

## WHAT IS LEAN OR TOYOTA PRODUCTION SYSTEM?

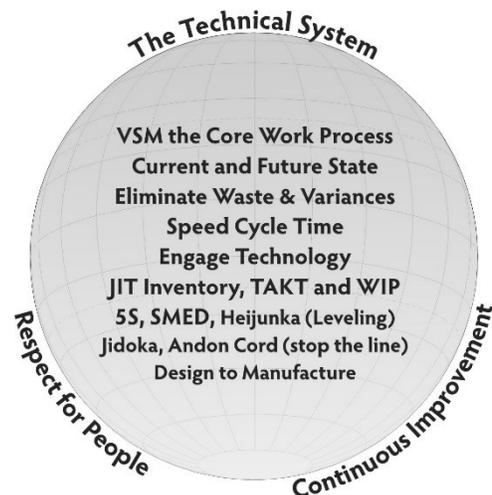
Years ago, when I would visit the Honda plant in Marysville, OH, I arranged for some of my clients to tour the plant. It was helpful, but too often they didn't get it. They would see that the plant was as clean as anyone's kitchen. They would see that they all wore the same uniforms. They would see that there was no warehouse. They could see the material results of the culture, but they couldn't see the underlying principles and behavior that define the culture. They didn't see that every newly hired manager and engineer spent six weeks working on the line. When I asked a woman, the public relations manager, how she felt about working on the line for six weeks she said, *"I worked in welding. Honestly it was frightening! I didn't like it. But, two year later I realize it was the best thing. I learned "respect." I learned to respect the world's greatest experts who are on-the-spot."*

Too often lean or Toyota Production System is understood as merely a set of tools. But it is more. It is a way of life, a culture that is embedded in the systems of the organization.

At Honda the process of hiring and educating new managers and employees is part of the architecture of lean. The plant layout is part of the whole-system. Incoming goods are delivered directly to the work station where they are assembled. The absence of private offices, with the President of Honda America Manufacturing sitting right out in the center of a large open office area, is part of the architecture. The visual posting of charts and graphs of performance, seemingly everywhere, is part of the architecture. The point system that rewards associates for suggestions, serving on quality circles, for attendance, and for other desired behavior, is part of the architecture. All of these and much more are all part of the architecture of a lean management system and organization. They all support and reinforce each other... just like the organs of the human body.

If someone tells you that "lean management is this" and not something else, if someone puts it in a box and ties a bow around it and presents it in a neat package with four walls around it, then that someone knows not of what they speak. Why? Because lean management is in motion and it is not a framed picture hanging on the wall. It is a melody, a rhythm, and not a note. Even Toyota has redesigned their own system to meet the needs of their people. Without calling it that, they have practiced whole-system architecture.

Lean management is generally derived from the Toyota Production System as developed by Taiichi Ohno, Shigeo Shingo and others over a forty year period. It began with efforts to reduce die change time on the stamping press which then allowed for a reduction of in-process inventory and this became just-in-time inventory management. This resulted in the need for less warehouse space, fewer forklifts, unnecessary space, etc. Once the flow of work can be interruption free, free of materials sitting, standing, and redo-loops, waste is eliminated. Lean is the elimination of waste. But, more importantly, lean is continuous improvement in all work processes.



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In order to improve the work of the die press and reduce waste Shingo did not instruct the workers. He asked the workers to think. He challenged them to innovate and find ways to speed the process by eliminating unnecessary activities. The workers who operated the press and changed dies worked as a team and together they experimented and sought improvement. It was the front line workers, who were on-the-spot, and who were truly the world's greatest experts in their work, who experimented, watched the data, and learned from the facts.

This model of improving the die change process by those who do the work, by those who are on-the-spot, is the essence of lean management. The model of Shingo asking the work team to think, to experiment, and to learn from the data, is the model of the lean manager. It is management that is humble and not arrogant. It is management that observes, encourages, challenges, and learns. Lean culture is management that gathers the facts, encourages experimentation, and spreads best practices. It is management that practices what they preach to others.

This example illustrates the two most important principles of lean, and these are not just hollow slogans, they are profound philosophy that impacts every practice at Toyota: Respect for People and Continuous Improvement (kaizen). We will keep coming back to these and other principles because everything you do in designing your future system should incorporate these two principles, at a minimum. The process of whole-system architecture incorporates both of these principles.

This model was quickly copied by Honda and other Japanese companies and has now become the standard of world class manufacturing. And, it has become the standard for management in all types of work settings.

Lean is a moving target because, at its heart, lean is a process of learning and improvement. It cannot be defined as something that is standing still or fixed. It is not simply mimicking what happened at Toyota or anywhere else. And, most importantly, it is not a kaizen event or a project.

## **QUALITY OF WORK LIFE AND THE TOYOTA SYSTEM**

Books on lean management and the Toyota Production System too often present this system as if it has been a virtual heaven of production efficiency and worker satisfaction. In some author's enthusiasm, questions about stress and work life are rarely raised or they are glossed over. In Japan there have been serious issues raised about the quality of work life at Toyota plants and Toyota has openly addressed this issue itself, along with its union, and conducted its own whole-system system redesign to improve the attractiveness and reduce the stresses of working within their system. They have been aligning the technical and social systems.

In the 1990's Toyota faced its own labor crisis with 25% rate of turnover among new recruits to the workforce, an aging labor force, and a general aversion among young Japanese to working in factories. This raised serious questions within Toyota about their own system and how it impacted the quality of work life. The following paragraphs are quotes from an important study of what Toyota did in response to this crisis, a study that has been overlooked by most proponents of lean manufacturing.

*"Facing up to the labour shortage and to the exhaustion of the whole work force, the management and the union at Toyota began to question the production system and the method*

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*of managing work. They concluded that a radical resolution of the crisis of work could only be found in a reorganization of the production system to make work more attractive, for they were in agreement that the cause of the labour shortage was the nature of assembly line work and the Toyotaist method of managing work.”*

*“The management of efficiency lay in the reduction of the number of workers, which was accomplished by Kaizen activities on production tasks and procedures. This in turn was based upon the ideas of ‘just-in-time’ and ‘autonomization’ (labour saving) which had been sustained and developed by T. Ohno. But the underlying cause of the crisis of work that Toyota was experiencing was precisely this system for managing productive efficiency. Therefore, the idea of ‘just-in-time’ was questioned. ‘Just-in-time should not be applied to people’, according to a section leader at the Motomachi factory. ‘If the number of production workers is increased, productive efficiency will be lowered. But we should not think solely about productive efficiency’, according to the personnel management department. The implication is that the reduction in the number of production workers should not be pushed too far. In other words, ‘lean production’ should not be applied to production workers. Otherwise, work will continue to be detested by the younger generation and will continue to tire production workers and supervisors. Hence the committee proposed to modify the management of costs.”*

*“This questioning of the production system has finished by modifying the idea of ‘just-in-time’ and the management of productive efficiency: ‘just-in-time should not be applied to people’, and ‘we should not think solely about productive efficiency’. Hence a humanization of the production system and of work was launched. By investing massively to improve working conditions, by developing a new conception of the production line, by allowing segments of the line to keep buffer stocks, by making social relations of work more equitable and rational, Toyota has changed the rules of the game. For Toyota, ‘lean production’ appears to be the model of the past, because it placed too much pressure on people. The new strategy at Toyota is to give a more humane dimension to its production system but without hindering productivity; even if progress remains slow, and is held back by the old Toyotaism.”*

*“In terms of teamwork, four production workers form a work team which is responsible for a segment composed of a series of connected tasks (three or four tasks). The work team takes responsibility for the quality of its tasks, whereas on traditional lines, each person is responsible individually.”<sup>1</sup>*

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<sup>1</sup> *“Humanization of the production system and work at Toyota Motor Co and Toyota Motor Kyushu.”* By Koichi Shimizu, In *Enriching Production: Perspectives on Volvo’s Uddevalla Plant as an Alternative to lean production.* Sandberg, Ake, Editor, Digital Edition, Stockholm. 2007. P. 398.

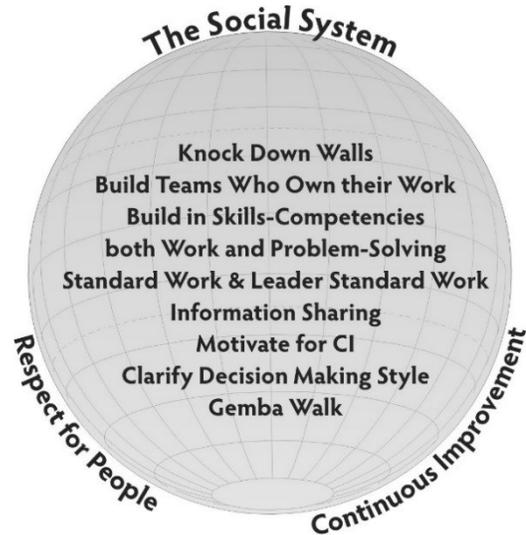
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The lesson of Toyota's experience at its own plants is that the lean system of production is not simply a technical or mechanical system in which the only goal is to improve production efficiency by eliminating waste. It is also necessary to design a system that takes into account the human factor, the social system that enriches the work and the quality of work life.

The other lesson from the above study is that the Toyota Production System, or lean, is an "open-system" able to adapt to the environment in which it lives.

### THE PHILOSOPHY OF LEAN

Lean is best captured as a philosophy rather than a particular method or technique. If you don't have the philosophy, you don't have it. Philosophy matters. If you were designing the culture of a country you might start with principles such as "government of the people, by the people, and for the people;" and freedom of speech, press and religion; or, the equality of men and women. Every country continuously pursues their philosophy and almost never achieves being there. But, the philosophy drives them toward the goal. Lean philosophy or principles are similar. The beginning of WSA is to decide on your principles and your philosophy. Here are several lists of principles that may help you decide on your own. Of course, there is overlap between these, just as almost every religion states the Golden Rule in slightly different language.



### LEAN PRINCIPLES AND PHILOSOPHY (END-STATE PRINCIPLES)

Lean is where we are going. It is the "what" that we are trying to create or, the end-state. The process of getting there is something else. First, let's consider the philosophy that defines where we want to go.

Here are some ways of describing lean philosophy or a lean system:

- Lean is a culture of continuous improvement practiced at every level of the organization and by every team.
- Lean is the application of the scientific method of experimentation and study of work processes and systems to find improvements.
- Lean is respect for people. It is respect for the voice of the customer and it is respect for those who do the work, who are "on-the-spot" and are, therefore, the "world's greatest experts" in their work.
- Lean is the elimination of waste in all its forms. Lean is the ability to distinguish between work that actually adds value to your customers and work that does not. By eliminating waste, you free resources to devote to value-adding activity that serves your customers.

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- Lean is a work environment that assures the quality and safety of all work for both customers and staff.
- Lean is a focus on improving the work process and not on blaming people or creating fear.
- Lean is a culture of teamwork, shared responsibility and ownership that cuts through organization walls or silos.
- Lean is a culture that returns the joy to work. Honda speaks of the three joys of buying, selling and making the product. We do our best work when we have joy in our work.
- Lean is flow. Lean is an interruption free process that flows from beginning to end without interruption.

### **TOYOTA WAY PRINCIPLES**

Jeffrey Liker in his book *The Toyota Way*<sup>2</sup> summarises the key architectural elements of Toyota's lean system in the following fourteen points.

- Do business with a long-term philosophy rather than constantly driving short term gains.
- Grow leaders from inside your organization.
- Create a "learning organization" that is continuously improving.
- Drive decisions through consensus.
- Empower employees to stop production to fix problems.
- To understand issues, go see them for yourself rather than simply getting reports from others.
- Respect your suppliers and network of supporters.
- Create continuous product flow to expose quality problems.
- Create pull systems to regulate work.
- Create visual inventory control.
- Level the work load so groups are equally balanced.
- Use reliable and stable technology.
- Employ exceptional people.
- Standardize processes and tasks.

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<sup>2</sup> Liker, Jeffrey K. *The Toyota Way*. New York. McGraw-Hill, 2004.

## **DR. DEMING'S FOURTEEN POINTS**

It is also reasonable to compare these with Dr. Deming's Fourteen Points<sup>3</sup> upon which much of the quality movement was built. These are also a good set of principles to consider as you design your own lean system.

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive, stay in business and to provide jobs.
2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
3. Cease dependence on inspection to achieve quality. Eliminate the need for massive inspection by building quality into the product in the first place.
4. End the practice of awarding business on the basis of a price tag. Move towards a single supplier for any one item, on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on the job.
7. Institute leadership. The aim of supervision should be to help people and machines and gadgets do a better job.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team, in order to foresee problems of production and usage that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity..
11. a. Eliminate work standards (quotas) on the factory floor. Substitute with leaders.  
B. Eliminate management by objective. Eliminate management by numbers and numerical goals. Instead substitute with leadership.
12. Remove barriers that rob employees of their right to pride of workmanship and eliminate the annual rating system
13. Institute a vigorous program of education and self-improvement.
14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.

## **LEAN ORGANIZATION ARCHITECTURE**

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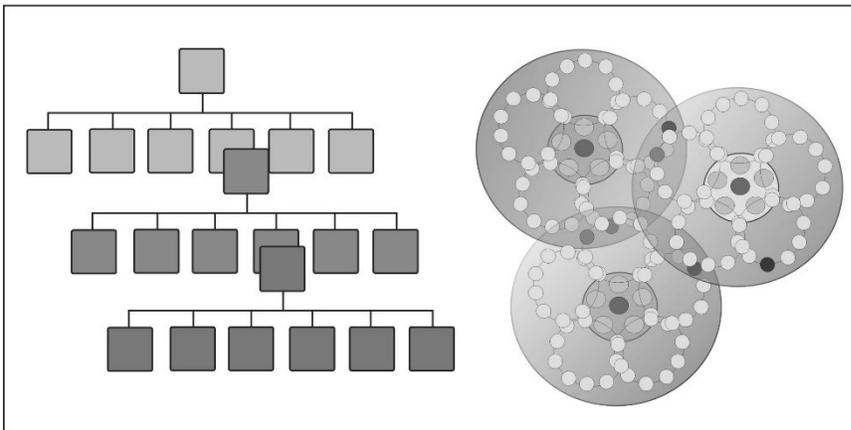
<sup>3</sup> Deming, W. Edwards. *Out of the Crisis*. Cambridge, MA. The MIT Press, 2000.

## What Is Lean Culture

Putting aside the assembly line or the specifics of work processes, is there a difference between lean and traditional organization? If you accept that lean is a culture, and not merely a mechanical process, then it is worth understanding that culture comes to be reflected in the organization's structure and systems, and these in turn, reinforce that culture. It is one reason why cultures are hard to change.

When the Internet was first appearing as a reality of life, I was working in a large engineering organization. Some enterprising young engineer who knew more than most about the Internet, set up a discussion list so engineers of a particular specialty could communicate about common problems. He was setting up an internal social network, although the term "social network" didn't exist at that time. He was fired. He was fired for violating the chain of command and encouraging people to share information without first going through their manager, and their manager's manager. He violated the architecture of the organization. He violated the values upon which that architecture was built. Of course, if the managers had more sense, they would have encouraged and promoted him instead of firing him. But that is the interplay between culture and organization architecture.

If you were forced to draw a picture of your organization, you might draw something like the following organization chart on the left. It is neat, orderly, and everyone knows their place. Everyone knows who they report to and they are likely to stay in their boxes and follow the lines. The one on the right is another matter entirely. It's very confusing and appears "unmanageable." But, is that reality or, is it merely our cultural perceptions that we impose on reality? Living forms in nature look much more like the one on the right and they have worked well for millions of years. But those biological systems tend to be self-organizing, rather than responding to command. Systems that rely on self-organization tend to be highly sustainable and those that rely on imposed order tend to be unstable and unsustainable.



In which organization do you think learning will occur more quickly? In which organization do you think people are more likely to collaborate and self-organize groups to work on projects or to share information? The organization on the right is perfectly orderly with five teams in each of three clusters and within each cluster there is a leader and five coaches. Some of their work overlaps and some members may serve on more than one team, both within a cluster and across clusters. Why isn't that architecture just as sensible as the one on the left?

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The organization on the left might be more suited to the orderly assembly line where the work flows in a linear manner and is done the same each day. But, that is not what most of our organizations do. Most of our organizations produce knowledge work where the most value-adding activity is thinking and innovating and that is much more likely to occur in the organization architecture on the right.

The architecture is more than structure. It is also systems of decision-making, information flow, training and development, reward and recognition and others. The nature of systems is an equally important part of the architecture and equally reflects cultural values and assumptions. Who sees and understands financial reports? Why doesn't everyone? Who has access to technical developments, problems or challenges? Why or why not? Who can communicate directly with customers or suppliers and how long does it take? Who do we trust? All of these questions are ones the design team will need to address. Their job will be to create the architecture that will enable the strategy of the organization.