

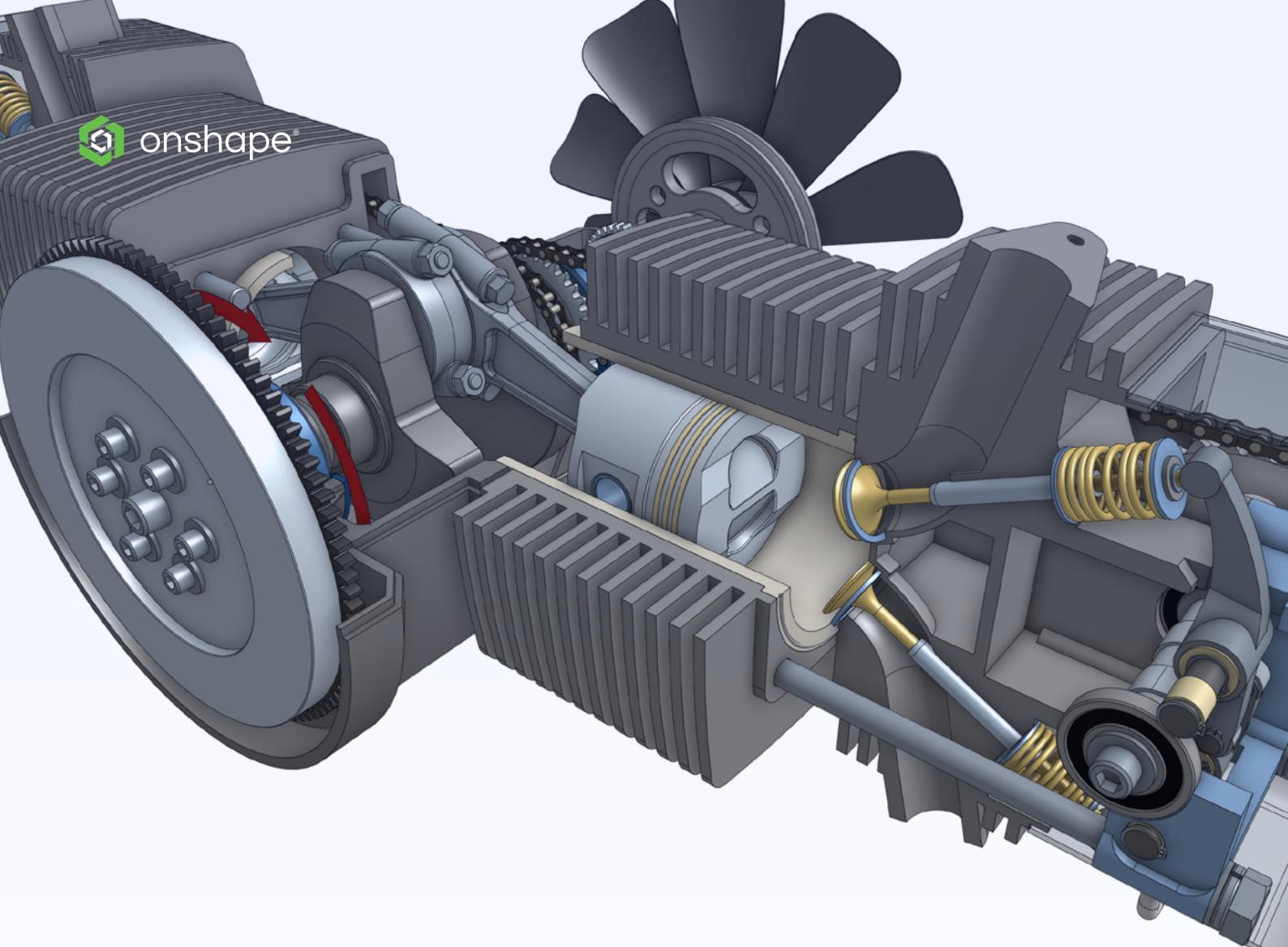
# The State of Product Development and Hardware Design 2021

The biggest challenges facing today's engineering and manufacturing teams – and their top priorities for improving business agility



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## INTRODUCTION

Today, companies that design and manufacture products are facing multiple challenges to their businesses.

**Customers**, acclimated to the one-click immediacy of e-commerce sites and services like Amazon and Uber, are bringing that expectation for fast responsive service to all areas of their lives.

**Employees**, many accustomed to the freedoms and work-life balance of working remotely, are increasingly averse to returning to the “old way” things used to be at the office.

**Competitors** now have few barriers to entry in any industry. With fast, available cloud computing power and the ability to recruit talent across the globe, new startups can quickly usurp larger, established businesses in a flash.

To better understand these ongoing challenges, Onshape commissioned the independent third-party research firm [Isurus](#) to conduct a broad-based product development industry survey.

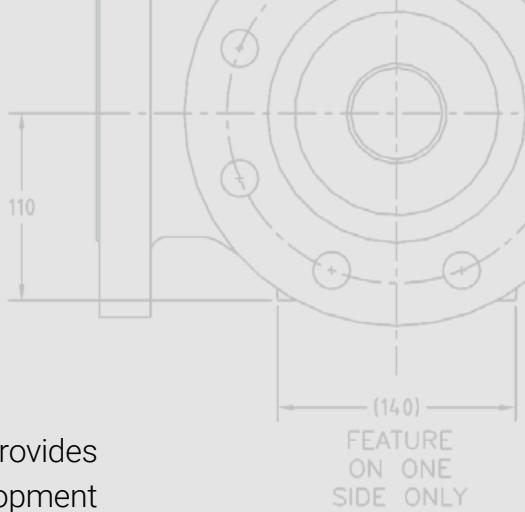
## INTRODUCTION

In this 2021 survey, which took the pulse of nearly 800 engineering and manufacturing professionals across the world, you'll gain insights on the following questions:

- **Areas of Improvement:** What aspects of the product design process need to be improved the most?
- **Performance:** How do manufacturing companies rate their own productivity and ability to drive innovation?
- **Perception Gaps:** Do executives, project managers and engineers have differing views about the strengths and weaknesses of their product development teams?
- **Technology:** How satisfied are product development professionals with the technology they are using today?
- **Work Flexibility:** How prepared are companies to provide the flexibility to work from anywhere?
- **Emergency Preparedness:** How has the pandemic impacted the processes and workflows of design teams?
- **Agility:** What can designers and manufacturers do to improve their business agility and resilience?
- **Generation Gap:** How are the expectations of Generation Z and millennials different from more senior engineers and executives?

Let's dive into *The State of Product Development and Hardware Design 2021* and explore some of the top engineering, design and manufacturing issues facing companies now and moving forward.

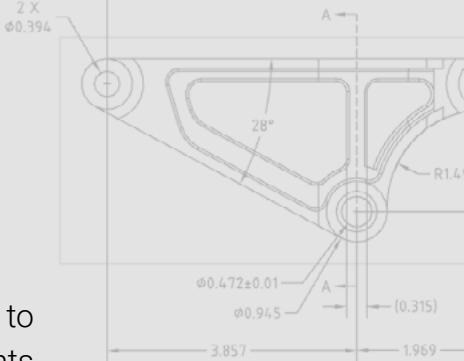
More data on the demographics of the respondents in this survey is available in the Appendix.



# Executive Summary

The *State of Product Development and Hardware Design 2021* report provides insights on the key challenges and opportunities facing product development professionals. The key areas that organizations are seeking to address in their business include:

- **Employees Are Seeking Improvement in the Technology They Need to Be Successful.** When asked to prioritize the most important design processes critical to their firm's success, and then rank their firm's capabilities against the criteria, respondents revealed critical shortcomings, or capabilities gaps. These gaps included "minimizing time spent on non-design related activities" with a 42% point gap; the lack of "early communication, visibility and clarity" in the design process, as well as a significant challenge in "managing data." The takeaway? Users want to focus on the work and they are seeking access to the technology that connects the data and colleagues they need to do it.
- **The View from the Top: Perception Differences Between Executives and Workers.** While it may be true that the view from the executive suite is usually different from the frontlines of business, the survey highlights a startlingly large gap between the perceptions of executives and their workers. Across all metrics, executives consistently graded their firm's development capabilities more highly than workers. In areas ranging from ensuring access to design data, reducing version control errors, and providing flexibility with remote work, the difference between executives and managers and engineers is significant. While it may be premature to draw definitive conclusions, the findings clearly highlight the need for executives to ensure they are paying attention to the difference in perspectives with their frontline workers.
- **Reducing Wasted Time.** Shockingly, the survey found that designers and engineers are saying they are wasting time on core fundamental tasks including simply accessing or locating critical design data they need. At a time when data is ubiquitous, more than 4 out of 5 respondents have difficulty finding the data they need to accomplish their tasks.



- **On-Premise PDM/PLM Slows Down Product Design.** When it comes to accessing and managing design data, the survey found 50% of respondents believe their on-premise PDM/PLM software creates delays in the design process. Intended to prevent the version control headaches common to file-based CAD, PDM nonetheless creates problems via the cumbersome check-in and check-out process it requires. In addition, 3 out of 5 on-premise PDM/PLM users said their software is “less user-friendly” than expected.
- **Highly Productive Companies Are Better at Supporting “Work From Anywhere.”** Companies that view themselves as highly productive are graded as better at supporting flexible work-from-anywhere policies. This positive correlation reinforces the notion that employees who are empowered to work on their own schedule will deliver better results for their firms. The caution for executives in this data is that executive-level respondents had a more positive review of their firm’s overall preparedness to “work from anywhere” than did managers or engineers. At a time when remote work is increasingly popular with today’s employees, companies that are better at supporting flexible work are likely to be more successful in attracting and retaining top talent from around the world.
- **In Today’s Uncertain Environment, Tools That Enable Team Collaboration Are More Important Than Ever.** When asked to prioritize tools and capabilities needed to be successful, the greatest request by respondents was for tools that: 1) Enable team members to collaborate even when working remotely; 2) Provide seamless access to design documents regardless of location; and 3) Let design team members more easily discover new information on their own. Clearly, as individuals are working remotely more frequently they are finding a need for product development solutions that enable improved collaboration and connectivity.
- **The Generational Gap: Millennial and Gen Z Engineers Expect More Flexibility.** The newest employees in the workforce, millennial and Generation Z engineers, uniformly rated their company’s capabilities lower in key areas than other workers and executives. As has been well documented by numerous business analysts and publications, today’s younger employees are seeking increased flexibility and work-life balance. The generational gap in expectations for younger employees should be of increasing concern to executives as they plan for the future success of their organizations.



# Product Development Survey Insights

insight  
**1**

## What Do Product Development Teams Need To Improve Most In 2021-2022?



Base: 666 respondents.

The “word cloud” above highlights the key areas that individuals believe need the most improvement in their product development process today.

The larger the word, the more frequently it was selected as an area for improvement. Concerningly, for leaders seeking to ensure their teams are empowered, critical process areas – such as communication, collaboration, access and management – are mentioned as frequently as design tools and technology (CAD, PDM, PLM).

Many of these keywords are related to data management challenges addressed later in this report, including the pros and cons of external add-on PDM/PLM systems and the difficulty engineers often have locating and accessing the correct design file.

Further exploring these top priority areas for improvement, we asked participants to identify which elements of the product design process are most critical to their company's success – and then we asked them to rate their own team's proficiency in that same area.

**INSIGHT 1**

**WHAT DO PRODUCT  
DEVELOPMENT TEAMS  
NEED TO IMPROVE MOST  
IN 2021-2022?**

In nearly every identified priority area, companies report they are falling short of where they know they need to be. This pattern of dissatisfaction is consistent across product development processes and design tools/technologies. No one gave themselves and their colleagues a perfect score.

## Gap Analysis: Importance vs. Current Capabilities

**1**

*How important are each of the following to the success of your company's product development process?*

**2**

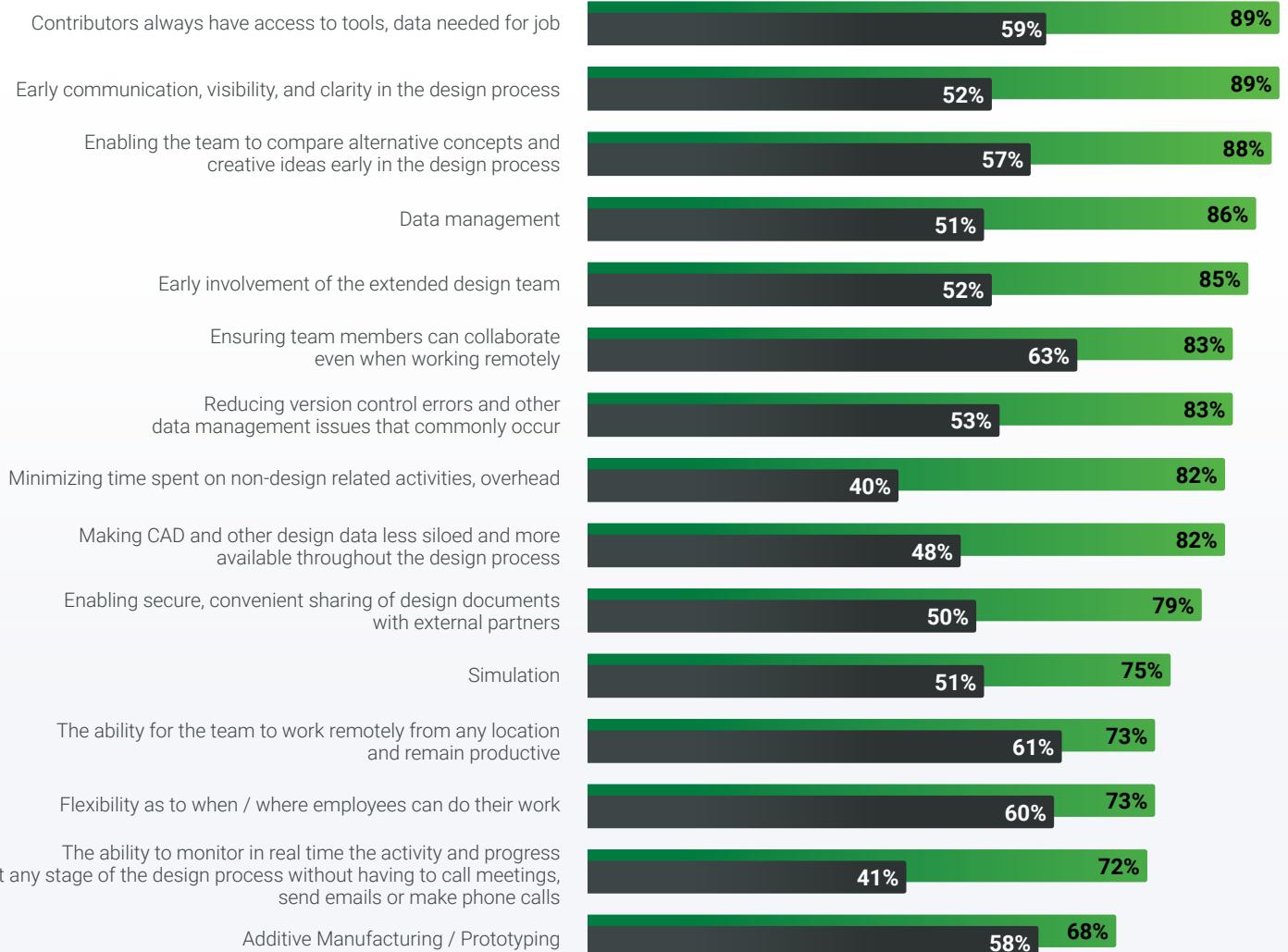
*How would you rate your company's current abilities in each of these areas?*



Very important or somewhat important



Current capabilities are "excellent" or "good"



Base: 699-774 survey respondents.

**INSIGHT 1**

WHAT DO PRODUCT  
DEVELOPMENT TEAMS  
NEED TO IMPROVE MOST  
IN 2021-2022?

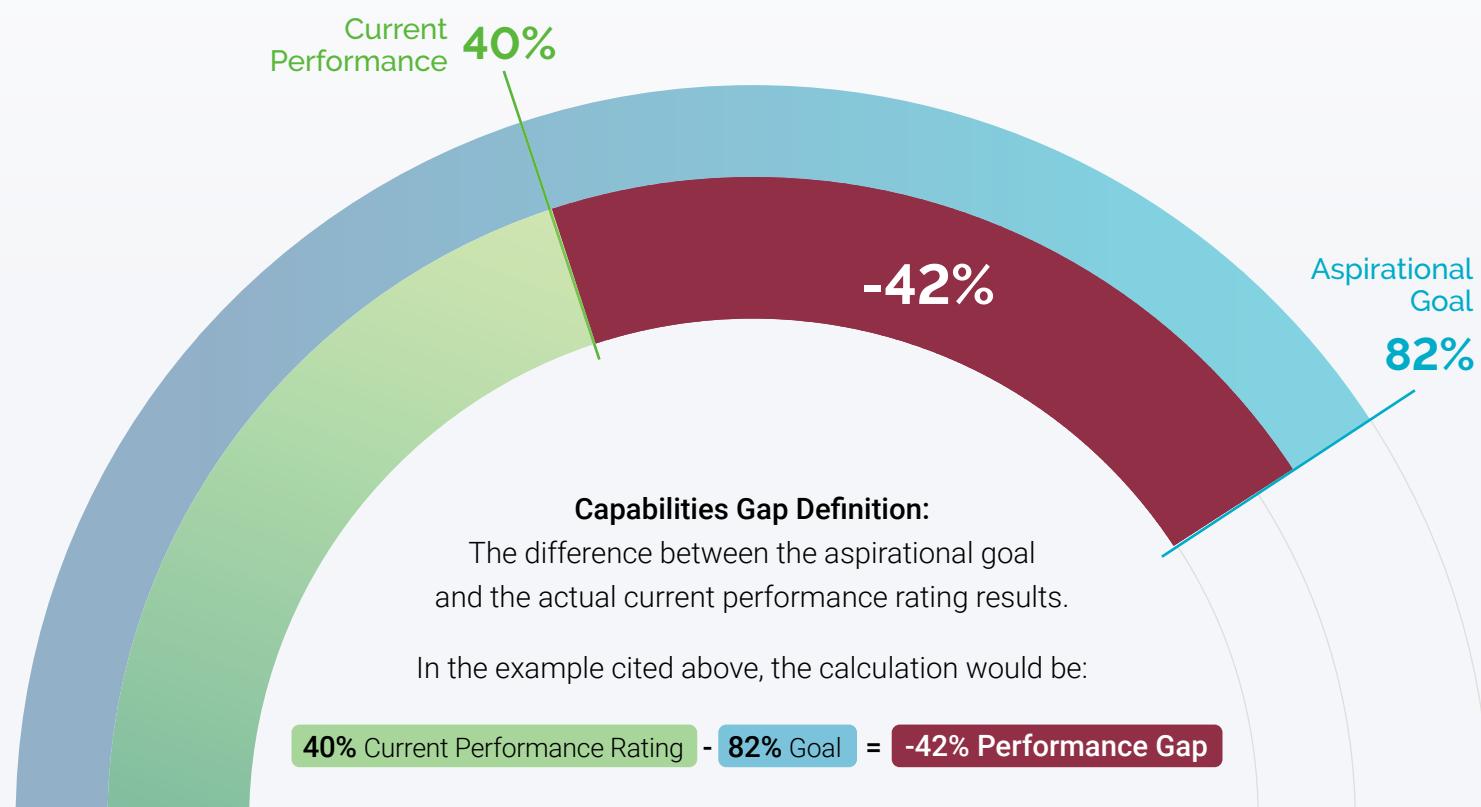
The priority areas on the previous page are listed in order of the respondents' perceived importance in the product development process.

It is striking to note that all of the **top 10 most important priority areas** concern product design processes (communication, data management, collaboration) as opposed to software functionality.

However, a more compelling story can be told by comparing the lengths of the black and green bars – the gap between a company's current abilities and the critical area's level of importance.

We call this deficit the "**Capabilities Gap**," which measures the difference between how successful a company wants to be in a specific area versus how successful they actually are at the moment.

For example, in the Gap Analysis on the previous page, 82 percent of respondents said they considered "minimizing time spent on non-design related activities" to play a very important or somewhat important role in the success of their product development process. But only 40 percent of those same professionals believe their companies are doing an "excellent" or "good" job at achieving that objective. Employees are becoming increasingly dissatisfied with complicated tools and processes that sap productivity and job satisfaction.



insight  
**2**

## The Capabilities Gap: How Companies Judge Their Actual Performance vs. Desired Goals

**-42%**

**Minimizing time spent on non-design related activities**

**1**

**-37%**

**Early communication, visibility and clarity in the design process**

**2**

**-35%**

**Data Management**

**3**

**-34%**

**Making design data less siloed and more available throughout the design process**

**4**

**-33%**

**Early involvement of the extended design team**

**5**

The five product development areas where teams report they need the most work focus much more on communication and processes versus tools. Design teams want more time to actually design and want to spend less time managing data. They want earlier communication and transparency beyond the core design team to include the perspectives of other internal stakeholders and outside partners. Earlier collaboration often results in considering more alternative ideas and increasing the likelihood of innovative improvements.

The number one “wish,” which is minimizing the time engineers spend on non-design related activities, is further explored on page 16.

insight

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## The Perception Gap: Executives Have a Rosier View of Their Design Capabilities than Project Managers or Individual Contributors

The view from the top is dramatically different than the view from the trenches. To explore this, we compared the “Capabilities Gap” based on job role.

The bar graphs below measure the percentage of respondents who rated their company “good” or “excellent” in each category.

**The difference between the frontline engineer ratings and the executive ratings defines what we call the “Perception Gap”.**

### The Perception Gap

*Current Capability Ratings By Product Development Role*

**Q:** How would you rate your company's capabilities in each of these areas?

**Percentage rated “good” or “excellent”**

- 1** Making design data less siloed and more available throughout the design process

**-17% GAP**

Engineers

**47%**

Managers

**43%**

Executives

**64%**

Base:  
Designers/Engineers:  
413-455 respondents;  
Engineering Manager  
or Team Lead:  
172-189 respondents;  
Executives:  
74-87 respondents.

**INSIGHT 3**

## The Perception Gap

- 2** Reducing version control errors and other data management issues that commonly occur



- 3** The ability for the team to work remotely from any location and remain productive



- 4** Contributors always have access to tools and data needed for the job



Base:

Designers/Engineers:

413-455 respondents;

Engineering Manager

or Team Lead:

172-189 respondents;

Executives:

74-87 respondents.

**INSIGHT 3**

## The Perception Gap

- 5** Flexibility as to when and where employees can do their work



- 6** The ability to monitor in real time the activity and progress at any stage of the design process without having to call meetings, send emails or make phone calls.



*Base: Designers/Engineers: 413-455 respondents; Engineering Manager or Team Lead: 172-189 respondents; Executives: 74-87 respondents.*

In all of the product development areas above, there is a consistent pattern of executives believing their company is doing a much better job than their engineers and project managers believe they are accomplishing. It is interesting to note the feedback from middle management. While one might expect project managers' ratings to be halfway between frontline engineers and executives, they are actually much more aligned with the individual contributors. This further underscores the conclusion that executives may be out of touch.

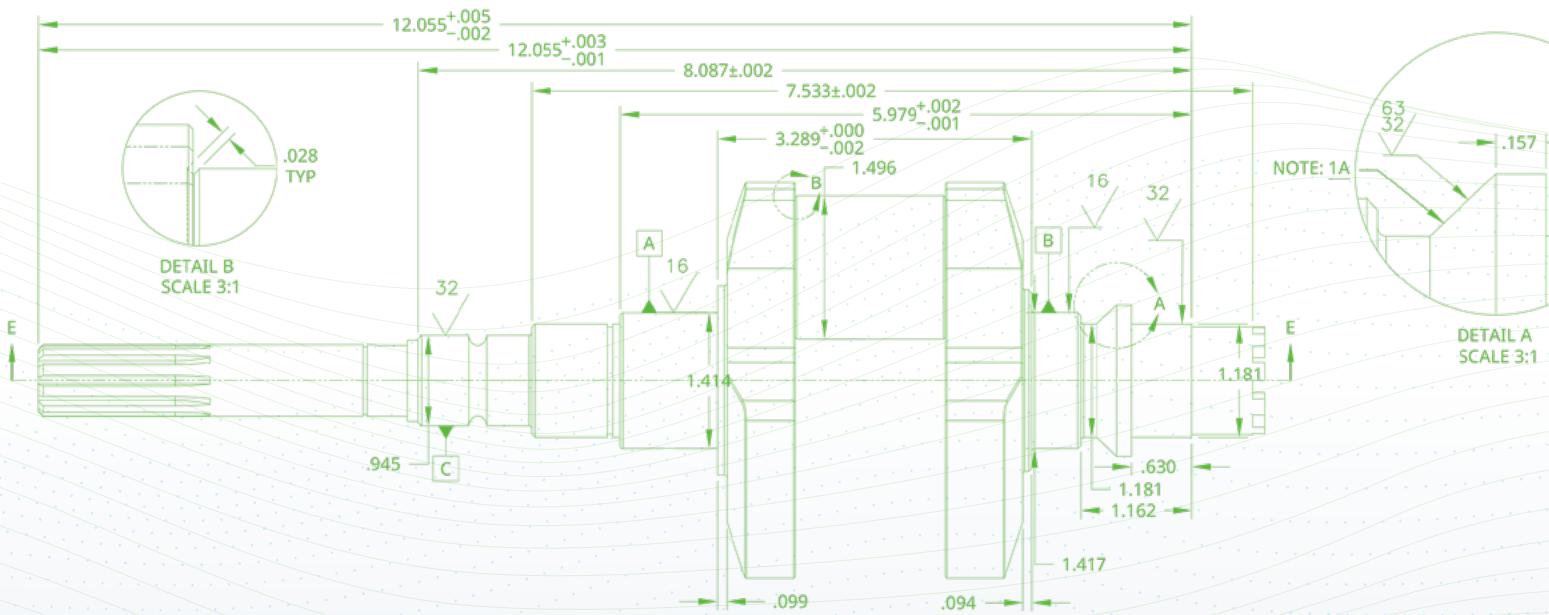
**INSIGHT 3**

## The Perception Gap

There is a measurable disconnect between how executives and their product development teams perceive the efficiency and quality of the design process. Logic would weigh in on the side of the engineers and project managers, who are the ones closest to the day-to-day product development.

Regardless of the psychology at play here, these survey results should raise concern amongst executives. Are they overestimating their firm's current technological capabilities and the effectiveness of their processes?

Design and manufacturing is a world of precision, where a difference of a few millimeters can cause costly mistakes and delays. Could these different perspectives about their company's true capabilities lead to unrealistic goals for delivering on critical project deadlines or customer expectations? Could these different views of the same reality be a result of poor internal communication?



insight

4

## Reducing Wasted Time: Most Hardware Engineering Teams Cannot Find the Correct CAD Data When They Need It

A key finding revealed by the capabilities assessment is that the most urgent priority for product development teams right now is to minimize the amount of time they devote to non-design related activities – tasks such as managing data, dealing with IT issues, and communicating with colleagues.

Companies live or die based on their intellectual property, and that IP is created by designers and engineers. Enormous sums are invested to generate the next big idea. Every hour the engineering team is not working on product designs wastes precious time and extends the wait for new improvements and innovations.

Wasted time also creates opportunities for competitors to catch up to your company or beat you to the market – provided that they are not wasting time, too.

So what activities are “stealing” design time? Let’s take a look.

### Importance of Reducing Wasted Time

**Q:** How important is it to reduce time related to each of the following activities?

**Response: “Very” or “Somewhat important”**

|  |            |
|--|------------|
| Accessing the correct design data      | <b>85%</b> |
| Locating the correct design data       | <b>83%</b> |
| Unproductive meetings                  | <b>73%</b> |
| Work lost due to crashes and data loss | <b>71%</b> |
| Technology maintenance                 | <b>71%</b> |

*Base: 776-787 respondents.*

**INSIGHT 4**

Reducing Wasted Time

## Design Team Productivity vs. Innovation

In today's digital economy, the pressure to continually increase productivity and drive innovation is unrelenting. For the third consecutive year, we asked survey participants to candidly rate their own company's performance on both criteria – on a scale from "very poor" to "excellent."

### How Companies Rate Their Own Productivity

**Q:** How would you rate the productivity of the product development process at your company?

**0%** Very Poor

**7%** Poor

**36%** Average

**46%** Good

**11%** Excellent

*Base: 792 respondents.*

Only 11% of respondents view the productivity of their company as "Excellent." Nobody who cares about their business or career leaps out of bed in the morning and asks themselves, "What can I do at work to be average today?"

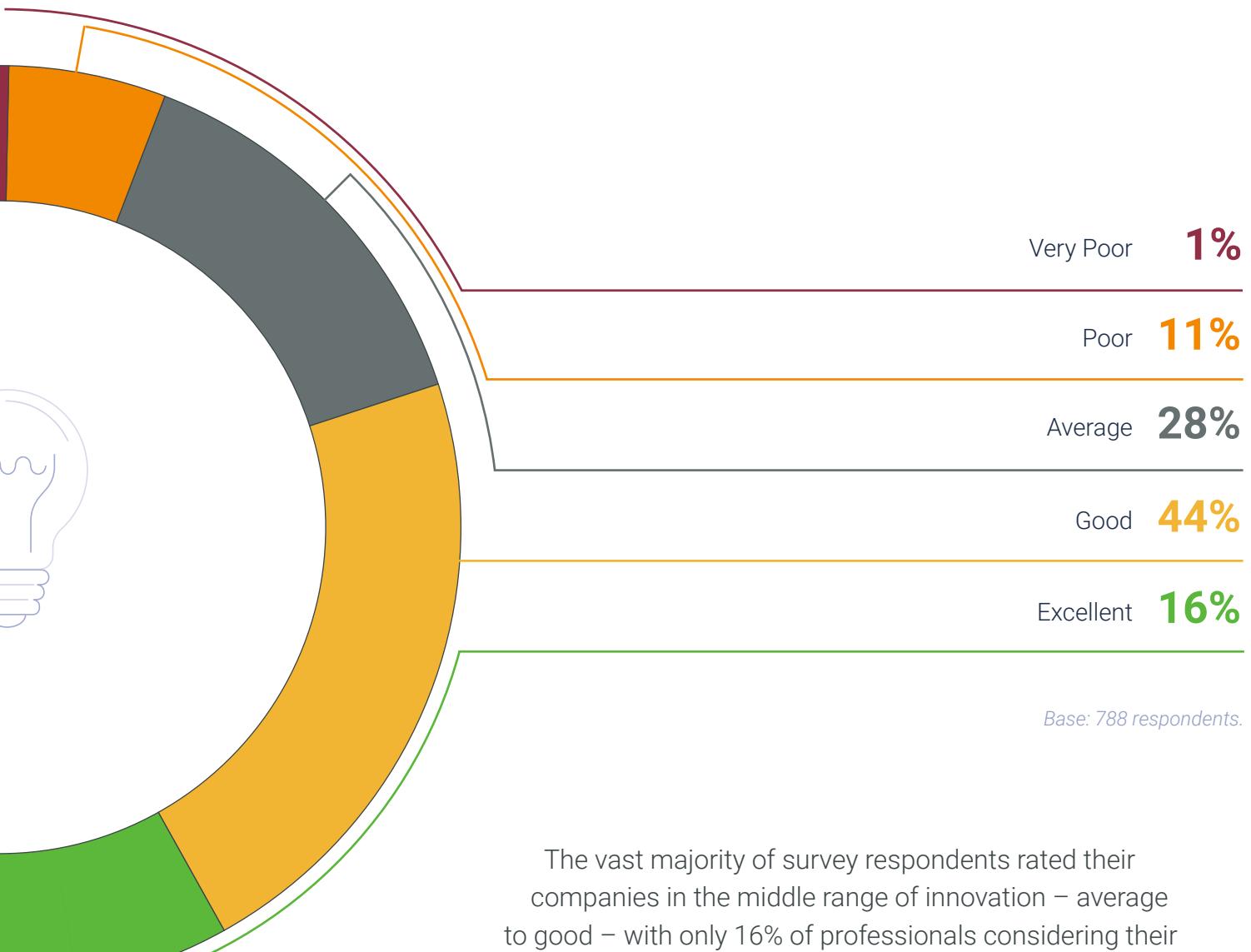
How do those self-rated "excellent" companies differ from the rank and file?

**INSIGHT 4**

Reducing Wasted Time

## How Companies Rate Their Ability to Drive Innovation

**Q:** How would you rate your company in terms of driving innovation in your product development process?



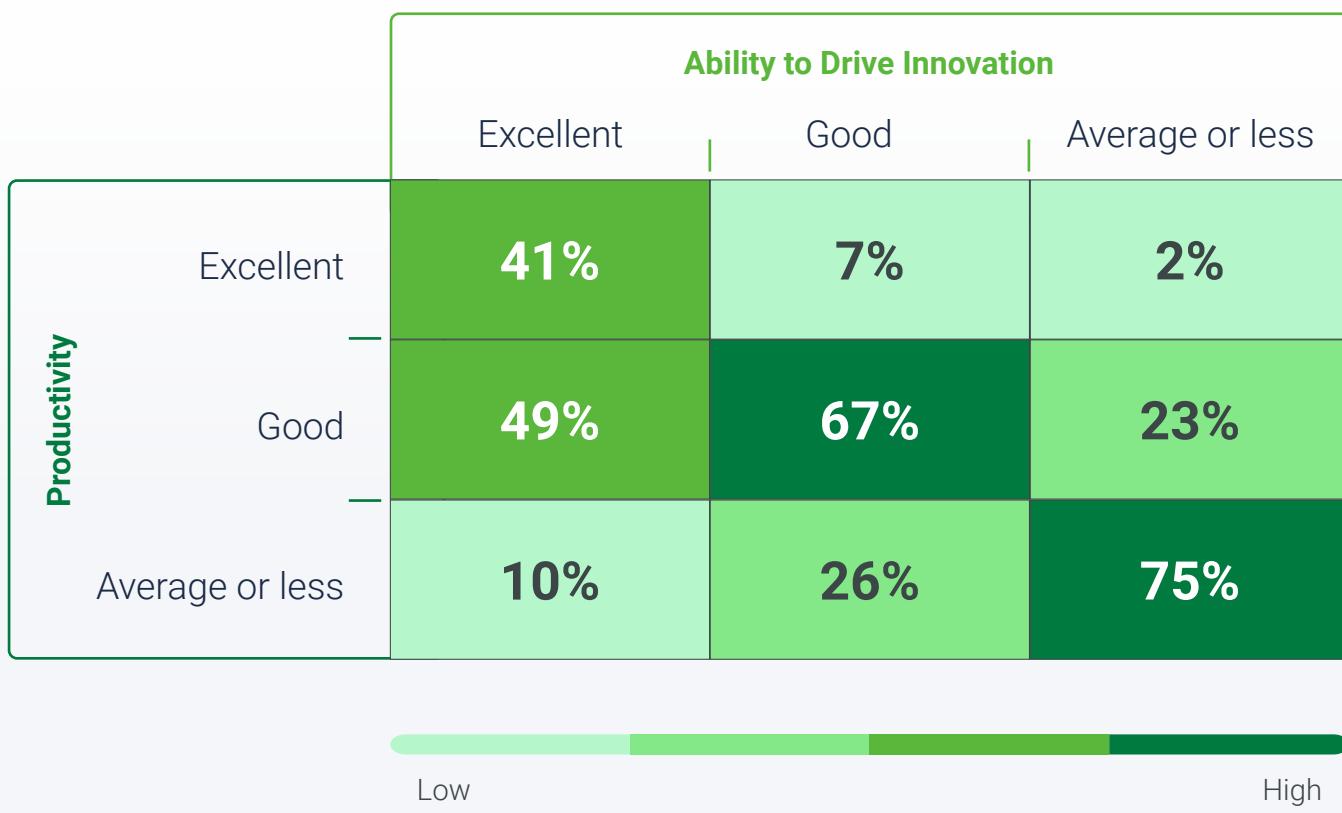
The vast majority of survey respondents rated their companies in the middle range of innovation – average to good – with only 16% of professionals considering their teams excellent. Put another way, **an overwhelming 84% of engineers, project managers and executives believe their companies have plenty of room for improvement.**

## INSIGHT 4

## Reducing Wasted Time

Even more compelling is the relationship between self-reported productivity and self-reported innovation:

# **Correlation Between Productivity and Innovation in Product Development (2021)**



Companies that view themselves as highly productive are more likely to rate themselves highly as innovators – and vice-versa. Note that only **2 percent** of people who rate their innovation as “average or less” see themselves as “excellent” at productivity.

Not surprisingly, productivity and innovation feed off each other. It is extremely difficult to achieve peak performance by taking the same approach year after year.

These results likely reflect a positive feedback loop. Firms that improve in one area are motivated to improve in other areas. Conversely, firms that feel stuck in one area may likely feel too discouraged to try elsewhere.

**INSIGHT 4****Reducing Wasted Time**

The wasted-time chart on page 16 reveals the most universal blockers to productivity and innovation. These survey results are worth revisiting because they are absolutely stunning. **More than 4 out of 5** product development professionals report having trouble finding the correct product design or accessing it.

Working on the wrong version of a design can lead to costly manufacturing errors, frustrating rework, wasted materials and possible liability issues. But it's also stolen time that could have been devoted to the next project. Not being able to locate the design in the first place is equally frustrating and unproductive.

The fact that the data management problems beat out unproductive meetings – everyone's favorite punching bag – is a notable feat. The engineering field, which places a high value on accuracy and precision, is still struggling with version control and making it easy for multiple contributors in a project to get to the right data.

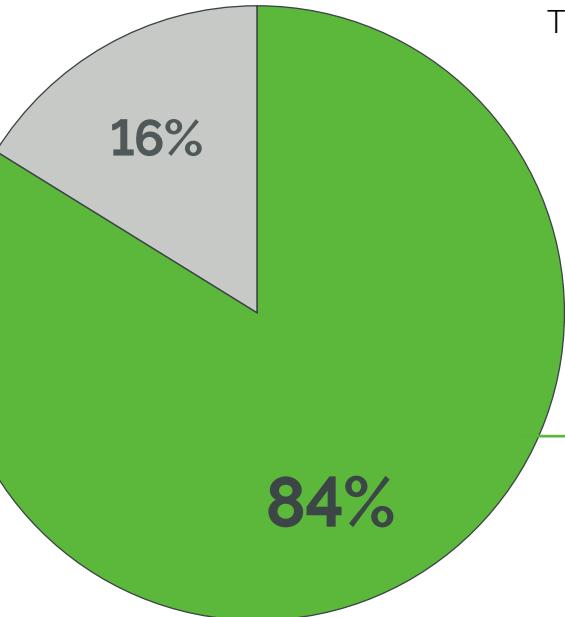
Rounding out the list of top time-wasters are CAD crashes and data loss (nothing is more aggravating than watching your work instantly vanish), and software and hardware maintenance.

Although long meetings will likely never go away, they could be reduced if employees could always get to the data they need and could communicate about it effectively peer to peer. This transition has already occurred in the software development industry and in the customer relationship management (CRM) space.

This list of time-wasters should motivate design and manufacturing companies to ask themselves, "How can we give our product design team more time for design?"

insight  
**5**

## Data Management: Half of PDM/PLM Users Say Their System Slows Down Product Design



Traditional file-based Product Data Management (PDM) and Product Lifecycle Management (PLM) systems might be considered the “frenemies” of the engineering world.

On the surface, most users of on-premise PDM/PLM systems report that their software does what it promises to do.

In the survey, **84% of PDM/PLM users agreed that these products help their teams avoid costly version control errors.**

However, these users cannot be considered happy customers. Here's the same group of survey respondents elaborating on what they don't like about their current data management solution.

### Drawbacks of PDM/PLM Systems

**Q:** Based on your PDM and/or PLM usage, how much do you agree with the following statements?

#### Percent Who Agree or Strongly Agree



Base: 250-265 respondents.

**INSIGHT 5**

## Data Management

For a product that has more than 80 percent of its owners praising its effectiveness, a high volume of complaints is quite unusual. These complaints aren't focused on trivial bells and whistles, but fundamental blockers of the product development process.

**Consider that:**

**3 out of 5**  
on-premise PDM/PLM  
users say their software  
is "less user-friendly"  
than expected



**1 out of 2**  
on-premise PDM/PLM  
users say their software  
is "cumbersome" and  
leads to delays in the  
design process



**nearly half**  
of on-premise PDM/PLM  
users say their software  
only "replaced one  
problem with another  
problem"



Why would a customer ever purchase a product that solves one problem, but causes several others? The only logical explanation would be that they are not aware of a better available solution.

On-premise PDM/PLM systems prevent version control errors by ensuring that only one engineer at a time can work on a design file. Files must be checked in and out of a vault, and no one can access a file until it is returned. This approach does eliminate the risk of two engineers accidentally overwriting each other's work, but it also makes it impossible for multiple people to simultaneously work on the same design.

Even more counterproductive is that while that design file is checked out, no one else can see how it is evolving. It is effectively siloed. On-premise PDM/PLM inherently forces teams to adopt a slower, serial workflow instead of a speedier parallel one.

Based on the major drawbacks cited by half of PDM/PLM users, it is clear that engineers want to be able to trust a single source of truth for version control, but also one that is always visible and accessible to any team member. This is already a reality in the software development and CRM worlds, but not in the manufacturing design process.

insight

6

## Work Flexibility: Companies That View Themselves as Highly Productive Are Better at Supporting “Work From Anywhere”

Within a product development team, not every job can be accomplished remotely. However, companies are now finding that many team members can remain productive if they are empowered with the right technology, such as cloud-native CAD and data management platforms.

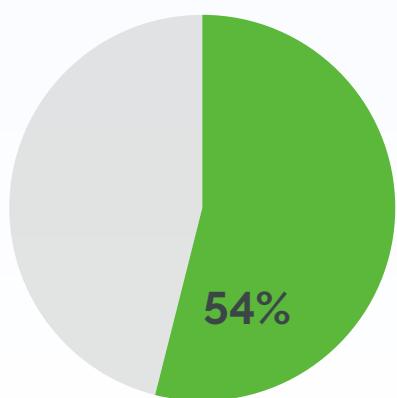
Taking a cue from the Perception Gap ratings on page 12, we explored how different job roles viewed their own company's institutional support for work outside the office. Do they believe the right tools and processes are in place to make remote team collaboration successful?

### Perception of Company Support for Remote Workers (By Job Role)

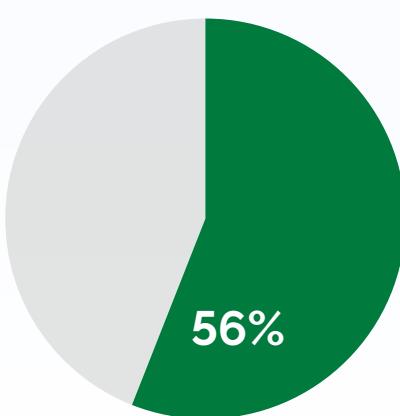
**Q:** How would you rate your company's ability to provide employees the tools and processes they need to effectively work from home?

Percent rating “Good” or “Excellent”

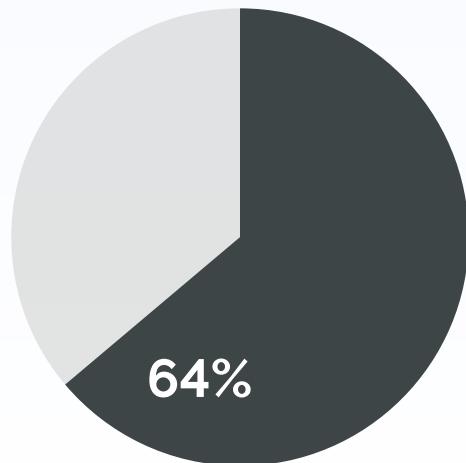
Designer or Engineer



Engineering Manager or Team Lead



Director, VP or Executive



**Base:** Designers - Engineers: 459 respondents / Managers: 190 respondents / Executives: 88 respondents.

**INSIGHT 6****Work Flexibility**

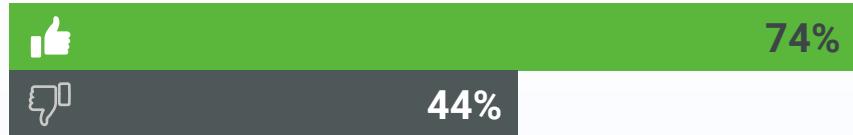
Echoing the other perception differences by job role outlined in this report, executives have a much more positive (perhaps overly optimistic) review of their overall preparedness to “work from anywhere.” This could be a function of many executives exclusively using cloud communication tools like Zoom, Microsoft Teams or Slack, but not directly experiencing the day-to-day CAD and data management responsibilities.

Using the self-reported productivity ratings highlighted on page 17, we also wondered if there was a correlation between highly productive companies and strong institutional support for flexible work schedules and remote work.

## Comparison of High vs. Low-Productivity Companies on Their Work Flexibility Expectations and Capabilities

◆ “Excellent” or “good” productivity      ◆ “Average” or less productivity

Able to effectively support work-from-home



Highly value giving employees flexibility for when and where they work



Highly value the use of remote collaboration tools



*Base: Average, Poor or Very Poor Productivity (297-326 respondents); Excellent/Good Productivity (400-435 respondents)*

Across the board, by more than a 30 percentage point spread, companies that view themselves as highly productive also place a high value on flexible work hours and flexible workspace.

It could be argued that companies that invest in cloud collaboration tools and give workers more freedom to manage their own time are also investing in company morale and employee mental health.

Offering more workplace flexibility to employees for improving work-life balance is increasingly becoming a priority for human resources departments in their recruiting and talent retention efforts. We explore this shifting dynamic in **Insight #8: The Generational Gap**.

insight  
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## Pandemic Impact: Team Collaboration Tools Are Now a Higher Priority For Product Development Firms

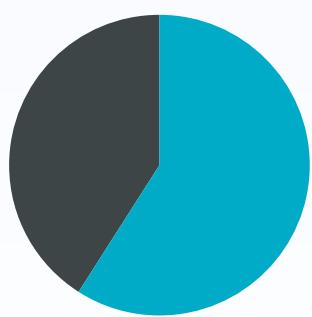
After the explosive growth of Zoom and Microsoft Teams in 2020, it appears that there is still a growing demand for other cloud collaboration software as well. As companies were forced to have more online meetings during the pandemic, many decided that these tools were more efficient for team communication regardless of the situation.

**Keep in mind that the increased usage seen below is on top of last year's unprecedented growth of this category of business software.**

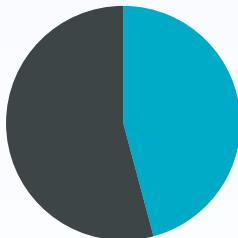
### Business Software Used More During Pandemic Than Previously

**Q:** Which of the following products have you used MORE in the past year than in prior years?

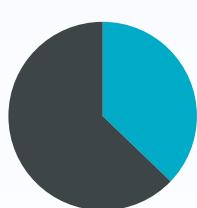
Microsoft Teams  
**59%**



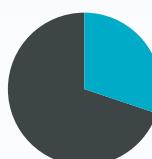
Zoom  
**46%**



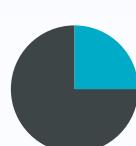
Microsoft Office 365 with online features  
**37%**



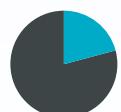
Installed Microsoft Office  
**30%**



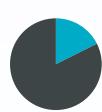
G Suite or Google Apps  
**25%**



Dropbox  
**21%**



Microsoft Office 365 files stored locally  
**18%**



Slack  
**10%**



Salesforce  
**4%**



Other  
**12%**



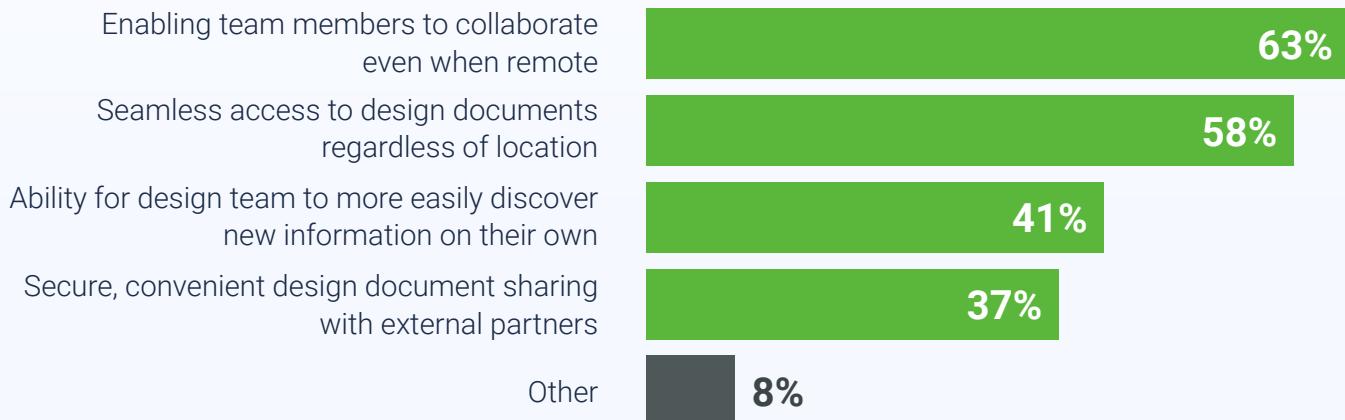
Base: 761 respondents.

**INSIGHT 7****Pandemic Impact**

From a product development perspective, we asked survey participants to identify aspects of team collaboration and the design process that have increased in importance as a result of their pandemic work experience. Many of these items are related to the functionality of their chosen product design software.

## Product Development Capabilities Which Are Now More of a Priority Due to the Pandemic

**Q:** Given the lessons learned from the COVID-19 pandemic, which of the following are MORE of a priority to you now? (Select all that apply)



Base: 690 respondents.

Adapting to work under pandemic conditions magnified the importance of “anywhere/anytime” access to design documents, and the value of remote team members being able to collaborate from multiple locations as if they were in the same office looking over one another’s shoulders.

The experience also underscored the importance of everyone having 24/7 visibility into the status of a project (without waiting for a formal design review), and making sure that external partners could receive the latest design updates in a secure and speedy manner.

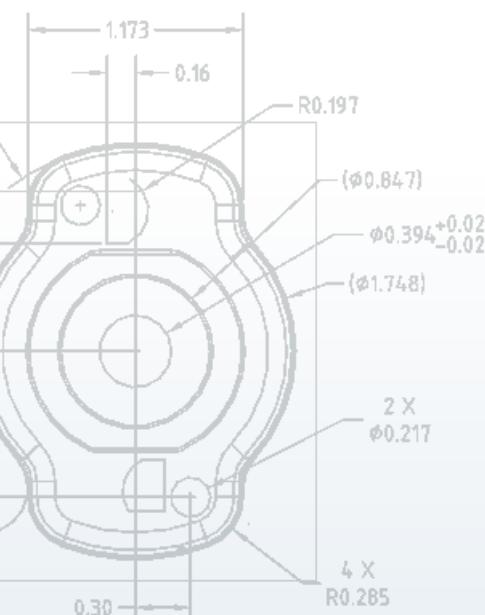
**INSIGHT 7****Pandemic Impact**

Interestingly, this list of pandemic “lessons” overlaps significantly with the survey’s most important product development priorities for 2021-2022 (as identified by the “Capabilities Gap” on page 11):

- 1. Minimizing time spent on non-design related activities**
- 2. Early communication, visibility and clarity in the design process**
- 3. Data Management**
- 4. Making design data less siloed and more available throughout the design process**
- 5. Early involvement of the extended design team**

The similarity between these lists should come as no surprise. While the pandemic may have put a spotlight on some of the key blockers slowing down product development, overcoming them is a universal challenge facing the industry, period.

The idea that the pandemic has accelerated the transition to cloud-native technologies to improve productivity has been validated by industry analysts. According to [McKinsey and Company](#), businesses have “vaulted five years forward in consumer and business digital adoption in a matter of around eight weeks” because of COVID-19.



insight

8

## The Generational Gap: Millennial and Gen Z Engineers Have Higher Expectations for Work Flexibility and Instant Access to Information

As executives develop strategies to ensure future growth, they may want to consider that the entry-level engineers their company will hire a decade from now are still in middle school today. Pause to think about that for a moment.

Generational differences do make a significant impact on company culture and on how teams work together. As each generation becomes accustomed to more advanced technologies – think about how skilled today's toddlers are with an iPad – their expectations for tech in both their personal and professional lives are higher. Young people who were bottle-fed video streaming do not want to go back to VHS tapes, DVDs or even DVRs.

To determine the most urgent priorities for improvement in the product development industry, this survey asked respondents to identify their most important goals and then measure their company's performance against those goals (see "**The Capabilities Gap**" on page 11). Drilling down further into these candid self-assessments, we wondered if there would be any noticeable differences in answers based on engineers' years of experience in the industry.

For most survey questions, the answers were very consistent across experience levels. However, a few categories stood out as markedly different.

After breaking down responses by years of experience, we discovered a consistent pattern of millennials (ages 25 to 40) and Generation Z (ages 24 and younger) being more critical of their companies' performance in several key product development areas.

As a reminder, survey participants were asked to rate their company's capabilities on a scale of one to five:

| 1         | 2    | 3       | 4    | 5         |
|-----------|------|---------|------|-----------|
| Very Poor | Poor | Average | Good | Excellent |

**INSIGHT 8****The Generational Gap**

We took the weighted average of these ratings and discovered that established career engineers, managers and executives were consistently giving their product development teams higher scores. Virtually all the weighted scores ended up between 3 and 4 on the 5-point scale, so a deviation of more than 0.15 is significant. Take a look at the chart below:

## Engineering Experience vs. Company Perception

**Q:** How would you rate your company's current abilities in each of these areas?

Ratings are based on a scale of 1 (Very Poor) to 5 (Excellent)

◆ Weighted Average Rating (0-10yrs)      ◆ Weighted Average Rating (20+ yrs)

The ability for the team to work remotely from any location and remain productive



Flexibility as to when and where employees can do their work



Contributors always having access to the tools and data they need to do their job



Reducing version control errors and other data management issues that commonly occur



The ability to monitor in real time the activity and progress at any stage of the design process without having to call meetings, send emails, or make phone calls



Early involvement of the extended design team



Minimizing time spent on non-design related activities and overhead



Base:  
0-10 Yrs Exp. (219-240 respondents);  
20+ Yrs Exp. (305-336 respondents)

**INSIGHT 8**

## The Generational Gap

The survey table highlights many profound perception gaps between early-career and later-career workers. This factor is increasingly important for executives to consider as they think about their future pipeline of engineering talent.

Here are some generational gap insights to consider:

- The top areas of concern for millennials and Generation Z engineers were focused on: workplace flexibility, team communication and the technological limitations of current design tools.
- The top generational gap in the chart, “the ability for the team to work remotely from any location and remain productive,” indicates that the desire for increased flexibility to get work done outside the office is significantly more important to younger people than their older colleagues. Engineers with 20+ years of experience also value workplace flexibility but less so, perhaps because they are conditioned to an office-centered career.
- The second-highest gap, “Flexibility as to when and where employees can do their work,” underscores that the new generation of workers not only want to break the chains from the office, but **also want to toss out the traditional 9-to-5 work schedule**. They may want to walk their dog for two hours midday, or go shopping, while continuing their work in the evening hours. Control over how one allocates their work schedule is being increasingly seen as an important benefit.
- Note that millennial and Gen Z engineers in this survey also **give their employers lower scores** for being able to monitor real-time design progress **without sending emails or scheduling meetings**. These are the generations that prefer texting over phone calls (or even face-to-face communication) and grew up Googling any information they needed in seconds. The idea of not being able to access information instantly is bothersome to engineers of all ages, but to the youngest generation in the workplace, it is heresy.
- It is worth noting that these generational gaps are all related to being able to find information on your own, always having access to your data anytime and anywhere, work flexibility, easy, asynchronous peer-to-peer communication, and instant availability (no installs, IT headaches, etc.). These findings are very consistent with our qualitative understanding of the digital-native generation.
- Underscoring the millennial/Gen Z **thirst for instant information**, engineers with 0-10 years experience were also twice as likely to increase their use of Slack over the past year. This comparison was gleaned from the business software usage data analyzed in Insight #7.

**INSIGHT 8**

## The Generational Gap

**Increased Use of Slack for Collaboration**

Have you used Slack more in the past year than in prior years?

## Career Experience



0 to 10 Years

**15.1%**

20+ Years

**6%**Base: 0-10 Years (226 respondents);  
20+ Years (332 respondents)

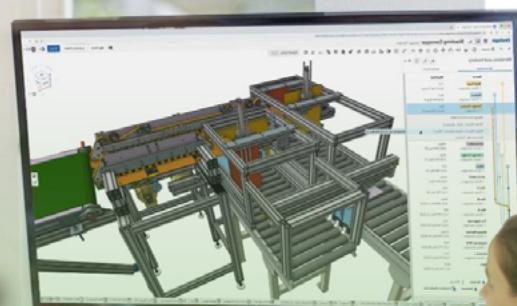
Hiring the right talent and employee retention are some of the most important factors in a company's long-term success. Understanding the mindset of the younger sector of the workforce is absolutely critical. [Gallup](#) has dubbed millennials as the "Job-Hopping Generation," recently finding that 1 out of 5 workers from this demographic switched employers over the past year – three times the rate of non-millennials. Gallup estimates that millennial turnover alone results in an annual loss of \$30.5 billion to U.S. companies.

A June 2021 study by the nonprofit research firm [The Conference Board](#) found that 55 percent of millennials question the wisdom of returning to the workplace given their high productivity doing remote work during the pandemic. This attitude amongst millennials is higher than Generation X (45 percent) or boomers (36 percent).

A March 2021 [Microsoft Work Trend Index](#) survey of 30,000 global workers found that **41 percent were thinking of quitting their jobs** or changing their careers this year. An August 2021 survey of 1,000 U.S. workers by the workplace analytics company [Visier](#) found that **70 percent would immediately quit their jobs** if another employer offered better policies to reduce burnout.

The media is calling this trend "[The Great Resignation](#)" and as [Entrepreneur magazine notes](#), "2021 is shaping up as a candidate market where organizations compete to win the best employees."

Companies who want to recruit and retain talent of any age are realizing that offering more workplace flexibility may be as important as a competitive salary and benefits. Companies that ignore this continuing shift may risk losing their most valuable employees to competitors.



## Reality Check: Are You as Agile as You Think You Are?

Exercise bikes. Automobiles. Fried chicken.

What do these things have in common? These products were among the many facing supply chain disruptions in 2021, resulting in lots of disgruntled customers.

With so many people avoiding gyms during the pandemic, [Peloton](#) could not keep up with the surge in demand for their interactive spin class bikes. Faced with major bottlenecks at ports, the company was forced to pivot to using air freight, which costs 16 times more than shipping by sea. In August 2021, [Toyota](#) announced it was suspending production at most of its U.S. automobile factories through September because of a [semiconductor chip shortage](#). Similar production woes occurred industrywide, including slowdowns at [Subaru](#), [GM](#) and [Ford](#).

In England, Kentucky Fried Chicken warned customers that it may run out of menu items and to expect different packaging. Across the UK, the food industry is facing an estimated [shortage of 100,000 truck drivers](#) due to Brexit, according to the BBC. The British Poultry Council projected the [labor shortages](#) would also cut Christmas turkey processing by 20 percent.

**REALITY CHECK:**  
**ARE YOU AS AGILE AS  
YOU THINK YOU ARE?**

Perhaps the biggest symbol of the supply chain problems that emerged in 2021 was the saga of the container ship [Ever Given](#), which turned sideways and got stuck in the Suez Canal, blocking more than 350 other shipping vessels for six days. Many of those shipping crates in limbo were filled with parts and raw materials, slowing down production at too many companies to count.

The chaos of 2021 underscores that companies with multiple locations, multiple manufacturing partners, and long supply chains need to come up with not only a Plan B – but Plans C, D, E and F. Maybe it means sourcing parts and materials from multiple suppliers closer to home, or turning to additive manufacturing to produce some of your own parts on demand on location.

You may not be able to sidestep a geopolitical event like Brexit or prevent a container ship from jackknifing the Suez Canal, but there are more common day-to-day product development delays that you can prevent altogether.

## Which Production Delays Can You Avoid?

During the early days of the pandemic in 2020, when government lockdowns were keeping workers at home, teams that were using cloud-native design and collaboration tools were able to keep working. In contrast, many users of legacy on-premise CAD and PDM systems could not easily access their design files remotely and dealt with major disruptions.

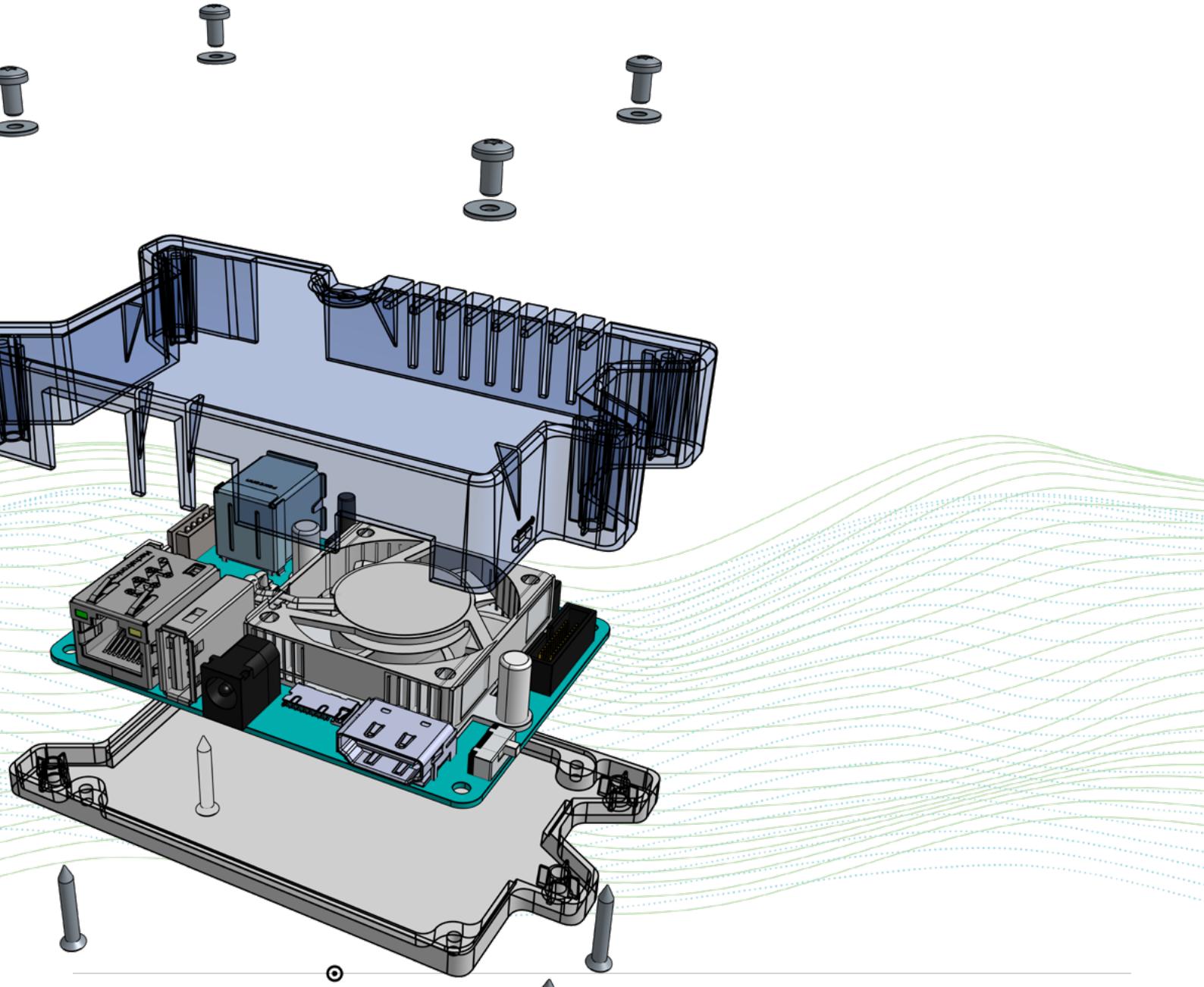
But there need not be a crisis for cloud-native CAD to make a transformative impact on your company's productivity and time to market. Let's revisit the five biggest product development areas where engineers said their teams need the most improvement right now:

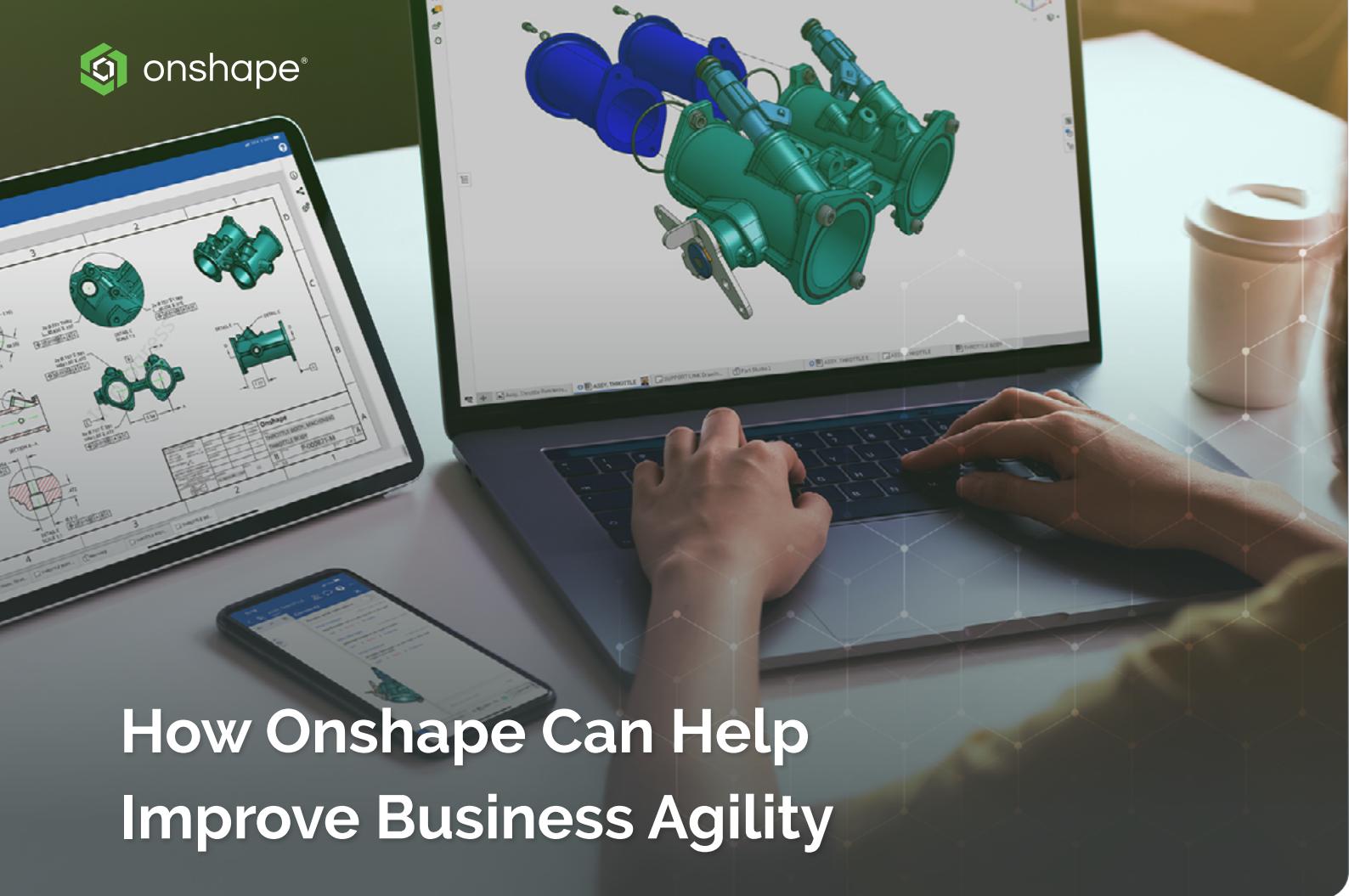
- Minimizing time spent on non-design related activities
- Early communication, visibility and clarity in the design process
- Data Management
- Making design data less siloed and more available throughout the design process
- Early involvement of the extended design team

REALITY CHECK:  
ARE YOU AS AGILE AS  
YOU THINK YOU ARE?

**Many of these areas of concern center around engineers having zero visibility into what their colleagues are working on and vice-versa.** A cloud-native CAD and data management platform takes the guesswork out of teamwork. Data is instantly updated so every team member sees design changes as they happen. Every team member, anywhere in the world, is also on the same software version – the latest one.

In the next section, let's explore how [Onshape](#), the only cloud-native product development platform that combines robust CAD tools with built-in data management and real-time business analytics, can improve your daily processes and boost your team's productivity and innovation.





## How Onshape Can Help Improve Business Agility

Onshape is a cloud-native CAD and data management platform that speeds up product development by eliminating the most common obstacles that slow companies down. As has been the case for years in software development, agility has become absolutely vital for hardware companies. Now more than ever, organizations need to improve their ability to respond quickly to unexpected or unforeseen conditions.

Cloud-native product development platforms give distributed design teams the flexibility to work together from any location. Engineers can instantly access their work and their design software from any computer, tablet or phone via a web browser or mobile app (iOS or Android) without delay. If one computer crashes or malfunctions, work can continue uninterrupted on another device.

Regardless of where an engineering team is working – on different floors, different office buildings, different states or different countries – cloud-native product development tools allow team members to work as if they are in the same room looking over each other's shoulders. Unlike with file-based installed CAD and PDM systems, multiple engineers can work on the same 3D CAD model simultaneously and provide immediate feedback as easily as making a comment on social media. There is no need to email screenshots back and forth or deal with downloading file attachments. There is no need to schedule time-wasting meetings to communicate information that can be accessed with the click of a mouse.

When engineers' downtime is minimized, IT overhead is reduced to zero, and communication is streamlined, product design teams can devote much more of their time to what they were hired to do – design!

**Here's how Onshape addresses some of the biggest product development challenges identified in this survey:**

✓ **Reducing Time Spent on Non-Design Related Tasks**

Engineers are never wasting time looking for the latest version of a design because there is only one place to look – their Onshape Document, which they can access the moment they sign in. Because Onshape is a SaaS platform, there are no downloads, installs, license codes or upgrades to worry about – engineers can spend more time being engineers. Companies should not be devoting their best CAD talent to time-draining administrative tasks. Simultaneous editing means that teams can say goodbye to productivity-killing serial workflows.

✓ **Data Management Chaos**

Onshape's built-in [Release Management](#) and advanced workflows eliminate the hassles of external add-on PDM/PLM systems, whose primary function is to manage copies of files. With this integrated, easy-to-use and intuitive system, there is no checking in or checking out files from a vault, forcing engineers to wait for colleagues to finish their work before they can start theirs. Teams can explore alternative branches of designs and later merge the best elements together. A comprehensive edit history tracks who made which change and when, allowing teams to instantly revert back to any prior state of the design that ever existed – think of it as “unlimited undo/redo.”

✓ **Bridging the Communication Gap Between Executives and Rank-and-File Engineers**

With executives often focused on big-picture planning and strategic initiatives, and engineers busy with daily hands-on tasks, it's easy to see how perceptions about the status of a project are not always aligned. Onshape's [real-time business analytics](#) offer an up-to-the-minute snapshot of who's working on what and when – and help identify potential bottlenecks before they become problems. Having anytime access to the latest version of a design – or alternative experimental branches under consideration – means that progress doesn't need to wait for formal scheduled design reviews. Everyone can stay on the same page all the time.

HOW ONSHAPE  
CAN HELP IMPROVE  
BUSINESS AGILITY

## ✓ **Improving Early-Stage Communication and Collaboration**

In product development, it's widely accepted that improved collaboration and communication results in more innovative products. Onshape's secure [Sharing](#) feature gives external partners immediate view-only, commenting or editing access to your designs – without the burden of installing any special viewing software. And once a project is over, access permissions to your designs can be instantly revoked (better protecting your company's IP). Design teams can get earlier feedback from their customers, who may normally have no access to CAD. Live chat and commenting enable more frequent real-time design reviews.

## ✓ **Empowering Companies to Support Productive Remote Work**

Team members can instantly access their CAD system and CAD data on any computer, tablet or phone – eliminating the barrier of needing a high-performance workstation to do engineering work. Onshape's [SaaS delivery](#) means that teams no longer require IT support for maintenance and upgrades and can keep working uninterrupted from anywhere. Having full [CAD for Mobile](#) capability is not only beneficial for working at home, but also for frontline service engineers who may need to access designs on the factory floor at client sites.

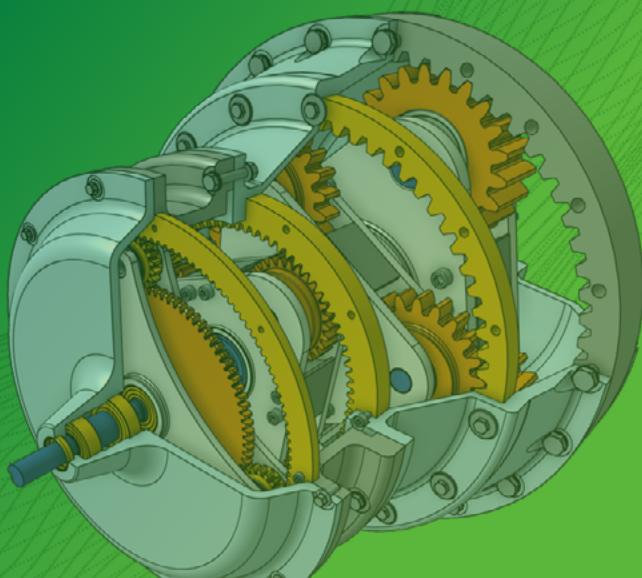
For forward-thinking product manufacturers, the implications of a greater shift toward "working from anywhere" seem clear. When it comes to attracting and retaining the best engineering talent, why settle for the best candidates within a 50-mile radius when you can expand your search pool to the best in the world?

The pandemic has accelerated transitions in technology and workplace culture that were already happening. Companies that ignore or dismiss these seismic shifts will be left behind. Investing in a cloud-native CAD and data management platform is no longer a "nice-to-have," but a "must-have" technology.

## Sign up for a Free Onshape Professional Trial

and experience the benefits of  
cloud-native product design today!

**Get Started**



# Appendix: Survey Demographics

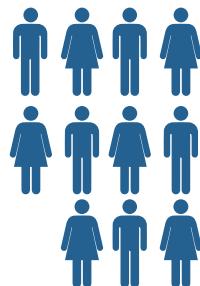
To better understand the current State of Product Development & Hardware Design, we analyzed the survey responses of

**794** product design and manufacturing professionals

with the following **JOB ROLES**:

**11%**

Director, VP or Executive



**24%**

Engineering Manager or Team Lead



**59%**

Designer or Engineer



**5%** Other /

Individual Contributors



Nearly two-thirds of respondents are individual contributors, with the balance serving in leadership roles.

#### SURVEY DEMOGRAPHICS

## Years of Professional Experience

More than two-thirds of respondents have more than a decade of experience in the product development field.

**43%**

**26%**

**16%**

**15%**

0-5

6-10

11-20

More  
than 20

01

05

10

15

20

20+

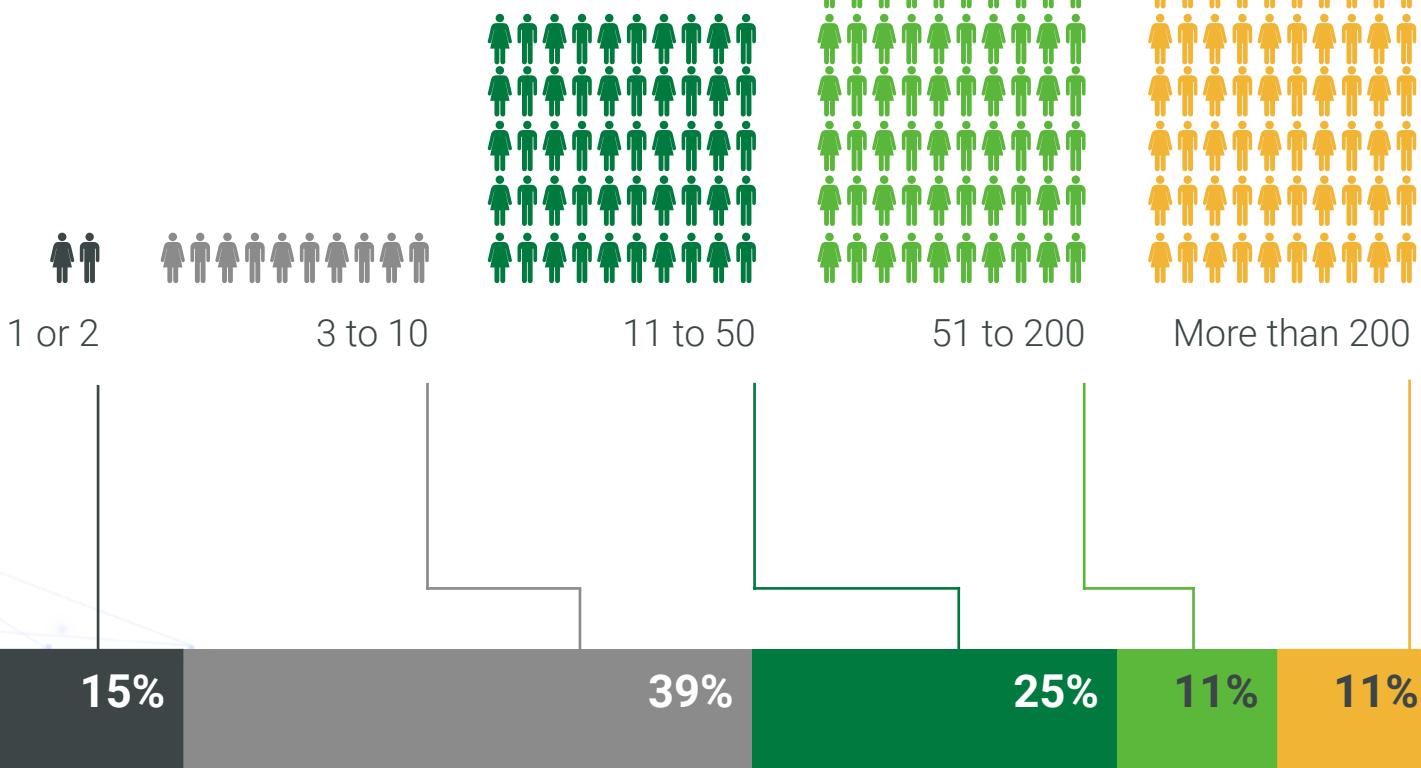


years of experience

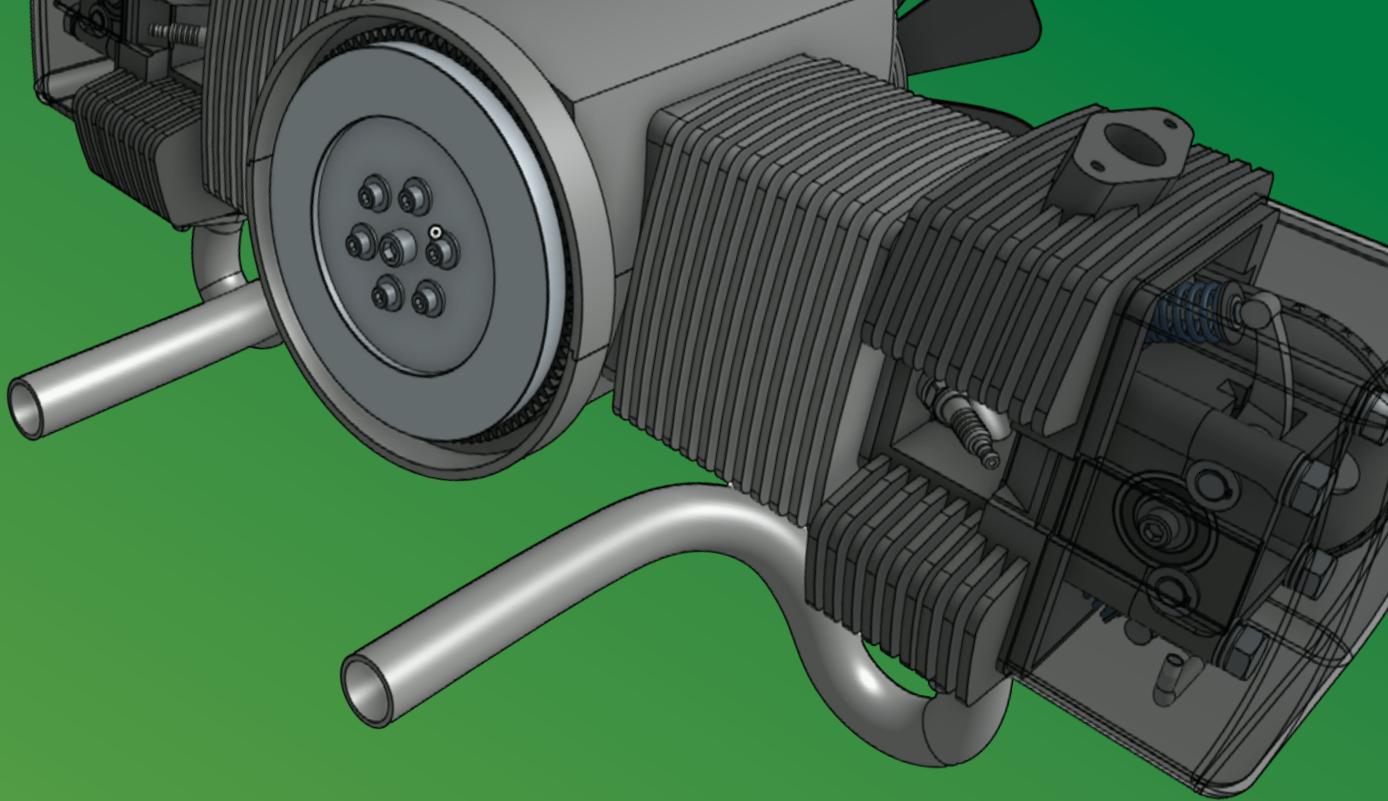
**SURVEY DEMOGRAPHICS**

## Size of Product Development Team

Product development is a team sport.  
 Nearly half of survey respondents currently work  
 on design and manufacturing teams with  
**more than 10 people.**



*Percentages are rounded up to the nearest whole number.*



onshape®

Onshape is the only Software-as-a-Service (SaaS) product development platform that combines powerful CAD tools with real-time data management, collaboration, and business analytics. Executives and managers can get up-to-the-minute progress reports on a project's status and built-in version control prevents costly delays and manufacturing errors.

**Sign up for a free Onshape Professional Trial and experience the benefits of cloud-native product design today!**

[GET STARTED](#)

Onshape.com

Onshape is a [PTC](#) Business.