The State of the Data Race

Insights from 500 executives and technology leaders on how leading organizations are winning with data—and how others can close the gap
Competing on data: the execution gap is real

We surveyed more than 500 executives and technical practitioners in 2021, across a range of industries and company sizes, about their data strategies. Nearly all (96%) report that their organization has a data strategy. But just 38% give their organization a top-box score on using data to create value for customers. And only 17% say data and analytics drive more than 20% of revenue.

Bold moves pay off

Today’s “data leaders”—those most likely to excel at using data to deliver value to customers and drive 20% of revenue with data and analytics—are achieving this by changing both culture and technology. They have almost universally assigned accountability for data governance to business domain owners (99%). Doing this—and aligning technical infrastructure strategy to support it triples the odds of an organization driving 20% or more of revenue with data.

Yesterday’s pace of progress isn’t fast enough

At nearly nine in 10 (88%) leading organizations, adapting to COVID-19 has increased the pace of innovation. A majority of respondents from data leaders “strongly agree” this is the case.

Open source software for the win

Data leaders are four times more likely to have deployed Apache Cassandra, Kubernetes, and two of any of the following open source technologies: Apache Spark, Apache Pulsar, Apache Kafka, or Elasticsearch. Companies using a robust open source software (OSS) data stack are two times more likely to attribute more than 20% of revenue to data and analytics.

Your next step to accelerate progress should be data-driven

Our survey incorporated more than 70 strategic, cultural, and technical patterns and practices based on dozens of interviews and conversations with executives and technical practitioners about what predicts success using data to create value. Analysis of the data reveals five distinct segments, each with common challenges and opportunities to accelerate progress toward achieving the level of data-driven success exemplified by the leaders who are setting the pace.
% of organizations reporting top box score on using data to deliver value to customers

0% of organizations attributing > 20% of revenue to data and analytics

% of organizations attributing > 20% of revenue to data and analytics

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“To have reached your destination sooner, you should have avoided the freeway.” “Your order could have shipped free from a different seller.” “Yesterday, you might have been in the mood for these rainy day love songs.”

Tongue in cheek, imagining the behavior of apps that can’t bring us data-driven intelligence at the moment it matters most might make for a fun party game, giving everyone a good laugh.

In real life, it would lose customers.

**Analyst firm Forrester describes** “fast data” as “any type of data that originates in applications and devices and is streamed, stored, and immediately analyzed by applications that detect patterns, automate decisions, and immediately initiate actions executed through a business or operations process and/or customer-facing applications.”

Mastering fast data is table stakes for meeting market expectations.

Fortunately, there is a set of technologies that has emerged with which to do this. At DataStax, we call the best-of-breed, modern, open-source technologies for fast data “the open data stack.” (For a definition and why we believe it is important, see the sidebar “Fast Data Quick Reference” below).

In early 2020, we started seeing an affinity for use of certain technologies in the open data stack at enterprises that had made the most progress toward scalability, portability, and AI-readiness in their data estates.

We weren’t surprised. We knew that some of these technologies (such as Apache Cassandra®) powered market-shaping data-driven experiences such as binge-watching on Netflix or sharing photos in iCloud.

Not long after, we saw proof positive that companies you might not expect could also excel at making the most of an open data stack for fast data.
## Fast Data Quick Reference

<table>
<thead>
<tr>
<th>What's in the modern, open source “fast data” stack?</th>
<th>We see some combination of Elasticsearch, Apache Kafka, Apache Pulsar, Kubernetes, Apache Cassandra, and Apache Spark frequently deployed in combination to power fast data apps.</th>
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<tbody>
<tr>
<td>Why do apps powered by fast data matter?</td>
<td>Fast data workloads—such as personalization, real-time recommendations, and always-up-to-date logistics and inventory—have become basic building blocks for any modern business. From a customer (or employee or partner) perspective, fast data is about getting the benefit of useful intelligence in real time, at the moment it matters most. Depending on the context, that may allow the lag between &quot;action and insight&quot; to be anywhere from as fast as milliseconds to as long as a minute. But the bottom line is that an end user would describe a great fast data experience as &quot;real time&quot; or &quot;immediate.&quot;</td>
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<tr>
<td>Why did a “fast data stack” emerge as a pattern?</td>
<td>To deliver a great fast data experience, you probably need streaming technology. And once you have streaming, you need a data store that can keep up with it. Once you’ve got the basics of handling data at high velocity, the best fast data apps likely also make smart use of some combination of stream analytics, a feature store, and event store (or all three). Many fast data workloads are spikey, and any data-driven experience has the potential to become smarter with greater scale. So you’ll want to build fast data apps with horizontally scalable, cloud-native technologies.</td>
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<tr>
<td>Why open source?</td>
<td>Popular fast data technologies grew out of the “best of the Internet,” solving novel problems about data velocity (Cassandra and Kafka, to name a couple). And this open source cycle of innovation continues—with Pulsar, for example, emerging as a more cloud-native friendly alternative to Kafka. You want to join the open source ecosystem rather than reinvent the wheel because what sets your fast data experiences apart won’t be the infrastructure, but rather your application of domain knowledge to put it to use in new ways to delight your customers.</td>
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Consider The Home Depot. These technologies helped the home improvement company deliver curbside pickup functionality to its app in weeks when the COVID-19 crisis made this strategic shift critical to business continuity.

We wanted to validate patterns and practices beyond tech alone that had set the company up for world-class use of these technologies, at pace. We hoped to find insight into steps that others less far along on their digital and data-driven business transformations could follow to accelerate their progress.

After conversations with dozens of executives and technical practitioners, we developed more than 70 strategic, cultural, and technical attributes that might predict similar success in leveling up the customer experience and driving business impact.

We incorporated these attributes into a survey we fielded to more than 500 executives and technical practitioners. Analysis of the survey data uncovered two striking patterns.

**The gap between making data a strategic priority and delivering a transformative business impact with data is wide**

Despite nearly universal commitment to a data strategy, little more than a third of respondents gave their organization a top-box score on using data to deliver value to customers.

And data and analytics are driving more than 20% of revenue at fewer than one in five.

Universal ambition, uneven progress

<table>
<thead>
<tr>
<th>Have a data strategy</th>
<th>Excel at using data to deliver value to customers</th>
<th>Attribute more than 20% of revenue to data and analytics</th>
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</thead>
<tbody>
<tr>
<td>96%</td>
<td>38%</td>
<td>17%</td>
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</table>
The path toward more impactful execution is clear—but one size does not fit all for a “next best step”

We found a clear, quantitative relationship between steps organizations can take to create conditions for excellence using the modern open source fast data stack and business impact. (For details on how, see the sidebar “About the Research”).

Patterns and practices among the top fifth of companies—the “data leaders”—strongly predicted greater likelihood of a 20-percentage point or greater contribution to revenue from data and analytics. Other organizations clustered into meaningful segments defined by similar progress, challenges, opportunities, and next best steps toward the winning conditions that prevail among the leaders.

In the following sections, we’ll dive into the attributes that define the leaders—and the challenges and opportunities for the other four segments, which we refer to as “rearchitecting,” “reorienting,” “scaling,” and “starting.”
In October, 2020, DataStax and ClearPath Strategies surveyed 515 executives and technical practitioners in US-based organizations. (Respondents are roughly one-third each senior executives, managers of technology teams, and technical line staff). Two-thirds of their organizations had more than 1,000 employees (and none had fewer than 100). Organizations spanned a variety of industries, but neither drilling down by industry nor a representative national sample was a goal for this particular survey.

We conducted a segmentation (or “cluster”) analysis of responses using a combination of 72 data-related behaviors, characteristics, technologies, cultures, people, processes, and business approaches. The algorithm (k-means) mathematically separates respondents into groups such that respondents within a segment are as similar to one another as possible and as dissimilar to respondents in other clusters as possible.

Neither the percentage or revenue their organization attributes to data and analytics nor self-reported progress toward digital transformation and being data-driven were part of the segmentation analysis; these variables were used to evaluate the model.

In our analyses, we frequently look for intensity among responses. In this report, this is typically expressed using the “top box score” as a metric. Top box scores are often useful for detecting whether an attribute is a strong or differentiated characteristic of an organization or a standout priority or pain point for a respondent. A top box score is usually represented by an answer of “strongly agree” to a particular statement or question.

The survey’s design and findings reflect months of qualitative research and organic conversations. This includes interviews of five executives recruited on the basis of how well their organization matched the segments after our analysis was complete.
Data Leaders

- Changing the game on cultural accountability for data
- Embracing hybrid cloud and OSS for data velocity
- All-in at a time ripe for disruption
Changing the game on cultural accountability for data

It is certainly arguable that data has now become the economy’s most valuable asset. But today’s data leaders demonstrate why it is misleading to think about data as if it were a commodity.

Data has highly differentiated value depending on the context within which it might be used to deliver value to customers. Making the most of it is inextricable from intimate knowledge of the product or service being delivered. A digital signal may be replaced by one with more predictive power in seconds—or it may only become informative when aggregated into a daily pattern. In some cases, both may be true, but for different analytic uses.

Finding novel and compelling ways to deliver value with data requires customer intimacy and domain expertise. Data leaders have adapted cultural norms to lean into this. Data is not something “managed by IT.” Instead, making use of data is part-and-parcel of business accountability for building the customer value proposition.

Among the data leaders, there is nearly universally clear ownership for turning data into products (95%). And primary accountability for the data governance that creates the context for doing so almost universally sits with business domain owners (99%). This does not eliminate a role for IT. To the contrary, it sharpens focus and raises the bar.

When data leaders align technology infrastructure strategy to a business domain-centric data strategy, IT’s mission becomes the enablement of the highest-value uses of data identified by those with the deepest customer intimacy.

“We have significant repositories of data. And now what we’re doing is using this next generation technology to activate that data in a more real way and try and provide insights to the world and to customers that we think will be quite valuable.”

Rob Carter, CIO, Federal Express
Embracing hybrid cloud and OSS for data velocity

Legacy data architectures weren’t built to meet modern market expectations for high-value use of data. For proof, we only need to look at how CIOs among today’s data leaders are driving change.

Consistent with making the most of cloud while preserving flexibility, nearly all are building a hybrid data infrastructure (97%, with two-thirds of respondents feeling this “strongly” describes their organization’s direction).

They have made progress on optimizing for data velocity (91% in total, with 61% in strong agreement).

And they are leaning in to using more OSS (96% in total, with 57% in strong agreement).

The degree to which data leaders have moved aggressively toward a modernized data architecture is highlighted by contrasting these patterns and practices with the organizations accomplishing the least with data today (a segment we describe as “Starting” their data journey). Among those starting out:

- Just over half (56%) believe they have optimized for data velocity, with only 13% in strong agreement
- No respondents strongly agree they have built a hybrid data infrastructure (with only 42% feeling it describes their organization at all)
- Barely more than a third (37%) are increasing use of OSS, with just one in 12 (8%) strongly agreeing

A strong majority of data leaders believe their modernized infrastructure gives them a competitive advantage (71%, with more than half characterizing it as a “big advantage”).
Data leaders are also four times more likely to have deployed Apache Cassandra, Kubernetes, and two of any of the following open source technologies: Apache Spark, Apache Pulsar, Apache Kafka, or Elasticsearch. Companies using a robust open source software (OSS) data stack are two times more likely to attribute more than 20% of revenue to data and analytics.

There is solid evidence data leaders are right in the long run as well as in the present moment.

“Probably the biggest transformation is that the infrastructure required to really build something wonderful and world-class no longer requires you to be the infrastructure provider in every sense of it. You don’t have to invent at that layer and you can put more of your fuel at inventing at the customer edge.”

Edmond Mesrobian, CTO, Nordstrom
The organizations we characterize as leading at using data to deliver value to customers and drive revenue today appear to be acting as if they’ve made this thesis core to corporate strategy.

Board-level attention to data strategy and funding that’s sufficient to fuel innovation are nearly universal attributes among these organizations. In contrast to any other segment, a solid majority (59%) strongly agree the latter describes their organization.

There is compelling evidence that now, more than ever, they are right to invest aggressively in potentially game-changing moves.

McKinsey & Company tracks how companies that grew faster and had higher profitability than their peers handled the 2008 financial crisis. The firm found those companies ramped up R&D and capital investments faster than others during the recovery. They also invested in building new capabilities and enhancing existing capabilities more than the others.

In our data, today’s data leaders show evidence of appreciating the value of urgency during disruption and through recovery: at nearly nine in 10 (88%) organizations, adapting to COVID-19 has increased the pace of innovation. It is the only cluster in which a majority of respondents strongly agree.

McKinsey’s research since 2008 has also found a correlation between progress delivering personalization, multichannel, cloud, automation, agile, artificial intelligence, and the outperformers’ growth rates. Lately—unsurprising in the context of changes in consumer behavior and business disruption caused by the COVID-19 pandemic—the firm has observed new growth in e-commerce, digital sales, sourcing, inventory management, and convenience as well.
Many of these are what we would characterize as “fast data” workloads.

While our data suggests few would argue with Morgan Stanley’s assertion that “the winners will be the industry leaders who best leverage data across their entire value chain,” today’s leaders are clearly sending signals they intend to achieve that first and most comprehensively.

“Looking at the entire broad spectrum of your customers and driving towards that hyper-personalized experience for them—keeping that in mind can absolutely get your entire staff excited.”

Dev Ganguly, Chief Operating Officer, Jackson Financial
Faster developer velocity is a competitive advantage for any digital business. Developer velocity is about reducing the time from idea generation to production code. Most organizations have been on a DevOps journey for some time in order to increase developer velocity.

Faster data velocity is a competitive advantage for a data-driven business. Much like DevOps, DataOps has coalesced as the set of practices with which to accelerate data velocity—but it is a more recent concept. Many organizations have made less progress on data velocity relative to developer velocity.

Catching it up is important. One key aspect of data velocity is reducing the time between generating data and shipping a data product. There’s a virtuous cycle of digital interactions generating data that’s used to generate insights that are in turn used to enhance or add to those interactions, winning more and different interactions (and so on). If data velocity gets bogged down, that virtuous cycle won’t spin.

The State of the Data Race

![Graph showing the state of data race with categories of Leading, Rearchitecting, Scaling, and Reorienting. The graph plotting the ability to deliver data products at the same speed as apps against developer velocity.](image-url)
Accelerating Your Progress

If your organization has a way to go toward excelling at using data to deliver value to customers and drive revenue (as data leaders do), the impending digitally-driven global economic recovery is a great time to take action to accelerate progress.

In this section, we pull together the results of analyzing our survey data along with insight from one-on-one executive interviews and roundtable discussions to offer a point of view on the highest-leverage moves organizations at different stages of their journey can make now. We divide them into organizations that are:

- **Rearchitecting infrastructure to unlock the next wave of innovation**
- **Reorienting toward a culture where data is core to everyone’s job**
- **Scaling a good start into true competitiveness**
- **Starting to treat data as more than an afterthought**
Your organization has a powerfully data-oriented culture, but growth through acquisitions makes getting a complete end-to-end picture of customer journeys technically challenging.

Your company is a recognized digital leader, but you’ve burned through so much low-hanging fruit that the next wave of innovation implicates complex migrations from legacy platforms (hence the “rearchitecting” label).

These are examples we uncovered in conversations with executives at organizations that fall in this segment—the only one where “technology” is rated as a bigger obstacle to progress than “culture.”

Their organizations know how to create value with data, and are as likely as data leaders to deliver double-digit contributions to revenue from data and analytics. But achieving this is a heavier lift.

While rearchitecting organizations meet or beat the market average for whether or not key data capabilities provide a big competitive advantage, they lag by double-digits behind leaders.

Thinking of your organization’s use of data, does this capability provide a big competitive advantage?

- Comprehensive utilization: -18 vs. 6
- Velocity: -17 vs. 4
- Frictionless access: -11 vs. 0

### Top box scores vs. data leaders

### Top box scores vs. the average
Our data confirms technology infrastructure as a contributing factor. In general, we typically see a maturity curve of organizations that starts with committing to a hybrid cloud strategy. Then, as awareness increases that data needs to be a "first class citizen" in the architecture, they embrace a hybrid data strategy. A hybrid data strategy takes the same mindful approach to ensuring consistent data access patterns and portability between on-prem and across multiple clouds.

Respondents from today’s data leaders signal equal progress and conviction about both, as measured by strong agreement that each attribute describes their organization.

Rearchitecting organizations stand out for breaking an otherwise consistent correlation between the two. Put simply, they are close to parity with leaders on hybrid cloud infrastructure, but further behind than the market average would predict on hybrid data infrastructure.

Organizations in the rearchitecting cluster are keenly aware of this and committed to action. In our data, they are at parity with data leaders on the near-universal commitment to a data platform—but they stand out in signaling that it is a priority, beating leaders on “strong agreement” by more than 10 points (70% versus 59%).

The challenge they face is that the scope and scale of investment required to unlock the next level of progress could stress the existing operating model.

Organizations in this group lag the data leaders by 20 points on strong agreement that the organization has metrics to value data. And they are a striking 46 points behind on having created an internal "open market" for frictionless re-use of data within the organization.
For rearchitecting organizations, a key next step is to consider the business implications of sticking with the status quo versus what it would take to build a hybrid data infrastructure comparable to that of today’s Leaders:

- If we possessed a data infrastructure with capabilities that matched our strong data culture, what new opportunities could be unlocked?
- As other companies in our sector lucky enough to be burdened by fewer technical challenges catch up on building a data culture themselves, what competitive risk does that pose?

**Bottom line:** Data infrastructure is limiting the power of your strong data culture. You may conclude the status quo is acceptable, that it needs to change urgently—or something in between. The key point: It’s time to make a deliberate, data-driven decision.

This group is the only segment in which technology is identified as a bigger barrier to change than culture.
By more than two-to-one, organizations in this segment rate culture a bigger barrier to progress than technology.

They have made significant progress on many fundamental enabling conditions for success. Compared to those just starting out, organizations in this segment are around twice as likely to describe their organization as one in which:

- Data strategy is aligned to corporate strategy (72% versus 38%)
- Data is scalable (79% versus 46%)
- We are good at discovering and operationalizing data (81% versus 38%)

But they have not unlocked impact at driving revenue to the extent leaders and the rearchitecting segment have. To do so, they need to redefine cultural norms across the organization.

Reorienting organizations are tied with those that are scaling and starting out at about one third of organizations attributing more than 10% of revenue to data and analytics. While (unlike the starting segment) some organizations in this segment have managed to generate 20% or more of their revenue from data and analytics (one in eight, or 12%), this is less than half as many as we see in the leading and rearchitecting organizations.

And they lag the market average on data strategy as a board-level discussion, business-domain driven data governance, and, furthest of all, excellence at using data to create value for customers.

Our data points squarely to “making it everyone’s job to use data to create value for customers” as the next best step to a bigger, broader impact.
For this segment, it is time to move beyond successful projects. Reorienting organizations should take data strategy to the board of directors as a company-wide change initiative.

**Bottom line:** Now is the time to commit to making it everyone’s job to use data to deliver value to customers.

**This is the segment in which “culture is eating strategy for breakfast.”**
For organizations in this segment, culture and technology are neck and neck as the biggest barriers to progress, with culture holding a three percentage point edge.

This is an accurate reflection of the work they need to do. Scaling organizations have made substantial progress on both technical and cultural conditions for success compared to organizations in the starting segment—but still have a long way to go.

The real progress they have made can’t obscure the fact that they are not yet in a position to compete and win.

Scaling organizations need to commit executive attention to ensuring the people and funding are in place to deliver fast growth toward big goals. Compared to the starting segment, respondents from scaling organizations are twice as likely to strongly agree data strategy is aligned to corporate strategy and that there is sufficient funding for innovation. Scaling organizations are 10-times (23% versus 2%) more likely than those in the starting segment to strongly agree the organization is good at discovering and operationalizing data.

Yet on each of these attributes, organizations in this segment lag the overall average and sit at least 10 points behind the reorienting segment on overall agreement that these attributes describe the organization.

The scaling segment falls behind the market average on strong agreement that data strategy is aligned to corporate strategy, the organization has sufficient funding for innovation, and a data platform team has been established.

Scaling organizations would benefit from benchmarking not against the progress they have achieved to date, but rather external competitive benchmarking to determine where they need to be—and when.
Bottom Line: You are making progress—but the right amount required moving forward isn't based on what you've done so far, but rather how the market is moving. Ensure your strategy and resourcing aligns with what you need to keep pace.

Real progress can’t obscure the fact that organizations in this segment are not yet in a position to compete and win.
At the one-in-ten organizations we describe as “starting,” data has been an afterthought.

This is the only segment in which some respondents (5%) believe data has a net negative effect on revenue. As striking, it is also exclusively where there were a significant number of (13%) “I don’t know” responses to the same question on data’s revenue impact.

Fewer than a third (31%) agree data strategy has buy-in from leadership, and 38% said that data strategy is connected to corporate strategy. The fundamentals are lacking as well: just a third (31%) believe the organization’s apps are scalable (just 2% strongly agree). Only 38% believe the organization’s data is scalable (just 8% strongly agree). For these organizations, the next best step is to acknowledge that creating value with data has not been a priority—and then choose to change that. Above and beyond following the trail toward excellence left by today’s data leaders is “learning by doing.”

The road to a strong data culture and technical infrastructure will be a long one. But the best way to start—and to accelerate progress—is to create space for projects that use data to create value for customers in the now.

Project teams will need strong support. A lot of manual work may be required. But picking a manageable customer experience or business process and creating the conditions for a team to use data to improve it is the fastest and strongest way to build conviction that leadership is in it to win it.

Bottom line: Intentionally or not, employees in your organization probably feel data has been an afterthought. The fastest way to build credibility and momentum changing that is to sponsor meaningful projects—however difficult—and start learning by doing.

Employees in these organizations are most likely to believe data has not been a priority. They may be right.
Scientists are creating a digital “twin” of the Earth to map climate development. This digital model will also be used to predict how certain scenarios would affect Earth and create effective solutions against climate change.

You’re probably going to do something similar for your organization: build a high-fidelity digital representation of processes and experiences in order to predict how to reduce risks and drive growth.

It’s an organic evolution from improving predictions, one by one, over and over again, and then in context—and then in broader context. The data products, datasets, and architecture should persist and build on each other.

It’s the competitive response to organizations that have reached a stage of technical maturity and data-driven culture that they tell us, confidently: “We just won’t ship a feature without an A/B test to prove it works. We just won’t.” Testing before shipping is even better.

It’s the logical endgame for a truly “data-driven enterprise.”

It’s a top trend highlighted in Accenture’s Technology Vision 2021.

It’s something today’s leaders already tell us they are trying to do.

It’s context for our point of view on the single most powerful North Star for change management at your organization, according to our data: top box scores on governing data by business domain and aligning infrastructure to this strategy. This triples the odds of an organization attributing more than 20% of revenue to data and analytics.
We already know the open data stack has an important role to play in making this happen. Organizations already attributing more than 20% of revenue to data and analytics are twice as likely to have deployed Cassandra, Kubernetes, and two or more complementary open source streaming and analytics tools.

This makes sense, because customers, inventory (digital or physical), and the forces that affect their interactions move in real time (and, hopefully for your organization, at a massive scale).

Our research agenda (and, by extension, our product roadmap) is inspired by the potential for more organizations to achieve more with it, faster.

We hope you find this first annual report helpful. We look forward to co-discovering how far we can go together as a community of technology enthusiasts, business decision makers and industry experts, and DataStax customers.
ABOUT DATASTAX

DataStax delivers an open, multi-cloud data stack built on Apache Cassandra, the world’s most scalable database. The company’s marquee offering is Astra DB, the industry’s first and only open, multi-cloud serverless database. Built on a modern, Kubernetes-based architecture, Astra delivers Cassandra-compatible services with an unprecedented combination of pay-as-you-go data, simplified operations, and the freedom of multi-cloud and open source. DataStax also offers Astra Streaming, a multi-cloud messaging and event streaming platform built on Apache Pulsar™.

With DataStax, any developer or enterprise can now deploy data at massive scale, with 100 percent uptime, for lower cost. Today, nearly 500 of the world’s most demanding enterprises and half of the Fortune 100 rely on DataStax to power modern data apps, including The Home Depot, T-Mobile, US Bank, and Intuit.