

Chief Engineer

The Ultimate Working Together Leadership Role

Welcome,

The chief engineer (CE) has become iconic in product development folklore, and rightly so. As my former colleague, Hau Tai Tang, once said, it is the ultimate stand-and-deliver job.

Whether airplane, automobile, or earth mover, it is the CE's product and he or she is totally responsible. My co-author, Jeff Liker, and I have written extensively on the roles, responsibilities, and the critical characteristics of successful CEs. We have shared these, and many stories of successful CEs in *The Toyota Product Development System*, in *Designing the Future*, and elsewhere. Other authors, such as this month's Design Brief contributors Lara Harington and Steve Shoemaker, have shared their experiences in the position.

“.. inspiring a technically diverse group of people to focus on a common goal and work together to create new value for their customer may be the ultimate test of an outstanding CE.”

In this *Design Brief*, I will talk about what may be the most important attribute of the CE. The CEs we have worked with have been truly diverse. Consequently, it's hard to say exactly what the makeup of a great CE is.

Sure, the ability to communicate, technical acumen, understanding the customer, entrepreneurial risk-taking, and just plain grit are all important. But in the end, I believe that inspiring a technically diverse group of people to focus on a common goal and work together to create new value for their customer

may be the ultimate test of an outstanding CE. I say “inspire” because the role typically has little direct authority over the people working on their program. And that's just one reason why the job can be so tough.

An unnatural act: value-stream focus

Individual people and individual functions naturally want to optimize locally -- to focus on “their deliverables.” Worse, many organizations reward local and individual performance, even at the expense of the company. The CE must overcome this powerful organizational inertia and get people to commit to the almost unnatural act of [value stream optimization](#). In other words, get the entire organization—design, procurement, manufacturing, service, etc.—rowing in the same direction.

This means overcoming egos, culture, and deeply embedded thinking. Why? Because to create the most value for their customer, they need to think about the entire value stream -- and how to leverage it to provide the best possible outcome. Because the customer doesn't care how good any individual department is, except to the degree that it contributes to the value they ultimately experience. In other words, to be successful, the CE must be a horizontal, value-stream thinker in a vertical world.

There have been many outstanding CEs who have demonstrated this capability. Just a few of my favorites include Boeing's Joe Sutter whose grit and creativity enabled him to rally his team and successfully persevere in his legendary battles with Pan Am's Juan Trippe and create the iconic 747. Lisa Drake, whose incredible attention to detail and ability to work effectively across functions all along the value stream, brought the first ever Ford Lincoln C class SUV to life. Ichiro Suzuki, the uncompromising first CE of Lexus, whose passion and vision inspired

his team to work together to create both a breakthrough car and a successful brand. Takashi Uchiyamada leveraged obeya management to unite disparate technical specialists together to create the game-changing Prius at Toyota. Every one is a phenomenally gifted chief engineer.

Best of the best

But for my money, the best of the best is Alan Mulally. Why? Well, to start, he led the development of the path-breaking flight management systems for the Boeing 757 and 767. Then he went on to lead the development of the 777, Boeing's first fly-by-wire aircraft, and the best-selling wide-bodied aircraft of all time. The triple seven is arguably Boeing's best product ever. As president of Boeing Commercial Aircraft, he saved it after orders tanked and shares plummeted following the 9/11 attacks in 2001. He led the commercial division to record sales by the time he left in 2006.

And for an encore? He refused taxpayer handouts and rescued Ford Motor Company from certain death. And he did it all using the same Working Together management system.

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Mulally's principles and practices, such as the weekly business plan review, have been well documented in books like *American Icon* and *Designing the Future*. There was one team, one plan, and one goal. Transparency, trust, and accountability were key. Everyone knew the plan,

the goal, and their responsibility. Everyone was included and the focus was on our customer. But books can't capture what it was like to be a part of the team.

His leadership behaviors and Working Together system both inspired and enabled us to do more and be more than we ever thought possible. I was fortunate enough to meet Alan early in his Ford tenure and meet regularly throughout our shared time at Ford, forging a friendship that lasts to this day. However, nearly everyone I meet, no matter where they worked at Ford during the Mulally era, has a personal connection to him. How can that be?!

This quote from Alan goes a long way to helping us understand. “People first. That's code for I love you as a human being. That's the purpose of life, to love and to be loved, including everybody. I've always respected people. I wanted to help them find meaning in what they are doing. I want to listen to them. I want to appreciate their work. I want to recognize their work.” And everyone felt it – and loved him back. Alan's love of people and the Working Together system enabled him to have an outsized positive impact on each person, product, and business he connected with. Through it all, he led like a CE.

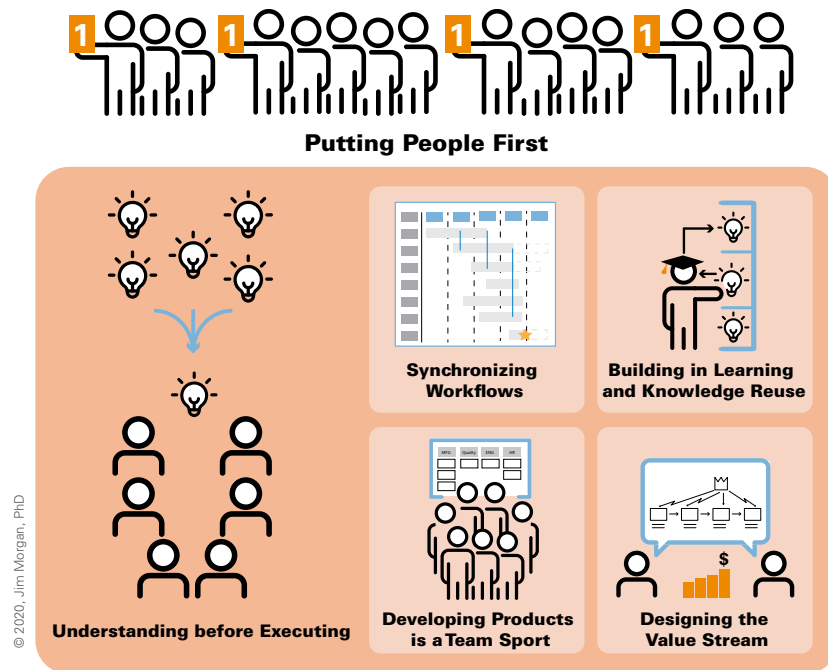
Perhaps we all should lead that way. As if we had no formal authority and needed to inspire our people to work together. As if we cared about our people and our customer. How about that for this month's challenge?

Regards,



Jim Morgan
Senior Advisor
Lean Enterprise Institute

lppd 



Lean Product and Process Development (LPPD) Guiding Principles

1. **Putting People First:** Organizing your development system and using lean practices to support people to reach their full potential and perform their best sets up your organization to develop great products and services your customers will love.
2. **Understanding before Executing:** Taking the time to understand your customers and their context while exploring and experimenting to develop knowledge helps you discover better solutions that meet your customers' needs.
3. **Developing Products Is a Team Sport:** Leveraging a deliberate process and supporting practices to engage team members across the enterprise from initial ideas to delivery ensures that you maximize value creation.
4. **Synchronizing Workflows:** Organizing and managing the work concurrently to maximize the utility of incomplete yet stable data enables you to achieve flow across the enterprise and reduce time to market.
5. **Building in Learning and Knowledge reuse:** Creating a development system that encourages rapid learning, reuses existing knowledge, and captures new knowledge to make it easier to use in the future helps you build a long-term competitive advantage.
6. **Designing the Value Stream:** Making trade-offs and decisions throughout the development cycle through a lens of what best supports the success of the future delivery value stream will improve its operational performance.

The LPPD Guiding Principles provide a holistic framework for effective and efficient product and service development, enabling you to achieve your development goals.



Toyota Chief Engineers Beat the Bureaucracy: an Anomaly That Works

By Jeffrey Liker, PhD

When Toyota started its nascent automotive business in 1937, there was no local auto industry to poach engineers from. There was, however, a strong Japanese fighter jet industry. What Ohno was to TPS, Tatsuro Hasegawa, an aerospace engineer, was to codifying the chief engineer (CE) role. He was the CE for both the first Corolla and Celica. The idea that a super engineer who had business smarts and deep technical expertise would be a powerful head of an engineering project was commonplace in aerospace. We would later say of Toyota “It is the chief engineer’s car.” In aerospace it was the chief engineer’s plane.

Now it is almost a given that the design of a complex system like a car or plane takes a team. But at Toyota, the chief architect and final decision maker is an individual, the CE, who reports up to the vice president of R&D. The CE develops the initial vision based on personal research about customers, writes a concept paper with a lot of detail about the size, shape, parameters of the vehicle, works with stylists and selects what the vehicle will look like, and is seemingly everywhere in the engineering offices, manufacturing plants, and suppliers checking, discussing, questioning and if needed deciding.

The CE needs a first-rate staff including cost planners who can estimate cost as the vehicle is being designed and quality analysts who can evaluate quality and assistants who act as project managers. But it is truly the CE’s car.

Phases and gates vs. CE system

These days when we look at EV startups it is often the founder who acts as the CE of the vehicle. In Tesla’s case it was a pair of engineers who seemed to work unusually well together—entrepreneurs Martin Eberhard and Marc Tarpennin. They worked tirelessly on every technical aspect of the vehicle, including blowing up packs of lithium-ion batteries in a ditch in the backyard of one of their houses. It took Elon Musk, who had the money, social contacts, and vision to take over as CE and commercialize the vehicles. R.J. Scaringe, a nerdy PhD in mechanical engineering from MIT was the founder of Rivian, but also de facto chief engineer. With a small team, they developed all the key concepts of their adventurer’s trucks-SUVs.

What is amazing about Rivian, and particularly Tesla, is they set the pattern for the core technologies (e.g., full electric powertrain, large capacity lithium-ion battery pack as part of underbody structure, most controls through

a large computer screen, integrated software through a single powerful computer, over the air upgrades, frunk, fast charging, low center of gravity) the legacy automakers would need to imitate. But instead of small teams led by a chief engineer, the rich and bureaucratic legacy automakers spent billions of dollars with thousands of engineers to duplicate these efforts.

Auto companies had invested in “lean” product development processes based on phases and gates and hundreds of rules to pass through gates. Supposed “experts” on lean product development became bureaucrats who audited that the right tools were used at the gate reviews. Led by powerful project managers, who in Toyota would not be capable of being chief engineers, the result was even more bureaucracy focused on tools and rules instead of excellent engineering.

What Toyota does not want is a huge bureaucracy that somehow manages to produce a design database which then somehow gets converted into production. They want a smooth and efficient process without losing the all-important vision of what the customer wants. They do not want hierarchy and specialization; they want teamwork and flow. To understand that they need something like the small tiger teams that are often set up off site, apart from the formal organization, in a separate location—think the first MacIntosh team that Steve Jobs set up. But Toyota also needs the functional expertise of engineers with “towering technical competence,” developing the detailed designs and seeing these through to production. How can we have our cake and eat it too?

How to make the matrix work

Jim Morgan and I in our 13 principles of The Toyota Product Development System found Toyota was using that tired old organizational design—the matrix organization. Talk to most people who have been part of a matrix organization, and they would rather get their teeth pulled. It is supposed to be the best of both worlds—deep functional expertise and flow of value to the customer—but often seems to be the worst of both worlds. What makes it work at Toyota are two things:

1. **The Chief Engineer’s Role:** A big problem with the matrix is every individual has more than one boss and does not know who gets precedence. At Toyota a functional engineer has only one boss, an expert in their specialty, but they know that the ultimate arbiter of all important decisions about the product is the chief engineer.
2. **Culture of Cooperation:** A result of all the confusion of the matrix there is room for a lot of disruptive politics, such as trying to get the best players on your team and struggles over who makes the decisions. At Toyota the customer is king, and the CE is the voice of the customer. The talented functional specialists all know that when working on a vehicle program they are serving the customer through the CE, and the CE trusts that the heads of the functions are working to develop excellent engineers and juggling where they should be assigned for the good of Toyota.

The team spirit and cooperation were so great that, as John Shook notes, the CE has tremendous responsibility with little formal authority. In a conventional matrix each person reports to a functional boss and a product boss and somehow, they need to work out who has more authority.

By contrast, with the exception of a small team of project managers and specialists, nobody reports directly or even in dotted-line fashion to the CE. They mostly report up the functional hierarchies. The CE does have authority, and some would say the “ring of the king,” but it is over the product-process design, not the people. This means the CE must rely on respect for their abilities and personal influence to lead what is still a complex organization.

In many ways separating formal authority from influence is advantageous. For one thing, the CE is not burdened with the day-to-day management of lots of people who are concerned about things like performance appraisals. In addition, it forces the CE to be a leader, not an administrator. If the CE had to rely on formal authority to get things done the CE would not be a great leader and certainly would not have the time to be everywhere guiding, coaching and deciding.

Neither tiger nor beast

When we put all this together, we have something that looks very different from development organizations we commonly see. It is not a small entrepreneur-led team of a startup, nor is it a top-down, command and control, bureaucratic beast we see in many large companies. The Toyota development teams are not set off from the bureaucracy and physical offices to act as autonomous tiger teams to avoid contamination. They sit within the existing organization. And the leader is not a project manager focused on cost and on-time delivery, but instead a visionary systems engineer who somehow also has business smarts and the ability, like an anthropologist, to understand the customer. If Toyota did not prove it works, we might laugh it off as the most preposterous and complex organizational form imaginable -- a little of this, a little of that, and dependent on people who care about more than their own interests.

But Toyota makes it work. I cannot prove in a scientific sense that the CE system is better than the alternative, because at Toyota it is all part of an integrated system. We do have

evidence that Toyota is exceptional at product-process development in lead time, cost, quality, and delivering products customers want. Increasingly organizations throughout the world are shifting in the direction of a chief engineer system and we are seeing great results from before to after lean PD. The benefits Ford achieved under Alan Mulally's leadership, which resulted in a transformational product lineup, are well documented in *American Icon*, as are the achievements under Jim Morgan's leadership in body and stamping development, detailed in *Designing the Future*, despite Ford being as traditional as it gets.

One caveat, a small startup does not need to develop a matrix organization. And for large corporations simply redrawing the organization chart into a matrix with a set of people titled chief engineers could create more chaos than help. So, like any other lean concept, simply copying is not enough. You need to develop a system that works for you. That is why we have worked to develop principles, not solutions. Avoid anyone who comes to you selling "solutions." Welcome new ideas that stimulate you to think and experiment! ■



The Role of a Chief Engineer in Vehicle Development: A Case Study of the 2019 Honda Passport

By Lara Harrington

At Honda, the individual leading the development of a new product is known as the Large Project Leader, or more commonly in the industry, the Chief Engineer (CE). This role demands both strong leadership and technical skills, as the CE is the concept creator and overall decision maker—the big boss, so to speak. The CE role is widely recognized in the automotive and aircraft industries and is crucial in bringing new and exciting products to market.

I was the CE for the 2019 Honda Passport, Honda's first five-passenger mid-sized SUV to enter the U.S. market. I led a team that developed a widely popular vehicle, attracting new buyers to the Honda lineup by offering a roomy, off-road capable, and sporty driving experience. The Passport is perfectly suited for both off-road adventures in Yosemite Valley and a cocktail brunch with the boss.

The role is complex and challenging, yet immensely satisfying, especially when seeing vehicles on the road with happy customers. Among the many responsibilities of the chief engineer, here are a few key ones.

Be the voice of the customer

The chief engineer is unwaveringly customer-focused, always keeping the end customer's needs and preferences at the forefront of the development process. They are

dedicated to ensuring that the vehicle not only meets but exceeds customer expectations for quality, performance, and usability. This involves continuously seeking and incorporating target customer feedback, analyzing market trends, and making decisions with the customer's satisfaction in mind.

I began my journey in understanding the Passport customer by exploring campgrounds, visiting dealers, and interviewing SUV buyers. My team developed SUV prototypes—one large suburban-style and one sporty mid-sized—and explored the value of each with different customer types. When it came time to create the vehicle concept, including its overall size, shape, and performance parameters, I could confidently do so as I had a strong, visceral understanding of what the Passport customer valued.

Set the vehicle-level objectives

At Honda, the CE operates within a matrix-style organization, leading a team that delivers to the CE but reports to managers within their own functional divisions. For this reason, the vehicle-level objectives must be crystal clear and widely shared throughout the organization via a concept paper. This enables the functional groups to work

effectively without guessing the customer's needs or the direction of the CE.

When I mentioned that the “Passport is perfectly suited for both off-road adventures in Yosemite Valley and a cocktail brunch with the boss,” it not only helped clarify the vehicle's positioning but reflected the vehicle-level objectives understood across the organization. For instance, the chassis engineers considered these objectives to enhance ground clearance and incorporate uniquely tuned dampers compared to the Pilot. Similarly, the interior engineers provided an easy-to-clean yet highly appealing rear cabin material. Clear vehicle-level objectives allow functional groups to deeply consider their contributions and deliver their best work, minimizing conflict and the need for the CE to micromanage every decision.

Set value targets

The goal of the CE is to deliver exactly what the customer values and nothing more or less. Offering features, styling, and performance characteristics that the customer does not value can be counterproductive—more is not always better, as customers ultimately pay for these extras. During development, it's common for people to develop favorites and for functional divisions to propose their latest-trend technologies, which can quickly lead to a vehicle with too many features. Once these features and performance parameters make it into the package, they are difficult to walk back. By setting clear value targets and prioritizing, the CE can ensure the vehicle delivers optimized value.

For example, during the early concept development for the Passport, one objective was to create a premium cargo-area experience. There was certainly no lack of good ideas on how to accomplish this. The team engaged in numerous roundtable discussions about options like fold-out tables, clam-shell folding rear doors, and gadget lighting, all of which came with premium price tags.

I felt that I hadn't done a good enough job clarifying what a premium cargo-area experience actually meant—because I wasn't sure myself. So, my ergonomics and interiors team and I went back to the *gemba*—a Japanese term for the actual spot where the customer finds value—and explored this topic more deeply.

During this investigation, it became clear that our customers' top priorities were interior volume and under-floor hidden storage. The gizmos and gadgets were just icing on the cake. This insight allowed me to set precise value targets for the rear cargo area, balancing cost, functionality, and usability. For even more precision, my ergonomics team suggested we set a target for a cargo area large enough to accommodate a German Shepherd-sized dog cage and long enough to sleep in the back. As a result, the Honda Passport features the largest interior volume among 5-passenger mid-sized SUVs and offers the most useful under-floor storage space in its segment, all at a reasonable price.

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Recently, I pulled up next to a Honda Passport in a Trader Joe's parking lot and saw a young woman loading groceries into the back, which was packed with camping gear. Curious, I asked where she was headed. With a smile, she said she was “heading out west without an agenda,” excited for the adventure ahead. Meeting her and hearing her plans really highlighted the essence of what makes being a chief engineer so rewarding. It's a role that combines technical expertise with visionary leadership, allowing one to work with talented teams to create products that truly resonate with customers. While it was the most challenging job of my career, it was also, hands-down, the most satisfying. ■



The Making of a Chief Engineer

By Steve Shoemaker

“I am calling to ask you to accept the role of Chief Engineer for the Excavator Product Line,” said the vice president responsible for Caterpillar’s global excavator business. The position would be in Akashi, Japan. I accepted immediately.

At the time, my family and I were on vacation at the Grand Canyon in Arizona. I had prepared my wife for this possibility, but the big challenge was telling our children. Our oldest was an adult living on her own. However, our son was entering high school, and our youngest daughter was entering junior high. Moving to Japan is not something most adults prepare for. Moreover, there is no way a young person could anticipate anything beyond leaving what is known and comfortable to something unknown.

I’m not sure I felt too much different than my kids.

I had spent the last six years as the director of engineering of the Building Construction Products Division of Caterpillar, Inc., located in Cary, North Carolina. The division was heavily dependent on the North American housing market and had weathered the global financial crisis in 2008. What now seems a distant memory taught me lessons I would not want to relearn today. The division was hemorrhaging

cash, making it an easy target for the Board to take action to improve the overall company. A complete business turnaround was needed and implemented. Being on the other side of that chaos was comfortable for me. We were in the final stage of building a new design and development center. The business was thriving and, better still, profitable.

The call to be a Chief Engineer is not unlike the call to be an officer of the company. There are only so many slots available and many desire the role. However, in today’s world, the pool of candidates to become a Chief Engineer is a shallower pond than the sea of candidates for roles leading the company. I hypothesize that the elements that make a Chief Engineer are rarer than the ingredients necessary to lead a division. I support this position with fifteen years of experience working depth charts for the Chief Engineer role alongside those working depth charts for product managers and officers.

I will not venture into whether Chief Engineers are born or made. It’s a bit of both. The table stakes are simple: one must be technically strong, mentally tough, and organizationally connected. Put simply, you need to know your stuff, have grit, and be able to influence up and down the company.

Demonstrate technical strength

While it's obvious a Chief Engineer must be technically strong, it's a point worth dwelling on. Disciplined thinking in the product and processes of development overcomes many of the behavioral risks involved in program execution. Pressure from executives to make the program go faster at less cost is inevitable. I witnessed an officer once say, "You need to go twice as fast for half the cost." He was dead serious. While it is ludicrous to think such a thing possible, a Chief Engineer must constantly deal with that sort of pressure.

Influence the organization

If technical competence prevents getting entangled in impossible situations, then organizational influence allows the CE to direct the ship in a positive direction even when facing unreasonable demands. It would have done me no good to argue with the officer about the unrealistic nature of the request. Removing or replacing the CE with someone who will agree does no good for the program or the team. How the Chief Engineer rights the ship after being challenged publicly is critical.

Another important element of influence is maintaining momentum across the company and the supply base. As Excavator Chief Engineer, I spent as much time with other parts of the company and suppliers as with the engineers in my own department. This maintains focus. My department was dedicated because it was our product, but the suppliers and other company divisions had other projects to work on. I needed to ensure the Excavator program had the greatest mindshare. This may sound selfish, but it is necessary to keep the program on track.

Show mental toughness

Grit is synonymous with mental toughness. One dictionary definition for "grit" is: courage and resolve; strength of character. I recall a discussion with a CE on how he wanted his children to have grit. He knew they would be better people if they had to persevere through trials in life. This is also true for engineers. Going through challenging situations does two things. First, it teaches how to deal with a situation that seems out of control. Second, it builds confidence that you can get through it.

Few things in the engineering world challenge are as challenging as dealing with a disappointed and angry customer or facing an assembly line shut down because of parts you are responsible for. This is when mental toughness grows and refines. There is a vast difference between the problems I faced early in my career and the ones I encountered later. The difference wasn't in the magnitude of the problems I faced but in how I learned to approach them. As a Chief Engineer, mental toughness is crucial because it gives your team and the entire organization confidence that the issue will be resolved. Like a ship in a storm, a passenger is comforted by the captain's calmness and would be terrified if the captain screamed and shouted as if things were out of control.

Acquire experience(s)

"If a picture is worth a thousand words, an experience is worth a thousand pictures."

– Stephen R. Covey, author of
The 7 Habits of Highly Effective People

As I reflect on the best Chief Engineers I know, I see a common trait: experiences, not just experience. Many people think that experience simply means time doing something. More importantly, however, is going through the experience completely. The best Chief Engineers I know have deep knowledge not just of their machine but of the subsystems inside that machine. One specialized in the operator station and the user interface, another had deep experience in hydraulics, and another in transmission and powertrain design. The art of product development is managing the system interactions and trade-offs to create a great machine.

As a Chief Engineer oversees a new product program, irrespective of the end product, they are constantly thinking about the elements of the product that are changing and how the changes in the various parts will impact the final product. Past experience developing a piece of the machine or system makes them more effective at knitting the machine together. Changing too many things at the

same time compounds the risk to the program. The Chief's experience dictates what system gets changed and how much change is manageable.

Experiences refine an engineer's metal and qualify them for their next steps. Experience builds technical competency, enabling an engineer to exert mental toughness in challenging situations. As these things occur a confidence is built in and around the engineer making them a candidate for the role of Chief. It is this confidence, not arrogance, in their preparation that enables someone to become an excellent Chief Engineer.

Consequently, organizations must be mindful of allowing chief engineers to gain experiences, not just by being involved at a point in time, but by taking a concept into production. This end-to-end experience allows a Chief to see things before they come to fruition—good and bad. Too often, people abandon a job midway. Imagine an Olympic athlete stopping in the middle of a race and saying, "I don't need to finish the race; I know what it is like to be in the Olympics, so I'm ready for the next thing." This sounds crazy, yet many jump from job to job without gaining the complete experience of putting the product they are responsible for into production.

Early in my career, I was moved into a computer simulation role in fuel systems, a component within the engine. This was at a time when a young engineer was told what he would do next. "Steve, we're going to move you into an analysis role. I think the product is going to fail, so it will be beneficial for you to see this from the inside," exclaimed my boss. That is encouraging I thought but he explained that they would find me a new job if that happened. Witnessing the complexities of component development was the prize, not necessarily the product itself.

This element of people development is underappreciated in many parts of the world today and is the rare earth element contained in the handful of great Chiefs. Allowing people the time to go through component, system, and complete machine (product) programs is the foundation of great engineers and, ultimately, the fertile fields from which future Chief Engineers will be picked. When HR processes or organizational dynamics inhibit the cultivation of this field, it ravages the harvest like a seven-year drought. Great Chief Engineers protect the fields they cultivate because they know these are the plants of future generations of engineers and likely the next Chief. ■

Contributor Highlight

Lara Harrington

Lara Harrington is a 33-year veteran in automotive engineering, specializing in product development and research management. Having retired as the Chief Engineer at Honda Research and Development, Lara played a pivotal role in overseeing programs within Honda's light-duty truck lineup, notably the 2019 Honda Passport. Her journey also includes a tenure as the Senior Director responsible for Honda's North American research portfolio.

Currently, Lara Harrington serves as a consultant, focusing on product development and manufacturing, with a strong emphasis on lean principles. Additionally, she is a dedicated educator, currently lecturing at The Ohio State University, where she teaches a course on Lean Product and Process Development.

Lara's contributions extend beyond the professional realm, as she has served on numerous boards, including the Edison Welding Institute. She has been recognized by The Ohio State University as a Distinguished Alumni and by Automotive News as one of the "Top Leading Women in Automotive" for her significant impact on the automotive sector.

Dr. Jeffrey K. Liker

Dr. Jeffrey K. Liker is Professor of Industrial and Operations Engineering at the University of Michigan. Dr. Liker has authored or co-authored over 85 articles and book chapters and thirteen books which have collectively sold over 1.5 million copies.

He is author of the best-selling *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*, McGraw Hill, 2004 which speaks to the underlying philosophy and principles that drive Toyota's quality and efficiency-obsessed culture and eight other books in the *Toyota Way Series* (*Toyota Way Fieldbook*, *Toyota Culture*, *Toyota Talent*, *Toyota Way to Lean Leadership*, *Toyota Under Fire*, *Toyota Product Development system*, *Toyota Way to Continuous Improvement*, and *Developing Lean Leaders*). He is Editor of *Becoming Lean: Experiences of U.S. Manufacturers* (Productivity Press, 1997), winner of the 1998 Shingo prize (for excellence in manufacturing research).

He has won eleven Shingo prizes for his research. Other books by Dr. Liker include *Engineered in Japan*, (Oxford University Press, 1995); *Concurrent Engineering Effectiveness: Integrating product development across organizations* (Hanser-Gardner, 1997), and *Remade in America: Transplanting and Transforming Japanese Manufacturing Methods* (Oxford University Press, 1999). He is active as a keynote speaker, speaker for executive retreats, and lean consultant, independently and through Liker Lean Advisors, LLC.

Contributor Highlight

James Morgan, PhD

Jim is a senior advisor at Lean Enterprise Institute and a board member at Adrian Steel. He has a unique blend of industry leadership experience and rigorous scholarship, which he draws upon to improve organizational performance at a select group of companies.

Jim's most recent industry experience was as chief operating officer at Rivian, an electric vehicle manufacturer on a mission to keep the world adventurous.

Before joining Rivian, Jim spent a little over ten years at Ford Motor Company. He began by leading the development of the Global Product Development System. He then served the last nine years as director of Global Body and SBU Engineering and Tooling operations, where he and his team contributed to the company's historic, product-led revitalization under then-CEO Alan Mulally.

Before Ford, Jim served as vice president of operations at Troy Design and Manufacturing (TDM) during a period of dramatic growth. TDM is a tier-one global automotive supplier of engineering services, prototype tools, and low to medium-volume production parts and subassemblies.

Steve Shoemaker

Steve Shoemaker was Vice President of Engineering for Caterpillar's Earthmoving Division until his retirement in December 2022. Since 2017, Shoemaker led the division's global product development with offices around the world.

Shoemaker began his career at Caterpillar in 1989 as a design engineer in Illinois, working in various engine roles for fourteen years, including overseas assignments. He then transitioned to the Electronics division in 2003, focusing on engine and machine controls and power electronics. In 2006, he became Engineering Director for the Building Construction Products Division in North Carolina, where he established global engineering teams. Shoemaker's responsibilities grew further in 2012 when he was named Chief Engineer for the Excavation division in Japan, overseeing development of tracked and wheeled excavators and managing over 600 engineers.

In 2023, Shoemaker joined the Lean Enterprise Institute as a Senior Advisor for Lean Product and Process Development (LPPD). In that role, he intends to grow awareness and deepen knowledge of LPPD through coaching organizations and writing.

Shoemaker holds a Bachelor of Science degree in Mechanical Engineering from the South Dakota School of Mines and Technology and a Master's Degree in Business Administration from Purdue University.

Are you a leader who wants to dramatically improve how your organization develops – and profitably delivers – new products and services? Do you want a chance to collaboratively run experiments with other leaders like you to help your team achieve that goal?

Then become a Co-Learning Partner

Apply to join fellow leaders in the Lean Product and Process Development (LPPD) Learning Group, our longest-running, co-learning partnership. Each partnership is focused on an industry, business function, or lean management discipline.

The LPPD group brings together diverse companies committed to transforming their product, process, and service development systems through lean thinking and practice. Much of this group's noteworthy improvements were captured by authors Jim Morgan and Jeff Liker in *Designing the Future*, co-published by the Lean Enterprise Institute (LEI) and McGraw Hill. Who knows, maybe your lean transformation story will become part of an upcoming LEI book.

Like all our co-learning partnerships, the LPPD group is open only to organizations demonstrating:

- Executive commitment to lean transformations;
- Enthusiasm for collaborative learning where work actually happens;
- Willingness to share results with the global lean community.

This learning approach allows organizations and their teams to learn from one another. While participants in the learning groups collectively direct the learning, LEI coaches facilitate meetings organized three to four times per year on-site at learning group companies or in virtual gatherings.

Companies we've partnered with



Coaches guide you as you design and evaluate the experiments that will help you discover the best lean approach to address a business problem or achieve breakthrough performance. We don't offer "cookie-cutter" solutions. Instead, coaches bring their decades of lean thinking, practice, and coaching to bear on the business issues you need to resolve. They guide you through discovering — for your organization and specific situation — how to resolve it.

By offering targeted, immersive experiences that demonstrate the value of addressing all five dimensions of the [Lean Transformation Framework](#), LEI coaches ensure you and your team gain an in-depth understanding through crucial guided practice.

To learn more about becoming a Co-Learning Partner, [schedule a call today with an LEI coach](#).



About the Lean Enterprise Institute

The Lean Enterprise Institute, Inc., was founded in 1997 by management expert James P. Womack, PhD, as a nonprofit research, education, publishing, and conferencing company. As part of its mission to advance lean thinking around the world, LEI supports the Lean Global Network.

Continue Your Learning

The Lean Enterprise Institute (LEI) offers a wide range of learning resources, all with the practical knowledge you need to sustain a lean transformation:

Learning Materials

Our plain-language books, workbooks, leadership guides, and training materials reflect the essence of lean thinking — doing. They draw on years of research and real-world experiences from lean transformations in manufacturing and service organizations to provide tools that you can put to work immediately.

Education

Faculty members with extensive implementation experience teach you actual applications with the case studies, worksheets, formulas, and methodologies you need for implementation. Select from courses that address technical topics, culture change, coaching, senior management's roles, and much more.

Events

Every March, the Lean Summit explores the latest lean concepts and case studies, presented by executives and implementers. Other events focus on an issue or industry, such as starting a lean transformation or implementing lean in healthcare. Check lean.org for details and to get first notice of these limited-attendance events.

lean.org

A quick and secure sign-up delivers these online learning resources:

- Thought-leading content delivered monthly to your inbox.
- First notice about LEI events, webinars, and new learning materials.