

Accelerating Innovation:

Digitalization in Product Development



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How Do You Empower Product Development to Develop Better Products Faster?

Getting Ahead of the Competition

How do Top Performing companies drive product innovation?

Product development teams face significant pressure to deliver high-quality, top-performing, innovative products. Yet, Top Performers achieve this better than their competitors. Part of their superior performance is due to their ability to save time by quickly finding data, easily sharing it, and providing accurate information to manufacturing.

About the Research

Based on a survey of 243 manufacturers, this research study examines product development practices at midsize enterprises, defined as those making between \$100 million and \$1 billion in annual revenue. The study looks at what holds engineers and management back, and what Top Performing companies do to overcome those obstacles to bring more successful products to market.

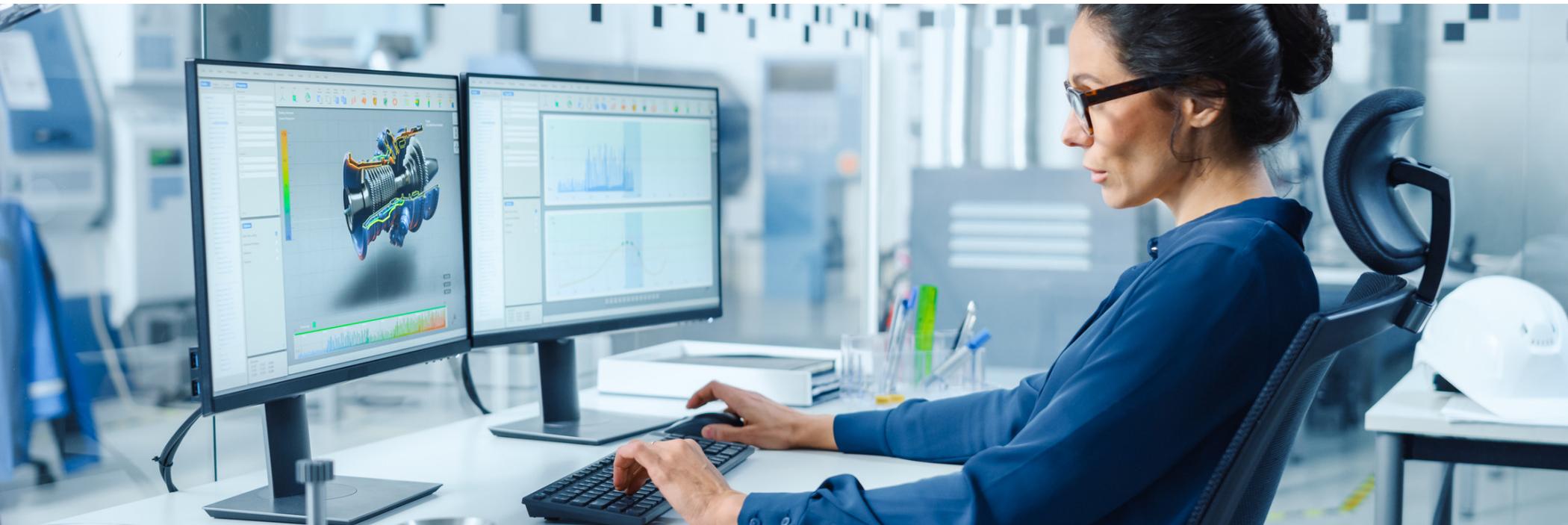


Table of Contents



	PAGE
Executive Summary	4
Midsize Enterprise Goals	5
Obstacles to Achieving Engineering Goals	6
Obstacles to Achieving Management Goals	7
Identifying Top Performers	8
Top Performing Differentiators	9
Strategies Driving Software Investments	10
Important Product Development Solution Qualities	11
Why Companies Value Cloud-Based CAD	12
Plan for the Future	13
Recommendations	14
About the Research	15
Acknowledgments	16

Executive Summary

Technology's Impact on Competition

It is hard to stand out from the competition in today's challenging global environment. To remain relevant and competitive, all companies need to possess the agility of a startup while leveraging the full resources of their company to profitably bring high-quality, innovative products to market.

Technology has made the world smaller, extending the reach of even small companies so that new competitors can come from anywhere. Plus, thanks to new technology, many companies have access to resources that previously were only available to larger companies.

With the benefits of modern software tools, smaller companies enjoy many advantages that even the playing field. Consequently, larger companies can no longer rely on their size as a competitive advantage. As a result, even startups can pose a significant threat to market share.

The rapid rise of unicorns, startups worth over a billion dollars, demonstrates this. In 2013, when unicorns were rare, there were only 39. By 2020, there were 569, and now there are over 1000, growing at a shocking rate of nearly two a day!¹ Now, midsize companies are squeezed by competition from both smaller

agile companies and larger businesses with more resources. To succeed, they face unique challenges to balance speed and resources.

What Top Performers Do

This report reveals the following about Top Performing midsize enterprises:

- How they overcome top challenges to meet their goals
- The strategies used to drive engineering investments
- What they value most in a product development solution
- They are more likely to identify a cloud-based product development solution as important to their success

Key Findings

The research also revealed several other interesting findings, including:

- Top management and engineering obstacles involve wasted time
- Top Performers are 2.8-times more likely to be innovators when adopting new technology
- Top Performers are 24% more likely than their peers to have a person responsible for driving change
- Top Performers are 4-times more likely than their peers to already use a cloud application for engineering



To remain relevant and competitive, all companies need to possess the agility of a startup while leveraging the full resources of their company.

Midsized Enterprise Goals

Management Goals

Successful, profitable products must stand out from competitive offerings to capture market share. They must be top-performing, high-quality, and innovative. Plus, products must get to market quickly to maximize the window of opportunity for new revenue before competitive offerings or the next generation of products supersede them.

Top management goals align with these priorities (see graph). To achieve these goals, managers need visibility to product development status for insights to manage issues before they become problems that increase costs, compromise product requirements, or put deadlines at risk. Management also needs the agility to intervene and adjust resources, plus easy methods to solicit feedback and suggestions to overcome problems.

Engineering Goals

Meanwhile, engineers identify their goals based on how they are measured. Of course, the easiest and most common metric involves deadlines.

Engineers are also motivated to design the best product they can and, like

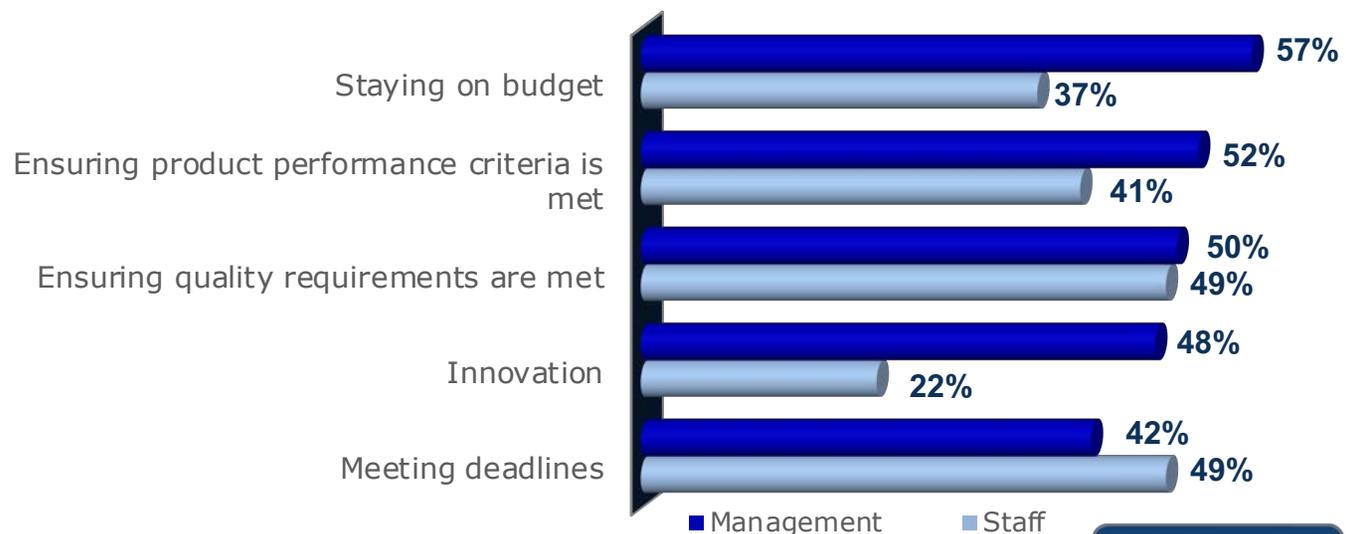
management, consider meeting performance criteria and quality requirements a top goal. This is also easily measured and can be assessed during product testing.

Since managing budgets tends to be a managerial task, it makes sense that engineers are less likely to consider this a goal. However, they need methods to work as efficiently as possible to ensure development costs stay on budget.

Interestingly, although management considers innovation a top goal, engineers don't. However, innovation is hard to measure, so it is difficult to define an achievable goal.

Consequently, engineers likely view innovation, experimentation, and exploring design ideas as tasks that consume time, making it harder to achieve their primary goal of meeting deadlines. As a result, they are less likely to view innovation as a goal. Unfortunately, with this disconnect, product development teams will not execute on this critical goal, and the company will miss out on revenue opportunities that come with innovation. To address this, companies should look to improve efficiency to free up engineering bandwidth, so they can dedicate time to innovate without missing deadlines.

TOP GOALS FOR MIDSIZED ENTERPRISES



Obstacles to Achieving Engineering Goals

Top Engineering Challenges

Unfortunately, several challenges hold engineers back, making it harder to achieve their goals (see graph). A common theme is wasted time.

Wasted Time

The most common challenge is simply waiting for information. As products become more complex, there are more interdependencies between components, and engineers need to understand the impact of changes. Every time they have to wait for change details, the latest version, specifications, feedback, approvals, and more, it slows them down. They could work far more efficiently with better real-time visibility and central access to needed information. In addition, they waste time whenever they search for data, which could also be minimized with easy-to-access, centralized data.

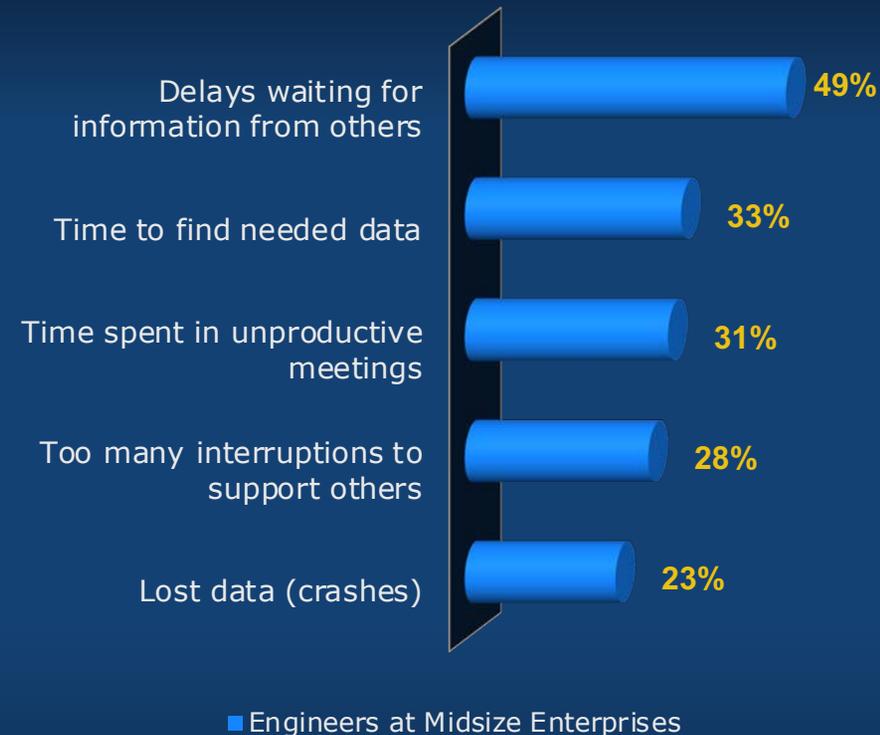
Poor Collaboration

Collaboration is critical during product development. With component interdependencies, change orders, tight deadlines, and more, there's no room for poor collaboration, yet it continues to be a struggle. Poor collaboration often results in additional meetings and frequent interruptions that inhibit progress. Collaboration could be significantly improved if the entire team had easy access to up-to-date information whenever they needed it. This could reduce the time in unproductive meetings and lead to fewer interruptions, allowing engineers to stay focused on their work.

Lost Data

Finally, any time software crashes, work is lost, and engineers must redo hours of effort. This takes them away from achieving their quality, performance, and innovation goals and instead creates even more pressure to meet deadlines.

TOP CHALLENGES THAT MAKE AN ENGINEER'S JOB HARDER



If engineers had better visibility and central access to needed information in real-time, they could work far more efficiently.

Obstacles to Achieving Management Goals

Top Management Challenges

Like engineers, several challenges make it harder for managers to do their jobs. Much of this is due to siloed data and difficulty getting needed visibility to projects.

Lack of Visibility

To excel at their jobs, management needs good real-time visibility of current project status to ensure projects stay on schedule and budget. They also need to report to upper management and the board. However, getting this visibility can be challenging, often requiring manual efforts, and it may not be clear if the data is up-to-date. As a result, they spend much time in unproductive meetings to get status updates and insights into current progress.

Wasted Time

It can become tedious and time-consuming to manually collect needed project status

details. Multiply that by all of the active projects at a midsize company and all of the people involved in each project, it requires significant effort. Plus, lack of visibility and delays getting information means they may not have needed insight into potential issues until it is too late to make adjustments to avoid delays or cost overruns. They also waste much time trying to find what they need. It would be easier if they had a single source to access all data when they need it.

Hiring the Right Talent

It is also hard to find skilled staff. It takes years to develop expertise, and as the most experienced staff approaches retirement, it gets even harder to find the right talent. However, skilled engineers are critical to product success, and without them, it will be harder to meet Engineering's top goals.

TOP CHALLENGES THAT MAKE MANAGEMENT'S JOB HARDER



Management needs good real-time visibility to current project status to ensure projects stay on schedule and on budget.

Identifying Top Performers

How Top Performers Were Defined

To identify best practices for overcoming challenges to meet their goals, Tech-Clarity identified Top Performing companies at midsize enterprises. These companies were defined as the top 25% of respondents who outperform their competitors in metrics that indicate product development success. These metrics were the ability to develop:

- High-quality products
- Innovative products
- Products efficiently
- Products that meet cost targets

We then focused on what Top Performers do, especially what they do differently compared to Others. This analysis was later used to identify the factors contributing to their success and a basis for recommendations to help midsize businesses improve their performance.

The Top Performer Advantage

Top Performers in this study have successfully navigated the unique challenges of being a midsize enterprise, allowing them to be both agile, while leveraging the resources they have. To understand what works well, companies rated the effectiveness of their processes. The table compares the percentage of Top Performers to Others who rated their processes as 'Highly' Effective.

Top Performers have implemented the right practices and technology to allow them to enjoy far more effective processes. As a result, they can work far more efficiently than their peers, making it easier to stay on budget while developing top-performing, high-quality, innovative products. By adopting practices used by Top Performers, companies can expect to see similar results. Let's explore what Top Performers do to help them enjoy superior results.

PERCENTAGE RATING THEIR PROCESSES AS 'HIGHLY' EFFECTIVE

METRIC	TOP PERFORMER	OTHERS
Quickly find data	63%	19%
Share engineering data with other engineers	72%	18%
Provide correct design information to manufacturing	67%	21%
Synchronize design information with 3rd parties	65%	8%

Top Performers have implemented the right practices and technology to work far more efficiently than their peers, making it easier to stay on budget.

Top Performing Differentiators

A Change Agent

Top Performers recognize they will not remain leaders if they stand still. Today's products are too complex,

market windows too short, and competition too steep not to continuously improve.

To drive this continuous improvement, Top Performers are 24% more likely than their peers to have a person responsible for guiding change. Changes may include digital transformation, process efficiency, and technology adoption. This person can identify process gaps, opportunities for improvement, and the latest technologies that will help.

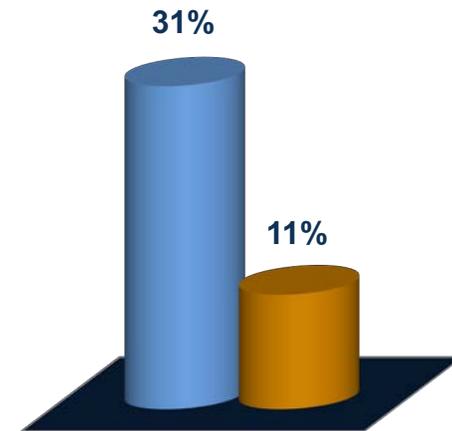
First to Benefit

One of the most striking differences between Top Performers and Others is their approach to new technology. Using definitions from *Diffusion of Innovations* for technology adoption,² Top Performers are 2.8-times more likely to be innovators when adopting new technology, meaning they are

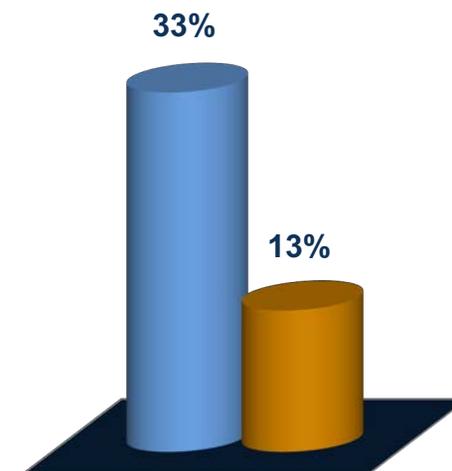
among the first adopters. Their staff is also 2.5-times more likely to be technology innovators personally. This creates an innovative culture that's open to new technology. Their early adoption allows Top Performers to enjoy the competitive advantages of promising technologies before their peers, empowering them to be more effective at meeting their top goals. This puts even more distance between them and their competitors. Therefore, companies looking to improve their performance should consider adopting technologies used by Top Performers before they get even further ahead.

However, fixing problems requires more than just investing in technology. In some cases, new, more efficient ways of working are needed to experience the full benefit, and a change agent can ensure that happens.

ARE YOU AN INNOVATOR WITH TECHNOLOGY ADOPTION?

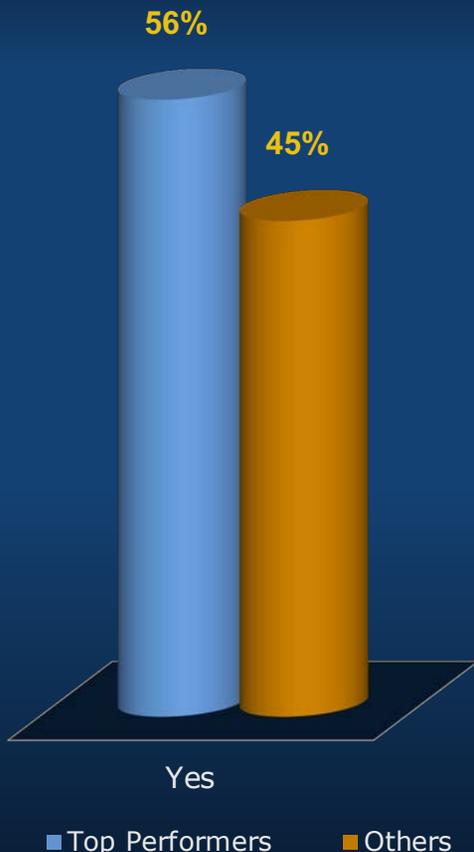


Company is an Innovator



Respondent is personally an Innovator

PERSON RESPONSIBLE FOR DRIVING CHANGE?



Yes

■ Top Performers ■ Others

Strategies Driving Software Investments

Top Strategies

As Top Performers look to drive change, there are several strategies they are likely to adopt (see graph).

Collaboration

Given time-to-market pressures and requirements to do more with less, especially considering engineering shortages, Top Performers want to improve team productivity. One approach is to work concurrently. This can drastically accelerate overall development time, but to truly reap the benefits, engineers need improved collaboration and real-time visibility into others' work, without data silos. Otherwise, they risk design conflicts, leading to downstream problems.

Flexible Environments

The circumstances of the COVID-19 pandemic forced companies to support flexible

work environments as people worked from home. For many, this continues to be a requirement. Consequently, companies will need better collaboration methods and real-time visibility into coworkers' progress, wherever they are. Thus, they will also require an infrastructure that enables engineers to securely connect as they design.

Agility

Market changes, customer preferences, supply chain disruptions, new technologies, competitive pressures, and more require engineers to pivot quickly and adapt. The resulting changes create yet another need for improved collaboration between engineers.

Digital Transformation

Digital transformation has consistently been a top initiative for many businesses for several years. A 2018

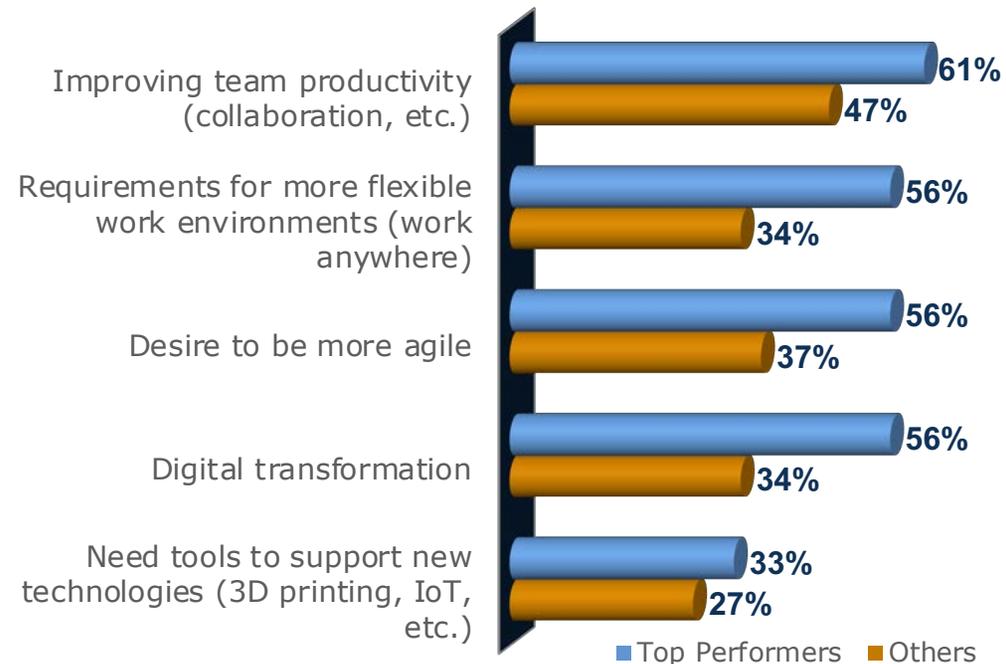
Tech-Clarity study found that 38% rated digitalization as critical, and another 27% said it was important.³ Since then, interest has only grown, and in 2021, 48% say it has increased.⁴

Digital transformation allows companies to achieve efficiencies competitors struggle to match. However, the right tools are needed to support it.

New Technology

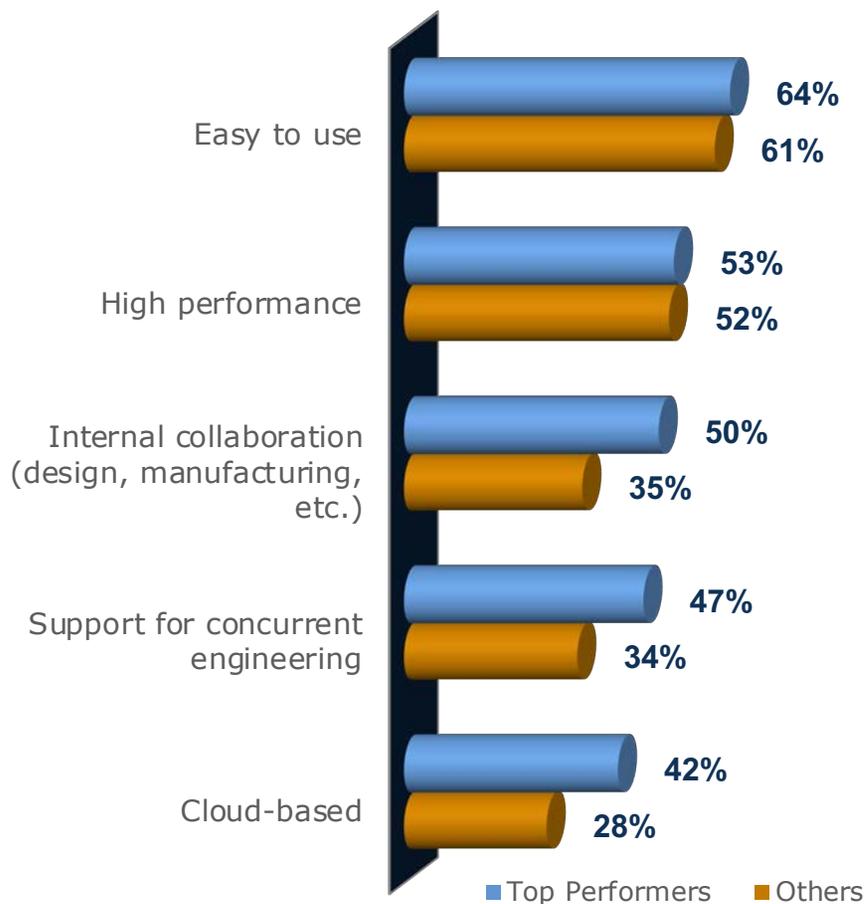
As new product technologies become available, companies need design tools to support them. A software solution that makes it easy to take advantage of the latest features and enhancements will enable companies to leverage new capabilities as soon as possible, helping them innovate.

STRATEGIES DRIVING ENGINEERING SOFTWARE INVESTMENTS



Important Product Development Solution Qualities

MOST IMPORTANT QUALITIES OF A CAD / PRODUCT DEVELOPMENT SOLUTION OVER THE NEXT 5 YEARS



Top Performers are more likely than their lesser performing peers to identify a cloud-based product development solution as important to their success.

The Right Solutions

Technology can play a critical role in successfully executing strategies, but only with the right software. CAD in particular can have a significant impact, especially since engineers report spending 61% of their time in CAD. With so much time in a single tool that is critical to their jobs, engineers need the best tools.

Designed for Collaboration

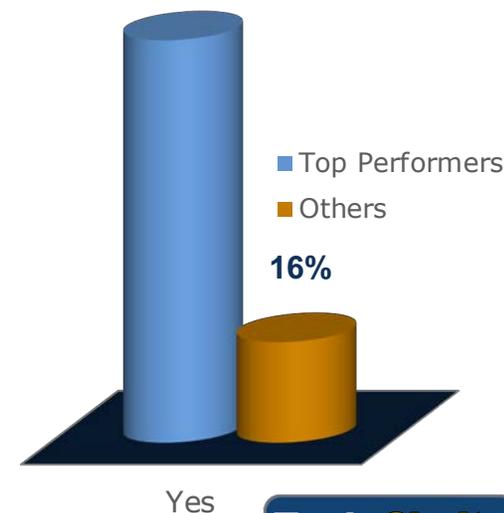
All companies are interested in an easy to use, high-performing CAD tool (see graph). However, when Top Performers think about what's most important over the next five years, they are more likely to consider how the team will work together. To support their top strategies, they need a development solution that will support collaboration and concurrent engineering. This will allow teams to work together more efficiently, saving time and lowering development cost.

The Cloud

Top Performers are more likely than their lesser performing peers

to identify a cloud-based product development solution as important to their success. In fact, consistent with Top Performers' desire to be technology innovators, they are 4-times more likely to already use a cloud application in engineering. They recognize it as a platform that will offer capabilities to help execute their strategies. The cloud can be a key enabler in helping Top Performers enjoy more effective processes, especially around finding data, sharing it, and providing correct design information to manufacturing.

USE A CLOUD APPLICATION FOR ENGINEERING



Why Companies Value Cloud-Based CAD

Cloud Benefits

Let's explore why Top Performers view the cloud as an important quality for a product development solution. The graph reveals what midsize enterprises like about the cloud, comparing those planning to use it to those who already are. The results show that the cloud tends to overdeliver as once midsize enterprises start using a cloud-based CAD tool, they are even more likely to recognize the top benefits.

Collaboration

Once companies start using the cloud, they appreciate the improved collaboration qualities. For example, engineers can connect to the same assembly model with real-time visibility into their coworkers' progress without waiting or searching for the latest data. This easy visibility means less time in unproductive meetings. Plus, anyone granted access to the model can access what they need. This means fewer interruptions so engineers can stay focused without breaking their train of thought. Improved visibility also allows management to manage processes better and identify bottlenecks to address potential issues that could cause delays.

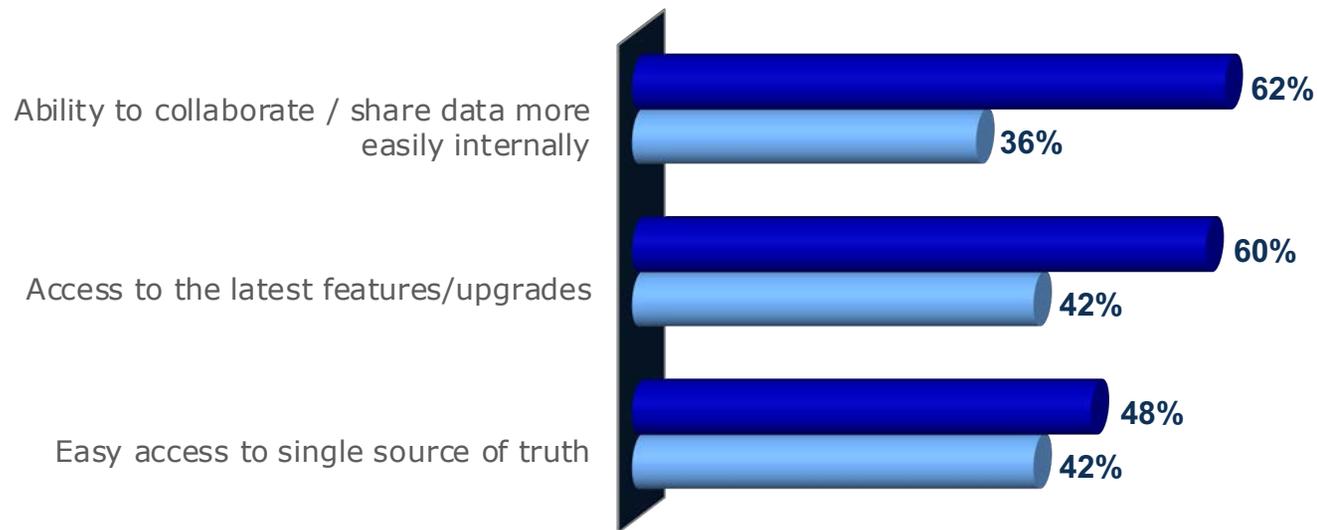
Access to the Latest Features

Midsize enterprises also like that they always have access to the latest features. They are no longer at the mercy of the IT department's schedule, waiting for IT to upgrade the software or install maintenance release fixes. Instead, they can immediately benefit as soon as a new release is available. They also have access to the latest capabilities and workflows to accelerate their work, such as digital processes to support digital transformation and new capabilities to support technology innovations.

Single Source of Truth

With everything stored on the cloud, midsize companies like that they can access centralized data when needed, wherever they are. This can offer significant time savings as no one wastes time searching shared drives or individual desktops trying to find data. They also don't have to worry about tedious check-in/check-out steps. Improved collaboration combined with a single source of truth also enables concurrent engineering so teams can compress their development schedules to get to market faster or spend more time innovating and improving quality and performance.

MOST APPEALING ABOUT CLOUD-BASED CAD TOOL TO MIDSIZE ENTERPRISES



■ Using cloud now

■ Planning to use the cloud

Plan for the Future

Increasing Requirements for Access

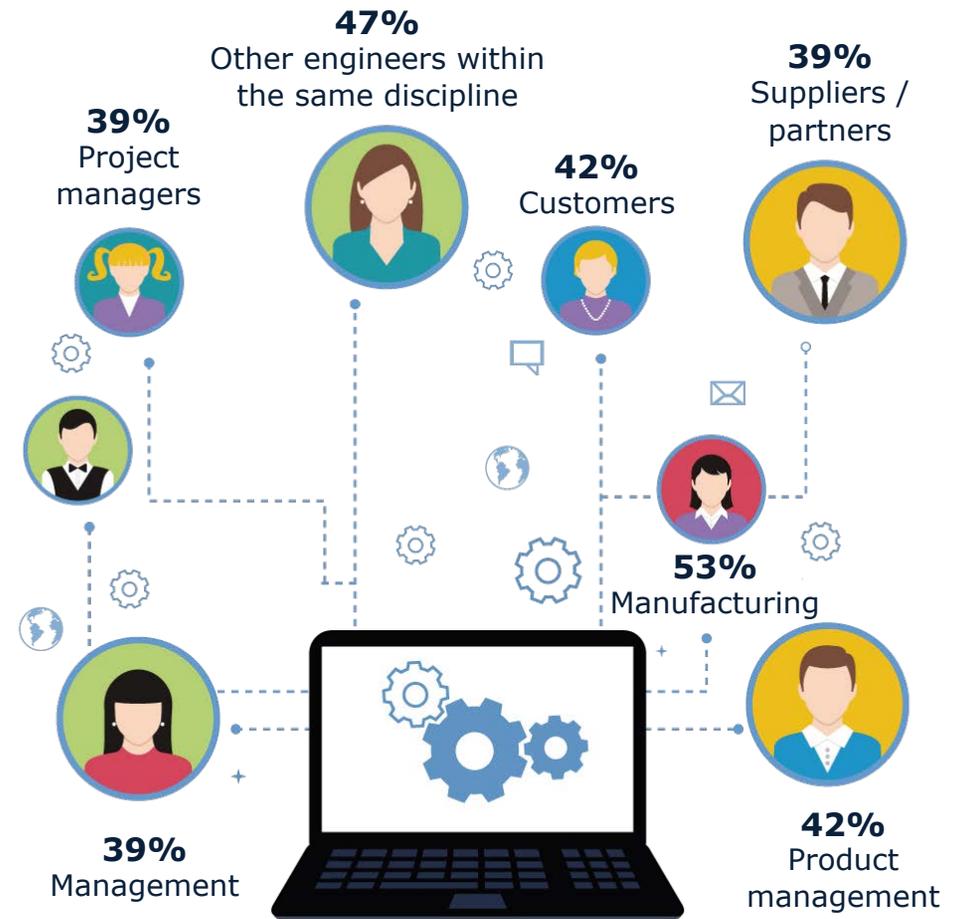
As crucial as collaboration capabilities already are, those requirements will only increase. When asked who will have increased needs to access design data over the next five years, Top Performers indicated they anticipate a long list of different groups (see graphic). This means improved collaboration capabilities and a single source of truth offered by the cloud will become even more valuable. Of course, these extended groups may not be regular CAD users, so they will be unfamiliar with traditional CAD applications. Still, if they can access what they need simply from a link, they will be far more empowered, and the company will get even more value from engineering data by making it accessible to the broader enterprise.

This extends even to third parties as the cloud offers the infrastructure to securely grant access to partners and suppliers, and turn it off when their work is complete. Furthermore, you do not lose control of IP with this approach, as you do when data is emailed.

Overcome Data Silos

To grant access to design data to more people, overcoming data silos will be critical. The collaboration benefits recognized by those using the cloud will also help unlock data from its silos. Those who need access to the data have seamless access without worrying if it has become outdated. Flexible access even offers more hiring flexibility since candidates no longer need to be limited to those near the office. The cloud can support frictionless access to data, to both internal and external groups, improving the overall efficiency of all teams.

WHO TOP PERFORMERS ANTICIPATE WILL HAVE INCREASED NEEDS TO ACCESS DESIGN DATA OVER THE NEXT FIVE YEARS



Recommendations



Recommendations and Next Steps

Midsize enterprises are in the unique position of being squeezed by competition from nimble smaller companies and larger companies with more resources. To successfully compete, they need to simultaneously address these competitive pressures.

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations for midsize enterprises:

- Do not underestimate the impact of challenges that prevent product development teams from achieving their top goals.
- Assess the value of engineering time and how much they waste if using suboptimal tools, especially considering engineers spend nearly 2/3 of their time in CAD.
- Consider adopting practices and technologies used by Top Performing companies before they move too far ahead.
- Ensure your CAD solution offers strong capabilities to improve team productivity, collaboration, and agility.
- Evaluate a cloud solution as a way to improve collaboration and enable concurrent engineering.
- When selecting a product development solution, do not overlook increased needs for future collaboration.

About the Research

Data Gathering

Tech-Clarity gathered and analyzed responses to a web-based survey from 156 midsize enterprises. Survey responses were collected by direct email, social media, and online postings by Tech-Clarity.

Industries

The respondents represent a broad cross-section of industries. 19% were from Industrial Equipment, 17% High-Tech, 15% Life Sciences, 15% Consumer Products, 14% Architecture, Engineering, and Construction, 12% Automotive, 8% Aerospace & Defense, and others.*

Company Size

The respondents represent a mix of midsize companies with 39% from between \$100 million to \$250 million and 61% from \$251 million to \$1 billion. Company sizes

were reported in US dollar equivalent.

Geographies

Responding companies report doing business in North America (79%), Western Europe (43%), Asia (15%), Eastern Europe (13%), Middle East (6%), Latin America (5%), Australia (4%), and Africa (1%).*

Title

The respondents were comprised of 19% Executive, 34% Directors or VP Level, 21% Manager level, and 26% individual contributors.

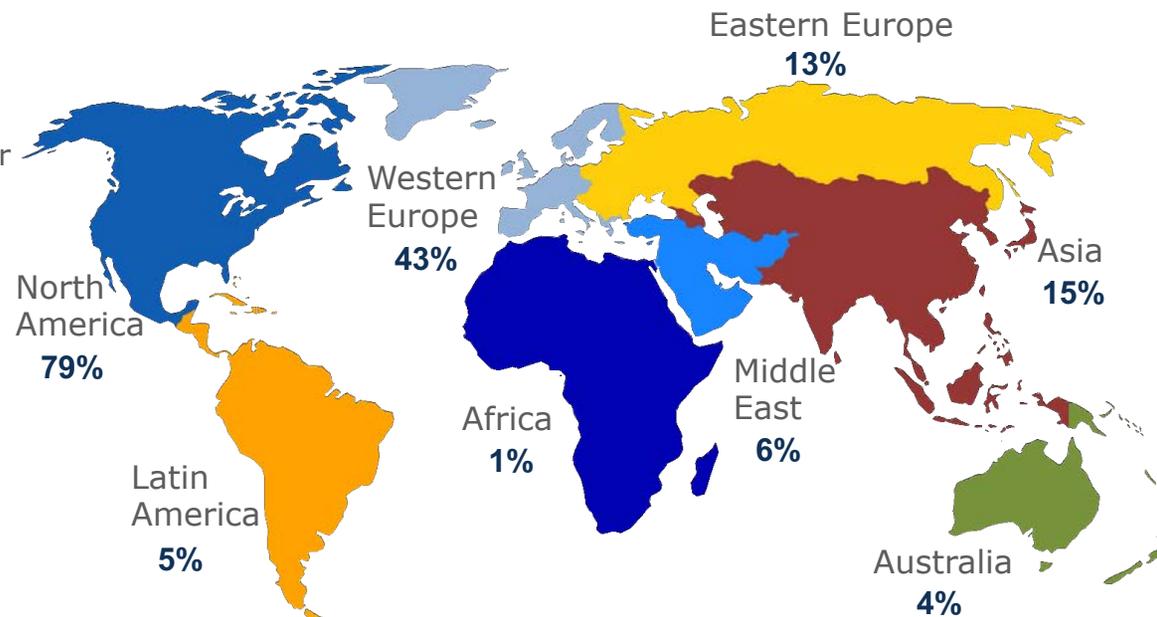
Organizational Function

Of the respondents, 45% were in Product Design/Engineering roles, 21% IT, 10% Manufacturing, 8% Product / Project / Program Management, and the remainder were

from a variety of other roles including Industrial Design, Analysts, Digital Transformation, and more.

* Note that the values may total greater than 100% because companies reported doing business in multiple industries and geographies.

The respondents represented a mix of industries, company sizes, and geographies.



Acknowledgments



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About the Author

Michelle Boucher is the Vice President of Research for Engineering Software for Tech-Clarity. Michelle has spent over 20 years in various roles in engineering, marketing, management, and as an analyst.

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Tech-Clarity is an independent research firm dedicated to making the business value of technology clear. We analyze how companies improve innovation, product development, design, engineering, manufacturing, and service performance through the use of digital transformation, best practices, software technology, industrial automation, and IT services.

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