
vsm
consortium
The State of
Value Stream
Management
Report 2021

THE STATE OF VALUE STREAM MANAGEMENT REPORT 2021

by the Value Stream Management Consortium

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Welcome from the Chair of the Value Stream Management Consortium

Welcome to the inaugural State of Value Stream Management Report from the Value Stream Management Consortium. When we launched the consortium on March 3, 2021, we began what we intend to be a multi-year research journey. Value stream management (VSM) as both a concept and a practice has been around since the 1950s with origins in the Toyota Production System and earlier manufacturing. Its roots include the subsequent application of lean principles and practices to enterprise management. Our inception and research have grown from the application of VSM within the technology industry and the resultant transformation of digital enterprise within the fifth technological revolution.

In 2018, Forrester produced their first *The Forrester Wave™: Value Stream Management Solutions*, in which analysts Condo et al. concluded that applying a single tool to visualize and manage value streams is a new development in the industry. While the principles of value streams and lean have been applied to software development for many years now, it is this key industry change that the consortium hopes to nurture. Condo et al. provide a definition for what they identify as this new and emerging market:

> *"Value Stream Management is a combination of people, process and technology that maps, optimizes, visualizes, measures, and governs business value flow through heterogeneous software delivery pipelines from idea through development and into production."*

The members of the Value Stream Management Consortium represent vendors, practitioners, and consultants. These members have many years of experience with techniques such as value stream mapping and intimate knowledge of frameworks built around value stream design.

Practitioners of agile frameworks such as SAFe, LeSS, and Disciplined Agile will already be familiar with some of the concepts discussed in this report as they draw heavily on VSM-centric thinking. DevOps uses the value stream as its foundational organizing principle; the early chapters of *The DevOps Handbook* emphasize how to select a starting value stream, and how to understand and make the work in that value stream visible.

Agile and DevOps are contributing to the current global digital transformation and the ongoing disruption of the industry. Marc Andressen's famous phrase, "Software is eating the world," has evolved to a more general view that, in order to compete or continue to compete in the new digital marketplace, organizations must consider themselves to be technology organizations or software-driven organizations. This is the Information Age.

At our inception then, our focus is primarily on the digital or technology-driven value stream. In 2020, a number of other pieces of research were published that were focused in this area, including an updated report from Forrester:

- *The Forrester Wave™: Value Stream Management Solutions* (July 2020)
- Research In Action's *Vendor Selection Matrix™ Value Stream Management* (July 2020)
- Gartner's *Market Guide for DevOps Value Stream Management Platforms* (September 2020)
- *GigaOm Radar for Value Stream Management* (September 2020)
- *Gartner Predicts 2021: Value Streams Will Define the Future of DevOps* (October 2020)

The members of the VSM Consortium read this research with great interest. These analysts have helped us all to further understand a marketplace that we feel passionately has the potential to take the industry to another level of organizational performance. This research also left us with questions that we want to answer.

Our research provides answers to how organizations design around value streams, how teams practice value stream mapping, how they measure and optimize value flow and value realization. This year, our research has helped us identify the current state of the VSM market. We have a clear view of the long-term vision and goals of the movement, and hope to be able to progress global organizational performance as it advances towards this over the coming years.

At this inception stage, we are not expanding our view beyond digital products to the value activities in the wider organizations that surround them. However, we will continuously adapt to the needs of our members and shift our focus as our membership grows, so that we continuously deliver value.

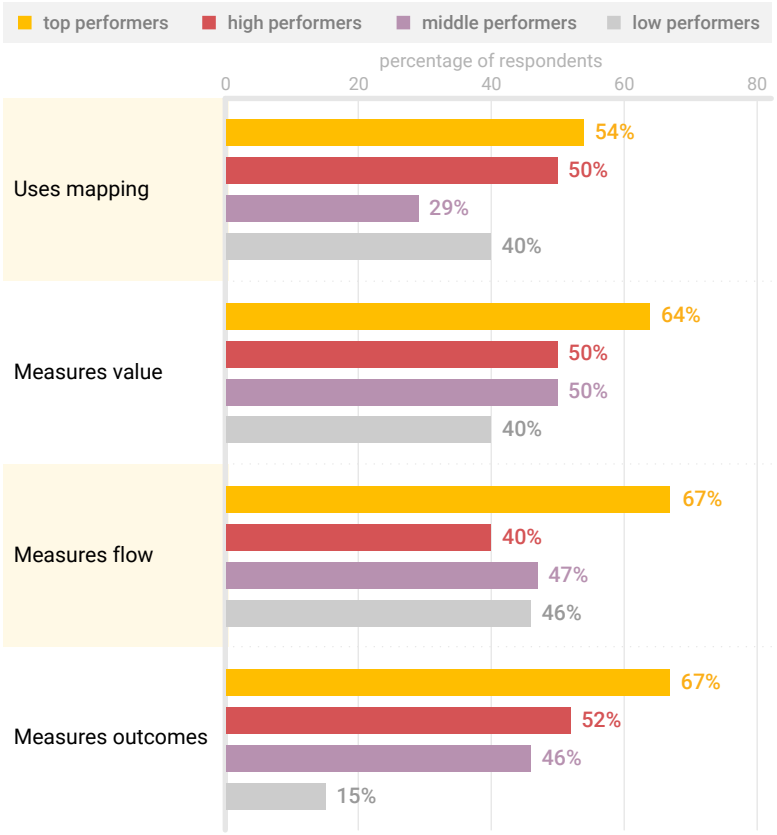
It is with huge gratitude to our research team, our founding members, and all of those who contributed their thoughts to our research survey, that the Value Stream Management Consortium presents our findings to you. We are grateful for all feedback and hope this is the catalyst for dialogue with you on how we can best support the VSM community.

Helen Beal

Chair of the Value Stream Management Consortium

Wow Moments

Value stream management practices are more common in higher-performing organizations



2x Platform or value stream-oriented teams are nearly twice as likely to use flow metrics as project-oriented teams

People

~50% of respondents' organizations have specific roles that are aligned to value streams

22% of respondents work in an explicitly named value stream team

Process

>50% of respondents measure value realization

>70% don't directly connect flow metrics to business results

Tools

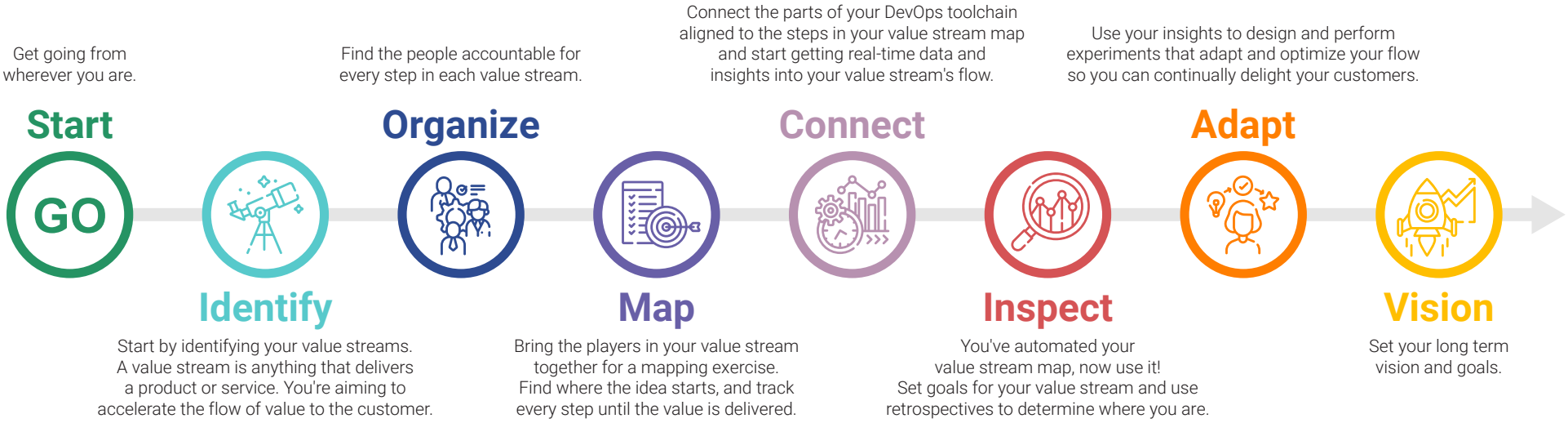
50% of organizations must implement VSM platforms within the next 2 years to maintain competitive advantage

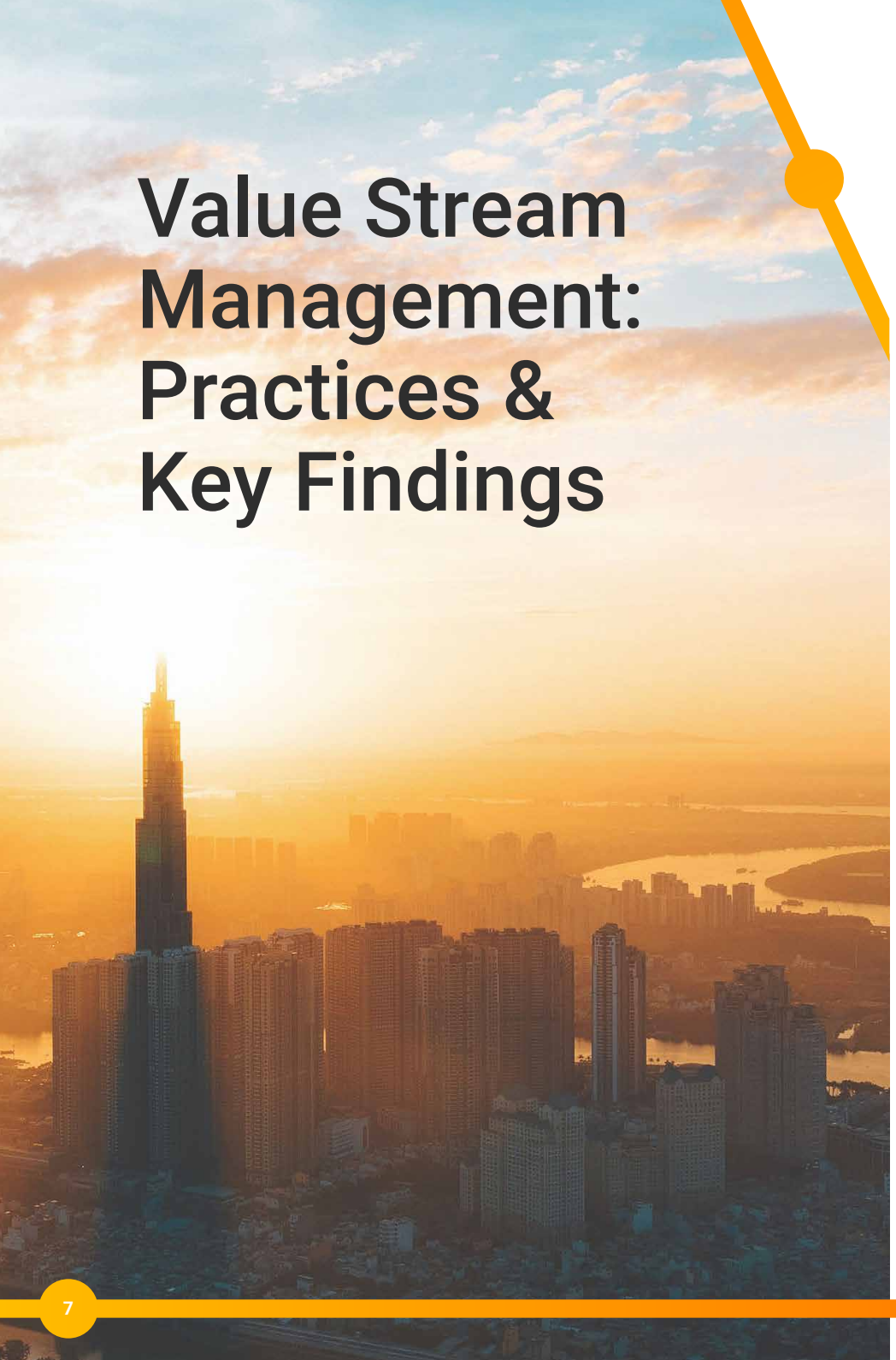
<20% are currently using VSM platforms

VSM Implementation Roadmap

VSM is a combination of techniques that continually and holistically optimize the flow and realization of value for a product or service. The implementation roadmap below illustrates the steps for adopting VSM to actively manage digital value streams with the ultimate goal of improving organizational performance.

Organizations often believe they are not mature enough for value stream management. We think the contrary; they should start measuring their value stream now and we recommend that they start wherever they are today. Even if they are practicing waterfall approaches and have manual testing and deployment, organizations need to benchmark themselves to understand where they are, then select target improvements and have visibility to see if there was a positive change. Waiting for reorganizations, CICD, microservices, cloud—or anything else—will hold them back.





Value Stream Management: Practices & Key Findings

The evolution of VSM has gained the attention of both business and technology leaders during the the fifth technological revolution (the Information Age) as it promises to determine the true value of an organization's software development and delivery efforts, and the associated resources. Organizational thinking has moved from "feature and function" towards conceptually organizing around the value pulled from the system by the customer. There is an accompanying shift to identify where processes can be pivoted to increase the speed that value can be pulled from the system, rather than on the efficiency of the process itself.

While there are still significant challenges around the adoption of VSM, the following three key practices are evidence of a shift towards broader adoption:

- **Organizations are identifying value streams and organizing around them.** As organizations need to continuously innovate, it is essential to understand the key value streams, gain visibility into them, and organize around them to then improve value delivery.
- **Product-oriented teams are more popular than project-oriented teams.** Product focus binds the team more closely to the producer-consumer relationship. Value is determined by the products' consumer utilization, rather than abstract outputs defined by the project, or program.
- **People have roles specifically focused on value stream-centric ways of working.** By defining organizational roles in terms of their value stream, individuals know their spheres of responsibility. Having specifically defined roles who own the adoption helps drive teams to think about value and change how it is managed.

Organizing around Value Streams

Moving from waterfall, big-batch, *project*-oriented ways of working to agile/DevOps, incremental and *product*-oriented ways of working requires three main organizational design considerations:

- **Flattening the hierarchy to distribute authority and empower individuals within teams.** The idea is to have few or no levels of intervening management between individuals and leaders with the goal to promote individual contributors' involvement through a decentralized decision-making process. The advantage is that this generates an environment of creative discussions, ideas, and comments so that feedback flows fast across the team and up to the next level.
- **Breaking down silos for improved collaboration.** When silos are eliminated, the flow of information is unencumbered and can be directed to reduce cognitive load. Additionally, unnecessary handoffs can be avoided as typically the group functions as a team. Critically, this shift means that the team can work autonomously with very little dependence on other teams and therefore can make necessary changes and adjustments quickly.
- **Systems thinking to promote end-to-end lifecycle management.** Practicing systems thinking means observing and understanding problems more completely and accurately before acting, and requires the willingness and availability of information to see a situation, problem, or product more interrelated and fully.

Digital transformation is often highly disruptive, particularly when organizations embark on wholesale redesign and assign new roles, create new teams and move their humans around. This can often result in huge dips in productivity and employee happiness, while people apply for new roles, deal with uncertainty and get up to speed in their new teams. Organizing around value streams will take executive support and often starts with a key team or business unit.

Value stream thinking does not always require a major organizational redesign. Although some organizations, such as Lloyds Banking Group have gone down this road, we are observing more organizations evolving incrementally as they embrace VSM roles and principles. In Robin Yeman and Suzette Johnson's talk titled *Industrial DevOps* at DevOps Enterprise Summit Europe in May 2021, they explained how lack of understanding of value streams was a key barrier to DevOps adoption. Their solution was to organize teams around value streams and make metrics visible and actionable.

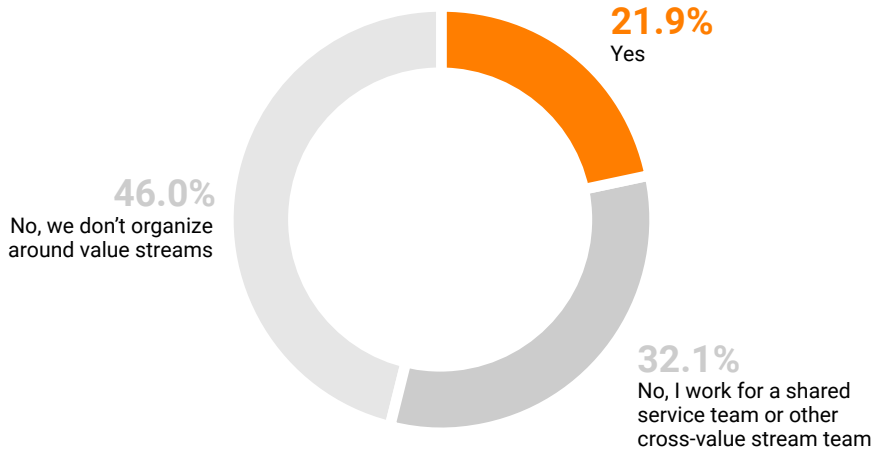
This transformation lead from a large, 100 year old bank explains the challenge posed by our traditional organizational models:

> *"In an enterprise bank with legacy applications and hundreds of systems, components, services, applications, value stream alignment is challenging. Although the business is structured around products such as lending, savings, and investments, technology has always been a single unit. Aligning the technology domains with the products that the bank provides is a great first step. Next is grouping the applications and services to these domains. Even then, we still have a number of shared systems and applications which are dependencies we need to manage."*

Alignment to a Specific and Explicit Value Stream is Higher than Expected

We asked if respondents were aligned to a specifically identified and explicitly named value stream. 46% said "No", 22% said "Yes", with the remaining 32% working in a shared service team or other cross-value stream team. For the research team, hearing that nearly a quarter of respondents are working in organizations that are identifying and naming value streams is very encouraging. We are very interested in how this will change over the coming years.

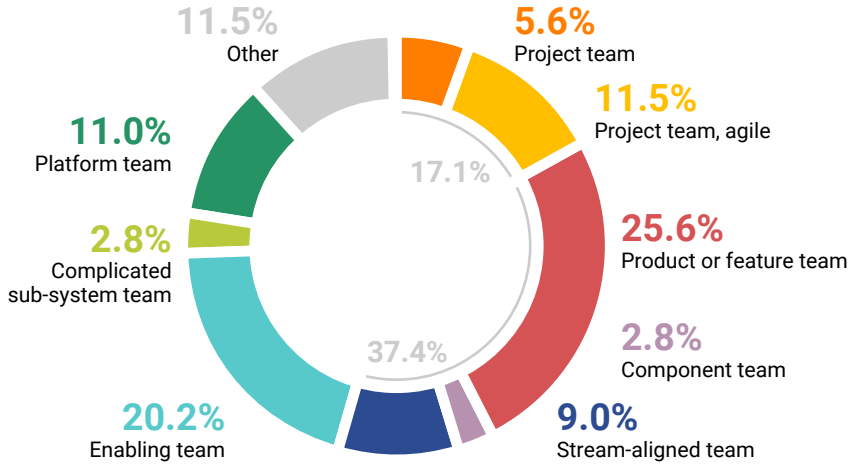
Are you aligned to a specifically identified and explicitly named value stream?



Product-Centric Thinking Wins over Project-Centric Thinking

We also asked what type of team people work in. Value stream-centric thinking requires a change in ways of working from project to product; a value stream can be loosely defined as anything that delivers a product or service. It was heartening then to find that nearly 40% (37.4%) reported working in a product, feature, component, or stream-aligned team. Conversely, 17.1% were in project teams although over half of these are working using agile principles. The remainder work in teams that support value streams such as platform or enabling teams.

In which type of team do you work?



The table at right details team types and descriptions we used in the survey. We chose the team types we most commonly see in the organizations we work with, and augmented them with the team types (highlighted in orange) derived from the guidance in *Team Topologies*, by Matthew Skelton and Manuel Pais. Whilst there is some overlap between some of the team types, we know that not everyone is yet familiar with those described in *Team Topologies*. We then divided the team types into three categories to allow for deeper data analysis:

1. **Project**
2. **Value Stream (Product)**
3. **Platform**

Team Topologies guides its readers' understanding of stream-aligned teams:

> *"A stream-aligned team is a team aligned to a single, valuable stream of work; this might be a single product or service, a single set of features, a single user journey, or a single user persona. Further, the team is empowered to build and deliver customer or user value as quickly, safely, and independently as possible, without requiring hand-offs to other teams to perform parts of the work. The stream-aligned team is the primary team type in an organization and the purpose of the other fundamental team topologies is to reduce the burden on the stream-aligned teams."*

A stream-aligned team then is a value stream team and we note that the authors identify this type of team as that which drives the value, with the other team types being supporting and enabling teams to the value stream. This view is shared by the VSM consortium members, who believe that organizing work around customer value leads to optimal organizational performance. As we will show in this report, our data shows this to be true and we hope to continue to build on this evidence as we continue our research.

Team Types

Team Class	Team Type	Description
Project	**Project team**	Transitory (exists for up 2 years but with a distinct delivery date), working in a waterfall manner
	Project team, agile	Transitory (exists for up 2 years but with a distinct delivery date), working in an agile manner
Value stream	**Product or feature team**	Long-lived (no defined end-date), dedicated to a specific product or set of features (not project)
	Component team	A team that focuses on the creation of one or more components of a larger product
	Stream-aligned team	Focused on a single value stream of work (a product, service, customer journey, or persona)
Platform	**Complicated sub-system team**	Responsible for building and maintaining part of the system that relies on specialist knowledge
	Platform team	Enabling stream-aligned teams to deliver work with substantial autonomy
Enabling	**Enabling team**	Composed of specialists or subject matter experts (SMEs)

The Creation and Alignment of Roles around Value

We asked respondents if their organization has any roles aligned to value streams. 51.4% said no, but we were pleasantly surprised to find that 44.4% of respondents have created and named roles aligned to value streams, indicating that they are also arranging their organizational design in a way that considers value streams.

1. Value stream lead or manager (17.7%)
2. Value stream facilitator (11.6%)
3. Value stream architect (9.8%)
4. Value stream analyst (5.3%)

Other value stream oriented roles that respondents named as "other" included:

- Value stream management office
- Value stream evangelist
- VSM SME
- CPO of the value stream
- Center of excellence consolidated VSM leads

Currently, the market does not have definitions for these roles. However, the Value Stream Management Consortium intends to build these out with member input over the coming months.

VSM is Seen by Change Leaders as Key to Evolving Ways of Working

In the demographics section of this report, you will learn that 34% of survey respondents are working in roles that are instrumental in changing ways of working (e.g., transformation leads and coaches). It must be noted that the type of people likely to share their experiences with VSM at this time are those most likely to have awareness of the topic. This indicates a bias towards positive reporting, and therefore that the figure is likely lower across the industry. Nonetheless, it is an encouraging signal that VSM-centric ways of working are being adopted in the mainstream, and not just by those wedded to value stream thinking.

The consortium passionately believes that adoption of VSM-centric ways of working will be critical to ongoing improvements in organizational performance. In future reports, we will explore the implementation and impact of VSM-centric roles in more detail, which will enable us to understand which role patterns are most effective.

Discovery through Value Stream Mapping

Value stream mapping is a tool from the lean canon that helps teams visually collaborate to understand and improve the way value flows from idea to realization.

- **Value stream mapping is not yet a universal practice.** Mapping the value stream is an essential early step towards embedding value stream ways of working; organizations must learn the practice and make it accessible to all or be left behind.
- **Value stream mapping currently focuses on alignment over improvement.** The perceived advantages of mapping currently focus on improvements in human-to-human alignment rather than the ability to have data-driven conversations and extract actionable insights.
- **Value stream mapping inspection should be continuous.** The value stream map is an artifact that visually represents current and target states and measures progress on a DevOps or digital transformation journey; it must be revisited regularly and ideally automated to allow for real-time, continuous inspection.

As the Chair's welcome note described, while VSM approaches are not new, their adoption in the technology driven sector is relatively recent. The DevOps Handbook, published in 2016 and written by Gene Kim, Jez Humble, Patrick Debois, and John Willis, provides advice on how to start with DevOps. In "Part 2", it guides readers on how to select a value stream, how to understand the work within it, make it visible through mapping, and expand the DevOps implementation across an organization. It quotes Damon Edwards, co-founder of Rundeck, now part of PagerDuty:

> *"In my experience, these types of value stream mapping exercises are always an eye-opener. Often, it is the first time when people see how much work and heroics are required to deliver value to the customer."*

In their talk titled *How Your Value Stream Management Practices Enable DevOps and Data-Driven Organizational Strategy* at DevOps Enterprise Summit Europe in May 2021, Lindy Quick and Saahil Panikar of Northrop Grumman quoted a team member's experience using value stream mapping:

> *"We have been working on this for 6 months and until (we) mapped out the business process we didn't know how to talk about the work."*

Value stream mapping is highly effective at identifying where waste can be removed in a value stream, but the consortium has also observed limitations that we want to explore further.

Over half (56%) of respondents said that they did not use value stream mapping to obtain data about flow. This is a "glass half full or half empty" moment then: should we be disappointed that half aren't using this practice, or pleased that half are?

Value Stream Mapping is Not Value Stream Management

Value stream mapping is frequently, and understandably conflated or confused with value stream management (VSM). Further complicating the distinction between the two is that they form the same acronym. The table at right highlights the differences.

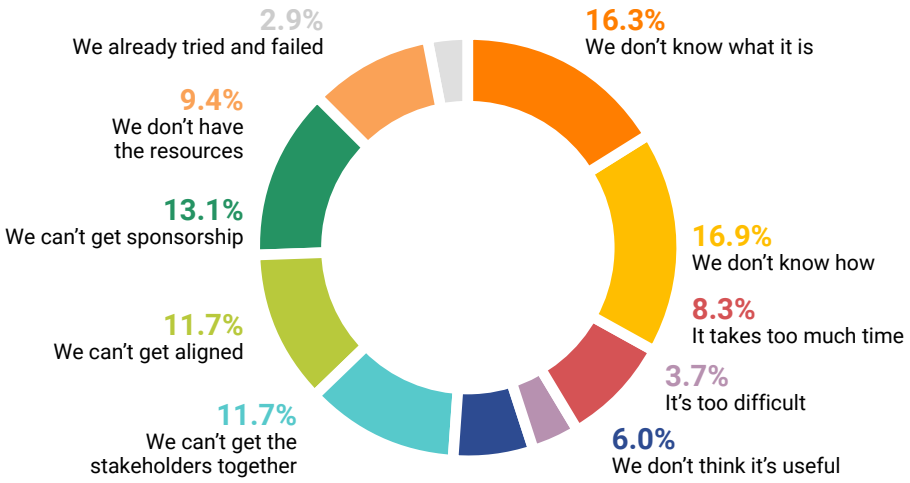
Value Stream Mapping	Value Stream Management
Narrative, storytelling, and human-centric	Science, insight, and tools-centric
Opinion-driven, qualitative	Data-driven, quantitative
Visual collaboration	Visibility and continuous inspection
Walls and post-it notes (virtual!)	Integrations, dashboards, and AI
Builds an initial business case	Ongoing incremental optimization
Defines present and future	Records past and present
Highlights waste	Automates for continuous compliance

Value Stream Mapping	Step	Improvement Kata
Scope the value stream's purpose	**1**	Set long term vision and goals
Map the current state	**2**	Understand the current state
Map the future state	**3**	Describe the next target state
Devise the hypothesis backlog for improvement	**4**	Experiment to travel between the current and target states

Use Value Stream Mapping as an Improvement Kata

The Value Stream Management Consortium recommends thinking of mapping as an early and essential step to enable management of the value stream; it's just one of the management techniques. It aligns with another lean tool, the improvement kata, a pattern for continuous improvement and adaptation. Together, these tools support the work needed to survive digital transformation.

Why don't you leverage value stream mapping?



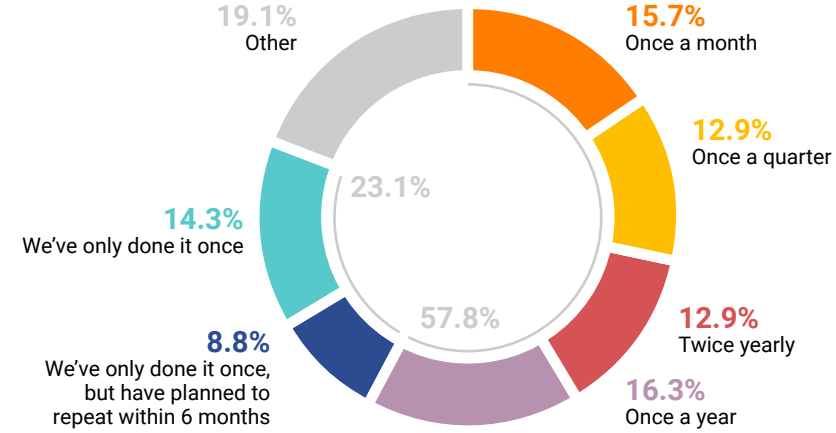
When Value Stream Mapping Isn't Done

Mapping is the foundational practice to VSM. When it's not done, it's going to be hard, or impossible, for teams and organizations to pursue value stream-centric ways of working. Mapping leads to the other techniques: automation, inspection, adaptation, and optimization that comprise VSM. The top three reasons people gave that value stream mapping is not practiced:

1. We don't know how
2. We don't know what it is
3. We can't get sponsorship

Despite the practice's 70 year history, prevalence in lean enterprise and lean manufacturing, and prominence in works designed to support digital transformation, such as The DevOps Handbook, we still need to help the market understand **how to do the practice and why.**

How frequently does your team practice value stream mapping?



When Value Stream Mapping Is Done

Those that do use value stream mapping vary widely in the frequency of their practice (see chart at left).

Nearly one-quarter (23%) of respondents had only done it once, and 19% 'Other', with the remaining 58% practicing between once a year and once a month. This is good news since practitioners have long reported that a key challenge with mapping is the difficulty of making it happen, and therefore of making it repeatable. This data indicates that people are viewing this as an activity to be continually repeated and therefore will be able to measure their progress in their digital transformation and DevOps journey.

The Value in Value Stream Mapping

When asked what they found most valuable about value stream mapping, those respondents practicing it ranked their top three:

1. **Alignment, shared understanding, and clarity (28% ranked first)**
2. **The visibility and transparency into our system (25% ranked first)**
3. **The vision and goals we create (18% ranked first)**

These attributes (clarity, visibility, and vision) all relate to setting organizational direction, but the lower scoring attributes are those that drive data-driven conversations and decisions that result in actionable insights and value outcomes:

- The data and metrics we collect
- The hypothesis backlog we generate
- The changes we agree upon

What's in the Way

Value stream mapping is a time-intensive activity. It requires people to take a break from "business as usual", and is particularly difficult to schedule in organizations where a "meetings culture" prevails. When we asked the respondents who perform value stream mapping what they find most challenging about the practice, their top three answers were:

1. Making it happen
2. Getting leadership buy-in to change
3. Extracting insights

What makes value stream mapping valuable and what makes it challenging have something in common. The answers that ranked lower were those that resulted in data-driven change in both cases:

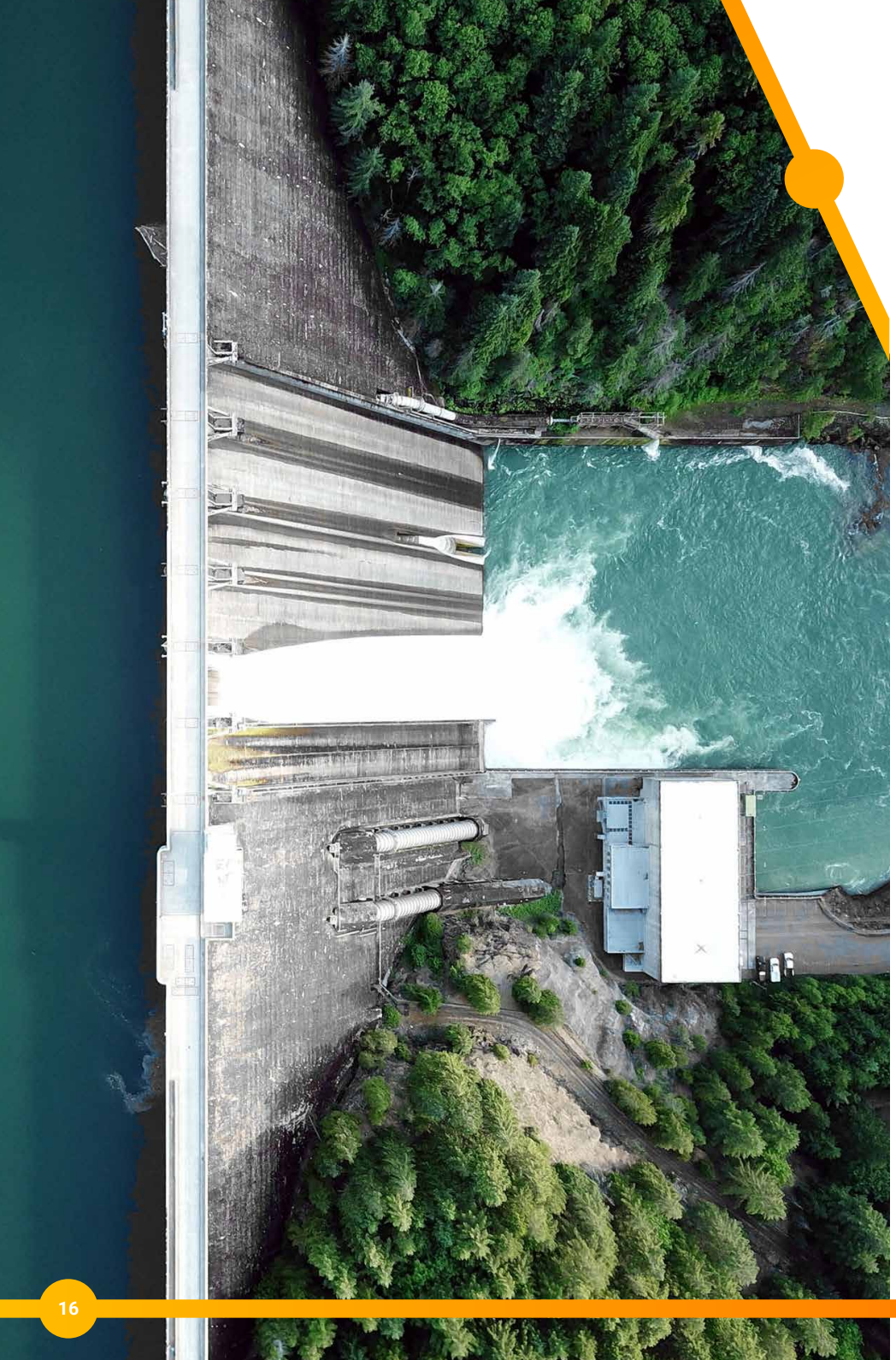
- Ensuring the follow-up actions are completed
- Making it repeatable
- That the "data" is based on opinion
- Revisiting our learnings

Ryan Sheldrake, Field CTO at Lacework, recalled his experiences practicing value stream mapping at a previous employer:

> *"I knew there was waste in the business and the route to live. There were some great ideas but things moved so slowly that they just evaporated. I started to talk across the heads of function about how we could accelerate delivery without losing quality. Quality was important as we were 'critical national infrastructure.' We then mapped where the hold-ups and delays were. But they wouldn't listen to me as an internal resource. But some consultants came in and provided independent verification for what I wanted to achieve."*

There are additional advantages to acquiring external support for value stream mapping exercises. The facilitator role is frequently an adjudicator so it helps if they are distanced from the inevitable politics in an organization. And it benefits from the skills, experience and insights which are only effectively gained through practice across a number of different organizations. Sheldrake went on to explain the benefits of this activity:

> *"They didn't know what they didn't know. That's why it was hard to get sponsorship for the participation. We had the whole of senior leadership working on this for four days in total; a really big time investment that was really hard to get them to agree to. It was worth it: visibility gave them the capability to uncover the unknowns. It focused on where to apply effort and investment to lessen the bottlenecks one by one."*



Inspection and Adaptation through Value Flow Analysis

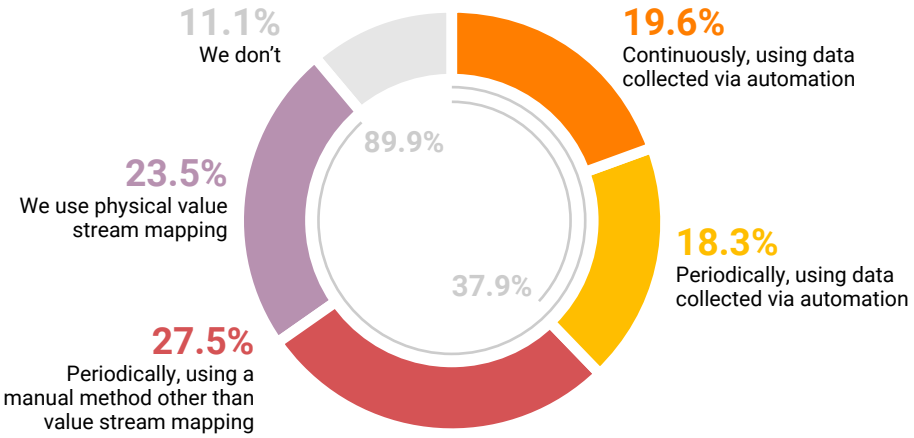
VSM-centric thinking requires an unerring focus on the flow of value through the system, the goal being to continually optimize time to value for the customer, without compromising system safety or performance.

- **Teams that map value streams are likely to continuously measure their flow.** Mapping sets a baseline from which teams can track progress and the impact of intended improvement activities using flow based metrics; it measures advances in a DevOps journey.
- **Team topology correlates with flow metrics capability.** When people are focused on a long-lived product, they can see and measure time to value and are more likely to use flow metrics to optimize performance.
- **Data is being collected, collated, and inspected.** Teams understand that there are multiple collection points for value stream data and that this enables automation of the value stream map. However, much of this work continues to be done manually and teams are not taking advantage of the automation available.

Nigel Griffiths, SVP sales at Adidas was quoted saying in a talk titled *From 6-Eye Principle to Release at Scale* from Fernando Cornago, Vikalp Yadav, and Andreia Otto at DevOps Enterprise Summit Europe in 2021:

> *"Only by understanding data across our entire value chain will we be in the position to improve our product design, supply chain or forecasting. I don't go anywhere without tech on the table."*

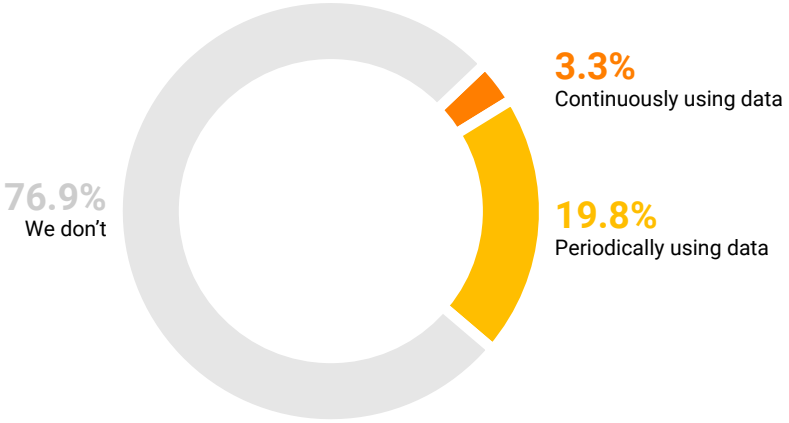
When does your team inspect flow?



When Concerned with Flow

Nearly 90% of our respondents that practice value stream mapping do inspect their value flow, with just under 40% having automated the data collection process, 20% continuously.

When does your team inspect value stream flow? (Those that don't practice value stream mapping.)



When Not Concerned with Flow

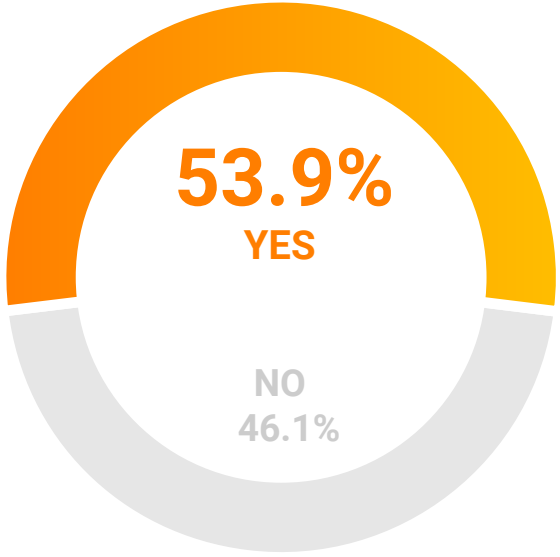
Among those that don't practice value stream mapping, nearly 80% do not inspect flow. Only by inspecting flow can we knowingly make adjustments to improve it. As Peter Drucker said, **"If you don't measure it, you can't improve it."**

Value Stream Metrics that Matter

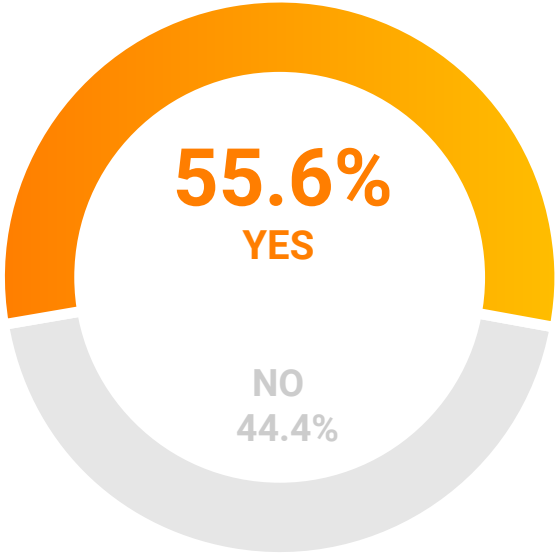
Just over half of all our respondents said that they measure their work across three categories:

1. Flow
2. Value outcomes
3. Organizational outcomes

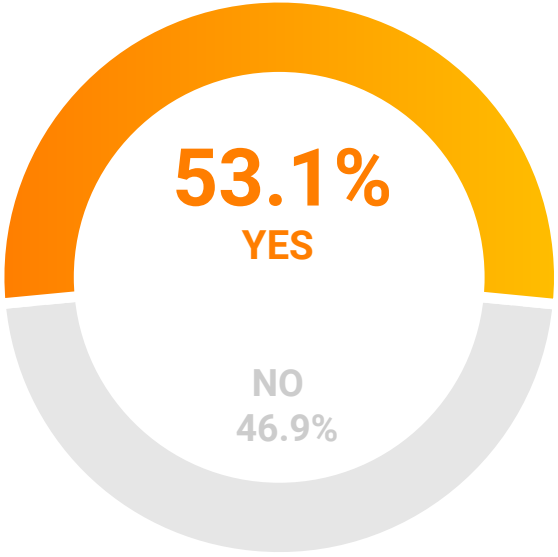
Do you measure value stream, flow, or technical metrics?



Do you measure value-based or business metrics?



Do you measure organizational outcomes?

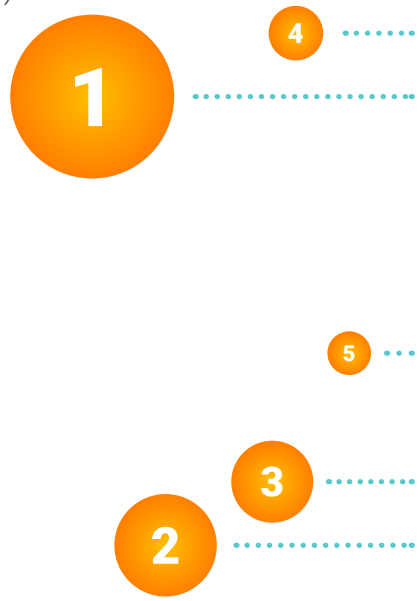


Value Stream Flow Metrics Used

The most popular metric used is cycle time (often conflated with lead time or flow time). We asked which value stream flow metrics are used.

Top 5:

1. Cycle time (lead/flow time)
2. WIP (flow load)
3. Throughput (flow velocity)
4. Code quality
5. Flow efficiency



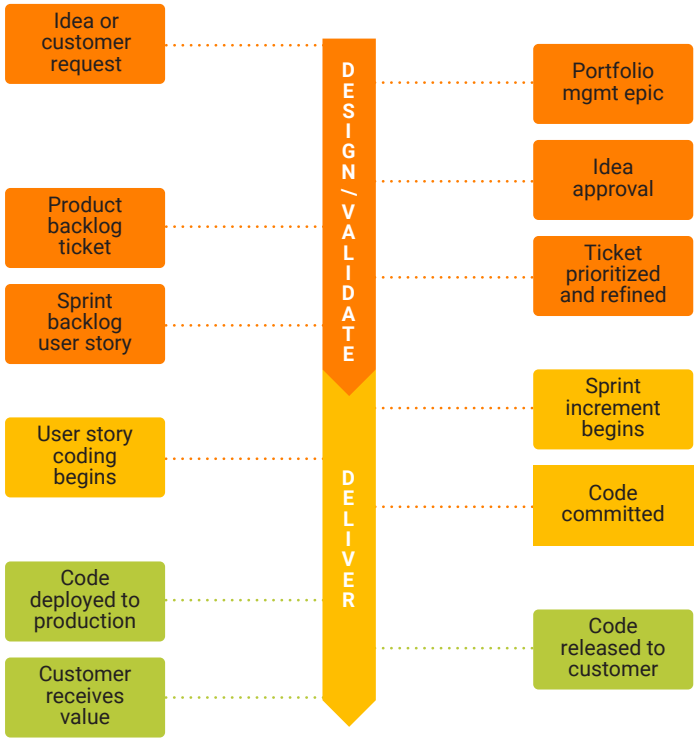
Value stream flow metrics definitions and rates of use among respondents

Metric	Definition	Source
Code change size	The number of lines of code added or deleted that have not been delivered	Bryan Finster
Code delivery speed	Cycle time (from start of coding to production deployment)	Richard Knaster
Code refactoring rate	The percentage of time spent on refactoring code	Richard Knaster
Code review churn	The number of lines of code that the team modified during a specific time period, or the number of times a file has changed over a specific time period	Richard Knaster
Code quality	Functional tests are passed, code is free from deficiencies	Helen Beal
Cycle/lead/flow time	Varies—see next page	Gartner, DORA/ GCP, Tasktop
Defect distribution	The ratio of defects completed over a particular time period, out of all completed work	Rebecca Dobbin, Tasktop
Feature distribution	The ratio of features completed over a particular time period, out of all completed work	Rebecca Dobbin, Tasktop
Flow distribution	The distribution of features, defects, risk, and debt completed over a particular time period	Rebecca Dobbin, Tasktop
Flow efficiency	The proportion of time that work items are active against their total cycle time	Gartner
Technical debt	The distribution of debt completed, over a particular time period, out of all completed work	Rebecca Dobbin, Tasktop
Throughput or flow velocity	The number of work items completed in a set period	Gartner
WIP or flow load	The number of work items that have been started and remain active or waiting	Gartner
Work profile	The proportion of each type of work item delivered in a time period	Gartner

Cycle, Lead, and Flow Time

These metrics are notorious for variance between lean and DevOps practitioners. There are many places to start and finish the measurements. The table on this page shows some well-established examples.

In future research, we plan to explore further how teams are using these metrics and how they measure them. The diagram below summarizes potential start (orange/yellow) and end points (green).



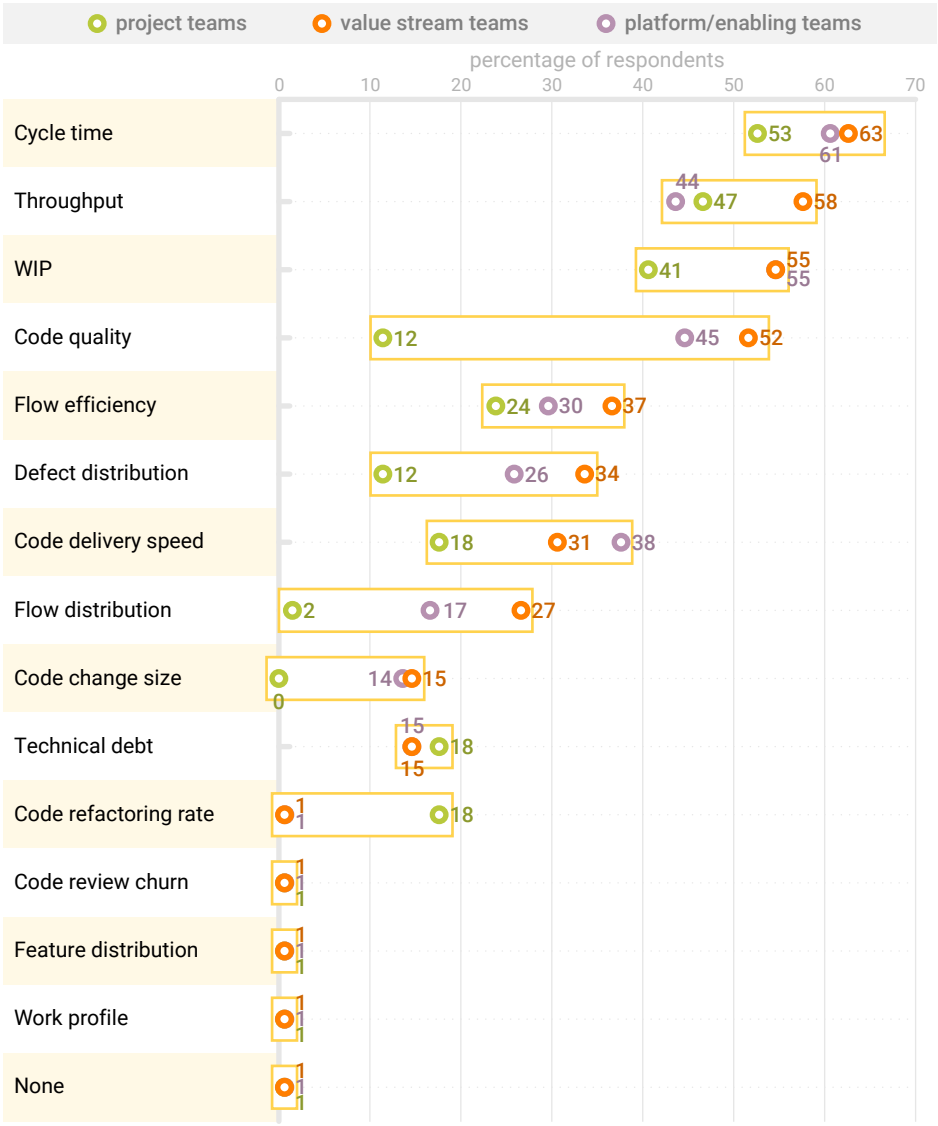
Cycle time	
Gartner:	The elapsed time from when work is started to when it is completed. Multiple teams developing a single product will have their own cycle time. This is frequently mistaken as code commit to cash (i.e., deployment value stream), but should be from when a work ticket is open to when it is closed.
DORA/GCP:	N/A
Flow Metrics:	The time it takes to complete one step in the process. Cycle time can help identify constraints—where the step with the longest cycle time will typically be the bottleneck—while lead time tells us the time it takes for the end-to-end process to run.
The Engineering Leader's Guide to Cycle Time:	Cycle time (four components): 1. Time to open [pull request size, rework, work in progress (WIP)] 2. Time to first review (pull request size, review involvement, review speed) 3. Time to approve (review coverage, review influence, review cycles) 4. Time to deploy [deploy volume, mean time to discovery (MTTD), mean time to recovery (MTTR)]
Lead time	
Gartner:	The customer's view of the elapsed time from requesting a capability to its release. Note that deployment installs code onto a production environment, but the release should be tracked because this is when it is available to end users. Traditionally, this was considered as "concept to cash," but more correctly it is "customer commitment to outcome."
DORA/GCP:	Lead time is the time it takes to go from a customer request to the request being satisfied—but there are two parts: design/validate and deliver. It's hard to know when to start measuring design and there is often high variability. DORA focuses on delivery: the time it takes to go from code committed to code successfully running in production.
Flow Metrics:	Flow metrics measure time through an entire process—comparing the time when the item starts in a "new" state to when it enters a "done" state. In contrast to Flow Time, this would begin at the time a customer requests the feature, rather than once the Flow Item is committed to.
The Engineering Leader's Guide to Cycle Time:	The time from idea to the delivery of features to customers.
Flow time	
Gartner:	N/A
DORA/GCP:	N/A
Flow Metrics:	Starts when a flow item is accepted into the value stream. In contrast to Lead Time, it measures time from "active" or "waiting" to "done". It does not include "new" time.
The Engineering Leader's Guide to Cycle Time:	N/A

Use of Flow Metrics Indicates Higher Team Capability

We correlated the use of these flow metrics with the team types, classifying into three categories. Teams aligned to product-centric ways of working are nearly twice as likely to use flow metrics than those operating in a project-oriented manner, with platform teams a close second.

It's easier for teams to conceptualize, sense, and respond to the value being delivered to their customer when they are organized around long-lived products and use incremental development with small batches.

What value stream flow metrics does your team measure?



Data Sources for Flow Metrics

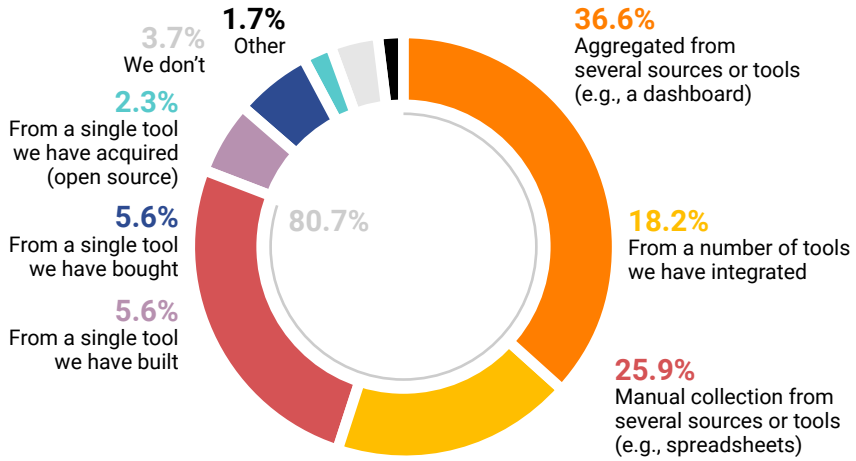
Teams are finding ways to collect the flow data they need from multiple sources but over 80% of respondents are doing this manually, using an aggregator, or have spent time integrating tools themselves. In order to optimize value stream management, and make it as quick and easy as possible for teams to inspect their flow metrics and invest their time on improvements, teams should look for a single tool that does this work for them. Currently, only 13% have a single tool to collate flow metrics (built, bought, or open source).

The top 3 tools categories for obtaining this data were:

- Build and develop (CI) (34% ranked first)
- Plan (29% ranked first)
- Customer or financial systems (13% ranked first)

Ideally, we would see a spread across all these systems to get a full picture of both flow and value realization across the end-to-end value stream. This would expose bottlenecks and potential improvements across key activity bridges: test and validate, release and operate, monitor and observe, and support and service.

Where do you obtain data about value flow?



The First Way of DevOps is about optimizing flow and performance across the entire system

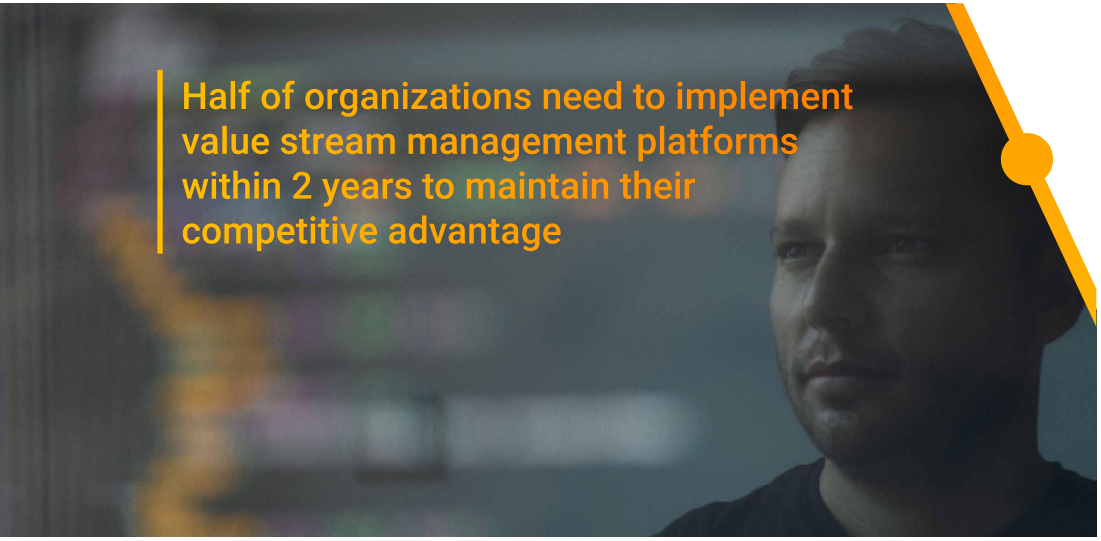
Available Automation is Not Being Used; the Time is Now

Whilst organizations continually strive to focus on business outcomes, few are using the technology available to make this easy. The survey indicates 36% of respondents are still manually connecting flow data to understand how it connects to business results, and of the 44% who are automating this task, only 8% are using a purpose-built value stream management platform (VSMP). Additionally, only 16% are in the implementation phase.

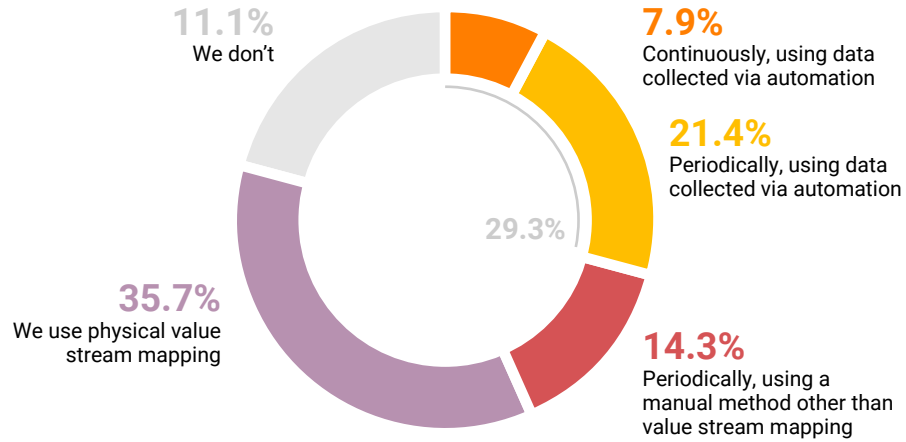
Gartner's January 2020 report, *The Future of DevOps Toolchains Will Involve Maximizing Flow in IT Value Stream*, by Majnunath Bhat, Daniel Betts, Hassan Ennaciri, Chris Saunderson, and Thomas Murphy asserted that:

> *By 2023, 70% of organizations will use value stream management to improve flow in the DevOps pipeline, leading to faster delivery of customer value.*

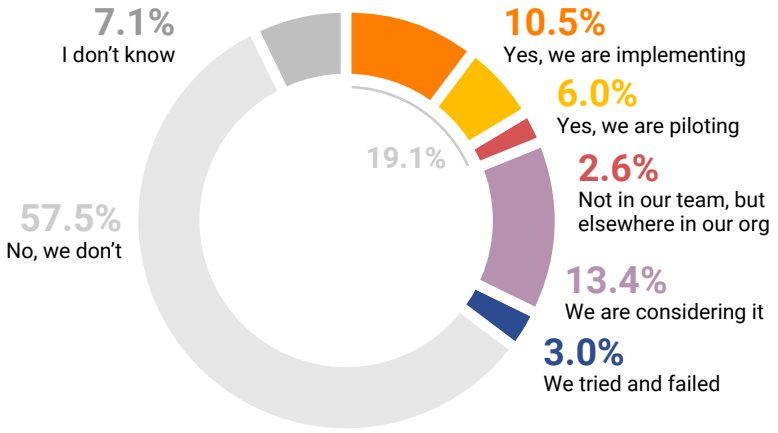
Our data shows that 19% of respondents are currently either using or implementing VSMPs. In order to reach the 70% forecast by Gartner, a further 51% will need to adopt this technology in the next two years. The likelihood is that the remaining 30% will be left behind, as the majority accelerate.

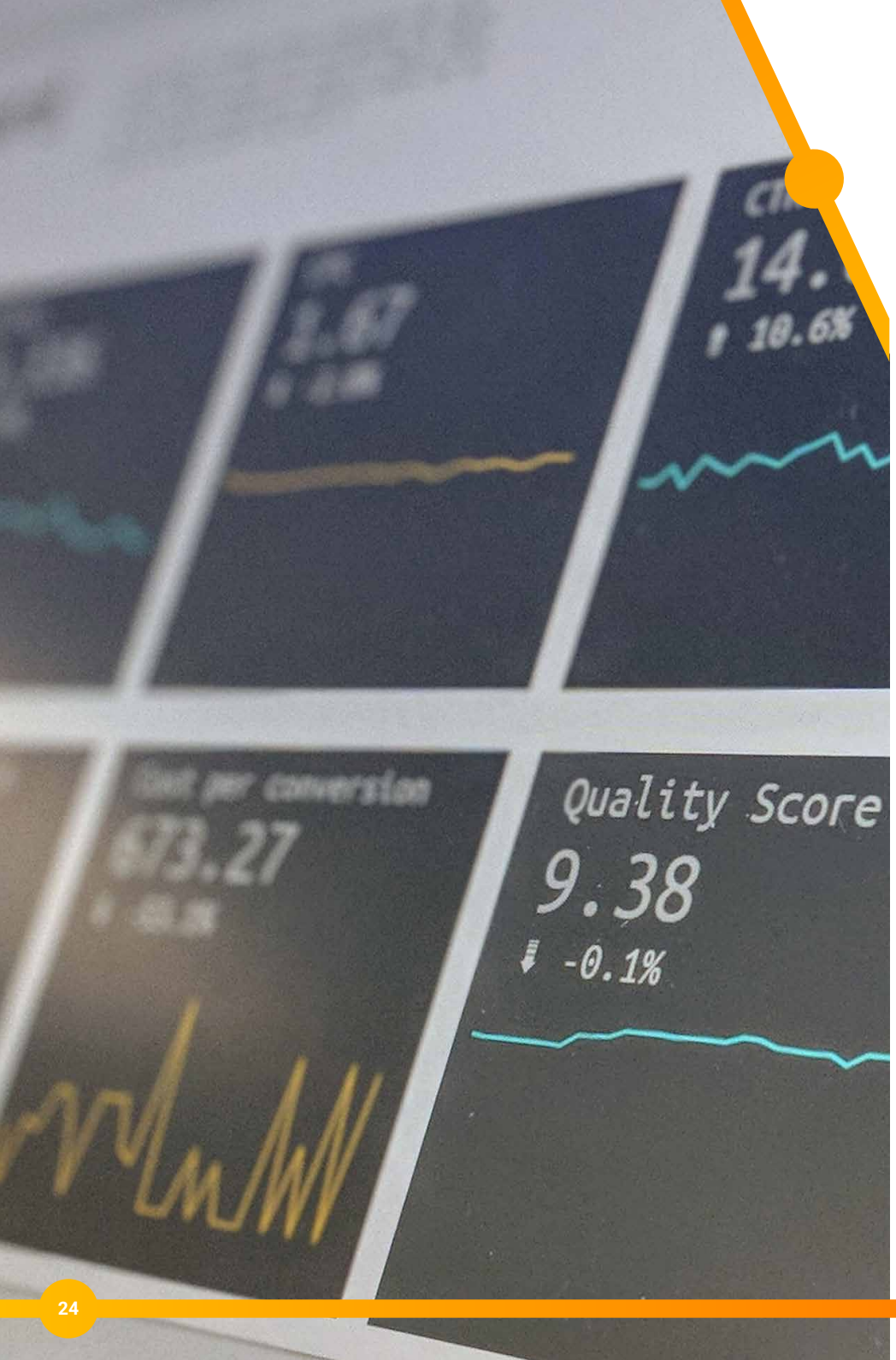


How does your team connect flow metrics with business results?



Do you use a VSMP?





Measuring and Acting on Value Realization

Our experience and observations as value stream management practitioners in the digital market led us to a hypothesis that most teams were not actively estimating or measuring actual value delivered by their work. Here's what our research revealed.

- **Value needs to be estimated to be assessed for impact.** Most teams are not currently measuring the value realized by their work and investment. They are estimating value early but lack direct customer feedback.
- **Business value currently trumps customer value.** Technology teams continue to be directed by "the business" and use financial metrics over customer experience measures.
- **Teams lack autonomy; "we build it, we own it" hasn't landed yet.** Teams are taking guidance on value estimation and mainly reporting on value realization to stakeholders outside their teams, which indicates that they do not have wholesale accountability for their value streams.

> Value is in the eye of the beholder, but customer experience is key

Automated Insights into Value Realization are Rare

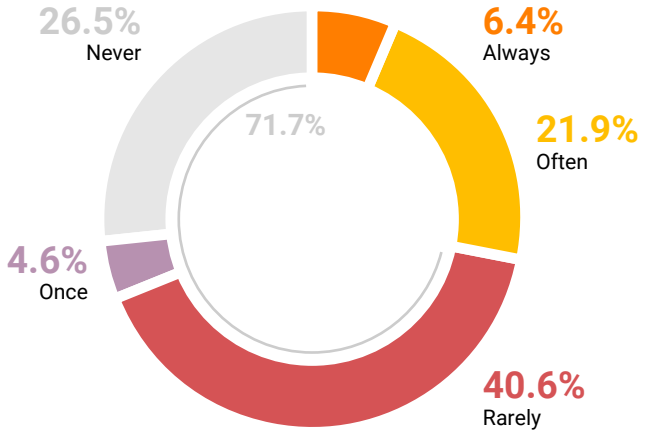
We asked survey respondents if they measure the actual value realized by new features in their products. 72% replied “Rarely”, “Once”, or “Never”.

Of those that measure the value realized, there is significant variance in the regularity, with only about 13% able to do this continually. A little over 16% do measure repeatedly over time but do not have this capability instrumented into their product or platform. 14% measure at the end of the experiment, in line with the culture of experimentation we seek to create in DevOps. However, this doesn’t indicate how continuous measurement supports continuous experimentation, which is a topic we will seek to explore in future research.

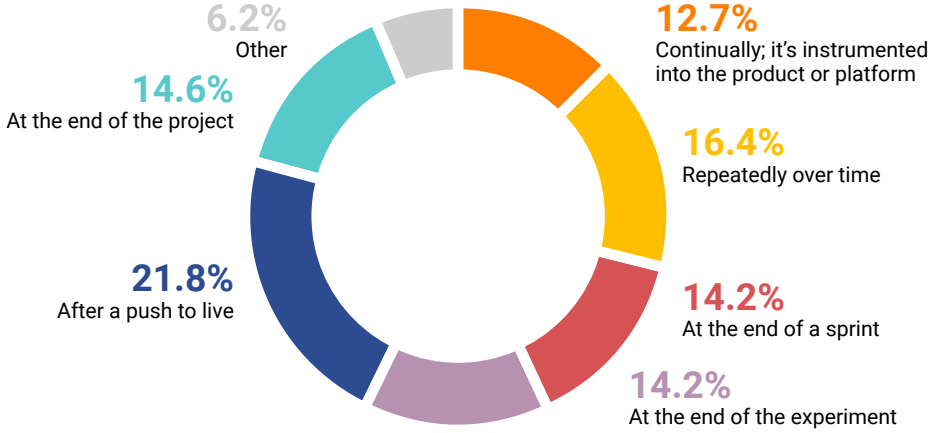
We note that it takes time for value to be realized so whilst it should be commended that some are measuring at the end of project, sprint or after a push to live, it may be that they are not able to fully understand the impact of their efforts. Time to market is replaced by time to value, which is increasingly replaced by time to learning. We learn through acting on the feedback we receive. Receiving actionable insights alongside the feedback supercharges this process.

In future research, we will investigate the capability to track and measure value realization at a granular level. When teams deploy changes frequently, it can be challenging to identify which new feature impacted particular customer behavior. We are very interested in how to create traceability here.

Do you measure the actual value realized by new features in your product?



When do you measure the actual value realized by new features in your product?



The Second Way of DevOps teaches us to shorten and amplify feedback loops

Continuous Experimentation and Improvement

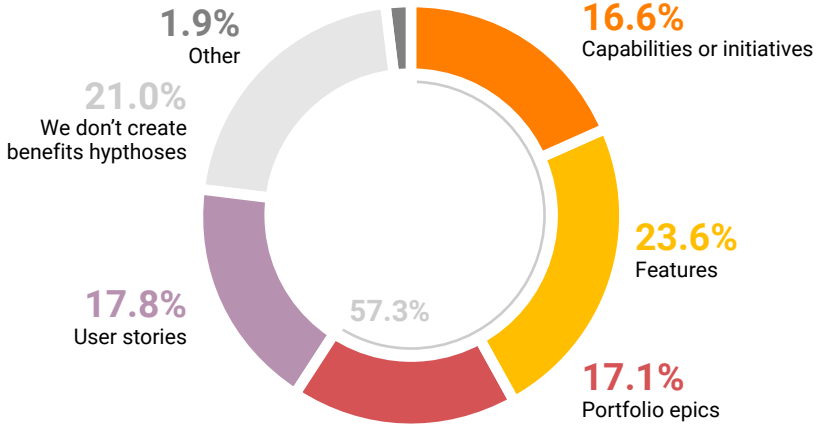
In order to measure value realized, make a success judgement, and adjust according to this feedback loop, we should first imagine the outcome of our work. Using an experimental approach and defining benefits hypotheses for value is recommended. Then the result of the experiment needs to be inspected, analysed, and acted upon (the Deming Cycle: Plan > Do > Check > Act).

A good benefit hypothesis is empirical and timebound; it has a clear measurable starting point and end point that will be inspected on a specific date(s).

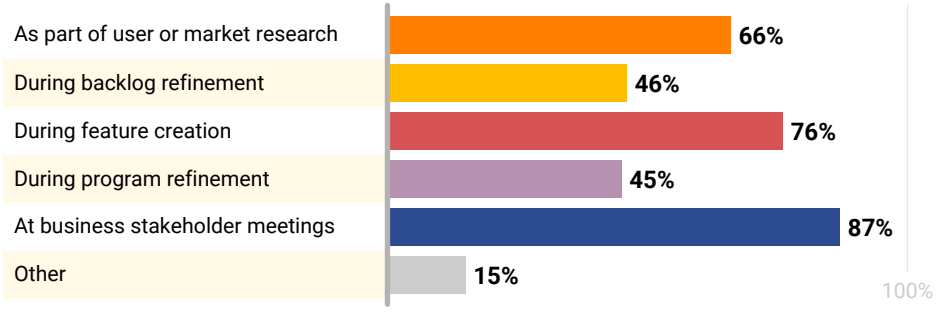
Of our respondents, 21% don't create benefits hypotheses, but almost 60% do it at a high level (initiatives, epics, features), with 18% estimating value outcomes at the user story level. Since agile guides us to work in small, incremental batches, we assume it would be useful to both estimate and examine value outcomes at the smallest unit of work that delivers value. This is something that we will continue to research.

> **The Third Way of DevOps** is a culture of continuous experimentation and learning

For which type of work items do you create a benefits hypothesis?



When do you define the benefit hypothesis for new features?



The Separation between IT and "the Business" Prevails

Most respondents perform the tasks of developing a benefit hypothesis in business stakeholder meetings. Even if both business and technology work together in these sessions, we identify a number of potential problems with this:

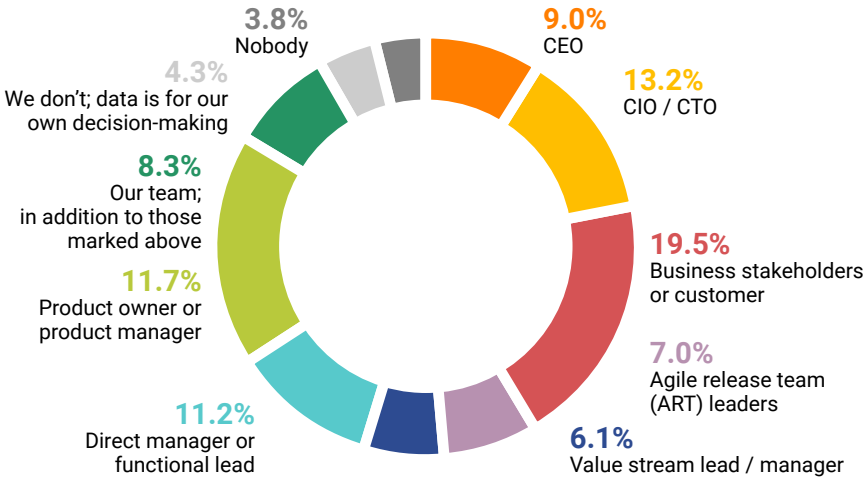
- The value stream is not fully connected
- The technology team and "the business" are seen as separate entities
- The technology team is taking orders from the business
- They are not being seen as strategic enablers for digitization
- Nor are they being given the autonomy needed to optimize flow
- The meetings themselves may represent waste/delay in value flow

The essence of VSM is that the business and digital elements should be one team. Yet, the most popular line for reporting value (19.5%) was "business stakeholders or customer," which demonstrates that the separation is persistent.

Our favored answer for this question is "We don't; this data is for our own decision-making," which indicates a truly autonomous team with fully integrated customer feedback (4.3%). An additional segment report directly to the CEO (9.0%), which is also favourable assuming the team has full autonomy.

Further reflecting the separation, was that of the 53% of respondents who said they do measure business results, only 7.9% were able to continuously and automatically connect flow metrics to business results (see on pages 18 and 23).

To whom does your team report to about value in your product?



> **In the Age of Information, technology does not align or integrate to the business; technology *is* the business**

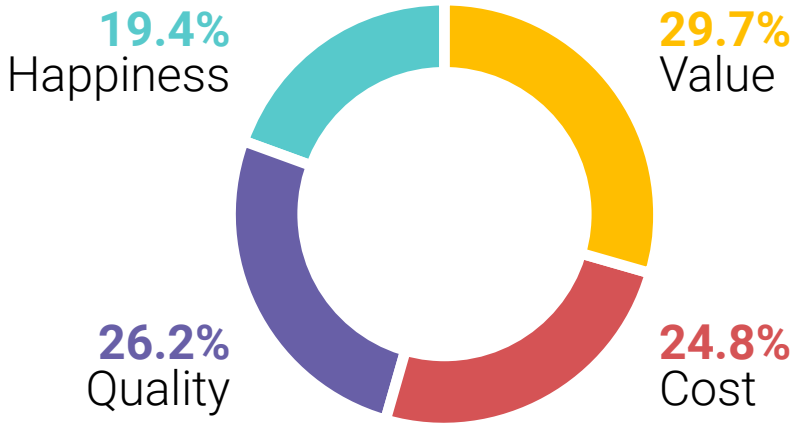
Value is Considered of Higher Importance than Happiness

The assumption here is that "happiness" is *employee* happiness rather than *customer* happiness, a point we will seek to clarify in future research. We see no reason why these business results couldn't be balanced equally and recognize that they are interrelated. For example, in a recent paper co-authored by GitHub, University of Victoria and Microsoft research, *The SPACE of Developer Productivity*, we learn:

> *"Measuring satisfaction and well-being can be beneficial for understanding productivity and perhaps even for predicting it. For example, productivity and satisfaction are correlated, and it is possible that satisfaction could serve as a leading indicator for productivity; a decline in satisfaction and engagement could signal upcoming burnout and reduced productivity."*

The main thrust of the Value Stream Management Consortium is, naturally, that actively managing the flow of value, and monitoring its realization are key to optimal organizational performance. However, we shouldn't forget the surrounding ecosystem and maintaining sustainability at work. Burnout is common across all technology teams and the pressures of digital transformation exacerbate the risks. The intention to create a sustainable pace of working is at the core of agile. With DevOps, we sought to balance throughput with stability. Now, in VSM, we should seek to balance value with cost, quality, and happiness.

Which business results does your team measure?



Revenue and Profit are Considered More Important than Customer Delight

Nearly 30% of responses related to the basic financial measures of revenue/sales, and profit margin. These are proxy metrics for customer experience. They are, of course, metrics that the business is interested in, but as Elon Musk has famously pointed out, from customer delight, comes all other things:

> *"Spend less time on finance, spend less time in conference rooms, less time on PowerPoint and more time just trying to make your product as amazing as possible."*

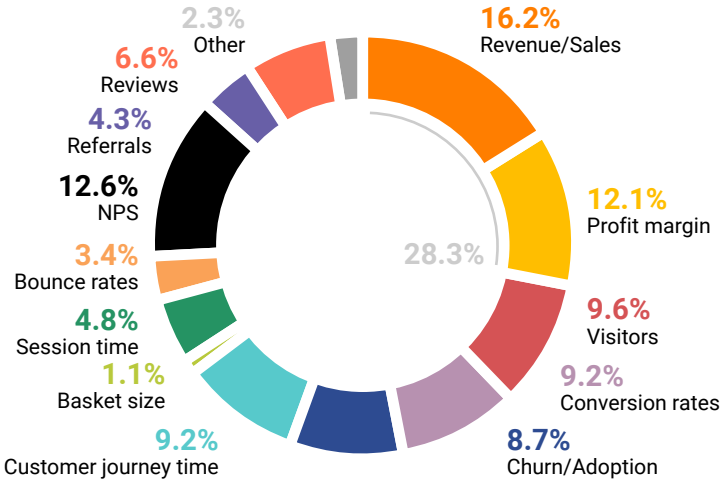
Top 3 answers:

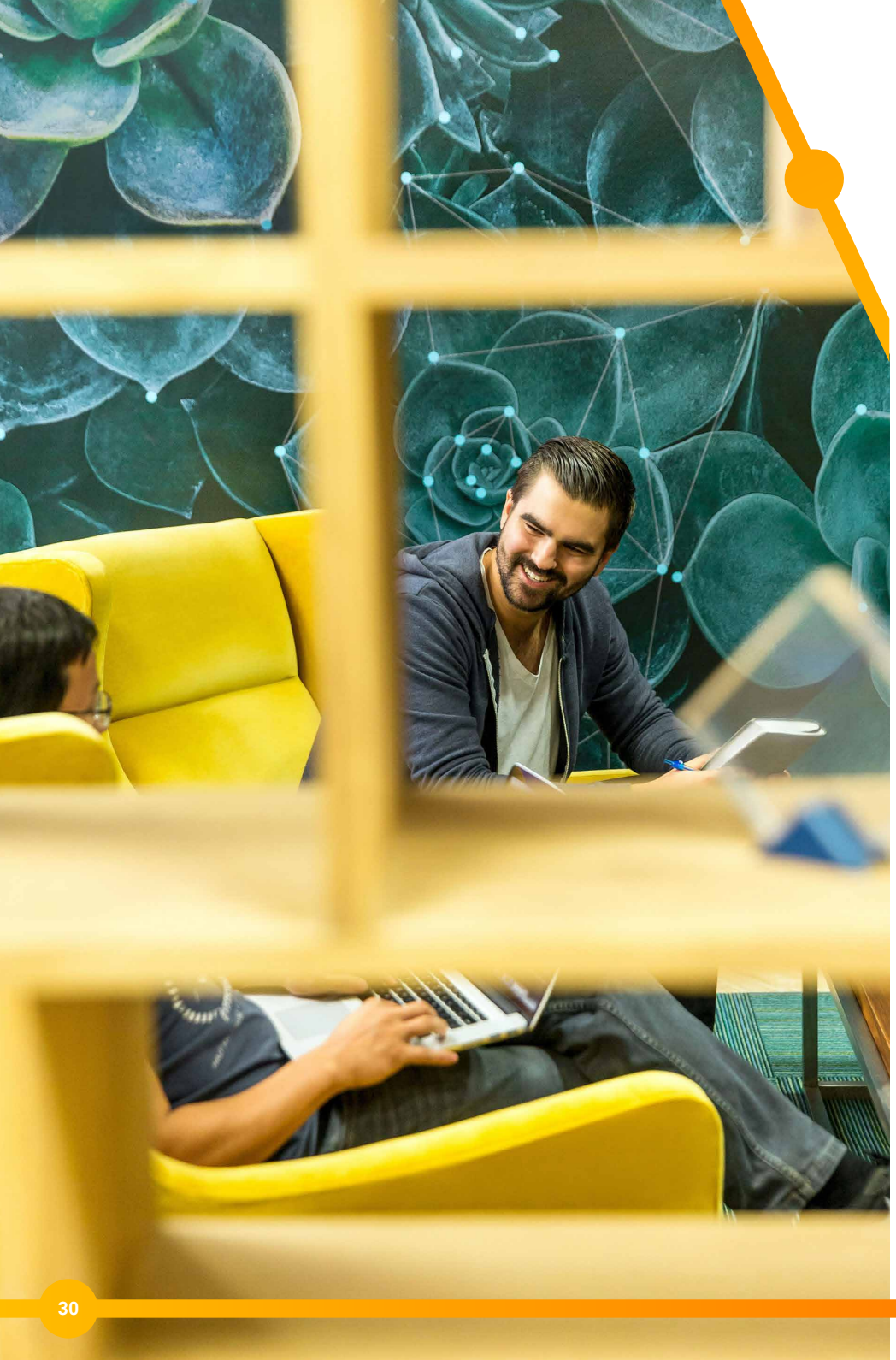
1. Revenue/sales (16.16%)
2. NPS (12.61%)
3. Profit margin (12.08%)

NPS (net promoter score) is directly connected to the customer, but is a lagging rather than leading metric. While well-established and popular, the value of NPS as a value metric is questioned, for example in this Forbes article, which also explains why the volume of referrals is a better metric to indicate whether customers are receiving the value intended for them. It's also a leading indicator that can help businesses to forecast future business.

Even better though, are real-time customer experience based metrics that a team can use to sense feedback dynamically and make course adjustments quickly. Customer journey time, number of visitors, and conversion rates are popular here, but bounce rates and session times could be used too, particularly with AI-driven observability tools. The key is to tie changes in customer behaviour to code changes to find insights into what delighted… and what didn't.

Which of the following value metrics does your team measure?





Guidance

Leading with Value Stream Management

While the software industry has seen transformations around people, processes, and technology with methodologies such as agile and DevOps, this next iteration or evolution is focused on enabling organizations to know exactly what value is derived from their technology investments. Information technology worldwide spending is expected to reach 4.07 trillion USD in 2021, with key initiatives focused on digital transformation and the future of work. To understand which value streams deliver value for customers, leaders must:

- **Arrange around value streams to focus on value flow and customer realization of the investments made for them.** To understand the best return on software investments, business value and customer experience are the ultimate measures. But today's complex systems and applications make it difficult to clearly understand where the best value and customer experience is coming from, and how to continually improve it. Organizing around value streams provides visibility into development and delivery processes with deep insights into what works and what doesn't, and allows for adjusting flow towards value immediately.
- **Assign people to value stream-centric roles to accelerate adoption of VSM skills and platforms.** The introduction of any new practice needs individuals who own and enable different ways of working. This is also true for the practice of VSM which requires individuals with the capabilities, knowledge, and expertise to lead VSM initiatives. VSM leaders will be able to introduce best practices, key performance indicators, and tools and platforms to support VSM.

Determine the Who, the What, and the Why before Engaging in VSM

The challenges we discovered range from "not knowing where to start" to "not achieving any results". These are symptoms of the bigger issue that many organizations lack a clear vision and strategy for how to go on a successful VSM journey. The missing link in many organizations today is to understand how different software development efforts are linked to the overall goal of the company or a specific business unit.

A first step is always to look at your organization and understand what the technology team does to support the business. Are the priorities of those who develop the software and those who serve customers aligned? It's key to provide an understanding into the people, processes, tools, and dependencies involved in how the software development and delivery is working. The best way to do that is to first organize and set up for success, and then to architect for real-time, data-driven conversations and decisions.

Organize and Set Up for Success

The scope of VSM includes the data capture, analysis, planning, and implementation of effective change within cross-functional or cross-company processes or value streams. There are some key steps to get organized and set up for success.

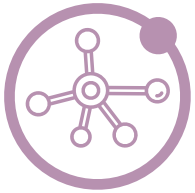
- **Perform value stream mapping as a foundational exercise for VSM.** A current state value stream map is used to visually describe the steps that a product or service needs to complete in order to produce an enhancement. Creating a target state map triggers discussions around outcome management, flow, team shape, and collection and sequencing of data (e.g., "shift left").
- **Identify individuals to champion VSM.** While value stream mapping is an activity undertaken by a team, it is critical to identify champions to lead the exercises. These champions are change agents that have expertise, vision and passion. Look to them to drive the adoption of value stream thinking beyond the exercise of value stream mapping (i.e., VSM).
- **The focus is on both clarity of goals and measurable outcomes.** Participants must ensure they have clarity on what they want to achieve. Typical goals for mapping are reduction of cycle time, identification of waste, and ongoing improvements in developer and engineer experience. Moving from mapping to management requires organizational alignment across value streams: shared goals and metrics.
- **Align organizational design with goals.** If the goal is to improve performance by optimizing flow, organizational design should ensure the value stream is aligned and waste is not created through handoffs and delays. Look to the reverse Conway maneuver to understand the relationship between system design and communication structure.
- **Focus on customer experience and value delivery.** The goal of VSM is to improve an organization's understanding of their digital products and the current state of how those products are delivered. The intention is to manage the value system as a whole and therefore improve quality, velocity, and customer experience.

Architect for Real-Time Data-Driven Conversations and Decisions

Once there is a vision and common understanding of which value streams to focus on, the ownership, players, and key goals, the next steps are to provide details for improvements. This is only possible with access to real-time data which allows key players to discuss and adjust the work and flow for improvements. To do this, the following practices are essential:

- **Provide a functional pane of glass into metrics.** Each value stream team consists of members with accountability for different processes. Real time data-driven conversations require immediate situational awareness for the people involved. This means providing a functional view of data in its immediate context and in the context of the wider value stream. In turn, this requires integration into different sources that collect data from the disparate tools in real time. Personalized actionable insights should be delivered to each team member.
- **Implement a platform that supports continuous experimentation and feedback.** Your platform of choice should reduce the overhead of connecting data points in your value stream and provide a real time view of how value is flowing through your system, providing insights into bottlenecks that can be inspected at any time.
- **Establish a measurement framework.** To adjust the work, processes, and flow, it is essential that key performance indicators (KPIs) and objective and key results (OKRs) are defined and monitored in real time to allow for course correction. Establish an adaptable framework of the initial metrics to improve your customer outcomes. Evolve the metrics as needed. This is a step towards truly data-driven decision making. It may necessitate a data platform; VSMPs are helpful here.
- **Inspect and adapt using automated value stream maps.** Once VSM practices and platforms are in place, the construction of value stream maps is automated. Teams can continually inspect and adapt alongside their product backlog experiments for continuous improvement.

What This Means: The Time Is Now



Adopt to disrupt

We identify value stream management as the next generation of DevOps. As DevOps has determined winners and losers in digitally disrupted markets, so will VSM. Now is the time to implement VSM and its supporting automation platforms.

Make time to save time

As with the adoption of all new ways of working, time will have to be assigned to learning. Learning how to value stream map, how to connect DevOps toolchains, learning the discipline of continuous inspection and adaptation of flow and value realization.

Invest in education

The Value Stream Management Consortium will shortly be announcing its flagship course, Value Stream Management Foundation (VSMF), available online to all members. We'll continue to investigate ways to support members and the wider community through our research and learning portfolio.

Model your implementation

Plan to go further than value stream mapping by using and automating the metrics gathered from mapping for continuous inspection and adaptation. Use outcome mapping and dependency tree techniques to drive vision and unpack challenges: ask "Why can't we do this?"

Leverage AI and observability

We simply have too much data for humans to process and yet we must have data-driven conversations and make data-driven conversations. AI can be leveraged for insights into both flow and realization.

Conclusions

Our research team summarizes their thoughts on the research.

Rebecca Dobbin

This report provides hope and opportunity for organizations aiming to improve their end-to-end software delivery capabilities. It validates what many leaders are realizing: DevOps is a great start, but something more is needed to ensure that software delivery meets the needs of the business. That something is value stream management. Teams need value stream-centric roles to accelerate adoption of VSM skills and platforms. They need to connect flow metrics to business results using a dedicated tool for value stream mapping automation and flow metrics. Organizations need to invest in VSM: finding the appropriate team structures, champions, tooling, and incentives to encourage adoption. Value stream mapping should be treated as an iterative activity with inherent benefits. Teams need to be willing to invest the time, energy, and resources needed to transform their organization from being project-focused to product-focused.

Jeff Keyes

Leaders should note the standardized way the industry has defined value stream efficiency and flow metrics. These metrics can be used to reduce bottlenecks, manage DevOps evolution, and improve the velocity of software delivery. Given organizations' massive investment into agile and DevOps practices, these metrics finally begin to answer the most important question: "Are we improving?" A correlation discovered in the report is the relationship between value stream orientation, and an emphasis on gathering those efficiency focused metrics. The report demonstrates that value-stream focused teams can not only answer the improvement question, but also use a system of continuous improvement.

Value stream metrics measurement is used by software development teams to understand, evaluate, control, make informed decisions, and predict flow of products/processes during software life-cycle stages. In our report, the top metric used is cycle time that is often combined with lead or flow time. When you dig deeper into the definition of cycle time as our report details, there is quite a variance at the granular level on how this metric is quantified, interpreted, and evaluated for maximizing delivered value throughout the software life-cycle. One important takeaway from this report is not only the use or shortage of metrics, but rather *what comprises the metrics* and most importantly, *how the metrics are presented* to the consumers who make the informed value decisions.

John Gelo

What struck me about the results in this extensive research is the difficulty that still prevails in driving insights. It's still a manual process for many, or it consists of multiple silos of reporting where information is not easily shared across teams. This also impacts traceability as indicated by the intention in our future research to understand how product and service changes actually deliver value with corresponding changes in system or customer behavior. With improvements in automation, connectivity, and reporting (with AI/ML) it should be getting easier to track the impact of a change from ideation through to production.

Richard Hawes

Conclusions (continued)

Steve Pereira

2021 is the perfect time to begin looking beyond agile and DevOps to the true convergence of business and tech across value streams. Three big insights popped out at me. Most teams that aren't mapping their value streams aren't measuring holistic performance at all. Even among those that do, the effort often stops with CI. Finally, organizations fail to meet business objectives 75% of the time. There's a clear cost of neglecting value stream alignment. Even among early adopters we have much to do in order to make progress and performance accessible. We're just starting to raise the tide!

Bryan Finster

The information gathered so far confirms my experience that the problems faced with improving delivery are very common and can be corrected by starting small. As an industry, we need to simplify and demystify the language and good practices to lower the bar of entry to continuous improvement. Improvement isn't hard. Easy access to verifiable good information backed by data is the industry constraint to delivery.

Richard Knaster

Our research indicates that value stream management is still in its infancy, and the focus is more on improving flow (outputs) than value delivery (outcomes). Not surprising, since most organizations report not meeting their stated business objectives and do not measure the benefit hypothesis of their features and epics. It's encouraging that 44% of organizations map their value streams (but not regularly), and most enterprises are moving away from the project model to organizing around value. It's evident that the VSM journey has begun in earnest, but we have a long way to go with most stuck manually collecting data from multiple tools. I'm excited to see how the Value Stream Management Consortium can help the industry mature and achieve better business outcomes.

Demographics

Roles and Responsibilities

The top three roles of 256 respondents were:

- Coach or Scrum Master (17.7%)
- Transformation lead (16.3%)
- C-Level executive (15.5%)

So 34% of respondents represent the people most active in digital/DevOps evolution work.

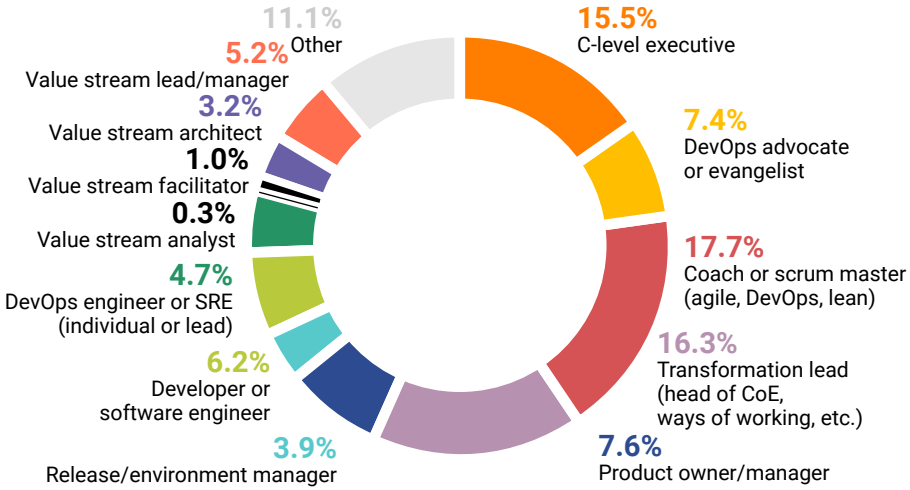
Nearly 10% (9.7%) of respondents reported being in a role that has "value stream" in the title:

- Value stream lead or manager (5.2%)
- Value stream facilitator (1.0%)
- Value stream architect (3.2%)
- Value stream analyst (0.3%)

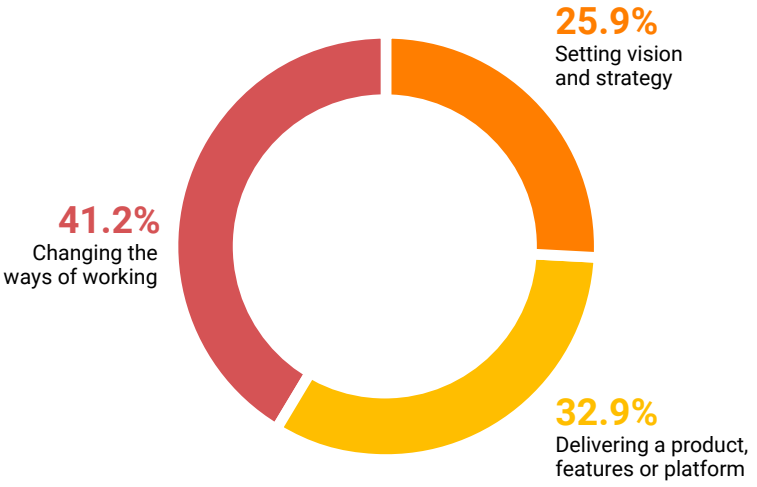
Based on our current observations in the marketplace, this is a number we expect to increase in future reports. The consortium plans to conduct further research in the coming months into what the day-to-day activities and objectives are for these roles and how to access the skills needed to perform them, as well as their relationship with the product owner or product manager role, which represented 7.6% of respondents.

Over 11% reported their role as "Other". These respondents identified as business and user experience analysts, project management and, most interestingly, from a VSM perspective, a value consultant and a release train engineer (RTE).

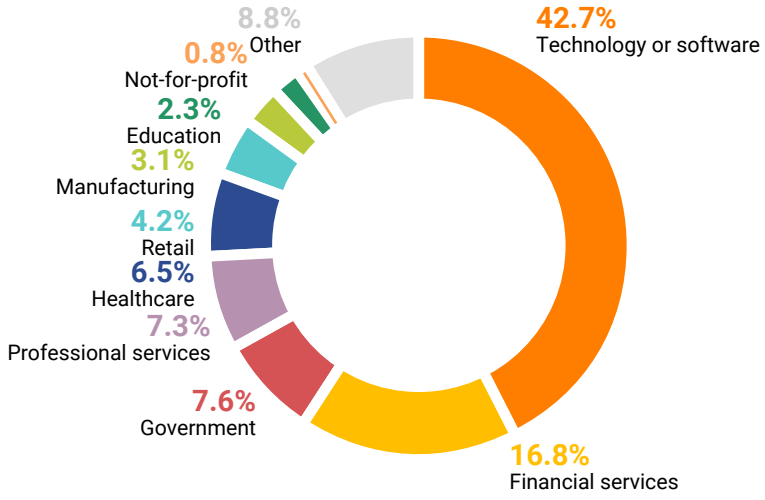
What is your role?



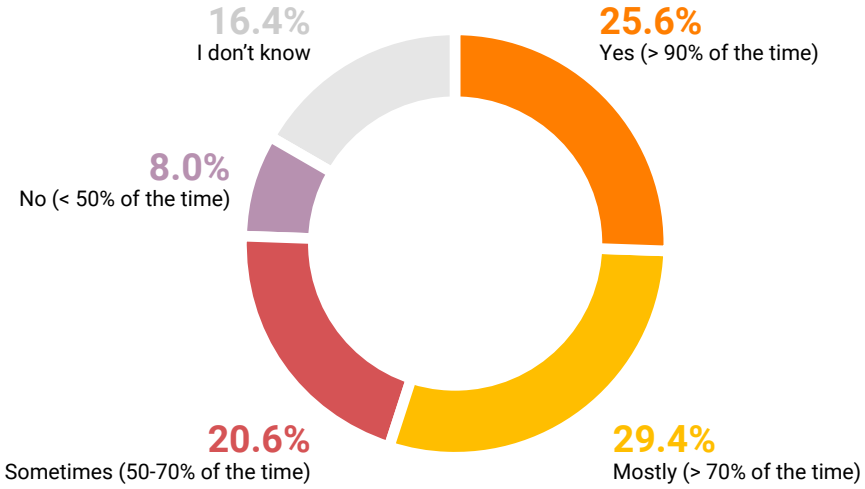
What is your primary area of responsibility?



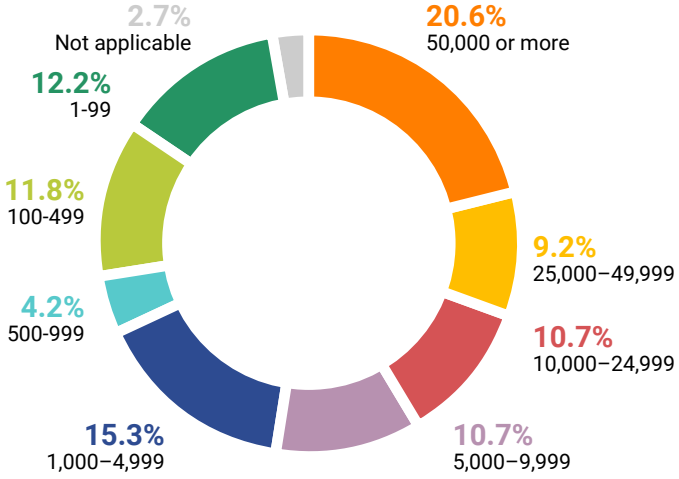
In which industry does your organization operate?



Does your organization consistently meet its quarterly business objectives such as revenue/profit, productivity, customer/employee experience, innovation, and/or market position?



What's your best estimate for the number of employees in your organization worldwide?



The Value Stream Management Consortium is a member association for enterprises and individuals working with value stream management practices and platforms. Our purpose is to advance value stream-centric ways of working in technology teams to lead to higher-performing organizations. Our mission is to cultivate and nurture the emerging market for value stream management and to help the community learn, devise practices and standards, and grow through their use.

Become a member at vsmconsortium.org