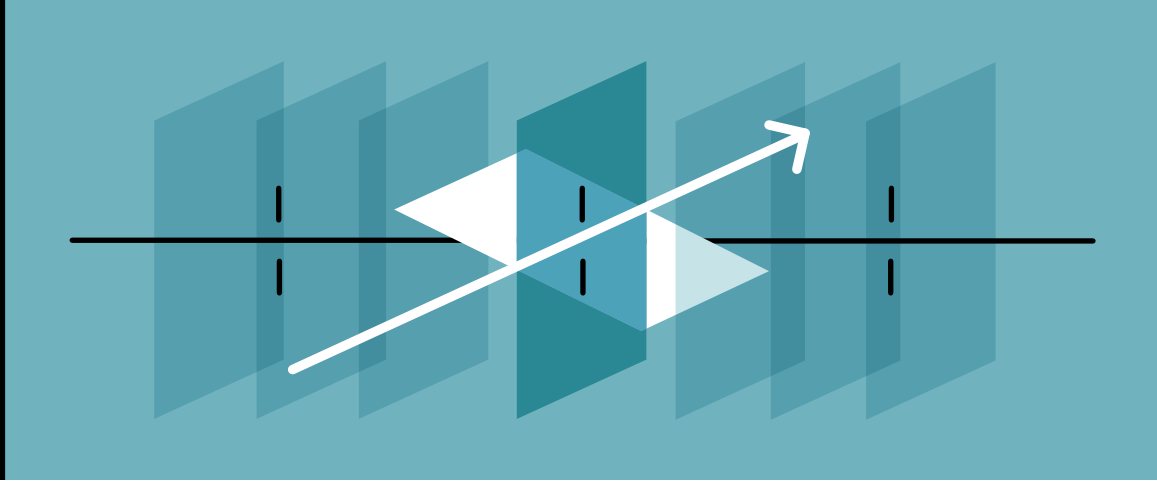
HARVARD BUSINESS REVIEW



Connecting the Data That Powers Real-Time, Value-Generating Insights

HBR Analytic Services **BRIEFING PAPER**

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Operational Blindness Is the New Technical Debt

For decades, technology leaders have defined "technical debt" primarily as aging code and legacy infrastructure. However, as the digital enterprise accelerates, a more insidious form of debt has emerged: operational blindness, which is the inability to see how work turns into value. This debt accumulates in the silent gaps between disparate tools, disconnected teams, and siloed data. It is the cost of running an organization that can move fast but struggles to see where it is going.

We have entered an era where speed is a given. Fueled by the widespread adoption of Agile methodologies and DevOps and now accelerated by generative AI, organizations have optimized for increased throughput. Yet, as this report suggests, high-velocity software delivery is wasteful if it is decoupled from business value. When financial planning sits on one island, engineering execution on another, and strategic portfolio management on a third, the enterprise operates as a fractured system.

The result is a "value gap." We see the costs of development and the speed of deployment, but we lack the unified data lineage required to measure the actual business outcome of those investments. Without end-to-end data lineage, organizations can't determine which investments pay off, and artificial intelligence (AI) can't compensate for missing or unreliable data.

To pay down this debt, forward-looking IT leaders are shifting their focus from merely managing disparate projects to orchestrating value streams. They are beginning to recognize that data integration is a strategic imperative that transforms their enterprise into an adaptive organism capable of real-time responsiveness and prepared for the data-hungry demands of an AI-driven future.

The following paper explores this critical transition. It examines how organizations are leveraging value stream management and strategic portfolio management to bridge the divide between strategy and execution. It argues that the path to a truly data-driven enterprise requires more than just new tools; it demands a culture that values data quality, transparency, and the relentless pursuit of visibility.

Broadcom is proud to sponsor this paper and hopes it helps leaders unlock the full value of data-driven initiatives.

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Katy Groves
Head of Product ValueOps
Broadcom

Connecting the Data That Powers Real-Time, Value-Generating Insights

The promise and complexity of running a data-driven enterprise require organizations to understand how and where business value is created. Too often, organizations lack this understanding because their data is siloed, unavailable, or indecipherable to key decision makers. Quite simply, they lack the necessary tools and processes required to unlock that data and develop value-generating insights across the enterprise.

MANY ORGANIZATIONS jump into major initiatives without deep expertise in data integration and running large-scale enterprise projects. One maxim of the Information Age is that fresh insights are fundamental to building and managing an efficient, large-scale, data-driven enterprise. Those insights require the deployment of the right tools and high-quality, comprehensive data to measure or project the impact of organizations' technology investments on business outcomes. To generate value from major investments, organizations must harness and measure the flow of value across the entire enterprise. Today, realizing value in the data-driven enterprise requires information that flows in real time across all tools in your ecosystem, especially those that provide robust performance insights.

Without data-driven insights, organizations cannot report how their products deliver customer value and drive revenue growth. Stephen Catanzano, senior analyst of data platforms at Enterprise Strategy Group (ESG), a Newton, Mass.-based tech market research firm, asks, "What's the value created at the end of this whole process? Is it going to create efficiencies or a competitive advantage?" According to Catanzano, enterprise initiatives are a "little harder to measure the value of 'at the moment.'"

Performance metrics, such as DevOps Research and Assessment (DORA) metrics, which measure software delivery throughput, have become central to modern enterprise

HIGHLIGHTS

Realizing value in the data-driven enterprise requires **information that flows in real time across all tools in your ecosystem**, especially those that provide robust performance insights.

Data-driven value creation becomes impactful with real-time insights provided by value stream management and strategic portfolio management and is viewable through dashboards via a web address, which **enables quicker and more-informed business decisions**.

Data-driven projects can be **hindered without proper data infrastructure**, including processes to automate data ingestion, scrub errors, and anonymize personal data.

management but are lagging indicators that can fall short on the other half of the picture: the value realized. For example, while DORA metrics measure performance and stability in software delivery, they don't track customer value or business outcomes. In addition to DORA metrics, the value stream management (VSM) framework equips project leaders with the tools to measure the value of software investments, improve data integration for deeper and fresher insights, and tame the complexity of large-scale enterprise projects. VSM aligns work with strategy, ensuring that development efforts are connected to business objectives and deliver measurable outcomes. While VSM provides an overarching platform, its strategic portfolio management (SPM) component enhances organizational planning capabilities, ensuring that financial commitments align with company goals, prioritize projects, and link budgets and assets to quantifiable commercial results. SPM gauges investment performance and determines whether investments are delivering the expected return, as well as their contribution to the overall portfolio value.

Data-driven value creation becomes impactful with real-time insights provided by VSM and SPM and is viewable through dashboards via a web address, which enables quicker and more-informed business decisions. Yet many companies are discovering that while they have dozens of potential uses for data, they may lack the correct data—or adequate data quality—to measure the outcomes of a project early and often or assess whether investments align with the strategy of each product in the portfolio. Data-driven projects can be hindered without proper data infrastructure, including processes to automate data ingestion, scrub errors, and anonymize personal data.

This paper will examine how VSM and SPM combine to provide insights essential to generating value and explore why organizations invest in the building blocks to capture and analyze data, as well as measure value, reduce business risk, and improve business outcomes. This paper will also highlight how data-driven insights impact project funding and development teams in their quest to reduce business risk and generate more value.

Data Integration Drives Real-Time Insights

Even as large IT groups focus on resolving technology challenges for other business units, such as bridging data silos or generating code for new applications, they often face their own roadblocks. For example, incomplete data can perpetuate operational blind spots for IT teams. Yet deciding to bridge this knowledge gap isn't always a no-brainer for organizations. A lack of critical data is often considered a form of technical debt—a problem that organizations may tolerate for months or even years due to cost or competing priorities. A lack of clear operational insight is an especially vexing issue for organizations saddled with incomplete, inconsistent, or inaccessible data for decision making.

"When I first came on, none of the systems we use for development or QA [quality assurance] were connected," recalls Robert Clee, IT associate vice president of Tokio Marine North America Services (TMNAS) in Bala Cynwyd, Pa. TMNAS provides accounting and actuarial services for Tokio Marine Holdings Inc., its parent company, a global insurance group headquartered in Tokyo. Clee says he sought to "connect data for IT across functions so we could be more effective and efficient."

A lack of timely communication between teams with incompatible management tools stymied TMNAS' development pipeline. To solve this problem, Clee wanted his development and quality assurance teams to exchange real-time notifications to enable frequent updates. For example, he says, developers were "supposed to send emails to QA" when code was ready for testing. "Well, something comes up and they don't send the email for three hours, wasting time for offshore resources," he recounts. "We want to be productive immediately. The faster we can do that, the more value we bring to our organization."

Still, rather than forcing each team to use the same management tool, Clee looked for a way to integrate data across TMNAS' disparate systems. He also sought deeper and more timely insights into his team's performance in his quest to

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drive greater value across the organization. “A lot of people looked at this [data integration] problem as technical debt and not something that would provide instant value,” he recalls.

But Clee identified a cost-effective solution that quickly changed minds. “We looked at tools that would allow us to create innovation without coding,” he explains. “Once we found the right tool, it was pretty quick. We implemented [the integration] in less than four months. Those connections [between several different application life cycle management systems] could be managed by anyone with a good technological skill set.”

The information was bidirectional and in real time, providing instant operational insights and visibility to everyone in the development value chain. With this additional information, Clee’s team could now “look for patterns in the data where we’re seeing consistent delays and failures.” TMNAS’ integration platform, which synchronizes data between diverse applications, provides his team with what he terms “true insight into the effectiveness of teams and functions in our organization.” These insights have enabled his management team to optimize managed resources, deliver value faster, and place timely “data into the hands of our business partners.” And the process continues, he explains. “Every time a new tool comes into the system, we’re learning more about the effectiveness of each team and each person,” Clee notes.

Valuing Predictability

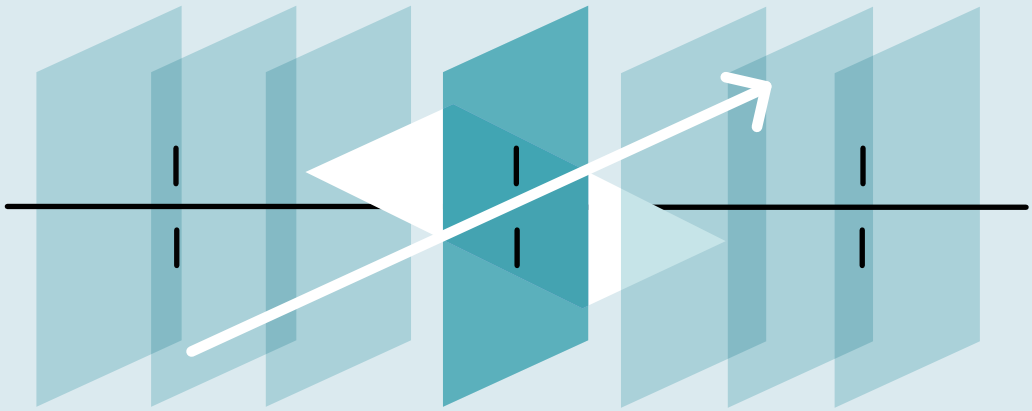
The importance of good data quality isn’t lost on software developers or program management offices, better known as PMOs, which typically fund them. PMOs usually consist of a committee of business and IT analysts and executives responsible for orchestrating and prioritizing technology projects. They evaluate each investment’s business case, enabling them to assess whether green-lighted projects align with the strategy. The PMO team gauges whether projects are meeting their KPIs and delivering their promised value on time and within budget. Ultimately, good data is the cornerstone of effective decision making, enabling PMOs to confidently track alignment with strategic goals, measure KPIs, and guarantee that investments deliver real value, such as higher customer loyalty and adoption. PMOs tap this data to determine whether their investments remain on track to deliver long-term value.

Dimitrios Psarros, a technical fellow in Honeywell International Inc.’s Access Security business unit in Rochester, N.Y., applies VSM to deliver compelling results to PMOs and business stakeholders. A value stream expert, Psarros sees value in equipping every stakeholder, including his development team and company executives, with the necessary performance insights to make informed decisions.

There were “a lot of bottlenecks” in his team’s development process in 2007 when he first embarked on VSM. “Our main motivation was to increase the efficiency with which we released our new products,” recalls Psarros. “Everything was in spreadsheets, and it took more time and resources to track and understand the [project] risks.”

Over time, he realized he wasn’t utilizing all the data that VSM could gather. “We realized we could improve our software delivery metrics—cycle time and throughput—to understand how fast we can deliver the work,” he says. “How long does it take to deliver a feature? Could we deliver a user story [a software feature as described by a customer or user] in five or six days?”

The data indicated to Psarros that a development team can lose efficiency when teams are overutilized or frequently change personnel. “If you want to improve a process, you need a little more control,” explains Psarros. Armed with VSM data, he ended the practice of “context switching”—namely, assigning his developers to multiple projects. Instead, he asked them to work on one thing at a time. “Get it done and then pull in other work,” he says. “By establishing those limits, we improved our predictability and ensured the [work]flow was as efficient as possible.”



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The PMO began to view its development team through a different lens. "If your work is predictable, there's trust," says Psarros. "We understood that flow management practices made us more predictable and 90% of our work would be done in under five days. We are above 90% with one team. That's significant." Flow management enabled the PMO to "manage the work instead of the people," he adds. Consequently, Psarros' team reduced cycle time—a key metric that tracks the duration of a single task from development to production. It also cut back on so-called non-value states, such as waiting for code reviews or dealing with activities that don't create customer value. Ultimately, he explains, "We improved our flow efficiency."

PMOs and project leaders equipped with VSM gain deep visibility into the flow of work, enabling them to identify and eliminate development bottlenecks, streamline software delivery, reduce wasted resources, and accelerate time to market. It also provides software engineering intelligence through automation and data-driven insights, allowing organizations to visually track alignment between product investments and business strategy and measure the realized value of those investments.

With enterprise adoption of data-driven tools like VSM and SPM, PMOs have transitioned away from funding projects in a so-called timebox—giving teams 10 weeks of funding for a specific deliverable. SPM empowers organizations to quickly seize strategic opportunities, such as funding products and the teams that build them. "It's a product operating model—[funding] products as opposed to projects," says Phil Clark, vice president of Parchment Technology, a portfolio company of Salt Lake City-based Instructure Inc. He's led software teams for over 25 years and serves on the board of the VSM Consortium, an industry group. Clark likes the persistent funding model because his teams can build product expertise and stay with it "through retirement." His firm's employee engagement study indicated that developers dislike "being switched from one project to another. We weren't getting the quality we would have if teams just stayed in one area."

Honeywell's Psarros believes in the power of predictability that stems from improved data quality. He adds that tracking the flow of a development team's work provides "greater insights into how they're performing, and you can use that information to forecast how long it will take them to deliver a new version of a solution." He acknowledges that it takes an organizational commitment to kick-start this effort. "Doing this means having the right tool sets and data and understanding to discuss it. Make sure you have a culture of continuous improvement."

Visualizing Data Value

Many, if not all, organizations maintain a collection of disparate, business unit–specific data stores, data lakes, warehouses, and cloud-based databases. In effect, the data remains locked in silos, sometimes with limited operational impact. As a result, organizations cannot fully operationalize the data for real-time business insights. Lacking this data, they can't close the loop between distributed data and outcome realization. They can't track the actual value of their investment.

Yet the data's value is not static—it can change instantly. A supply chain may need reconfiguring when a global mishap or environmental problem occurs. New data partners may come online and data sets may require more in-depth analysis or subject matter experts to continue driving value. ESG's Catanzano notes that in manufacturing, "There could be a million different variables along their value chain that they've got to adjust when things happen."

In principle, synchronizing data distributed between products, locations, and business units may enhance value by expanding its usefulness. But while it's possible to unify and measure data across business silos, organizations may not know the potential value of data aggregation across disparate silos. This process is especially valuable in evaluating data integration for artificial intelligence (AI) and analytics. According to Parchment's Clark, you can understand how

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>
> Phil Clark, vice president, Parchment Technology

the value flows through the system by applying visualization tools such as value stream mapping and outcome mapping.

“These [visualization] tools facilitate dynamic, data-driven coordination, helping organizations align their spending with strategic priorities,” says Clark. “They also enhance the ability to track aged work and dependencies, reduce risks, and ensure smoother collaboration across multiple teams, ensuring that investments in large-scale systems or programs are well coordinated and deliver the intended outcomes.”

Psarros’ business unit also applies value stream visualization tools to illuminate delivery bottlenecks and better understand the features they produce for the organization. He says that if a development project takes longer than expected, “We do root cause analysis around that. Inside the flow, there are value-added states and non-value-added states. We want to minimize the non-value-added states. So, we need data and insights about our value stream.”

Other Honeywell stakeholders use visualization tools to assess Psarros’ team’s product delivery workflow. He describes a process that combines product and solution teams, where the program management delivery, marketing, and customer support teams gather periodically to review the program execution. The working group examines various graphs, metrics, and KPIs and then issues reports on the program’s health to executive leadership. He credits visualization tools for empowering his team’s productivity and predictability breakthroughs. “We achieved that [success] by visualizing our workflow and managing the work by limiting what’s in progress” to one project per developer, says Psarros.

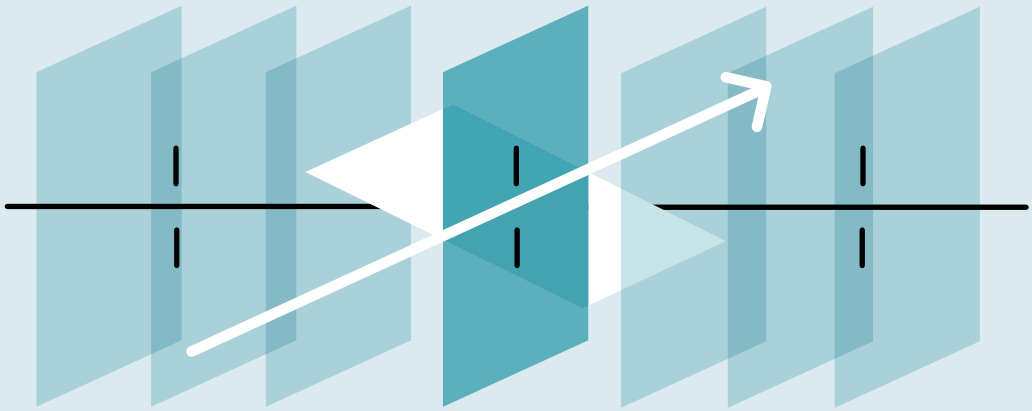
The Data Quality Imperative

By its very nature, data is complicated to extract, clean, store, protect, and analyze. Data teams manage it in structured or unstructured forms and disparate data formats. The data scrubbing process—establishing standard data formats for AI and analytics—can best be summed up in a quip often attributed to Otto von Bismarck, a 19th-century Prussian statesman: “Laws are like sausages. It’s better not to see them being made.”

Although data cleansing may seem perfunctory, data synchronization and normalization tools play a crucial, albeit unsung, role in enabling data sets to surface timely business insights and deliver business value. New tools for automating processes such as data synchronization and data cleansing can help organizations improve the freshness and accuracy of their data insights. Without data synchronization, data can become inconsistent across different software or storage platforms. The tools help eliminate conflicting or out-of-date versions of the data.

Yet, by every indication, mounting an effective data quality improvement effort remains a work in progress. A December 2023 ESG study found that “44% of organizations only somewhat trust the data given to end users for decision making.”[1] Catanzano adds, “When decision makers think about data they want to democratize, challenges exist.” Few raw data sets are ready for public scrutiny or consumption, at least not without extensive scrubbing. “Transforming data into common formats that organizations can then use with AI and analytics is probably their biggest challenge,” says Catanzano. He says companies use data quality tools to determine whether their data is accurate and to ensure that no personally identifiable information or confidential information is disclosed. He says an organization needs to know: “Are there biases in this data? Is it something we could build a model around that we’re not going to regret later? So, you have a lot of bias mitigation.”

Building a deeper reservoir of operational data gives organizations more opportunities to launch value-generating projects. But Catanzano cautions that error-laden data could be rejected by customers and cause reputational harm. To diminish this risk, he insists that cleaning up inaccurate data isn’t just a rote task—it must become a cultural imperative. This effort requires “a higher level of understanding and education between companies and employees so everyone is aware that when they see something that’s not right, they need to report it,” Catanzano says. “Having this loopback is important.”



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December 2023 Enterprise Strategy Group (ESG) study

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Conclusion

Data-driven value creation requires harvesting insights quickly for timely business decisions. In the digital transformation and VSM era, where Agile practices have revolutionized software delivery, organizations need deeper data insights to align their value streams with investment objectives. VSM enables organizations to tame the spiraling cost and complexity of the data-value delivery cycle—ensuring that data quality, integration, and AI development efforts satisfy their robust expectations.

Well-scrubbed operational data lays the groundwork for generating value. But the true challenge lies not only in answering the question, “Are my team’s goals and investments aligned with my strategy?,” but also in ensuring that forward-looking organizations can clearly identify the steps needed to realign and drive value. This data-value delivery effort requires an ongoing, data-driven assessment to safeguard both timely delivery and the realization of value.

Many organizations have yet to change their approach to measuring and delivering value, and they haven’t mastered data-driven value generation. For instance, visionary executives need the data formatted so they can easily access and act on it. “Every company is still on the journey” to becoming data-driven, explains Catanzano. And that journey must filter data in a way that helps people interpret and trust it. “If you want to empower more of your employees to make good decisions,” he says, “you need to provide them with trusted, quality data.”

Endnote

1 Enterprise Strategy Group, “State of DataOps,” December 2023. https://research.esg-global.com/reportaction/515201716/Marketing.

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