PORTFOLIO CASE STUDY 02 | INDUSTRY 4.0

Production Intelligence with Aprizo / MES

A practical path from disconnected shop-floor signals to faster loss detection, traceability and predictive manufacturing.

MES OEE FPY TRACEABILITY

EVIDENCE STATUS

Source notes name Aptiv Kenitra and 'Aprizo'. The official Dassault Systemes product is spelled 'Apriso'; confirm whether the source refers to that platform or an internal system. All charts and targets here are synthetic.

Case at a glance

01 From reporting to operating system

The case connects production KPI analysis, quality loss, MES data and a governed improvement loop that can mature toward prediction.

PROBLEM

Data-rich, insight-poor

Production, quality, downtime, material and maintenance signals can exist without a shared loss hierarchy, trusted KPI logic or timely decision route.

PROCESS

Connect and reconcile

Map systems and events, validate timestamps and states, calculate a trusted baseline, stratify losses, test countermeasures, then automate only stable logic.

SOLUTION

Production intelligence layer

A governed MES semantic model, role-based dashboards, traceability drill-down, alert rules and a staged predictive roadmap tied to action ownership.

SOURCE-BACKED
Visible in supplied notes

ENGINEERED
Portfolio reconstruction

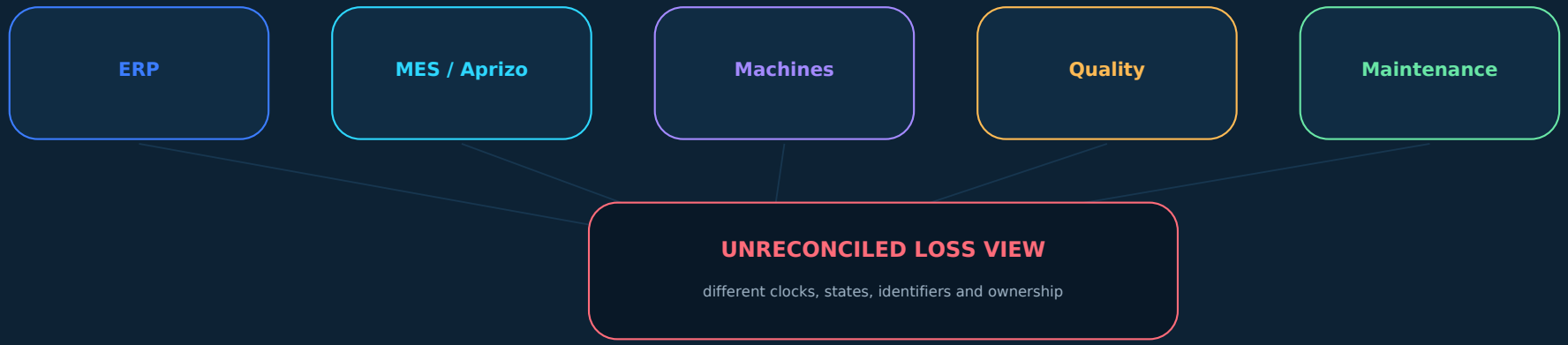
ILLUSTRATIVE
Synthetic data or target

SOURCE-BACKED SCOPE

- Analyze cycle time, downtime, FPY, OEE and bottlenecks; reduce quality defects, scrap and recurring NOKs.
- Strengthen traceability of materials, machines and finished products; improve real-time monitoring and data accuracy.
- Explore predictive maintenance, AI/predictive analytics, virtual-line optimization and green manufacturing.

A loss can hide between systems

CURRENT-STATE SIGNAL FLOW



A dashboard can look polished while still disagreeing with the line. The engineering problem is to create one defensible event model and one decision path, not merely another screen.

LOSS TREE

AVAILABILITY

planned vs run time

- breakdowns
- changeover
- starved / blocked

PERFORMANCE

ideal vs actual rate

- micro-stops
- speed loss
- cycle variation

QUALITY

good first-pass output

- NOK
- scrap
- rework / retest

FLOW

order-to-output movement

- WIP
- waiting
- bottleneck

Define the measures before the dashboard

CORE KPI LOGIC

OEE
Availability x Performance x Quality

owner + cadence + source

FPY
Good at first pass / total processed

owner + cadence + source

SCRAP
Scrapped units or cost / total output

owner + cadence + source

CYCLE GAP
Actual cycle - reference cycle

owner + cadence + source

DOWNTIME
Stopped duration by reason and asset

owner + cadence + source

Each KPI needs a business definition, event-state logic, source fields, exclusions, time basis, owner, refresh cadence and reconciliation test. Without those, trend comparisons are not trustworthy.

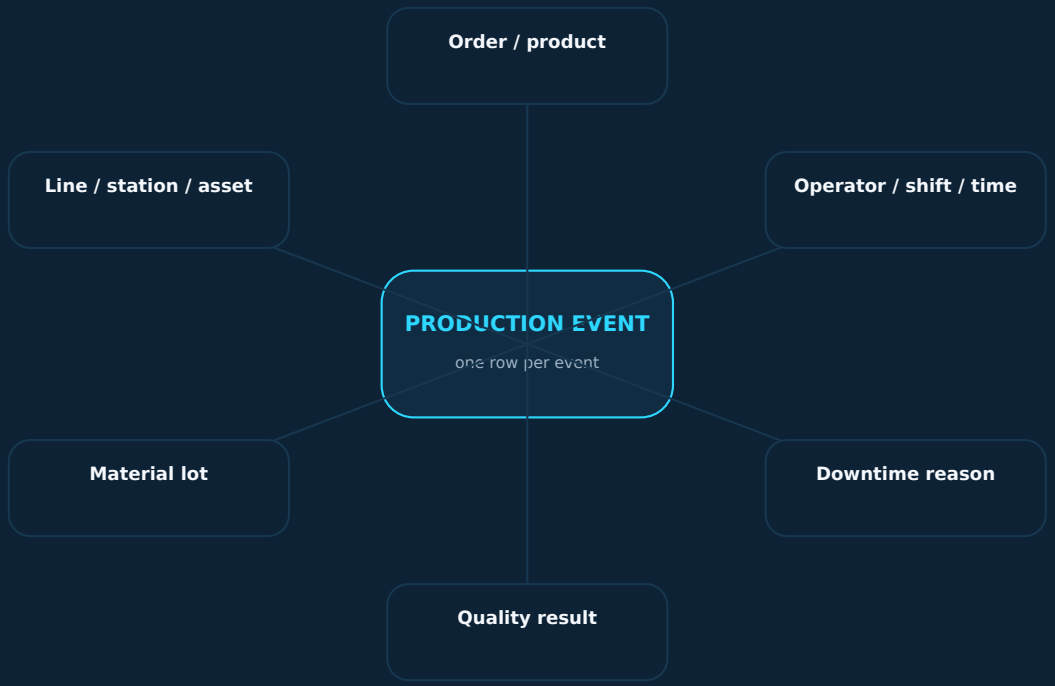
DEMO BASELINE COCKPIT

71%	92.6%	3.1%	+7.4%	114m
OEE	**FPY**	**SCRAP**	**CYCLE GAP**	**DOWNTIME**
82% A x 91% P x 95% Q	Synthetic demo	Synthetic demo	Synthetic demo	Synthetic demo

Synthetic portfolio data - replace with verified project records before publication.

Create one event model across the line

PRODUCTION EVENT STAR



RECONCILIATION TESTS

- Output total matches approved shift report
- State durations fit the scheduled window
- Every NOK has product and station context
- Downtime reason hierarchy is controlled
- Material genealogy has no orphan event

SEMANTIC LAYER

SOURCE	MES, PLC, quality, maintenance, ERP
EVENT	canonical IDs, states, timestamps
MEASURE	OEE, FPY, scrap, time loss
DECISION	alerts, owner, action, outcome

Design principle: preserve raw events, transform visibly, version business rules and trace every KPI point to its lineage.

Find bottlenecks and recurring losses

DOWNTIME PARETO | MINUTES

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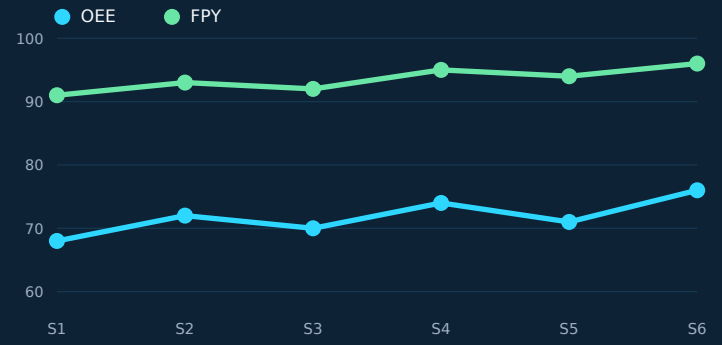
SHIFT TREND | OEE VS FPY



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BOTTLENECK TEST

44s	**47s**	**55s**	**46s**	**42s**
S10	**S20**	**S30**	**S40**	**S50**
reference: 48s	reference: 48s	reference: 48s	reference: 48s	reference: 48s

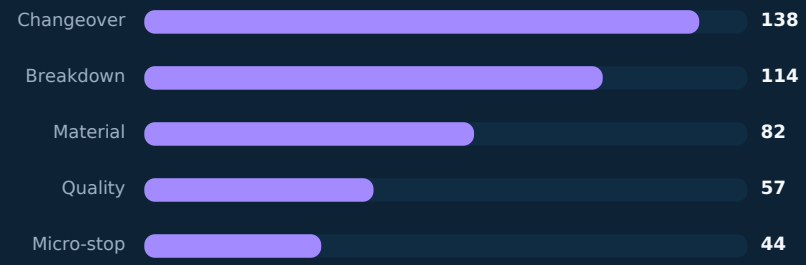
S30 is the demo constraint. The next step is event-level stratification by product, state, shift and reason - not immediate capital expenditure.

The production intelligence cockpit

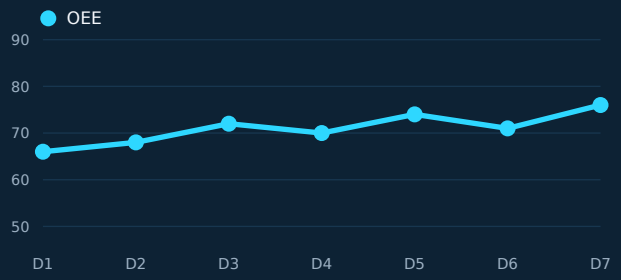
PRODUCTION INTELLIGENCE | DEMO

71%	92.6%	3.1%	114m
OEE	**FPY**	**SCRAP**	**UNPLANNED STOP**
Demo baseline	Demo baseline	Demo baseline	Demo total

LOSS BY CATEGORY



OEE TREND



DRILL-DOWN PATH

Site -> area -> line -> station -> product -> event -> source record. Every alert opens with context, accountable owner, due date, action status and post-action measure.

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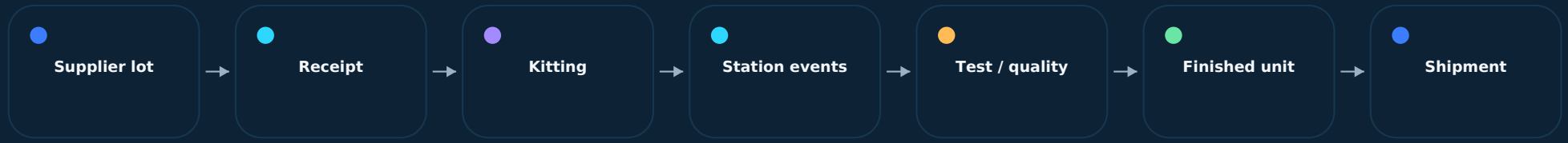
Follow one unit from material to decision

GENEALOGY FLOW



A traceability view should answer four questions quickly: what went into the unit, where and when was it processed, what result was observed, and which approved decision followed?

EXCEPTION RULES

- Material lot missing or outside validity
- Station bypass without approved reason
- Quality result without unit identity
- Timestamp order conflict or duplicate event
- NOK without disposition and closure owner

TRACEABILITY SCORE

97.8%

COMPLETE CHAINS

Synthetic demo

12

ORPHAN EVENTS

Synthetic demo

Score = units with all required upstream, process, quality and disposition links / units sampled.
Report both completeness and unresolved exceptions.

Synthetic portfolio data - replace with verified project records before publication.

Progress from visibility to prediction

ANALYTICS MATURITY WITH GATES

L1 Descriptive

What happened?

EXIT GATE
trusted KPI + lineage

L2 Diagnostic

Why did it happen?

EXIT GATE
stratified root cause

L3 Predictive

What may happen?

EXIT GATE
out-of-time validation

L4 Prescriptive

What action is safest?

EXIT GATE
human approval + guardrails

PREDICTIVE MAINTENANCE PILOT

Asset signal → **Feature check** → **Risk score** → **Maintenance review** → **Work order** → **Outcome label**

Start with one failure mode whose signal, maintenance history and intervention outcome are reliable. Compare against a simple baseline, monitor false alarms and require human approval.

Test change virtually and reduce waste

VIRTUAL-LINE EXPERIMENT

BASELINE	cycle distributions, routing, failures, staffing
SCENARIO	buffer, sequence, staffing, maintenance window
SIMULATE	throughput, WIP, utilization, queue and risk
VERIFY	sensitivity, constraints, operational review
PILOT	limited real-world test with stop criteria

The virtual line is a decision-support environment. It reduces implementation risk only when assumptions are explicit and real performance is measured after the pilot.

GREEN KPI SET

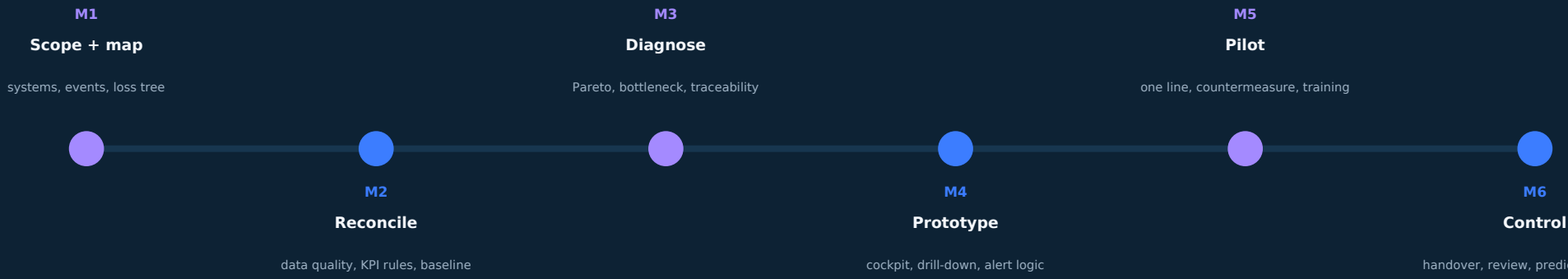
Scrap / good unit	kg or cost
Rework energy	kWh / unit
Idle energy	kWh / stopped hour
Material yield	good mass / input mass
First-pass yield	% accepted first time
Avoided expedites	count / period

DEMO SCENARIO COMPARISON | NORMALIZED BASELINE = 100

Synthetic portfolio data - replace with verified project records before publication.

Build trust in six controlled phases

PHASED DELIVERY



GOVERNANCE

OWNER Every KPI, data source, alert and action has a named accountable owner.

VERSION Definitions and transformations are versioned with a reason for change.

ACCESS Least-privilege roles protect production, quality and personnel data.

REVIEW Daily operations, weekly loss and monthly control reviews use different views.

Measures and portfolio narrative

MEASUREMENT PLAN | TARGETS, NOT CLAIMED RESULTS

MEASURE	DEFINITION	BASELINE	PILOT TARGET	GUARDRAIL
OEE data agreement	Dashboard vs approved report	To measure	>= 99%	Document variance
FPY	Good first-pass / processed	To measure	+2 to +5 pts	Stable test rule
Unplanned downtime	Stopped minutes by asset/reason	To measure	-10% to -20%	No reason hiding
Scrap rate	Scrap / total output	To measure	Downward	Quality protected
Traceability complete	Units with full required links	To measure	>= 99%	Audit sample

CAPABILITIES DEMONSTRATED

- Manufacturing KPI architecture
- MES event modeling and lineage
- Quality and bottleneck analysis
- Traceability and dashboard UX
- Predictive roadmap with validation gates

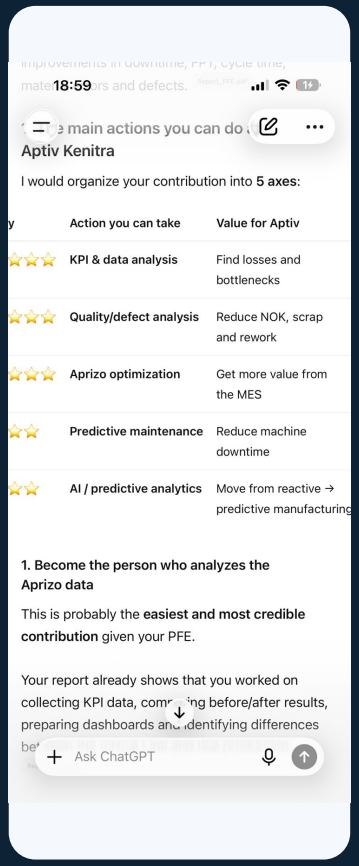
INTERVIEW NARRATIVE

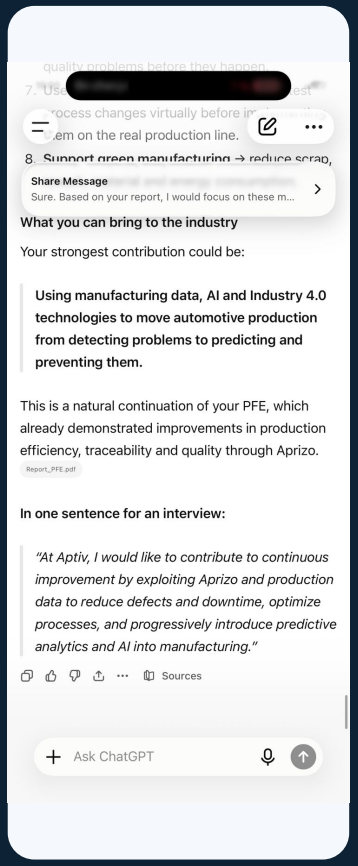
I would use manufacturing data and Industry 4.0 methods to move production from detecting losses after the fact toward preventing defects and downtime.

My sequence is deliberate: trusted events first, diagnostics second, predictive models only after the baseline is stable and the action owner is clear.

Source notes and reference framework

SUPPLIED SOURCE CAPTURES





Visible evidence: Aptiv Kenitra, KPI and quality analysis, MES / 'Aprizo', traceability, predictive maintenance, AI, virtual line and green manufacturing.

PRIMARY REFERENCES

01 **Dassault Systemes - DELMIA portfolio and Apriso**
https://www.3ds.com/products/delmia

02 **NASA - Hybrid engine system test (January 2026)**
https://www.nasa.gov/aeronautics/hybrid-engine-tested/

NAMING + PUBLICATION NOTE

The supplied notes spell the platform 'Aprizo'; confirm the exact system name before publication. This dossier makes no claim that Aptiv uses a specific vendor product. Company dates, responsibilities and verified improvements must also be confirmed by Aymane.