Lean Communications – Enabling manufacturing processes through visual technologies

In every organization there are wasteful activities, both in operations and in communications. Seldom, however, are these activities conveniently labeled as wasteful, nor do these activities standout and beg for improvement. In fact, many of these activities masquerade as critical functions, consuming valuable resources with little return value. It wasn't long ago that manufacturers considered inventory a business asset. It took the application of Lean Manufacturing principles to reverse that thinking (see *Find Waste!*), pointing out that unsold inventory was a waste and a symptom of overproduction. Lean Communications—delivering the right information when it is needed, where it is needed—can have an equally profound impact on manufacturing.

Find Waste!

Considered the pioneers of Lean Manufacturing, Dr. Shigeo Shingo and Taiichi Ohno were the initiators of the Toyota Production Process established in the 1950s and 1960s. The process became known in the West in the 1970s as Just-in-Time Manufacturing, but is now referred to as Lean Manufacturing. This process has several key foundations and is focused at eliminating and removing the seven deadly wastes of manufacturing:

- Defects
- Waiting
- Inventory
- Processing (unnecessary)
- Movement
- Transportation
- Overproduction

In one famous incident, Dr. Shingo was touring a plant where he observed a very large banner hanging high above the manufacturing floor that read "Eliminate Waste." Dr. Shingo commented that "usually, if people find waste, they will get rid of it. The big problem is not noticing something as wasteful. The slogan should read *Find Waste!*" This is the key first step for any improvement process, particularly for improving communications.

Simple Solution from a Simpler Time

Before the dawn of the industrial revolution, a craftsperson would build a product, market it and sell it to the customer directly. This was a very efficient business process as all of these activities would occur under the direction of a single entity. The craftsperson would buy or harvest the raw materials, build the product and demonstrate the capabilities to a willing customer. If the customer did not like the product or, conversely, loved it and wanted more, the craftsperson could take immediate action, either stopping or increasing production. If this direct, real-time communication process could be effectively scaled to a multinational corporation it would be the envy of the corporate world. Processes, however, get inherently more complicated as the number of people in an organization grows and its geographic footprint gets larger. Still, this model is more achievable than most would think, even for large, geographically dispersed manufacturers. The key is to extract the fundamental concept that makes the early production process so effective.

The ability to recognize and extract the fundamental elements of a process leads to understanding the *what*, and, more importantly, the *why* things happen as they do. This is an essential element of continuous operational improvement. As processes generate information, that information can continually be evaluated for improving the overall process. This can be summarized as:

issue recognition > **root cause discovery** > **issue resolution**

This formula will operate effectively only when the following conditions exist:
- **Ownership –** A process owner is essential.
- **Empowerment –** The process owner is empowered to take action.
- **Creative Discontent –** Improvement ideas can be tested safely.
- **Collaboration –** Creative assets nearby can easily be engaged in the resolution efforts.

This formula worked very well for the pre-industrial revolution craftsperson. As no one else was involved in the process, this individual was empowered to make decisions and take action. The craftsperson would go back to their shop, work out new ideas, and finally discuss the situation with others in the community to get different perspectives and expertise. The result was a significantly improved process and product, and a more experienced craftsperson, or what businesses would later call organizational development.

The challenge for 21st century businesses: To maintain the effective integration (sharing of information) of process management and process execution in organizations that have a global footprint and are characterized by widely dispersed supply chains and specialized functions. The information that these geographically dispersed processes create during execution will need to be managed by new Lean Communication methods in order for manufacturers to sustain organizational development and improved efficiencies.

The World is Lumpy

As the global marketplace expands and mergers and acquisitions continue to take place, organizations are becoming increasingly more dispersed. Such dispersal has created a need for numerous companies to focus solely on their core competences, shedding operations that are not essential or are not involved with the economic drivers of the organization and its customers. This shedding allows companies to focus future investments on processes that increase competitive differentiation and outsource non-core operations.

Why Organizations Are Growing More Dispersed

- Outsourcing (IT, HR, Engineering services, Manufacturing, Finance).
- Mergers and Acquisitions.
- The need to get close to the customer, remote sales offices.
- The need to get close to critical resources, labor or materials, remote production facilities.
- Recruiting key talent wherever it may be, creating growth in the small office home office (SOHO).

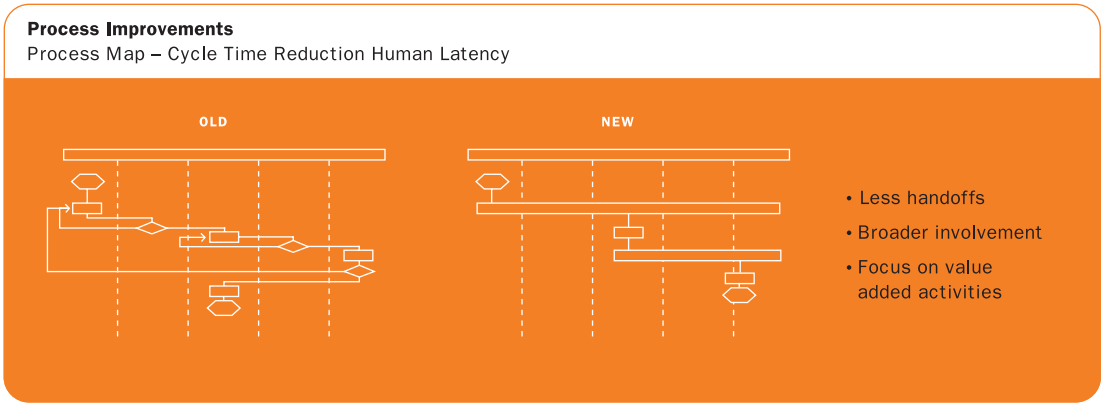
Collectively, these dispersed locations are all contributors to a larger business process that runs through each, and ultimately generates value in the marketplace. For example, outsourcing manufacturing is only one element of a company's larger business process to fulfill a customer's need.

Business Process Chain

Marketing > Sales > Order Management > Manufacturing > Logistics > Customer Training > Support

Unfortunately, there is inherent human latency as each of these processes hands responsibility to the other. One of the foundations of any process improvement, including lean communications, is removing the non-value-added activities. As we have seen, one of the keys to uncovering dead wood is to keep the process linked with the information generated by that process. One technique that is often deployed in Lean Factories is to move operations closer together so that a smooth process is established, eliminating transportation, movement and inventory wastes. The information from each previous operation is available to the next since they are right next to each other. Because they now see and understand each others' activities, they can continually discuss new methods to further improve operations in real time.

For many organizations, however, bringing all operations together is not feasible. So how do these geographically dispersed entities see and understand what the others are doing in order to improve the overall business process?



Some would argue that with the arrival of the Internet as a business tool, anyone can communicate with anyone else in the world at any time. In the book, *The World Is Flat: A Brief History of the Twenty-first Century* (Friedman 2005), the argument is made that all you need are brains and a computer and you can reach out to anyone at anytime, a truly flat paradigm. While in some situations this may be true, when an organization is trying to execute a complicated, global process, the world is lumpy at best. There are islands of excellence, but true value is created when all operations that touch a process function seamlessly together and, more importantly, are constantly improving. Such functionality requires true real-time information, where each element of the operation can see and understand what the other is doing. This can only be achieved through Lean Communication practices.

See, Understand, Take Action

One of the more complex challenges in the 21st century is managing the global supply chain effectively. One of the ironies of Lean Manufacturing is that there is less inventory in the system to act as a buffer to supply chain disruptions. If supply disruptions last long enough and stop a production line, the opportunity costs are enormous. For example, in the automotive industry, a car manufacturer can produce a small car every minute and a larger car every 2.5 minutes. Avoiding disruptions is critical, and it's not unusual for a parts supplier to be charged $18,000/minute for late deliveries. Typical Tier-1 suppliers often budget for late delivery charges in the millions of dollars. Therefore, the ability to quickly assess supply chain disruptions and collect critical information for addressing the problem in real time can save millions of dollars.

A visually-enabled supply-management process can quickly tie key individuals into the resolution process and move the problem through the cycle of issue recognition to root cause discovery to resolution implementation on a global platform. Suppliers can be linked to their customer's video communication network, allowing the type of intimate information sharing and quick understanding that occurs when two operations are right next to each other. For more mature supplier management implementations, critical sub-suppliers and/or distributors can be tied in to gain additional visibility into the supply network. In a visually-enabled supply-management process, critical information can be supplied at the point of need, when it is needed, quickly and with little cost.

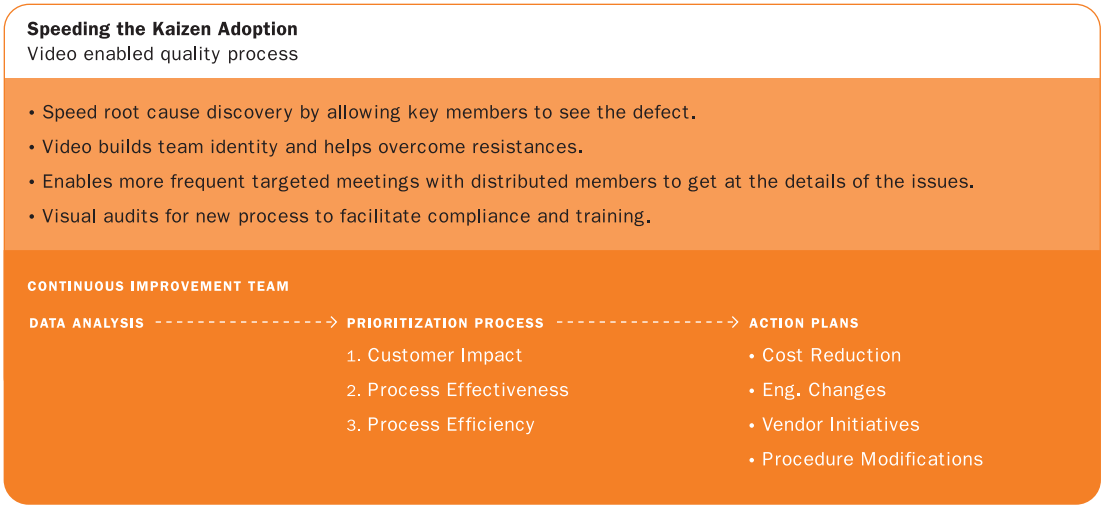
Additionally, in an outsourced business structure, coordination with the supply base is essential. Contract manufacturers want to develop close planning and execution relationships with their customer base. Conversely, the customer wants to feel like they are dealing with their own employee when discussing issues and plans with the contract manufacturer. Visual communication builds the trust and familiarity that becomes the foundation for a long term business relationship. Linking data systems and EDI connections in the supply chain builds efficiency, but business is essentially a human enterprise. There is no data replacement for collaboration and innovation, the kind that occurs best in a face-to-face, real-time environment.

Visually-Enabled Kaizen

A key methodology for team based improvements is the technique of Kaizen meetings. Kaizen strategy calls for never-ending efforts for improvement of operations. Kaizen meetings are often supported by data that characterize a process or condition that is being investigated, and a team associated with the process, along with technical experts, is assembled to work on improvements. These are structured collaborative events that build on the strengths of the team and their diverse experiences. They start by investigating what forces created the present condition and then brainstorm new ideas to create a higher level of performance. These events work best when the team meets near the process they are studying and can see or participate in the process itself. The other hallmark of a good Kaizen project is that the group meets frequently (albeit for short periods of time, approximately 20-30 minutes)

to sustain momentum and capitalize on progress. The ability to tie a supplier into these improvement efforts, something that can be done efficiently and with little cost through video, further extends the process improvement capabilities.

In a multi-plant environment, best practices are routinely shared across multiple locations. However, best practices are most effectively shared and communicated when the operators in one plant can actually see how the other plant has solved a particular problem or implemented an innovation. This often requires significant travel, sending plant operators from one plant to the other, something plant management is often either reluctant or unable to do due to the costs and loss of key personnel for extended periods of time. These trips have very beneficial effects, but usually do not take place frequently enough to sustain long-term improvement. One of the values of a visually connected supply chain in a multi-plant environment is that teamwork and cooperation is constantly reinforced through frequent, targeted meetings; building on each success the team experiences. Collaboration over distances becomes commonplace and geographic separation becomes a transparent issue as innovation is implemented on a more global scale. To modify the old phrase “think globally, act locally,” you can now “collaborate and innovate globally, while you act and stay locally.”



Machines Can Talk Back

Capital equipment manufacturers are expanding the idea of a virtual factory. Some manufacturers are incorporating a software client that resides in the machine (monitoring the programmed logic computer controller) and can report all the information regarding the status of the machine over the internet. This allows an expert to monitor the equipment remotely and advise the customer on:

- **Better operating methods**
- **Out of tolerance conditions**
- **Preventative maintenance actions**
- **Rapid troubleshooting to minimize downtime occurrences**

Capital equipment manufacturers are selling these capabilities as a new level of service offering and performance that could never have been achieved with a traditional technician and a van. This new service offering is being taken to the next level of customer satisfaction where the remote expert can view the status of the machine in the form of bits and bytes, and the operator can initiate a video call to the remote expert to discuss the machine's condition in real time.

In addition, with complex machinery, there are often numerous functions and operations that are seldom used or performed. Remembering how to correctly perform these seldom-used operations can be a significant a problem. Such "on-demand" training, as well as machine-calibration and maintenance questions, can be answered expeditiously and easily through a video call to the machine expert. Simultaneously, the remote expert can verify that the activity was performed correctly or offer guidance for improvement. In addition, the operations or maintenance of the equipment by expert operators/technicians can be recorded and used as a training video for newer employees. This new level of visually-enabled equipment service can be a significant differentiator in the market place.

As corporations, educational institutions and government entities continue to develop their visual networks, these networks become the foundation for continued collaboration and innovation. Many organizations are realizing that these networks are content generators, generating valuable knowledge and intellectual property specific to their core competence, and if recorded, could become a resource library for:

- **Spreading best practices;**
- **Training future employees;**
- **Developing common strategic objectives across geographies and cultures;**
- **Improving compliance with, and understanding of, essential processes; and**
- **Customer training and information.**

As the ideas and technologies embodied in Lean Communications spread and are applied in new ways, the list of benefits of Lean Communications will continue to grow and positively impact the manufacturing industry.

Evolution of Lean Thinking

In 1911, Frederick Taylor, a mechanical engineer, introduced the concept of Scientific Management. This concept proposed: there existed a "perfect process" that yielded the "best results" for all operations. This was a revolutionary idea for that time. Simple enough in theory, the practical challenge was to uncover the perfect process for each operation and decide on the end points for that process.

One early adopter of Taylor's concept was automotive pioneer Henry Ford. Utilizing the tools and thought processes Taylor developed for Scientific Management, Ford redefined the beginning and end point of the automotive manufacturing process in his River Rouge manufacturing plant. In this plant, raw iron ore was barged into steel plants at one end and completed Model T Fords were delivered at the other. It was a uniquely integrated supply chain, and each step in this varied and expansive process was highly mechanized for that time. Each operation was studied and controlled. Waste was eliminated, but critical information was managed outside the process by a newly created industrial engineering positions. These were one of the first "knowledge workers" in American manufacturing.

Though the origin of the Scientific Management concept and the first practical implementation took place in the early 1900s, it wasn't until the 1970s that a large number of manufacturers became interested in Lean Manufacturing, primarily spurred on by the success of Taiichi Ohno and Dr. Shigeo Shingo Toyota Production System (TPS). And while numerous manufacturers had widely adopted Taylor's Scientific Management concept and imitated Ford's integrated supply chain model, they had not been able to fully identify the best process for their operations nor maximize their results, particularly as their organizations grew in size and scale.

So, how were Toyota and Dr. Shingo able to effectively implement this concept and achieve substantially improved results? The implementation of Taylor's ideas in Japan was very different than in the United States and Europe, even though they were based on the same work. Taylor made one profound error in laying out the principles of Scientific Management, one which did not become evident until the 1950s and '60s. Taylor advocated the separation of the planning and information flow that a process inherently possesses from the actual act of operating the process.

In applying Scientific Management to Toyota's Production System, Dr. Shingo and Ohno never implemented the above rule of Scientific Management. Though most likely due to a number of circumstances, (both cultural and economic), this omission had profound impact. Instead of a process that separated planning and feedback from operations, Toyota's implementation was characterized by highly integrated functions of running a process built on continuous efforts at improvement by the process operator. This plan for improving the process evolved over time, continually finding and eliminating waste, until Japan had turned into the manufacturing powerhouse of the 1970s and '80s.

It was this fast cycle of collaboration between man, method and machine that extended the industrial revolution into the 21st century. And, while the previous century's success was based on efficiency and scale, this century's success is more often being based on a short cycle of collaboration that leads to innovations (both large and small) that build upon one another and extend competitive advantage. This continuous, real-time collaboration is the key to Lean Communications.

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