Synchronizing Workflows

Creating a system to enable cross-functional work teams to work concurrently keeps the product, process, and services development moving steadily forward and reduces or eliminates downstream rework.

Part four of a series exploring the Lean Product and Process Guiding Principles.

lppd

Dear Reader,

Thank you for downloading part four of our ebook series, where we explore the practical application of Lean Product and Process Development (LPPD) guiding principles. This edition's theme is "synchronizing workflows," one of a set of principles and practices that LEI's LPPD initiative has identified as proven to improve development performance.

In this ebook, we share many perspectives from lean thought leaders and practitioners on how to synchronize all functional areas — including production, supply chain, logistics, finance, and others — to ensure your new product, process, or service fulfills customer needs and achieves business objectives. All contributors agree that collaboration across functional work streams is vital for a development program's success.
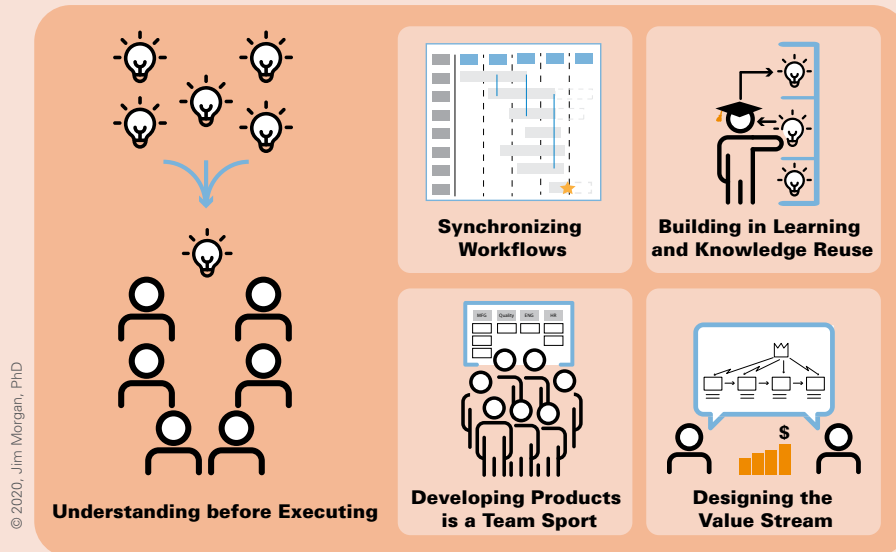
Sincerely,

Jim Morgan, PhD
Senior Advisor, LPPD
Lean Enterprise Institute

lppd

Putting People First

Understanding before Executing

Synchronizing Workflows

Building in Learning and Knowledge Reuse

Developing Products is a Team Sport

Designing the Value Stream

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# 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.

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

Watch the video read the transcript by clicking on the image or at lean.org/LPPD-guiding-principles.
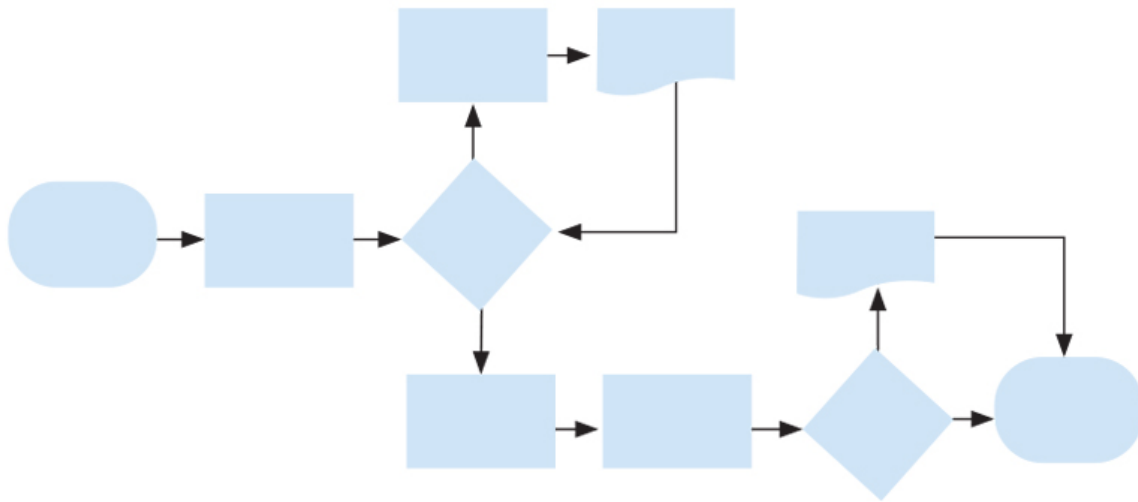
How Synchronizing Workflows Eliminates Waste in Development Processes

By Jim Morgan

It's still surprising when people want to debate whether an individual's activity is waste in product development. "You know," they say, "a developer's work is not like manufacturing." Really? "That's so interesting" is my typical response while thinking about missing the forest for the trees.

The fact is that the amount of waste in most product and process development systems is staggering — and almost none of it has anything to do with the work of individual contributors. Most of the waste in development is the direct result of a poorly designed development system and processes that seem intent on thwarting even the most talented development teams.

I am usually more comfortable talking about value creation in development. It's more fun, and, after all, creating new value is the point. Unfortunately, most development systems create more frustration than value. They waste people's valuable time, not to mention copious amounts of organizational resources. Consequently, I think it's essential that we also discuss opportunities to reduce some of that system-generated waste — starting with badly designed development processes. Fortunately, the countermeasure to

this problem lies in fundamental lean thinking: Make the value-creating steps of product and process development flow.

Still, one significant challenge is creating flow when people from across the organization are contributing (or should be) to a new product's creation. For example, achieving flow might require coordinating the concurrent work of design, engineering, software development, manufacturing, and logistics. And that can seem a daunting task. The key is synchronizing the individual contributing workstreams, and that starts with deeply understanding the actual work. By identifying the interdependencies of critical inputs and outputs across workstreams and understanding the impact of critical decisions, you can keep the process moving steadily forward instead of constantly looping back for expensive rework.

There are two mutually reinforcing approaches to creating flow in development: Building flow into the process at the start and helping your team synchronize work in real time.

Value Stream

All of the actions, both value-creating and nonvalue-creating, required to bring a product from concept to launch (also known as the development value stream) and from order to delivery (also known as the operational value stream). These include actions to process information from the customer and transform the product on its way to the customer.

from the *Lean Lexicon 5th Edition*

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.
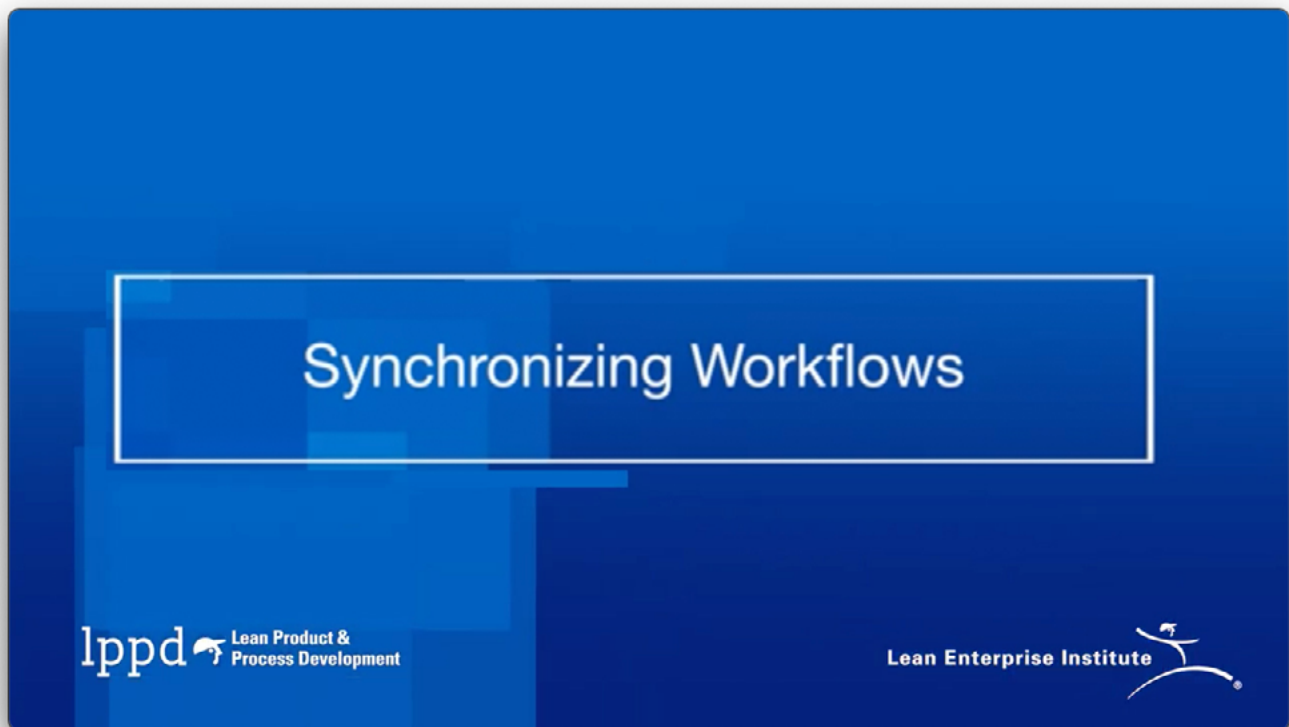
Building flow into the process ensures the development team makes the most of incomplete but stable information and enables true concurrency. To build flow into the process, first design the development tasks and their sequence to maximize the utility of vital inputs and outputs. Then determine milestones and schedule integration events when teams can coordinate and evaluate progress based on agreed-upon quality-of-event criteria. To help this evaluation, be sure to use input requirements as leading indicators of progress. Value stream and decision flow mapping are often reasonable ways to start your development process re-design.

Unfortunately, no process, no matter how well designed, will be sufficient. Organizing and leading your development team to synchronize work in real time during development helps the team respond to inevitable unexpected situations. As Mike Tyson says, "everyone has a plan until they get punched in the face." Stuff happens. Things go wrong. Teams need to be able to react and keep making progress in the face of unexpected changes. Effective obeya stand-up meetings and good visual management are very helpful here, and a strong chief engineer leading the program is essential. Depending on the product, you may want to consider organizing cross-functional teams around product sub-systems.

The point is that you need tools and mechanisms that give the team an early heads-up and enable them to absorb inevitable variation and keep moving forward. ∎

# How Synchronizing Workflows Eliminates Waste in Development Processes

In this month's video, we share excellent examples of two mutually reinforcing approaches to creating flow in development:

1. Building flow into the process at the start. Peter Cooper, platform leader of medium wheel loaders at Caterpillar, explains how they used value-stream mapping to reduce waste dramatically and create better flow on a set of time-critical development programs.

2. Helping the development team synchronize work in real time. Alison Seward, program senior director at GE Appliances, a Haier company, shares her secrets for synching up work across her large development team on a critical new product program.
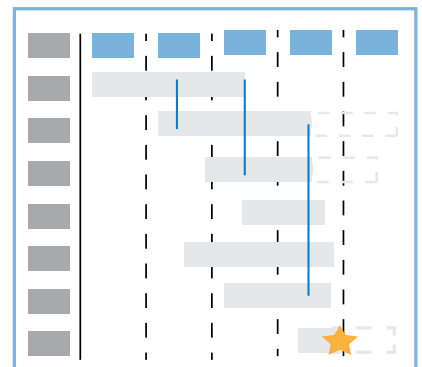
Watch the video or read the transcript by clicking on the image or at lean.org/synchronizing-workflows.

Synchronize Work Flows
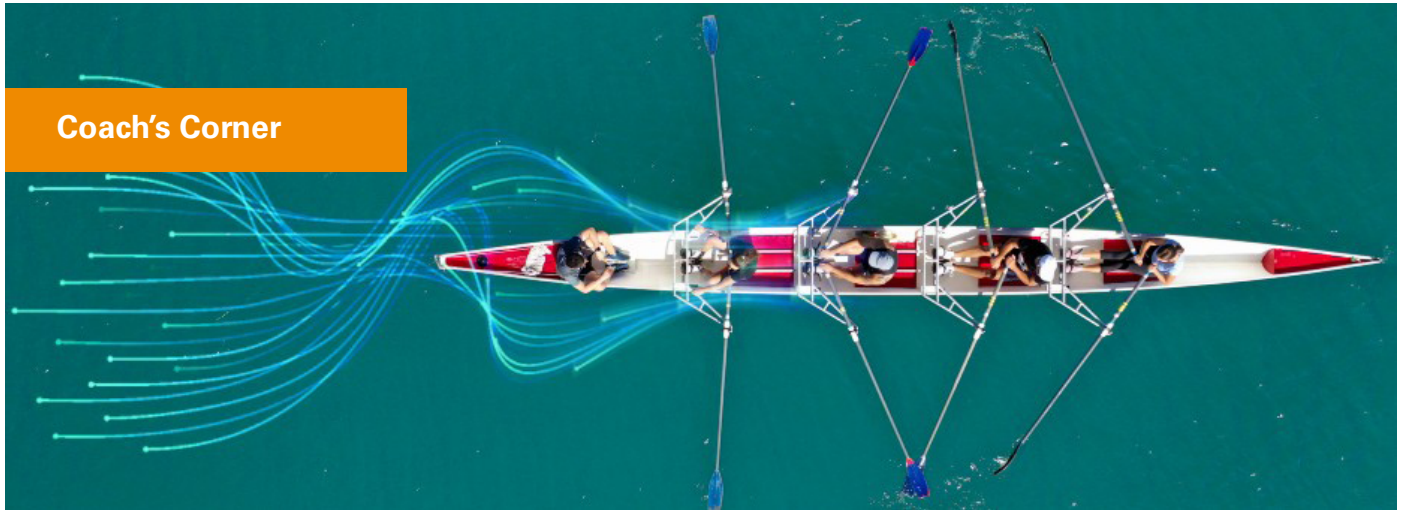
Coach's Corner: Why Your Development Plans and Obeya Practices Aren't Working – and How to Fix Them

By John Drogosz, PhD

QUESTION: I feel like we do a lot of planning at our company, yet we still struggle to get good flow on our projects. We have been experimenting with Obeya, and that has helped a bit, but we still frequently slide our scheduled dates or push work before it's complete, leading to the inevitable rework later in the project. What are we missing?

Thank you for your question. I wish I had a simple solution to give you, but, unfortunately, I don't! Your problem is one that many organizations grapple with every day and has several facets to it. However, the core of the issue lies with the topic of this month's design brief – synchronizing workflows.

Fixing Common 'Planning' Problems

First, let's start with the part of your question about planning. When working with companies, I hear some people say they do too much planning and others who say they do not do enough. I believe it is less about the time and effort expended than it is about the quality of the process.

I find many planning activities more focused on asking everyone what needs to be done and when they can have their tasks completed. Teams then go through several

iterations of the plan to make it fit into a pre-defined timeline. Frequently, these planning activities become a series of negotiations on allocating time and resources rather than focusing on the flow of work that needs to be accomplished to meet the project's goals. The root cause of the problem often is that we don't understand how our work fits into the overall development process and how everyone else's work affects ours. This knowledge gap leads to a lot of misunderstanding — and mistrust. Everyone thinks the other group is either sandbagging their estimates or exaggerating their capabilities to deliver.

> "The root cause of the problem often is that we don't understand how our work fits into the overall development process and how everyone else's work affects ours."

Product Development Value Stream Mapping is a good way for teams to understand better how everyone's work fits together and see where the interdependencies between groups occur (or should occur) to enable flow. Just like

product development, understanding the value stream is a team sport and cannot just be the project manager's responsibility. The more team members deeply understand each others' work, the more they can work concurrently and flow smaller increments of stable yet incomplete information to the next step. This practice of delivering the right information, at the right quality, at the right time in product development is analogous to the just-in-time principle in the factory.

Getting the Most from Obeya

I'm glad to hear obeya is providing some help. However, I find that many teams are missing an opportunity to get the most out of obeya. Having a visual schedule is helpful to keep all eyes on the work (assuming it was constructed with a good understanding of the value stream, as noted above). Still, the only sure thing in product development is that the original plan will change as unknowns become known and need to be addressed.

Many team huddles around obeya (or scrum) boards focus a lot of their energy on completing tasks and providing help when assignments fall behind. That is great, but how much are they talking about adjusting the inputs and outputs between groups to maintain or improve flow when these inevitable changes occur? Are they continually and proactively asking – what do you need from me? What do I need from you? In addition to improving workflow between groups, seeing each others' work builds trust between them, leading them to become more effective problem-solvers when things do not go according to plan and improving overall team dynamics throughout the project.

Focusing more on synchronizing the workflows between tasks during the planning phase and then continually managing those flows during the project in obeya dramatically improve your time to market. ■

Value-Stream Mapping

Value-stream mapping (VSM) is diagraming every step involved in the material and information flows needed to bring a product from order to delivery. It is a fundamental practice used in continuous improvement to identify and eliminate waste. Toyota developed value-stream mapping (but called it material and information flow diagramming), and it has become a critical part of the Toyota Production System.

A value stream is all the actions (both value-creating and nonvalue-creating) required to bring a product from raw material to the arms of the customer.

Value-stream mapping typically begins with a team creating a current-state map, which means capturing and visually depicting the actual condition of a value stream's material and information flow. Subsequently, the team draws a future state map, which visually illustrates a target image of how material and information should flow through the value stream.

Doing this over and over is the simplest and best way to teach yourself and your colleagues how to see value.

Though value-stream mapping lean practitioners in manufacturing most commonly use value-stream maps, managers in any industry can benefit from the practice.

from the *Lean Lexicon 5th Edition*

Contributor's Corner

Contributor's Corner: How Synchronizing Workflows Helped TechnipFMC Develop its Latest Robot

By Scott Fulenwider and   *Hannah Schell*

At TechnipFMC Schilling Robotics, we make robots! But just as exciting is how we've begun to launch products more effectively by experimenting with Lean Product and Process Development (LPPD) principles.

The robots we make aren't those of science fiction fame, nor are they college lab stunts. Instead, they are remotely operated vehicles (ROVs) and serve as the only credible tool to do work in the most remote place on the planet, the deep ocean. Our customers in oil and gas, offshore wind, science, and defense require products that perform in this hostile environment with exceptional capability, efficiency, and reliability.

Our most recent development, the Gemini® ROV, was intended to, as we say, "revolutionize deepwater productivity" — and would become our most technically advanced, integrated, and demanding product development to date. From a technology perspective, the product is impressive. We developed automation sequences, machine vision, advanced hydraulic control, sensor fusion, and big smiles on the faces of our users. These developments represented a huge stretch not only for engineering but also for manufacturing, quality, supply chain, and our services organizations.

We have a fantastic culture of super talented people and great leadership support. We also had decades of experience grinding out programs and doing whatever was necessary to deliver. We refer to this as "grit." But we began to wonder if this reliance on determination was blinding us to better ways of working. Must every launch require herculean efforts? Or worse, what if you put in the effort, burned out the team, and still failed to get the product out the door? The more we thought about it, and as the program progressed, the clearer it became that the challenges of Gemini® would require a different way of working.

We decided to give some of the methods and practices of LPPD a try. In addition to many other benefits, LPPD offered us a more synchronized or coordinated way of working concurrently that is far less wasteful and brutal on our teams than past programs. Two areas where we saw the greatest benefits were in purchasing and manufacturing.

Supply-Side Benefits

On major programs in the past, our supply chain team experienced two significant problems. First, our previous design release process scheduled a single batch release of more than 2,000 parts on a single day. There was no way

our relatively small supply chain team could handle that volume of releases at one time. Second, many of the parts (we did not always know which ones) had never been made before. Consequently, we had no idea how long it would take our suppliers to make them until we saw the designs, so we could not plan lead times. It was simply impossible for our small purchasing team to succeed with this huge design release curve and uncertainty.

For the first issue, the downstream implications of the batch release problem became abundantly clear when we value-stream mapped prior program release performance. But mapping also showed that engineering was not completing all the designs on the same day, just working to a single release date. The supply chain and engineering teams worked together to agree to a common design release priority based on long-lead parts and scheduled a stagger in releases that flowed releases into the system on a regular cadence instead of overwhelming the supply chain team.

For the second issue, the unknown lead times of completely novel designs, the supply chain and engineering teams worked early in the program to understand which parts were most likely to fall into this category. For those parts, we proactively problem-solved using incomplete but stable data from our product prototyping rounds: supply chain looked for alternate suppliers, and engineering adjusted the release date if necessary. Addressing these issues before the critical procurement window was far less stressful for the entire team.

Manufacturing Benefits

Previously, we waited until after production launch to do our first kaizen activities and develop our manufacturing cells. With the Gemini® program, we started when engineering was in their prototype round of development. This earlier start allowed us to give specific and meaningful manufacturing feedback when there was still time to incorporate it into the product design.

We also changed our kaizen process such that during the engineering prototyping rounds, we created prototype manufacturing cells (think cardboard fixtures and folding

tables). Then, when the engineering design was finalized, we were able to complete the cell design more quickly than with our previous process.

Tying in the Enterprise

Finally, we leveraged our weekly cross-functional obeya meetings and milestones as an effective way to manage the work in real time. As with any program, things did not always go as planned, and these meetings enabled us to make changes on the fly in a coordinated and transparent way.

Positive Cultural Changes

In the end, developing the Gemini® was a tough program, and launching the product was a super challenging ordeal. Healthy doses of grit were still required. But what we did was turn the impossible into the possible. It wasn't easy, but we now have a product in the field "revolutionizing deepwater productivity."

Perhaps the more meaningful result is the positive change in people's behavior. We watched techs giving design feedback, engineers flexing schedules to improve the loading of buyers, and a true enterprise-wide understanding of the flow of efforts that lead to shipment.

We have a long way to go, and I'm sure we could stand to dial back our appetite for pain. However, I certainly wouldn't want to lose anything we've tried or learned by synchronizing workflows. ∎

Kaizen

Kaizen is a Japanese term meaning continuous improvement to create more value with less waste. Ideally, it entails the engagement of every employee in the never-ending pursuit of better on the way to perfection. By making incremental improvements, organizations can improve productivity and achieve competitive success.

from the *Lean Lexicon 5th Edition*

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 lean 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
Lean 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).

Eric Ethington

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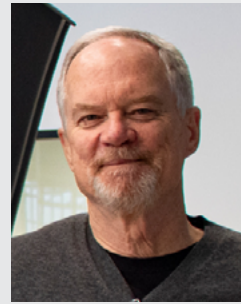Lean Enterprise Institute

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](#)

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.

Companies we've partnered with

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.

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 (leanglobal.org), the Lean Education Academic Network (teachinglean.org), and the Healthcare Value Network (healthcarevalueleaders.org).