

Leveraging the Cloud for CAD and Product Development Collaboration



Tech-Clarity

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Improving Product Development Performance

Leveraging CAD and Product Development Collaboration to Hit Product Development Targets

Rapid new product development (NPD) is critical for success in the manufacturing industries, but 85% of manufacturers routinely miss their project due dates (see page 5). How can manufacturers improve product development performance and more consistently hit their product development targets? We surveyed over 200 companies to find out.

The results show that Top Performers, those that more frequently hit their product development targets, have better collaboration capabilities and are more likely to use the cloud for both CAD and project collaboration. It finds, however, that these Top Performers are not necessarily just using general cloud file sharing solutions like Dropbox, Drive, or OneDrive. The leaders' cloud solutions include more design and engineering-specific collaboration capabilities.



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Collaborative Systems are Key to Successful NPD

Collaboration is Mandatory, but Challenging

Collaboration is crucial to efficient and effective new product development. Today's products are complex and typically require input from multiple design and engineering disciplines. Beyond technical product design, developing a profitable commercial offering demands input from a variety of other departments and the supply chain. But our research¹ shows that about 40% of companies say collaborating with other departments and 3rd parties on NPD is a challenge.

Leverage Structured Solutions

Product Lifecycle Management (PLM) and Product Data Management (PDM) are proven to help drive better NPD collaboration and performance. Our surveys² show that Top Performers are more likely to use data management tools to collaborate – both externally and internally. This study confirms that, showing that Top Performers are more likely to use PLM. But we also recognize that although many smaller companies see the value of PDM / PLM, they feel it's out of reach.

Turn to the Cloud

The cloud can help make structured, collaborative solutions more attainable. The cloud has clear collaboration benefits, and a recent study³ shows that companies using the cloud for product development are more likely to report that collaboration is "very easy." That same study shows that Top Performers are 21% more likely to use cloud systems to support product development.

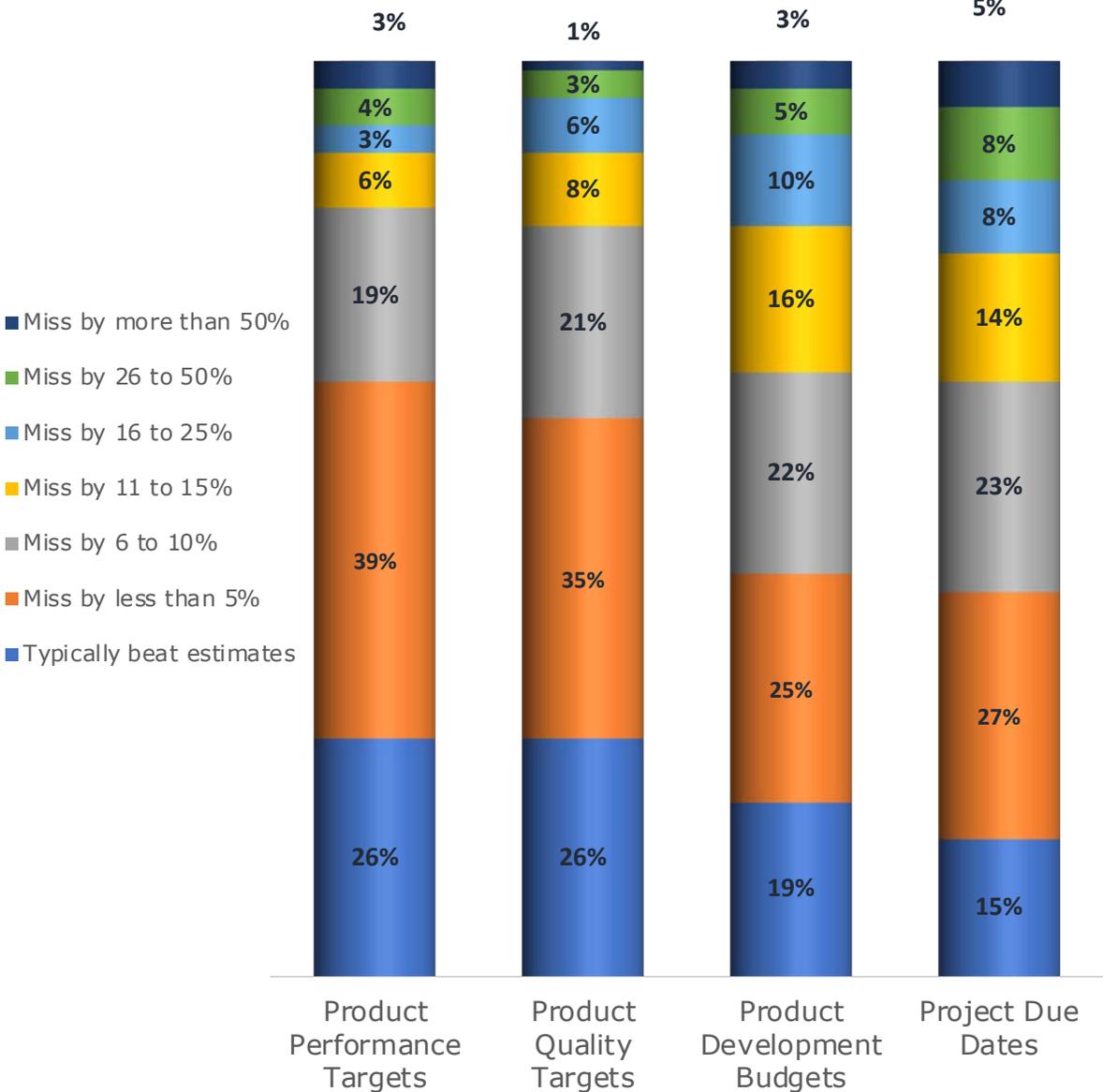
But, not all of the solutions that companies use are structured, formal PDM or PLM. Data from that study also shows that 62% of Top Performers (and 60% of companies overall) use cloud file sharing solutions for product development, although those tools are not necessarily the only solution they use. This study further investigates how leading companies leverage the cloud for better CAD and product development collaboration.



This study further investigates how leading companies leverage the cloud for better CAD and product development collaboration. The findings show that **Top Performers** are using **cloud file sharing systems** that are enhanced to recognize the nuances of engineering and product development.

Missing Product Development Targets is the Norm

ABILITY TO MEET PRODUCT DEVELOPMENT TARGETS



Routinely Missing NPD Due Dates and Budgets

Manufacturers miss their product development targets on a regular basis. Less than one-half of the companies we surveyed meet product development budgets and due dates within 5%, on average. In fact, about one-third miss these targets by over 10%.

Missing Less on Product Performance and Quality Targets

As we've seen in prior studies, companies are more likely to meet product performance and quality targets than budgets and due dates. We believe this is because companies will spend more time and money to get products right, sacrificing their time-to-market goals. While performance and quality targets are critical and help maintain company reputations, time-to-market is a well-known factor to drive profitability.

An Opportunity to Improve

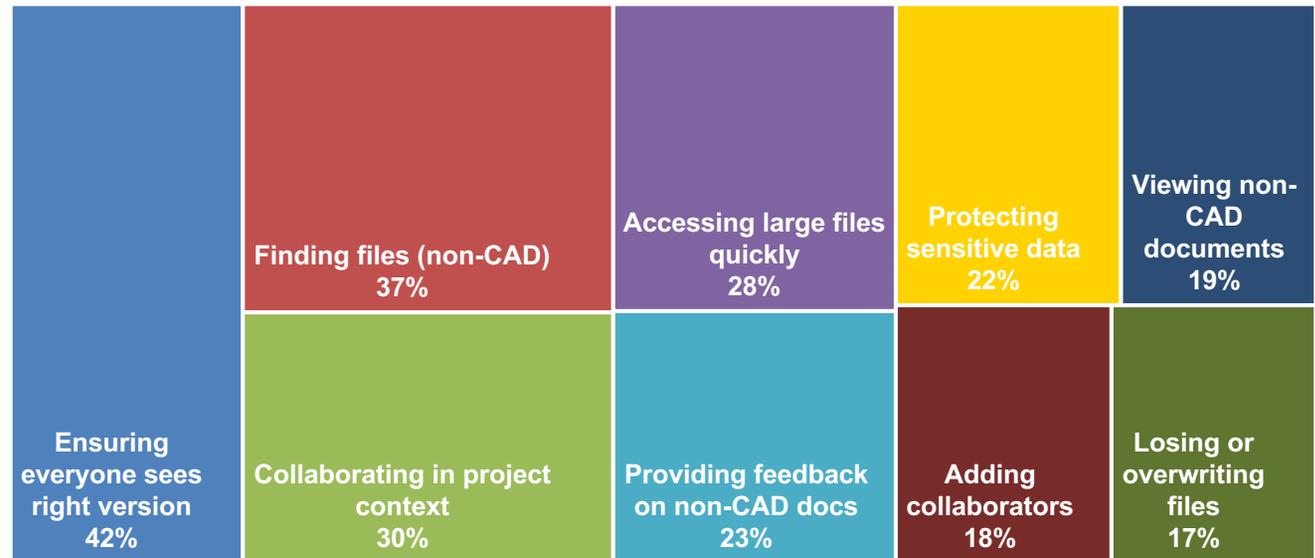
As we'll see later, however, some companies are much better at hitting their product development targets than others. We'll investigate those companies further to understand what they do differently to drive better performance. In particular, we'll look at how they collaborate.

Collaboration Basics are Challenging

General Collaboration Challenges

We asked companies what challenges they face in collaboration, recognizing that product development requires contributions from many in the organization and supply chain. The survey shows that companies struggle with the basics. Even for standard documents like spreadsheets or text documents, companies struggle with the fundamentals of controlling, accessing, and sharing product data.

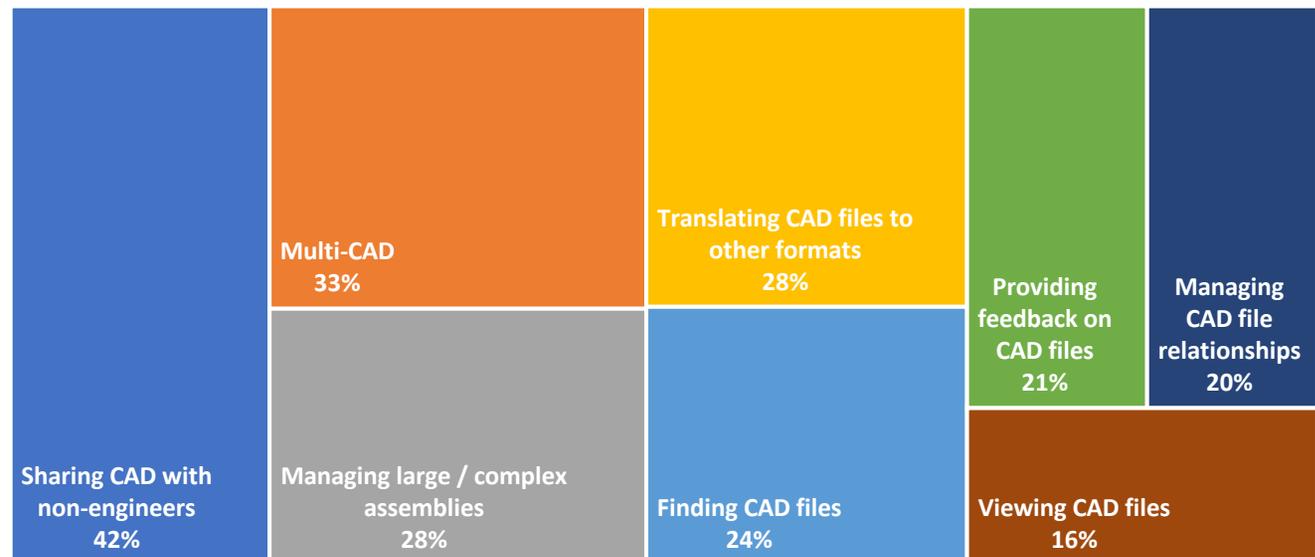
TOP CAD COLLABORATION CHALLENGES IN PRODUCT DEVELOPMENT



CAD Collaboration Challenges

Collaboration on CAD designs has unique challenges, in particular making sure non-engineers can interpret the information. Collaborating on CAD is important to help others understand and contribute to the product design, but sharing CAD files with these non-engineers is a top challenge. In addition, one-third of companies share that they have difficulty combining CAD models from different CAD tools. This multi-CAD collaboration is important when working with external designers and the supply chain.

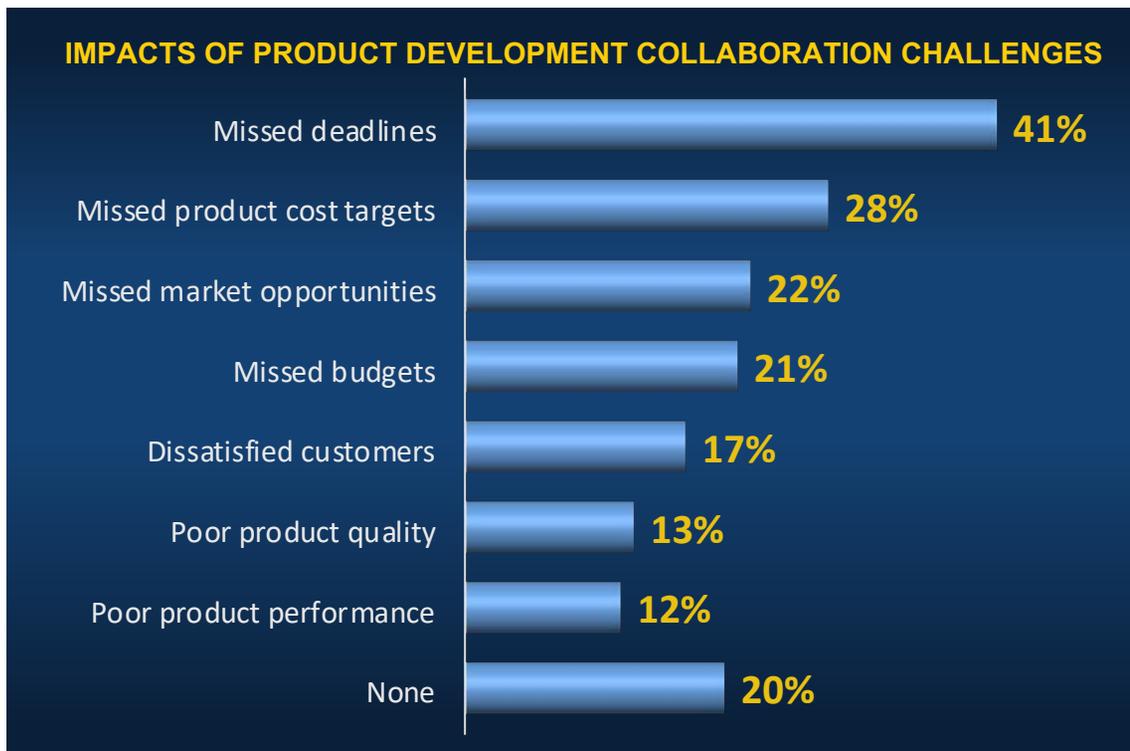
TOP NON-CAD COLLABORATION CHALLENGES IN PRODUCT DEVELOPMENT



Collaboration Challenges Impact the Business

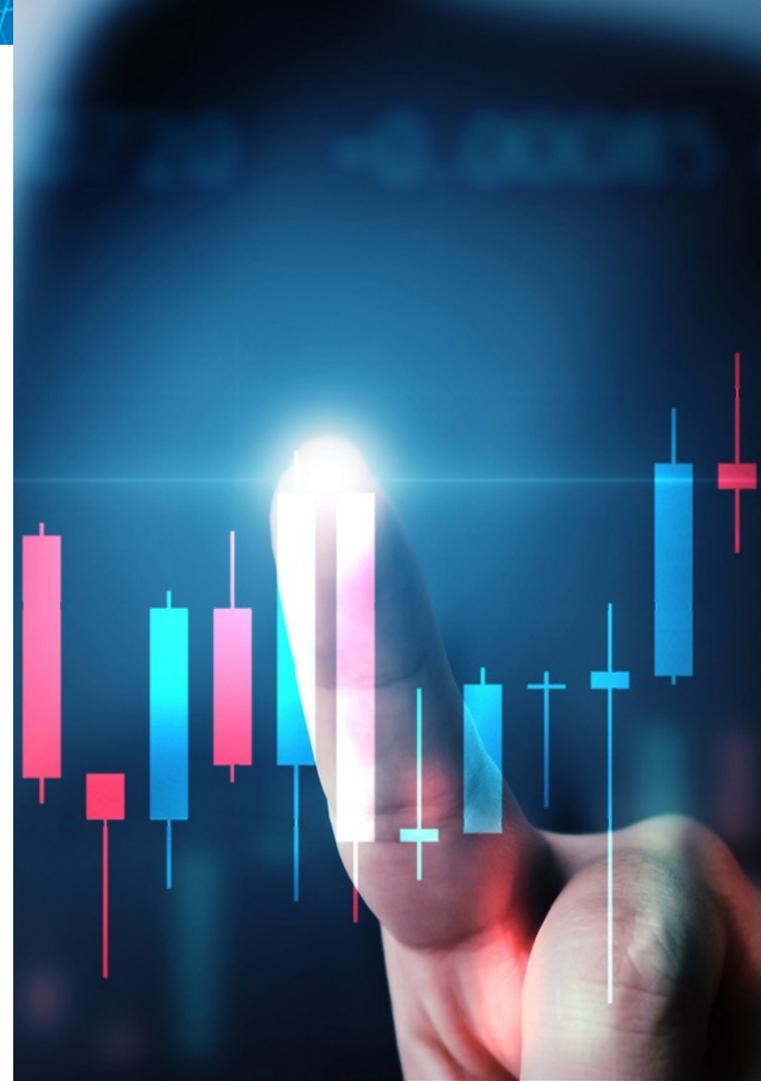
CAD and PD Challenges Lead to Missed Deadlines

The collaboration challenges in the previous charts aren't just annoyances, they have significant business impacts. The most common impact reported by survey respondents is missed deadlines. Given the frequency that companies miss project deadlines, this is a significant issue.



Improving Collaboration is Business Opportunity

On the other hand, this impact suggests that improving collaboration is a significant opportunity for improvement. If manufacturers can reduce their CAD and product development collaboration challenges, they should be able to get their products to market faster and improve profitability.



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Collaborating Across Boundaries is Hard

Why is Collaboration so Important?

Let's step back to discuss why collaboration has such a big impact on hitting product targets. Our research and experience show that:

- Products have become more complex, including increased reliance on electronics and software
- Supply chains are more dynamic and complex

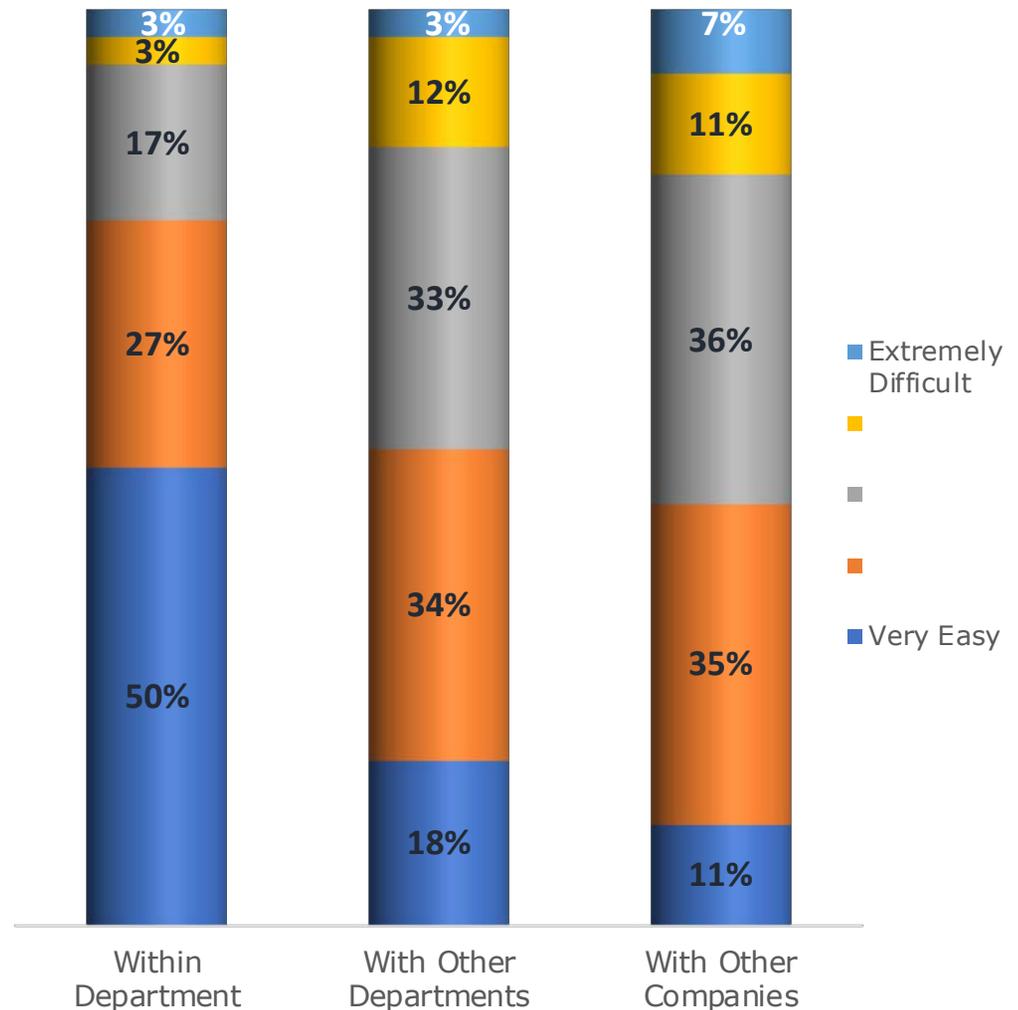
Both of these trends drive increased need for product development collaboration.

Why is Collaboration so Challenging?

Not only do product and supply chain complexity increase the need for collaboration, they demand engineers and others to collaborate across departments and the supply chain. As the survey data shows, working with people in other departments increases collaboration difficulty. While one-half of participants report that it's "very easy" to collaborate within their departments, less than one out of five say it's that easy to collaborate with other departments.

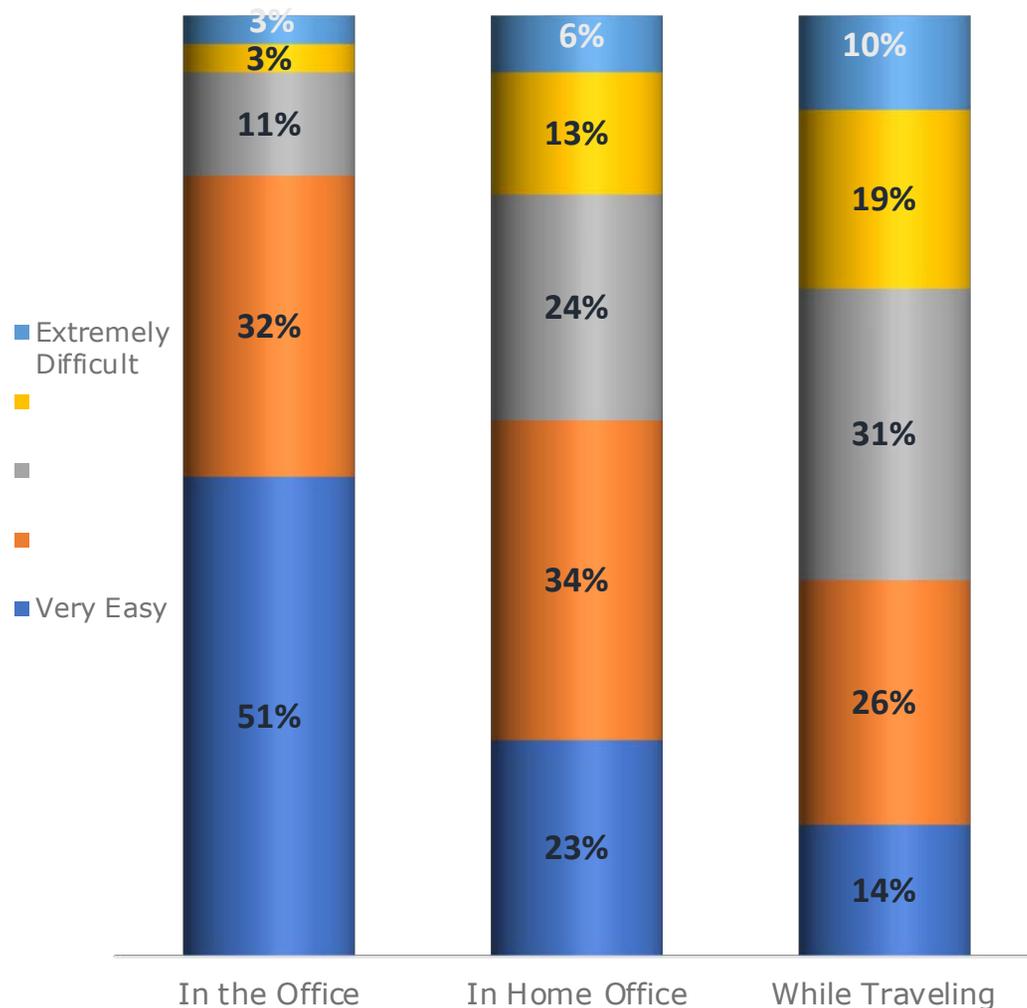
Beyond working internally, only about one out of ten participants say it's "very easy" to collaborate with other companies. It's interesting to note, though, that the challenge of working outside of their department is almost as difficult as working with someone else in another company. We believe that this is at least partly due to employees working more remotely (see next page) and continued globalization.

EASE OF COLLABORATION BY ORGANIZATIONAL BOUNDARIES



Collaborating Out of the Office is Difficult

EASE OF COLLABORATION BY PHYSICAL SETTING



Remote Collaboration is the Norm

Our research shows that the COVID-19 pandemic has forced companies to work more remotely. Our current expectations are that engineering and product development will return to more traditional, in-office methods over time. Despite that, we expect this transition to happen slowly and that it will not result in a full return to pre-pandemic office working environments.

Remote Collaboration is Challenging

Not surprisingly, remote work drives collaboration complexity and challenges. Collaboration gets more difficult as employees move away from their offices. Accessing, viewing, and working on files typically becomes more difficult out of an established office setting. Clearly, companies have made improvements to their ability to work remotely over the last year. But even with these improvements, and still even after workers return to work, employees who travel typically find more issues with collaboration.

Why Do Some Companies Better Meet NPD Targets?

Identifying Top Performers

Our experience shows that some companies are much better at hitting their product development targets than others. To identify these companies, we used a benchmarking process we call "Performance Banding."



In this process, we evaluated respondents' reported performance on their ability to hit their product development targets as compared to their competitors.

We selected the 24% of respondents with the highest performance in meeting a combination of:

- Product quality targets
- Product performance targets
- Design due dates
- Design budgets

We labeled the companies with this higher level of product development performance the "Top Performers" and labeled the poorer performing companies the "Others."

Evaluating the Top Performers

Once researchers identified the Top Performers, we examined their organizational, process, and technology characteristics as compared to the Others. The goal was to understand the best practices common to the Top Performers that contribute to their higher performance. We then make recommendations to Others based on the differentiated capabilities of the higher-performing companies.

The Top Performers are the **top 24%** of companies in their ability to hit new product development quality, performance, due date, and budget targets.

Top Performers have a Collaboration Advantage

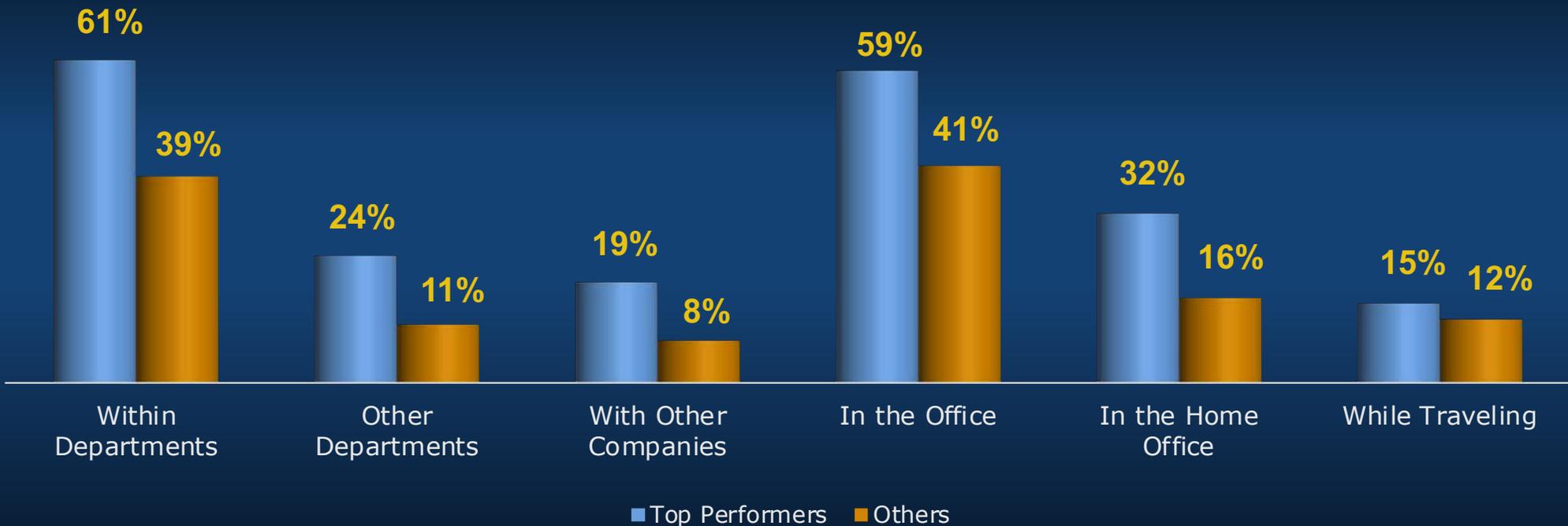
Top Performers Find It Easier to Collaborate

Leading companies in NPD, the Top Performers, are much more likely to report that collaboration is “very easy” in all of the scenarios investigated. Not only were they better able to collaborate within their departments and in the office, they were better at collaborating in more complex situations.

Top Performers Collaborate Despite Complexity

Complexity still impacts Top Performers’ ease of collaboration, but it is not as dramatic as it is for Others. Top Performers, for example, are more than twice as likely to report that collaboration with other departments and other companies is very easy. They are also twice as likely to report having an easier time collaborating from a home office. Both Top Performers and Others, however, share the challenge of collaborating while traveling, although Top Performers still find it somewhat easier.

EASE OF COLLABORATION BY PERFORMANCE BAND



Top Performers Use More Cloud File Sharing

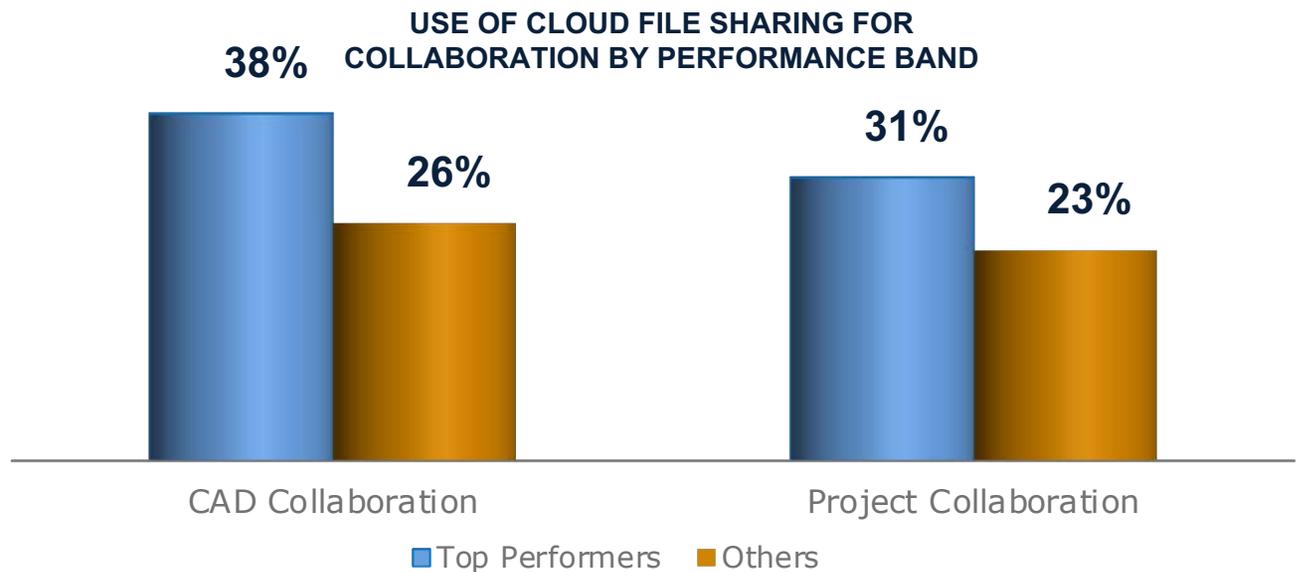


Enabling Collaboration

Researchers looked at the tools that manufacturers use to enable their better collaboration capabilities. The most common collaboration tools for both CAD and project collaboration across performance bands are network shared drives, PLM, and standalone PDM. A number of our prior studies show the advantage of PLM and PDM for product development. This study confirms that, particularly for larger manufacturers. About one-half of top-performing companies with over 100 engineers use PLM for both CAD and product development collaboration. Some smaller companies may feel that PLM is out of reach, though. These smaller companies were more likely to use informal methods including shared / network drives and email.

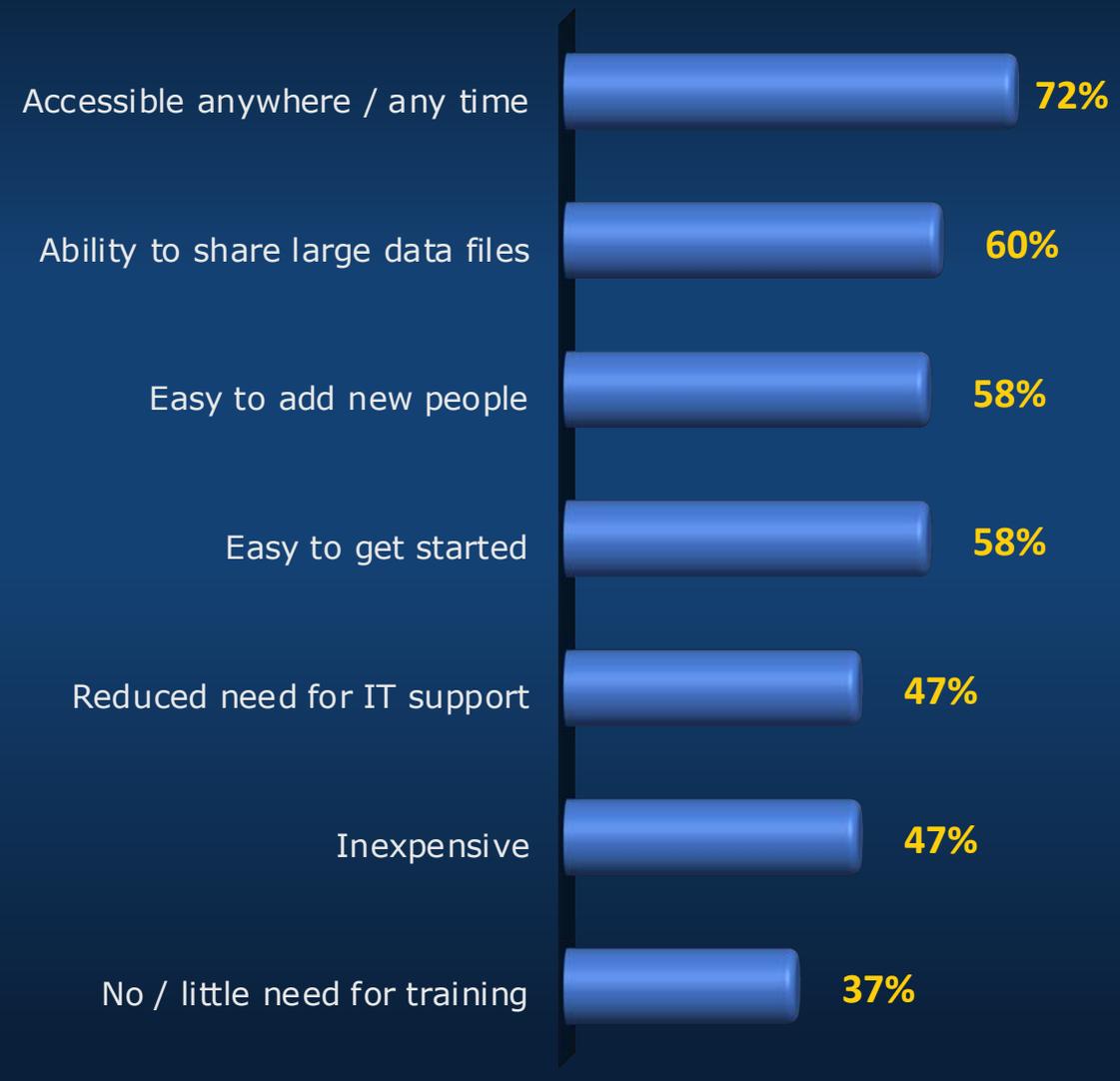
Enabling Collaboration with Cloud / SaaS File Sharing

For this study, we investigated the use of cloud file sharing solutions such as Box, Dropbox, Google Drive, and others in addition to formal tools. Researchers found that Top Performers of all sizes are more likely to use these cloud collaboration tools, adopting a variety of collaboration methods. We believe that while some companies may use cloud solutions as their primary collaboration method, these tools can also play a complementary role to formal data management systems like PDM and PLM.



Cloud File Sharing is Attractive for Collaboration

BENEFITS OF COLLABORATING WITH CLOUD FILE STORAGE FOR CAD AND PRODUCT DEVELOPMENT



Benefits of Cloud File Sharing

Cloud file sharing tools have grown in popularity for both personal and business use. Traditionally, however, these solutions have been challenging for CAD and product development collaboration. As participants stated in response to an open-ended question, a cloud file sharing solution “helps a little but CAD files are treated the same as text files” and although they are “easy to setup and get started” they are “not well suited for engineering work.” The solutions simply were not built for engineering or CAD.

Benefits of Cloud File Sharing for CAD and NPD

On the other hand, participants report benefits including the ability to share large data files that are highly valuable for CAD and product development scenarios. In addition, they offer benefits that help in cross-company collaboration with the supply chain like the ability to easily add people. Perhaps one of the most timely benefits relates to the remote collaboration challenges identified earlier. Almost three-quarters of participants report that a benefit of cloud / SaaS file sharing tools is the ability to readily access the system anywhere, any time.

The Ease of Cloud with Engineering Context

Extending Cloud File Sharing for Engineering

How can manufacturers take advantage of Cloud / SaaS file sharing benefits for CAD and NPD? As mentioned earlier, general cloud file sharing solutions have challenges for CAD and product development collaboration. The primary shortfall is because these systems don't "understand" the underlying CAD files and data relationships like PDM / PLM systems and don't address the challenge of sharing CAD with non-CAD users.

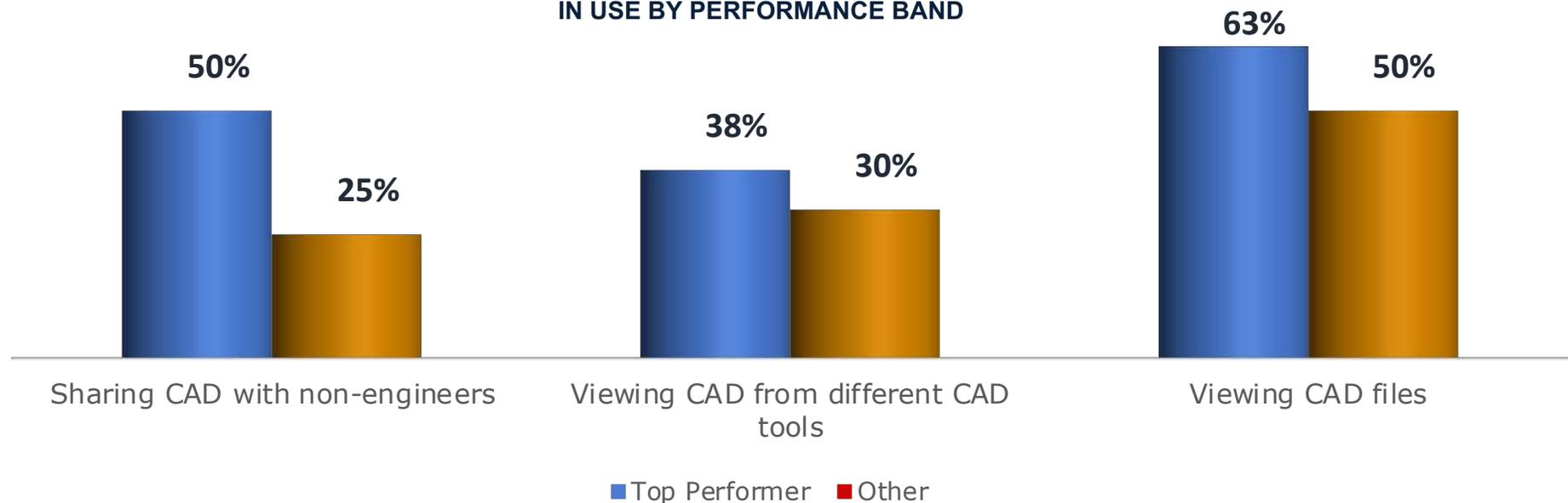
Value-Added Engineering and Product Development Capabilities

Our experience shows that there are software vendors tailoring and extending cloud file sharing solutions to work in an engineering context. These systems are being enhanced to recognize the nuances of engineering and product development.

We looked at capabilities being added to these tools including markup, managing relationships, CAD file

check-in / check-out, and more. The capabilities that are used by Top Performers more than Others for CAD and NPD collaboration meet the basic needs of sharing files with non-engineers and viewing CAD from multiple CAD tools. These enhanced solutions directly address the top two CAD collaboration challenges reported in this study. This combination may be a more achievable solution for smaller companies.

DIFFERENTIATED CLOUD FILE STORAGE CAPABILITIES IN USE BY PERFORMANCE BAND



Conclusions and Next Steps

Better Collaboration Leads to Better Product Development Performance

Top Performing manufacturers, those that better hit their product development targets, have better collaboration capabilities than the poorer-performing Others. These companies, particularly larger ones, are more likely to use formal systems like PDM and PLM. But they are also more likely to use cloud SaaS file sharing tools.

Cloud File Sharing has a Place in CAD and PD Collaboration

Despite the shortcomings for engineering data, cloud / SaaS file sharing solutions can provide significant value in CAD and product development collaboration. Cloud file sharing can help improve product development collaboration, leading to the ability to better meet product development targets. To be most effective, however, the solution must address the challenges of CAD and Product development collaboration – primarily sharing CAD with non-engineers and multi-CAD.

Engineering-enabled cloud file sharing solutions have the potential to improve performance by complementing formal, proven PLM or PDM systems. For smaller companies, who may find cloud file sharing more accessible than formal solutions, these solutions have the potential to add value to NPD performance even as standalone solutions. We believe that cloud file sharing solutions are worth investigating and may be able to play an important role in CAD and product development collaboration.

Cloud / SaaS file sharing solutions tailored for engineering can improve CAD and product development collaboration and improve the ability to hit product development targets to drive better product development performance.

About the Research

Data Gathering

Tech-Clarity gathered and analyzed over 200 responses to a web-based survey on companies that design / develop products (84%) or provide engineering / design services (16%). Survey responses were gathered through direct e-mail, social media, and online postings by Tech-Clarity, Siemens, and IndustryWeek.

Industries

The respondents represent primarily manufacturing and engineering industries. 37% were from Industrial Equipment / Machinery, 22% Automotive / Transportation, 15% Life Sciences / Medical Devices, 14% Architecture / Engineering / Construction, 12% Electronics / High Tech, 11% Aerospace / Defense, 11% Consumer Products, and others*.

Company Size

The respondents represent a mix of company sizes,

including companies employing less than 20 engineers (50%), 21 to 50 engineers (16%), 51-100 engineers (7%), 101-500 engineers (10%), 501-1,000 engineers (5%), 1,001-5,000 engineers (5%), and over 5,000 engineers (7%).

Geographies

Responding companies report doing business in North America (64%), Western Europe (39%), Asia (29%), Eastern Europe including Russia (14%), Latin America (14%), Australia (12%), Middle East (8%) and others including Africa.*

Supply Chain Role

58% of respondents are OEMs (making final products), 15% are Component / Subsystem Suppliers, 10% are Contract Designers, and the remaining come from Raw Material Suppliers, Part Suppliers, Distributor / Broker, and Retailers.

Role

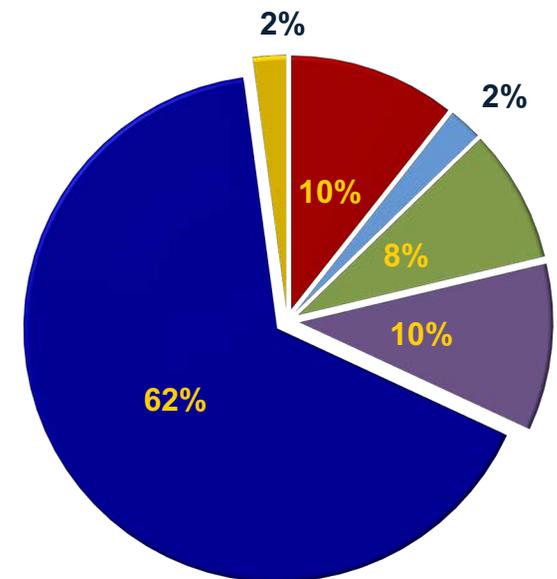
The respondents were comprised of 16% Manager level, 8% Directors, 10% Executive or VP Level, and 64% individual contributors, and others.

Organizational Function

Of the respondents, 51% were in Product Design / Engineering, 10% in Manufacturing, 8% in Industrial / Manufacturing Engineering, 8% in Industrial Design and the remainder were from a variety of organizations including Project / Program Management and Plant / Facilities Engineering.

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

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



- Executive, "C-level" (CEO, CFO, COO, etc.)
- Vice President
- Director
- Manager
- Non-manager, staff, individual contributor, engineer
- Other

Acknowledgments



Jim Brown
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About the Author

Jim Brown founded Tech-Clarity in 2002 and has over 30 years of experience in the manufacturing and software industries. Jim is an experienced researcher, author, and speaker and enjoys engaging with people with a passion to improve business performance through digital enterprise strategies and supporting software technology.

Jim is actively researching the impact of digital transformation and technology convergence in the manufacturing industries.



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References

- 1) Jim Brown, "Extending PDM Beyond Design Data Management," Tech-Clarity, 2019.
- 2) Jim Brown, "Design Data Management Maturity Improves Profitability," Tech-Clarity, 2017.
- 3) Jim Brown, "Accelerating Product Development with the Cloud," Tech-Clarity, 2020.

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