

Lean Enterprise Institute



## Developing Products is a Team Sport

Creating an environment for robust and consistent collaboration across all functions ensures the optimal performance of each step in bringing to market a new product, process, or service.

*Part one of a series exploring each of the six Lean Product and Process Guiding Principles.*

lppd 

Dear Reader,

When people come together to develop a new product, process, or service, they are engaging in one of the most critical activities in any organization. Not only are the actions they take and decisions they make going to impact the performance of their organization for years to come, but how they do it will profoundly affect their organization's culture. Consequently, there is no organizational capability more important to strengthen.

That's why we created the lean product and process development (LPPD) initiative at LEI. Through many years of real-world practice and research across various industries, we have identified a set of principles and practices proven to improve development performance. Now, we are redoubling our commitment to sharing this knowledge and experience to help other organizations around the world. This ebook is just one example of that.

An essential part of our initiative is building a global community that will share experiences to advance the art and science of creating new value.

We hope you enjoy the insights distilled here and wish you good luck in your journey to adopt the lean product and process development guiding principles.



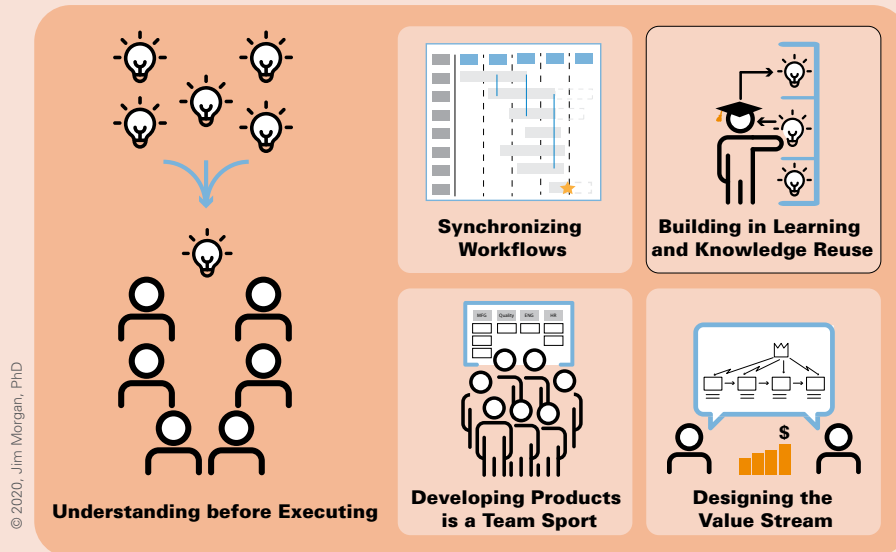
A handwritten signature in black ink, appearing to read 'Jim', with a stylized flourish at the end.

Sincerely,

Jim Morgan, PhD



### Putting People First



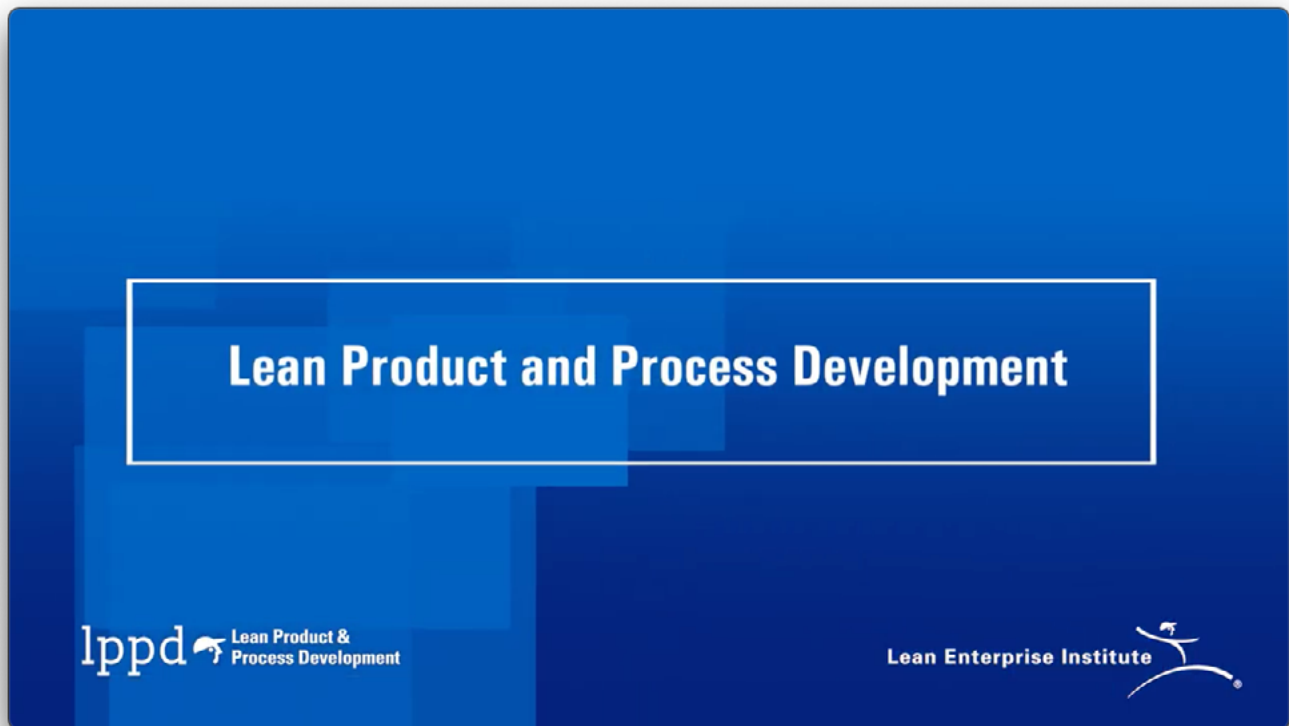
## Lean Product and Process Development (LPPD) Guiding Principles

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.

## **Introducing the Guiding Principles of Lean Product and Process Development**

**In this 12-minute video overview, you'll hear practitioners briefly describe how the LPPD Guiding Principles helped them improve their product, process, and services development.**



**“The success of your product determines the success of your organization – and every organization creates a product.”**

Jim Morgan



## Why Development is a Team Sport



By *Jim Morgan*

The opportunity to work in and lead teams of experts in product design, process engineering, tooling, and operations over the past 30-plus years has given me a unique perspective on product and process development. One thing this experience has made clear to me is that product development is a team sport. No one person or even a single department can create great products on its own. Great products are created by diverse and talented teams of people from across the organization bringing their skills and experiences together to achieve a common and compelling goal. While working this way is powerful, this approach to product and process creation comes with many challenges.

**“No one person or even a single department can create great products on its own.”**

Fairly early in my career, a Toyota Lexus Chief Engineer told me, “it takes a lot of conflict to make a great product.” And in the subsequent years, I have experienced the truth of those words. People from various disciplines, perspectives, and backgrounds who care passionately about creating great products are bound to clash. In fact, a lack of this

### What is Obeya?

A project management practice, obeya in Japanese means simply “big room.” Obeya enables the development team to communicate, collaborate, coordinate, make decisions, and solve problems more effectively.

An obeya makes a program’s most important information visual to enable a shared understanding across the development team. Typical elements made visual in an obeya include the program vision, schedule, performance targets, plans to meet performance targets, design concepts, and other relevant information. An obeya enables more effective problem-solving by helping the design team:

- track progress-to-plan for early problem identification
- make problems visible
- collaborate cross-functionally
- gain the help and support they need from leadership and other team members

Obeya meetings can also offer leadership development opportunities to the project team.

creative tension in your development system is, for me, a cause for grave concern.

Compromise to “keep the peace” is not the path to great products—you actually need to embrace the tension. What’s required is a way to focus this tremendous creative energy and enable these passionate individuals to operate like a team. That’s where LPPD principles and practices come in.

LPPD tools and methods help people from across the organization to communicate, collaborate, coordinate, and make decisions more effectively. The obeya system, well-designed integration events, design reviews, decision mapping, and the concept paper are just a few practices that enhance teamwork and improve development performance. ■

## Developing Products is a Team Sport

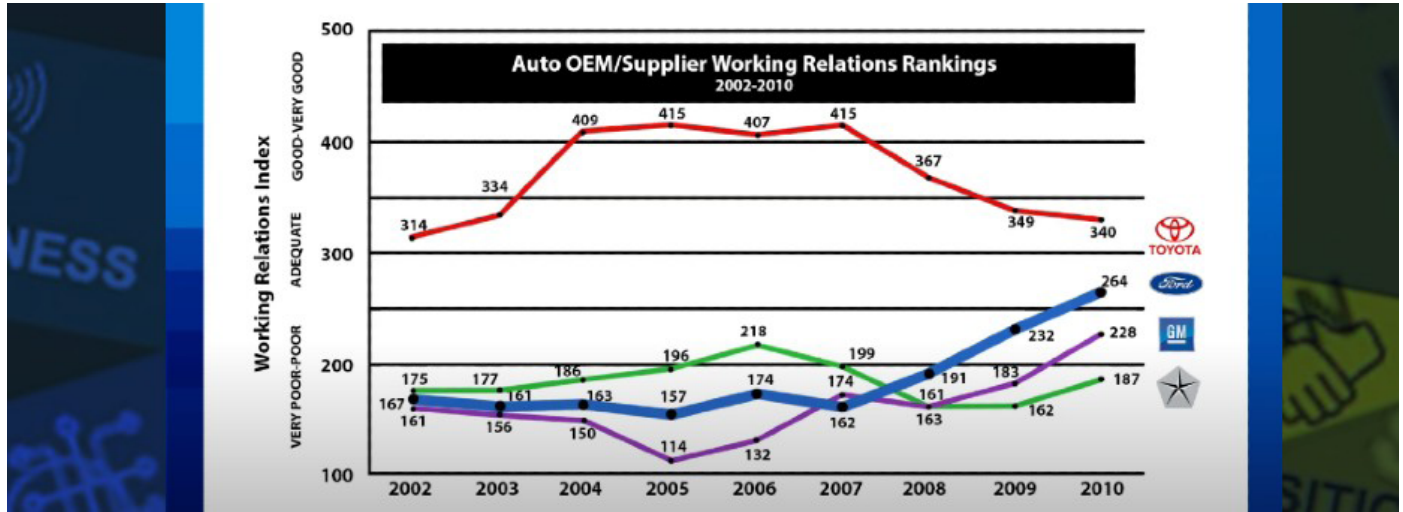
**Experts and executives join Jim Morgan in explaining how collaboration is vital to new product, process, and services development. Plus, they offer specific ways you can enable and strengthen cooperation between your work teams.**



This 12-minute video shares a more in-depth exploration of the principle Developing Products is a Team Sport through the stories of three teams who've used and benefited by following it.

First, the team from Schilling Robotics, a division of TechnipFMC, shares how the obeya system and other LPPD practices helped them bring together people from across the organization into an aligned team. Together, they developed and launched the most advanced deep-water remotely operated vehicle ever created.

Second, Susan DeSandre, a former Ford and Apple supply chain executive, describes how these two very different organizational cultures worked to build better relationships internally and with supplier partners to improve both development performance and the working environment.



## How Ford Built an Aligned Team Using ‘Matched Pairs’



By Jim Morgan

In the previous video, my friend and former colleague Susan DeSandre mentions the “matched pair” initiative at Ford Motor Company. I thought it might be helpful to explain this concept in a bit more detail.

### Building an Aligned Team

Conflicting objectives and the resulting organizational feuding had caused poor relationships to develop between Supply Chain and Engineering at Ford. This internal strife then contributed to poor supplier relationships, which ultimately proved quite costly for the company in terms of cost, quality, and technology.

As a countermeasure, the Supply Chain and Engineering leadership established the “matched pairs” initiative to improve transparency, teamwork, and communication both within Ford and with its supplier partners. They started the matched pair structure with the global directors of supply chain and engineering for each major vehicle system such as Electrical, Powertrain, Chassis, and Body. They then cascaded the structure down within each organization to subsystem chiefs, managers, and supervisors, establishing aligned and jointly owned targets for all supplier-related activities at each level. This structure was applied across all the new-model programs, annual cost reduction objectives,

and long-term vehicle subsystem strategies, as jointly established by Commodity Business Plans. To enable the teams to work together effectively, they created an operating system, shared metrics, and basic infrastructure that was all orchestrated during the Monday morning meetings mentioned in the video.

### Better Teamwork = Better Results

The matched pair work resulted in much stronger relationships both inside and outside Ford. Additionally, the resulting improved teamwork led to significantly lower costs, shorter lead times, improved quality, and better technologies that Ford could share with its customers. What’s more, matched pairing created a dramatically improved working environment for all of us.

### Going Beyond Ford

Susan later went on to do similar work — in spirit if not in structure — at Apple. Also, at least one of LEI’s LPPD Learning Partners is experimenting with “matched trios” by adding manufacturing engineers to the mix. The point is that no matter the specific countermeasure applied, improved teamwork results in better performance no matter the industry. ■



## The 4 Critical Elements of Collaboration



By Eric Ethington

**QUESTION: Do you have any ideas on how to make development collaboration more effective? We've invited manufacturing to our design reviews, but they seem disengaged. When they do speak up, it is usually only to say that our designs aren't buildable. How do we get them on the team?**

**Response:** Your problem is not uncommon, even when you think you have brought everyone together. Our experience and empirical research find that merely inviting collaborators to join you in your development process is not enough. Please indulge me while I explain with a story.

It was one of those rare days for November in Michigan — the sun was shining. It was the day that we were going to perform our first collaborative trial-run on a process that would soon launch into full production.

Production readiness runs were old hat to us, but this one was different. The day's activities were part of an improved launch readiness process with the goal of hitting all our quality, delivery, cost, and productivity targets on the first day of full-rate production. With our old process, our reality could be described as “launch and fix.” Of course, we always hit our customer's quality and delivery targets, but at a very steep cost.

All of the functional areas were at the line:

- Program Management and Launch Readiness
- Product and Process Engineering
- Operations
- Production Control & Logistics
- Skilled Trades / Maintenance
- Purchasing
- Quality
- Key Suppliers and Others

Everything was ready: The line was staffed with 18 operators and stocked with enough parts to build 150 assemblies. Still, things immediately went wrong.

First, the line had the wrong fixtures installed. Eighteen operators sat for 30 minutes while skilled trades swapped out the fixtures. With that corrected, the line ran for a little over an hour while the rest of us watched. When the build was over, we moved to the main conference room to debrief our successful run. Or so we thought.

Second, we failed to capture the metrics we'd planned to collect. The plan had called for us to determine success objectively. We were to fill out a scorecard, which would



calculate the leading indicators of the launch's ultimate success. However, despite the crowd watching the build, only a few metrics were captured and certainly not enough to fill out the scorecard. Without the metrics, we could not determine whether we were on target at this stage in the program. We had squandered our chance to understand. I stared out the window, thinking, "I'd rather be outside in the cold, sunny weather rather than sitting in here."

Implicit in the LPPD guiding principle of *Developing Products is a Team Sport* is the concept of collaboration. On that sunny November day, we thought that we were collaborating, but we fell into the trap of thinking that co-located team members equaled collaboration. There are other versions of this equation:

- Co-located files = Collaboration
- Cross-functional = Collaboration
- Communication = Collaboration

And this list goes on. Our experience tells us that collaboration requires a clear purpose, a clear process, clear expectations, and clear support.

1. **Clear purpose:** What is the reason for the collaboration? What's the business case or business need? Without alignment on the purpose and its underlying importance to the organization, the collaboration will fail. The scope will start to change, or other priorities will take precedence.
2. **Clear process:** How will the collaboration take place? What are the steps? What is the timing? Who is responsible for what? We all know that parts don't assemble themselves. We can't just throw them in a box, drop them off at UPS, and hope they "shake" themselves together on the way to their destination. Yet, when we throw people together without a clear process to work together, we essentially do the same thing.
3. **Clear expectations:** What is the specific goal or outcome we are striving for through this collaboration? Our purpose in the trial-run example was to contribute to improved launch performance for the corporation, but that day we needed to achieve a scorecard rating of at least 50%.

4. **Clear support:** Problems will arise that the team cannot handle on their own. In those cases, what is the escalation process, including who and when?

Reflecting on that sunny day long ago, we learned a valuable lesson about true collaboration. We all understood the purpose, the expectations, and there was a robust support structure. What we lacked was a well-defined process for doing a trial run. Once we put this critical process for running trials in place, true collaboration began to happen. ■

### Chief Engineer

The role defined at Toyota for the leader who has total responsibility for the development, launch, and market success of a product.

The Chief Engineer is more than just a role; it is a system that encompasses a project from beginning to end. The chief engineer represents the customer and translates their needs into clear, consistent, and prioritized requirements to focus the project team around a coherent and compelling vision for the product (concept paper). The chief engineer also guides the development and industrialization of the product, acting as the system integrator and referee to ensure the customer is represented throughout the process.

The chief engineer system drives continuous improvement by challenging the organization to innovate to meet the customer needs while managing the risks. However, chief engineers do not directly supervise most of the developers who work on their products.

Instead, the system creates a natural tension between the project leader, who wants to realize his product vision, and the functional leaders, who intimately understand what is possible. This creative tension becomes a source of innovation as the project leaders continually push the organization into new territory according to market needs. While at the same time, the functional units try to keep the project leaders true to the organization's technological capabilities.

Chief engineers typically have been groomed over time and have strong technical skills to effectively lead the technical component integration and optimize the product's value to the customer.



## Why a Variety of Perspectives is Good For Your Products



*By Kevin Nolan, President and CEO, GE Appliances, a Haier Company*

Imagine a team whose members look and think alike. They read the same books. They live in the same neighborhoods. From afar, chances are you might see this team working in untroubled collaboration and harmony. However, with a closer look, you'll discover a dangerous homogeneity that glorifies consent and buries true creativity.

Product development is a team sport. Yet, like in any sport, not all teams succeed. The very best teams are those driven by passion and inspired by the belief that there's always a better way. Team members have deep domain knowledge and are interested in learning, contributing, and getting work done. They need to be the best listeners, enjoy the creative crashes, and be willing to have their own beliefs challenged.

The best teams attract, promote, and celebrate diversity of thought, enabling team members to approach problems differently. I've worked with plenty of teams throughout my career, and the ones that deliver best are always the ones where the different personalities dance and fight in passionate, thought-provoking rooms. An obeya room filled with this can be magical. Now, as a CEO, I see the importance of not only promoting diversity within our teams but also opening them to a broader range of input—particularly coming from passionate people with personal interest in the product.

Today's new challenge or opportunity is integrating our communities and consumers into product development. Can we make them integral members of our team? Just like inviting fans to join their favorite sports team on the field. It sounds messy, but this could be the connection to the most powerful creative process we've seen.

The key to all this, of course, comes from leadership and orchestration. Like a coach, the best program managers are a special kind of problem-solvers who inspire and lead their teams to solve the complex issues. Looking back, Thomas Edison and Henry Ford come to mind. They had a passion and a love for problems at hand, tirelessly working with their teams to answer the questions that emerged every step of the way. The program management roles are very stressful and demanding, requiring mental toughness, flexibility, skills to manage people, the discipline to drive process, and an openness to embrace multidisciplinary discussions.

Through the effective execution of the Lean Product and Process Development Principles, tools and methods, I'm convinced there will be obeya rooms the size of our cities, energizing and empowering diverse teams to develop products we haven't even imagined yet. ■

## Faculty Highlight



### **Katrina Appell, PhD**

Senior Coach  
Lean Product and Process Development  
Lean Enterprise Institute

President  
Katrina Appell Consulting

With over 15 years of coaching, facilitating, training, and team development experience, Katrina is passionate about supporting organizations in improvement and transformation. She has coached lean principles and practices at many companies in various industries, including Caterpillar, Michigan

Medicine, Pella Windows & Doors, TechnipFMC, US Synthetic, and Whirlpool. At LEI, Katrina codeveloped and is an instructor of LEI's *Designing the Future Remotely: A Lean Product & Process Development Immersive Learning Experience*.

In addition to coaching, Katrina has collaborated with Dan Cooper, PhD, to research how LPPD can enable reducing greenhouse gas emissions and other ecological concerns across a product's entire lifecycle.

Katrina holds a master's and a doctoral degree in industrial and operations engineering from the University of Michigan at Ann Arbor and a Bachelor of Science in General Engineering from the University of Illinois at Urbana-Champaign.



### **John Drogosz, PhD**

Senior Coach and Chief Engineer  
Product and Process Development  
Lean Enterprise Institute

Vice President  
Liker Lean Advisors

John has over 25 years of experience applying lean principles and practices in manufacturing, product development, and services. As a coach, he has led lean transformations in numerous companies and industries, including Northrop Grumman, Johnson Controls, Harley-Davidson, Embraer, and Caterpillar. As LEI's chief engineer, lean product and process development, John leads the development of learning experiences that enhance design professionals' lean development knowledge and capabilities while advancing the discipline's body of knowledge. He codeveloped and is an instructor of LEI's *Designing the Future Remotely: A Lean Product & Process Development Immersive Learning Experience*. Additionally, John teaches classes in lean product and process development for the College of Engineering at the University of Michigan. He has contributed to several books and articles, including *The Toyota Product Development System* (2006) and *The Toyota Way to Continuous Improvement* (2011).

## Faculty Highlight



### Eric Ethington

Senior Coach and Chief Engineer  
Lean Product and Process Development  
Lean Enterprise Institute

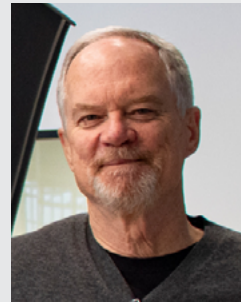
President  
Lean Shift Consulting

Eric is a recognized expert in process development and problem-solving methodologies with over 30 years of industry experience in frontline-through-executive leadership roles at Delphi and Textron and 12 years of consulting practice. His experience in applying lean includes most types of industries and functional areas, including organizations as varied as Medtronic, Michigan Medicine, Coca-Cola Enterprises, and Goodwill.

As LEI's chief engineer, process and product development, Eric leads the development of learning experiences that enhance design professionals' lean development knowledge and capabilities while advancing the discipline's body of knowledge.

Eric holds a Bachelor of Science in Industrial Engineering from General Motors Institute (now Kettering University), a Master of Business Administration from the University of Michigan-Flint, and a six-sigma black belt in design.

Additionally, he is the coauthor of *The Power of Process, a Story of Innovative Lean Process Development* (2022).



### Jim Morgan, PhD

Senior Advisor  
Lean Enterprise Institute

President  
EMC Network

Jim is recognized globally for his expertise in product and process development. His know-how comes from a unique combination of industry experience as a senior executive and rigorous scholarship. His most recent industry role was as the chief operating officer for Rivian, an electric vehicle manufacturer, during a critical transition period. Before that, he was global director of Body and SBU Engineering and Tooling Operations during Ford's historic, product-led revitalization under then-CEO Alan Mulally. Before joining Ford, Jim served as vice president of operations at TDM, a tier-one global automotive supplier, during a period of rapid growth.

In addition to his nearly 40 years of industry experience, Jim has authored or coauthored two books — the award-winning *The Toyota Product Development System* (2006) and *Designing the Future* (2018)— three book chapters, and numerous articles.

**LEI's Co-Learning Partner Program is for leaders looking to transform their enterprise and contribute to the lean thinking and practice body of knowledge. You and your team will closely partner with LEI Coaches in a journey of discovery that will take your organization to the next level.**

### **Become a [Co-Learning Partner](#), LEI's Most Extensive Custom Learning Experiences**

Partner with the Lean Enterprise Institute (LEI) to accelerate your lean journey and jointly conduct experiments on the best way to advance your lean transformation. As one of a select group of companies, you'll work closely with LEI thought leaders, such as John Shook, Jim Morgan, and other top-flight LEI Coaches and subject-matter experts.

Within the partnership, LEI Coaches will 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 come in with a cookie-cutter solution. Instead, LEI Coaches bring their decades of lean thinking, practice, and coaching to bear on the business issues you need to address and guide you through discovering—for your organization and in the 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.

### **Join a Learning Group**

LEI's most advanced partners—those who have reached the highest levels of lean thinking and practice—are invited to participate in an LEI facilitated learning group. Open only to those who have and are willing to share advanced lean thinking and practices, this learning opportunity allows organizations and their teams to learn from one another. While participants in the learning groups collectively direct the learning, LEI Coaches facilitate the meetings three to four times per year and share related learning materials.

The meetings are held on-site at a learning group company or in virtual gatherings. The learning groups are organized around a specific LT&P discipline, industry, business function, and the like.

The longest-running Learning Group is focused on Lean Product and Process Development (LPPD), bringing together partner companies interested in transforming their product, process, and service development systems. Much of this Learning Group's learning was captured in Jim Morgan's and Jeff Liker's *Designing the Future*, which LEI co-published with McGraw Hill in 2019. Who knows, maybe your lean transformation story will become part of an upcoming book published by LEI.

### **Some of our LPPD Learning Group Partners**





## About The Lean Enterprise Institute

The Lean Enterprise Institute, Inc., was founded in 1997 by management expert James P. Womack, Ph.D., 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 ([leanglobal.org](http://leanglobal.org)), the Lean Education Academic Network ([teachinglean.org](http://teachinglean.org)), and the Healthcare Value Network ([healthcarevalueleaders.org](http://healthcarevalueleaders.org)).

## 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](http://lean.org) for details and to get first notice of these limited-attendance events.

### [lean.org](http://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.