergence (ESF set)

```

{
    "ts_utc": "2026-02-01T20:21:07Z",
    "result": "ESF SET EQUIVALENT",
    "baseline_esf_rows": 84,
    "audit_esf_rows": 84,
    "baseline_distinct_esf": 84,
    "audit_distinct_esf": 84,
    "baseline_only_count": 0,
    "audit_only_count": 0,
    "baseline_esf_packet": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_ESF_Node03_HVT_A_SOURCE\\
\\ESF_SET_QMS.ndjson",
    "audit_esf_packet": "C:\\\\IV\\\\Integrity_Assurance\\\\ZC_ESF_Node03_HVT_A_COMPLETED\\
\\ESF_SET_QMS.ndjson",
    "out_diff_ndjson": "C:\\\\IV\\\\Integrity_Assurance\\\\NODE03_SOURCE_VS_COMPLETED\\
\\ESF_SET_DIFF_QMS.ndjson",
    "policy": {
        "qms_safe": true,
        "container_identity": "(esf_sha256, row_pairs) multiset",
        "paths_ignored": true,
        "names_ignored": true
    }
}

```

| # | side | esf_sha256 | row_pairs |
|---|------|------------|-----------|
|---|------|------------|-----------|

4) HVT-A completion statement

Completion of this report (hash-set diff + ESF divergence) constitutes **HVT-A complete**. No file-names, paths, or raw evidence are required for HVT-A.