intelycx

EXECUTIVE WHITE PAPER



A PRACTICAL GUIDE FOR MANUFACTURERS

How to bridge the OT/IT gap: A unified data strategy

A practical guide to closing the gap between operational technology on the shop floor and information technology in the enterprise, with a step-by-step framework for building a unified data architecture.

AI-generated conceptual illustration of laser wafer patterning

01 / EXECUTIVE SUMMARY

Two worlds. One version of the truth.

Shop-floor data only creates value when the enterprise can trust it and act on it.

A gap built over decades

Operational technology was designed to run machines safely and reliably. Information technology was designed to run the business. Each grew its own systems, protocols, teams and priorities. The result is a plant where the controllers know exactly what happened and the enterprise systems learn about it days later, if at all.

Why it matters now

Planning, quality, maintenance and AI initiatives all depend on machine data that is timely, contextualized and consistent. Point-to-point integrations cannot deliver that at scale. Each new connection adds cost and fragility, and every system ends up with its own version of the numbers.

What this paper offers

A clear account of why the OT/IT gap persists, a unified data strategy built on a shared namespace, and a six-step framework for building the architecture without replacing working systems. It closes with how Intelycx CORE delivers that architecture in practice.

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THE STRATEGY IN ONE LINE

Connect once at the edge, add context at the source, publish to a shared namespace, and let every system subscribe.

02 / THE GAP

Why OT and IT grew apart

The gap is structural. Each side optimized for a different job.

Operational technology

OT keeps production running. It values uptime, determinism and safety above all, changes slowly, and is often owned by controls engineers and maintenance. Its data is high-frequency, local and described in tags that make sense only to the people who wrote them.

Information technology

IT runs the business. It values security, standardization and integration across sites, changes on release cycles, and is owned by central teams. Its systems expect clean, transactional records tied to orders, parts and customers.

EXHIBIT 1

Two operating models on one site

DIMENSION	OPERATIONAL TECHNOLOGY	INFORMATION TECHNOLOGY
Primary goal	Safe, continuous production	Accurate, secure business records
Data shape	High-frequency signals, states and counts	Transactions: orders, parts, costs
Time scale	Milliseconds to seconds	Shifts, days and periods
Protocols	OPC UA, Modbus, proprietary fieldbus	REST, SQL, message queues
Change cadence	Years; changes risk downtime	Months; regular release cycles
Ownership	Controls, maintenance, operations	Central IT and data teams
Security posture	Isolation and availability	Identity, access and patching

03 / THE COST OF THE GAP

What the gap costs a plant every day

The symptoms rarely appear as a single line item. They show up as slow decisions and duplicated effort.

1 **Manual reconciliation**

Engineers export historian data, supervisors key counts into spreadsheets, and analysts spend their time matching records instead of finding causes.

2 **Conflicting numbers**

The ERP, the MES and the line display each report a different output for the same shift. Meetings start with debating the data rather than acting on it.

3 **Decisions that arrive late**

When machine events reach the enterprise in daily batches, a recurring stop can repeat for several shifts before anyone with authority sees it.

4 **Stranded analytics and AI**

Models need contextualized, consistent history. Without it, pilots stall at the data-preparation stage and never reach production.

Point-to-point does not scale

Most plants bridge the gap one integration at a time: a script from the historian to a database, a custom connector from a PLC to the MES. Each link works, but the web of links becomes brittle, undocumented and expensive to change.

The hidden owner problem

When an integration breaks, OT assumes IT owns it and IT assumes OT owns it. Without a shared architecture there is no shared accountability, and the gap widens with every workaround.

THE PATTERN

Every workaround closes the gap for one system and widens it for the rest.

04 / THE UNIFIED DATA STRATEGY

Publish once. Use everywhere.

A unified data strategy replaces a web of integrations with one shared structure.

The unified namespace

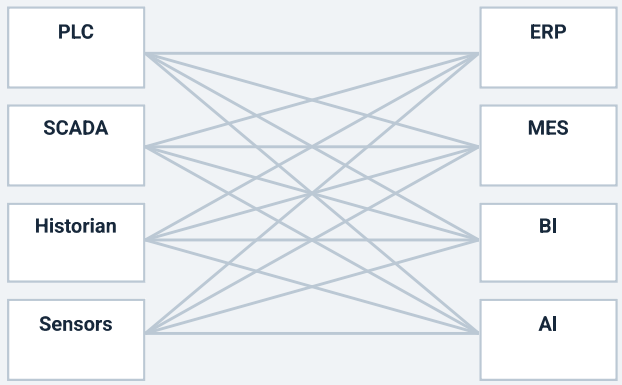
A unified namespace is a single, structured layer where every machine and system publishes its current state, organized by the plant's own hierarchy. Consumers subscribe to what they need rather than requesting custom feeds from each source.

Context at the source

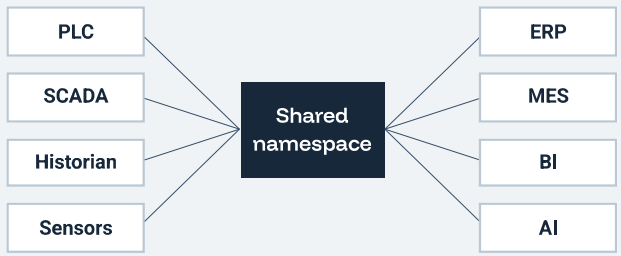
Raw tags become useful when they carry identity, time and production context. Adding that context at the edge, close to the machine, means every downstream system receives the same meaning, not just the same numbers.

EXHIBIT 2

Integration effort: four sources, four consumers



Every source wired to every consumer. Each new system adds a link to each existing one.



Each source publishes once; each consumer subscribes once. A new system adds one link.

THE PRINCIPLE

Integrations grow with the number of systems, not with the number of pairs.

05 / THE SIX-STEP FRAMEWORK

A step-by-step path to a unified architecture

Build the foundation in sequence. Each step produces something the next step depends on.

EXHIBIT 3

The unified data framework

1	**Assess** Inventory assets, signals and consumers	List machines, controllers and interfaces by line. Record which decisions each IT system needs to support and which signals they depend on.	OUTPUT **Asset + signal inventory**
2	**Connect** Capture signals at the edge	Connect legacy and modern equipment through open protocols, without reprogramming controllers or stopping production.	OUTPUT **Live, trusted signals**
3	**Contextualize** Attach identity, time + production context	Map raw tags to assets, states, counts, work orders and parts at the edge, using one naming standard for every site.	OUTPUT **Meaningful data**
4	**Unify** Publish to a shared namespace	Organize data by enterprise, site, area, line and machine. Every source publishes once to the same structure.	OUTPUT **One source of truth**
5	**Integrate** Feed IT systems by subscription	Connect ERP, MES, BI and AI tools to the namespace through standard interfaces, replacing point-to-point links over time.	OUTPUT **Consistent numbers everywhere**
6	**Govern + scale** Assign ownership and expand	Agree OT and IT responsibilities, security controls and change processes. Reuse the approved model on the next line and site.	OUTPUT **A repeatable blueprint**

START SMALL

Run all six steps on one line before scaling. The second line proves the model is repeatable.

06 / MODELING CONTEXT

Give every signal an address and a meaning

A shared model is what lets OT and IT read the same data the same way.

Name things the way the plant is organized

Structure the namespace around the physical hierarchy: enterprise, site, area, line and machine. Industry models such as ISA-95 provide a common starting point. A consistent path tells every consumer exactly where a value comes from.

Attach the context IT needs

A machine state on its own answers "what". Production context answers "for which order, part and shift". Joining these at the edge removes the reconciliation work that otherwise falls on analysts and supervisors.

EXHIBIT 4

One machine, fully addressed

NAMESPACE PATH

ENTERPRISE	Acme Manufacturing
└ SITE	Plant 2
└ AREA	Machining
└ LINE	Line 4
└ MACHINE	**CNC-04**

```
acme/plant-2/machining/line-4/cnc-04/state
```

CNC-04 / STATE

State	**Running**
Timestamp	**14:32:07.412**
Part count	**1,248**
Work order	**WO-2291**
Part number	**PN-7730-B**
Shift	**B**

Illustrative values

07 / GOVERNANCE + SECURITY

Shared data needs shared ownership

The architecture closes the technical gap. Governance closes the organizational one.

Agree who owns what

Define responsibilities before the first connection. OT owns the equipment and signal quality, IT owns the platform, identity and integrations, and operations owns the decisions the data supports. Write it down and review it at each expansion.

Secure by design

Keep control networks segmented. Prefer outbound-only connections from the edge, encrypt data in transit, and manage access by role. Align controls with the plant's existing security framework, such as IEC 62443, rather than creating a parallel one.

EXHIBIT 5

A starting responsibility model

AREA	OT / CONTROLS	IT / DATA	OPERATIONS
Equipment + signals	Owns	Consulted	Informed
Naming + data model	Co-owns	Co-owns	Consulted
Platform + security	Consulted	Owns	Informed
Integrations	Consulted	Owns	Informed
KPIs + decisions	Consulted	Informed	Owns
Change management	Co-owns	Co-owns	Consulted

THE TEST

When something breaks, everyone should already know whose job it is to fix it.

08 / INTELYCX CORE

The unified data architecture, delivered

Intelycx CORE provides each layer of the framework as one connected platform.

EXHIBIT 6

How CORE maps to the framework

1	**Assess**	Discovery confirms signal availability, capture method and exceptions for each asset class.
2	**Connect**	Intelycx Nano Edge and the Edge layer communicate with more than 400 device types, including PLCs, PACs, sensors and legacy controllers, over OPC UA, MQTT, Modbus and REST.
3	**Contextualize**	Lightweight ETL at the edge aligns asset identity, timestamps, states, counts and production context before data leaves the plant.
4	**Unify**	A unified namespace normalizes machine telemetry into a standard format, creating a single source of truth.
5	**Integrate**	Live production data feeds ERP and MES through REST APIs and standard connectors. CORE complements existing systems rather than replacing them.
6	**Govern + scale**	PaaS or SaaS deployment with backup, failover and connection monitoring; automated audit tracking; and a reusable model for the next line and site.

BEYOND THE BRIDGE

From insight to action.

A unified namespace is the foundation, not the finish line. CORE adds alerts and notifications, descriptive, diagnostic and predictive analytics, and integrated workflows, so shared data turns into assigned, tracked action. The same foundation can be paired with AI tools such as ARIS.

09 / CUSTOMER EVIDENCE

From siloed SCADA to shared insight

A medical-device engagement shows what happens when OT data reaches the people who can act on it.

The production challenge

Our customer faced an automated new-product line with recurring faults, quality rejects, and initial OEE of 30–40%. Existing SCADA information was siloed and required substantial analysis before it could guide a response.

Bridging the gap

Gateways connected equipment PLCs to our cloud platform. Teams combined faults, quality-inspection data, sensor telemetry, and production KPIs in one place, then used statistical analysis to investigate variability.

The reported result

Within a few months, our customer case documented uptime improving from the low 40s to above 80%, while scrap fell from over 30% to below 1%. These results included targeted engineering changes.

Why it worked

The data was not new. It had always existed in the controllers. Unifying it with quality and production context gave engineering a shared, trusted view, and live information helped validate each change.

EXHIBIT 7

Customer outcomes: two distinct measures

UPTIME

Low 40s → >80%

Before → After

SCRAP RATE

>30% → <1%

Before → After

10 / GETTING STARTED

A 90-day path to a unified foundation

Prove the architecture on one line with OT and IT working from the same plan.

DAYS 1–30

Assess + connect

Form a joint OT/IT team. Inventory one line, agree the naming standard, and connect its machines at the edge.

Gate: live signals trusted by both teams.

DAYS 31–60

Contextualize + unify

Add production context, publish to the namespace, and replace one manual report with a live view.

Gate: one set of numbers for the line.

DAYS 61–90

Integrate + govern

Feed ERP or MES by subscription, retire one point-to-point link, and document ownership.

Gate: a blueprint ready for the next line.

CONCLUSION

Close the gap with architecture

The OT/IT gap persists because each side optimized for a different job. A unified namespace, with context added at the source and ownership agreed up front, lets both sides keep their priorities while working from one version of the truth.

Build it once, then reuse it

Start with one line, follow the six steps, and measure the result. A proven model turns every later line and site into a repeat of known work rather than a new integration project.

One namespace. One version of the truth.

Book a unified data assessment at intelycx.com.



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