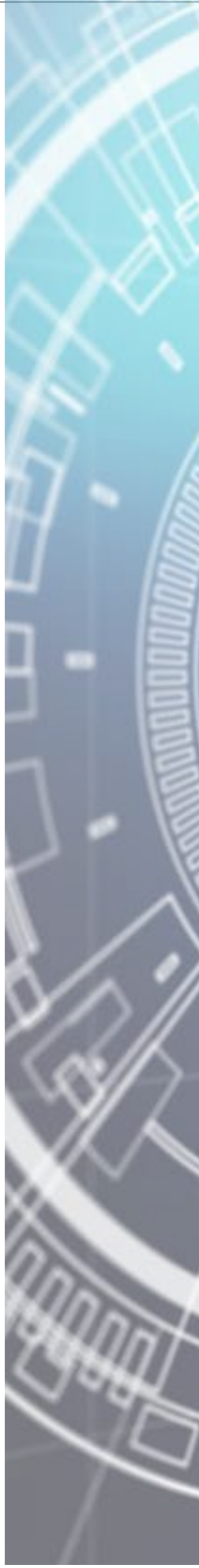
Tech-Clarity

The How-to Guide for Changing CAD Tools

What You Should Know

Michelle Boucher, Vice President, Tech-Clarity

Table of Contents



Executive Overview

Do you need to upgrade your design capabilities to keep up with competitors? Competing in today's global economy is not easy. With significant global competition plus pressure from new entrants and innovative startups, it is tough to stand out. Many companies are turning to new technologies such as 3D printing, new materials, smarter products, digitalization, and more to innovate. Tech-Clarity's research, How to Futureproof Your Product Design, finds that that 83% of Top Performing companies rate new technology as very or extremely important to their innovation goals. However, many of these technologies require new approaches to design. Will your CAD tool support these new approaches? With the right design tools, companies are better positioned to quickly bring high-performing, high-quality, innovative products to market. If you are struggling to keep up with competitors, your CAD tool may be holding you back.

Business reasons rather than problems with CAD tools have become more influential when choosing a CAD tool.

So what should you do if you find your CAD tool is holding you back? Should you consider a change? If so, what should you expect? Is it worth the time to convert archived data into a new format? Most importantly, do the benefits outweigh potential risks?

Tech-Clarity surveyed 192 companies to answer these questions. While there are many interesting findings, the most striking is that over time, business reasons rather than problems with CAD tools have become more influential when choosing a new CAD tool. Growing influencers include supply chains, the vendor's vision for design, and the CAD vendors' full breadth of offerings. This indicates CAD is now viewed as a strategic piece of a larger product development solution.

The biggest challenges of switching CAD tools are overcoming the learning curve and reusing legacy data. However, you do not need to convert all legacy data. In fact, on average, companies only convert about half of it, 52%. Despite the efforts involved, companies who have made a CAD change tend to be very happy. Eighty-three percent (83%) of respondents rate their satisfaction a four or five on a scale of one to five.

CAD is now viewed as a strategic piece of a larger product development solution.

The study also identified what successful companies look for in a new CAD tool. Top Performers are more likely to consider ease of use, Technical Support, software quality, and market share, which includes the size of the user community. Since implementing their current CAD tools, Top Performers have reduced development time by 19%, development costs by15%, and the time to implement ECOs (engineering change

Since implementing their current CAD tools, Top Performers have reduced development time by 19%, development costs by15%, and the time to implement an ECO by 16%.

orders) by 16%. They have also been able to increase the number of design iterations by 17%, helping them achieve greater levels of innovation.

Understand Business Needs for Design

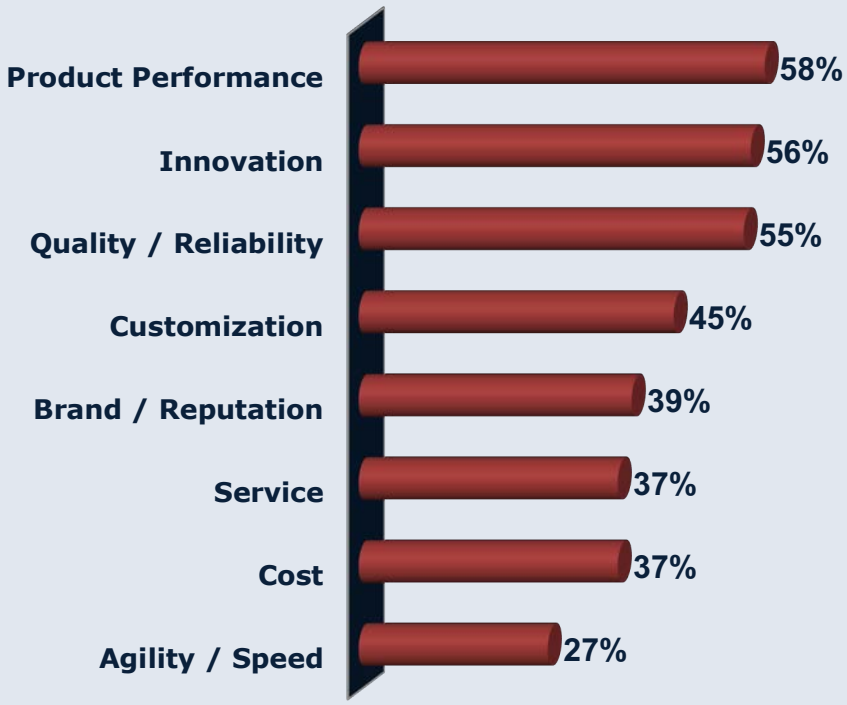
Today's global economy has created significant competition. With the internet, cloud technologies, and other advancements even small companies can have a global presence. Not only do companies find they must defend market share against global competitors, but options like Kickstarter have reduced the barrier to entry for new startups. Now companies must work even harder to differentiate.

The leading strategies today are very product-centric.

Tech-Clarity's study, *Product Lifecycle Management Beyond Managing CAD*, asked survey respondents how they differentiate themselves (Figure 1). The study finds, "The leading strategies today are very product-centric…Respondents appear to be focused on getting the product right for the customer with less focus on market factors such as speed to market or cost, which have been higher drivers in past surveys. Although they are not listed as ways to differentiate, we expect they are both still important factors for competitiveness in crowded, global markets."

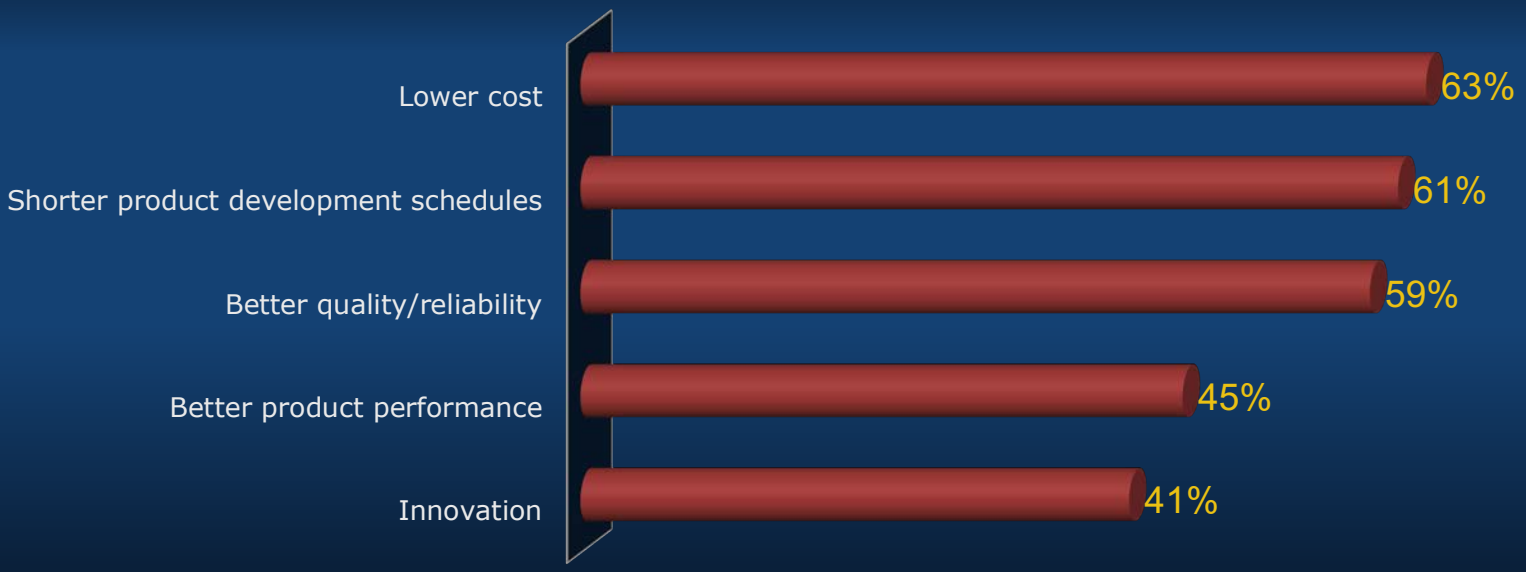
Companies also find they cannot focus on one thing. To be competitive, they must consider a variety of factors such as performance, innovation, quality, and personalization. This drives many companies to invest in the design process. Figure 2 shows the top reasons companies invest in design.

FIGURE 1: TOP DIFFERENTIATION STRATEGIES



Companies invest in engineering and design to lower their costs as well as to improve efficiency. Both impact top and bottom lines. Quick product cycles shrink the window of opportunity for maximum revenue potential. Before long, products are superseded by even newer products, diminishing the opportunity for additional revenue.

FIGURE 2: BUSINESS NEEDS DRIVING INVESTMENTS IN DESIGN



Plus, the faster a company releases its product, the smaller the development investment, making it easier to recoup those costs. Also, first to market has a competitive advantage for capturing market share, leading to higher revenues.

Additional cost savings can also come from IT. Tech-Clarity's Consolidating CAD finds that not only does consolidating CAD tools save licensing and hardware costs, but there are other benefits as well. The report states, "From the IT perspective, consolidation provides the ability to focus resources on a smaller number of solutions. This reduces workload and cost and allows IT to provide a higher level of business support with today's lean organizations…Beyond cost savings, though, are even greater strategic benefits… For example, a single CAD environment can enable a 'design anywhere – build anywhere' strategy. This approach allows companies to rapidly adjust to market changes and resource shortages by offering the ability to transfer design or production to new facilities without concern for incompatible design data, tools, or processes."

To be competitive, manufacturers must consider a variety of factors such as performance, innovation, quality, and personalization to differentiate products.

What Drives a Change in CAD?

Many reasons drive companies to switch CAD tools. For example, Arihant, a water park and playground equipment manufacturer, sought a design solution that was easier and faster to use so the company could boost productivity. "We needed to become more efficient to increase throughput," says Assistant Manager–Design Mithun S. Mandal, "Other goals

related to switching platforms included better graphical representation of product designs, shorter design cycles, and enhanced recruitment." The change has certainly paid off. Since implementing the new CAD software, Arihant has realized meteoric growth, boosting annual revenues by 250 percent in just two years.

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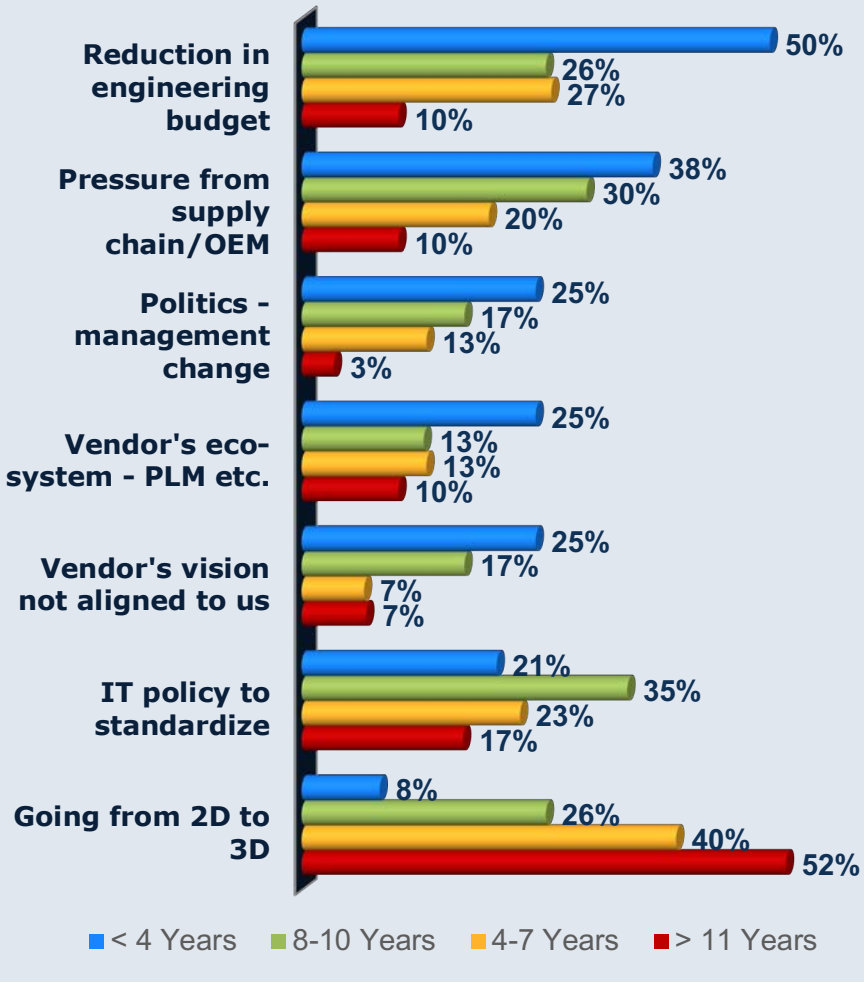
In other cases, the current CAD tool may be working well, but it may no longer fit corporate goals for growth, as was the case at Hutchinson Hayes Separation. Hutchinson Hayes Separation manufacturers separation equipment to separate solids from liquids in a wide range of applications from meat rendering to oilfield, petrochemical to marine fuels and vegetable oils to biodiesel. "Although we were successful using our old tools to support our standard product line, our business plan required us to develop new products for additional applications. To support the increased activity, we needed a 3D platform that would enable us to tighten up development and manufacturing," says Sales Manager Hans van der Voort at Hutchinson Hayes Separation. "By doing so, we could shorten delivery lead times and free up resources to go after new opportunities."

To understand the primary factors driving a change, Tech-Clarity looked at both business reasons and CAD challenges. Business reasons are external to CAD such as management decisions, corporate initiatives, or the vendor relationship. Over the last twelve years, business needs have evolved, impacting the motivators for a CAD change. Figure 3 compares some of the top business reasons for changing CAD.

FIGURE 3: BUSINESS REASONS DRIVING A CAD CHANGE



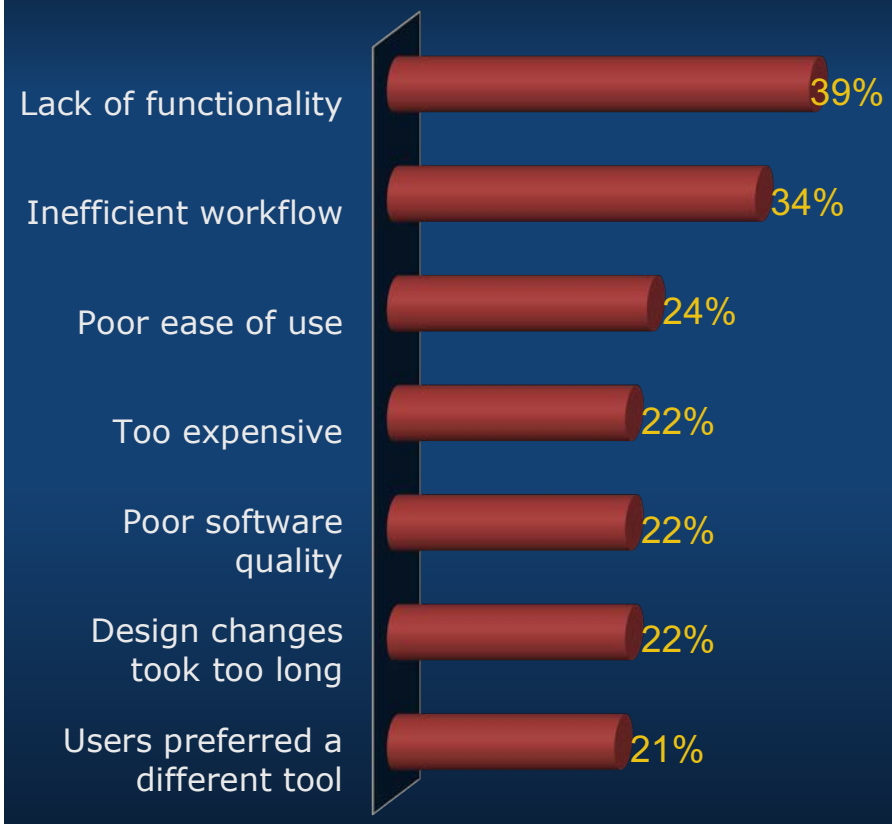
Companies who made a CAD change more than twelve years ago were often going from 2D CAD to 3D. More recently, budget reductions drive the

change. This could be because they are looking to save costs by consolidating CAD tools and licenses. Interestingly, this was also a top driver eight to ten years ago, at the height of the 2008 recession, but the pressure was coming from IT rather than the engineering budget. Companies making a change now may feel they will lower cost through efficiency improvements that better utilize resources and help release products more quickly. Compared to the past, companies are much more influenced by supply chains or OEMs, internal politics, and the vision for design and portfolio of products offered by the CAD vendor. The vendor's vision will likely continue to become more influential as companies look for ways to make it easier to make their products smarter, adopt 3D printing, and take advantage of other new technologies.

Compared to the past, companies are much more influenced by supply chains or OEMs, internal politics, and the vision and portfolio of products offered by the CAD vendor.

Tech-Clarity also looked at challenges using CAD tools which led to a change (Figure 4). While CAD tools have evolved significantly over the last twelve years, interestingly, the CAD focused drivers for change have remained consistent interestingly, the CAD focused drivers for change have remained consistent over the years. The most common reason is the existing tool lacks needed

FIGURE 4: CAD CHALLENGES DRIVING A CHANGE



functionality. Looking to the future, it will be critical that your CAD continues to evolve to support new technologies to make it easier for engineers to leverage it for innovation. As new technology becomes increasingly important to product innovation, CAD tools lacking functionality that makes it easier to incorporate new technology into your products could put you at an even greater competitive disadvantage.

Another top reason is an inefficient workflow, such as too many mouse clicks or a user interface that is not intuitive. In these cases, companies likely turn to a different CAD tool with an expectation that additional

functionality and a more efficient workflow will improve their productivity. As products continue to become more complex, tedious workflows will only become more burdensome.

Trends show that business decisions, rather than problems with the CAD tool have become more influential.

This was the case at Induce Design, a design services company. The company transitioned to new 3D design software in 2010 because the solution was easier to use, provided a more complete set of modeling capabilities, and helped the design firm leverage design for manufacturability tools. "I chose our design software as our primary tool because it's easier and more efficient for both modeling and engineering new product designs," says Owner and Principal Designer Hrishikesh Borude.

"Our new CAD software simply is a better fit for the design and engineering needs of our studio."

Since implementing the new design software, Induce Design has cut its design cycles by 30% and shortened the time to make design decisions by 30%. Borude attributes these productivity gains to the intuitive user interface of the new CAD software and the ability to communicate more effectively with clients.

Survey respondents were then asked to select the primary driver for changing their CAD tool. Interestingly, the primary driver has changed over time. Trends show that business decisions, rather than problems with the CAD tool have become more influential (Figure 5).

Supply chains, vendor relationships, vendor vision, and the full portfolio of offerings dictate the choice of CAD tools, indicating that CAD is viewed as a strategic piece of the overall product development solution.

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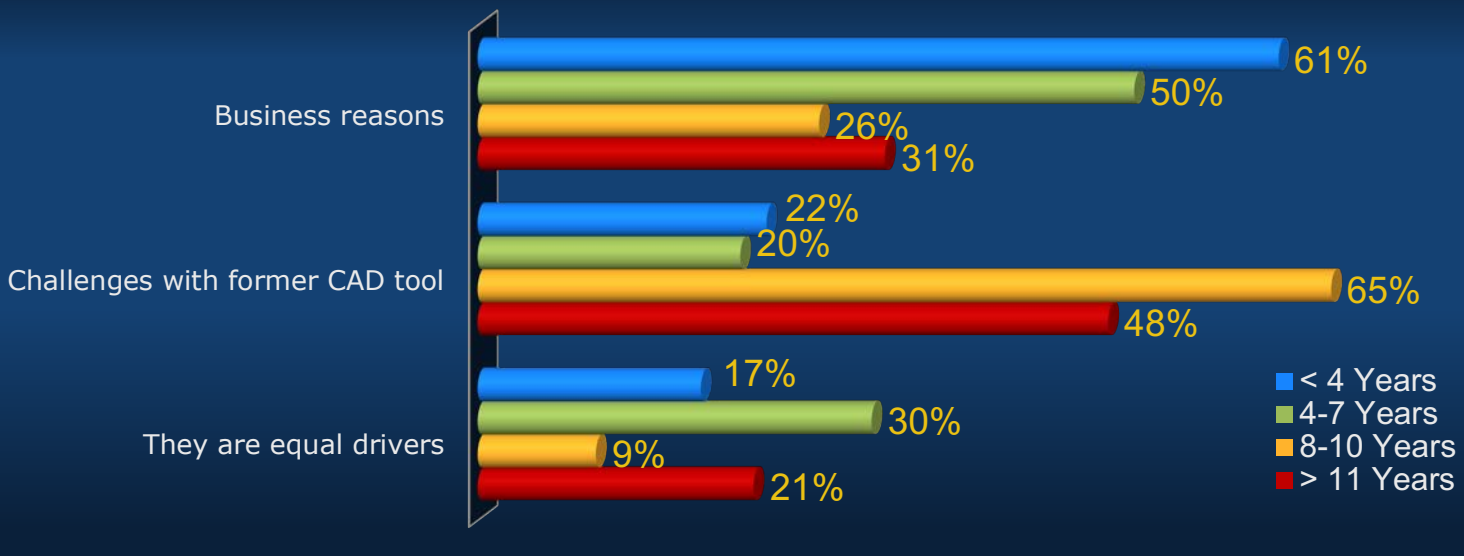
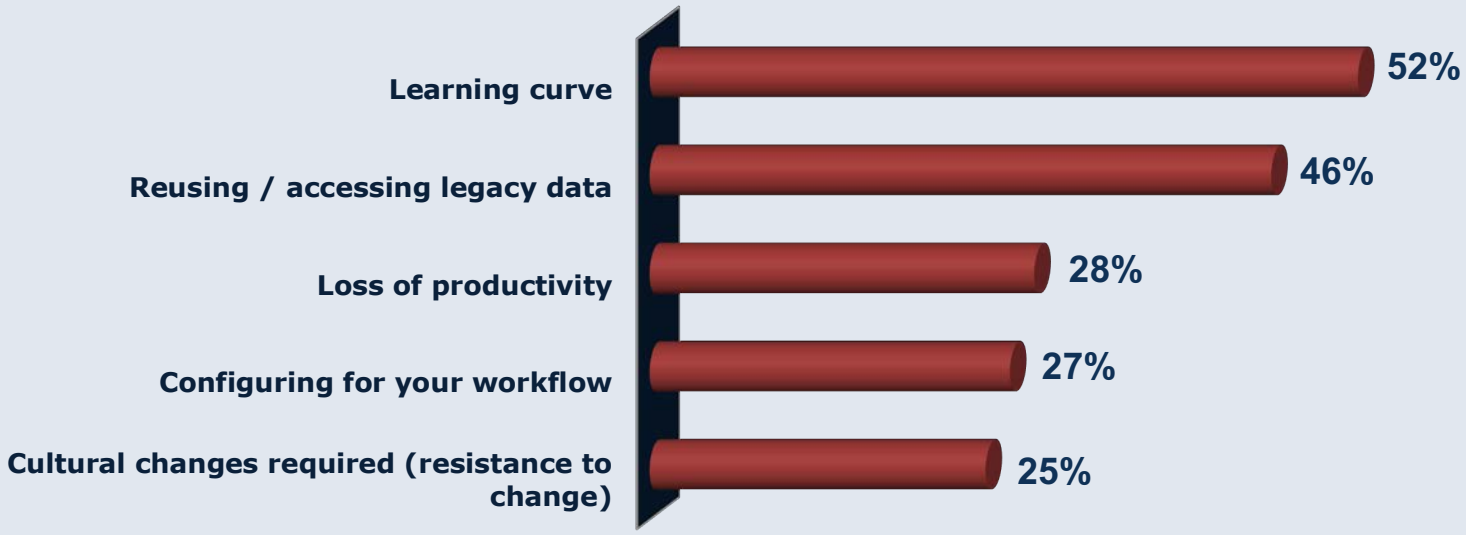
FIGURE 5: PRIMARY DRIVER OF CHANGE OVER TIME



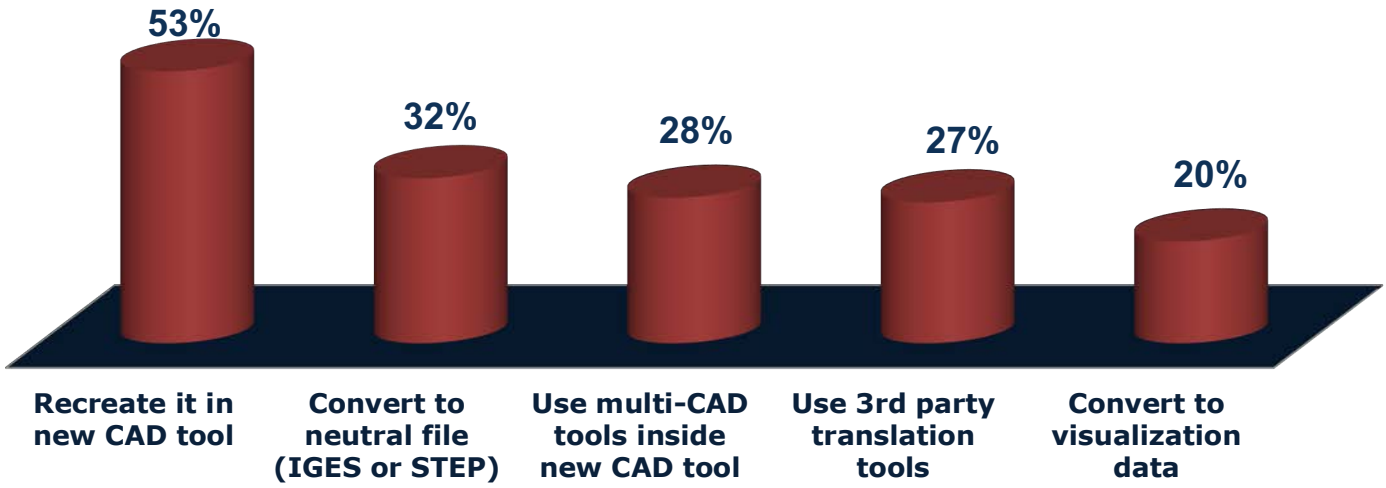
Set Expectations for the Change

FIGURE 6: TOP CHALLENGES OF SWITCHING CAD TOOLS



What should companies expect when making a CAD change? Figure 6 shows the top challenges. Employee education is the most common challenge, followed by reusing legacy data. Tech-Clarity explored the legacy data challenge further. Despite the advancements to support multi-CAD data, by far, the most common approach to legacy data is recreating it. Converting to a neutral format such as IGES or STEP comes next (Figure 7).

FIGURE 7: APPROACH TO LEGACY DATA

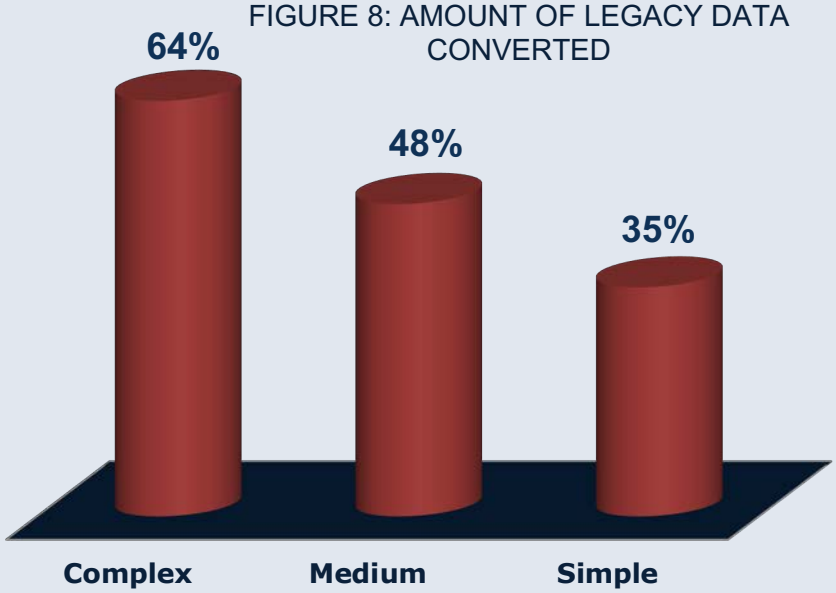


Overall, companies convert 52% of their legacy CAD data, but product complexity has an impact. They are more likely to convert it if it is complex (Figure 8). The number of configurations and components factored into the level of complexity.

Overall, companies convert 52% of their legacy CAD data, but product complexity has an impact.

Very complex models take a long time to recreate, so it is worth the effort to convert them. On the other hand, since very simple models are easily recreated, it is harder to justify investing time for conversion. As a mechanical engineering manager at a communications company commented, "The odds are you do not need to move all your legacy data into the new CAD tool. Keep one seat of the old CAD tool and move legacy data as needed. Odds are that most of the legacy data will not be needed in the future."

FIGURE 8: AMOUNT OF LEGACY DATA CONVERTED



Identifying Top Performers

To understand how the most successful companies approach a change in CAD tools, Tech-Clarity identified Top Performing companies. Top Performing companies were the top 20% of companies who rated their processes as more effective compared to their competitors in their ability to:

- Develop products efficiently
- Design high quality products
- Develop innovative products
- Meet cost targets

Table 1 quantifies the benefits enjoyed by Top Performers since implementing their current CAD tool. Regardless of their performance category, companies report significant improvements since implementing current CAD tool, but Top Performers see even more substantial gains. The ability to quickly make changes

Regardless of performance category, companies report significant improvements since implementing their new CAD tool.

TABLE 1: BENEFITS SINCE IMPLEMENTING NEW CAD TOOL

SINCE IMPLEMENTING CURRENT CAD	TOP PERFORMERS	OTHERS
Change in Development Time	**19%** Reduction	**14%** Reduction
Change in Development Costs	**15%** Reduction	**10%** Reduction
Change in Time to Implement ECOs	**16%** Reduction	**8%** Reduction
Change in Number of Design Iterations Evaluated	**17%** Increase	**9%** Increase

combined with efficiency improvements enable companies to evaluate more design iterations. Top Performers evaluate 76% more design alternatives than competitors which helps them become more innovative.

Top Performers evaluate 76% more design alternatives than competitors, which leads to greater innovation.

In fact, the need to evaluate more design concepts was an important consideration when ElliptiGO, an elliptical bike manufacturer, selected their CAD tool. "I knew that we would need to do a ton of iterations and analysis studies to get the design ready for commercialization and then support machining and production," stresses Brent Teal, Co-president at ElliptiGO.

While the efficiency gains are appealing, how much effort is required to make the change? Table 2 shows the average training time, time to resume full productivity, and the time to Top Performers report they spend less time on training, yet they resume productivity eight weeks sooner than their lesser performing competitors.

TABLE 2: WHAT TO EXPECT DURING A CHANGE

SINCE IMPLEMENTING CURRENT CAD	TOP PERFORMERS	OTHERS
Training Time	**6** Weeks	**9** Weeks
Time to Resume Productivity	**13** Weeks	**21** Weeks
Time to Recoup Investment	**46** Weeks	**50** Weeks
Satisfaction with ROI of CAD Switch (scale of 1 to 5, with 5 being extremely satisfied)	**4.7**	**4.0**

Despite the time investments to make the switch, companies tend to be very happy with the return on their investment (ROI).

The criteria Top Performers look for in a CAD tool likely contributes to this. recoup the investment.

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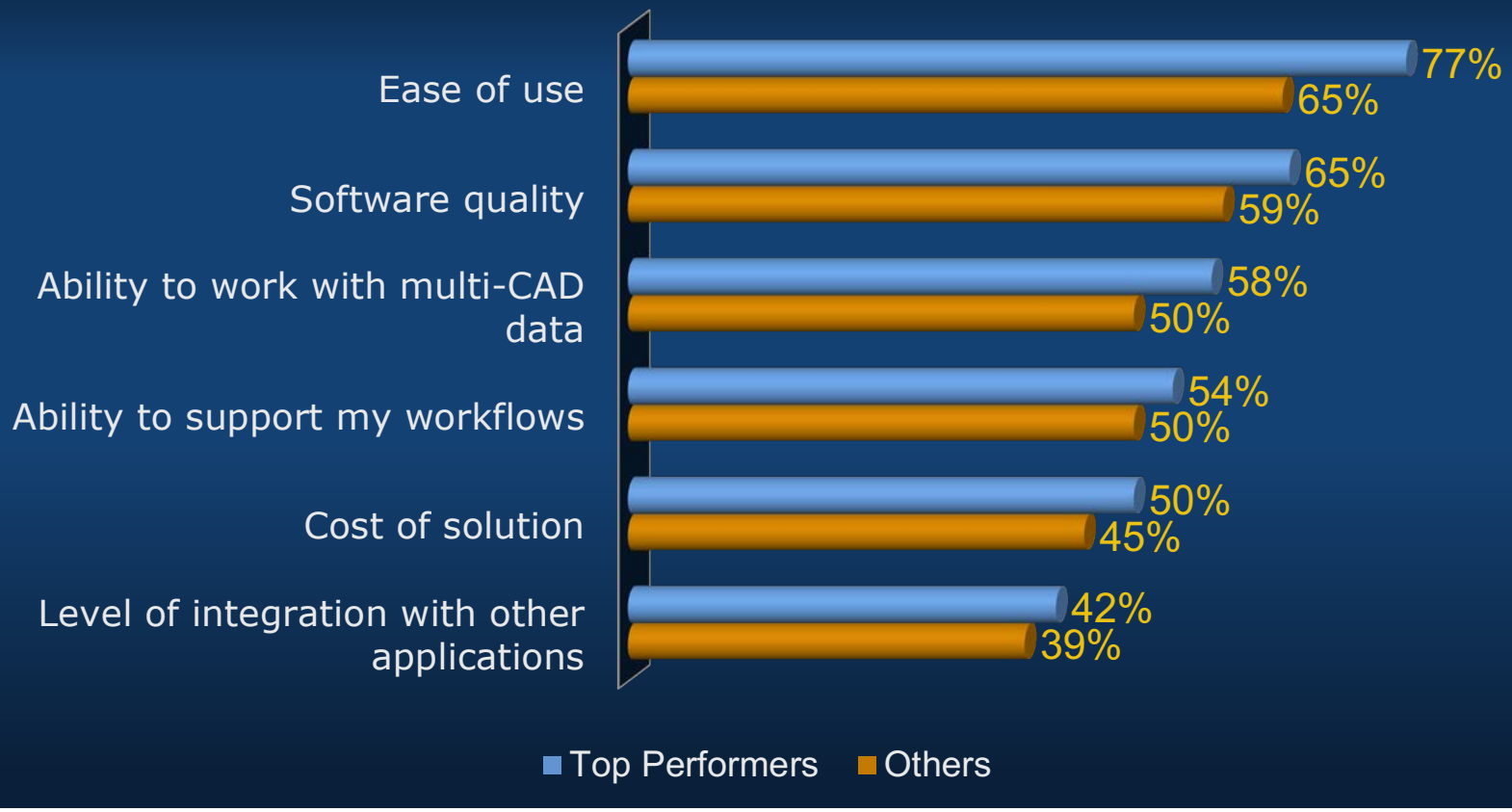
Despite the time investments to make the switch, companies tend to be very happy with the return on their investment (ROI). Overall, companies rate it a 4.2 on a scale of one to five, with five being extremely satisfied. Given their faster return to full productivity, Top Performers are especially happy, ranking their satisfaction a 4.7.

Identify the Right CAD Solution

What do Top Performers look for in a CAD solution? Compared to lesser performing competitors, Top Performers are more likely to look for Ease of use, software quality, and the ability to work with multi-CAD data (Figure 9).

FIGURE 9: TOP QUALITIES SOUGHT IN A NEW CAD SOLUTION



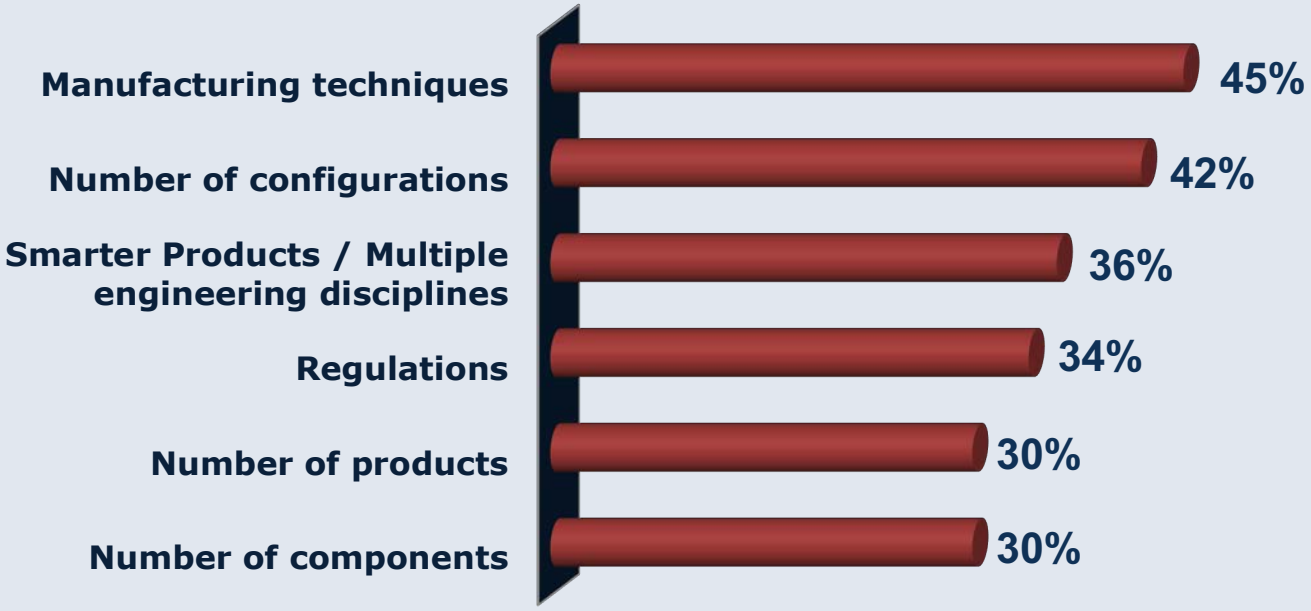
Top Performing companies are 19% more likely than competitors to rate ease of use as a top quality of a CAD solution. This likely helps them resume full productivity eight weeks before their competitors, even with less training.

Another part of selecting the right CAD tool involves planning for the future as your business evolves. Managing complexity already is a top challenge for companies and it will only get harder as products become more technologically advanced. Complexity comes from a variety of sources and your CAD tool should have functionality to help. Research from Tech-Clarity's *How to Futureproof Your Product Design* study identified top sources of complexity (Figure 10).

The graph shows that manufacturing techniques is a top source of complexity. Look for solutions that will help design engineers make better decisions about manufacturability. Consider CAD tools that support production processes you may need now and in the future such as 3D printing, CAM, plastic and mold design, and sheetmetal. Also look for capabilities to support configurations and design automation to help manage the various configurations of your products. CAD tools that support better collaboration between mechanical and electrical engineers will help the development of smarter

Top Performing companies are 19% more likely than competitors to rate ease of use as a top quality of a CAD solution.

FIGURE 10: TOP SOURCES OF PRODUCT COMPLEXITY

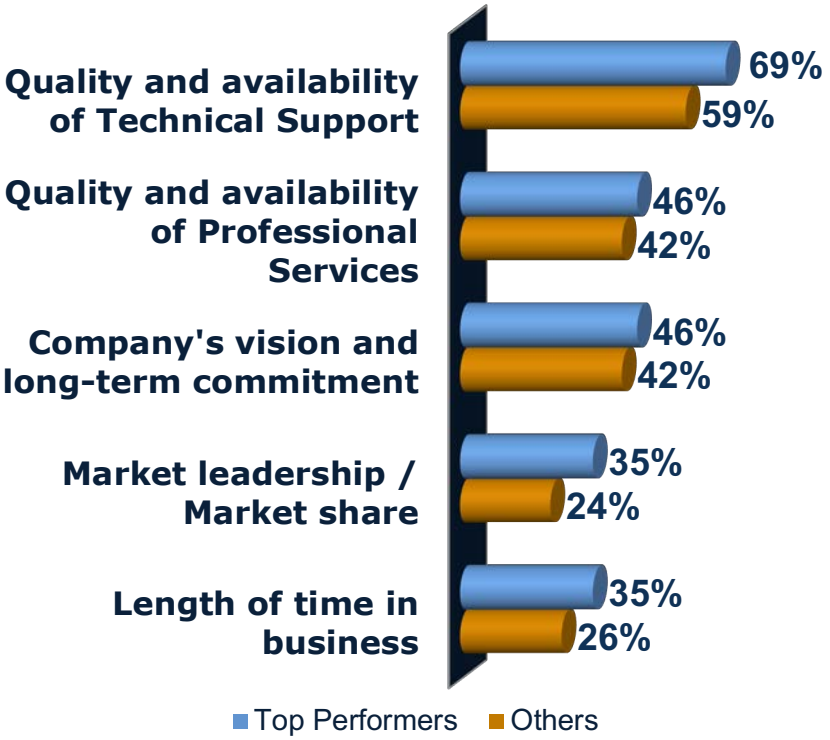


products. Finally, PDM or PLM capabilities can help with managing the number of products and components in your products.

In addition to the CAD tool, the vendor relationship is also an important consideration. With CAD playing a more strategic role in development, manufacturers need a vendor who is a true partner and can advise them on trends and functions they should consider. Figure 11 shows the top qualities companies value in a CAD vendor.

Top Performers are 18% more likely than their competitors to rate quality Technical Support as their top criteria for a vendor. Good phone support provides Top Performers with yet another resource to supplement training and enable engineers to quickly resume full productivity. Technical Support can come from either the vendor or VAR (Value Added Reseller) channels. What's important is that engineers have easy access to help.

FIGURE 11: TOP QUALITIES IN A CAD VENDOR



USSC, a manufacturer of seating for a variety of vehicles, credits the support of their VAR with helping facilitate the deployment of their new CAD tool. "Our VAR did an excellent job supporting the process," explains Jeff Krueger, Director of Product Development. "They held weekly conference calls with us, supported us at every step, and made us aware of what we could do with our new CAD software."

> "It's much easier to recruit talented designers and engineers who already know how to use it."
>
> — **Mithun S. Mandal**, Assistant Manager Design, **ARIHANT**

Top Performers are also 47% more likely to consider market share. Market share makes it easier to find partners and suppliers who are working with the same design tools. It also makes it easier to find a resource pool from which to hire. Trained users will need less training, so they become productive more quickly. This was part of the selection criteria at USSC. They evaluated different CAD tools against a range of requirements including the ability to hire trained designers and engineers, partners and customers using the solution, and pervasiveness within the supply chain. USSC chose the CAD solution that gave the company more freedom to work with partners, customers, and other integrated technologies.

A larger pool of trained users to hire from was also important to water park and playground equipment manufacturer, Arihant. Assistant Manager–Design Mithun S. Mandal notes, "In addition to providing greater accuracy and a much better graphical representation of our products, it's much easier to recruit talented designers and engineers who already know how to use it."

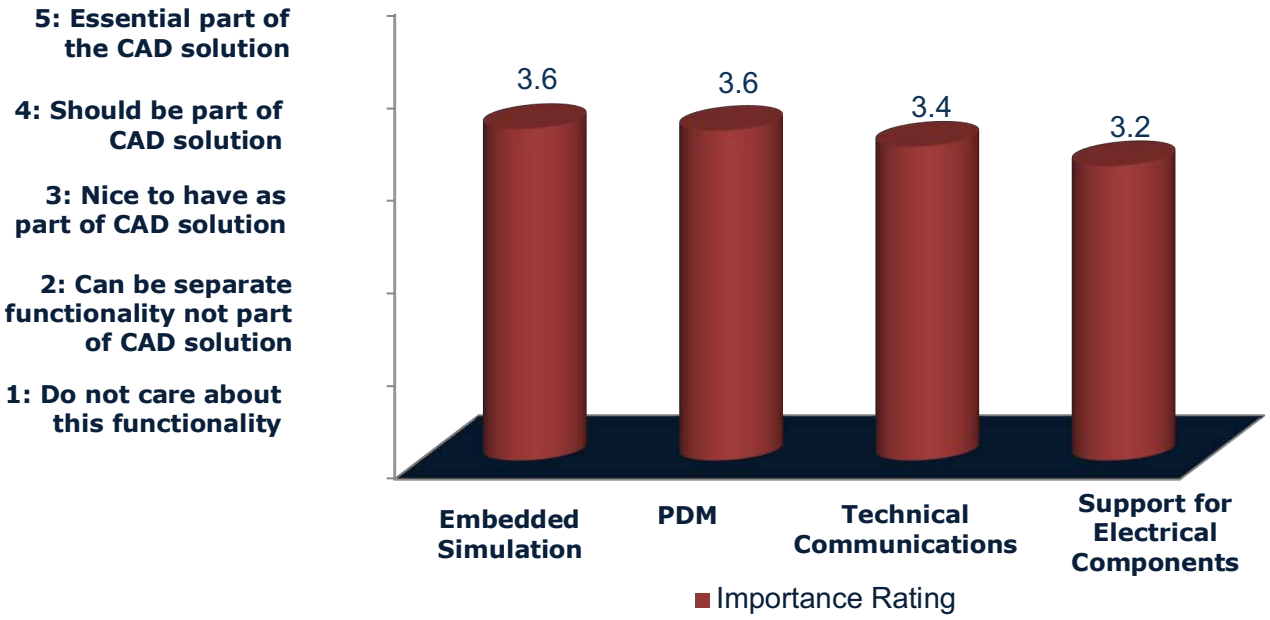
> "The non-financial aspects of CAD: culture, ease of use, vendor support, customer support, etc. are the real cost drivers and will affect your bottom line, not annual subscription price."
>
> — Configuration Manager

The many factors to consider when selecting a CAD tool can be overwhelming. This advice from a configuration manager can help maintain perspective, "The non-financial aspects of CAD: culture, ease of use, vendor support, customer support, etc. are the real cost drivers and will affect your bottom line, not annual subscription price."

Top Performers are also 47% more likely to consider market share.

Extend CAD

FIGURE 12: IMPORTANCE OF EMBEDDING EXTENDED APPLICATIONS IN CAD



Extended applications are another important consideration. Survey respondents rated their importance on a scale of one to five. Overall, companies prefer extended applications as part of their CAD solution (Figure 12). As products increase in complexity, respondents assign a higher importance rating on extended applications.

Integrated extended applications are important to Harvard Apparatus, a manufacturer of laboratory equipment for bioscience research products "We moved all our design work to a CAD tool that is easier to use, has integrated analysis capabilities, and is better for sheet-metal and plastic part design. We realized that with its additional functionality and file transfer capabilities, it was better for our company," says Engineering Manager Mark Davis.

Companies prefer extended applications as part of their CAD solution.

Conclusion

Empowering engineers can help companies as they struggle to compete in today's global economy. Quickly developing high-quality, innovative products, more economically helps companies differentiate and stand out from competitors. CAD tools, in particular, can have a significant impact on a company's ability to achieve this. CAD has evolved significantly, and those who find their existing tool no longer

meets their needs or will not support plans for growth may want to consider switching CAD tools. In many cases, companies have found it has had a very positive impact on their business.

Top Performing companies are more likely to consider ease of use and support resources when selecting a CAD tool. This contributes to their ability to realize even more value, in less time.

Recommendations

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

- Understand the business goals of your design process and ensure your CAD tool will support them. If not, consider a change.
- Consider other factors beyond the features and functions of the CAD tool, but also the ability to collaborate with your supply chain, market share including available community, the vendor's vision, the relationship with the vendor, and the needs for other supporting design tools.
- Consider extended applications as part of the CAD solution, such as embedded simulation, PDM, technical communications, and support for electrical components.
- Avoid overestimating requirements for training and loss of productivity by considering ease of use as well as available resources such as Technical Support, market share, and potential hiring pools.
- Convert only the legacy data you need. It's likely, you will only need half of it.

About the Author

Michelle Boucher is the Vice President of Research for Engineering Software for research firm Tech-Clarity. Michelle has spent over 20 years in various roles in engineering, marketing, management, and as an analyst. She has broad experience with topics such as product design, simulation, systems engineering, mechatronics, embedded systems, PCB design, improving product performance, process improvement, and mass customization. She graduated magna cum laude with an MBA from Babson College and earned a BS in Mechanical Engineering, with distinction, from Worcester Polytechnic Institute.

Michelle began her career holding various roles as a mechanical engineer at Pratt & Whitney and KONA (now Synventive Molding Solutions). She then spent over 10 years at PTC, a leading MCAD and PLM solution provider. While at PTC, she developed a deep understanding of end user needs through roles in technical support, management, and product marketing. She worked in technical marketing at Moldflow Corporation (acquired by Autodesk), the market leader in injection molding simulation. Here she was instrumental in developing product positioning and go-to-market messages. Michelle then joined Aberdeen Group and covered product innovation, product development, and engineering processes, eventually running the Product Innovation and Engineering practice.

Michelle is an experienced researcher and author. She has benchmarked over 7000 product development professionals and published over 90 reports on product development best practices. She focuses on helping companies manage the complexity of today's products, markets, design environments, and value chains to achieve higher profitability.

Michelle can be reached at michelle.boucher@tech-clarity.com. You can read additional research, watch Tech-Clarity TV, or join the Clarity on PLM blog at www.tech-clarity.com. You can also follow Michelle on Twitter at @MichBoucher, or find Tech-Clarity on Facebook as TechClarity.inc.

Michelle Boucher
Vice President
Tech-Clarity, Inc.

About the Research

Tech-Clarity gathered and analyzed 192 responses to a web-based survey in 2015 for the report, *Are You Changing CAD Tools? What You Should Know*. Survey responses were gathered by direct e-mail, social media, and online postings by Tech-Clarity. This report is an updated version of the findings from that research.

The respondents were comprised of 42% who were individual contributors, 39% were manager or director level, and the remaining 19% were from VP and executive levels.

The respondents represented a mix of company sizes, including 49% from smaller companies (less than $250 million), 7% between $250 million and $1 billion, 13% between $1 billion and $5 billion, and 11% greater than $5billion. 20% chose not to disclose their company size or did not know. All company sizes were reported in US dollar equivalent.

The responding companies were a good representation of the manufacturing industries, including Industrial Equipment and Machinery (35%), Automotive (23%), Architecture, Engineering, and Construction (20%), Aerospace and Defense (14%), Consumer Products (14%), High-tech and Electronics (12%), and others. Note that these numbers add up to greater than 100% because some companies indicated that they are active in more than one industry.

The respondents reported doing business globally, with most companies doing business in the North America (67%), about one-third doing business in Western Europe (34%), about another one-third doing business in the Asia-Pacific regions (32%), Eastern Europe (13%), and Latin America (10%).

Respondents included manufacturers as well as service providers and software companies, but responses from those determined not to be end users of CAD software (including software vendors and consultants) were not included in the analysis. The majority of companies were considered to have direct involvement in designing and developing products, and the report reflects their experience.

Acknowledgments

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.

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