

'Lean' thinking

Applying “lean” principles to a shop floor can have startling results, such as a doubling of productivity and a halving of the production space. As increasing numbers of companies reap these improvements resulting from lean thinking, they are turning their attention to office and professional areas, such as order entry, engineering, and administration.

“Appointing value stream managers, drawing value stream maps, and achieving future states in the office can produce savings equal to or greater than those in your plants,” said James P. Womack, founder and president of the Lean Enterprise Institute (LEI).

LEI is a non-profit training, publishing, and research center in Brookline, Massachusetts, USA, and has worked closely with the Lean Enterprise Research Centre at the Cardiff University Business School, Wales.

A “value stream” is simply all the value-creating and wasteful steps currently required for the design and creation of services or goods that share similar steps. Value stream maps are paper and pencil representations of those steps along with some key information, such as the customer demand rate.

Converting a shop-floor value stream to lean principles typically doubles productivity, improves throughput time by 90%, and reduces production space by half, noted Womack. Achieving similar gains in administrative functions begins with the same process that works so effectively in the shop – mapping value streams.

Value Stream Mapping

A value stream manager undertakes the mapping in two stages. He or she:

1. Identifies all the steps currently required to move the product or service from order to delivery.
2. Quickly creates a leaner future state map with substantially less waste by challenging every step and crossing functional boundaries.

The key question the manager asks during the mapping process is: “Would the customer think the service is worth less if this step could be left out?” The final mapping phase is to create and implement a plan for achieving the future state.

Implementing a Leaner State

Since it is never possible to remove all the waste immediately, the value stream manager continually revisits the value stream to improve it by removing more waste so value can flow faster to the customer. Thus, the first future state becomes the new “current state,” and so on.

Chet Marchwinski, LEI communications director, noted that people who have applied lean thinking to value streams in administrative or professional areas have discovered the office equivalents of the seven main types of industry wastes identified decades ago by Taiichi Ohno, the developer of the Toyota Production System, which is the model for lean thinking. The industry wastes and some of their office counterparts are:

1. Overproduction: printing too many reports; writing 1,000 lines of computer code when 100 lines would achieve essentially the same function
2. Waiting: waiting for reports, information, quotes, or meetings
3. Transporting: moving designs, office equipment, or computers from one spot to another
4. Over processing: requiring too many approvals; preparing overheads, charts, or reports that aren't used; creating services or software features that the customer doesn't really want
5. Inventory: too many office supplies
6. Wasted motion: searching for lost files

7. Rework and defects: engineering change orders; correcting wrong information in computer systems; debugging computer code; correcting quotes.

Leaner IT

Marchwinski noted that a recent contributor to a discussion at the LEI web site's Forum ([Lean Enterprise Institute](#)) reported that creating software functions with fewer lines of computer code had reduced application bugs, maintenance and support, application processing time, and application response time.

Marchwinski also noted that Microsoft and Hewlett-Packard reported applying the lean technique of mistake-proofing to software development several years ago. A mistake-proofing device in the shop is typically a clever but inexpensive mechanism or procedure that assures that an error, once its cause is known, will not reappear.

HP and Microsoft were using mistake-proofing code, small programs or scripts, to catch errors in other code early in development, sometimes on a daily basis. The traditional software process is to write code then test it downstream. But repair becomes more complex and time consuming the later a bug is detected. Using the mistake-proofing concept, software developers direct poka-yoke programs at areas in code where errors occur or are expected to occur, just like a lean manufacturer would position a mechanical or electrical mistake-proofing device at the source of a problem on a machine.

Another LEI Forum contributor reported a "lack of interest" among office personnel when he tried introducing them to lean techniques that had cut lead time from receipt of order on the shop floor to shipment from 14 weeks to one day. The "blank looks" began to disappear when he showed them that moving the order from receipt to the shop floor took two weeks.

Leaner Storage

At a conference on lean applications, a company reported discovering that it had 52 boxes of five types of copy paper at a corporate office. It removed all the paper in storage, leaving just two boxes of the two most common types. Two or three additional packages of paper were left at each copy machine. The last package carried a kanban card, a ticket bearing re-order information. The office worker opening the last package placed the ticket in a reorder bin for the supplier to pick up.

Paper, which had been ordered once a week through requisitions, now is delivered daily, based on the kanbans. The paper supplier already was making daily stops at the company to deliver other items. Other improvements included reducing an inventory of transparencies from 31 boxes of five different types to nine boxes of just three types. The company characterized the total savings as worth several thousand dollars.

Office Cells

Even bigger benefits come from improving the flow of work with office "cells," a product-oriented way of arranging different functional tasks in sequence to produce a completed item from start to finish. On the shop floor, different types of equipment is arranged in processing sequence, typically in a U-shape, with dramatic improvements in quality, throughput time, productivity, and space savings. Similar gains are possible in offices.

For example, at Rockwell Collins Aviation Services unit in Cedar Rapids, Iowa, USA, writers, editors, and illustrators were co-located into cells, which cut floor space by 53%, work-in-process by 55%, and cycle time by 74%. On-time delivery improved by 23% and productivity increased 40%, the company reported.

The unit produces and updates avionics maintenance manuals. The value stream was fractured because writers, illustrators, and editors worked in three buildings in separate functional departments, just like people and equipment in a traditionally organized plant would work in separate departments like grinding, painting, or heat treating. The result was poor communications and delays as manuals were handed off in batches from one process to the next, where they waited for the next step.

Assisted by an outside consultant, a team of employees and supervisors, rearranged desks and computer terminals into a lean cell after mapping the value stream for manuals and related products. Arranging stations in processing sequence was not as critical as in a production cell. However, people sit along the interior wall of an office cubicle, close enough to make communication easy. A low wall aids communication with others in the office.

To determine the customer demand rate, or how often it had to produce a manual, the team determined how much new and backlogged work -- counted as pages -- it had to finish monthly based on the time available. Team members identified the work elements needed to produce manuals and used the information to figure out how many people the cell needed to do the work. The answer was four.

The team starts working on a manual when it has the engineering information and drawings. Team members meet to determine the best way to do the work. For instance, the illustrator can prepare graphics while a writer works on some text, while the editor checks the remaining text for formatting. The cell usually works on one job at a time. A column outside of the cell displays small colored flags that alert management to any problems. For example, a yellow flag means another job will be needed in less than five days.

The Lean Enterprise Institute is a 501(c)(3) non-profit corporation founded by James P. Womack, Ph.D, in August 1997 to promote a set of ideas commonly known as lean thinking. These ideas, based initially on the Toyota Production System, are explained in a series of books and articles co-authored by Womack and Professor Daniel T. Jones of Cardiff University over the past 20 years.