



Top Five Tips to Transform Product Design for Smarter Products

Michelle Boucher | Vice President | Tech-Clarity

The Journey Toward New Development Approaches

The emergence of smart, connected technologies is enabling unprecedented innovation. We have public trash cans that let trash collectors know when they need to be emptied. Pill bottles that remind you to take your medication. Complex machinery that notifies you when it needs servicing. The opportunities and growth potential seem limitless. Technology has become so critical, **52% of companies developing smart products fear losing market share unless they continually make products smarter.** On top of that, 47% worry about reduced revenue.

With this in mind, we can expect to see a continual increase in the amount of software and electronics in products. Even 25% of companies that have not already made their products smarter, plan to add software and electronics over the next five years.

To successfully take advantage of the opportunity and transform products into intelligent systems, companies should embark on a journey to perfect development processes and manage the additional complexity. This eBook outlines steps to make your journey to transform your products a success.



You Don't Know What You Don't Know



While emerging technologies open doors for innovation and opportunity, they introduce new challenges. However, as you start your journey, it is hard to know what you don't know. Learning from the experiences of others to minimize or avoid common challenges should be a first step. Even if you have already started your journey, knowing where to focus your energy for improvement can minimize risk. Based on the experiences of over 180 manufacturers, the top six challenges of making smarter products are:

- Products become much more complex
- Knowledge silos / lack of cross-functional knowledge
- Ensuring product requirements are met
- Lack of visibility into the impact of design decisions across disciplines
- Tools are incompatible across engineering disciplines
- Identifying system level problems sooner

These challenges create barriers during your journey to improve your development process. Overcoming them requires putting the right processes and technology in place.

Collaboration Is Critical

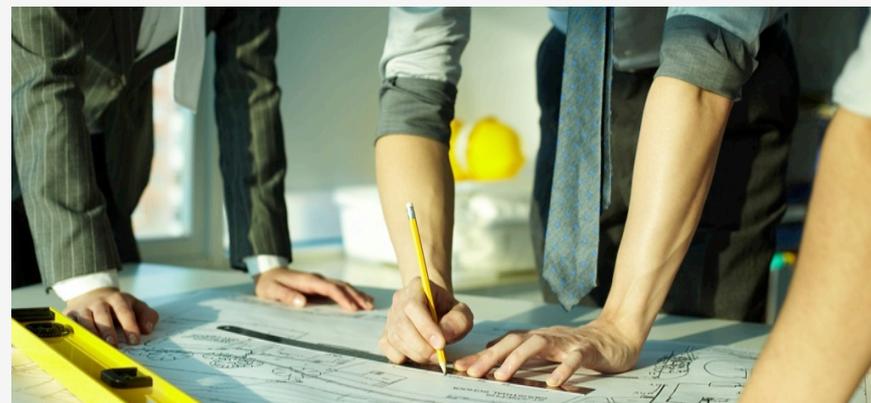
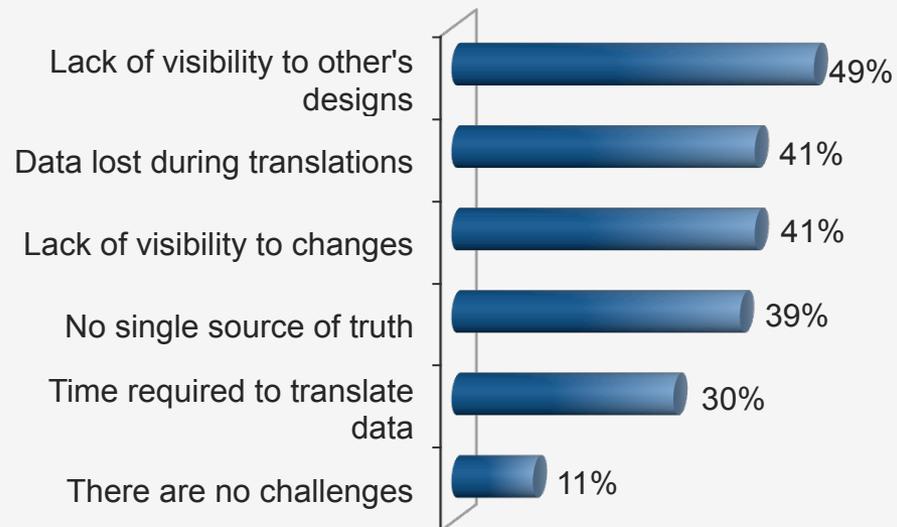
Many of the challenges of developing smarter products lead to poor collaboration, which creates even more problems. **An overwhelming 89% report they have issues due to poor collaboration.**

Developing smarter products requires multiple engineering disciplines requiring mechanical, electrical, and electronic software. When you add connectivity, you expand the ecosystem, increasing the number of people required to successfully develop products. By improving collaboration, you can tap into the collective expertise of the entire team to truly innovate and bring very competitive products to market.

Survey results show failing to solve these challenges costs the business in many ways, including:

- Higher cost
- Late to market
- Missed customer expectations
- Lost revenue opportunities
- Poor quality

The good news is that by adopting best practices, you can overcome these challenges and avoid the associated costs.



Identifying Best Practices

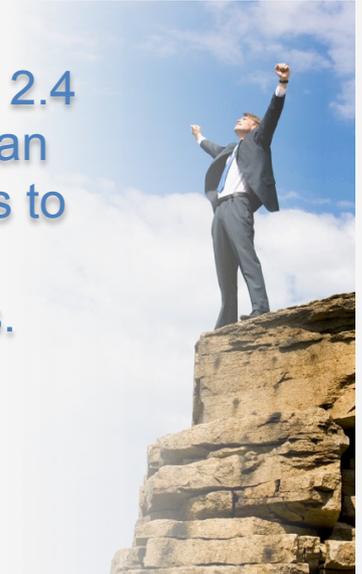
To identify best practices, Tech-Clarity examined the behaviors of Top Performing companies. We defined Top Performers as those who exceed their competition with:

- Higher quality products
- More innovative products
- Better development efficiency
- Meeting product cost targets

We then based our recommendations on the practices Top Performers are more likely to adopt compared to their peers. As a result of their best practices, Top Performing companies enjoy the following performance advantages:

Targets:	Top Performer	Average Performer
Design Due Dates Product	Within 3%	Within 10%
Product Cost Targets	Within 2%	Within 10%
Product Development Budget	Within 3%	Within 11%

✓ Top Performers are 2.4 times more likely than Average Performers to already develop connected products.



Reinforcing the role of emerging technology in creating a competitive advantage, Top Performers are 2.4 times more likely than Average Performers to already develop connected products.

We will now reveal the top five practices Top Performers follow to support their journey to bring smart, connected products to market.

1. Refine Your Strategy for IoT

One of the biggest differences between Top Performers and Average Performers is the development of a strategy around the Internet of Things (IoT). **Top Performers are 3.1 times more likely than Average Performers to have an IoT strategy in place.**

Part of this strategy should include defining what parts of the strategy will be determined during initial planning and which parts will be worked out once you move into the development phase. Making smart, connected products is a transformational journey that can change the very core of your business. New functions that never had to be considered before will now become important during development. Given how challenging collaboration is, during initial planning, Top Performers consider aspects of the strategy that impact the larger ecosystem or will fundamentally impact how they approach development.

It is hard to know what you do not know so as you move along the journey, you will discover things about your product. With this in mind, parts of the strategy that impact specific development tasks can be defined later, during the development phase.

✓ Top Performers are 3.1 times more likely than Average Performers to have an IoT strategy in place.



3. Extend the Product Ecosystem

Once you've decided what you will sell, think about the ecosystem you need to offer those services.

- Will you need outside partners or will you use your existing offerings?
- Will you develop part of the ecosystem yourself?
- What expertise will you need?
- Do you have that expertise or will you need to outsource or hire the right staff?
- What tools will you need so that the ecosystem can connect as a cohesive development team?

The ecosystem creates new opportunities for innovation, but it also expands the development team. Consequently, you want to make sure you are getting the right people involved from the very beginning.



4. Determine the Data Collection Strategy

While the opportunity to collect streaming data from your products will be incredibly powerful, you want to have a plan in place around what data to collect and how you will obtain it. Managing this data is one of the most critical parts of moving to the IoT and you do not want to underestimate its importance. As you evolve the business strategy, the data may be a critical part of your new offerings. Think about exactly what data will be required to deliver those offerings. Define this early on as it impacts many groups including your ecosystem and groups across your enterprise.

As you determine what data to collect, think about how other internal groups could benefit from it. For example, data about the functions customers use and do not use could be very helpful for product managers as they plan the next version of the product. Data about performance and potential quality issues can be extremely valuable for engineering as they consider future improvements.

Finally, make sure you have a purpose for the data you collect and how it will be used. While there is a lot of information you can collect, too much data can quickly become overwhelming unless you have a plan for its use and how it will be analyzed.



5. Select the Right Software Tools

When developing a smart, connected product, some of the software tools you will need should be best-of-breed. These tools have been optimized for specific tasks, yet can still integrate with other solutions.

However, with a connected product, other parts of your development tools should be a single platform. The table shows which tools Top Performers select as best-of-breed and when they use a single platform.

Best-of-Breed	Single Platform
Design tools	IoT application development
Device management	Application development
Security	Connection services
Service and support	Analytics

Collaboration is already a significant challenge for developing smart products. There are inherent knowledge silos across disciplines that make it hard. Plus every discipline uses tools that have been tailored for a specific use but are incompatible with the other disciplines. Connected products further exasperate this challenge. It is important that you select that right technology that will enable collaboration across the entire team.



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21.94

67.11

37.99

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-30.22

63.11



2009

2008

2007

91.99

Demographics

77.51

41.89

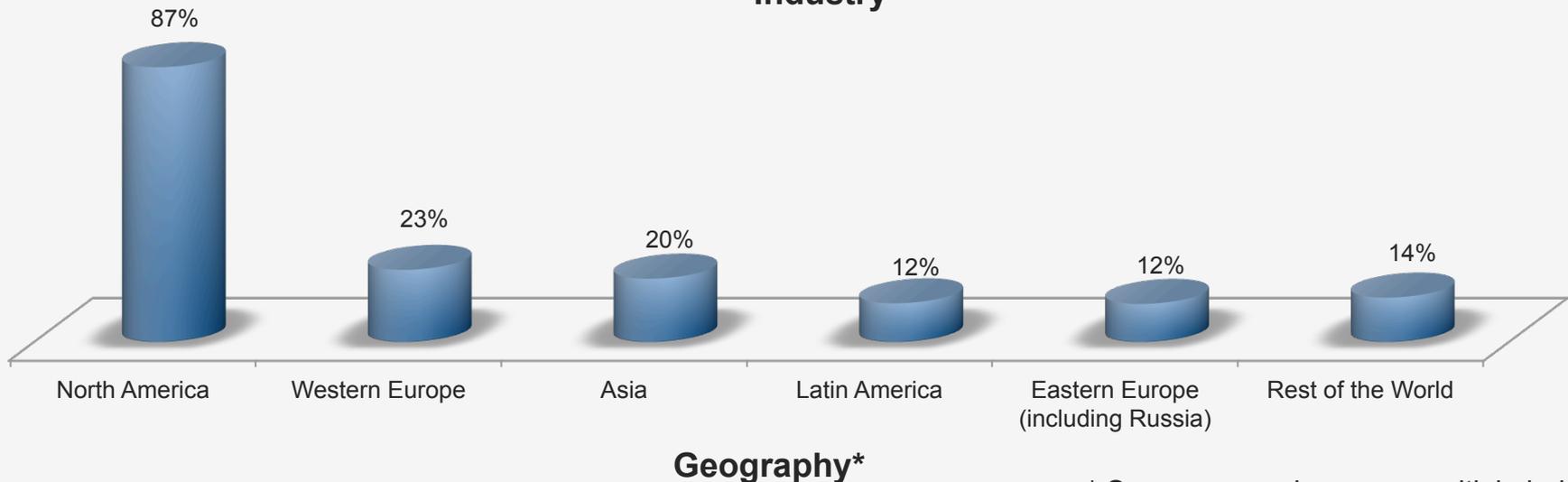
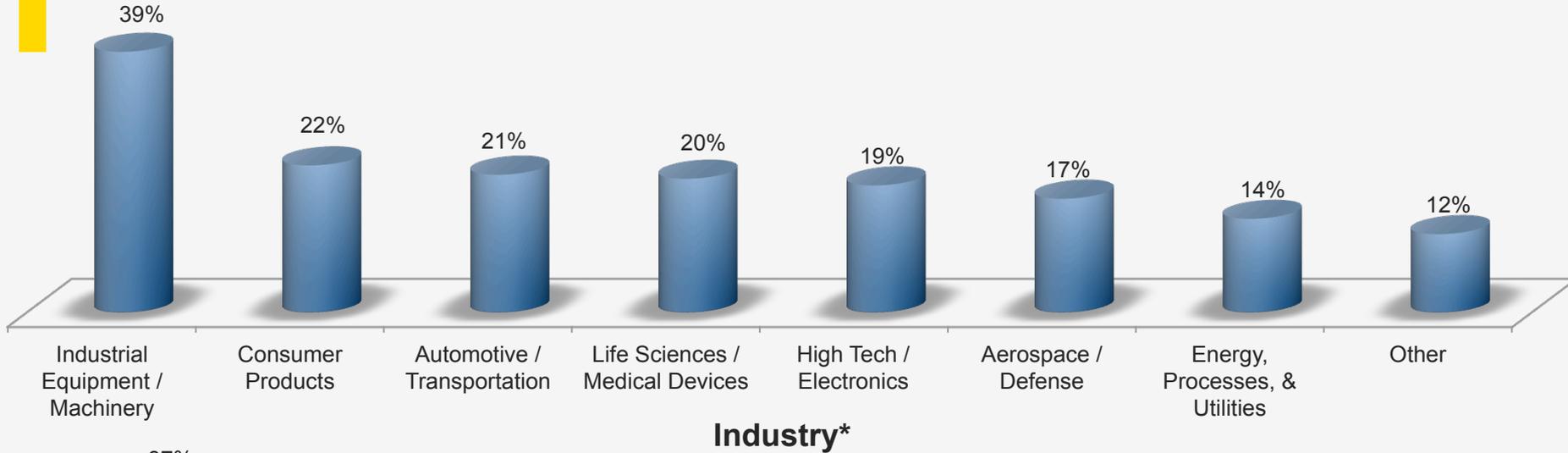
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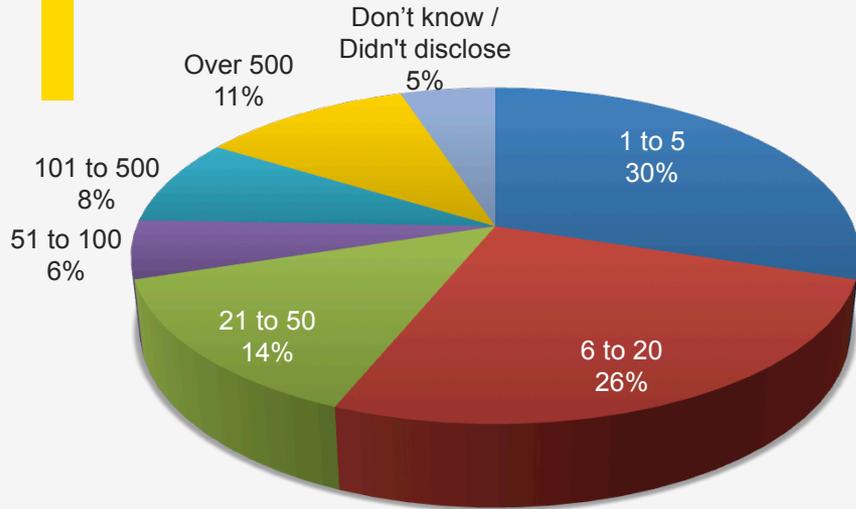
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Industry and Geography



* Some companies serve multiple industries and geographies.

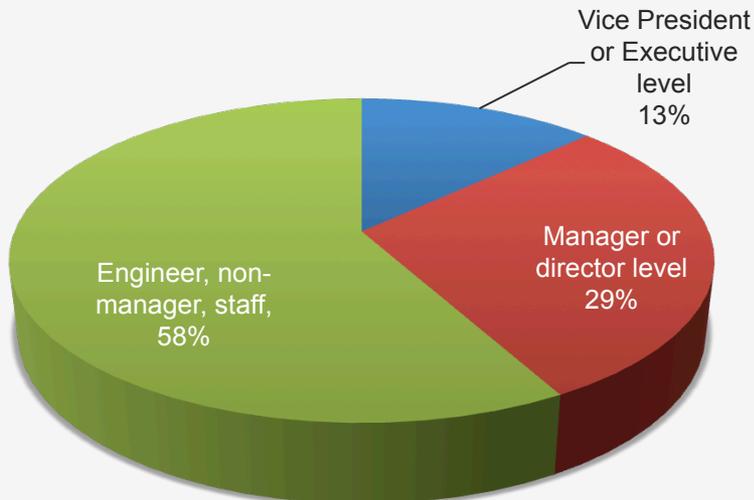
Role and Size



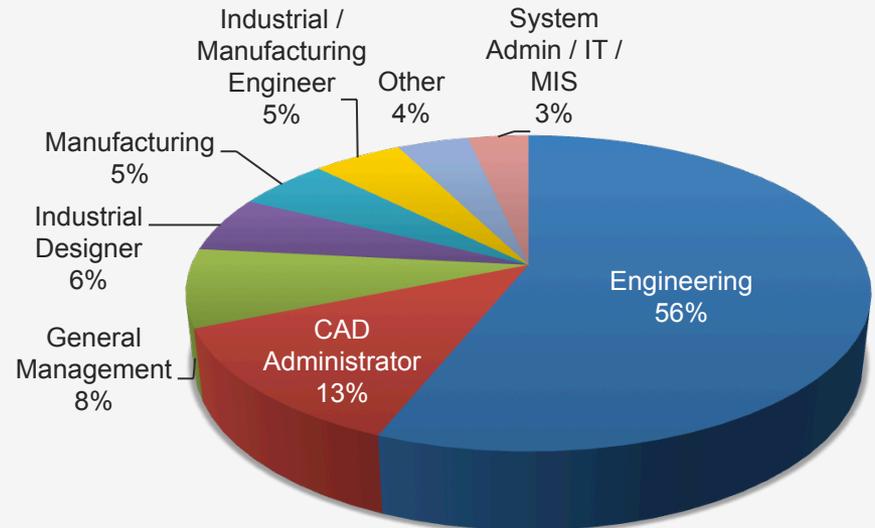
Number of Engineers



Size by Revenue



Title



Function



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About the Author

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

Michelle 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 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.

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