Chapter 9

CAPABILITY 4: DEVELOPING HIGH-VELOCITY SKILLS IN OTHERS

It is an understandable view that leaders are responsible for setting objectives, allocating resources for the pursuit of those objectives, and establishing an emotional tone for the organizations they lead, including establishing the right combination of incentives to achieve the objectives. Leaders in high-velocity organizations do all those things; their combination of perspective and authority makes them the only ones who can. However, it is what they do in addition that sets them apart from their low-velocity counterparts. One difference, of course, is that they must be system-oriented—responsible for the design and operation of processes at levels of aggregation for which others have insufficient perspective and authority. We saw that kind of boundary-spanning responsibility exercised by the senior leadership at the Aisin plant described in Chapter 7. Quality circles and other mechanisms could have been used to make the component modules of the process self-correcting and self-improving, but only those who were more senior were in a position to make the major line reconfigurations that were described in that chapter. We'll see another example of a leader owning some aspect of a system's design, operation, and improvement in this chapter when we describe Gary Convis's experience leading Toyota's facility in Georgetown, Kentucky.

Leaders in high-velocity organizations must play yet another role: They must develop those for whom they are responsible so that the organizational capacity to be self-correcting, self-improving, and self-innovating is distributed and practiced widely and consistently. We have already seen some examples: middle and higher-level managers who were responsible for developing quality circle members at Aisin, NHK, and Taiheiyo, the standout team leader at MacDougal.

In this chapter we'll see how high-velocity organizations consider leaders to be both mentors (or developers) and process managers. Let's look over the shoulder of Bob Dallis as he learns to lead at Toyota.

Learning to Lead at Toyota

Bob Dallis was an accomplished auto-manufacturing manager who made a huge career shift. He spent several years at a Detroit Big Three company, where he led the turnaround of an 1,800-employee assembly plant and ran a new-engine design program as well as leading an engine plant through its design, ramp-up, and first years of operation. His accomplishments before age 40, interlaced with engineering and business degrees and honors from great universities, would be noteworthy for most people in their fifties and sixties. But in the face of downsizing and offshoring—and always dreaming of helping reinvigorate American manufacturing—Dallis left for Toyota, the automaker that was most aggressive about increasing design and production in North America. Their shared objective was that, after a period of initiation, he would become a senior leader, probably at Toyota's flagship plant in Georgetown, Kentucky.

One might have expected a quick transition for someone with Dallis's credentials—perhaps a round of cursory walkthroughs and introductions. Given Toyota's emphasis on shop-floor operations, perhaps he would also do some hands-on line work and visit dealerships for direct customer contact, but soon he would have substantial managerial responsibility. However, that was not the case. Learning to lead at Toyota was a months-long effort managed by a more experienced Toyota veteran, Mike Takahashi. And although we will be following Bob Dallis, in some ways this is also Mike Takahashi's story. Bob learned a lot from Mike, and so can we.

Learning to See and Solve Problems

Takahashi first assigned Dallis to Toyota's West Virginia engine plant, not to Kentucky, to improve the work of a 19-member group on three dimensions: ergonomic safety, efficiency, and operational availability. For six weeks Takahashi emphasized observation, seeing the reality of the "current condition"—how work was actually performed and what problems actually affected it. Then he emphasized making changes so that maximum insight would be generated about the complex system of work. This was not a matter of making arbitrary modifications but of predicting clearly what was expected to occur before those alterations were made. With cause and effect articulated—out in the open—if a modification did work, Dallis would truly understand why. If it did not work, he would at least have some idea of where he had gone wrong, having put his reasoning "on the table" from the start.

For six weeks, Dallis focused on the work of the individual operators. He implemented some changes that seemed laughably minor in comparison to his past and future responsibilities: reconfiguring line-side parts racks so that material was more accessible, repositioning the handle on a machine to reduce ergonomic strain, and so forth. Others were more substantial and required shifting work among the workstations. That meant coordinating with material handling about part delivery and with maintenance to relocate light curtains, so those changes were completed over a weekend, when the plant was shut. With those changes, Takahashi reinforced the importance of tracking actual results against predicted ones, watching with Dallis to see what the real effect would be in comparison to what Dallis had predicted. Productivity and ergonomics had gotten better, but operational availability—the proportion of the time that a machine ran without delay—declined (see Table 9-1). Of course, the employees had not sabotaged the equipment. Instead, with the group working more fluidly and productively, problems with the machines which hadn't previously seemed significant now seemed like real impediments.

So Takahashi redirected Dallis's assignment for the next six weeks. Rather than focusing on people, he was to focus on the machines, looking for ways to improve their reliability and availability. Takahashi insisted that Dallis not speculate but

Table 9-1 Before-and-After Comparison of Assembly Line's Performance

	Before	*After*
Productivity		
Number of operators	19	15
Cycle time	34 seconds	33 seconds
Total work time/engine	661 seconds	495 seconds
Ergonomics*		
Red process steps	7	1
Yellow process steps	2	2
Green process steps	10	12
Operational availability	≈ 90%	≈ 80%

*The difference in the total number of processes in the two ergonomic columns reflects the reduction from 19 to 15 in the number of process steps. Process ergonomics were rated from worst (red) to best (green) on the basis of a formula that considered the weight lifted, the difficulty of reaching, the need for twisting, and other risk factors.

wait to see real-time failures so that he could investigate problems when and where they had occurred. This seemed awfully inefficient because machine failures did not occur frequently and machines could not participate in analysis and correction the way people could, but over time, the power of this approach became more evident. In one case, a switch was in a position where workers could brush it accidentally, activating the machine before a jig was loaded. After investigating several faults in another machine, Dallis discovered that the shape of an interior bumper allowed pallets to ride up and get out of line. Direct observation of the machines, root-cause analysis and recreation of each failure, and immediate reconfiguration to remove suspected causes raised operational availability to 90 percent, but this was still below the 95 percent target Takahashi had set.

Dallis spent 12 weeks learning about the importance of observation as the basis for improvement and of using the scientific method of being clear about expectations before making changes and following up to observe the results of those changes. Having learned these skills, while significantly improving the process on which he had been working, wasn't it time for him to begin his "real" work at Toyota? Or would he first have to practice the same skills on a larger scale, given the responsibilities for which he was being prepared? Neither. Instead, Takahashi and Dallis flew to Toyota's Kamigo engine plant in Japan. Takahashi had worked there, but more significantly, it was the storied plant where Taichi Ohno had first scoped out the basic elements of the Toyota Production System and just-in-time manufacturing. For engine and manufacturing people, Kamigo is not just a destination but a pilgrimage, like visiting Kitty Hawk or the Wright Brothers' lab in Dayton, Ohio.

On arriving, Dallis learned his assignment: For three days, he would work with one operator in one machining cell. In three shifts, they had to put in place (not just plan) 50 changes to reduce the "overburden" on the employee—anything that was taking more effort than was really needed. The cell would be "on-line" with daily production demands. The Kamigo team member spoke no English, and Dallis spoke no Japanese. Dallis applied the lessons he had learned in West Virginia about using direct observation to see a process's failures and rapid experimentation to arrive at better approaches, but with far greater acuity and speed than he had done before. Despite the imposed pace, Takahashi insisted that Dallis not speculate but always ground alterations in observed data and always test against well-articulated expectations.

Dallis came to see subtleties he had not appreciated before. For example, relocating a jig was not a matter of making a single change. Whether it was to the worker's left or right, how far away it was, and the angle at which the elbow and wrist had to be bent to grasp it all mattered. He also learned that the demand for speed and the insistence on discipline were not irreconcilable if he could construct high-speed, low-cost prototypes to test an idea. As he explained to me, "If I had an idea to relocate something, Takahashi would challenge me." If something required welding, was it possible to bolt it in place to test the idea? If it could be bolted, could time be saved with temporary taping? Instead of taping, could it be held in place to see the flaws in the idea with extreme speed? "Mike," said Dallis, "was trying to get me to go quicker, quicker, quicker, making as little investment as possible in an idea so I could try it and discover its strengths and shortcomings first, before making more of a commitment. It was all about learning at maximum speed." Dallis was learning how to minimize the trade-off between speed of testing and discipline of learning.

After three days, Dallis had identified 50 problems with the cell's quality checks, tool changes, and other work. To deal with those problems, he had made 35 changes, with 15 suggestions still to be implemented (see Table 9-2).

With the shop-floor changes done, Takahashi had Dallis present his work to the plant manager and the machine shop's

Table 9-2 Summary of 50 Changes Made by Dallis in the Machining Cell

	*Quality Checks**			*Tool Changes**			
	Walking	*Reaching*	*Other*	*Walking*	*Reaching*	*Other*	*Other Work*
Number of changes	8	8	13	7	4	5	5
Effect of changes	20-meter reduction (50%) per check	2-meter reduction	Remove trip risk; organize tools to reduce confusion, risks, etc.	50-meter reduction per tool change	180-cm reduction in reaching	Improved ergonomics; organization to reduce confusion and risk, etc.	Remove trip risk; simplify oil change

*Quality checks were performed two to three times an hour and tools were changed hourly. Together, Dallis's changes cut approximately half a mile of walking per shift while also reducing ergonomic and safety hazards.

manager and group leaders. Two things struck Dallis. The first was the discipline with which he had to prepare and present the report. Dallis and the two team leaders who had been going through a similar experience in adjacent cells had to explain the changes they had made in context; the presentations took place on the shop floor alongside the work cells in question. They had to explain what they had observed of the process, the problems they had found, the causes they could assign to those problems, the changes they had made to remove the problems, what they had expected the results of the changes to be, and the outcome they had achieved. They could not simply report changes or results; they had to make very clear the entire thought process underlying their actions.

This emphasized the importance of using the scientific method to (a) solve problems, (b) build deeper process knowledge, and (c) spread what was learned by showing the discovery process, not just the solution. Dallis was also struck by the detailed questions he was asked. "The plant's general manager, the machine shop's manager, and its group leaders were engaged in what the 'lowly' team leaders said. They busily took notes during the presentations, asking pointed questions, constantly challenging our thinking."

With the work at Kamigo behind them, Dallis and Takahashi visited several other plants to learn how group leaders managed a variety of improvement projects. One project involved reducing changeover times and establishing a more even production pace for an injection-molding process, another focused on reducing downtime in a machining operation, and a third sought to improve productivity and quality in final assembly. Another project focused on proactive maintenance, finding ways for operators to distinguish "normal" from "abnormal" in a machine so that maintenance would be able to solve real problems, not just take preventive actions whether they were needed or not. In all those projects, the group leaders followed the same disciplined approach of explaining the entire discovery process, both to provide instruction and to invite critiques.

Bob Dallis's takeaways from his first several months at Toyota included:

- The importance of direct observation so that problems are seen in the idiosyncratic context of person, product, process, place, and time in which they occur and are investigated while they are still hot. This is the way to improve complex systems of work while creating deep knowledge about how those complex systems actually work.
- The importance of structuring all improvement efforts so that assumptions embedded in the work and in the changes could be tested.
- The lesson "to bolt rather than weld, to tape rather than bolt, and to hold rather than tape," so there need be no trade-off between speed and problem-solving discipline.
- The importance of reporting not only your actions and their results but also the reasoning that led you to take those actions and to expect certain results (which may or may not have been what actually happened).

Add it up and we see that Dallis was being introduced to the first three of our four capabilities—process design and operation, problem solving that is also knowledge building, and knowledge sharing. In fact, as we will see, he was also being introduced to Capability 4, learning to lead others through his relationship with Takahashi.

The "Process" of Leadership

Dallis found that these practices of observation, experimentation, and speed were ubiquitous in Toyota, used not only for manufacturing but also for intangible processes such as training. In preparing Dallis to be a Toyota manager, Mike Takahashi was applying the very process he was trying to instill in Dallis. For example, before Takahashi ever met Dallis, he had plenty of data—résumés, references, and anecdotes—concerning Dallis's career and accomplishments. But he had never *seen* Dallis in action. Just as he didn't want Dallis to speculate about what to do on a manufacturing process before seeing it in action, he was not prepared to "develop" Dallis until he had seen him in action. Therefore, following his own formula, he first observed Dallis at work in a fairly controlled situation (in West Virginia). It was a familiar technical setting (an engine plant), but on the simpler side of things (assembly, not machining). There were only 19 in Dallis's group and the experience itself was professionally safe. Dallis could make mistakes, be corrected, and be directed, but not in front of people he might later be leading in Georgetown, Kentucky.

Takahashi had reduced the complexity of the situation so he could focus on how Dallis solved problems and how he involved the people with whom he was working. Because he was seeing Dallas in action frequently, he was able to adjust his coaching appropriately by seeing problems with the training process and quickly trying changes rather than trying to think his way through a whole high-level training program in advance; in other words, there was the familiar emphasis on rapid discovery rather than planned design. It was the equivalent in Takahashi's own work of holding rather than taping rather than bolting rather than welding.

In short, to enhance Dallis's ability to learn about processes and his own ability to learn about Dallis, Takahashi took an incremental but intensive, immersive, high-speed approach to Dallis's development, much as he had had Dallis break down shop-floor processes into their microelements. He might have thrown Dallis into an unfamiliar environment—paint rather than power train—or started in Japan with its attendant language and cultural differences, but that would have introduced too much novelty. If Dallis struggled, what would it indicate? With so many factors in play, drawing conclusions about what caused the trouble would be terribly difficult. Table 9-3 shows the process of introducing novelty in small increments.

Although Dallis took away many important lessons about problem solving and knowledge sharing, the lessons he learned about leadership were the most compelling. Each level of the management hierarchy was part of a cascade that developed the problem-solving process-improvement skills of the people for whom it was responsible. Consider the colleagues he met at Kamigo. First there was the team member with whom he worked for three days. Dallis discovered that this frontline operator was not only capable of doing work in what must have been an already finely tuned, slack-free environment—after all, this was Ohno's old stamping grounds—but was also able to be an active participant in making improvements to such a well-tuned system. Then there were

Table 9-3 Introducing Novelty in Small Increments*

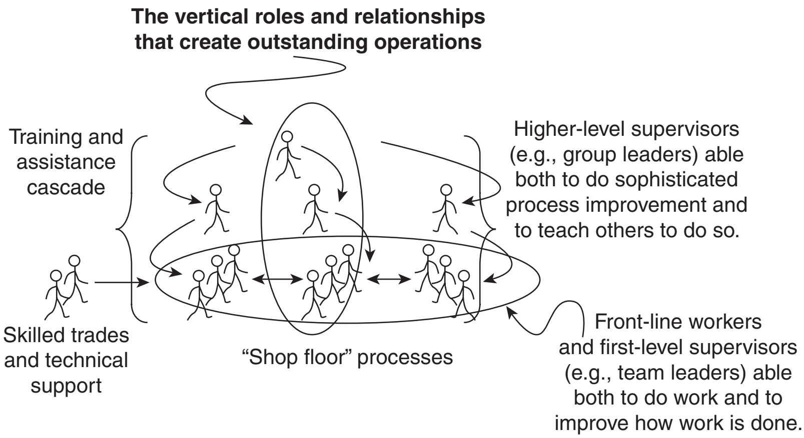
	Last Employer	*West Virginia*	*Kamigo*
Product	Engine	Engine	Engine
Management system	Old employer's	**Toyota's**	Toyota's
Processes	**Assembly** and machining	Assembly	**Machining**
		First: Work methods **Second: Machine problems**	First: Improve work-space and methods **Second: Learn about machine improve-ments**
Plant workforce's experience and process knowledge	Less than 10 years	Less than 10 years	More than 30 years
Problem-solving support from skilled trades	1-week lead time for changes	Changes tested within a day's time	**Several changes tested every hour**
Familiarity of plant	Dallis's work site	Known by Takahashi	Takahashi's former work site

*Items in **boldface** refer to something novel.

the team leaders who were having a similar training experience in cells near Dallis. To get to that position, they would already have to be capable of supporting team members (frontline workers) in doing their daily work. However, they were also exceptional problem-solvers in their own right. On the first day, Dallis was delighted to demonstrate seven changes that he had put in place, only to learn that one team leader had nearly 30 to explain, while the other had more than 30.

Then there were the group leaders at Kamigo who participated in the wrap-up. They displayed detailed process knowledge and knew how to help Dallis and the team leaders learn even more from their experiences by asking them challenging Socratic questions: How did you observe? What did you see? Why did you do this? Why did you try that? What did you expect? What did you get? What was the gap? What do you think might have been its cause? What might have you done differently? The constant challenges that these group leaders and the production and

Figure 9-1 Managerial cascade of training and assistance and the supporting infrastructure



plant managers were able to provide and that Takahashi provided ceaselessly were part of the development program.

We can draw the following conclusions, summarized in Figure 9-1:

- Frontline workers, like the one with whom Dallis worked for three days in the Kamigo plant, were so accustomed to change that production could continue even when a non-Japanese speaker was making changes in how work gets done several times an hour.
- First-level supervisors (the team leaders who were receiving the same training as Dallis) were capable problem solvers in their own right, able to conceive and execute many changes in rapid succession.
- Second-level supervisors (the group leaders who explained their discoveries) were capable of facilitating larger-scale process innovations that were at the very least akin in scale, scope, and impact to what Dallis—an exceptionally accomplished manager—had done during the first 12 weeks of training.
- Senior management within Toyota was building the process-innovation capabilities of those less senior, much as Takahashi had been doing for Dallis.

Dallis now saw important contrasts. So many people had characterized Toyota by emphasizing a handful of shop-floor tools for managing the flow and transformation of materials—value-stream maps, pull systems, standardized work, production cells, and "5S" workplace orderliness. These are aspects of managing the horizontal flows of material from receiving through shipping. However, Dallis came to appreciate how sharply this contrasted with the top-down cascade of training and support, the daily development of people's skills in designing, operating, and improving systems, as shown in Figure 9-1. This is how Toyota created operating velocity and improvement-and-innovation velocity. If one contrast was between Toyota's practice of developing people and its imitators' inordinate emphasis on product and process, there was also a contrast between how many companies thought about responsibility and how it was carried ou at Toyota. Dating back to Frederick Winslow Taylor and before, there is the view that management is responsible for designing systems, solving problems, and ensuring "compliance" with procedure, leaving it to subordinates to work around problems until something goes so badly that management can't ignore it any longer. That wasn't the way at Toyota.

HOW I LEARNED TO LEARN

My own experience during the six months that I worked at Toyota was that my managers led me by directing me to situations in which I could learn, just as Takahashi did for Dallis. For instance, in my first days at Toyota, I was assigned to a team responsible for developing a first-tier supplier of stamped parts. I asked my boss, Mr. Ohba, what I was supposed to do. He said, "Go find out what they make." (It was not until later that I realized I was learning to observe a system at the four levels—output, pathways, connections, and activities—and according to the two criteria—specified in design and operated with built-in tests—that we encountered in Chapter 6).

I came back later that day with a list. "How did you get the information?" he wanted to know. I explained that I had interviewed managers, including the plant manager and the sales manager. "You don't really know," he said before turning to other matters. I came back the next day with a different list. "How do you know this is what they make?" he asked again. I explained that I had gone to the supplier's accounting department to see what had been invoiced as shipped. I had figured that those guys would not invent phantom shipments. "You still don't know," he told me. I went back to the plant the same day and returned some hours later with a third list. "How do you know this is what they make?" he asked yet again. This time I had not counted on invoices; I had asked accounting to let me see what Toyota had actually paid for. I did not think they would pay for materials they had not received. I should not have been surprised when he said, "You still don't know."

The next day I came back once again. It had taken longer than the previous tries, but the list was quite different. Ohba asked, "How do you know this is what they make?" I was ready this time. "Well, here's what I did," I said, thinking to myself, "I'm on to your tricks and games."

I explained that I had stood at shipping and, as each box was about to be loaded onto the truck for delivery, I had written down the part number. Not the number on the kanban card (the shipping label), mind you; I had checked the part number stamped into the metal. I had done that for both shipments. I had also confirmed that for each part there was a stamping die in the plant that could make it. Not that I had ever suspected that the supplier was reselling parts made by someone else, but now I *knew*. I told Ohba, "I know there are still some holes; there may be ones I didn't see yet, but these are what they make, I'm pretty sure."

Ohba nodded his head for a moment and looked at my list again. The he looked at me and said, "Well, that's probably not wrong. But I have another question: How are these parts made?"

A Toyota Leader in Action

Some years ago I had a chance to shadow Norm Bafunno, a senior manager at Toyota's assembly plant in Indiana. That plant does an exceptional job of manufacturing top-rated products; it has proved itself capable of rapid expansion in production capacity, flexibility in terms of the product types it can make, and quick assumption of responsibility for testing new manufacturing equipment and developing new manufacturing techniques in preparation for the launch of a new model.

Bafunno, like the others there, had specified his work: what he was going to do, when, with whom, where, and with what expected outcome. If something ran early or late, an explanation was called for: What had unexpectedly happened along the way? Typically, his morning began with meetings on safety, production, and similar issues. Then he would visit one of the several improvement projects being undertaken in his plant or at nearby suppliers. The basic format of each visit was the same: Those involved in the project explained how the process they were trying to fix had worked at the time of the senior manager's last visit, the problems that had been experienced then, the root-cause analysis that had been conducted, the countermeasures that had been tested, the target condition that had been predicted, and the actual results that had been achieved. The presentation always made explicit the experimental design of the improvement efforts.

Here are my reflections on watching this leader in action:

- Visiting these projects was part of Bafunno's daily work. He visited each project every two weeks or so, not quarterly or for annual reviews.
- The review occurred where the problem was being solved, not in a conference room, office, or off-site location.
- The entire hierarchical chain that linked Bafunno to the group leaders who headed the improvement effort came to the review.
- Everyone in attendance took notes and asked questions about the problem, the attempted solutions, and the results.
- Toward the end, Bafunno would always say, "Thanks for the [technical] explanation you've just given, and congratulations on the results you've achieved. But let me ask you, aside from what you accomplished [with the process], what did you learn?"

This is the quintessential Toyota leader question. It comes from the most senior level and cascades down to the front line. It is asked regularly and is based on a manager's direct experience with the person doing and improving the work. It emphasizes the importance of continually building knowledge and expertise.

Leader as Capability Developer

I've been fortunate that so many people have been willing to share their experiences with me over the years. What is striking about Toyota is that when I ask people to describe a seminal experience with a leader, almost all the stories revolve around the leader doing something that helped develop the storyteller. The story is almost never about the tough call or the brilliant move the leader made; I didn't encounter the common view of managers as decision makers who tell others what needs to be done. When Toyota people tell these stories, it is not a dispassionate, academic recollection. Inevitably, at some point midway through the telling, they have to stop and collect themselves because the experience still has deep emotional resonance even though it happened even decades before. Here are some examples.

Ken Kreafle was with the Georgetown plant from its earliest days. He shared his story with me:

> I remember when I was running a paint shop for the first time. We were told a senior manager from Toyota City was going to visit. We spent a day

searching for the finest example we could find of a painted vehicle. We pulled it off the line, set it up in an undisturbed part of the facility, lit it with bright lights, and roped it off so no one would touch or otherwise mark or mar it. The only thing that made it different from a Hollywood big shot on Oscar night is that we didn't actually have a velvet rope or a red carpet, but not for lack of trying.

The Japanese manager who was my "coordinator," mentor, guide, and coach asked me what we were doing. I explained that we wanted to show off the best example of our work. We had a lot to be proud of. It was the early years of the plant, we were Toyota's first greenfield site in the United States, and we had worked very hard to get the plant up and running with what had started as an inexperienced workforce.

He said, "That is not the one he wants to see." We didn't understand. "What does he want to see?" He said, "I'll show you." He closed his eyes, turned on his heels, and pointed. When he opened his eyes, he said, "That one!"

"That one?" we asked. He had taken a body at random.

"That's not all," he continued. "He'll want to see what you found wrong with the car."

We did not get the point at first, but over the next several hours we were scouring that car for every slight imperfection, scratch, dust spot, and blemish. Not just on the visible areas like the hood, trunk, and fenders. We were crawling under and in the car, places you would only see if the car were on a lift or disassembled (or not yet assembled, like this one was). By the time we were done, marking each flaw with a Post-it, the car looked like an especially large piñata.

"Now," our coach added, "you're *almost* ready. When he gets here, he'll not only want to see what you found, but also what you think caused those defects and what you think you can do to prevent them from happening again." The next day, when he showed up, I couldn't believe it. I had worked for one of the Big Three. When an executive came, it was all about showing him the good news, and the questions were all about the numbers. Did we meet our targets? What was our scrap, our overtime? It was all stuff that got measured right on the bottom line but that we couldn't touch directly. Not this guy. He wanted to know all about the process and more, all about what we knew about the process, the stuff that eventually reached the bottom line but the stuff that we *could* touch directly. When we got to a bump or a mark that we couldn't explain, we didn't leave it there. We walked back and forth between the car we had examined and the line, trying to find the link. I'll never forget it.

Kreafle recounted a story with another leader:

Then there was my first annual review with Mr. Cho, now Toyota's chairman but then the president of Toyota Kentucky. When we started the year, he asked me to lay out the agenda for our department. I did, but he kicked it right back to me, asking, "Where is the business case for these changes? Even if we hit these goals, are they enough to succeed?" We spent the next hour working our way backward: what the market demanded of us to be a top competitor and how that translated to quality, productivity, lead time, and all the measures relevant in my department. Then we set some marks for where we had to be to be top in our class. It seemed impossible, but every day we went at it, trying to hit those measures.

At the end of the year, it came time for my annual review. At Toyota, reports are pretty simple: For almost every measure it is red, yellow, or green. As I started going down the sheet, I started looking at all the red, the preponderance of yellow, and a paltry amount of green. I had known all along where we were, but this was the first time I had confronted the reality of how far we were from the objectives we had set many months before. Right before my meeting, I stopped for a minute and called my wife. "I'm going for my review right now," I explained. "I may be out of a job this afternoon." With that, I walked into his office.

I started by apologizing. He listened for a while and asked why I was being so contrite. What had I done wrong? I started to show him my summary sheet, all the red and yellow and the marked lack of green. The year was pretty much a failure as far as I could tell.

"No, the year was a success."

"Excuse me?"

"You made a lot of progress—"

"But," I interrupted, "the goals we set when we started. . . ."

"Those were what we had to achieve to absolutely delight the market. Those are real targets. We set those so we wouldn't fool ourselves into thinking we are better than we actually are. We weren't good enough then, and we still aren't good enough. But we are much better. And I know what is going on in paint. We are going to be even better yet. Don't worry. The year was a success. We're just not done."

Process-Excellence Boot Camp

In any sophisticated organization, one would expect to find experts in particular technical specialties. At an auto company, for instance, there would be experts in styling, design, power trains, and so forth. Within the manufacturing portion, there would be experts in stamping, forging, molding, welding, paint, assembly, and so on. At Pratt & Whitney there are experts on various parts of a jet engine—compressor, combustion, and turbine blades—and the various disciplines required to make those elements work—materials, aerodynamics, controls, and the like. High-velocity organizations that outpace, outrace, and outdistance the competition have all these same experts—and something more. They have people whose specialty is the art, science, and discipline of processes: the harmonious integration of specialties and functional pieces into coherent wholes.

We've already visited Aisin several times in this book. Aisin has an organization called the Operations Management Consulting Division (OMCD). Think of it as the home of the Toyota Production System experts of the organization, a place where people have a chance to step outside their normal line responsibilities and have a deep, intense boot-camp experience in designing, improving, and innovating processes and—equally important—teaching others to do the same thing.

At the time I was studying Aisin's OMCD, it had three general managers, three assistant managers, and 88 other members. Some of them were technical experts who were past 55 years old and permanently assigned to OMCD. Some were at OMCD for a two- to three-year stay, during which they deepened their TPS knowledge before returning to their home plants. The rest of the 88 had graduated from Aisin College, a developmental program for those hired into Aisin with no advanced education. OMCD members participated in improvement activities that lasted from one to three months. Upon completion of their tenure there, the temporary members were reassigned to Aisin plants as TPS promotion experts, a resource something like Alcoa's environmental, health, and safety experts whom we met in Chapter 4, available to advise and assist at every level and scale of aggregation—plant, location, business unit, and corporate.

According to Aisin's OMCD head, Mr. Torii, the three-year curriculum had a logical progression. In the first year, students focused on process improvements, smaller-scale work like that done by Bob Dallis in West Virginia and Kamigo. In the second year, they advanced to system-level projects, progressing from component work methods to problems of connections and pathways, the interfaces and architecture of work systems. For instance, they might have participated in the line redesign at the Aisin plant, which I described in Chapter 7. In the third year, the students would oversee improvement activities, both to solidify their own knowledge and to practice transferring similar skills to others, much as Mike Takahashi had done with Bob Dallis and as Dallis was learning to do with others.

As a training ground for process experts and a supplier of process expertise, Aisin's OMCD played several critical roles. It evaluated the effectiveness of each production line, established performance-improvement goals, and supported improvement efforts by identifying opportunities for fruitful change. Each of those activities was a venue in which people could hone their problem-solving skills while removed from their positions of operational responsibility.

Toyota, of course, has its own Operations Management Consulting Division. Toyota's OMCD supports plant-improvement activities and provides a venue in which people can become more expert through frequent problem solving. For example, during one of my research trips, one of my hosts was Mr. Numa, who had worked for Toyota for 16 years, much of it in the quality-control division, and was in his first year at OMCD. He had projects at three sites where he developed his own problem-solving skills and practiced developing those skills in others.

Leader as Process Owner

Gary Convis is someone with a unique perspective on Toyota. He worked at Big Three firms for nearly two decades before coming to NUMMI. There, he worked with and was responsible for people who, like him, had seen what it was like to work in a low-velocity environment like the one I described in Chapter 3 and who now knew what it is like to work in a high-velocity organization. Convis helped launch Toyota's Georgetown, Kentucky, plant and became the first non-Japanese president of a Toyota manufacturing site.

Convis described to me an occasion on which he had had to take charge of a process change, not because others were unwilling or incompetent, but because of the number of boundary-spanning issues involved. As with many of Toyota's problems, this one resulted from its success. The Georgetown plant had to increase its productive capacity because of increasing demand. What is the solution for such a problem? In part, you continue to make progress on the way people work with machines, seeing if more speed can be squeezed out. However, there may be limits with existing equipment, or the speed of improvement may not match the speed needed for growth. Georgetown had reached the point where it needed more equipment, but where to put it? Expanding the plant was neither a low-cost nor a quick solution. That pointed to the next question: Where was space used unproductively? The answer: in parts storage.

This might seem surprising in light of Toyota's reputation for small inventories that turn over very quickly, but there is still line-side storage of the minimum number of parts needed to tide production over while material is replenished. In certain areas, those parts are big and even minimal storage requires a big footprint. Consider body weld. If a station needs one or two beams per cycle and each beam is 2 to 3 feet long by a few inches wide, that requires a few square feet of floor space. Keep enough on hand for even a small portion of an hour's worth of work before material handling returns with a refill, and the footprint is several feet by several feet. Multiply that by the many workstations in the shop and you have consumed a lot of space for storage. Factor in that the parts come in sets of 5 or 10 at a time and that each set has a carrier and the work area gets even more congested.

Probing questions were asked: Why do you need carriers for several parts? Can't parts be conveyed in lots of one? Why must the parts be carried and stored horizontally, consuming even more space? (These parts could not be stacked, so the more there were on a conveyer, the wider that conveyer had to be.) That inquiry helped establish a goal of transporting one piece at a time; even when several traveled together, each would have its own small conveyor. Added to that was the objective of moving and storing them vertically, not laid flat.

These objectives were not as easy to reach as they sound. Working from the point of customer contact—the line-side location where the parts were used—it meant reconfiguring workstations to accept material presented in a different fashion (the domain of production engineering) and reconfiguring the way in which the pieces were accessed and handled by operators (the realm of the production supervisors and managers). When material handling moved long beams upright, they had a tendency to wobble. Could they be transported vertically without danger of being damaged? Transport would have to be altered, as would the way in which parts were loaded at the suppliers and unloaded at Toyota. There were a lot of organizational boundaries over which collaboration and coordination of effort and innovation would have to be managed. This made it Convis's job.

What makes the situation so different from what might take place in other organizations is that Convis himself felt that this was his job. He never saw it as something "below his level," nor would he have concluded that if moving parts vertically instead of horizontally was going to be this much trouble, then it just wasn't worth it. This points out another critical difference between the manager in a high-velocity organization and his or her counterparts elsewhere. If a problem makes it way up to his or her level, the high-level manager has to be part of its resolution. Either the problem spans boundaries over which no one else has authority and responsibility, or it doesn't, but it is challenging enough that it could not be resolved at lower levels. Either way, the senior leader has to be a process improver, which depends on seeing problems when and where they occur.

Who Is in Charge of Whom?

If the goal is to design work to see problems and then solve them where they are seen, a leader must be in a position to see problems as they arise. The higher the level of authority, the harder it can be to do this because much of the work itself is less tangible. "Normal" may be harder to define, which makes departures from normal harder to see. Convis reflected that one of the most difficult conceptual challenges is finding abnormality in things that one cannot see. They may be intangible, they may just be far away. Nevertheless, if they go wrong and the problem is not detected, they cause trouble. If they are seen as they start to go wrong, their effects may be mitigated quickly and the organization may learn from their occurrence.

In most organizations, the more senior person tells a less senior person what to do and the less senior person confirms that what has been mandated has been completed. This system is inverted when the objective is to ensure that problems are seen and solved where they occur by and with the people affected by the problem. If those less senior people cannot solve the problem, they have the right and the responsibility to pull on someone more senior for help and he or she is obliged to provide that help.

Put bluntly, the most senior manager is the most subordinate person. Everything is done in support of shipping product to customers. Problems pull support from successively higher levels; in effect, the senior person's pace of work is determined in large part by the needs of people many years and many ranks his or her junior. The same thing is true in a design or service situation. There is much that the senior leader must do in terms of directing, expanding, and contracting people's behavioral latitude: We're working on this, not that; you're needed here, not there. However, in an organization managed to see and solve problems, it is the occurrence of problems and, more to the point, the occurrence of problems that cannot be reconciled that determines where a manager's efforts are directed. And that's just what we saw earlier in this chapter in the attitude of the visiting senior manager who didn't want to see the perfectly painted car. He wanted to know where the struggle points were so he could do his job—helping those below him improve their own work.

Convis has addressed this point:

> I remember when Mr. Higashi became the second president at NUMMI, following T. Toyoda, I was promoted to VP of manufacturing. Mr. Higashi had exactly the same philosophy I had heard from Mr. Ikebuchi and T. Toyoda. He said this to me during one of my earliest meetings with him:
>
> "Everyone knows you're the boss. But I want you to manage as if you had no power over your subordinates." He explained that I couldn't just mandate things. He wanted me to go out on the shop floor and sell my ideas. To do that, I had to get out of the office and down on the production line. That's the only way to understand the issues.

In Chapters 6 through 9, we've looked in detail at Toyota in order to see examples of the four capabilities that characterize high-velocity organizations. Those organizations are quick to meet customers' needs; they reach that speed with an intense commitment to specifying how work is expected to proceed to ensure that the best known approach is used. However, they couple that commitment to specificity with building tests into the work (Sakiichi Toyoda's *jidoka* principle) to ensure that problems are seen when and where they occur. When problems are seen, they are swarmed, investigated, and solved—not just to make them go away, but to replace the process and/or system ignorance that allowed them to occur with useful knowledge about how to operate better. That knowledge is not kept locally. It is shared so that individuals' experiences contribute to the expertise of their colleagues as well. Finally, leaders of high-velocity organizations play roles not often seen in those organizations stuck in the pack, racing for second or third place. These high-velocity leaders manage processes, designing and improving at the level at which no one else has the necessary perspective, responsibility, or authority. Most importantly, they are personally responsible for establishing the cascade of capability development throughout the organization that makes it high velocity.

Before we leave Toyota, we'll look in Chapter 10 at what it means for an organization to use these capabilities not only for routine situations but also for crises. In the examples that follow, Toyota was hit by seismic disruptions, yet recovered quickly through the agility of its responses. We'll come to see that when you are seeing and solving problems every day all day, there are no crises per se; there are just some problems that are bigger and more demanding than others.