EMPOWER ENGINEERS WITH

CUTTING-EDGE DESIGN TOOLS

How the Advantages of Modern Infrastructures Unite Teams and Improve Competitiveness

Michelle Boucher | Vice President | Tech-Clarity

Tech-Clarity

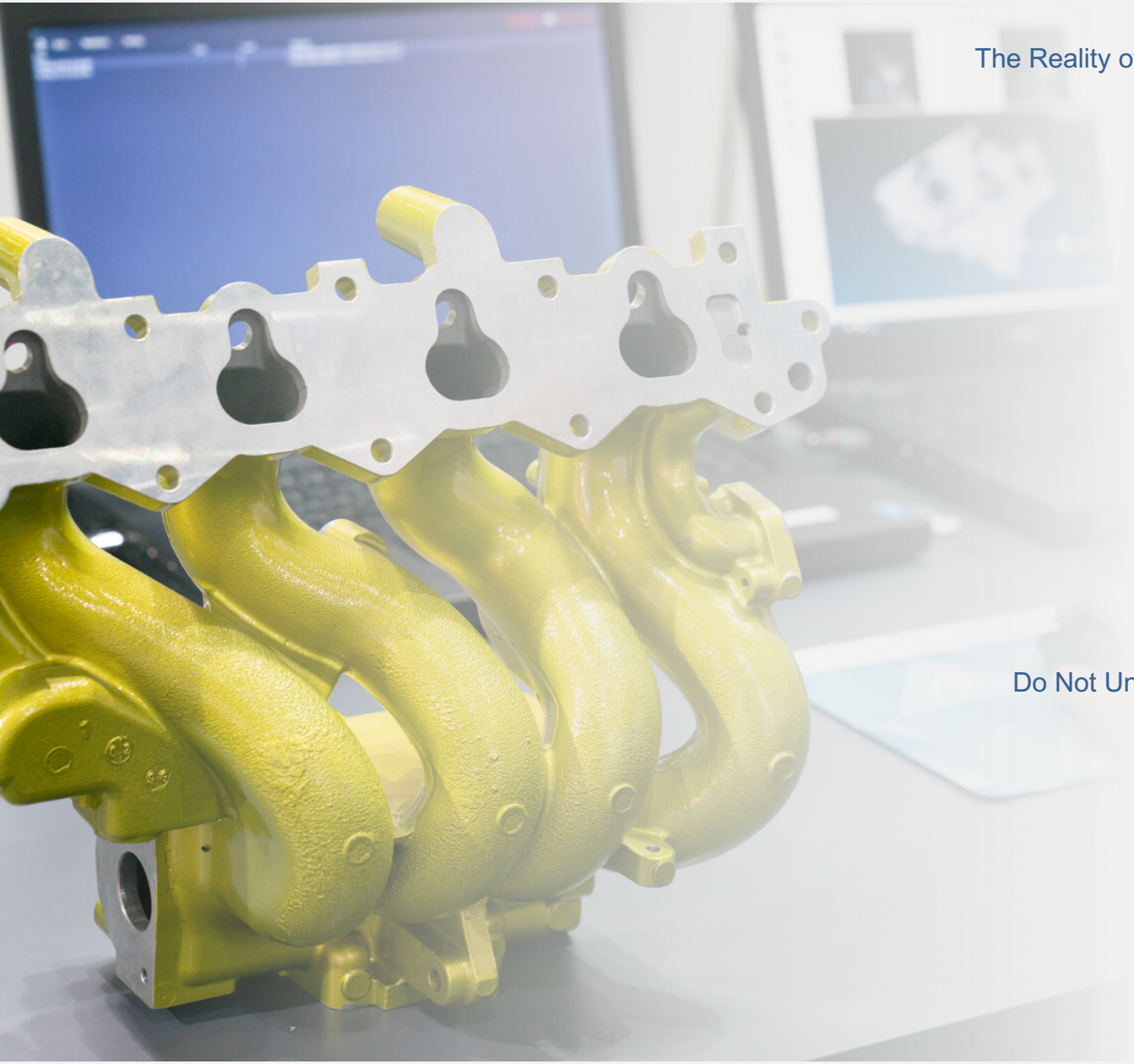
What Holds Product Development Back?

Learn How to Overcome Bottlenecks During Design

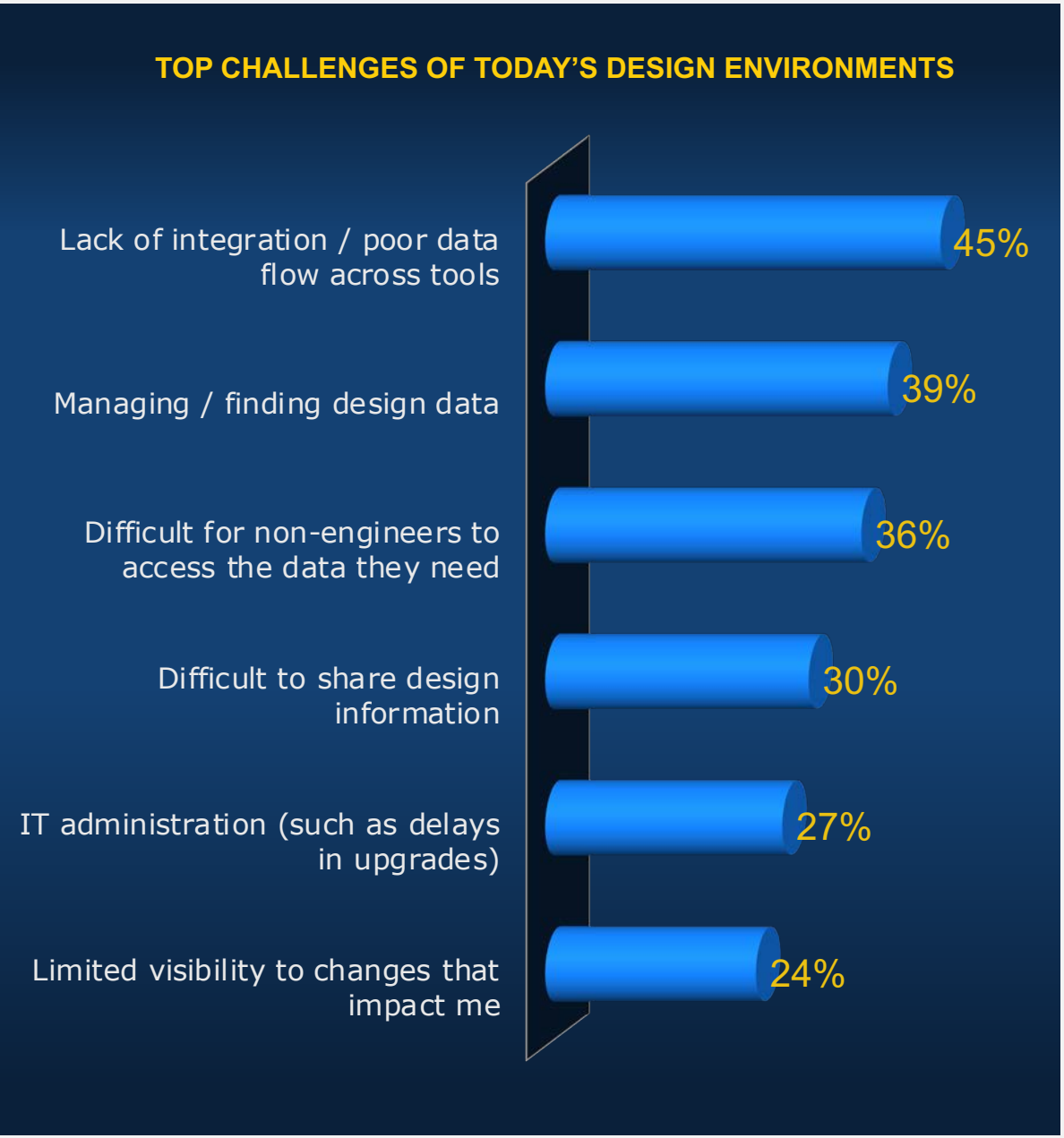
Many companies struggle with bringing innovative, cost-effective products to market as efficiently as possible. With the pressures of global competition, the stakes are high. Not getting it right can lead to lost market share and diminished profitability. The vast majority of companies, 99%, report they experience design bottlenecks that hold them back, which consequently hurts their success. Unfortunately, the cause of these bottlenecks is inherent in today's design environments. Those looking for a competitive edge may want to consider design tools that use a modern infrastructure. Modern infrastructures take advantage of the latest innovations to enable smooth collaboration across the design team, including global locations and third parties.

Tech-Clarity surveyed 240 companies to identify the primary sources of bottlenecks in the design process and their impacts on the company. A startling 99% report they experience negative business impacts due to design bottlenecks. These negative impacts cost the company in many ways, including delayed time-to-market, excess cost, and poor quality. This report explores these issues further and identifies how to solve the challenges associated with design bottlenecks.

Table of Contents



The Reality of Today's Product Development Environment



Staying Competitive

To successfully develop competitive products, companies must focus on a variety of factors, especially product performance, innovation, and quality. Achieving this falls on the shoulders of engineers, but juggling so many different requirements makes the job tough. To achieve these goals, product development teams must be empowered to make the best design decisions efficiently. However, several factors stand in the way.

Limitations of Product Development Environments

To identify factors that slow down engineers, we asked survey respondents about the top challenges of today's design environments (see graph). Due to all the criteria engineers must think about, they need access to a lot of information. Unfortunately, poor integration across tools makes it hard to find what they need. It also means it's hard to know about changes that impact other parts of the design. Plus, design information tends to be in a format that is not easy to share nor easy to understand, especially for staff with less technical knowledge. This limits opportunity because when more people provide input, you can explore more ideas. More ideas lead to superior innovation and improvements in usability, quality, and manufacturability. IT limitations also create challenges. It takes time to maintain all the different software tools. Also, hardware investments are costly.

These problems are so widespread, surprisingly, only 5% do not experience challenges with today's design environments. In other words, 95% of companies suffer from design environment challenges that lead to design bottlenecks and collaboration problems. Let's explore these challenges further to understand their impacts.

Understand Collaboration Needs

Collaboration Is Critical

Collaboration is a big piece of the design process as product development teams must work with a variety of groups. This includes both internal and external groups (see table).

The table shows the top five groups that collaborate with engineering and the percentage of companies that report engineers work with that group. The viewpoints from these different groups provide critical insight to meet the various criteria required to produce the best possible design.

Time-to-market pressures have also driven the design process to become less sequential and more concurrent. Consequently, frequent collaboration between these groups becomes essential. Yet, the design environment challenges we saw on the previous page create silos between these groups.

Groups That Collaborate with Engineering	Percentage of Companies Requiring Engineers to Collaborate with Each Group
Other internal engineers	74%
Manufacturing	67%
Suppliers	57%
Customers	52%
Third party design partners	40%

Silos Create a Barrier to Collaboration

Problematic Silos

Some of the silos between engineering and other groups are especially problematic. The graph shows the percentage of companies that experience design challenges due to silos with engineering and each respective group. It also compares the latest results with how companies responded in 2016.

Silos with third parties are most likely to cause design challenges, yet with existing technology, overcoming them has been difficult. There are also problems because it is tough to share design information with management, manufacturing, and marketing. Some engineers even run into issues collaborating within the engineering department.

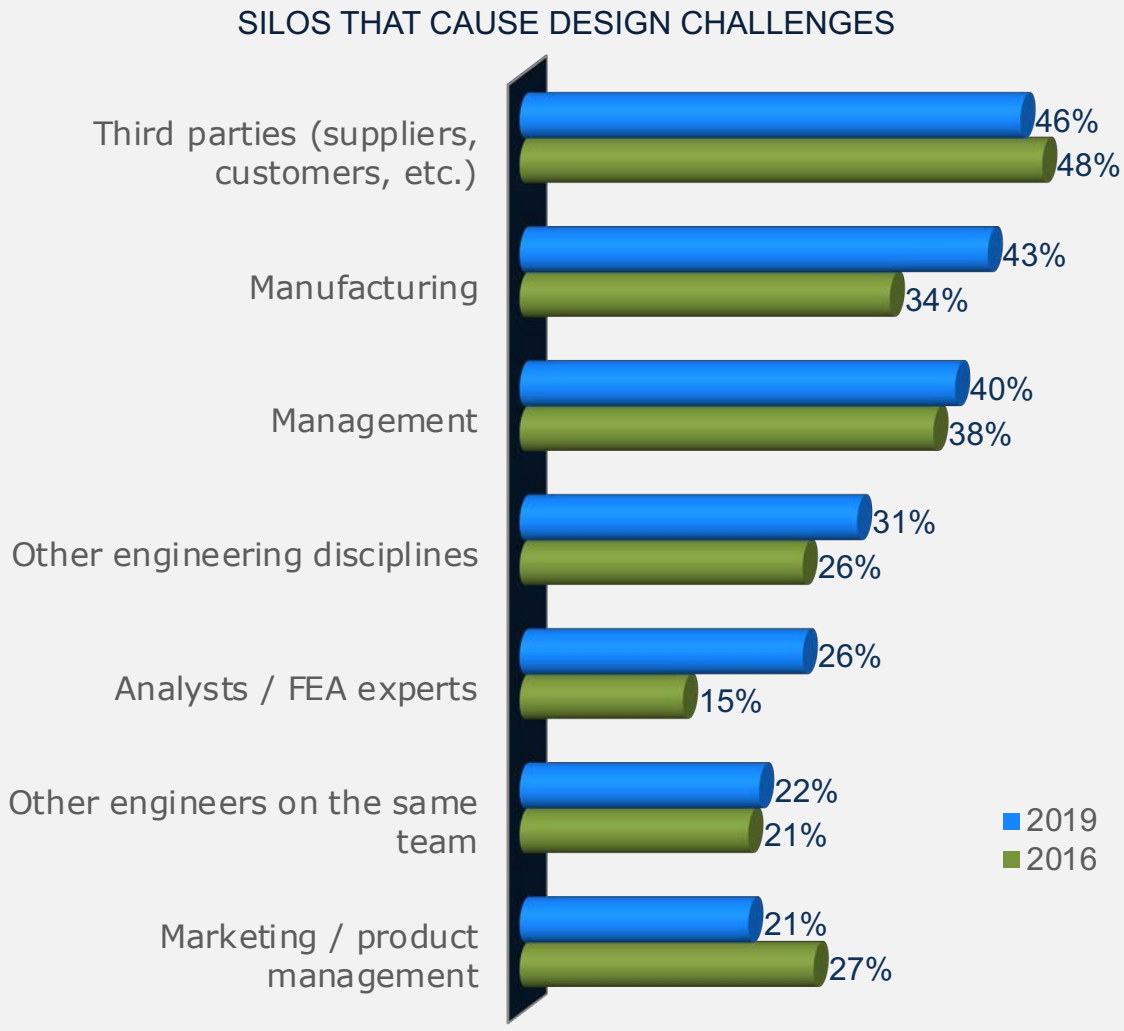
Engineering and Manufacturing

Interestingly, there has been an increase in the percentage of companies reporting problems due to silos between manufacturing and engineering. This highlights a growing problem with the lack of manufacturing knowledge within engineering, making engineering and manufacturing collaboration even more critical to ensure designs are manufacturable.

Growing Needs for Simulation

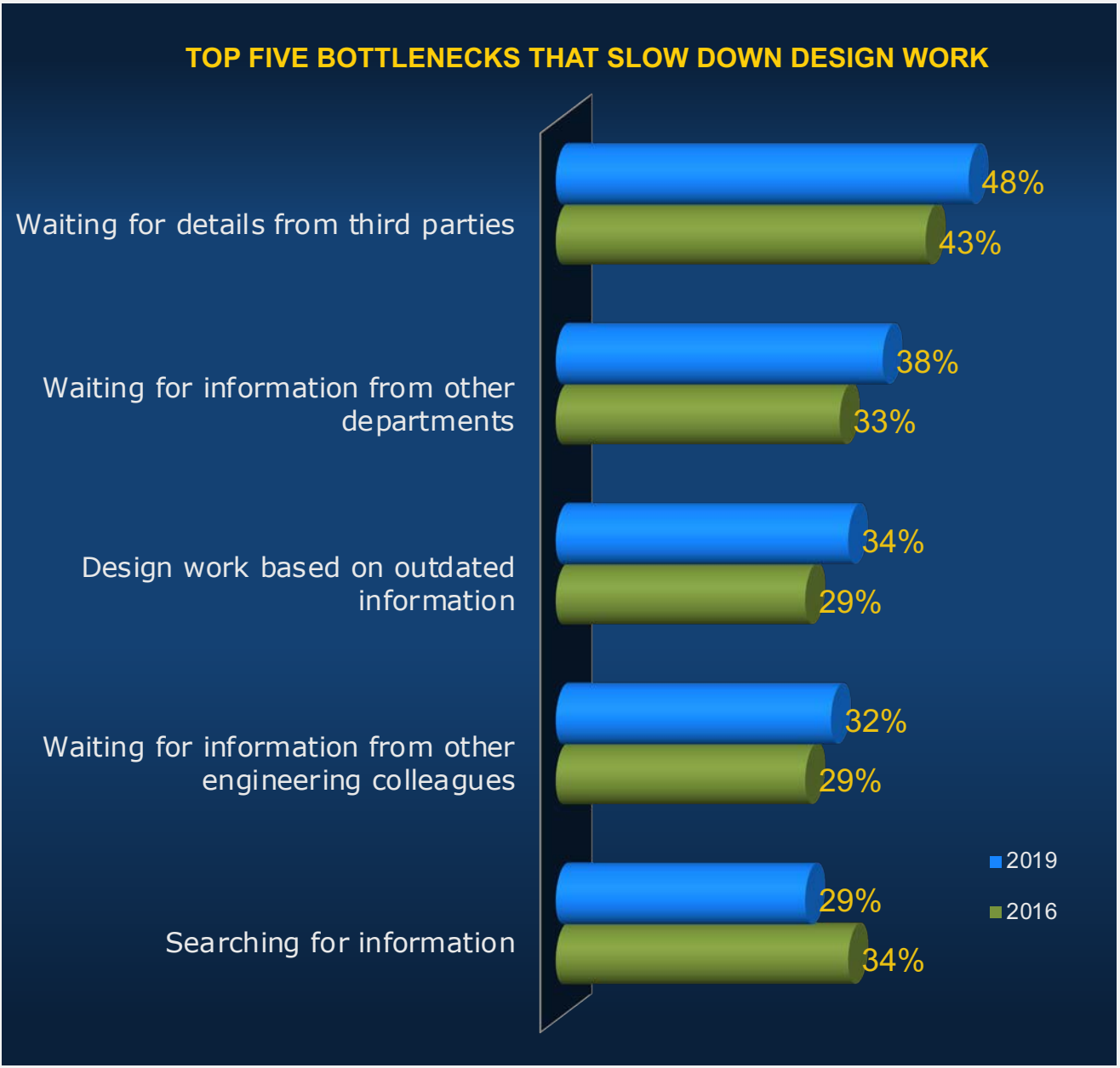
The increase in product complexity is also driving more reliance on simulation during design. Consequently, over the last three years, even more companies report problems due to poor collaboration between engineering and analysts.

Considering the number of silos that result in design challenges, companies need better methods to break down the silos and improve collaboration.



Silos with third parties are most likely to cause design challenges, yet with existing technology, it has been difficult to overcome these silos.

Understand Bottlenecks



Poor Collaboration Leads to Bottlenecks

One of the most significant impacts of poor collaboration is bottlenecks. The graph shows the top five bottlenecks that slow down design work, comparing the results from 2016 to now. Interestingly, an even higher percentage of companies are reporting bottlenecks.

Not surprisingly, the group that is hardest to collaborate with, third parties, continues to be the leading source of painful bottlenecks. However, there are many other bottlenecks due to internal silos. Waiting for information from someone else, as well as trying to find needed information, slows things down. As revealed in the "Top Challenges of Today's Design Environments" graph on page 4, this is inherent in today's design environment, pointing to the need to adopt new infrastructures.

Another painful bottleneck is finding out that design work must be redone due to outdated information. Again, this is mostly a result of poor internal or external collaboration, which includes the inability to manage and share data.

99% Suffer with Bottlenecks

It is also interesting that poor collaboration hurts almost every company. Only 1% say they do not have any bottlenecks. Given how prevalent it is, many companies have just accepted it as a way of doing business and continue to work around the challenges. Imagine the advantages a company could enjoy if they no longer had to deal with this.

Impact of Bottlenecks

Cost of Poor Collaboration

Part of the reason many companies have accepted the status quo of dealing with poor collaboration and the resulting bottlenecks may be because collaboration can seem very abstract and difficult to measure. However, the problems resulting from poor collaboration come at a high cost that hurts profitability. The graph shows the top ways these bottlenecks impact the business.

Lost Time

The biggest impact is delayed time-to-market. Time spent waiting and searching for information or waiting for approvals wastes valuable time you could spend on more value-added design tasks. It also hurts efficiency. Consequently, products are released later, which drives up development costs. Also, shrinking windows of opportunity mean there is less time before competitive products supersede existing products. The longer it takes to release a product to market, the less time there is to capture market share, recoup development investments, and bring in new revenue.

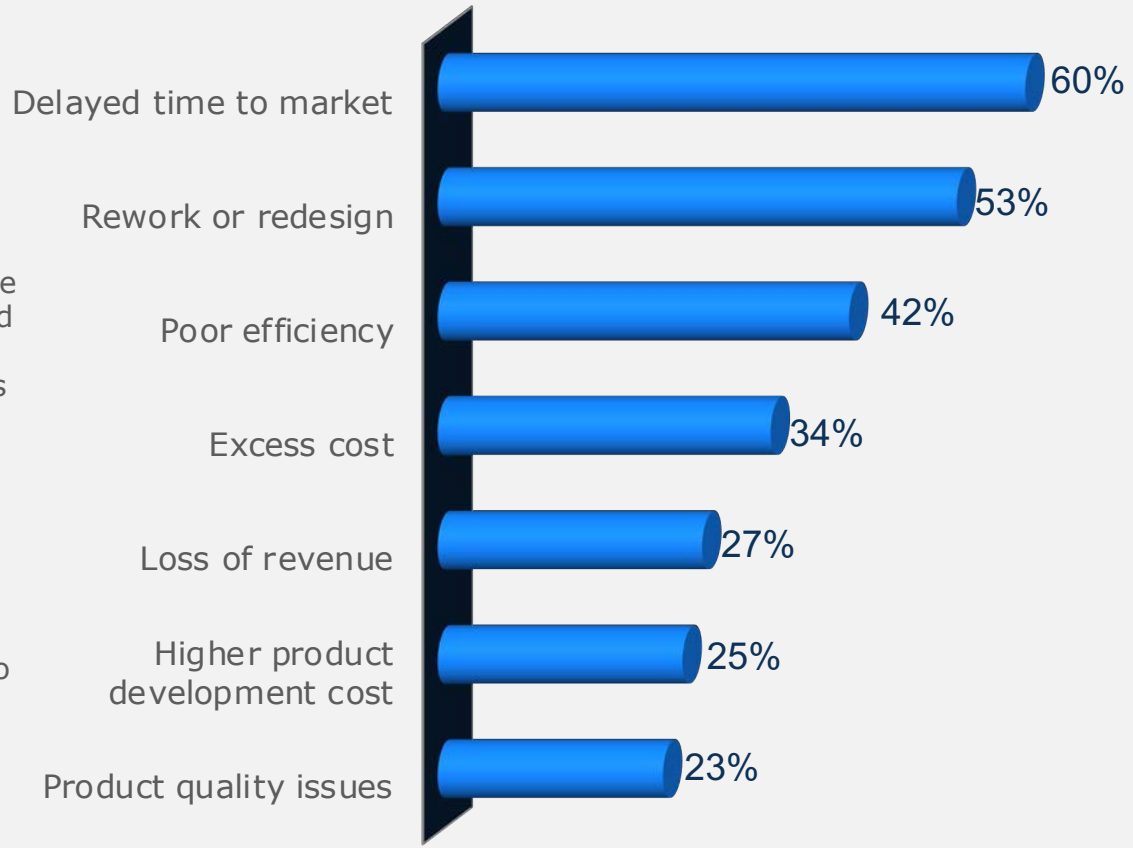
Also, when bottlenecks mean engineers work with outdated information, errors will ensue. This leads to further delays, excess cost, and quality issues. It hurts brand reputation and negatively impacts future revenue too.

Opportunity Costs

So while your company can still release products despite collaboration challenges and resulting bottlenecks, there are significant opportunities to improve profitability by overcoming these bottlenecks. Almost every company struggles with these issues. In fact, only 1% said there are no impacts. Companies that can put solutions in place to overcome bottlenecks will enjoy a significant competitive advantage by avoiding these impacts.

Companies that can put solutions in place to overcome bottlenecks will enjoy a significant competitive advantage by avoiding these impacts.

TOP IMPACTS OF DESIGN BOTTLENECKS



Explore Solutions to Overcome Bottlenecks

Share Preferences

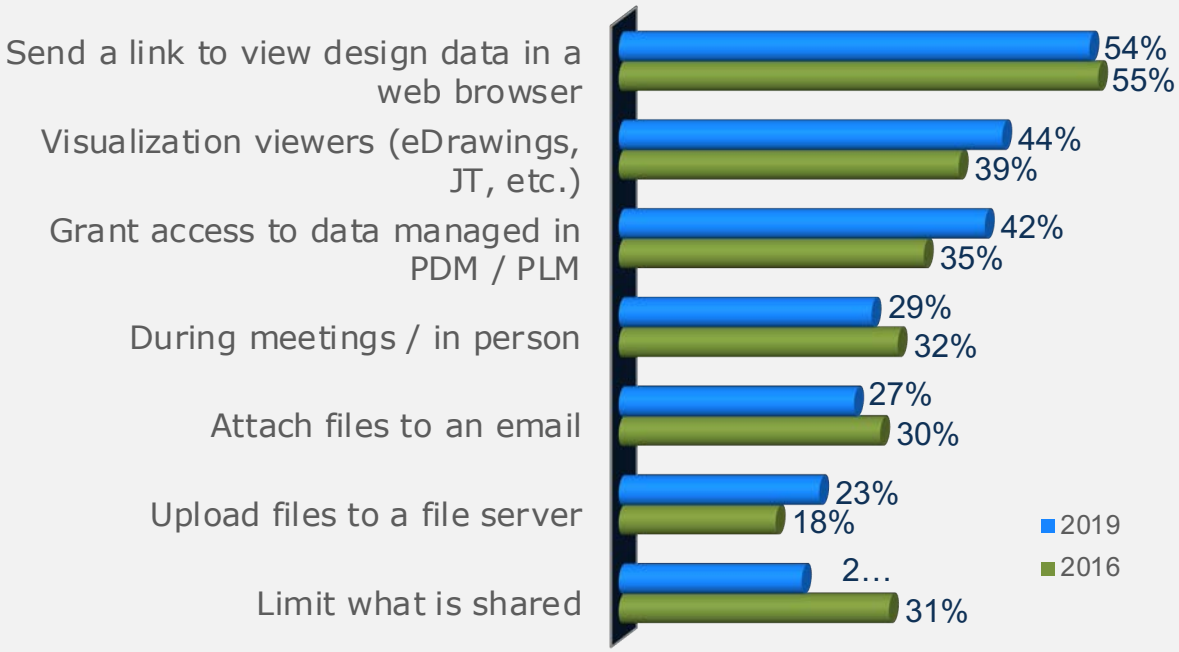
Many bottlenecks are due to the inability to efficiently share information. The graph below shows the top ways engineers prefer to share design information today compared to 2016.

Use a Link

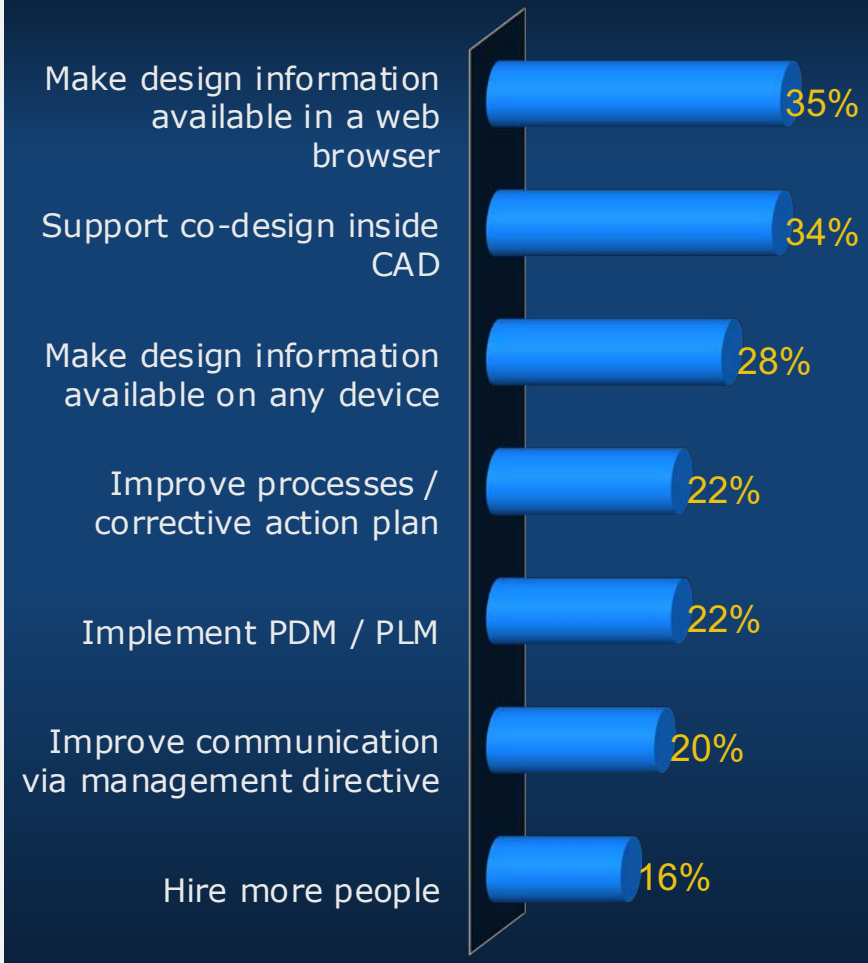
The majority prefer to share design information by sending a link so that it can be accessed in a web browser. This method is the least disruptive to the engineering workflow while still ensuring secure access to the design data. Other ways of sharing data often add extra steps. You could limit what you share, which might seem easier from an engineer's perspective, but it would do little to overcome collaboration challenges. Interestingly, this is becoming less of an option as there is a significant reduction in the percentage of people selecting it compared to 2016, providing further evidence of the increased importance of collaboration.

When asked about the best ways to reduce bottlenecks, respondents again reinforced the preference to make information available in a web browser (See graph on the right).

IDEAL WAY TO SHARE DESIGN INFORMATION

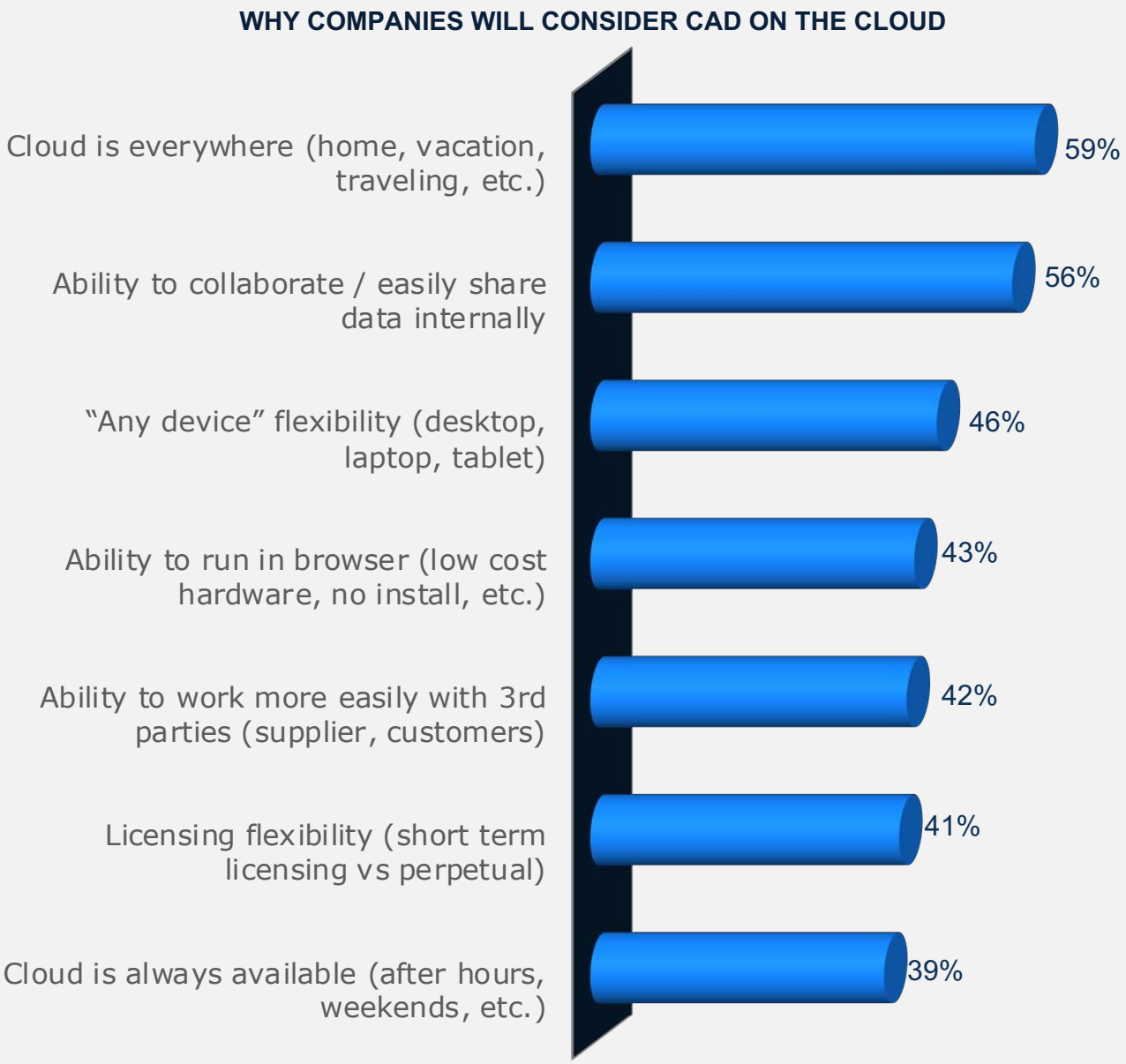


WHAT WOULD REDUCE BOTTLENECKS?



Respondents prefer to improve efficiency by making CAD models available in a browser.

CAD on the Cloud



Drivers to Use CAD on the Cloud

The benefits of cloud technology translate to a CAD solution well. The flexibility of its availability and better collaboration are the top drivers for companies to consider using a CAD solution on the cloud. This makes sense as it can help overcome the top bottlenecks of design. It improves collaboration, both internally and externally. The cloud makes it possible to share CAD models via a web browser. When you send someone a URL, they can access the CAD model without installing any software. This makes it easy to access from any device. Plus, both engineers and nonengineers can easily access design information. Even those who do not have access to CAD software can evaluate a 3D model, without installing any software.

Current Adoption

While the current adoption of CAD on the cloud is still low, it is growing, and companies are a lot more open to it than even just three years ago. Since 2016, the percentage of companies reporting they are either currently using CAD on the cloud or plan to adopt it within the next three years has increased by 65% to 41%. This doesn't mean that these companies will completely shift to 100% CAD on the cloud, but they may start introducing it into an aspect of their development process. Also, the percentage who say they will never use CAD on the cloud has reduced to only 5%.

Do Not Underestimate Security Concerns with Existing Infrastructure

How Safe Is Your Data?

Security tends to be the most significant concern people have with cloud software. However, for some, their design information may be safer with a cloud solution. First, because collaboration is such a challenge, CAD models are often emailed. While this provides a quick and easy method for sharing design information, it is not secure. Plus, once a CAD model is sent via email, especially when it goes to a third party, there is no control over who has access to it. This creates another IP security risk.

Protections Offered by a Cloud Solution

With the cloud, you can turn off access to the design data, so you never lose control of your data. Third parties have access only for as long as you want them to. Also, they cannot send the data to anyone who is not authorized.

Another reason data can be more secure with a cloud solution is that a cloud provider has more capacity to keep data safe. In most cases, they can protect it better than a manufacturer can by itself. As stated in Tech-Clarity's report, *Assessing the Cloud PLM Opportunity*, "Cloud providers base their business success on providing security and uptime. They can afford top-notch experts (some of whose salaries might rival the executives in a small manufacturing firm) because they are leveraging these resources across multiple companies." Tech-Clarity's *Unlocking Engineering Value for Small and Medium Business with Product Design on the Cloud* explores the security issue as well. The report states, "A vendor providing a cloud solution can also dedicate resources to stay regularly informed of the latest top security threats such as those identified by the Open Web Application Security Project (OWASP), a worldwide organization focused on improving software security. The vendor can offer further protections through redundant disks, disaster recovery, and backup and restore procedures should anything happen to the data." All of these precautions help keep data safe.

SMBs Are Not Safe from Cyberattacks

Many small and medium-sized companies (SMBs) think that just because they are small, they do not have to worry about security. However, they may want to reconsider. As an example, 71% of cyberattacks target businesses with fewer 100 employees.[1] Unfortunately, most SMBs lack the staff and budget to protect themselves from cyberattacks properly.[2] By adopting a cloud solution, a company can benefit from more security protections than they have now, without making major investments.

With the cloud, you can turn off access to the design data, so you never lose control of your data.

Conclusions

Finding a Competitive Advantage

As companies prepare for the future, they have a lot to consider. There are many exciting opportunities for innovation. However, significant global competition puts pressure on already thin profit margins. In response, companies must bring the right products to market to improve competitiveness and boost profitability.

The Cloud Can Help

Unfortunately, many challenges can get in the way. Many companies struggle to bring the right product to market in an efficient, cost-effective way as poor collaboration, silos, and bottlenecks hold them back. The good news is that a modern infrastructure can help.

To overcome bottlenecks, 54% of companies would prefer to share design information by sending a link that recipients use to access design details via a web browser. However, this approach is difficult with existing tools and infrastructures. By adopting a tool that uses a moderate infrastructure, such as one that takes advantage of cloud technology, companies can enable this approach and enjoy the benefits of superior collaboration.

To overcome bottlenecks, 54% of companies would prefer to share design information by sending a link.

Recommendations

Recommendations and Next Steps

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

- Invest in product development to improve competitiveness and boost profitability.
- Understand how challenges in the design environment contribute to collaboration challenges and bottlenecks.
- Do not underestimate the business cost of collaboration challenges.
- Consider options that allow design data to be shared via a web browser and on any device as a way to improve collaboration.
- Consider a CAD solution on the cloud as a way to overcome design bottlenecks and improve collaboration.
- Do not underestimate security risks in your existing infrastructure. A cloud solution may offer greater security protection.

About the Research

Data Gathering

Tech-Clarity gathered and analyzed over 240 responses to a web-based survey. Survey responses were collected by direct e-mail, social media, and online postings by Tech-Clarity.

Industries

The respondents represent a broad cross-section of industries. 33% were from Industrial Equipment, 21% Automotive, 19% Engineering Services,19% AEC, 18% Life Sciences, 13% Aerospace & Defense, 12% Consumer Products, 7% High-Tech, and others.*

Company Size

The respondents represent a mix of company sizes, including 37% from smaller companies (less than $100 million), 17% between $100 million and $1 billion, 21% greater than $1 billion. 25% did not disclose their company size. Company sizes were reported in US dollar equivalent.

Geographies

Responding companies report doing business in North America (60%), Western Europe (28%), Asia / Pacific Rim (37%), Eastern Europe (9%), Latin America (12%), and others.*

Title

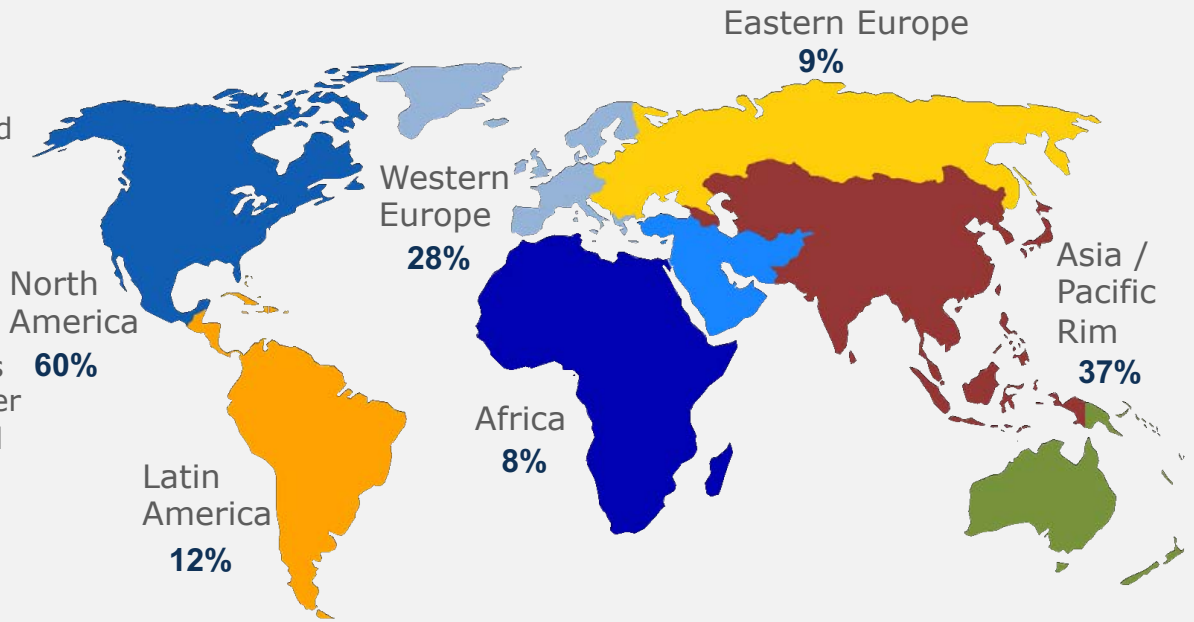
The respondents were comprised of 7% Executive, 10% Directors or VP Level, 21% Manager level, and 62% individual contributors.

Organizational Function

Of the respondents, 54% were in Design Engineering roles, 11% Administration, 10% in Manufacturing, 6% Draftsman, 5% Industrial Design, 5% IT, and the remainder were from a variety of other roles.

* 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

Michelle Boucher

Vice President

Tech-Clarity

About the Author

Michelle Boucher is the Vice President of Research for Engineering Software for research firm Tech-Clarity, an independent research and consulting firm that specializes in analyzing the business value of software technology and services. Michelle has spent over 20 years in various roles in engineering, marketing, management, and as an analyst.

Michelle graduated magna cum laude with an MBA from Babson College and earned a BS in Mechanical Engineering, with distinction, from Worcester Polytechnic Institute. She is an experienced researcher and author, having benchmarked over 7000 product development professionals and published over 90 reports on product development best practices.

Tech-Clarity.com

TechClarity.inc

@TechClarityInc

Tech-Clarity

Tech-Clarity is an independent research firm dedicated to making the business value of technology clear. Our mission is to analyze how companies can improve the way they research, innovate, develop, design, engineer, produce, and support products through the intelligent use of best practices, software, and IT services.

References

1) "The Small Business Guide to Cybersecurity," SCORE, https://www.score.org/resource/small-business-guide-cybersecurity, 2019.

2) "2019 Global State of Cybersecurity in Small and Medium-Sized Businesses," Ponemon Institute, 2019.

Image Credits © Can Stock Photo / Nostal6ie (pg. 2), thai6D (pg. 3), barneyboogles (pg. 11), Paha_L (pg. 12), gina_sanders (pg. 13), Speedfighter (pg 14)

About this eBook This is an update to our "Empower Design Engineers with Easy Collaboration Powered by the Cloud," originally published in 2016.