LEVARU WHITE PAPER

The Visual Asset Register

How 360-Degree Documentation Improves Work Orders, Inspections and Staff Handoffs

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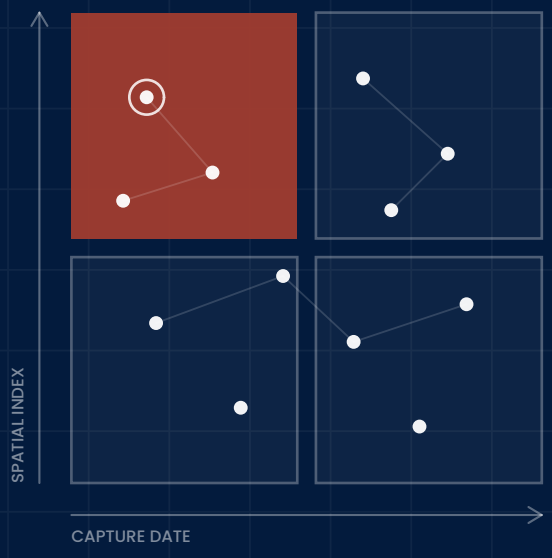

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RESEARCH SERIES · PAPER 1

Abstract

Facility teams do not lose the record of their buildings all at once; they lose it one retirement, one contract change and one undocumented repair at a time. Asset data sits in CMMS text fields; drawings sit on shared drives, often several renovations out of date; procedures live in O&M binders; and the most operationally valuable layer lives only in the memories of long-tenured staff. None of that record is spatial, and only the last of it can answer the question every work order, inspection and handoff eventually asks: what does this space actually look like, and where exactly is the thing that matters? This paper defines the **Visual Asset Register** (VAR): a spatially indexed, time-stamped collection of 360-degree captures of a facility, linked to asset records and maintained on a defined re-capture cadence under documented governance — far more useful than the photo folder, far less costly than the engineering-grade digital twin. It examines how a maintained register measurably improves work-order execution, inspection consistency and staff and vendor handoffs, then supplies a staged implementation path, a five-level maturity model, a baseline-first metrics discipline, an explicitly illustrative cost model, and the governance that keeps comprehensive imagery of a facility from becoming a liability. It aligns the practice with ISO 41001, the ISO 55000 series, COBie handover conventions and IFMA's competency framework, and closes with candid limitations. Any facility team, in any region, can begin within 90 days.

KEYWORDS

visual documentation · 360-degree capture · facility management · work orders · inspections · staff handoffs · knowledge continuity · ISO 41001 · COBie

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About this series: This is the first paper in Levaru's research series on the operational record of buildings. It is followed by *Minimum Viable Digital Twin for Existing Buildings* (2026) and *The Continuity Audit* (2026).

Vendor neutrality: This paper names no commercial platform and describes capability categories rather than implementations.

Contents

1. The problem: the documentation gap

Every facility function ultimately depends on a record of the building — and in most organizations, that record is scattered. Asset data sits in computerized maintenance management system (CMMS) or integrated workplace management system (IWMS) text fields. Drawings and closeout documents sit in shared drives, often several renovations out of date. Procedures live in operations and maintenance (O&M) binders. And the most operationally valuable layer — which panel feeds which wing, which valve isolates which riser, what the mechanical room actually looks like behind the locked door — lives in the memories of the most experienced people on the team.

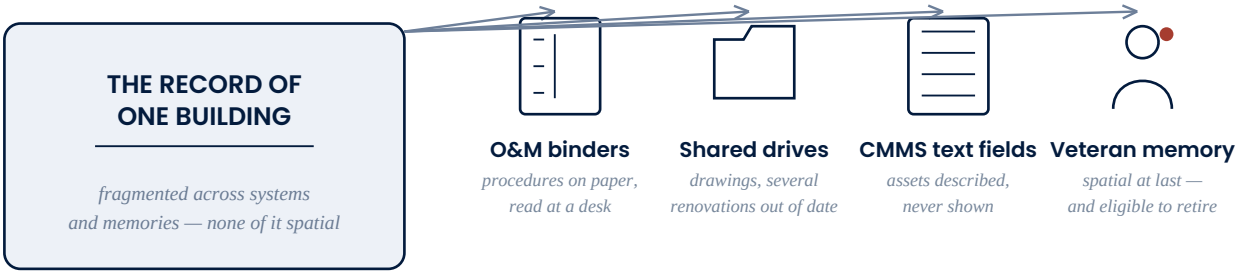

Figure 1. The documentation gap: the record of one building fragmented across O&M binders, shared drives, CMMS text fields and the memories of long-tenured staff — none of it spatial.

Look closely at the daily failures this arrangement produces — the repeat visit because the technician could not find the isolation valve; the disputed inspection finding; the new hire who cannot work alone for a year — and a common shape emerges. Each is, at bottom, a *where / what / how-does-this-space-actually-look* failure. Text records cannot answer that question. People can, until they leave. The distance between those two facts is the documentation gap this paper addresses.

> *"Text records cannot answer that question. People can — until they leave."*

This paper defines a practical answer to that gap, examines the three activities where it costs the most, and provides the implementation framework, metrics model, maturity model and governance practices required to close it responsibly. Any facility team, in any region, can begin within 90 days.

2. Definition: what a Visual Asset Register is — and is not

> **Definition.** A **Visual Asset Register** (VAR) is a spatially indexed, time-stamped collection of 360-degree captures of a facility, linked to asset records and maintained on a defined re-capture cadence under documented governance — so that any authorized person can view any covered space as it existed on any capture date.

The technology involved is deliberately modest: consumer- and prosumer-grade 360-degree cameras, typically costing from a few hundred to a few thousand U.S. dollars or euros, plus the labor hours required to walk the spaces. What turns the resulting imagery into a register — rather than another photo pile — is five properties.

Spatial indexing. Every capture is anchored to a location: a floorplan position, a room number, a coordinate. The register is navigated by walking the plan, not by scrolling a folder of files named IMG_4471.

Time-stamping and versioned re-capture. Captures are dated and retained when new ones are made, so the register holds the history of each space, not only its latest state. “What did this room look like before the renovation — and on the day the contract started?” becomes an answerable question.

Asset linkage. Panoramas, or points within them, are tied to asset identifiers in the CMMS or IWMS, so the visual record and the maintenance record reference each other. A work order can open onto the room; an asset record can open onto its surroundings.

Governed access. Role-based permissions, documented handling rules for sensitive areas, and a defined process for revoking access — for example, when a vendor contract ends. Imagery of a facility is operational information and must be treated as such (Section 10).

Defined cadence and ownership. A named owner and a written re-capture schedule tuned to space criticality. Without cadence, a register decays into an archive; with it, the register stays trustworthy.

Positioning matters as much as definition. On the continuum of facility documentation, a VAR sits between photo folders and CMMS attachments on one side, and laser scanning, building information modeling (BIM) and live digital twins on the other. It offers far more operational value than the former: indexed, dated, navigable, connected to the work. It costs far less than the latter: no scan crews, no modeling budgets, no sensor networks.

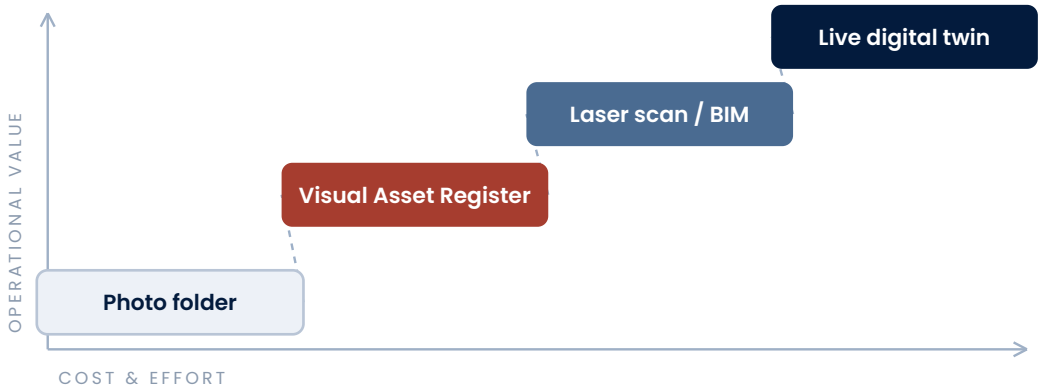

Figure 2. The documentation continuum. A register sits above the photo pile and below the engineering-grade twin — far more operational value than the former, far less cost than the latter.

It is also honest about what it is not. A VAR does not provide measurement-grade geometry unless it is built from scans; it carries no live telemetry; it is a record of appearance and location, not of performance. Organizations that already operate BIM or digital-twin programs will find a register complementary — an inexpensive, frequently refreshed visual layer covering the operational spaces that formal models rarely keep current — while organizations with neither will find it the highest-value first step.

A Visual Asset Register is	It is not
Spatially indexed — every capture anchored to a floorplan position or room, navigated by walking the plan	**A measurement instrument** — no dimensioning or take-offs unless built from scans
Time-stamped and versioned — captures dated and retained, so the register holds each space's history	**Telemetry** — a record of appearance and location, not of performance
Asset-linked — panoramas tied to CMMS / IWMS identifiers; the work order opens onto the room	**A photo pile** — undated, unindexed imagery is exactly what it replaces
Governed — role-based access, sensitive-zone handling, revocation wired into offboarding	**A digital twin** — no scan crews, modeling budgets or sensor networks required
Owned, on cadence — a named owner and a written re-capture schedule tuned to criticality	**Self-sustaining** — without cadence, a register decays into an archive

The definition at a glance: five defining properties against five stated exclusions.

3. Why now: three converging pressures

Three pressures are now converging on the fragile arrangement described in Section 1 — and each is supported by published figures this paper cites rather than its own.

The first is workforce exit. A 2021 study cited in the *Facility Management Journal* (FMJ) of the International Facility Management Association (IFMA) found that 31 percent of facility management employees are older than 55 and will be eligible for retirement between 2022 and 2037 [1]. The pattern is already visible on the ground: at the University of Tennessee, Knoxville, in the United States, the facilities services department — roughly 600 staff maintaining more than 250 buildings — recorded 97 retirements between 2020 and 2025 [1]. Each departure takes located knowledge that was never written down, because it never needed to be while its holder was one radio call away.

The second is time lost to information hunting. McKinsey Global Institute estimated that interaction workers spend about 19 percent of the working week — nearly a full day — searching for and gathering information [4]. More recent cross-industry research points the same direction: in a 2023 Quickbase survey, 53 percent of respondents reported spending more than 10 hours per week chasing the information they need from different people and systems [2]. Facility work adds a physical dimension to that waste. When the missing information is "where is it and what does it look like," the search happens on foot, in vehicles and in repeat site visits.

The third is backlog and audit pressure. Gordian's 13th annual *State of Facilities in Higher Education* report puts deferred capital renewal on North American campuses at US$156 per gross square foot — an 8 percent rise in a single year and nearly double the level of 2007–2008 — with institutions funding only 73.5 percent of what is needed to stop the backlog from growing [3]. Moody's Ratings estimates that US$750–950 billion in capital spending would be needed over the coming decade just for the colleges and universities it rates to make significant progress on deferred maintenance and facility renewal [5]. The bodies that fund, insure and audit facilities are responding the only way they can: by demanding better, dated, defensible condition evidence.

THE PRESSURE, IN PUBLISHED FIGURES

31%
of facility management employees are older than 55 and eligible to retire between 2022 and 2037 [1]

97
retirements in five years in one 250-building university portfolio — roughly 600 staff [1]

53%
of workers surveyed in 2023 spend more than 10 hours a week chasing information [2]

$156
deferred capital renewal per gross square foot on North American campuses, in US dollars [3]

Sources: IFMA Facility Management Journal [1]; University of Tennessee, Knoxville [1]; Quickbase [2]; Gordian [3]. Full citations in the References.

The sections that follow examine the three activities named in this paper's title — work orders, inspections and handoffs — because they are where the documentation gap costs the most, and where a maintained register pays back first.

4. Pillar one: work orders

Walk the lifecycle of a typical corrective work order and count how many steps depend on knowing what a space looks like.

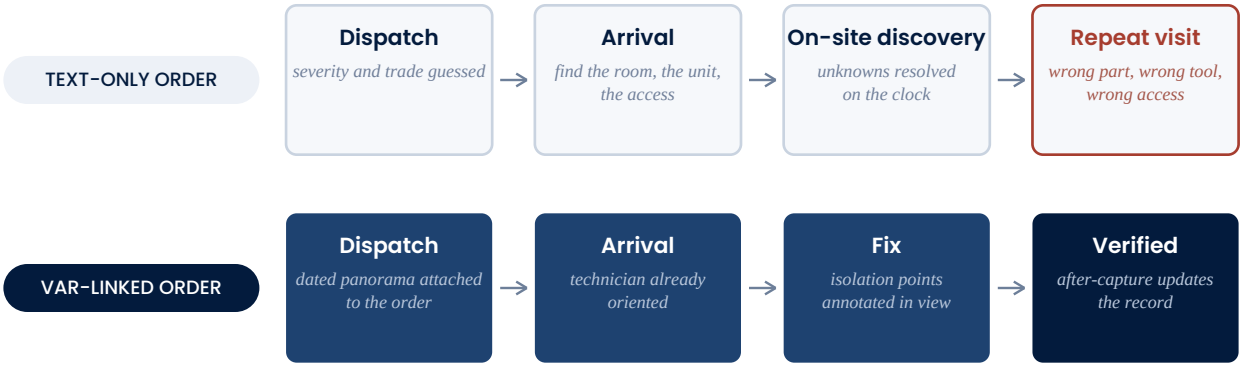

Figure 3. One corrective work order, with and without the register. Every unknown on the upper path is resolved on site, on the clock; a VAR-linked order moves the discovery to the desk.

Triage. A request arrives: “water on the floor, level 3 corridor.” Without visual context, the coordinator guesses at severity, trade and urgency. With the corridor’s most recent capture open — and the plant spaces above it — the same coordinator can often identify the likely source, the right trade and the access route before anyone is dispatched.

Assignment. A text-only work order reads: “Air handling unit AHU-7, Building C, Level 3 — bearing noise.” The assigned technician must find the right mechanical room, work out access, identify which of several units is AHU-7 and discover what surrounds it: clearances, isolation points, whether a ladder or lift is needed. Each unknown is resolved on site, on the clock. A VAR-linked work order attaches the dated panorama of that room instead, and the technician arrives already oriented, carrying the right tools and parts.

Execution. Inside the space, annotated captures answer the questions that otherwise go to a veteran by phone: which valve isolates this run, which panel feeds this zone, where the shutoff hides above which ceiling tile. This is precisely the located knowledge that departs with experienced staff (Section 6); a register keeps it available at the point of work.

Vendor dispatch. For externally assigned work, the gap is priced in. Contractors either visit the site to quote — a truck roll before any work occurs — or quote blind and pad for uncertainty. Giving a vendor governed access to the relevant captures allows accurate quoting and prepared arrival without a preliminary visit. The same logic serves specialty trades mobilized across a portfolio, whether that portfolio is a healthcare network in North America, a university estate in northern Europe or a commercial holding in the Gulf region.

Verification. Before-and-after captures close the loop: the completed state is documented in context rather than as a cropped close-up, and the next person to work in the space inherits the updated record.

Because these effects occur at defined points in the lifecycle, they are measurable. Four metrics matter most, defined fully in Section 9: **time-to-locate**, the elapsed time between arriving on site and beginning hands-on work; **first-time fix rate** (FTFR), the share of corrective orders completed without a repeat visit; **repeat visits** attributable to missing information, wrong parts or wrong access; and **pre-work site visits** by vendors per quoted job. Published FTFR benchmarks skew toward commercial field-service organizations and transfer poorly to in-house facility teams, so this paper deliberately makes no industry claim; the correct benchmark is

the team's own baseline, measured before a pilot and again after it. What can be said with confidence is directional: every one of these metrics is a function of how much a worker knows about a space before entering it, and a register exists to raise exactly that.

5. Pillar two: inspections and compliance

The quiet power of a register lies in one mechanism: same-viewpoint re-capture. When a space is photographed from the same positions on a defined schedule, condition change stops being a matter of recollection and becomes visible — two dated panoramas, side by side. That single mechanism upgrades several inspection and compliance activities at once.

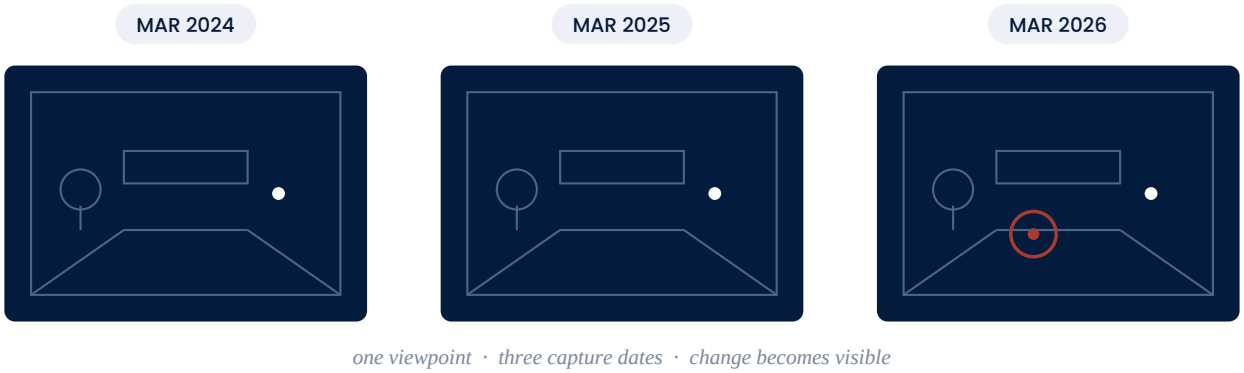

Figure 4. Same-viewpoint re-capture: one plant-room viewpoint across three capture dates. Condition change stops being a matter of recollection and becomes a comparison of dated images.

Condition assessment and capital planning. Facility condition assessments (FCAs) feed the capital plan, and the capital plan now carries extraordinary weight: with deferred renewal at the record levels described in Section 3, and rating agencies calling the backlog a hidden liability [5], the quality of condition evidence increasingly determines whether funding requests are believed. A register gives assessors, leadership and finance approvers the same view — not a spreadsheet adjective ("penthouse plant room: poor") but the dated imagery behind it, comparable across years.

Life-safety and access checks. Many recurring checks are, at heart, visual: egress routes clear, signage present, extinguishers and equipment in place, storage rules respected. A dated panorama documents the state of a corridor or plant room at a point in time, in full context — evidence that a cropped phone photo, taken from an unrepeatable angle, cannot match. Requirements differ by jurisdiction; the evidentiary logic does not.

Insurance, warranty and disputes. Pre-loss condition is the perennial argument in property claims; hand-back condition is the perennial argument at the end of leases, projects and service contracts. A register that captured the space before the loss, before the works, or on the day the contract started converts those arguments into lookups. Teams that have produced dated captures in a warranty or damage dispute rarely need convincing a second time.

Transitions of responsibility. Move-in and move-out states, project handover states, and contract-start and contract-end states for outsourced facility management are each a moment when two parties need an agreed

record of “how it was.” Scheduling a capture at every such transition creates that record as a by-product of normal operations.

There is a second-order benefit that practitioners discover quickly: a register shows not only condition but *verification recency* — when each space was last actually looked at. Coverage maps of capture dates expose the rooms nobody has entered in two years, which is itself a finding. Auditors ask, “how do you know?” A register answers with a date.

Two disciplines keep the pillar honest. First, disputed findings do not vanish entirely: imagery documents appearance, not performance, and a bearing can be failing in a room that looks immaculate. Second, evidentiary value depends on cadence: a register whose newest capture predates the renovation is a liability in a dispute, not an asset. Both are governance questions, addressed in Sections 7 and 10. The measurable outcomes for this pillar — inspection labor hours per cycle, findings disputed or re-inspected, and elapsed time to produce condition evidence on request — appear in Section 9.

6. Pillar three: staff handoffs and knowledge continuity

Ask what actually leaves when a 30-year technician retires, and the answer is more specific than “experience.” It is located knowledge: which panel feeds which wing; which valve isolates which riser; where the cleanout hides above which ceiling tile; which roof hatch sticks, and which chiller was piped unconventionally decades ago and has confused every contractor since. This knowledge is real, operational and almost never written down — not from negligence, but because prose is a poor medium for it. Nobody writes paragraphs about ceiling tiles. People point.

> *“Nobody writes paragraphs about ceiling tiles. People point.”*

The exposure quantified in Section 3 — nearly a third of the workforce eligible to retire within the planning horizon, and 97 retirements in a single university facilities department in five years — is being met, in IFMA’s own literature, with mentoring, apprenticeships and structured knowledge-sharing programs, and rightly so. Those programs transfer judgment, method and culture. What they transfer least well is the spatial layer, because the spatial layer must be shown, and showing does not scale.

An annotated register converts pointing into a record. The veteran walks the plant rooms once with a camera — or reviews existing captures at a desk — and pins the knowledge where it lives: this valve, that panel, this access hatch, each with a sentence of context. The result is a walkable record that survives the walker. Four handoff types benefit.

Retirement and succession. Capture-and-annotate sessions with departing staff become a standard offboarding step, prioritized by the spaces they alone know well. A register makes the session concrete — walk, point, annotate — rather than an open-ended interview, and the window for it is before the leaving date.

New-hire onboarding. New technicians tour buildings virtually before touring them physically, and revisit any space on demand instead of interrupting a senior colleague. The measurable outcome is time-to-independent-work: how long until a new hire can be dispatched alone.

Vendor and contract transitions. When an outsourced facility management contract changes hands, the incoming provider inherits a portfolio it has never seen, and mobilization consists largely of discovering it. A governed register shortens that discovery from months of site walks to structured review — and the outgoing provider's access is revoked on day one (Section 10).

Emergency coverage. At 02:00, with water coming through a ceiling and the person who knows the building unreachable, "where is the isolation valve for this riser" is not a training question. A register answers it in minutes, from a phone.

> **The Handoff Test.** If the most experienced technician on the team were unreachable for 90 days, what percentage of their located knowledge could a competent stranger recover from the organization's systems alone? Most teams find the honest answer uncomfortable. The distance between that answer and 100 percent is the continuity risk a Visual Asset Register exists to close.

The test does not ask the register to replace mentoring, exit interviews or succession planning; it asks it to give them the one layer they cannot carry.

7. Implementation: crawl, walk, run

A register earns trust by being useful early and governed always. The three-stage framework below is written so that a team can begin within a quarter, with tooling of its own choosing.

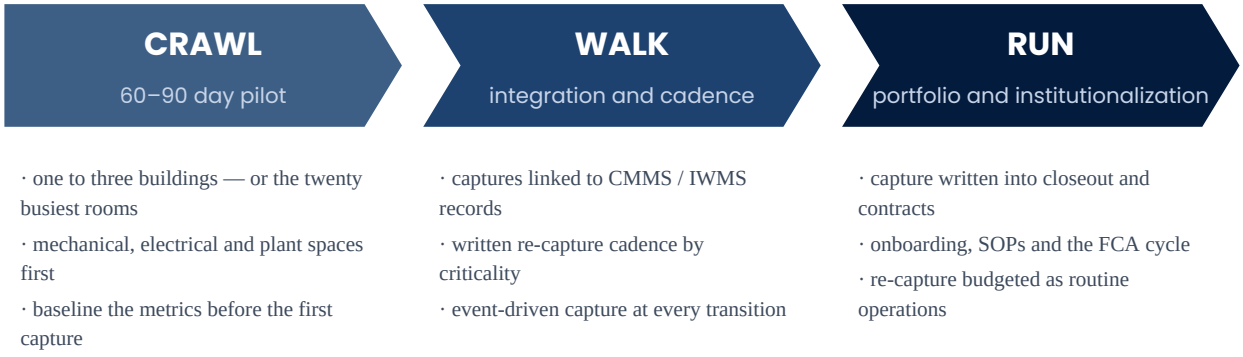

Figure 5. The implementation path. Each stage is complete in itself: a team can stop after the crawl with a measured result, or carry the same practice to portfolio scale.

Crawl — a scoped pilot, 60 to 90 days. Select one to three buildings — or, sharper still, the twenty rooms that generate the most work orders. Capture mechanical, electrical and plant spaces first: they carry the highest knowledge density per square meter (square foot), and they are where located knowledge concentrates. Establish minimal viable governance from day one: a naming convention, floorplan anchoring, a single named owner and a simple access rule. Baseline the metrics in Section 9 before the first capture, not after.

Walk — integration and cadence. Link captures to CMMS or IWMS asset records so the register is reached from within existing workflows rather than alongside them. Set a written re-capture cadence by space criticality

— plant and technical rooms quarterly to semi-annually, standard spaces annually — plus event-driven capture after renovations and incidents, and at every transition of responsibility: project handover, contract start, contract end. Expand coverage building by building, and begin the annotation sessions with senior staff described in Section 6.

Run — portfolio and institutionalization. Write capture into the processes that already govern change: project closeout requirements, vendor and outsourcing contracts, onboarding curricula, standard operating procedures and the FCA cycle. At this stage the register is no longer a project; it is how the organization remembers its buildings, and re-capture is budgeted as routine operations rather than initiative funding.

Governance is not a later stage; it is a property of every stage. The minimum checklist: naming conventions and floorplan anchoring, defined before the first capture; a named register owner, accountable for cadence and quality; authorization rules for who may capture, and under what conditions; access roles for who may view which spaces, including external parties; a sensitive-zone list with capture and access restrictions (Section 10); and retention rules, with an access-revocation step in every offboarding and contract-end procedure.

8. A maturity model for the register

Teams need a way to locate themselves before they can plan a route, and maturity can be self-assessed on a five-level scale (Table 1). Most organizations discover, without embarrassment, that they are at Level 0 or 1 — which is exactly what the crawl stage is for.

Figure 6. Five maturity levels. The levels describe the practice, not the people — most teams assessing themselves honestly land at Level 0 or 1.

Level	Name	Characteristics
0	**Scattered**	Photos exist in phones, emails and shared drives; unindexed, undated, effectively unfindable.
1	**Ad hoc tours**	Occasional 360-degree tours exist (often from marketing or a project) but are not indexed to operations, not versioned and not maintained.
2	**Indexed register**	Spatially indexed, dated captures with a named owner; navigable by floorplan; basic access control in place.
3	**Integrated register**	Captures linked to CMMS/IWMS asset records; written re-capture cadence by space criticality; role-based access, including vendors; annotation in active use.
4	**Embedded register**	Register referenced in standard operating procedures, onboarding, contracts, project closeout and FCA cycles; re-capture budgeted as routine operations; coverage and recency tracked as performance indicators.

Table 1. The Visual Asset Register maturity model. Most organizations assessing themselves honestly land at Level 0 or 1.

9. Measuring results: baselines before benchmarks

The discipline that separates a program from a purchase is baselining. Every metric in Table 2 can be measured with existing systems or a two-week sampling exercise, and each should be measured before the pilot begins — afterwards is too late, because the pilot's own effects contaminate the baseline they were supposed to be measured against. This paper publishes no industry benchmark for any row below; the correct benchmark is the team's own baseline, measured before the pilot and again after it.

> *"The correct benchmark is the team's own baseline — a pilot that cannot beat it has produced a finding, not a failure."*

Pillar	Metric	Baseline method	Direction
Work orders	Time-to-locate (arrival on site to hands-on work)	Technician sampling or CMMS timestamps	Decrease
Work orders	First-time fix rate	Orders completed without a repeat visit ÷ total corrective orders	Increase
Work orders	Pre-work site visits by vendors	Count per quoted job	Decrease
Inspections	Inspection labor hours per cycle	Timesheets per inspection round	Decrease
Inspections	Findings disputed or re-inspected	Count per cycle	Decrease
Inspections	Time to produce condition evidence on request	Elapsed time per audit, insurance or counterparty request	Decrease
Handoffs	Time-to-independent-work for new hires	Supervisor sign-off date versus start date	Decrease
Handoffs	“Ask-a-veteran” interruptions	One-week sampling by senior staff	Decrease
Handoffs	Critical-space knowledge coverage	Percent of critical spaces captured and annotated	Increase

Table 2. Metrics by pillar. No industry benchmark is offered for any row; the benchmark is the team’s own baseline, measured before the pilot and again after.

An illustrative cost model. To show the shape of the economics — and only the shape — consider a deliberately assumed case, every input of which is a stated assumption rather than a benchmark or a promise, to be replaced with local values: a portfolio of 25 buildings, roughly 140,000 square meters (1.5 million square feet), generating 6,000 work orders per year, of which 15 percent involve external vendors.

An illustrative year-one model — every input a stated assumption	Hours
Assumed case: 25 buildings; ≈140,000 m² (1.5 million sq ft); 6,000 work orders per year, 15% vendor-assigned; two new technicians onboarded; platform and storage costs additional.	—
Effort — capture of priority spaces, year one	~300
Effort — indexing, administration and governance	up to ~80
Year-one effort, total (refresh ≈ 80 h annually thereafter)	**~300–380**
Recovered — vendor pre-quote site visits avoided (one in five vendor-assigned orders; ≈180 visits at ≈1.5 h of travel and coordination each, before any call-out fees)	~270
Recovered — locating and orientation time (one in four internal orders saves 15 minutes)	~320
Recovered — new-hire supervision and shadowing (two technicians reach independent work two weeks sooner)	~160
Year-one recovery, before any avoided dispute, expedited claim or retained veteran knowledge	**~750**

Table 3. An illustrative cost model. The inputs are assumptions, not benchmarks or promises; the point is the shape — bounded, predictable capture effort against returns that compound with coverage and cadence. Teams should rebuild the table with their own volumes.

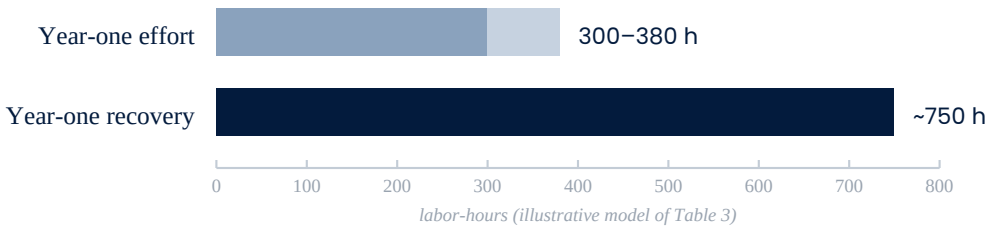

Figure 7. The shape of the illustrative model: bounded, predictable capture effort against returns that compound with coverage and cadence. Inputs are assumptions — teams should redraw both bars from their own volumes.

On these assumptions, the model recovers on the order of 750 hours in a year against 300–380 hours of capture and administration effort — before counting a single avoided dispute, expedited claim or retained piece of veteran knowledge, which is where the largest but least quantifiable value sits. The point of the model is not its outputs but its shape: capture effort is bounded and predictable, while returns compound with coverage and cadence. Readers should run the same arithmetic with their own volumes — and treat a pilot that cannot beat its baseline as a finding, not a failure. Honest measurement is what keeps a register a management tool rather than a photogenic shelf.

10. Governance, security and privacy

Comprehensive imagery of a facility is operational intelligence. The same panoramas that orient a technician also reveal security equipment, server rooms and control panels — and, if captured carelessly, people, screens and credentials. A register run without governance is not a lesser register; it is a liability. Five practices are non-negotiable.

> *"A register run without governance is not a lesser register; it is a liability."*

Restrict by design. Maintain a sensitive-zone list — security operations, data rooms, laboratories, clinical and residential areas, critical infrastructure — where capture is prohibited, or where captures are held in a restricted tier with named-individual access.

Capture people out. Schedule captures when spaces are unoccupied; where occupancy is unavoidable, blur faces. Blur screens, whiteboards, credential cards and posted codes as standard post-processing, not as an afterthought.

Control access by role. Viewing rights follow job need: an external contractor sees the spaces relevant to the contracted work, for the duration of the contract, and nothing else. Every offboarding checklist — employee or vendor — includes register access revocation.

Respect data-protection law. Imagery that can include people is personal data in many jurisdictions, including under the European Union's General Data Protection Regulation (GDPR) and comparable regimes elsewhere [10]. Data residency, retention periods and lawful-basis questions belong in the register's design, agreed with information-security and privacy functions — not discovered after deployment.

Retain deliberately. Versioned history is the register's value, so deletion should be rare and rule-based — but "keep everything forever, visible to everyone" is a policy failure, not a default.

None of this is exotic; it is the same discipline organizations already apply to keys, badges and drawings. The distinction of a well-run register is that governance is part of the definition (Section 2, property four), owned by the same named owner who is accountable for cadence. Facility, information-security and privacy functions setting these rules together, once, at the start, is the cheapest risk control available.

11. Standards and competency alignment

A Visual Asset Register is not a departure from established management frameworks; it is the documented information those frameworks already call for, in a form operations can actually use. The alignments below are offered so that teams operating under these frameworks can position register work inside obligations they already carry.

Framework	Where the register fits
ISO 41001:2018 — Facility management systems [6]	Requires the documented information necessary for the effectiveness of the FM system and its service delivery; a governed register is precisely such documented information — current, controlled and retrievable at the point of use.
ISO 55000 series — Asset management [7]	Treats asset information as a foundation for asset-management decisions; a register extends that principle to the visual and spatial dimension most decisions about physical work quietly depend on.
COBie / BIM handover conventions [8]	Gives operations a structured starting point on day one; a register is the operational continuation, anchored to the same spatial and asset identifiers and kept current on cadence where handover data ages.
IFMA competency framework [9]	Sits primarily in Facility Information Management and Technology Management, and secondarily in Operations and Maintenance — the two competencies whose intersection defines the documentation gap itself.
GDPR and data-protection regimes [10]	Governs imagery that can include people: lawful basis, residency, rule-based retention and access control designed in at the start, not discovered after deployment.

Table 4. Standards and frameworks alignment.

The COBie alignment deserves the emphasis. Construction handover conventions give operations a structured record on day one of a building's life — and then the record ages with every uncoordinated change. A register on cadence keeps the visible state of the building current, and because it can be anchored to the same spatial and asset identifiers, it extends the handover's discipline into the decades of operation the handover was made for [8].

12. Limitations and outlook

Limitations. Candor is cheaper than disappointment, and this paper's claims are bounded. A VAR is *not a measurement instrument*: unless built from laser scans, panoramas support orientation and recognition, not dimensioning, and quantity take-offs still need a tape or a scan. It is *not telemetry*: a register records how spaces look, not how systems perform, and a compressor can be dying in a room that photographs beautifully. It is *only as trustworthy as its cadence*: a register whose newest capture predates the last renovation misleads with authority, which is why every capture is displayed with its date and why cadence has an owner. It is *a governance obligation*: Section 10 is a condition of operating one, not an appendix. And it is *not for everyone*: a single small site with stable, long-tenured staff and current documentation may rationally conclude that the binder and the veteran suffice — for now. The Handoff Test in Section 6 is the honest way to check whether "for now" is doing more work in that sentence than it should.

Outlook. Three developments are worth watching, stated here as outlook rather than promise. First, **machine recognition**: models that identify assets, read nameplates and flag visible conditions within panoramas would let

a register partially index itself, reducing annotation labor. Second, **automated change detection**: comparing same-viewpoint captures across dates to surface what changed — the missing extinguisher, the new corrosion, the blocked egress route — would turn re-capture from documentation into inspection. Third, **convergence**: as reality-capture costs fall, the boundary between a register and a digital twin will blur [11], and organizations that maintained disciplined, spatially indexed, dated capture will find they already own the data layer that twins require. The prudent reading of all three is the same: the durable investment is not any particular device or platform but the practice — cadence, indexing, governance. Teams that build the practice now will be positioned to adopt whatever the tooling becomes.

13. Conclusion

Facility teams lose time, money and institutional memory because the record of the building lives in people's heads and scattered files. This paper has argued for a specific, buildable alternative — the Visual Asset Register: spatially indexed, time-stamped, asset-linked, governed and maintained on cadence — and has shown where it pays. Work orders are executed by people who arrive already knowing the space. Inspections rest on dated, same-viewpoint evidence rather than recollection. Handoffs preserve located knowledge beyond the person who located it.

None of it requires exotic technology. It requires a camera, a plan, an owner and the discipline of cadence — begun, credibly, within 90 days, and measured against a baseline taken before the first capture.

Buildings outlast careers. The knowledge of how they actually work does not have to retire with the people who hold it — but only if that knowledge is given somewhere to live. A Visual Asset Register is that place.

References

[1] Alcorn, R. (2025, December 15). Case Study: Avoiding the Loss of Institutional Knowledge. *FMJ*, the official magazine of the International Facility Management Association. Figures cited: 31 percent of facility management employees older than 55 and eligible to retire between 2022 and 2037 (2021 study cited therein); University of Tennessee, Knoxville facilities services — roughly 600 staff maintaining more than 250 buildings, with 97 retirements recorded between 2020 and 2025.

[2] Quickbase. (2023). *The Roadblocks to the Dynamic Enterprise.* Quickbase. Figure cited: 53 percent of respondents spend more than 10 hours per week chasing the information they need from different people and systems.

[3] Gordian. (2026, April 8). *The State of Facilities in Higher Education*, 13th Edition. Gordian. Figures cited: deferred capital renewal on North American campuses of US$156 per gross square foot — an 8 percent rise in one year and nearly double 2007–2008 levels — with institutions funding 73.5 percent of the need.

[4] Chui, M., Manyika, J., Bughin, J., Dobbs, R., Roxburgh, C., Sarrazin, H., Sands, G., & Westergren, M. (2012, July). *The Social Economy: Unlocking Value and Productivity Through Social Technologies.* McKinsey Global Institute. Figure cited: interaction workers spend approximately 19 percent of the workweek searching for and gathering information.

[5] Collins, C., Raimes, E., Fitzgerald, S., & Oliva, D. (2024, August 20). *Higher Education – US: Pent-up Capital Needs: The Hidden Liability with a Hefty Price Tag.* Moody's Ratings. Figure cited: US$750–950 billion in capital spending needed over the coming decade for rated colleges and universities.

[6] ISO 41001:2018. *Facility management — Management systems — Requirements with guidance for use.* International Organization for Standardization, Geneva.

[7] ISO 55000:2024. *Asset management — Vocabulary, overview and principles.* International Organization for Standardization, Geneva.

[8] COBie — Construction-Operations Building information exchange, as maintained within the United States National BIM Standard (NBIMS-US), buildingSMART alliance.

[9] International Facility Management Association. IFMA core competencies of facility management (competency framework).

[10] Regulation (EU) 2016/679 of the European Parliament and of the Council (General Data Protection Regulation).

[11] Hanov, N. (2026). *Minimum Viable Digital Twin for Existing Buildings: A Facility Manager's Practical Framework for 360° Reality Capture, Structured Asset Data and Operational Integration.* Levaru. levaru.co/white-papers/minimum-viable-digital-twin/

About the author

Nikolai Hanov has more than 20 years of facilities and operations experience across multi-site portfolios, covering maintenance, capital planning, vendor management, facility data and operational improvement. His work focuses on making facility information usable by the people who operate buildings, rather than on technology adoption for its own sake. He is the author of *Strategic Facility Management: How Buildings Become Profit Centers, Not Cost Centers*. He is affiliated with Levaru.

About Levaru

Levaru is active in the built-environment information field. Its work concerns how information about buildings is captured, structured and kept usable by the people who operate them. This paper is published as part of that work and, as stated on the abstract page, is vendor-neutral: it names no commercial platform and describes capability categories rather than implementations.

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