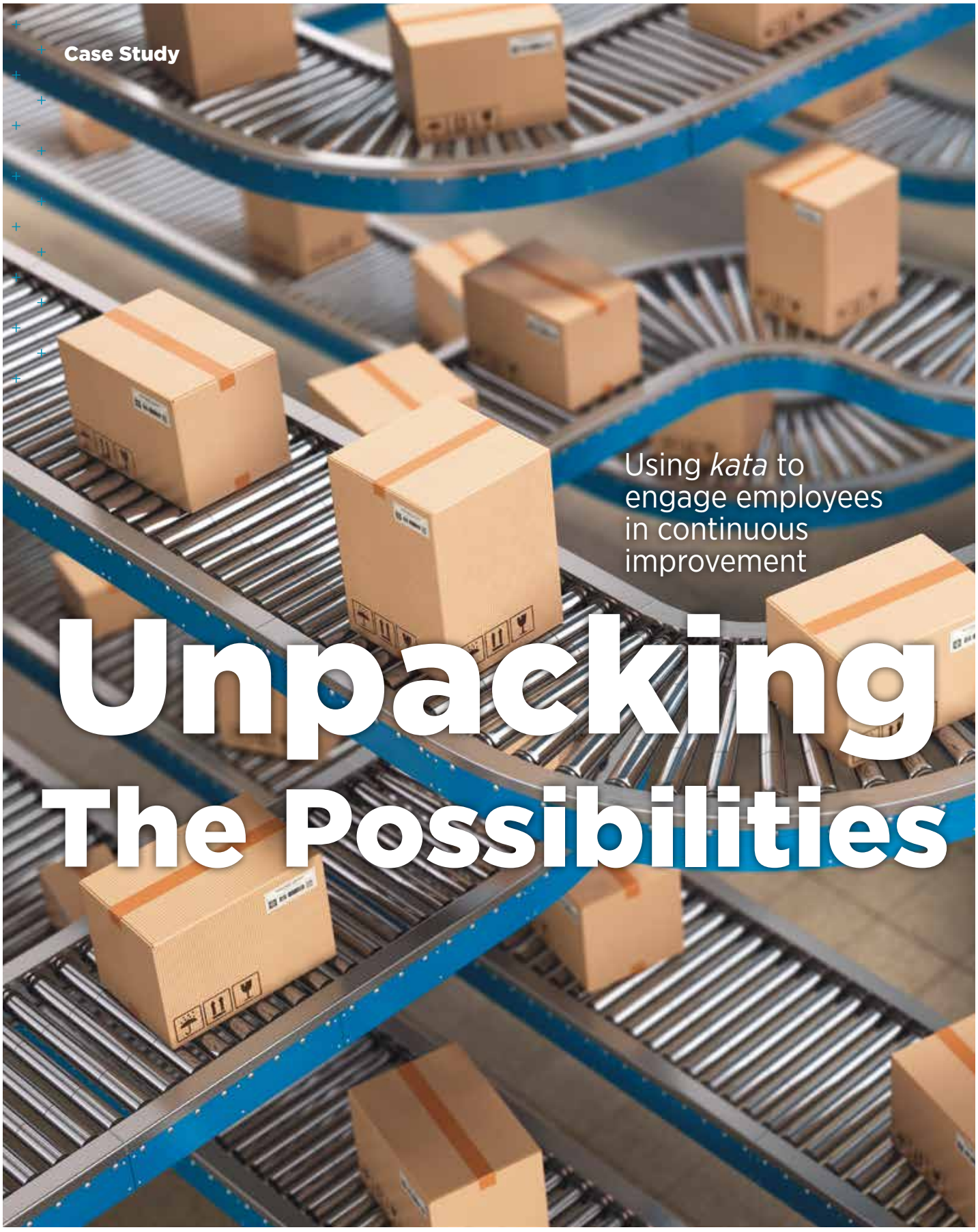
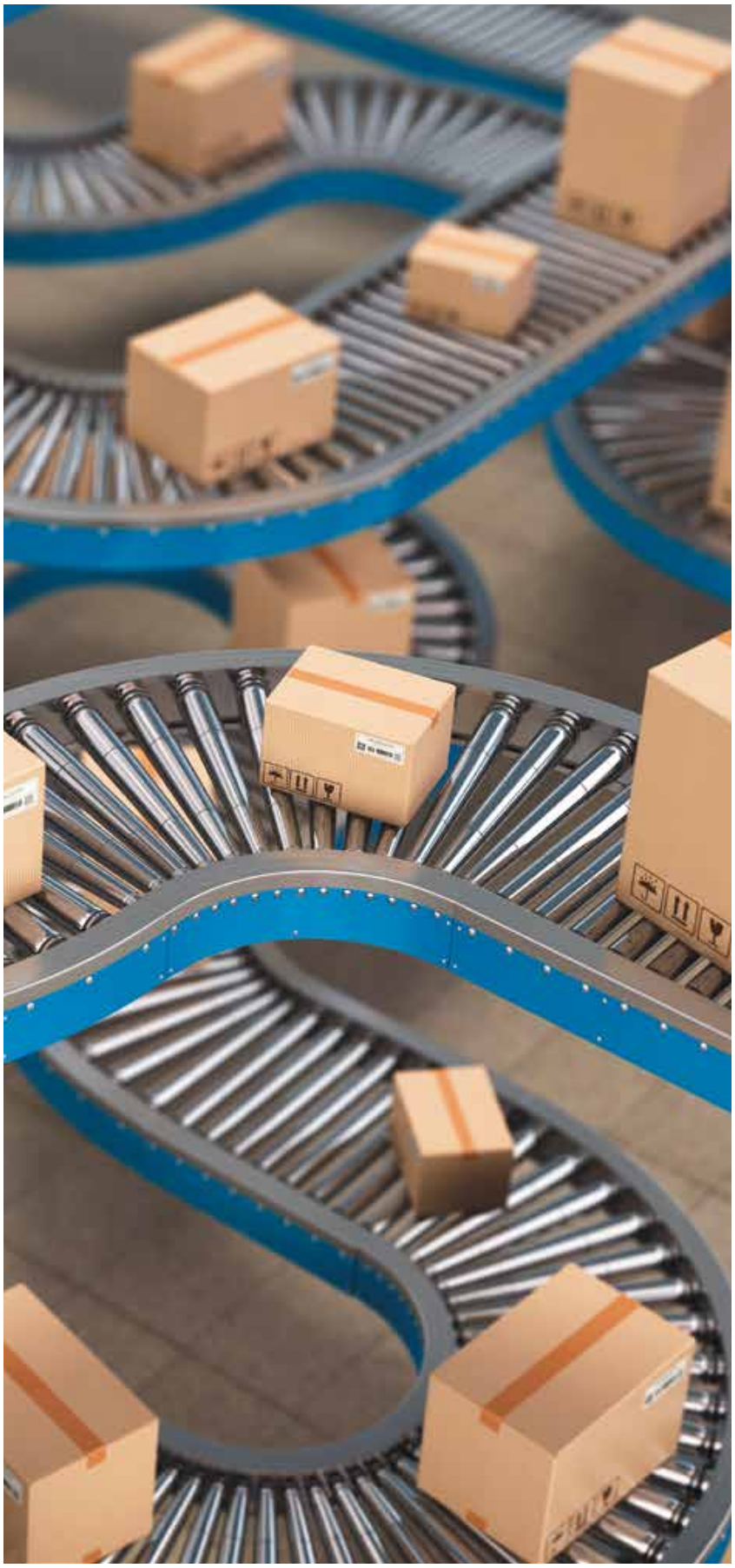
Case Study



Using *kata* to engage employees in continuous improvement

Unpacking The Possibilities



Topic
Toyota Kata

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There are many examples of lean Six Sigma (LSS) failing to deliver on expectations.[1] Typically, great results are seen for projects, but the new work patterns are not sustained, so results diminish. There is broad agreement that one root cause of this is lack of effective leadership.

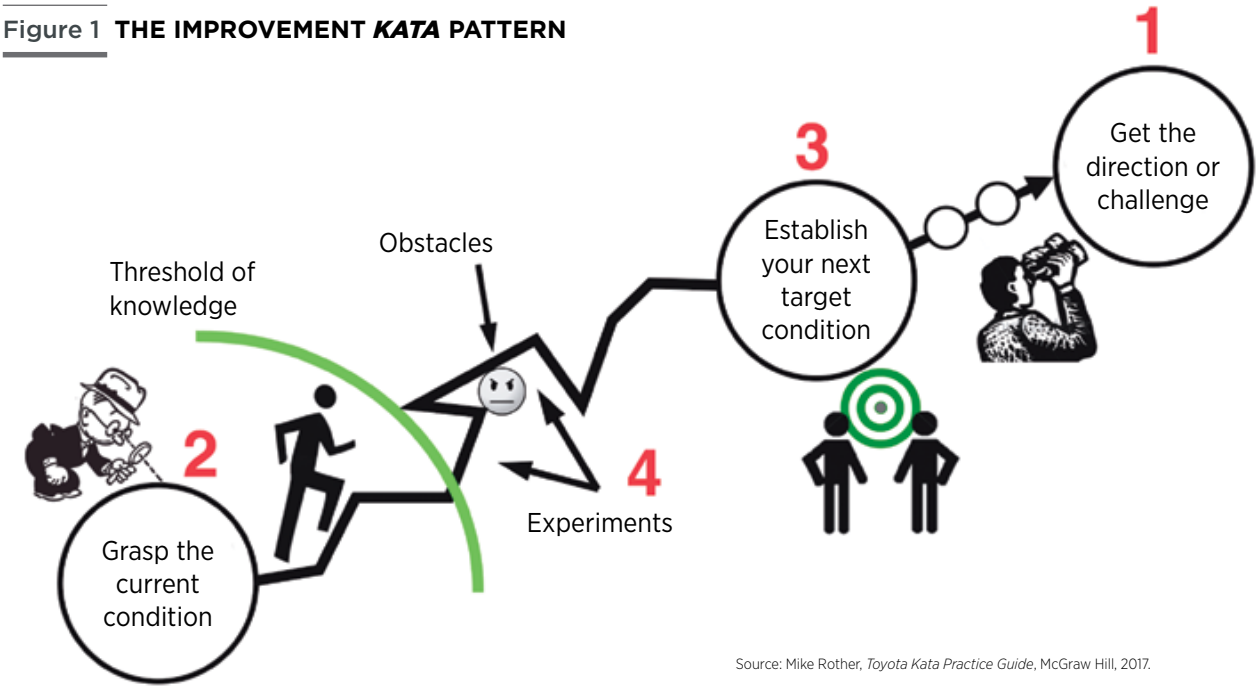
Take Toyota, for example, which is the model for lean. It makes enormous investments in developing leaders,[2] and a closer look reveals that the essence of Toyota's approach is the master-apprentice relationship. The master is a leader who has internalized the lessons of the Toyota Way so they become natural and part of his or her daily behavior. The apprentice usually is a direct subordinate of the master who is dedicated to learning from him or her.

Steve Spear and Kent Bowen studied these Toyota Production System (TPS) masters at work and uncovered several core principles, which they called the DNA of Toyota. Their fourth rule states: "Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organization."[3]

It should be noted that Toyota employees are not acting in accordance with rigorous scientific methods that would survive peer review. Rather, they are thinking scientifically when they approach problems, which means gathering data and facts, taking time to test hypotheses, examining results and reflecting on what they learned.

If, in fact, improvement based on scientific thinking is what brings TPS to life, how do we develop people who think this way? Toyota's answer is the coach-learner relationship and daily practice. Toyota has developed many coaches over many decades, but few other organizations have. A strong step in addressing this problem was introduced in Mike Rother's book, *Toyota* Kata,[4,5] in which he offers a simple step-by-step process, along with starter *kata*—or practice routines—to develop scientific thinking skills by learning while improving a real process toward a challenging goal.

Figure 1 **THE IMPROVEMENT *KATA* PATTERN**



Source: Mike Rother, *Toyota Kata Practice Guide*, McGraw Hill, 2017.

This article summarizes Toyota *kata* and illustrates how it is being used at Zingerman's Mail Order (ZMO), an online artisan foods mail delivery organization, which has been working to develop lean systems for more than 15 years. ZMO began with a type of practice and coaching similar to Toyota masters, but found there was insufficient continuous improvement activity, outside of a few senior managers. Toyota *kata* helped encourage continuous improvement in a broad set of ZMO employees, which moved the company toward a culture of scientific thinkers. From this case study, two important issues for LSS practitioners are uncovered:

1. The value of practicing Toyota *kata* to develop scientific thinking skills.
2. How the *kata* approach supports the use of LSS tools.

Toyota *kata*

Rother had many opportunities to observe and talk to TPS masters from Toyota. He noticed that although there were differences in their specific approaches, they all followed a common cycle:

1. **CHALLENGE.** Teacher defines a clear and large challenge for the learner.
2. **CURRENT CONDITION.** Learner looks, analyzes and learns to deeply understand what is happening now.
3. **NEXT TARGET CONDITION.** Learner formulates a near-term target outcome and target pattern of work to be achieved in the short term, in the direction of the challenge.
4. **EXPERIMENT.** Learner finds ways to test ideas to overcome obstacles to the target condition.

The cycle is practiced repeatedly by setting next target conditions and experimenting against obstacles on the way to the challenge. The four-step pattern became the basis of what Rother called the improvement *kata* pattern (see Figure 1). Some key points of the pattern are:

1. It represents a practical, scientific-thinking approach. It's practical because it is about pursuing goals rather than understanding the nature of something, like traditional science.
2. It starts with an aspirational challenge—usually six to 12 months out. What big improvement will make an important difference?
3. It assumes uncertainty. If the challenge is well conceived, the solutions will be unclear at the outset.
4. It makes rapid learning cycles explicit. Each target condition is intentionally short, such as two to four weeks. Each experiment tests one idea quickly and cheaply.

Over a 10-year period, demand increased from $7.5 million, it remained in the same space, and temporary staff hired for the busy Christmas season shrunk from 800 to 400. Year-round staff increased from 50 to 100.

5. It is intentionally simple with only four steps that can be easily understood.
6. There generally is one coach and one learner who is accountable for the process and results.

To help the coach teach the improvement *kata* pattern, Rother developed coaching *kata*, which starts with asking the learner questions to reinforce the improvement pattern and help the coach discern how the learner is thinking. Figure 2 outlines the five coaching *kata* questions.

The intent of *kata* is not to solve specific problems, but rather to develop a habit of thinking scientifically. *Kata* are practice routines and, through deliberate practice, the learner begins to develop neural pathways, which makes it easier for the learner to follow the pattern of the improvement *kata*. Rother deliberately calls them "starter *kata*" and warns they are intended for teaching and not to replace a problem-solving method. Of course, like learning any skill, this only works if the coach is highly skilled and the learner is willing to dedicate time to practicing. Skilled coaches are in short supply, and it takes time and patience to develop them.

ZMO's lean journey

Zingerman's Delicatessen was founded in 1982 in Ann Arbor, MI, and focused on artisan foods that were hand-picked by its founders.[6] Its philosophy from the start was people-oriented—employees receive good pay and benefits, and share in the profits, and employees' first priority is the customer.

The deli became so popular among University of Michigan students and faculty that demand grew for its food to be mailed around the United States. Thus, ZMO was started in the basement of the deli in 1994, and eventually expanded into a warehouse and call center. Rapid growth in demand led to ZMO's biggest problem—constantly outgrowing spaces and the cost of moving to a larger site every few years.

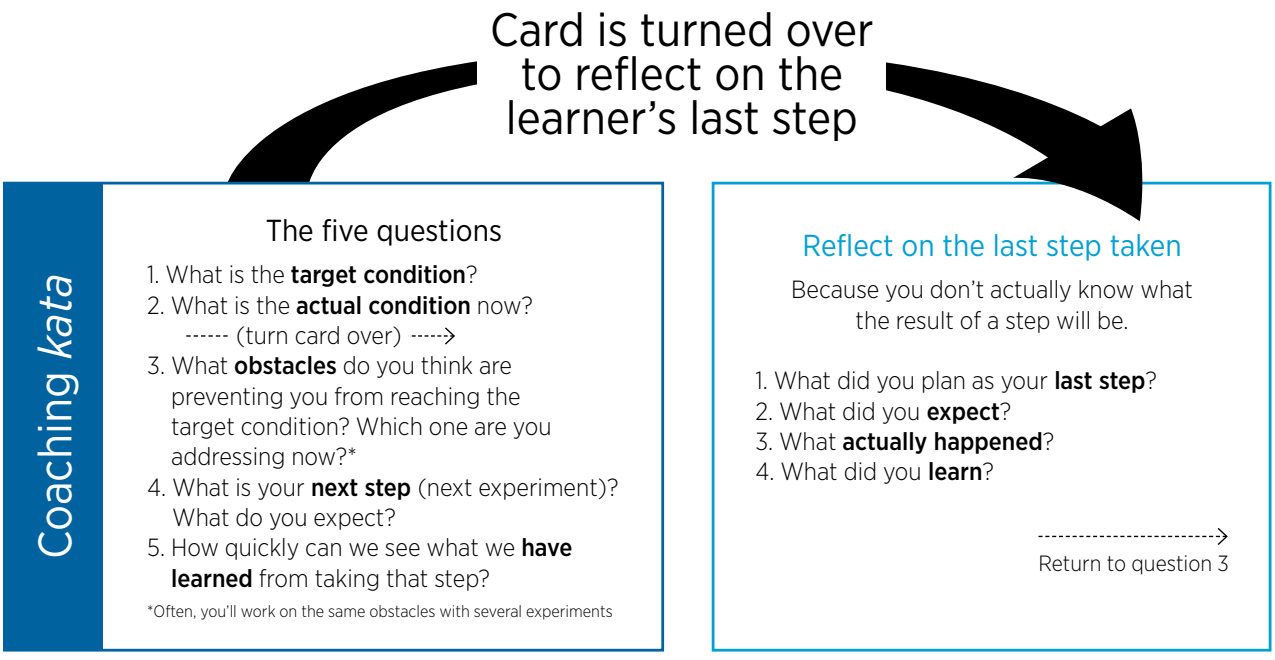
This led ZMO's partners to investigate lean and connect with Eduardo Lander, one of Jeff Liker's doctoral students. Lander was interested in lean in high-variety businesses and became ZMO's lean consultant.

ZMO received many of its products from all over the world and shipped to actual demand, which varied day to day. A demand tsunami hit every year like clockwork between Thanksgiving and Christmas, which is when half of ZMO's annual sales are shipped, with about two-thirds of that happening in a two-week period.

At the time, ZMO's business was based on push systems, which created huge inventories. In the busy season, for example, ZMO employees built gift boxes all night long, which were stored wherever there was room. During the day, employees seemed to spend as much time searching for product as placing them into orders.

Lander was studying *The Toyota Way* and, though a novice, fashioned his consulting after his understanding of how TPS masters train. He challenged, asked questions and provided explanations only when needed, but the managers did much of the planning, and they led lean implementation.

Figure 2 **THE FIVE COACHING *KATA* QUESTIONS**



Source: Mike Rother, *Toyota Kata Practice Guide*, McGraw Hill, 2017.

With Lander's guidance, the ZMO team decided to launch its lean transformation before the busy 2004 holiday season, which brought in hundreds of temporary workers. The team started by changing a significant portion of the floor layout so gift boxes could be made to actual customer orders in a flow line, and material was pulled to the line with a simple *kanban* system (a visual system to control material flow based on a pull system). They got through the busy season with far less inventory and less chaos.

Lander continued to advise ZMO, and the company's senior managers continued to lead the implementation. Virtually every lean tool found its way into practice—*takt* (the average time available for orders to meet customer demand), leveling, standard work, *kanban*, visual management, error-proofing, group leader roles, weekly meetings at metrics boards, pull systems with suppliers and more.

The results were stunning. Every holiday season was better than the last—the company saw improvements in space use, productivity and quality, and best of all, it didn't have to move as demand continued to increase between 2004 and 2019. In fact, over a 10-year period, demand increased from $7.5 million, it remained in the same space, and temporary staff hired for the busy Christmas season shrunk from 800 to 400. Year-round staff increased from 50 to 100.

Employees enjoyed working at ZMO with healthy profit sharing and a family-like culture. Full-time employees who worked throughout the year started in manual labor positions on the production line, but became captains during busy times and were off the line, leading the hundreds of temporary workers.

But ZMO's top leaders still were unsatisfied. The philosophy of the company was based on servant leadership, which meant developing all employees. Despite repeated attempts to teach various problem-solving methods, few employees were seriously involved in improvement activities. ZMO's leaders felt they still were losing opportunities to improve the operation for customers. And not all the lean tools were working as expected. For example, order mistakes still were being made and ZMO leaders believed employee involvement could reduce those errors.

From management-led lean to *kata*

From the very beginning of lean implementation, the idea was to engage employees in continuous improvement, which fit with ZMO's democratic values. But it never seemed to work very well. ZMO leaders asked for input, taught problem solving using A3 reports[7] and taught Toyota business practices (Toyota's problem-solving method). In each case, there was a burst of employee engagement, but it eventually fizzled out.

There were two problems: There was no real structure for daily improvement activity, and the methods themselves were too complex. Employees were bright but more practically inclined than academic.

In 2013, ZMO leaders learned about Toyota *kata* and agreed that a major goal for 2014 would be to experiment with it. It seemed simpler and more practical than other multistep problem-solving methods, and ZMO leaders were hopeful it would engage employees.

At the same time, Liker introduced a new graduate course called lean thinking, which was based on Toyota *kata* and built around semester projects. He approached ZMO and began a productive collaboration where groups of industrial and operations engineering (IOE) graduate students and ZMO employees took on projects to solve critical business issues. ZMO senior leaders were eager to learn *kata* and lead the activities, which continue today.

Almost immediately, ZMO employees were engaged and loved experimenting with problem solving. The IOE students also were learning a practical "meta" approach to improvement that relied less on crunching numbers and more on studying the *gemba* and rapid experimentation. The projects continued after the academic semester, and ZMO's language and way of approaching problems changed over time.

Let's consider one of the many projects.

A *kata* story: Out of market

A section of the ZMO warehouse is devoted to picking items into gray totes. When the orders are complete, they are placed on a motorized conveyor that takes them to checking stations. Internal mistakes went up and down, and exhibited the typical behavior of a process not in control.

Figure 3 OOM EXPERIMENT 1

EXPERIMENTING RECORD					
Obstacle: Lost meat *kanban*		**Process:** *Kanban* audit process			
		Learner: Group			**Coach:** Betty
Date and step	**What do you expect + metric**	**Coaching cycle**	**Run experiment**	**What happened**	**What we learned**
Start: 2/22/16 to 2/28/16 **Step:** A daily meat *kanban* audit records lost *kanban* on an A4 sheet. **Metric:** Percentage meat OOM as a percentage of work orders.	25% reduction in meat OOM.			No change in percentage meat OOM as a percentage of work orders.	• Lost *kanban* was not correlated with OOM. • A *kanban* audit process is in place and being used.

OOM = out of market

In 2013, a series of events caused the system to fail spectacularly. Demand patterns were different than expected, routes did not follow a consistent schedule, and there was no clear reaction to routes falling behind or products that were persistently out. On the worst day that year, 36% of work orders contained a mistake, a third of which were caused by a missing item in the market—called out of markets (OOM). When an item is missing, the pickers put the available items in the totes and send them to the next station, where checkers identify the problems and kick the incomplete totes out of the line so a mistakes crew can fix the issues. On this particular day, mistakes could not be fixed quickly enough and orders accumulated, ultimately shutting down the line. Clearly, something needed to change.

The persistence of this focused effort from 2013 to 2018 illustrates that ZMO was dedicated to continuous improvement.

In January 2014, this issue became a *kata* project for IOE students and ZMO employees that continued for years. The 2014 team got the OOM down to 3.4% and the 2015 team reduced it further to 3.1%. But even that was chaotic. So in 2016, a new team of four IOE students and four ZMO employees took on the biggest challenge yet: achieving zero OOMs.

CHALLENGE: Zero OOMs. For the academic semester, the team set a more modest challenge of 0.75%.

CURRENT CONDITION: 3% OOMs with continued backups at checking. Mapping the process led to identifying *kanban* replenishment as the bottle neck, and the team chose to focus on one of the biggest offenders—meat products. Observations included:

Figure 4 OOM EXPERIMENT 2

EXPERIMENTING RECORD					
Obstacle: Frequency of *kanban* replenishment for meat route not scaled to match *takt*		**Process:** Meat replenishment route			
		Learner: Group			**Coach:** Betty and John
Date and step	**What do you expect + metric**	**Coaching cycle**	**Run experiment**	**What happened**	**What we learned**
Start: 2/9/16 to 3/11/16 **Step:** Scale frequency of meat route to meet *takt*. **Metric:** Percentage meat OOM as a percentage of work orders.	80% reduction in meat OOM—from 0.67% to 0.17% by 3/11.			Meat OOM increased on 3/9 and 3/10. Variability persists and target is not achieved.	Club meat demand might be the reason for variablility that may cause OOM.

OOM = out of market

Figure 5 OOM EXPERIMENT 4

EXPERIMENTING RECORD					
Obstacle: Incorrect market sizing for monthly ordering clubs (assumes deterministic demand)		**Process:** Market sizing			
		Learner: Emma			**Coach:** John
Date and step	**What do you expect + metric**	**Coaching cycle**	**Run experiment**	**What happened**	**What we learned**
Start: 3/24/16 to 4/4/16 **Step:** Have a flexible market size estimate for clubs through coordination between marketing and routes teams.	Meat OOM as a percentage of work orders should drop below 0.17%.			• Meat OOMs were between 0.19% and 1.2% of total work orders. • OOMs were zero for three out of five days.	Adjusting market sizing based on varying demand reduced OOMs.

OOM = out of market

1. *Kanban* were lost.
2. Lineside market, or quantity replenished, was fixed but wasn't revised with the same seasonality cycles as the demand.
3. *Takt* changes weren't communicated to incoming materials areas by the floor lead.
4. Restocking cards were lost in the warehouse.
5. Products were in the wrong location (mis-slot).
6. The frequency of material handling routes was inadequate.
7. Lineside markets weren't flexible enough to meet changing demand.

FIRST TARGET CONDITION (SET ON FEB. 29, 2016): 80% reduction in mean OOMs by April 15 with the following operating conditions:

1. The frequency of replenishment is aligned to the established *takt*.
2. Staff use and assignment is scaled to *takt*.

The team conducted five experiments over the semester, each time clarifying the focus and learning more about the process (see Figures 3-5, pp. 14 and 15, for experiments one, two and four, respectively). By the end of the semester, the team saw a reduction in OOMs and reached its target condition. The project continued in subsequent years, and although OOMs continued to peak when the temp workers started each year in December, progress was clear:

- December 2016 = 2.6% OOM.
- December 2017 = 2% OOM.
- December 2018 = 1.59% OOM.

The process was not only improving, but also was clearly under control. And the persistence of this focused effort from 2013 to 2018 illustrates that ZMO was dedicated to continuous improvement.

An indicator of cultural change

Over the years, there was evidence that scientific thinking was becoming part of ZMO's culture, which is the shared assumptions, beliefs and values that distinguish a social collective and shape patterns of behavior. Senior leaders bought into and used the language of target conditions and experiments, and there was a general attitude that "not knowing" was acceptable and even welcomed.

As an example, a temporary employee was hired for the 2017 holiday season and offered a full-time captain position. In March 2018, he wrote this email:

"I wanted to pass along the results of the experiment I ran at the captain's station in assembly over the past 10 work days. For the first five days, I used a cardboard insert (conceived and built by the service center) on top of whatever Jazzpak [filler material to put in the box] I was working with. For the last five days, I worked without the insert.

"Each five-day period I collected fallen Jazzpak from my station and placed it in the same bag. I was the only one working at the station over the 10 days, so there's an integrity to the results. I'm happy to report that those results show the insert made a real difference!

"The bag from week one—with the insert—weighed 1.6 pounds. The bag from week two—without the insert—weighed 3.8 pounds. That's a 42% difference! While this is only a snapshot and not necessarily indicative of how much less Jazzpak will be composted over the course of an entire month or year, I think it's enough to conclude that the box insert idea is a winner and will help us if all stations feature it as a mainstay."

This example illustrates a more general phenomenon observed at ZMO: employees collectively share in scientific thinking as a value of ZMO, and it is reflected in their way of talking and acting.

Lessons learned

In the early years of lean transformation, a more conventional top-down approach to lean transformation was used at ZMO and achieved great results in improving the process at a macro level. However, on reflection, there still were many nagging problems and tools didn't always work as expected. Senior leaders believed that the next step was to build a true culture of continuous improvement that reached all levels of the organization. Practicing the improvement *kata* and coaching *kata* led to scientific thinking throughout the operation, changing the culture. Some general observations include:

1. The combination of a simple but powerful model of improvement with practice routines and daily coaching managed to engage employees at all levels of the organization, changing their mindsets and behaviors.[8] There were more than 20 official *kata* projects between 2013 and 2018, for example, and almost every permanent warehouse employee has been involved in at least one *kata* activity during that time.
2. The more conventional lean transformation set the stage for *kata*. There already was a reasonable layout and flow, and the concepts of lean were well understood.
3. The success of *kata* came from committed senior leaders who were curious and open to learning.
4. Practicing improvement *kata* and coaching *kata* required continued leadership commitment and energy.

On this last point, ZMO has had to work hard to continue practicing *kata* after IOE students complete their one-semester project. Activity continues, but inevitably falters during the Christmas peak and must be jump-started with the next year's student group. On the other hand, scientific thinking has become much more natural, even without formal daily coaching, and senior leaders are *kata* geeks—deeply committed to the way of thinking.

The sustainability of *kata* has been evident with ZMO's continued *kata* practice

Senior leaders bought into and used the language of target conditions and experiments, and there was a general attitude that 'not knowing' was acceptable and even welcomed.

and engagement in projects for more than five years. All projects have met their target conditions and led to measurable performance improvements. Lander still advises ZMO, helping mostly with big lean projects, but now ZMO follows the *kata* pattern of defining the challenge, understanding the current condition and establishing target conditions along the way. Every step is an experiment. In fact, the whole year leading up to the November and December holidays could be viewed as planning for the big holiday experiment, and the cycle starts again by reflecting on it the following January. Lean tools and principles plus scientific thinking has become a winning formula. &

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6. Ari Weinzweig, *A Lapsed Anarchist's Approach to Building a Great Business*, Zingerman's Press, 2010.
7. John Shook, *Managing to Learn: Using the A3 Management Process to Solve Problems, Gain Agreement, Mentor and Lead*, Lean Enterprise Institute, 2008.
8. According to Eduardo Lander, "The biggest change I saw at Zingerman's Mail Order (and other places I've introduced the practice of *kata*) is that people get engaged. … All of a sudden improvement changes from this awful thing that I must do in addition to my job, to this interesting thing that I want to do constantly. That change is, to me, the most important one. The engagement is, in my opinion, what allows people to learn scientific thinking that then results in mindset and culture change."

DILBERT