

Standardizing Facility Data

From Rickety Registers to a Single Source of Truth

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Inconsistent facility data can be a silent tax on every asset decision your organization makes. This paper quantifies the cost of that problem, maps the full standards stack that already exists to address it, compares how five major sectors approach facility data standardization, diagnoses the six failure modes that most commonly derail standardization initiatives, and provides an eight-step practitioner roadmap that organizations can begin implementing next quarter. It draws on ISO 55001:2024, ISO 55013:2024, ISO 19650-3:2020, the GFMAM Asset Management Landscape (3rd ed., 2024), the IAM Anatomy of Asset Management (v4, 2024), PEMAC, the NAMS/IPWEA IIMM, and sector benchmarks from APPA, the City of Calgary, NHS England, and Prologis.

1. The Problem: Facility Data Is Broken Almost Everywhere

As already stated, inconsistent facility data can be a silent tax on every asset decision your organization makes — and the price is now measurable. The U.S. National Institute of Standards and Technology put the cost of poor data exchange in capital facilities at \$15.8 billion per year, with roughly two-thirds — approximately \$10.6 billion — borne by owners and operators in the operations and maintenance phase (Gallaher et al., 2004). Two decades later, NHS England's 2024–25 Estates Returns reports a maintenance backlog of £15.9 billion, built in part on data fields that its own analysts note are “reported with errors” and retrospectively amended (NHS England, 2024).

The strategic question is no longer whether to standardize facility data, but how to do so without joining the majority of data governance initiatives that, as data management practitioners have observed, “die on the vine” — or the 60–70 percent of (related or similar) CMMS implementations that fail for organizational, not technical, reasons (UpKeep, 2023).

1.1 The Three Symptoms Practitioners Recognise

Most facility managers, reliability engineers, and capital planners encounter the same three symptoms regardless of sector:

- “We own it, but we can’t find it.” Asset records are scattered across spreadsheets, legacy CMMS versions, paper O&M manuals, and people’s institutional memory.
- “The data doesn’t match reality.” Equipment has been moved, renamed, or replaced — but the register was never updated. Nameplate data may be available at best.
- “We don’t trust the numbers.” Facility Condition Indices built on Grade D data; capital plans based on inadequate best guesses; boards and auditors pushing back.

“Not knowing what one has is tantamount to playing a game of Russian roulette.”

— Carl March, *Life Cycle Engineering* (as cited in *Reliable Plant*, 2014)

1.2 The Economic Cost Is Well-Documented

Gartner estimates that poor data quality costs the average enterprise \$12.9 million annually (as cited in Dataversity, 2023). The “1×–10×–100× Rule” quantifies cost escalation: fixing a data error at the point of entry costs one unit; if undetected and propagated through systems, 10 units; at the point of a wrong capital decision, 100 units.

AssetFuture (2019) documented that data collection consumes up to 70 per cent of the total operational cost of information management. DNV’s structured information modelling work on a single offshore asset demonstrated savings of approximately \$50 million and a 50 per cent reduction in human errors (DNV, n.d.).

2. What “Standardizing Facility Data” Actually Means

Standardizing facility data is not a software project. It is an organizational discipline that produces three artefacts every experienced practitioner instinctively already half-recognizes:

- A shared asset hierarchy — Site > Building > System > Asset > Component, with every asset having a parent, and functional location decoupled from physical asset so equipment can be swapped without destroying maintenance history.
- A consistent naming and classification convention — e.g. Unifomat II® codes for capital and FCI, OmniClass for BIM/FM cross-referencing, ISO 14224 taxonomy for reliability engineering.
- An auditable data quality record — NAMS/IPWEA IIMM Confidence Grades A through E attached to every dataset class, with capital forecasts expressed as ranges with explicit confidence levels.

Done well, the register answers the six questions that should be answerable in seconds: What do we own? Where is it? What condition is it in? What does it cost? What depends on it? How confident are we in the answer?

Sandy Dunn of Assetivity (2022) frames the foundational principle plainly:

“Your asset register is the foundation on which its asset information systems are built. Dodgy foundations mean a rickety building.”

— Dunn, S. (2022). 5 Tips for a Better Asset Register. Assetivity.

3. The Standards Stack That Already Exists

Practitioners do not need to invent a framework. A coherent, interlocking set of standards now exists across six layers: strategy and governance, lifecycle process, handover and exchange, element classification, naming and hierarchy, and data quality assurance.

3.1 Strategy and Governance Layer

ISO 55001:2024 Clause 7.6 (“Data and Information”) sets the certifiable requirement, mandating both data and information specifications and a collection/quality improvement plan — the codification of an Asset Information Strategy in the requirements standard itself. ISO 55013:2024 (“Asset management — Guidance on the management of data assets”) elevates data to asset status:

“The role of data is changing from being a resource that supports management activities to a non-physical asset from which value is generated by being managed in a coordinated way, just like any other tangible or intangible asset.”

— ISO 55013:2024, Introduction

The GFMAM Asset Management Landscape, 3rd Edition (2024) organizes the discipline into Subject Area 5 (“Data and Information”), containing five subjects: AM Data and Information Strategy (5.1), Standards (5.2), Management (5.3), Systems (5.4), and Configuration Management (5.5). Subject 5.3 is cross-referenced by at least ten other subjects in the Landscape, confirming that data governance is a cross-cutting discipline, not a siloed IT concern. The IAM Anatomy of Asset Management, Version 4 (2024) elevates Capability 7 (Information Management) to a foundational enabler, positioned as one of three capabilities that underpin all other asset management capabilities in the 10-box model.

3.2 Lifecycle Process Layer

ISO 19650-3:2020 provides the operational-phase rulebook for built assets. Its terminology is now standard: Organizational Information Requirements (OIR) cascade into Asset Information Requirements (AIR), which feed Exchange Information Requirements (EIR) into contracts, producing a Project Information Model (PIM) during construction that hands over to an Asset Information Model (AIM) for operations. As Desapex (2024) notes, “AIM isn’t just a handover deliverable — it’s a long-term strategy.”

3.3 Handover and Exchange Layer

COBie (Construction Operations Building Information Exchange), maintained by the National Institute of Building Sciences (NIBS, n.d.), operationalizes ISO 19650-3 for North American projects. Its structured data sheets — covering Facility, Floor, Space, Zone, Type, Component, System, Job, Resource, Spare, Document, and Attribute — provide a standardized format for transferring asset data from contractor to owner at “practical” cost. Specifying COBie in every Exchange Information Requirement costs owners nothing up-front and prevents years of post-occupancy data recovery.

3.4 Classification and Naming Layer

Three systems carry the classification load for North American facility managers:

- Uniformat II (ASTM E1557) provides the functional element hierarchy — Level 1 categories A through G plus Z, drilling to Level 3 components — Level 4 allows for more detailed FCA and capital renewal forecasting, but there is no standard at this level.
- OmniClass provides 15 inter-related faceted tables (aligned to ISO 12006-2) covering Elements, Work Results, Products, Spaces, and Properties, and is embedded in most BIM authoring tools.
- MasterFormat carries the construction-specifications side (50 divisions, work-results based).
- ISO 14224:2016 adds a nine-level plant taxonomy (Industry > Business > Installation > Plant/Unit > System > Equipment > Subunit > Component > Part) widely used by reliability engineers for FMEA and RCM data collection.

The practical North American pattern: Unifomat for early design, cost planning, and FCI; MasterFormat for specifications and procurement; OmniClass as the multi-axis vocabulary that ties BIM and FM together; ISO 14224 for plant and equipment.

3.5 Data Quality Assurance Layer

The NAMS/IPWEA International Infrastructure Management Manual (IIMM, 6th ed.) provides a structured data confidence grading scale (A through E) that facility managers should apply to every dataset class, not just infrastructure assets:

Grade	Label	Accuracy	Description
A	Highly Reliable	±2%	Sound records, properly documented, dataset complete.
B	Reliable	±10%	Sound records with minor shortcomings, dataset mostly complete.
C	Uncertain	±25%	Incomplete or extrapolated from limited sample. Up to 50% extrapolated.
D	Very Uncertain	±40%	Unconfirmed verbal reports or cursory inspection only.
E	Unknown	N/A	No data or very little data held.

The strategic principle: capital forecasts should be expressed as ranges with explicit confidence grades — e.g., “10-year renewal need = \$42.6M ±25%, Grade C.” This is both more honest and more useful than a false-precision single-point estimate (NAMS/IPWEA, 2015).

4. How Different Sectors Approach the Same Problem

The same standards stack lands differently across market sectors. The contrasts are instructive.

4.1 K-12 Education

K-12 school districts operate at significant scale but with characteristically thin technical staffing. A 2025 found that 51 per cent of the general public is not confident their local school district knows the age and condition of its facilities, and 64 per cent are “not confident their local schools have the data to make informed decisions about upgrades.” The primary standardization driver is the Facility Condition Assessment and its capital reporting obligations. Katie Gramajo summarizes the stake:

“School buildings and facilities, like any physical asset, only continue to depreciate without appropriate maintenance, and waiting until problems reach a critical point leads to costly repairs that disrupt the learning environment.”

— Gramajo, K. (2025)

4.2 Higher Education

Higher education is the most benchmarked sector for facility data, anchored by APPA’s Facility Condition Index methodology (covering 377+ institutions, 450+ campuses, and approximately 1.5 billion gross square feet). As reported, deferred maintenance backlogs at public campuses

averaging \$108 per gross square foot — the first time the figure cleared the \$100/GSF threshold that is described as the point “where maintenance can no longer be pro-active.” Earlier findings remain the strongest causal evidence in the sector: campuses that consistently invested in planned and preventive maintenance achieved a 25 per cent reduction in total work orders. Even APPA acknowledges that FCI reliability is challenged by “variations in institutional definitions of components of the formula and problems with uniformity of data collection” (APPA, n.d.) — the standardization-of-the-standard problem.

4.3 Municipal Government

Municipal governments were pushed toward standardization by GASB Statement 34, which required state and local governments to inventory and report on infrastructure. The City of Calgary has become the leading North American exemplar: ISO 55000-based asset management policy adopted in 2011, an internal CAD standard adapted from MMCD ensuring data flows from design submittals into operational systems, and in 2025 the first Canadian city to deploy enterprise decision analytics across transportation, water, parks, and civic buildings in a single integrated system (City of Calgary, 2024, 2025).

4.4 Healthcare

Healthcare (Ontario). Ontario's hospital sector operates under one of the most data-driven capital funding frameworks in Canada. The Ministry of Health's Facility Condition Assessment Program (FCAP) conducts an ongoing cycle of third-party assessments across all eligible hospitals, producing condition data that directly determines each hospital's annual Health Infrastructure Renewal Fund (HIRF) allocation. The current provincial benchmark FCI score across all eligible Ontario hospitals is 0.21 — meaning the sector is carrying accumulated deferred maintenance equivalent to 21 cents on every dollar of current replacement value. The critical data governance point: hospitals must review and approve their FCAP data by December 15 each year to influence the following year's funding allocation. If the data isn't accurate, the funding case isn't defensible. In 2024, Roth IAMS was awarded the FCAP contract by the Ontario Ministry of Health, with existing inspection data migrated into SLAM CAP to ensure — in the Ministry's own words — “consistent and defensible FCA data across the portfolio.”

4.5 Commercial Real Estate and REITs

Commercial real estate is now driven by ESG and climate disclosure obligations. Suzanne Fallender, Prologis' Vice President of Global ESG, identifies the core challenge: “Two key challenges to standardized ESG reporting include Scope 3 data availability and the need for context across key metrics” (as cited in Nareit, 2022). The triple-net lease compounds the difficulty — tenants have no obligation to share consumption data with owners, which is why portfolio managers are pushing data clauses into new leases and migrating from legacy IWMS to what Verdantix (2025) terms Connected Portfolio Intelligence Platforms.

5. Six Failure Modes — and Their Countermeasures

Five failure modes recur across every sector. They are worth naming because each has a known countermeasure.

Boiling the ocean

Setting sweeping data policies across every domain simultaneously overwhelms teams into paralysis. The countermeasure is a small, decision-driven pilot: one building, one system, or one renewal forecast. Prove the value, then scale.

Tool-first thinking

Purchasing a CMMS or EAM platform before defining data discipline guarantees low-quality output. As UpKeep (2023) observes, “immediately investing in a CMMS without a plan is a massive mistake that can kill a project on arrival.” Define requirements and governance before procuring technology.

Over-classification

Establishing every item that has a tag number in the asset register produces an unmaintainable monster. Dunn (2022) is direct: “One of the traps that we have seen some organisations fall into is establishing every item that has an item tag on a P&ID in the asset register.” Tag only what you would raise a work order against.

No data ownership

Without named owners and stewards, data quality improvement has no accountability. Name a master data manager. Name data stewards by site or system. Tie data-quality metrics to performance reviews (Eptura, 2024).

Set-it-and-forget-it

A one-time cleanse with no governance to sustain it is a wasted investment. NRX AssetHub (2023) notes: “Even once a solid asset data foundation has been established it can be very difficult to keep it that way.” Quarterly audits, blocked work orders without tagged assets, and PM libraries built from equipment class rather than technician memory are the operational disciplines that sustain quality.

Confusing classification with hierarchy

Uniformat II tells you what something is. The asset hierarchy tells you where it lives and what depends on it. A well-designed register carries both, plus a third decoupling — functional location versus physical asset — so equipment can be swapped for overhaul without destroying the maintenance history attached to its location.

6. The Eight-Step Practitioner Roadmap

A practical implementation sequence emerges consistently across ABL Group’s six-step model, the Verdantis MDM roadmap, PEMAC’s MDRR framework, and ISO 55001:2024 Clause 7.6. Compressed into eight steps:

Step 1: Define information requirements first. Start from decisions (renewal, energy, compliance, criticality) and back-derive the data needed to make those decisions well. This is the OIR → AIR cascade of ISO 19650-3, and the only way to avoid collecting data nobody uses.

Step 2: Establish governance before tooling. Appoint a master data manager, name data stewards by site or system, and tie data-quality metrics to performance reviews. Eptura (2024) recommends a quarterly hierarchy review cadence as a baseline governance rhythm.

Step 3: Choose the classification stack and apply all of it. Uniformat II for capital and FCI; OmniClass for BIM and multi-axis tagging; MasterFormat for specifications; ISO 14224 for plant taxonomy. Designate one code as primary for sorting; carry the others as attributes.

Step 4: Build the hierarchy and naming convention before the CMMS does it for you. Agree on the naming and numbering convention with all affected organizational stakeholders. (e.g. County tax office names assets and assigns asset numbers and sub designations. Coordination does not happen and with long-standing (old) agencies – before you know it, the building names are named one thing in CMMS (like asset nicknames) and something else on the tax role and insurance documents) before design begins — the cheapest data integrity comes from designing it in at the capital stage (Dunn, 2022).

Step 5: Assess current state using IIMM confidence grading. Tag every dataset class A through E. Report capital forecasts as ranges with explicit confidence scores (e.g., “10-year renewal need = \$42.6M ±25%, Grade C”).

Step 6: Cleanse, enrich, migrate — in that order. Deduplicate first, then standardize against the taxonomy, then normalize attributes. Pilot on one representative building before portfolio rollout. Electronic capture is approximately 60 per cent faster and 400 per cent more accurate than paper-based methods (ABL Group, 2023).

Step 7: Embed the standards in business processes. Specify COBie in Exchange Information Requirements for every capital project. Block work-order forms from saving without a tagged asset. Generate the PM library from equipment class, not from technician memory. Drive the capital plan and ESG submission from the same register.

Step 8: Sustain through KPIs and audits. Track the percentage of records at Grade A/B, the percentage of work orders linked to a tagged asset, duplicate-detection rates, and the percentage of capital decisions traceable to a documented data source. Improvement investment should target high-decision-value Grade C and D data, not data quality in the abstract.

7. Conclusion

The deepest shift signalled by ISO 55013:2024 is conceptual: data is no longer the byproduct of asset management — it is itself an asset, with a lifecycle, a confidence grade, and an owner. The practitioners succeeding at facility data standardization are not those who bought the best CMMS. They are those who treat their asset register the way they treat their physical assets: specified at design, commissioned at handover, maintained through governance, audited for quality, and renewed when its confidence grade slips.

The opening question — “What do we own, where is it, what condition is it in, what does it cost, what depends on it, and how confident are we?” — is not a data question. It is a stewardship question, and the standards stack now exists to answer it.

The strategic move for facility, reliability, and asset leaders in the next 12 months is not to launch another data-cleanup project. It is to formalize what already exists: adopt ISO 55001

Clause 7.6 as the audit hook, ISO 19650-3 as the lifecycle process, COBie as the handover artefact, Unifomat/OmniClass as the common vocabulary, and the IIMM confidence grade as the truth-in-advertising layer over every number that reaches a board paper.

References

References are formatted in accordance with the American Psychological Association (APA) Publication Manual, 7th edition.

- ABL Group. (2023). 6 steps to master asset data collection, validation and enrichment. ABL Group. <https://abl-group.com/abl/all-media/blog/6-steps-to-master-asset-data-collection-validation-and-enrichment/>
- APPA: Leadership in Educational Facilities. (n.d.). Facilities condition assessment. APPA. <https://www.appa.org/facilities-condition-assessment>
- AssetFuture. (2019, August 7). How to develop an asset information strategy. AssetFuture. <https://assetfuture.com/content/2019/8/7/how-to-develop-an-asset-information-strategy>
- ASTM International. (2015). ASTM E1557-15: Standard classification for building elements and related sitework — UNIFORMAT II. ASTM International. <https://www.astm.org/Standards/E1557.htm>
- Brightly Software. (2025). Brightly Software releases data on Americans' public K–12 school infrastructure outlook. Brightly Software. <https://www.brightlysoftware.com/resource/brightly-software-releases-data-on-americans-public-k-12-school-infrastructure-outlook>
- City of Calgary. (2024). Asset management policy. City of Calgary. <https://www.calgary.ca/employees/asset-management-policy.html>
- City of Calgary. (2025). Corporate asset management. City of Calgary. <https://www.calgary.ca/our-services/asset-management.html>
- Construction Specifications Institute & Construction Specifications Canada. (2016). MasterFormat®. CSI/CSC.
- Dataversity. (2023, March 15). Putting a number on bad data. Dataversity. <https://www.dataversity.net/articles/putting-a-number-on-bad-data/>
- Desapex. (2024). Implementing asset information management (AIM) with ISO 19650-3: A practical guide for smarter facilities management. Desapex. <https://www.desapex.com/blogs/implementing-asset-information-management-aim-with-iso-19650-3-a-practical-guide-for-smarter-facilities-management>
- DNV. (n.d.). Asset information modelling framework: Structuring digital assets (DNV-RP-0670). DNV. <https://www.dnv.com/digital-trust/recommended-practices/asset-information-modelling-dnv-rp-0670/>
- Dunn, S. (2022, August). 5 tips for a better asset register. Assetivity. <https://www.assetivity.com.au/articles/maintenance-management/5-tips-for-a-better-asset-register/>
- Eptura. (2024). Scaling EAM asset hierarchies: Best practices for naming conventions and parent-child relationships. Eptura. <https://eptura.com/discover-more/blog/best-practices-for-naming-conventions-and-parent-child-relationships/>
- Gallaher, M. P., O'Connor, A. C., Dettbarn, J. L., Jr., & Gilday, L. T. (2004). Cost analysis of inadequate interoperability in the U.S. capital facilities industry (NIST GCR 04-867). National Institute of Standards and Technology. <https://doi.org/10.6028/NIST.GCR.04-867>
- Global Forum on Maintenance and Asset Management (GFMAM). (2024). The asset management landscape (3rd ed.). GFMAM.

- Institute of Asset Management (IAM). (2024). An anatomy of asset management (Version 4). IAM.
- International Organization for Standardization. (2018). ISO 55002:2018: Asset management — Management systems — Guidelines for the application of ISO 55001. ISO.
- International Organization for Standardization. (2020). ISO 19650-3:2020: Organization and digitization of information about buildings and civil engineering works, including building information modelling — Information management using building information modelling — Part 3: Operational phase of assets. ISO.
- International Organization for Standardization. (2016). ISO 14224:2016: Petroleum, petrochemical and natural gas industries — Collection and exchange of reliability and maintenance data for equipment. ISO.
- International Organization for Standardization. (2024a). ISO 55001:2024: Asset management — Management systems — Requirements. ISO.
- International Organization for Standardization. (2024b). ISO 55013:2024: Asset management — Guidance on the management of data assets. ISO.
- The King's Fund. (2024, June). What does the ERIC data tell us about the state of NHS buildings? The King's Fund. <https://www.kingsfund.org.uk/insight-and-analysis/blogs/recent-eric-data-state-nhs-buildings>
- March, C. (2014). The 5 biggest risks to effective asset management. Reliable Plant. <https://www.reliableplant.com/Read/27771/Ris%20effective-asset-management>
- Nareit. (2022, July/August). REITs prepare for the SEC's proposed climate risk reporting rules. Nareit. <https://www.reit.com/news/reit-magazine/july-august-2022/reits-prepare-secs-proposed-climate-risk-reporting-rules>
- National Asset Management Steering Group / Institute of Public Works Engineering Australasia (NAMS/IPWEA). (2015). International infrastructure management manual (5th ed.). NAMS/IPWEA.
- National Institute of Building Sciences (NIBS). (n.d.). Construction to operations building information exchange (COBie) v3. NIBS. <https://nibs.org/nbims/v3/cobie>
- NHS England. (2024). Estates returns information collection: Summary page and dataset for ERIC 2023/24. NHS England. <https://digital.nhs.uk/data-and-information/publications/statistical/estates-returns-information-collection>
- NRX AssetHub. (2023). The implications of poor-quality asset data. NRX AssetHub. <https://www.nrx.com/the-implications-of-poor-quality-asset-data/>
- Open Access Government. (2024, November). NHS estate crisis deepens as maintenance backlog nears £16bn, new report warns. Open Access Government. <https://www.openaccessgovernment.org/nhs-estate-crisis-deepens-as-maintenance-backlog-nears-16bn-new-report-warns/200165/>
- OXMaint. (2024). Facility management for healthcare: Joint Commission and CMS compliance. OXMaint. <https://oxmaint.com/industries/facility-management/facility-management-healthcare-joint-commission-cms-compliance>
- Plant Engineering and Maintenance Association of Canada (PEMAC). (2024). 4.01 Asset information strategy. PEMAC. <https://www.pemac.org/asset-management-landscape-subjects/401-asset-information-strategy>
- UpKeep. (2023). What are the most common failures in CMMS implementation? UpKeep. <https://upkeep.com/learning/most-common-failures-in-cmms-implementation/>

Verdantix. (2025). Green quadrant: Connected portfolio intelligence platforms (CPIP/IWMS) 2025. Verdantix.