



Architecting a Product Data Foundation That Stays Consistent at Scale

How to create unified product data that strengthens every system you rely on

Product data touches every part of an enterprise, yet it can still be treated as something each team manages on its own. That approach works until launches slow, channels drift out of sync, and AI initiatives struggle to make sense of inconsistent inputs.

A Product Information Management (PIM) system is often seen as a tidy catalog that organizes this chaos. But for enterprise stacks, its potential is much larger. When PIM is designed as the normalization and governance layer for product information, it becomes the backbone that keeps every downstream system aligned.

Product data becomes reusable, predictable, and ready for anything that depends on it, from ecommerce to AI solutions.

This whitepaper breaks down how that backbone can be built in practice. You'll see the patterns that eliminate fragmentation, the structures that keep product data consistent at scale, and the integration and governance decisions that make PIM a reliable source of truth. Every insight comes from enterprise environments where consistency is hard-won and shortcuts don't survive.

If you need product data that stays trustworthy as your ecosystem expands, this whitepaper gives you the path to build it.

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How Fragmented Data Slows Enterprise Growth

Let's imagine there's no PIM or any similar solution in your ecosystem. Then, with a high degree of certainty, your product data lives in too many places at once: across ecommerce platforms, marketplace connectors, and regional databases, each evolving its own version of truth. Every system operates on different data models and rules. Some may hold duplicate identifiers or untracked changes, while others rely on manual operations that introduce quiet inconsistencies.

Add to this a layer of legacy integrations built on one-way data flows, batch synchronizations that run overnight, and the absence of versioning or change tracking, and fragmentation becomes inevitable. It's no surprise that 68% of organizations name data silos as their top data management concern.

The differences that seemed harmless at first start to multiply. Over time, they ripple through product catalogs, pricing, and inventory accuracy, and those gaps are expensive. In fact, even small corrections in stock data have been shown to boost sales by 4% to 8%, revealing just how much value remains locked behind fragmented information.

Clean systems start with clear thinking. Follow us on LinkedIn for more grounded takes on digital foundations.

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The impact of fragmented data becomes visible across daily business processes, where disconnected data directly translates into slower market expansion, delayed product availability, and limited innovation velocity

WHERE FRAGMENTATION HITS THE BUSINESS

BUSINESS PROCESS	OPERATIONAL REALITY	BUSINESS IMPACT OF FRAGMENTATION	POTENTIAL ROOT CAUSE
Product Launches	Each team – IT, marketing, B2B sales, marketplaces – works with its own data exports and file formats. Product names, specs, or certifications rarely match on the first try.	Repeated reconciliation, delayed time-to-market, and inconsistent product identity across channels.	No single source of product truth; manual exports and imports; different attribute models per system.
Pricing Updates	Prices updated in ERP or SAP don't reach ecommerce and marketplaces at the same pace, leaving some channels outdated.	Customers see different prices, causing trust and accounting issues.	Batch-based syncs, lack of event-driven updates, inconsistent price attributes.
Inventory & Availability	Warehouse data and online listings drift apart, showing items in stock that are already sold or unavailable.	Overselling, canceled orders, and lost sales.	Delayed synchronization; missing real-time API connections; manual stock adjustments.
Localization	Regional teams manually translate or adapt product content. Older versions often stay live.	Content divergence, outdated descriptions, and wasted manual effort.	No centralized localization workflow; lack of version control and approval tracking.
Compliance & Governance	Certification, labeling, and regulatory details vary between systems and regions.	Increased risk of non-compliance and higher QA workload.	Absence of a validated master record for compliance attributes; no role-based data governance.
Analytics & AI Readiness	Product, pricing, and inventory data remain inconsistent across systems. Machine-learning or forecasting models can't rely on it.	Limited scalability of AI and analytics initiatives; unreliable predictions.	Fragmented, incomplete datasets; no unified schema or governance layer for analytical use.

Fragmentation compounds over time, creating a system that spends more effort reconciling data than using it to drive decisions or innovation. However, like any systemic issue, it has its symptoms, and spotting them early gives enterprises a chance to address root data problems before they scale into operational losses.

SYMPTOMS OF FRAGMENTATION YOU CAN MEASURE

High data inconsistency rate.

Differences in product names, attributes, or prices across systems indicate that each source maintains its own version of truth.

Manual data correction workload.

When teams spend over 20% of their time fixing exports or reconciling product data, fragmentation has already become routine.

High return or complaint ratio due to wrong info.

Incorrect product details, outdated specs, or mismatched visuals directly increase returns and customer dissatisfaction.

Inventory mismatch frequency.

Stock levels differ between ERP and sales channels, leading to overselling and order cancellations.

Delayed product launches.

The average time to publish new products across all channels exceeds internal SLAs because each department must verify and align inconsistent data first.

SKU duplication rate.

Duplicate product IDs or SKUs across systems — often with slightly different attributes — lead to reporting errors, inflated catalog sizes, and confusion in analytics or promotions.

Data readiness for analytics score.

A low percentage of product data is actually usable for analytics or ML because it lacks structure, completeness, or a consistent taxonomy.

Fragmentation reveals a simple truth: enterprises don't lose growth because they lack opportunities, but because their data remains scattered across systems. The answer isn't just better coordination, but a stronger data backbone. A well-implemented PIM can become that backbone, quietly turning fragmented product information into a unified source of truth.

The Role of PIM in Data Foundation

Most enterprises think of PIM as a way to organize product catalogs — a practical tool for managing descriptions, attributes, and digital assets. But if you look beyond that surface, PIM has the potential to become something much more powerful: the central hub that unites product data across the enterprise.

When implemented as part of a broader architecture, PIM builds a single, normalized, and governed data foundation that can feed various business operations across marketing, analytics, etc.

This turns product information from a fragmented operational resource into a strategic, reusable asset that drives consistency, speed, and data confidence across all channels.

Still, turning PIM into that kind of backbone requires more than deployment — it depends on how well the solution connects and collaborates with the rest of the ecosystem.

Its true value appears only when it's tightly integrated with systems like ERP, CRM, and DAM, and supported by clear data ownership and governance processes that keep information accurate over time.

PIM also has its boundaries: it manages product master data — attributes, content, and structure, but it doesn't replace ERP logic, CRM workflows, or analytical tools. Instead, it gives them the one thing they all need to perform reliably — a clean, consistent, and trusted source of product truth.

EXAMPLE FROM PRACTICE

A global travel company managing thousands of hotels worldwide struggled with fragmented product data. Information about each hotel – descriptions, attributes, and availability – was stored in multiple regional systems, creating duplicate and conflicting records across booking platforms

After implementing PIM as the central product data hub, all sources were connected to one governed system. Duplicates were removed, attributes standardized, and updates synchronized across channels. The result was faster product publication and a single, trusted view of hotel data enterprise-wide.

HOW PIM CREATES A UNIFIED DATA FOUNDATION

The opportunities PIM introduces lie in how it structures and governs product data at its core. Instead of letting each system define its own rules, PIM enforces one shared language for how product information is created, enriched, and distributed across the enterprise.

- **Data normalization.** PIM unifies attributes, taxonomies, and formats into a single schema, ensuring that every product follows the same structural logic no matter the source.
- **Governance and validation.** It embeds data quality rules, such as completeness checks, attribute validation, approval workflows, to guarantee accuracy before any information reaches downstream systems.
- **Enrichment and localization.** Regional teams can manage variations, such as language, measurements, regulatory details, within one controlled structure, avoiding the risk of version drift.

- **Integration capability.** Acting as the clean data source, PIM synchronizes with ERP, ecommerce, CRM, DAM, and analytics tools through APIs or event-driven data flows, ensuring every platform receives consistent, up-to-date product information.
- **Versioning and change management.** PIM maintains a full history of changes, allowing teams to track updates, roll back errors, and maintain long-term data consistency.
- **Metadata management.** By organizing metadata alongside product information, PIM enhances the usability of data for analytics and AI models.

However, even with the right architecture, the success of a PIM isn't guaranteed if it's understood and managed unrealistically.

WHAT TO KEEP IN MIND FOR EFFECTIVE RESULTS

Understanding these nuances early helps teams avoid misplaced expectations and focus their efforts where PIM delivers measurable value.

I CLEAR RULES BEFORE TOOLS

PIM can't enforce what the business hasn't defined. Without common data models, ownership, and governance rules, even the most advanced system will eventually mirror existing inconsistencies instead of fixing them.

I FOUNDATION, NOT A REPLACEMENT

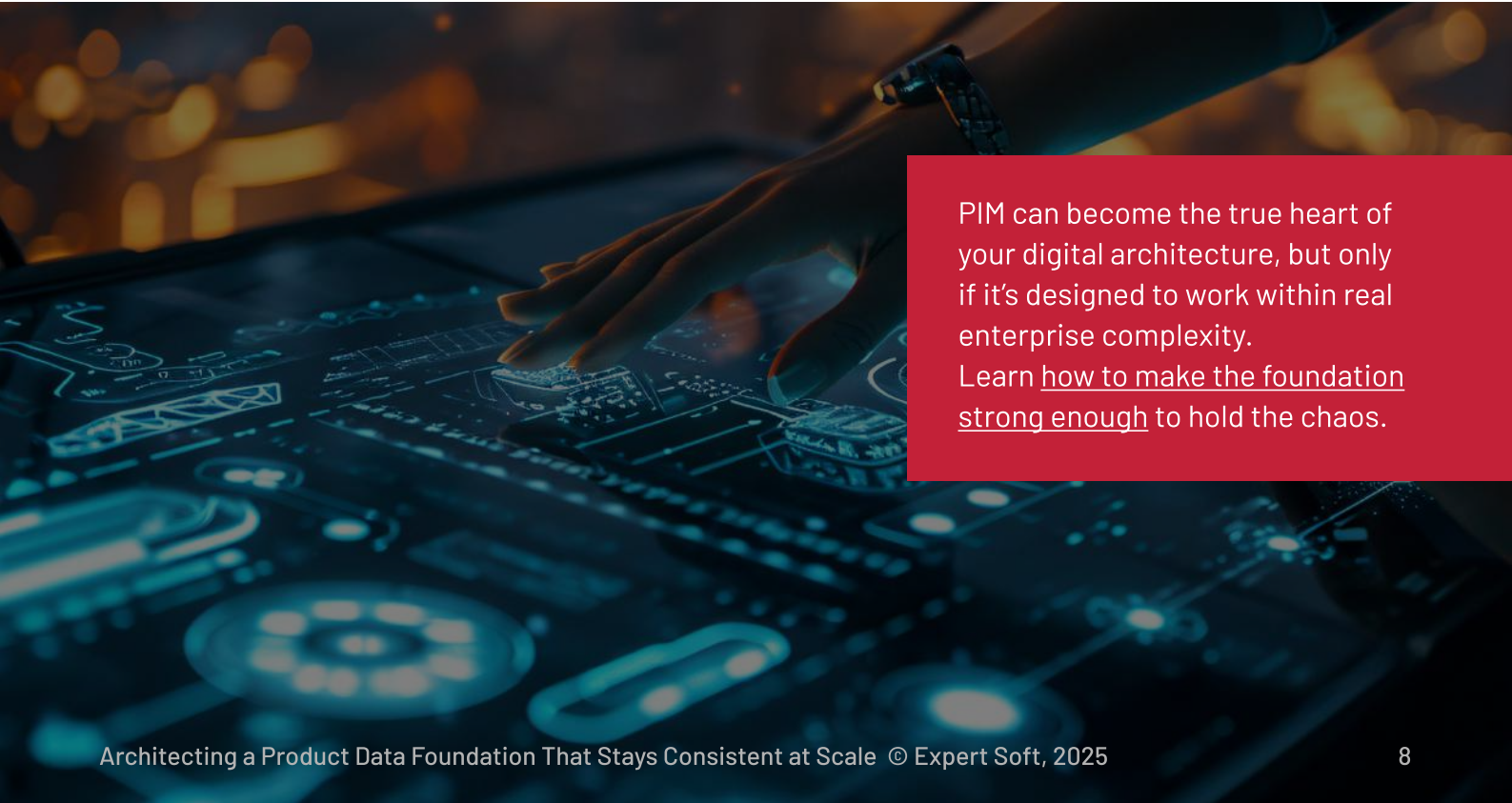
PIM creates the base layer for trustworthy product data but doesn't take over analytical or forecasting functions. It enables these tools to work better by ensuring their inputs are consistent and reliable.

I CLEAN INPUTS, CLEAN OUTPUTS

PIM doesn't automatically cleanse data from external systems, so it requires well-structured integrations and agreed exchange formats to maintain integrity. The quality of the output always reflects the quality of what comes in.

I PROCESS DISCIPLINE MATTERS

Sustainable data quality depends on user behavior as much as technology. Unapproved changes, skipped validation steps, or manual updates outside defined workflows can quickly bring fragmentation back.



PIM can become the true heart of your digital architecture, but only if it's designed to work within real enterprise complexity. Learn [how to make the foundation strong enough](#) to hold the chaos.

What a Clean Product Data Core Unlocks

A clean, unified product data core can change the way your business runs daily operations. When information flows consistently through every system and channel, coordination stops being a manual effort and becomes a natural part of how work happens. Teams make faster decisions, data moves without friction, and accuracy is no longer something to double-check but is built into the process itself.

The following scenarios show how a clean product data core transforms key operational areas, from product launches to compliance and customer experience. Each example reflects a familiar challenge we've described earlier, but this time with a different outcome: speed, trust, and coordination built directly into the data itself.

SCENARIO	WHAT HAPPENS WITHOUT UNIFIED DATA	WHAT CHANGES WITH UNIFIED DATA BACKBONE
New product introduction (NPI)	Marketing, ERP, and marketplaces each maintain separate product files. Launches are delayed by 2–3 weeks due to reformatting and reapproval cycles.	Product information is entered once in PIM, enriched through workflows, and distributed across channels. With well-connected processes, launch readiness drops from weeks to days.
Variant and regional management	Each region manually maintains localized data, leading to outdated or inconsistent specs.	PIM maintains core and local attributes in one model; teams reuse most of the content globally.
Regulatory compliance	Product certifications and energy labels are scattered across spreadsheets, often missing during audits.	PIM keeps compliance metadata linked to every SKU, ensuring documents are current and accessible. It doesn't validate regulatory conformity but guarantees traceability and audit readiness.
Marketing campaign prep	Campaigns require images, specs, and prices from multiple systems, each with its own format and update cycle.	Marketing retrieves all needed assets from one verified source, accelerating campaign setup and minimizing errors across channels.
Customer self-service or B2B portals	Inaccurate product data increases support tickets, returns, and lost trust.	Centralized and verified information ensures customers and partners see consistent, reliable details, reducing post-sale friction and service costs.

In these scenarios, what truly grows is trust — the confidence that every decision is made using the same, verified source of information.

Building a unified data foundation is a milestone, not a finish line. Over time, even structured data can age into clutter if left unmanaged. Understanding [how to keep data fresh](#) is the next step in building systems that stay efficient, not just organized.

How a Clean Product Data Core Feeds AI and Planning

Enterprises are racing to embed AI into everything — forecasting, pricing, logistics, personalization — yet often underestimating one point: AI is only as good as the data it consumes.

A well-structured PIM solves a major part of this challenge by providing normalized, complete, and governed product information that AI systems can rely on without additional cleanup.

But it's important to draw the line clearly: PIM does not create or run models itself. What PIM provides is the foundation — a consistent product data layer that keeps inputs stable so AI initiatives can operate without drowning in inconsistencies.

ASSORTMENT & PORTFOLIO PLANNING

Business aim: The business wants to know where product gaps exist and which categories deserve investment.

What data the AI needs:

Models need standardized taxonomy, complete attribute sets, and reliable product hierarchies to evaluate coverage accurately.

What PIM provides:

PIM delivers that structure — clean hierarchies, consistent categories, and unified attributes — allowing objective comparison across markets.

How AI uses it:

AI evaluates overlaps, gaps, and growth opportunities by combining sales and market data with the standardized product structure. Portfolio planning becomes proactive and evidence-driven. Teams can balance innovation with efficiency, invest where demand truly exists, and streamline underperforming segments.

DEMAND FORECASTING

Business aim: The business wants to see demand ahead to plan production, secure inventory, and hit every delivery window without overspending.

| What data the AI needs:

Forecasting models depend on stable identifiers, product hierarchies, variant relationships, and attribute consistency across markets.

| What PIM provides:

PIM supplies a clean, unified product structure that links every SKU, category, and region under one normalized schema. This ensures the AI model receives aligned inputs rather than mismatched fields.

| How AI uses it:

The forecasting engine can focus on pattern detection — not data cleanup — spotting early demand shifts, cross-category signals, and regional patterns.

EXPERT SOFT'S USE CASE:

We helped a global industrial automation supplier modernize its supply chain and forecasting processes to cut costs and prevent stockouts. Product and component data unified in the PIM layer fed AI models that predicted component shortages, suggested substitutes, and calculated optimal warehouse stock levels.

AI models predicted shortages of critical components, suggested viable substitutes, and recommended optimal stocking levels per warehouse. It resulted in a 30% reduction in excess inventory costs, 15% fewer stockouts in critical categories, and faster procurement cycles through autonomous supplier interactions.

PERSONALIZATION & SEARCH

Business aim: The business wants every customer to find the right product fast and see options that actually fit their needs, which boosts conversion and reduces bounce rates.

| What data the AI needs:

Recommendation and search models require structured metadata, consistent attributes, category relationships, and enriched product descriptions.

| What PIM provides:

PIM supplies clean metadata, stable hierarchies, and verified relationships between products, giving search and recommendation engines a clear semantic map.

| How AI uses it:

The engine matches customer intent with the correct product attributes, understands feature relevance, and builds highly accurate product-to-product connections.

EXPERT SOFT'S USE CASE:

Expert Soft helped a global beauty retailer boost product discoverability through AI-driven keyword recommendations.

Using structured product data prepared within the PIM ecosystem, the system connected seamlessly to a third-party AI service that suggested engaging, category-specific keywords on the storefront. Each keyword led to dynamically generated landing pages with relevant products, powered by clean data and precise filtering logic.

CONTENT PERFORMANCE ANALYTICS

Business aim: The business needs to understand which product content actually drives conversion and influences buying decisions across regions and categories.

What data the AI needs:

Analytics models rely on consistent attributes, category structure, and localized content aligned across regions.

What PIM provides:

PIM ensures attributes and descriptions follow the same schema everywhere, creating a comparable dataset for performance evaluation.

How AI uses it:

AI links product attributes with behavioral metrics, identifying which content patterns raise conversion and which fall flat.

PRICING OPTIMIZATION

Business aim: The business wants pricing that reflects real product value in each market, without guesswork or margin-draining discounts.

What data the AI needs:

Dynamic pricing models rely on clean attributes like capacity, size, material, version, and energy class, plus a consistent taxonomy to compare items accurately.

What PIM provides:

PIM standardizes these attributes and maps each SKU into one coherent category structure. The AI receives comparable inputs instead of conflicting field names and fragmented attribute sets.

How AI uses it:

Pricing models analyze elasticity, detect willingness-to-pay patterns, and recommend targeted adjustments as demand or competition shifts.

SUPPLY CHAIN VISIBILITY

Business aim: The business wants full visibility into how materials, components, and finished goods move through the supply chain to anticipate shortages early, align logistics with demand, and eliminate delays caused by inconsistent or incomplete data.

| What data the AI needs:

Supply chain models require unified component attributes, parent-child structures, and metadata linking raw materials to final products.

| What PIM provides:

PIM maintains these relationships in one normalized structure, giving AI systems traceable inputs for mapping dependencies and identifying weak points.

| How AI uses it:

Using the structured layer, AI detects bottlenecks, flags supply risks, and simulates production or logistics scenarios. This results in reduced lead times, improved coordination, and balanced inventory levels across production and distribution centers.

A clean product data core gives AI a solid base of consistent, high-quality inputs. The next step is building an AI backbone around it — one that scales, adapts, and delivers reliable intelligence across the enterprise. [Explore how to design that foundation](#) for lasting impact.

Implementation Essentials: How to Make PIM a True Backbone

We've talked about how PIM can become the foundation for consistent product data, but not yet about how to build that foundation. The main idea is that a strong PIM foundation is the outcome of making the right structural decisions early.

So, let's shift from theory to practice and explore the steps that turn PIM from a catalog manager into the unified source of truth your enterprise can rely on. The goal is clarity, not complexity — each step builds a layer that keeps data consistent, governed, and ready for every downstream system.

It's important to understand that not all steps carry the same weight. **In most enterprise environments, data modeling, migration, and integration work consume the majority of the timeline and budget.** These stages surface legacy inconsistencies, conflicting schemas, and hidden business rules, and underestimating them is the most common reason PIM projects derail.

MODEL PRODUCT DATA

Start by defining reusable product structures: categories, attributes, variants, relationships, and hierarchies that will support current and future product lines. This step also includes standardizing and mapping data from existing sources so that every system aligns to one schema instead of reinventing its own. A clear model at the start prevents inconsistencies from resurfacing later.

PRO TIP

Model attributes based on business meaning, not system behavior. When an attribute reflects how the organization thinks about the product, it becomes reusable across workflows, channels, and future integrations.

CLEAN AND MIGRATE THE DATA

Migrate historical data into the new model, eliminate duplicates, align formats, and fill missing attributes so every product enters the system in a consistent state. This step is non-negotiable, as without it, even the best-designed PIM will inherit old inconsistencies from day one.

PRO TIP

Don't migrate everything. Identify low-value SKUs, expired assortments, and legacy attributes that no longer matter — archiving them upfront keeps the new foundation lean and easier to maintain.

ESTABLISH WORKFLOW OWNERSHIP

Workflow design defines how product data moves through the organization, from creation to enrichment to final publication. Start by mapping every action a product record passes through: who creates the base data, who enriches attributes or media, who validates compliance fields, and who pushes updates to channels. Then turn that map into structured workflows inside PIM with clear ownership, approval steps, and hand-offs so every update follows a predictable, governed path.

PRO TIP

When defining roles, separate “who edits” from “who approves.” Many enterprises merge these by accident and end up with bottlenecks or silent bypasses. Splitting them creates both speed and control without extra complexity.

ARCHITECT CLEAR INTEGRATION PATHS

Design how product data flows through the ecosystem before any connector work begins. Start by defining clear master/slave roles for every attribute to prevent circular updates and sync conflicts.

Also, design the integration paths accordingly — PIM → ERP → commerce and analytical tools, ensuring each system receives only the data it should own. With ownership and direction defined upfront, integrations stay predictable, and every downstream system receives consistent updates without drift.

PRO TIP

Document not just the data flows, but the conditions under which updates propagate. This prevents surprises later, like ERP overwriting PIM attributes because of an unnoticed sync rule.

INSIGHT FROM PRACTICE

A global healthcare brand ran its product data through a PIM UI, SAP Commerce as a back-end, and several downstream systems. Because attribute ownership wasn't clearly defined, different services updated the same fields, causing product states to drift across channels.

We fixed the issue by assigning strict master roles: commerce-owned operational states, while the PIM layer owned editorial data. Once ownership was explicit, updates propagated predictably, and every endpoint stayed aligned.

TEST THE FLOWS END-TO-END

Validate not just PIM functionality, but how product data behaves once it reaches every downstream channel. Check attribute mapping, media delivery, variant logic, and how listings render on ecommerce sites or marketplaces to ensure nothing breaks in translation.

PRO TIP

Run tests with real, messy products — the ones with complex variants, unconventional attributes, or irregular content. They reveal edge-case failures long before customers do.

MEASURE DATA QUALITY CONTINUOUSLY

Governance only works when it's measurable. Define the KPIs that show whether your product data is improving or slipping, such as completeness by channel, attribute accuracy, error rates, time-to-publish, and the volume of manual corrections. Make these metrics visible to every team involved so issues surface early and quality becomes a shared responsibility.

PRO TIP

Don't track metrics in aggregate, break them down by category, region, or workflow stage to get more observability.

PREPARE TEAMS FOR THE NEW REALITY

A PIM foundation only works when people use it correctly. Train every role on the new workflows, show what "source of truth" means in practice, and make it clear which updates must happen in PIM — not in spreadsheets, local systems, or quick manual patches.

PRO TIP

During onboarding, track the first 30 days of user behavior. Early patterns reveal where habits slip back into old processes, letting you fix workflow friction before it turns into long-term data drift.

Following these steps, you'll build **a reliable source of product truth** that your teams can trust and your operations can scale on. A PIM shaped with clear models, clean data, disciplined workflows, and well-defined integrations becomes a backbone you can rely on.

And once that foundation is in place, **the benefits extend far beyond product data**. Every connected system, such as commerce, manufacturing, analytics, AI, stops compensating for inconsistencies and starts working from the same stable core.

Decisions become faster and more confident, product launches move with fewer surprises, and forecasting models gain the clarity they need to perform reliably. **The entire architecture becomes calmer and more predictable because its inputs hold still.**

This is how enterprises can create systems resilient enough to support real digital transformation as the roadmap evolves.

About Expert Soft

Expert Soft is a targeted ecommerce software delivery company, partnering with Fortune 500 companies and global corporations across the US and EU. With SAP Commerce Cloud and Java as our backbone, we know how to ensure scalable and high-performing solutions that can handle 1 mln requests per second, delivering a smooth customer experience.

Developing a payment engine that saved our client about \$100 million in operational expenses, ensuring multi-country platform support, adapting solutions for new market entry with tailored enhancements — these are just a few of the challenges our specialists tackle.

We aim to deliver more than a software system. We aim to deliver tailored solutions that maximize profitability within available resources. Our success is driven by:



TEAM STRENGTHS

- | All our engineers have a university background
- | Specialists excel their skills in our training LABs
- | Perfect English skills
- | Ready to help 24/7

CLIENTS

We work with corporations around the world with revenue of over \$20 billion and 150K+ employees.

APPROVALS BY AUDITS

Our ongoing work with corporations is consistently validated through rigorous audits, both by internal teams and Big 4 consulting firms.

HIGH-LEVEL SECURITY

Approved by assessments from global companies, who are leaders in their respective industries.

BUDGET EFFICIENCY

By carefully aligning technology investments with your business goals, we ensure optimal value and cost-effectiveness.

PROFESSIONAL TEAM

No offshore outsourcing and our team's average tenure of 4+ years means you get seasoned problem-solvers, not just coders.

EXPERT SOFT EXCELS IN

- | PAYMENT ENGINE
- | MICROSERVICES ARCHITECTURE
- | CONTENT MANAGEMENT
- | REDESIGN
- | E-COMMERCE PLATFORM
- | HEADLESS COMMERCE
- | MICRO FRONTENDS
- | MIGRATION&INTEGRATION

OUR TECH CORE



FRONT-END

HTML, CSS, JavaScript
(Angular, React, Vue,
Next, TypeScript,
Jquery), Spartacus



BACK-END

Java EE, Spring, SAP
Commerce (Cloud),
Node.JS.



DEVOPS

Docker, Kubernetes, CI/
CD



UX/UI DESIGN

UX Research, UI Design,
Figma, Adobe, Sketch



QUALITY ASSURANCE

Manual Testing, Test
Automation

TARGETED DOMAINS



SHARED PATHS, LASTING ECOM VICTORIES



LET'S TALK SOLUTIONS!



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