Value Stream Management for the Digital Age

Accelerating Value Discovery and Delivery from Digital Transformation
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Why Value Stream Management?

It is not necessary to change. Survival is not mandatory.

W. EDWARDS DEMING
Management consultant and author
Accelerating time to market is more than a goal; it’s a critical survival skill in today’s *Digital Age*. An enterprise’s success depends on its ability to create innovative digital applications, products, and services quickly and adapt to new and evolving business models.

Many enterprises have struggled to achieve digital transformation for more than a decade, never fully realizing its full benefits. Why is that? Organizational silos and local optimizations are the primary root causes. As companies grow, they try to improve efficiency through specialization, creating departments, functional domains, and various silos.

For example, as an insurance company grows, it may organize itself by departments: marketing, underwriting, auto, home, claims, product development, IT, and customer service. It may further specialize some departments by functional domains, for example, analysis, development, testing, and compliance. Next, it may organize by technology layers, such as front-end, middleware, and back-end.

After adopting agile, the company may form separate teams for each part of the customer journey: gather information, seek advice, purchase a policy, and report a claim. While some of these organizational constructs may offer a small degree of improvement, each team focuses only on a siloed piece of the value flow. Customers buy whole products, not features or partially complete solutions.

No matter how you slice it, the results are the same — silos inhibit collaboration and sharing common goals, priorities, rewards, and incentives. *Even worse, value must wind its way through a complicated maze of silos until it finally reaches the customer.*

These complexities result in a slower time to market, lower revenue, product quality, customer satisfaction, and employee engagement.
In contrast, organizing teams of people around a value stream — a product or service — optimized for flow maximizes performance, product quality, and business results.

Companies that implement value stream management (VSM) have seen extraordinary business improvement in car manufacturing, software, financial, and medical industries. VSM promotes the use of systems-thinking to optimize the whole — not just the parts.

**VSM is a set of lean principles and practices that optimize the application of people, process, and technology to improve the flow of business value continuously, from ideation to customer delivery.**

In 2020, the pandemic made every organization realize the need to become a digital business. Since then, the accelerated rate of change has pressured organizations to become extremely agile. Accomplishing this goal requires aligning business and development value streams to operate together with a shared mission, vision, and cadence.
Given its benefits, it is not surprising that Gartner predicts that, “by 2023, 70% of organizations will use value stream management to improve flow in the DevOps pipeline, leading to faster delivery of customer value.”

Digital transformation is not just about optimizing the business for incremental productivity and efficiency improvements. It balances doing things right (streamlining business processes) while also doing the right things (innovating and delivering meaningful business outcomes).

In a recent Forbes article Ashok Reddy, CEO of Digital.ai makes the following analogy between digital transformation and a caterpillar turning into a butterfly:

A fast caterpillar may achieve business objectives faster and cheaper, creating a better user experience or boosting efficiency by moving to the cloud or building mobile apps. A butterfly learns to deploy digital technologies to reshape how it operates, establishing new sustainable revenue streams and omnichannel experiences for evolving customer expectations. But when transformation efforts fall short, all you have is a faster caterpillar.¹

ASHOK REDDY
CEO, Digital.ai

In companies that succeed at digital transformation, the business and technology teams jointly define value as a *hypothesis* to be proven and shaped by customer feedback. Figure 1 provides a simple template to develop a hypothesis statement with the business.

<table>
<thead>
<tr>
<th>Work Item Type</th>
<th>Our scope is a &lt;Feature, Capability or Epic&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis</strong></td>
<td>We believe &lt;this functionality will&gt;</td>
</tr>
<tr>
<td><strong>Desired Benefits</strong></td>
<td>Will result in &lt;this outcome(s)&gt;</td>
</tr>
<tr>
<td><strong>Experiments</strong></td>
<td>We will conduct &lt;these initial experiments to test our benefit hypothesis&gt;</td>
</tr>
<tr>
<td><strong>Measures</strong></td>
<td>We will have confidence to proceed when &lt;we see these measurable leading indicators&gt;</td>
</tr>
</tbody>
</table>

*Figure 1. Hypothesis-driven development template*

**Hypothesis-driven development** offers a scientific approach for implementing new features, products, and services — *even digital transformation* — as a series of experiments to discover if an expected business outcome will be achieved. Steering outcomes to success is achieved by continuously learning and improving through collaboration with the business, customers, and end-users.

Several VSM practices help you to gain the full benefits of your agile and digital transformations, allowing the enterprise to become a butterfly:

1. Understanding value streams
2. Focusing on *outcomes over outputs*
3. Adopting value stream management
4. Steering with KPIs and metrics
Understanding Value Streams

Whenever there is a product for a customer, there is a value stream. The challenge lies in seeing it.

MIKE ROTHER, JOHN SHOOK

Learning to See
Every business is a **value delivery system** that creates and offers products and services to customers. Every organization has value streams, but most people don’t know they exist or understand how value flows through them. This knowledge gap leads organizations to improve one functional silo, only to create new problems in another.

Such improvement is like a never-ending game of ‘whack-a-mole’ — after you hit one mole, two new ones pop up, you hit another, and more pop up and disappear before you can nail them all. It’s an all too familiar losing game.

Further, the lack of insight about flow often results in adding or changing processes that don’t solve the root cause of the problem or, worse, erode overall performance resulting from local optimizations.

“Conflicting priorities, interdepartmental tension and — in the worse cases — infighting within leadership are common outcomes when a company attempts to operate without understanding how an organization’s various parts fit together and how value is delivered to its customers.”

With this context in mind, a value stream is defined as follows.

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**A value stream is the series of interconnected processes needed to deliver a product or service to a customer. Value streams also contain the people, processes, information, and tools to create and deliver value.**

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In general, there are two types of value streams: 3

- **Development value streams** convert a benefit *hypothesis* into a digital feature, product, or service. Examples include developing an internal software application for customer service, designing wearable tech, or implementing new features for a retail bank’s website. The development value stream’s output is marketed and sold to customers through one or more *business value streams* that directly serve the customer.

- **Business value streams** (also called operational value streams) offer products or services to external customers. Examples include insuring a car, marketing and selling a product, fulfilling an order, providing a loan, and filling a pharmacy order.

Figure 2 illustrates the three main components of an example business value stream for buying auto insurance. Development value streams also have the same components but are focused on agile and DevOps processes.

1. **Trigger.** A customer need or request triggers the start of a value stream.

2. **Processes.** A series of interconnected processes are needed to deliver value to the customer. These processes repeat in a never-ending loop as long as a particular product or service exists.

3. **Value.** The value stream ends with delivering some kind of value to the end customer. The main focus of value streams should be on external customers because they are the ultimate buyers or consumers.

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3 Adapted from the SAFe framework ([www.scaledagileframework.com/development-value-streams](http://www.scaledagileframework.com/development-value-streams))
Although Figure 2 shows the value stream as a sequential flow, some processes may occur in parallel to others in reality. Also, some value stream processes may be done by third parties. Finally, most enterprises will have many value streams. For example, at least two types of value streams are needed to provide insurance policies: a development value stream to create the technology solution and a business value stream that will use it to offer and sell insurance policies.

Delivering value typically requires a network of interconnected development and business value streams, including other supporting streams, which form a value stream network within and across portfolios. For example, business streams for customer service, auto, and home insurance, and supporting value streams such as people operations, accounting, and finance. There may also be a development value stream for the core insurance platform, mobile, and more.
Focusing on Outcomes over Outputs

These are my magic questions for finding outcomes: What are the user and customer behaviors that drive business results? How can we get people to do more of those behaviors? How do we know that we’re right?

JOSH SEIDEN
Author, Outcome Over Output
While value streams are critical aspects of lean methods, it’s a common misconception that improved efficiency is their primary objective. That’s not surprising because eliminating waste is one of the most often discussed aspects of lean. However, nothing could be further from the truth.

Every value stream’s goal is to deliver the maximum amount of value to the customer, with the highest possible quality and delight in the shortest sustainable lead-time.

Accordingly, it is imperative to focus on creating business outcomes — not merely outputs. While it’s essential to measure both, ultimately, we must care more about business outcomes. Because many get confused between these two terms, let’s explore the differences:

- **Outcomes.** Outcomes are achieved end states that can be verified through measurable results. Examples include increased customer satisfaction, increased revenue, reduced costs, increased process efficiency, cultural change, and improved quality. First, determine the outcomes you want to achieve, then define the outputs that will get you there.

- **Outputs.** An output is something that is done to accomplish a goal. Examples include developing a new feature, conducting a product demo, and deploying code to production. Achieving outcomes typically requires producing one or more outputs, such as a feature, but not all provide meaningful business outcomes.

Historically, development teams have focused on output metrics such as the number of features created, cycle time, velocity, and the number of deployments. Output metrics remain critical for measuring progress and value stream health. However, they miss the mark in an era when delivering the right software depends on business data and input from leaders. VSM can break down communication barriers and let enterprises track how their software efforts help them flourish and grow.
Adopting Value Stream Management

A corporation is a living organism; it has to continue to shed its skin. Methods have to change. Focus has to change. Values have to change. The sum total of those changes is transformation.

ANDREW GROVE
Intel CEO and founder
VSM is the most powerful way organizations can realize software and system development’s business benefits. Value stream management organizes business and development teams around value, connects agile planning and portfolio management, software delivery, application security, and quality so you can delight customers.

VSM offers several practices that optimize *people*, *process*, and *technology* to continuously improve business value flow, from ideation to customer delivery.
People are the most critical component of VSM. The way you organize people for collaboration helps create true empowerment and a purpose-driven culture motivated for continuous improvement and value delivery. Intentionally create teams around value streams, and across functional silos, for optimal value flow, and in portfolios.

**Organizing Teams Around Value Streams**

> It would be much better to assign work to established teams than to reconstitute teams around projects.

MARY AND TOM POPPENDEIECK
Authors, *Implementing Lean Software Development*

Managing work using the project model, even for those practicing agile, is a common failure point for digital transformations. The flaws in the project model for knowledge work, such as software development, are well understood. In a *project model*, a company:

- Focuses on resource utilization over faster throughput of value
- Fully funds initiatives before proving the benefit hypothesis with a minimally viable product (MVP) or feature
- Forms temporary teams that are brought to the work and disbanded afterward
- Develops a project budget based on multiple siloed cost centers, causing delays, overhead, and friction
- Creates overly-detailed business cases based on speculative, lagging ROI forecasts
- Constrains work based on the ‘iron triangle’ of fixed scope, cost, and dates
- Governs using phase-gate approval processes that don’t mitigate risk, discourage incremental delivery, and cause delays

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4 Adapted from the Scaled Agile Framework (https://www.scaledagileframework.com/extend-to-the-portfolio/)
Additionally, project teams often have different goals, tools, rewards, and incentives. Functional managers and product owners often give team members conflicting directions and priorities. By their very nature, projects are temporary endeavors and focus on completing tasks (outputs) instead of delivering value.

People are often assigned part-time to a project team and have other job responsibilities, including other projects. As a result, task-switching across projects is a common issue that can reduce productivity and introduce delays when priorities change. This multi-tasking causes projects to go through a never-ending ‘start-stop-start’ cycle that provides a false illusion of progress. In reality, this system causes many conflicts and collisions, which delay all projects. Even more shocking is that the project model causes the ‘theft of knowledge’ as people move on to other projects, and the collective learning is forever lost.

In contrast, a value stream organizational model creates long-lived, stable teams that relentlessly improve the value stream’s outcomes, not merely the results of a single function. Such an organization makes it possible to improve time to market, quality, and other KPIs. If a value stream’s performance improves, the overall company’s results become better, which may not occur when a single function improves. Indeed, local optimizations of a system usually worsen overall performance.
The bottom line is that when companies adopt agile and DevOps but retain the old organizational structures, roles, mindsets, and KPIs, their digital transformation is doomed before it even begins. “Every battle is won or lost before it is ever fought,” said Sun Tzu, famous Chinese general, in his book *The Art of War*. It remains one of the world’s most famous military texts, 2,500 years after it was published, and it has had a profound impact on business strategy and execution.

**Creating Cross-Functional Agile Teams**

Create small, cross-functional agile teams that span *silos*. Each group of people (5-11 members) from across the company are dedicated to their team within the value stream, *full time* to develop products and services, as shown in Figure 3. This organizational design reduces handoffs and delays caused by pushing work across silos.

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**Organizational boundaries can increase costs by 25% or more. They create buffers that slow down response time and interfere with communication.**

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An effective agile team has all the skills needed to develop small increments of value in a short, fixed time period. Consequently, assigning work to individual team members should no longer be required as teams are primarily self-managing. This team structure fosters autonomy, decentralized decision-making, and execution.

Daily task direction is lessened, freeing managers to coach and mentor teams, help them collaborate, and change internal processes to support leaner and more agile ways of working.

A word of caution: *autonomy requires continuous alignment to avoid chaos*. It does not mean that teams get to do whatever they want whenever they want. Company priorities must be defined by leadership, and planning needs to align work with these objectives. It’s also essential to define guardrails that help ensure continuous alignment.

Alignment is not a natural state and requires fighting entropy to avoid misalignment. Consequently, VSM requires mechanisms to keep teams and
Organizing Agile Teams for Value Flow

Organizations which design systems are constrained to produce designs which are copies of the communication structures of these organizations.6

MELVIN CONWAY
Datamation, 1967

Is your company its own worst enemy when it comes to digital transformation and delivering value faster? Your ability to engage and delight customers may be missing the mark because you’re tripping over your own organizational feet. In a 1967 article in Datamation, Conway hypothesized that companies tend to design and architect systems that mirror their communication structures. His theory, known as ‘Conway’s Law,’ was popularized in Fred Brook’s book, The Mythical Man-Month, and is more relevant today than ever.

6 https://www.melconway.com/Home/Conways_Law.html
What does it mean in practice? Suppose the technology department at ABC Insurance has three main workgroups: one focused on insurance claims, a second for underwriting, and a third for actuarial analysis. Conway’s Law predicts that your system design will mirror this organizational structure. In turn, there will be a separate software module for each of these three capabilities. Each will likely have a unique architecture, design, infrastructure, and systems integration protocols.

The implications of team structure on architecture are often overlooked. The team’s organizational design should align with the desired technical architecture, not the other way around.

While there is no perfect design, authors Mathew Skelton and Manuel Pais describe four basic team patterns in *Team Topologies, Organizing Business, and Technical Team for Fast Flow* (as shown in Figure 4). Applying these design patterns simplifies organizing teams for fast flow.

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• **Stream-Aligned Team.** A team aligned to a single, valuable stream of work, such as a product, service, set of features, entire user journey, or user persona.

• **Enabling Team.** This team is composed of specialists in a given technical domain who help stream-aligned teams overcome their shortcomings. Think of them as a technical consulting team that provides guidance and support for continuous improvement (for example, offer recommendations for tooling, practices, and configuration). An example team consists of architects, build engineers, and highly experienced development and testing team leads.

• **Complicated-Subsystem Team.** This team is responsible for building and maintaining a component that depends heavily on a specialist’s domain or technical knowledge. An example is an ‘actuarial’ subsystem used by insurance, finance, and other industries.

• **Platform Team.** This team enables stream-aligned teams to deliver work with more autonomy. These team members develop self-service APIs, tools, and services and share knowledge with delivery teams to reduce coordination, dependencies, and accelerate development. An example is a **System Team** in SAFe.

Agile teams in an enterprise do not exist in isolation. Often, multiple teams need to coordinate closely to deliver value. Nothing is more powerful than an **Agile Release Train** (ART) — an agile team-of-teams — aligned with a shared vision, mission, and strategy. By moving work to agile teams and
ARTs, organizations can start replacing the inefficient project model. Each ART is a virtual organization (typically 50-125 people) that plans, commits, develops, and deploys together.⁸

Figure 5 illustrates two ARTs within a value stream. Each ART has approximately 50 people. The first one is for creating technology solutions for renewing insurance policies. The second develops new insurance policies and illustrates how an ART is organized using the team topologies patterns. This ART has three stream-aligned teams, an enabling team, a platform team, and a complicated-subsystem team for the actuarial business rules engine.

Each of these agile teams is cross-functional and has approximately 5-11 people. The stream-aligned teams cover three different customer journeys: competitor takeout, mature drivers, and young drivers. Each has all the skills needed to deliver end-to-end functionality for its customer journey across functional domains (design, build, test, and deploy) and technology
layers (front-end, middleware, and back-end). For a small subset of functionality, stream-aligned teams sometimes need to collaborate with the complicated-subsystem team (for example, the actuarial business rules engine in Figure 5).

Organizing long-lived agile teams within value streams offers many benefits, such as:

- Enabling the shift from managing teams in projects to organizing people around the portfolio’s development value streams that create solutions for customers.

- Reducing handoffs and delays between functional areas, significantly reducing time to market.

- Bringing together the business, product management, development, deployment, and service personnel needed to offer whole product solutions within the same team of agile teams.

- Supporting success measurement using outcome-based key performance indicators (KPIs) instead of outputs.

- Organizing and rapidly reorganizing value streams as needed to support emerging opportunities and competitive threats. This capability forms the foundation of what Gartner calls a “composable business architecture.”

Shifting to VSM also involves moving away from temporary project teams organized around functional silos that deliver outputs, to cross-functional teams organized around long-lived value streams, which continuously deliver outcomes. They are dedicated to relentlessly improving their ability to provide solutions and customer value better and faster.
Organizing Value Streams in Portfolios

*Without strategy, execution is aimless. Without execution, strategy is useless.*

**MORRIS CHANG, CHAIRMAN, AND CEO of Taiwan Semiconductor Manufacturing Company**

All successful companies need to think of their organization as a system. Such a system must be created and continuously evolved with intentionality. The key to understanding a system comes with realizing its aim — the larger purpose of the system.

To thrive, value streams and the teams within them need what Dr. Edwards Deming (management consultant and author) in his writing on management and engineering efficiency, called a “constancy of purpose” to guide decisions and to provide visibility and insights within the enterprise. He goes on to say, "without a purpose, there is no system.” Therefore, the aim should offer a future vision and something important to employees that unlocks their intrinsic motivation. Leaders should communicate the purpose widely, so everyone understands the larger goals. According to Deming, the dual concepts of a business being a system and a business having an aim propelled Japan to become an economic superpower. Japanese lean manufacturing, its supply chain, and customers were the system.

Deming also advocated for “optimization of the system throughout time.” He defined optimization as the “process of orchestrating the efforts of all components toward the achievement of the stated aim.” For a transportation company in the United States, Deming offered the following aim as an example:

“Better and better service — that is, more dependable delivery. Continual improvement in on-time delivery. Lower and lower cost to the carrier. Better quality of life for employees of carriers and shippers. Protection of the environment.”

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One proven way to be intentional with the *aim* is the creation and execution of strategy. While mainly beyond this ebook’s scope, lean portfolio management (LPM) guides the value streams’ actions and helps determine how much investment leaders should allocate to each value stream.

Organizing related value streams in a lean portfolio for a specific business area helps enterprises achieve their business strategy. Figure 6 illustrates ABC Insurance’s four portfolios:

- **Home & Auto**
- **Personal**
- **Recreational**
- **Business**

Each portfolio contains value streams for the products and services it offers. In this example, the Home & Auto insurance portfolio has five business value streams: Auto, Motorcycle, Condo, Home, and Renters.
LPM enables adjusting value stream investments according to changing market conditions, competitive threats, people and resource capacity, and priorities more frequently than annual budgeting. It also helps optimize return on value stream investments by offering the following practices related to VSM:

- Funding value streams (persistent teams of people), not projects (temporary teams)
- Tracking and approving large initiatives (epics) across value streams in the portfolio kanban system
- Applying a lean startup, hypothesis-driven approach to developing epics
- Using collaborative budgeting to fund value streams using the portfolio’s collective knowledge
- Using objectives and key results (OKRs) to track progress toward the portfolio’s strategic themes — which are differentiating business objectives from the enterprise
- Applying lean budget guardrails, such as investment horizons or capacity allocation that prevent starving the future by over-investing in today or vice versa

For more information on LPM, visit the Scaled Agile Framework (SAFe) website (wwwScaledAgileFramework).
An enterprise’s processes are also a critical component of VSM. To optimize VSM, you should:

- Apply the five principles of lean
- Improve flow with value stream mapping
- Embrace the seven principles of lean software development

**Applying the Five Principles of Lean**

According to Womack and Jones, founders of the Lean Enterprise Institute, there are five key lean principles, illustrated in Figure 7.

![Five Principles of Lean Diagram](image-url)

**Figure 7. Five principles of lean**
1. **Identify Value.** Before value can be identified, it’s essential to define what it means. Put simply, value is what the customer is willing to pay for your product or service. Therefore, it’s critical to discover the actual or unexpressed needs of the customer. Several design thinking techniques such as user and market research, empathy interviews, customer journey mapping, analytics, and prototyping can help you decipher what customers find valuable. Using these design thinking techniques and having a deep understanding of the customer’s problems, you can uncover what they genuinely need, how they want the product or service to be delivered, and the price they are willing to pay.

2. **Map the Value Stream.** The idea is to draw a ‘map’ of the flow of value through any process on one page. Value stream mapping aims to identify every step that does not create value and then find ways to eliminate those wasteful steps. Ultimately this exercise also results in a better understanding of the entire business operation from developing a product, offering it to customers, and providing customer service.

3. **Create Flow.** After the waste has been removed from the value stream, this step ensures the remaining processes flow smoothly without interruptions, delays, or bottlenecks. This improvement typically requires breaking down silos and making efforts to become cross-functional across all departments, which can be one of the greatest challenges for lean programs to overcome. However, studies show that breaking down silos leads to huge gains in productivity and efficiency, sometimes as high as 50% improvement or more.

4. **Establish Pull.** With improved flow, time to market can be dramatically improved. Establishing and shifting to a pull system allows for new functionality to be consumed when the business demands. Accomplishing pull requires deploying new functionality into production frequently but restricting its visibility by using feature flags or toggles. When business stakeholders are ready to release the new functionality, the feature can simply be toggled on to make it available to customers or end-users. Using a kanban system across the portfolio is another highly effective method of establishing pull.
5. **Seek Perfection.** Accomplishing the first four steps is a great start, but the fifth step is arguably the most important: *making lean thinking part of the corporate culture*. As gains from improvement continue to accumulate, it’s important to remember that lean requires relentless improvement and vigilance to perfect. Every employee should be involved in implementing lean, and experts often say that a process is not truly lean until it has been through value stream mapping at least half a dozen times.

**Improving Flow with Value Stream Mapping**

*Highest value and quality, lowest cost, and shortest lead time by continually eliminating waste.*

_HOUSE OF LEAN_,
_Toyota Production System_

Understanding how development value streams create value for one or more business value streams can be complex. The inefficiencies are not highly visible like the ones you might see at a lean manufacturing plant. A catwalk high above the factory floor lets you observe the business value stream to see if the ‘line’ is slowing or grinding to a halt.

Value stream mapping is the equivalent of the catwalk for digital value streams. It lets you see the entire value flow, allowing the identification of bottlenecks and delays. Nevertheless, the inefficiencies have the same effect: decreased productivity, overburdened workers, uncertainties, and lower quality.

*Value stream mapping is a lean improvement technique for management, which defines and illustrates the series of interconnected processes to bring a product or service from ideation to customer value delivery.*
Figure 8 shows an example of a simplified development value stream map. As you can see, most waste in knowledge work occurs from handoffs (or wait time) between team members, not within the value-added processes, such as to define, design, and code. Indeed, it’s not unusual that the value-adding processes are less than 5% of the entire lead time as is the case here!

The value stream metrics shown in Figure 8 highlight the need for substantial improvement.

Only 4.8% of the lead time was value-added time, while the other 95.2% was spent waiting! Also, there was significant rework, as indicated by the
40.5% complete and accurate metric. This metric tells us that work had to be returned to an upstream process six times out of ten because it was neither complete nor accurate.

“Value stream mapping, the macro perspective, provides the means to align cross-functional leadership to define strategic improvements to the workflow, whereas process-level mapping enables the people who do the work to design tactical improvements.”\(^\text{10}\) Figure 9 illustrates these two perspectives, which are equally important but have significantly different purposes.

**Value Stream Mapping**
(Macro-Level Processes)

![Value Stream Mapping Diagram](image)

**Process Mapping**
(Micro-Level Steps within a Process)

![Process Mapping Diagram](image)

**Figure 9.** Value stream mapping versus process mapping for auto-insurance

_A word of caution:_ “Many value stream teams have people too low in the organization participating — they don’t have the authority, nor do they have the experience and vision to design the kinds of big, significant improvements that leaders need to decide on before anyone does the actual work.”\(^\text{11}\)

Because value stream mapping is strategic, it usually requires the active engagement of senior leaders. Only they are empowered to take strategic

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and financial decisions and have the authority to enact improvements across organizational boundaries to optimize the system as a whole. Examples include creating cross-functional teams and busting silos, eliminating phase gates, funding value streams instead of projects, and more.

Value stream mapping is only worthwhile when the right people actively engage for the entire workshop, such as:

- Executives, managers, and leaders from different silos
- Leaders with authority to change business operations, including security and compliance policy, practices, and team organization
- Architects and managers responsible for identifying impacted systems and who are empowered to make the necessary changes
- Representatives from the target value stream
- Change agents who can support and facilitate the value stream mapping and follow-up actions
Before starting mapping, it’s helpful to define the name, purpose, and boundaries of the target value stream, as shown in Figure 10. With agreement on the scope, purpose, and borders, the team will be aligned to map the value stream.

<table>
<thead>
<tr>
<th>Value Stream Name</th>
<th>New auto insurance policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Provide financial protection against vehicle damage and bodily injury resulting from automobile accidents</td>
</tr>
<tr>
<td>Type of Value Stream</td>
<td>Business value stream</td>
</tr>
<tr>
<td>Customer Segment</td>
<td>New retail car buyers</td>
</tr>
</tbody>
</table>

**Value Stream Boundaries**

<table>
<thead>
<tr>
<th>Trigger (start)</th>
<th>New car purchase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Value (end)</td>
<td>Insurance coverage and card</td>
</tr>
</tbody>
</table>

![Figure 10. Value Stream Definition Template](image)

A proper value stream mapping workshop typically takes two to three days, including creating a small improvement plan. At its core, a value stream mapping workshop involves the five steps shown in Figure 11.

![Figure 11. Process for a value stream mapping workshop](image)
1. **Prepare for Value Stream Mapping.** Choose the value stream you want to improve by clearly defining its boundaries (start and endpoints). Next, identify the value stream mapping team, set the date, and book a meeting room for a two- or three-day value stream mapping workshop. Gather the workshop supplies, including different colored stickies, felt tip pens, and a whiteboard (or electronic equivalent for remote sessions).

2. **Map Current State.** The mapping team collaboratively identifies the target value stream processes using sticky notes (or electronic equivalent). The most valuable part of the mapping exercise is the conversations leading to a shared understanding of the current state. Now it’s time to collect and calculate metrics, such as the average process time, lead time, and percent complete, and accuracy for each step. With this information in hand, you can calculate the total lead time and process time (value-added time), flow efficiency (total process time/total lead time), and aggregate percent complete and accurate.

3. **Design Future State.** Review your current state value stream map and the metrics that were collected. Begin identifying processes with significant delays and rework. Reflect on what you’ve learned, capturing notes and improvement ideas on sticky notes. The team can now design the future state process map using the improvement ideas and applying *systems thinking* to improve holistically.

4. **Develop an Improvement Plan.** Often, teams new to value stream mapping focus solely on reducing the *processing time*, which they see as beneficial. After all, that’s where the value-added work occurs, and everyone wants to work more efficiently. But an obsession with efficiency often results in shortcuts that negatively impact product quality, culture, employee happiness, and business outcomes. The main focus should be on eliminating rework, unnecessary steps, and handoffs, which inhibit improvement. After completing the initial design, verify the proposed changes by estimating and calculating the same metrics as you did for the current state.
6. **Execute the Improvement Plan, Measure, and Repeat.** Build a backlog of activities that will be implemented to achieve the future state. Be sure to write backlog items as experiments or hypotheses that must be conducted and proven with metrics. Prioritize the backlog based on the size of the improvements, time, and effort. Repeat the process and closely monitor results. Ideally, automate the metrics collection and monitoring, and correlate the impact on business outcomes. Value streams provide the most essential and fundamental knowledge of how an organization serves its customers and provides value. Lean enterprises continually improve their business performance by identifying, analyzing, and optimizing business and development value streams. The purpose of development value streams is to create and enhance the business value streams’ systems and products. So, understanding and improving both of these value streams is critical to overall business performance.

It’s hard to overstate the importance of value stream mapping.

**Gartner predicts: “by 2023, 75% of enterprise architects and application leaders will use value stream mapping to guide strategy, steer agile, and drive customer-centricity.”**

Value streams provide the most essential and fundamental knowledge of how an organization serves its customers and provides value. Lean enterprises continually improve their business performance by identifying, analyzing, and optimizing business and development value streams. The purpose of development value streams is to create and enhance the business value streams’ systems and products. So, understanding and improving both of these value streams is critical to overall business performance.
Embracing the Seven Principles of Lean Software Development

The following principles of lean software development are summarized from Mary and Tom Poppendieck’s influential book, Implementing Lean Software Development from Concept to Cash. These principles are critical to managing and improving value streams.

1. **Eliminate Waste.** The three biggest wastes in software development are:
   - *Extra features:* We need a process that allows us to develop just those 20% of the features that give 80% of the value.
   - *Churn:* If you have requirements churn, you are specifying too early. If you have test and fix cycles, you are testing too late.
   - *Crossing boundaries:* Organizational boundaries can increase costs by 25% or more. They create buffers that slow down response time and interfere with communication.

2. **Build Quality In.** If you routinely find defects in your verification process, your process is defective.
   - *Mistake-proof code with test-driven development:* Write executable specifications instead of requirements.
   - *Stop building legacy code:* Legacy code is code that lacks automated unit and acceptance tests.
   - *The big bang is obsolete:* Use continuous integration and nested synchronization.
3 Create Knowledge. Planning is useful. Learning is essential.

- *Use the scientific method:* Teach teams to establish hypotheses, conduct many rapid experiments, create concise documentation, and implement the best alternative.

- *Standards exist to be challenged and improved:* Embody the current best-known practices in standards that are always followed while actively encouraging everyone to challenge and change the standards.

- *Predictable performance is driven by feedback:* A predictable organization does not guess about the future and call it a plan; it develops the capacity to rapidly respond to the future as it unfolds.

4 Defer Commitment. Abolish the idea that it is a good idea to start development with a complete specification.

- *Break dependencies:* System architecture should support the addition of any feature at any time.

- *Maintain options:* Think of code as an experiment — make it change-tolerant.

- *Schedule irreversible decisions at the last responsible moment:* Learn as much as possible before making irreversible decisions.

5 Deliver Fast. Lists and queues are buffers between organizations that slow things down.

- *Rapid delivery, high quality, and low cost are fully compatible:* Companies that compete on the basis of speed have a significant cost advantage, deliver superior quality, and are more attuned to their customers’ needs.

- *Queuing theory applies to development, not just servers:* Focusing on utilization creates traffic jams that actually reduce utilization. Drive down cycle time with small batches and fewer works-in-process.

- *Limit work to capacity:* Establish a reliable, repeatable velocity with iterative development. Aggressively limit the size of lists and queues to your capacity to deliver.
6 **Respect People.** Engaged, thinking people provide the most sustainable competitive advantage.

- *Teams thrive on pride, commitment, trust, and applause:* What makes a team? Members are mutually committed to achieve a common goal.
- *Provide effective leadership:* Effective teams have influential leaders who bring out the best in people.
- *Respect partners:* Allegiance to the joint venture must never create a conflict of interest.

7 **Optimize the Whole.** Brilliant products emerge from a unique combination of opportunity and technology.

- *Focus on the entire value stream:* From concept to cash and customer request to deployed software.
- *Deliver a complete product:* Develop a complete product, not just software. Complete products are built by complete teams.
- *Measure up:* Measure process capability with cycle time, team performance with delivered business value, and customer satisfaction with net promoter score.
Technology is the third critical component of VSM. A *VSM platform* offers end-to-end oversight and governance of the DevOps pipeline and the business outcomes, which they create. VSM fundamentally changes how you develop and deliver software. It links outputs from the development of new and improved technology solutions to business outcomes allowing your organization to steer its way toward success.

Value stream management platforms integrate disparate toolchains into a unified data model that delivers end-to-end visibility and traceability within and across value streams. This platform facilitates deep analysis of a broad and diverse dataset using artificial intelligence (AI) and machine learning (ML), enabling organizations to make data-driven decisions and innovate faster.

**Implementing a Value Stream Management Platform**

A VSM platform seamlessly integrates with other tools to collect and surface real-time data about the value stream’s health, as shown in the example in Figure 12. This approach lets companies optimize the DevOps pipeline for maximum value delivery and quality instead of compliance with fixed delivery plans. VSM accomplishes this goal by optimizing the flow of value to customers across silos, such as divisions and functional departments, suppliers, channels, and more.
Digital.ai Platform
End-to-end AI-driven platform to orchestrate the delivery of software-driven business value

Intelligence
AI-powered analytics solutions enable organizations to predict and prevent issues that reduce software delivery reliability, efficiency and customer experience.

Orchestration
Integrated enterprise agile planning, DevOps, application protection, and testing solutions for frictionless software delivery.

Panoramic insights align software to business goals, optimize processes, and deliver business, and customer value.

Shared Services
AI & analytics engine, unified analytical model & data lake, third party integrations, and shared services

Each value stream contains one or more continuous delivery (CD) pipelines, depending upon the applications and solutions it produces. Ideally, each value stream only has one CD pipeline. However, you might need more than one CD pipeline when modern and legacy infrastructure are present because of their disparate compute and tooling environments.

By gaining visibility across teams, processes, and pipelines and connecting them with strategic objectives, organizations can effectively measure value and quality, such as customer satisfaction and retention, application usage and security, execution efficiency, revenue, growth, and more.
Integrating Software Lifecycle Orchestration

Modern enterprises have multiple development and IT tools from many different vendors. The information from these tools must be orchestrated to gain the insights needed for coordinating work to reach the desired business results. Moreover, data is being amassed at an unprecedented scale — this isn’t new. However, for the first time, we now have tools to make sense of it.

By visualizing and analyzing data within and across value streams, using prescribed ‘lenses,’ we can get meaningful views and insights for different job roles. Indeed, this is a game-changer, enabling people at all levels to ‘learn to see’ within value streams and across the portfolio. It’s like having a catwalk above the ‘software factory floor’ and business operations, providing unprecedented visibility of bottlenecks, delays, and trapped value enabling you to see new opportunities and protect against competitive threats.

Digital.ai’s VSM platform provides analytic lenses by integrating data from enterprise agile planning and portfolio management, DevOps, application protection, and continuous testing to offer frictionless software delivery.

Digital.ai offers solutions for enterprises who are at any point in their digital transformation journey, enabling your organization to start from wherever you are today without a painful and risky big bang, all-in approach. Our platform provides a clear, seamless path to successful VSM adoption:

- Digital.ai provides an end-to-end DevOps value stream management platform with first-rate tools across every aspect of the software development life cycle for those just beginning their journey.

- Digital.ai can use existing data from other vendors’ tools and apply AI and ML, providing panoramic, 360-degree insights to align software execution with business goals.

Creating a Wide-Angle Business Lens by Applying AI and ML

Data is often siloed within an organization. AI and ML uncover what’s occurring inside silos and stitch disparate data together. Like a wide-angle lens, it offers a holistic view of data, analysis, and insights across sales,

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13 Forrester Wave: [https://info.digital.ai/forrester-cdra-wave.html](https://info.digital.ai/forrester-cdra-wave.html)

marketing, finance, development, operations, and technology teams. By processing and analyzing massive amounts of data with AI and ML, you can significantly reduce human biases and concentrate on the most critical data to make better fact-based decisions.

For example, instead of manually reviewing a handful of inputs, use AI and ML to find patterns along the entire customer journey from thousands or even millions of customer records and transactions. Identify and measure what creates the most value from personalized customer experiences:

- Discover what’s already working that warrants further investment so that it can be made to scale.
- Reduce risk and uncertainty by using experiments to learn what’s not working and make course corrections.
- Reduce guesswork by sifting through big data and analyzing it in minutes or even seconds to uncover new opportunities.

Analytics powered by AI also enable organizations to predict and prevent issues that reduce software delivery reliability, efficiency, and customer satisfaction. Digital.ai’s unified, out-of-the-box data model correlates data from different sources to offer an intelligent VSM platform. It ties strategy and execution to help determine if enhancements to digital products or the creation of new business models or products move the needle on business outcomes. AI and ML can look back and dig deeper into potential root causes of problems, spotting bottlenecks and inefficiencies that would be hard to see with a manual review. It also can help spot potential issues and target fixes before the problems occur.
Getting Started with Value Stream Management

Start somewhere and then learn from experience.

JOHN SHOOK
Author, Learning to See

Getting started with VSM is relatively easy. Start with a value-creating process and learn what works and adapt. Identifying value streams is relatively easy. Anywhere there is a product or service, there is a value stream.

Figure 13 provides a simple roadmap to begin your VSM journey. While this is a proven pattern for adopting VSM, you need to adapt it to your unique context.

Figure 13. VSM adoption roadmap
The first value stream to target for improvement is often the one that lies at the intersection of the four criteria shown in Figure 14.

- **Strong Leadership Support.** Some senior leaders may have already been trained and have previous experience with lean-agile development and digital transformation. This is often an excellent place to start, as these leaders are more likely to possess the right mindset and thinking.

- **Highly Visible Value Stream.** VSM is most easily applied to a clear and tangible product or solution — something the company sells directly or values highly. These development value streams usually create or configure the products and services that your enterprise offers.

- **Existing Agile Teams.** Ideally, start the improvement where successful agile teams are already collaborating on building an important product or service. Likely, these teams are better prepared to embrace change and VSM.

- **Significant Challenge or Opportunity.** Select a target value stream that is truly worthy of the change effort, ideally one with a big challenge or a new opportunity. Getting a short-term win generates immediate benefits and facilitates faster adoption. If the development value stream provides something important or challenging, it also provides tangible evidence that VSM can benefit everyone.
Improvement needs to start where you are, so it’s essential to visualize your current flow to know where and how to invest. You’ll get a clear picture of your unique value stream flow, top risks, gaps and opportunities, and insights towards your ideal future state. Your journey will always be different than anyone else’s, but you can learn a lot from others. “It’s said that a wise person learns from their mistakes. A wiser one learns from others’ mistakes. And the wisest person of all learns from others’ successes.” Greatness, however, cannot be copied from the minds of a few smart people. It comes from your specific organization’s collective genius and requires everyone’s engagement to seek perfection continually.

14 Quote adapted from John C. Maxwell and Otto von Bismarck.
Steering with OKRs, KPIs, and Metrics

Ideas are easy. Execution is everything.

JOHN DOERR
Measure What Matters
While enterprises have made significant progress in launching technology initiatives, many organizations struggle to measure the value (benefits) of the work delivered, optimizing workflows, reducing risks, and increasing the quality of their software releases. Without the right metrics in place, teams can’t demonstrate the value of their DevOps efforts or make informed decisions about where to focus. These companies make themselves vulnerable to software defects, poor end-user experiences, and efficiency issues.

Choose metrics wisely and understand their purpose; poorly chosen measures will persuade no one and may have a negative domino effect. Misunderstanding a metric or data can lead to wrong thinking, wrong actions, and wrong results. For example, don’t use velocity as a measure for productivity and to compare teams. Its sole purpose is to estimate the amount of work that a team, ART, or Tribe can get done within a specific time period.

VSM metrics should include data from both business and development value streams allowing correlation of software development to business outcomes.

Following are examples of the types of metrics that organizations should be considering for steering their work and measuring progress against achieving business results:

- **Objectives and Key Results (OKR).** OKRs are a collaborative goal-setting system that offers leaders visibility into the entire organization, providing alignment around strategic goals and tangible evidence of progress toward specific business outcomes. Creating alignment in the organization is one of the main benefits of OKRs. They also help ensure everyone is going in the same direction, with clear priorities, in a continuous rhythm.
• **DevOps Research and Assessment (DORA).** DORA metrics help companies understand the actions required to quickly and reliably deliver and develop technology solutions (Figure 15).

• **Flow Metrics.** Flow metrics provide a baseline to measure the current state of a value stream (Figure 16). These metrics allow teams to analyze and propose countermeasures and other potential improvements which form the basis of experiments.\(^\text{15}\)

• **Program Performance.** Program performance is a set of metrics to evaluate how well an agile release train (or tribe) performs (Figure 17).

• **Lean Portfolio Management (LPM).** LPM metrics are a comprehensive set of lean measures that you can use to assess internal and external progress for an entire portfolio of value streams (Figure 18).

• **Business Metrics.** Business metrics, also called key performance indicators (KPIs), display a measurable value that shows the progress of a company’s business goals (Figure 19).

• **Technology Business Management (TBM).** TBM is a set of standard metrics developed by the TBM Council to help IT leaders manage the business of IT (Figure 20).

• **General Business Metrics.** A set of KPIs that shows the progress of the company’s business goals.

The metrics shown in the following tables may seem overwhelming. However, these measures serve different purposes and apply to distinct personas. The roadmap for implementing VSM offers a workshop to help your organization choose the metrics that matter for your specific context. Don’t try to implement them all. Start small and add additional metrics and measures as needed.

Moreover, your VSM platform should automatically collect data from many independent sources. It should use AI and ML to visualize business and technology outcomes and execution data simultaneously. It should offer intelligent insights and unique lenses (views) into the portfolio and its value streams. A ‘value stream metrics and KPI workshop’ with stakeholders is an excellent way to agree and align on metrics, preventing waste.

\(^\text{15}\) https://flowframework.org/faq/
### Objectives and Key Results (OKRs)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>An objective is your organization’s most important goal. Achieving this goal must be fundamental to the success of your business.</td>
<td>Key results are specific, measurable and time-bound metrics that help steer towards your objective.</td>
<td><strong>Objective:</strong> Create a welcoming customer experience&lt;br&gt;<strong>KR1:</strong> Improve NPS from 40 to 60&lt;br&gt;<strong>KR2:</strong> Increase repurchase rate from 10% to 30%&lt;br&gt;<strong>KR3:</strong> Maintain customer acquisition costs under 1K</td>
</tr>
</tbody>
</table>

*Figure 15. Objectives and key results (OKRs)*<br>Source: [https://cloud.google.com/blog/products/devops-sre/using-the-four-keys-to-measure-your-devops-performance](https://cloud.google.com/blog/products/devops-sre/using-the-four-keys-to-measure-your-devops-performance)

### DevOps Research and Assessment (DORA) Metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment Frequency</td>
<td>How often an organization successfully releases to production.</td>
<td><strong>Low performer</strong> = deploy between once per month and once every six months&lt;br&gt;<strong>Elite performer</strong> = on-demand, multiple deploys per day</td>
</tr>
<tr>
<td>Lead Time (from code commit to deploy in production)</td>
<td>The amount of time it takes a commit to get into production.</td>
<td><strong>Low</strong> = lead time between one and six months&lt;br&gt;<strong>Elite</strong> = less than a day</td>
</tr>
<tr>
<td>Change Fail Rate</td>
<td>The percentage of deployments causing a failure in production.</td>
<td><strong>Low</strong> = 46-60% change failure&lt;br&gt;<strong>Elite</strong> = 0-15%</td>
</tr>
<tr>
<td>Mean Time to Recovery (MTTR)</td>
<td>How long it takes an organization to recover from a failure in production.</td>
<td><strong>Low</strong> = average restore takes between one week and one month&lt;br&gt;<strong>Elite</strong> = average is less than an hour</td>
</tr>
</tbody>
</table>

*Figure 16. DORA Metrics*<br>Source: [https://cloud.google.com/blog/products/devops-sre/using-the-four-keys-to-measure-your-devops-performance](https://cloud.google.com/blog/products/devops-sre/using-the-four-keys-to-measure-your-devops-performance)
## Flow Metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
</table>
| Flow Velocity | Represents the number of flow items of each type completed over a particular period, also referred to as throughput. | 30 completed features  
50 completed debt items  
100 completed defects  
20 completed risks |
| Flow Time     | Measures the time it takes for flow items to go from ‘work start’ to ‘work complete’, including both active and wait times. | 18 days on average to close a flow item |
| Flow Efficiency | Identifies when waste is increasing or decreasing in your processes. It represents the ratio of active time versus wait time out of the total flow time. | 17% of time flow items are in active states |
| Flow Load     | Monitors over and under-utilization of value streams, which can lead to reduced productivity.  
Flow load measures the number of items currently in progress (active or waiting) within a particular value stream. | 75 active or waiting flow items, on average |

**Figure 17. Flow Metrics**

*Source: [https://projecttoproduct.org/](https://projecttoproduct.org/)*
<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Velocity</td>
<td>The velocity of an ART for a PI, trended over time.</td>
<td>PI 21.1 had a velocity of 1,000 story points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PI 21.2 had a velocity of 1,500 story points</td>
</tr>
<tr>
<td>Program Predictability Measure</td>
<td>As summary of all the ARTs PI performance in a value stream (actual business value achieved / planned business value).</td>
<td>ART A has a program predictability of 82%</td>
</tr>
<tr>
<td>Feature Progress</td>
<td>The feature progress report tracks the status of features and enablers during PI execution. It indicates which features are on track or behind at any point in time.</td>
<td>Feature A has completed 20 out of its 25 planned stories</td>
</tr>
<tr>
<td># Features Planned</td>
<td>The number of business features that were planned for a PI.</td>
<td>ART A has planned 10 features for PI 21.2</td>
</tr>
<tr>
<td># Features Accepted</td>
<td>The number of business features that were accepted by Product Management during the PI.</td>
<td>10 features were accepted during PI 21.1</td>
</tr>
<tr>
<td># Enabler Features Planned</td>
<td>The number of enabler features planned for a PI.</td>
<td>15 enabler features were planned for PI 21.1</td>
</tr>
<tr>
<td># Enabler Features Accepted</td>
<td>The number of business features that were accepted by Product Management during the PI.</td>
<td>14 enabler features were accepted for PI 21.1</td>
</tr>
<tr>
<td># Stories Planned</td>
<td>The number of stories planned for a PI.</td>
<td>ART A has planned 125 stories for PI 21.1</td>
</tr>
<tr>
<td># Stories Accepted</td>
<td>The number of stories that were accepted by Product Management during the PI.</td>
<td>ART A has accepted 115 for PI 21.1</td>
</tr>
<tr>
<td>Unit Test Coverage %</td>
<td>The percentage of the code that has unit test coverage.</td>
<td>90% code coverage for PI 21.1</td>
</tr>
<tr>
<td>Defects</td>
<td>The number of defects that were reported.</td>
<td>125 defects were created during PI 21.1</td>
</tr>
<tr>
<td>Total Tests</td>
<td>The total number of tests that were developed and run.</td>
<td>100 new test were created, and 10,000 test ran during PI 21.1</td>
</tr>
<tr>
<td>% Test Automated</td>
<td>The percentage of tests that were automated.</td>
<td>80% of all stories were automated during PI 21.1</td>
</tr>
<tr>
<td>#NFR Tests</td>
<td>The number of nonfunctional requirements tests that were developed or run during the PI.</td>
<td>30 new NFR test were created and 5,000 NFR tests were run during PI 21.1</td>
</tr>
</tbody>
</table>

**Figure 18.** Program Performance

Source: [https://www.scaledagileframework.com/metrics/#P3](https://www.scaledagileframework.com/metrics/#P3)
# Lean Portfolio Management (LPM) Metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
</table>
| Employee Engagement      | Employee surveys                                                            | Fully engaged: 13%  
Engaged: 205  
Somewhat engaged: 55%  
Disengaged: 12% |
| Customer Satisfaction    | The Net Promoter Score (NPS) is an index ranging from (-100) to 100, which measures the willingness of customers to recommend a company’s products or services to others. | The NPS for App Protection for the past six months was 88 |
| Partner Health           | Partner survey                                                              | 80 NPS for Partner A  
60 NPS for Partner B |
| Portfolio Performance    | Objectives and key results (OKRs); LPM Self-assessment                      | Objective: Create a welcoming customer experience  
KR1: Improve NPS from 40 to 60  
KR2: Increase repurchase rate from 10% to 30%  
KR3: Maintain customer acquisition costs under $1k Scores from LPM self-assessment survey |
| Value Stream Performance | Various value stream KPIs:  
• Revenue  
• Operating margin  
• Market share  
• Solution usage  
• Feature cycle time  
• Non-financial innovation accounting KPIs  
• User and business owner satisfaction (NPS)  
• Absolute costs and ratios for new development versus sustainment  
• Customer NPS | Revenue: 100M  
Operating margin: 229M  
Market share: 25%  
Solution usage: 5%  
Feature cycle time: Six weeks  
Innovation accounting KPIs: 10,000 downloads of new mobile app  
Customer NPS: 65, Business owner NPS: 75  
Absolute costs and ratios for new development versus sustainment: 70% sustainment, 30% new development  
Customer NPS: 65% |
| Program Predictability   | Program predictability measure                                              | ART A is 80% predictable, Solution Train B is 70% predictable |
| Time to Market           | Number of releases; feature cycle time                                      | Number of releases per year: 12 |
| Relentless Improvement   | Self-assessments for team, program, and portfolio                          | Self-assessment survey results for team, program, and portfolio |
| Quality                  | Defect count, cycle time, support call volume; escaped defects             | Defects: 132 per PI  
Average cycle time: Two days per story  
Support calls for product A: 30 per PI  
Escaped defects: 20 per PI |

*Figure 19. LPM Metrics*

Source: [https://www.scaledagileframework.com/lean-portfolio-management/](https://www.scaledagileframework.com/lean-portfolio-management/)
# Technology Business Management (TBM) Metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of IT Investment on Run, Grow, and Transform the Business</td>
<td>70% of the IT budget is spent on running the business, 10% on growing the business, and 10% to transform.</td>
</tr>
<tr>
<td>% of IT investment on Customer-Facing Initiatives</td>
<td>80% of IT investment is for customer-facing initiatives.</td>
</tr>
<tr>
<td>IT Spend by Business Unit</td>
<td>70% of the IT budget was spent by Retail banking.</td>
</tr>
<tr>
<td>Customer Satisfaction Scores for Business Facing Services</td>
<td>80 NPS for email, 90 NPS for Mobile Banking, 60 NPS for online banking.</td>
</tr>
<tr>
<td>% of IT Investment by Business Initiative (epic, features)</td>
<td>The percentage of the IT budget spent on a specific epic. Average spend on features.</td>
</tr>
<tr>
<td>% of IT Investment by Portfolio, Value Stream, and Team-of-Agile Teams (ARTs or Tribes)</td>
<td>50% of IT investment was for the consumer banking portfolio, 40% on mortgage servicing, and 10% on customer service.</td>
</tr>
<tr>
<td>IT Spend by Application or Service</td>
<td>10M on core banking, 25M mobile banking.</td>
</tr>
<tr>
<td>IT Spend Versus Plan (OpEx &amp; CapEx Variance)</td>
<td>40% CapEx, 60% OpEx.</td>
</tr>
<tr>
<td>% of Business Facing Services Meeting SLAs</td>
<td>The CRM system met its service level agreement 80% of the time.</td>
</tr>
<tr>
<td>Infrastructure Unit Costs Versus Target</td>
<td>600M actual spent versus 550M planned for IT infrastructure.</td>
</tr>
</tbody>
</table>

*Figure 20. TBM Metrics
Source: Adapted from [https://www.tbmcouncil.org/](https://www.tbmcouncil.org/)*
## General Business Metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee Happiness</td>
<td>Brief surveys and open discussions about the measures in aggregate.</td>
<td>Employee survey results</td>
</tr>
<tr>
<td>Customer Lifetime Value (CLV)</td>
<td>CLV estimates how much value (usually revenue or profit margin) any given customer will bring to your business over the course of the total time they interact with your brand — past, present, and future.</td>
<td>A marathon runner who regularly buys shoes from your store might be have a customer lifetime value of 3,200. 100 revenue per pair of shoes X 4 pairs per year X 8 years = 3,200</td>
</tr>
<tr>
<td>Cost to Acquire Customer (CAC)</td>
<td>Dividing all the costs spent on acquiring new customers (marketing) by the number of customers acquired in each time period.</td>
<td>ABC company spent 10M on marketing in a year and acquired 1,000 customers in the same year, their CAC is 10,000.</td>
</tr>
<tr>
<td>Cost Per Marketing Lead</td>
<td>Lead Cost = Campaign Budget / Total Leads</td>
<td>You have a total marketing campaign budget of 160,000 and you gain 320 leads from it. This makes your lead cost at 500.</td>
</tr>
<tr>
<td>Value Per Marketing Lead</td>
<td>Lead Value = Campaign Return / Total Leads</td>
<td>The revenue at the end of the marketing campaign is 192,000 and you gain 320 leads. The value per marketing lead is 600.</td>
</tr>
<tr>
<td>Cost Per Closed Lead</td>
<td>Cost Per Closed Lead = Campaign Budget / Number of Closed Leads</td>
<td>The cost per lead for the marketing campaign was 500. You closed three deals. This makes your cost per lead 166.66.</td>
</tr>
</tbody>
</table>
| Gross Profit Margin                  | Gross margin is a company’s net sales revenue minus its cost of goods sold. Put simply, it’s the sales revenue a company keeps after incurring the direct costs associated with producing the goods it sells and the services it provides.                                                                                                                                           | ABC’s gross profit reported from their consolidated 10-K statement was as follows:  
  • Net sales or (total sales revenue) = 229 billion  
  • Cost of goods sold (cost of sales) = 141 billion  
  • Gross profit = $88 billion Solution usage (or $229B - 141B  
  • 229 (Total revenue)−141 (COGS) /229 (Total revenue) = 38%                                                                                                                                  |
| Net Profit Margin                    | Net margin is the percentage of revenue remaining after all operating expenses, interest, taxes, and preferred stock dividends (but not common stock dividends) have been deducted from a company’s total revenue.                                                                                                                                              | The business makes 10,000 in sales and it costs you 7,000 to make your products. An additional 1,000 was spent on operating costs (such as taxes).  
  • Total sales − (Cost of goods sold + Operating costs)  
  = Net profit 10,000 − (7,000 + 1,000) = 2,000  
  • Net income ÷ Sales = Net profit margin 2,000 ÷ 10,000 = 0.2 (20%)                                                                                                                      |
| Gross Retention Rate                 | Gross Revenue Retention (GRR) measures annual revenue lost from a company’s customer base, not including any benefits from expansion revenue (cross-sells, upsells), or price increases.                                                                                                                                                           | The gross retention rate for 2020 was 83%.                                                                                                                                                                                                                     |
| Net Retention Rate                   | Revenue retention is the revenue generated from the previous month’s (or year’s) customers.                                                                                                                                                                                                                                                  | The net retention rate for 2020 was 120%.                                                                                                                                                                                                                      |
| Market Share                         | Market share is the percentage of a market accounted for by a specific entity.                                                                                                                                                                                                                                                             | Google has a 90% market share for search.                                                                                                                                                                                                                      |
| Units Sold                           | The unit sales number on a balance sheet represents the total sales of a product in each period.                                                                                                                                                                                                                                        | Company A sold 30,000 licenses of XYZ software.                                                                                                                                                                                                                  |

*Figure 20. TBM Metrics*
Conclusion

Leaders are challenged today to deliver value faster while balancing outputs with positive business outcomes. Other hurdles include achieving strategic objectives, transforming business and operating models, and solving systemic flow issues while working within existing people and resource constraints.
Many leaders are frustrated by their agile and DevOps transformation not living up to their promise. Some reasons for this are:

- Development has sped up, but overall delivery time is still slow and unpredictable
- Quality has suffered and has not recovered back to expectations
- Bottlenecks and delays have not been identified
- It’s unclear how to define and measure the value delivered to the business
- No specific leader is responsible and empowered to optimize the entire end-to-end process

The future of large-scale digital and agile transformation is VSM — the practice of focusing on increasing the flow of business value from customer request to delivery. Begin your journey towards business agility by first understanding flow and VSM. This systematic approach to measuring and improving flow helps organizations reduce time-to-market, increase throughput, enhance product quality, and optimize business outcomes.

VSM helps your organization by:

- Organizing teams around value and eliminating silos and bottlenecks
- Enabling the continuous delivery of value
- Creating visibility into real progress throughout the process
- Integrating data from your entire toolchain and providing metrics and insights to cover the end-to-end process
• Aligning strategy, funding, and budgeting with execution capacity

• Clarifying who is responsible for optimizing the overall, end-to-end process

• Combining OKRs, KPIs, and metrics for business and technology to understand the big picture

In today’s fast-paced digital economy, agile and DevOps are no longer sufficient to get the full benefits of a digital transformation. Enterprises must adopt VSM to deliver value better and faster than their competitors. This shift involves moving away from temporary project teams, organized around functional silos that produce outputs — to cross-functional teams, organized around long-lived value streams — which continuously and predictably deliver outcomes.

Learn more

• The Agile.ai Community ([agile.digital.ai](https://agile.digital.ai))

• The [Digital.ai website](https://digital.ai) to learn more about our enterprise solutions for agile planning, DevOps, app protection, continuous testing, AI- and ML-powered analytics, and value stream management.


• Mary and Tom Poppendieck. *Implementing Lean Software Development: From Concept to Cash.*

• Richard Knaster and Dean Leffingwell. *SAFe Distilled: Achieving Business Agility with the Scaled Agile Framework.*

• Jez Humble, Joanne Molesky, and Barry O’Reilly. *Lean Enterprise: How High-Performance Organizations Innovate at Scale.*
• Mike Rother and John Shook. *Learning to See: Value stream mapping to create value and eliminate MUDA*.


**About the author**

Richard Knaster is the Vice President and Chief Scientist of Value Stream Management at Digital.ai. He is a SAFe Fellow, SPCT, and author of five books on SAFe having served as a methodologist and Principal Consultant at Scaled Agile, Inc. He has over 15 years’ experience helping enterprises with their digital transformations to become lean and agile. He enjoys working with enterprises to experiment with new lean, agile, DevOps, and value stream management practices to make work more engaging, productive, and fun.
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Digital.ai is an industry-leading technology company dedicated to helping Global 5000 enterprises achieve digital transformation goals. Using value stream management as its cornerstone, Digital.ai combines innovative technologies in agile planning, application protection, software testing and delivery, and artificial intelligence into a unified value stream management platform. Digital.ai makes it possible to connect software development and delivery efforts to strategic business outcomes and create secure digital experiences customers trust.

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We help the world’s largest enterprises accelerate their digital transformation initiatives. We connect software planning, delivery, and application security in the first intelligent value stream platform that provides the end-to-end visibility organizations need to deliver value and drive growth.

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