

Best Practices for Lean Quality Management

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Overview

Traditionally, manufacturing firms organized their enterprises hierarchically, creating a number of levels in the chain of command. At each level, middle managers and first-line supervisors were responsible for translating goals and objectives passed down from upper management into work instructions that were clear and easy-to-follow. The same person monitored progress against these goals, collected and organized information, and reported the status back to management. This structure attempted to allow enterprises to efficiently manage and control various groups of employees using a “top down” structure for decision making. Unfortunately, this was a painstakingly slow and ineffective process. Management did not receive information quickly and because the enterprise divided goals and objectives into such small pieces, employees could no longer see the importance of their actions relative to the entire company. By organizing employees into highly specialized vertical departments, or “silos,” manufacturers created sectionalism and parochial decision-making within their enterprises.

Within this vertical structure, employees spent much of their time trying to coordinate and document activities rather than focusing on creating quality products. Every department produced its own paperwork, which it stored in its own bank of file cabinets. Product engineers developed product drawings and specifications that were reviewed and approved by other product engineers. Although they did not participate in developing the product specifications, manufacturing engineers inherited these documents and were expected to use them to design efficient production processes. This lack of communication trickled down to the tool room machinists who were forced to manipulate the manufacturing engineers’ tool designs so they would “work” on the shop floor.

With this isolated and insulated departmental structure, poor communication, and the blurring of the corporate goal, manufacturers became fragmented with multiple strategies, which interfered with their ability to respond quickly to market changes. To keep increasingly large organizations under control, personnel departments devised elaborate rules and regulations, burying employees in an organizational bureaucracy that often drained their willingness and readiness to work effectively. With globalization resulting in increased market competition, companies realized the advantage of being able to respond immediately to their customers and the importance of having access to accurate real-time information. Organizations needed to improve communications and share accurate information so they could create quality products and deliver them on time (Figure 1).

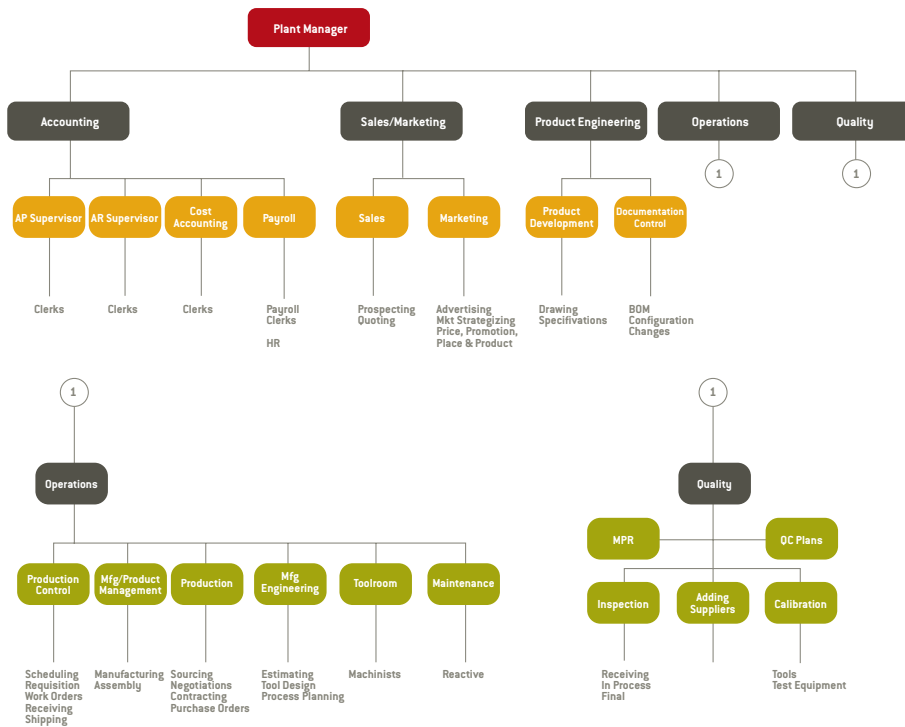


Figure 1: Traditional manufacturing organization chart with responsibilities

Manufacturers wanted a better work environment—one that would support a certain degree of independence for employees, encourage the delegation of authority and responsibility, promote open communications, and encourage people to question rules and to develop new ways of solving old problems. Today, it is common to read about organizations that are in the process of “de-layering” or “flattening.” Manufacturers are now reducing and sometimes eliminating middle management. Decision-making has gone from top-down to bottom-up. Improved communications and new business strategies have resulted in an unprecedented improvement in production efficiency and decision-making speed. The evolution of information technology has enabled these changes, which, when implemented correctly, fulfill the data gathering and dissemination functions previously carried out by armies of clerical and middle management staff. Manufacturers have removed their organizational layers and encouraged cross-functional work teams and upper management to share and implement common strategies and objectives around major business processes.

Some of the differences between the traditional vertical manufacturing departments and the new “horizontal” team approach include:

Traditional Manufacturing

- Organize around function
- Tall hierarchy
- Autocratic decisions flow down
- Profits drive performance
- Individual performance-based rewards
- Only sales people are allowed to talk to customers
- Employees as fixed resources

Horizontal Teams

- Organize around process
- Flat hierarchy
- Teams manage the organization
- Customers drive performance
- Team performance-based rewards
- Teams are in contact with customers
- Training programs are provided to all employees

Manufacturers strive to control and manage their supply chain so they can provide rapid, cost-effective solutions to their customers and surpass the competition. Employing knowledgeable, skilled employees and accessing accurate, timely information are all factors that differentiate successful, flexible enterprises in today's competitive environment. Manufacturers must offer their employees the tools they need to improve performance and make informed decisions.

Infor understands manufacturers' unique business needs. To help enterprises adopt the new horizontal business structure and seamlessly connect their employees with their business processes, Infor offers the integrated supply chain solutions of Infor ERP^{VISUAL}, and Infor ERP^{VISUAL} Quality Management.

Infor ERP^{VISUAL} and Infor ERP^{VISUAL} Quality Management offer manufacturers the communication tools they need to quickly accomplish integrated information collection, analysis, reporting, and action with automated notification. Management can access data about product management, process management, partnership development and quality assurance modules and related operations maintenance, continuous learning and improvement, and new product development. Because Infor ERP^{VISUAL} Quality Management provides information about all levels of the organization, management can make decisions based on accurate, up-to-the-second data (Figure 2).

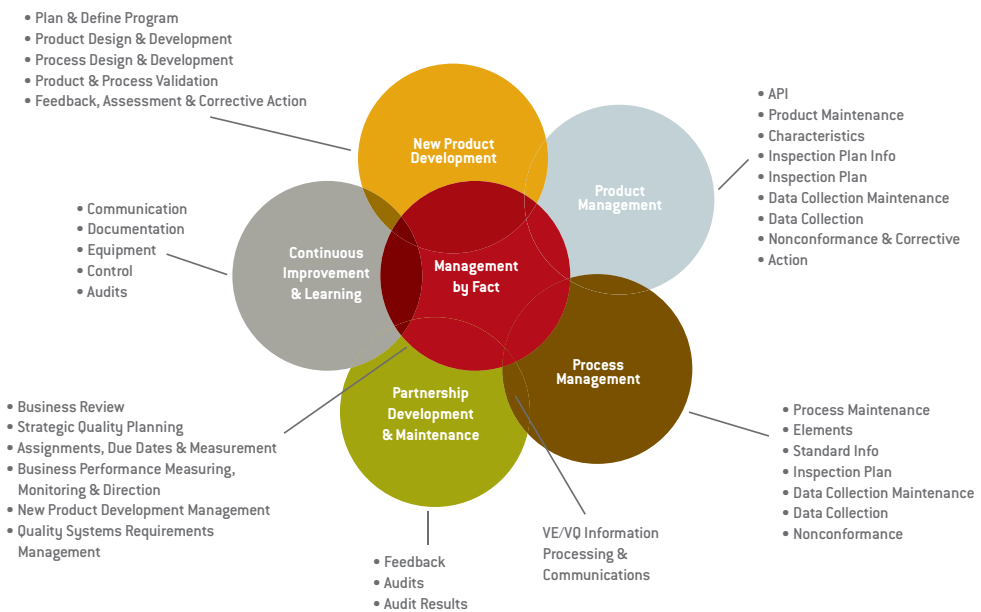


Figure 2: Technology-enabled organizational structure

Integrated within Infor ERP ^{VISUAL} and Infor ERP ^{VISUAL} Quality Management are peripherals such as accounting, configuration, quality, status, feedback, and action items. Infor incorporates strong enterprise capabilities into its software design so that manufacturers gain control across the manufacturing, administrative, and management operations of the company. Table 1 illustrates this strategy on a department-by-department basis, listing which modules are directly relevant to each operation.

Infor ERP ^{VISUAL} Quality Management, like Infor ERP ^{VISUAL}, incorporates the capabilities of both a traditional ERP (Enterprise Resource Planning) system and the operational execution of a Manufacturing Execution System (MES). Combining the strengths of both systems, Infor ERP ^{VISUAL} Quality Management offers enterprises maximum quality and performance benefits.

Infor ERP ^{VISUAL} Quality Management helps manufacturers see every aspect of their organization's operations, finding numerous ways to improve business flow, saving time and money. The following list provides some of the improvements that the information technology within Infor ERP ^{VISUAL} Quality Management brings to a manufacturer's operations.

- Improved product and service quality
- Lower cost
- Increased responsiveness to markets
- Increased responsiveness to customers and suppliers
- More flexibility
- Improved safety
- Reduced equipment downtime
- Smaller work-in-process inventories
- Increased long-term profitability

As market competition increases, customers consistently demand quality products on time and at a low cost. The scope of quality has evolved from a strict focus on ensuring product reliability to a model that now encompasses product and process individualization and customization. Proof of this change is evident by the migration of manufacturing from largely make-to-stock, to now include make-to-order capabilities, even in markets where products were traditionally viewed as straightforward commodities.

Always trying to stay ahead of the market, Infor originally developed Infor ERP ^{VISUAL} with the flexibility to produce products in a truly mixed-mode or make-to-order fashion. The addition of Infor ERP ^{VISUAL} Quality Management to the Supply Chain product line expands this development even further by providing the means for enterprises to identify and respond to the market forces that drive these changes.

	Order Entry	Plan/Schedule	Purch	Ship/Recv	Mfg	QA	HR	Sales	Facilities	Eng	Finance
Audit	•	•	•		•	•		•			•
Cost of Quality			•								•
Doc Mgmt	•	•	•	•	•	•	•	•	•	•	•
Employee Dev							•				
Gage Mgmt				•	•	•				•	
Inspection				•	•	•					
PDM/PDM+	•	•	•	•	•	•					
APQ/PPAP		•				•				•	•
Prevent Maint									•		
Process Mgmt	•		•	•	•	•	•	•			•
Sales Cont	•					•		•		•	
SPC+		•	•		•	•				•	
Vendor Cont			•	•		•					
Vendor Perf			•			•					•

Table 1: Quality modules and related operations

Infor ERP ^{VISUAL} Quality Management offers the tools manufacturers need to translate customer wants and needs into the development, maintenance, and revision of products. A survey performed by the Automotive Industry Action Group (AIAG) and the American Society for Quality (ASQ) reported that through numerous internal improvements, such as better internal communication, improved external communication between vendors and customers, fewer defects, less scrap, and employees' better understanding of jobs and tasks, ISO 9000 and TS16949 registered companies added an average savings of 6.2% to their annual sales. Based on a company's sales of \$20 million, this represents a revenue gain of \$1.24 million. This increase in profits resulted solely from the internal return on investment, not from new business achievements. Infor ERP ^{VISUAL} Quality Management offers the tools needed to achieve and maintain such enterprise-wide continuous improvement. These tools can also help manufacturers understand internal enterprise needs and problems and allow for the reengineering of internal processes and operations.

With Infor ERP ^{VISUAL} Quality Management, enterprises can develop, manage, and maintain quality assurance activities for documentation, products, processes, equipment, and devices as well as for suppliers, customers, and employees. Through trend and analysis monitoring, companies can focus on their major continuous improvement opportunities and substantially reduce the costs associated with quality. Manufacturers can achieve and maintain quality standards and compliance certification faster and at lower costs than with other systems.

New product development

To help enterprises set standards for new products, Infor ERP ^{VISUAL} Quality Management offers a quality planning module called Advanced Product Quality Planning (APQP). Product planning includes all the activities beginning with the conception of the product to its introduction to the manufacturing shop floor. Like the other major Infor ERP ^{VISUAL} Quality Management modules, APQP consists of both major and minor links or “threads” that seamlessly work behind the screens, bringing all the information from the different quality elements into one location within the program management system. The major threads for this process involve five major steps as shown in Figure 3: Program Planning and Definition; Product Design and Development; Process Design and Development; Product & Process Validation; Feedback, Assessment, & Corrective Action. These five steps coordinate with other factors such as customer, supplier and employee communication, projects, meetings, to do lists, checklists, Failure Mode and Effects Analysis, etc.

The APQP system is the major holding area for all the new product assignments and activities handled simultaneously by individual employees or teams throughout the entire enterprise and its supply chain. As the arrows in Figure 3 indicate, information flows from the other Infor ERP ^{VISUAL} Quality Management modules to the APQP module, which monitors and manages the new or revised product development project(s). This advanced quality planning tool can either be designed around the enterprise’s specific management of appropriate activities throughout the design development cycle or the TS16949 requirements that the Infor ERP ^{VISUAL} Quality Management APQP module mirrors. APQP is the up-front engineering tool that allows you to validate and implement a product or process. This completely paperless system facilitates communication with everyone involved in the supply chain, ensuring that personnel complete required steps on time.

APQP offers enterprises many benefits including:

- Satisfying the customer with direct resources
- Promoting early identification and resolution of required changes
- Avoiding late changes and any charges or lost business opportunities associated with late changes
- Providing a quality product on time at the lowest cost

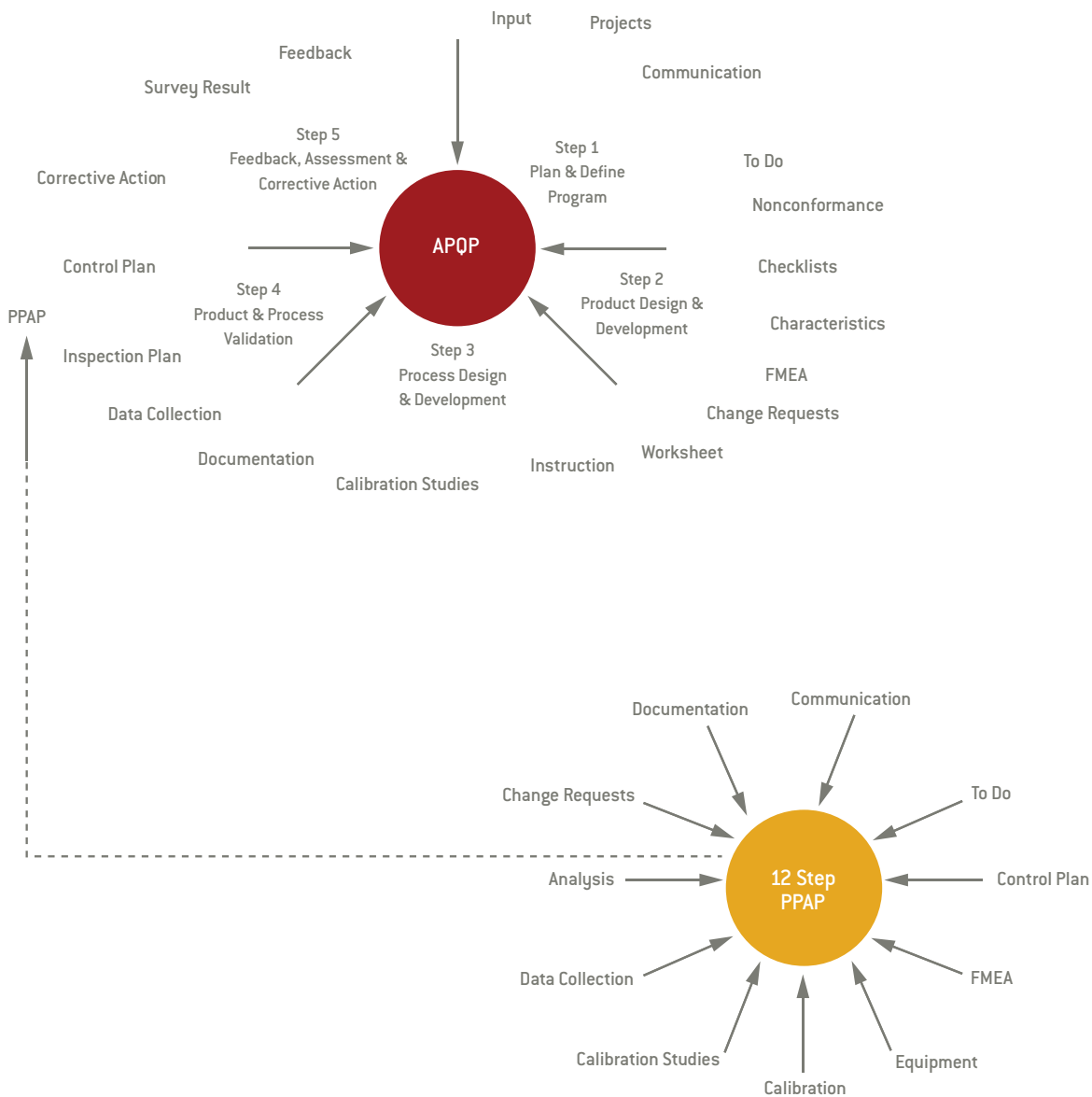


Figure 3: Time to market

Product management

Product Management is the “heart” of Infor ERP VISUAL Quality Management. Steps one through nine in Figure 4 display the major links within Product Management. This module has a multitude of minor threads that integrate product and manufacturing engineering, manufacturing, quality assurance, and supply chain management into one dynamic management tool. The nine-step process begins with an Application Programming Interface (API) link that delivers shared information from Part, Supplier, Customer, Resources, and the Bill of Materials (BOM) data of Infor ERP VISUAL.

Infor ERP VISUAL Quality Management expands the part master into a comprehensive repository for all relevant information, including supplier and customer links, audit histories and schedules, quality cost standards, and all key part characteristics or specifications. In addition, you can establish and manage teams comprised of internal, customer, and supplier personnel that Infor ERP VISUAL automatically notifies as the product changes and evolves.

Before any inspection can take place on the shop floor, Infor ERP VISUAL Quality Management provides the option to use the part master and the routing steps to build inspection plans directly from characteristics and standards established by your enterprise. Generic inspection plans can be generated from a built-in engineering workflow methodology. Infor ERP VISUAL Quality Management allows you to pre-select measurement devices, sample sizes, and tooling and equipment for the product, and embed this information in the foundational records.

Engineering change request uses the task management window, or “To Do List,” to update the change history automatically and establish new revision levels and dates. Infor ERP VISUAL Quality Management also flags related inspection and control plans and other linked records for updates.

In addition to the link and embed features included in the part master itself, Infor ERP VISUAL Quality Management’s document management module allows you to track electronic and physical documents related to your business, such as quality manual, procedures, work instructions, drawings, certificates of analysis, customer-supplied specifications, training videos, or marketing brochures.

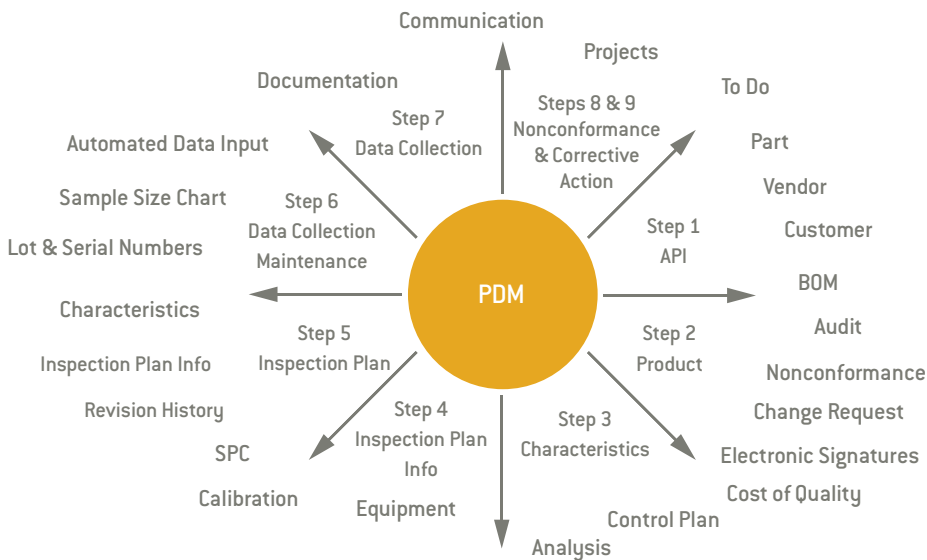


Figure 4: Product management

Due to these initial integrated steps, Infor ERP ^{VISUAL} Quality Management guides and automates your data collection and follow-up steps across the plant. Infor ERP ^{VISUAL} verifies data collection from capability studies, receiving, in-process, or final audit inspection against original standards, eliminating discrepancies, accidental deviations, or unaccounted for exceptions. Whenever a data collection step reveals out-of-specification or out-of-control conditions, the system generates a warning signal and message with integrated nonconformance (NCM) management, automatically including part and inspection details in the NCM record. If you must initiate a corrective action (CAR), Infor ERP ^{VISUAL} Quality Management automatically attaches inspection and nonconformance details and part master links. And with integrated gage, tooling and equipment, and statistical process control systems, you can ensure that processes remain in control.

Because Infor ERP ^{VISUAL} Quality Management has every inspection, nonconformance, corrective action, and engineering change record filed in the database, you can always review specific records or ranges of records for traceability, trends, root causes, and permanent corrective actions.

The integrated functionality of Infor ERP ^{VISUAL} Quality Management offers enterprises organized and effective product data management (PDM). Every new product you create will benefit from the data you've collected about:

- How to design and produce quality products,
- What processes result in less excess material,
- How to easily modify or customize the product, and
- Where to focus to prevent weak spots or potential bottlenecks on your shop floor.

Process management

Manufacturers need to survive in today's highly competitive marketplace. All managers, whether executive, line, or staff, must improve key processes to obtain an acceptable bottom-line. Every day, staff and production workers must find better ways of performing their tasks to eliminate duplication of efforts and improve productivity and quality. Process control systems address the many small, but important, variability issues that enterprises must monitor to continually improve their business and reduce costs. Figure 5 illustrates how Infor ERP^{VISUAL} Quality Management's process management allows employees in every location of the organization to develop and implement effective process controls while maintaining consistency and repeatability. This module provides integrated communication between employees, suppliers, and customers; information and action-item management; and documents. The Process Management module compares quality standards to the actual variation to help you monitor, maintain, and improve processes. Enterprises can effectively break down enormous tasks into small, simple, routinely manageable parts and in parallel, plan and reduce or eliminate excessive process variation.

Infor ERP^{VISUAL} Quality Management employs total process management for all nonpart ID number identified processes throughout the entire organization, such as accounting, purchasing, human resources, customer service and marketing in the front office; and product families or painting, plating, heat treating, and lasering on the shop floor. The eight-step sequence that is depicted in Figure 5 applies to every organization and is structured so process development and improvement proceed in parallel with the daily production activities.

Infor ERP^{VISUAL} Quality Management automates Process Management so that you can:

- Easily retrieve compliance to process worksheets for use in cause and effect studies and subsequent capability evaluations
- Quickly access feedback of process worksheet compliance
- Significantly improve product tracking and identification
- Immediately access data for further analysis and problem solving

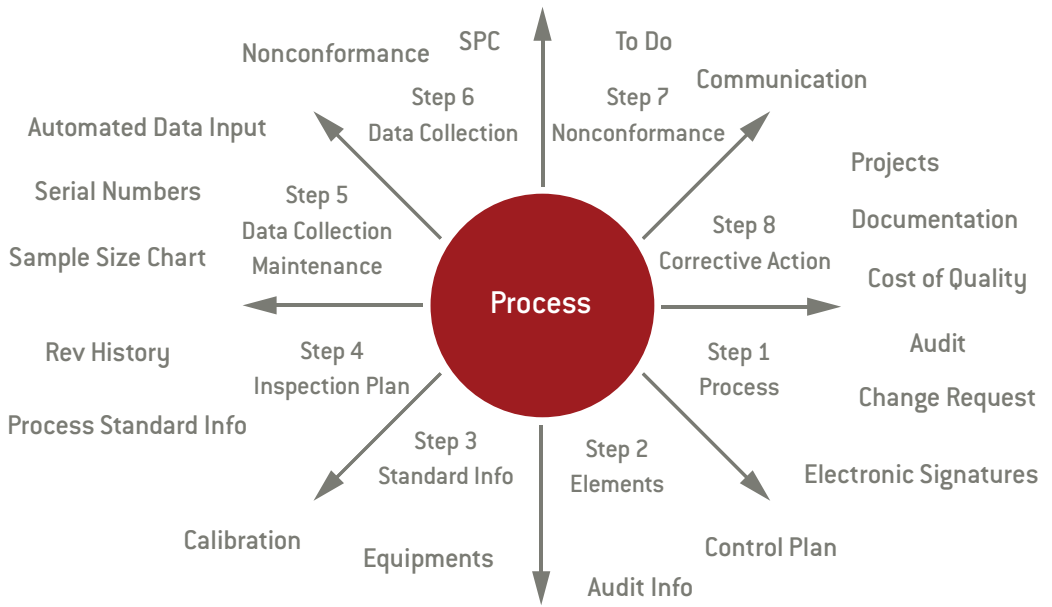


Figure 5: Process management

Helping today's manufacturers

The environment of rapid change and rising customer expectations requires enterprises to use a flexible, fast information system to help them decrease production times and increase throughput. Infor ERP^{VISUAL} Quality Management allows enterprises to maintain quality assurance requirements and continuously improve efficiency in the design and production stages, saving both time and money. Infor ERP^{VISUAL} Quality Management supports the faster pace response time required by today's customers with communication tools such as customer and supplier feedback, employee input, projects, meetings, and to do lists (Figure 6).

The integrated business process and performance management found in Infor ERP^{VISUAL} Quality Management offers companies a major structure and mindset methodology advantage. By offering real-time information across the enterprise and improving communication and decision-making, Infor ERP^{VISUAL} Quality Management helps unite the entire supply chain. This allows enterprises to effectively achieve and maintain quality standards, environmental requirements, and regulations with the primary goal of decreasing cost of goods sold to increase earnings without raising new sales, buying new equipment or hiring new people. Infor ERP^{VISUAL} Quality Management offers new technology and strategies that help empower manufacturers to rebuild ineffective, traditional organizational structures into profitable enterprises that can compete successfully in the global marketplace.

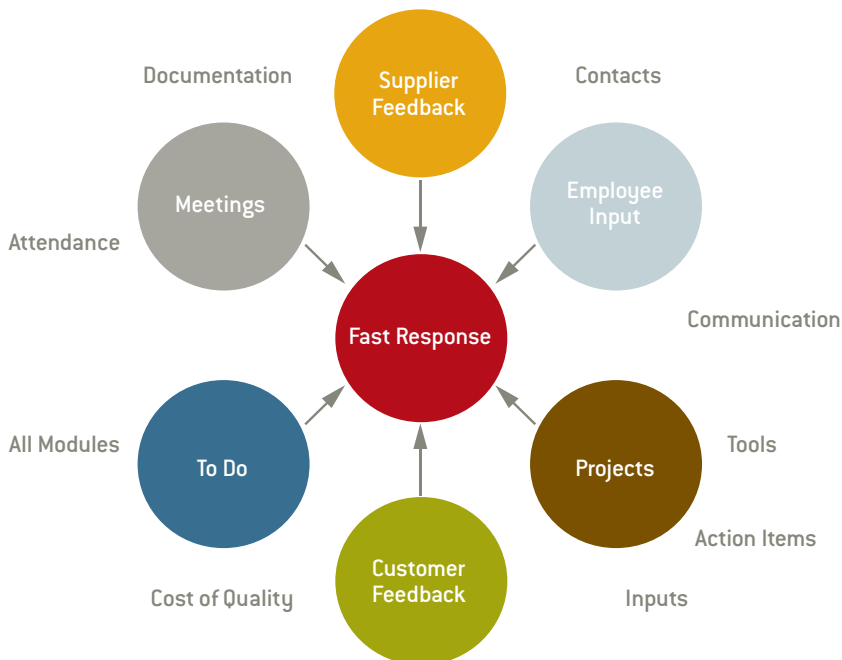


Figure 6: Fast response

Summary

Manufacturers and distributors have embraced the Lean philosophy to great benefit in improved performance, shorter lead-times, better quality, and lowered costs. The tight controls necessary for success with Lean, however, leave companies more vulnerable to supply disruptions, production problems, quality issues, and abrupt changes in demand.

All indications are that variability, chaos, uncertainty, change – however you choose to characterize it – will continue to be an increasingly challenging fact of life. It is essential that companies first understand the impact external changes have on their operations, plans, and competitiveness, and then proactively prepare themselves to thrive and grow in this new reality. Manufacturers, therefore, must be prepared to recognize impending change as early as possible, assess the potential impact, determine the optimum strategy for dealing with the change, and implement that strategy in the most effective way possible.

The key to that four-step operating philosophy can be found in broad-based, integrated information management systems like Infor ERP ^{VISUAL}. With forecasting and comprehensive measurement systems to detect change, advanced planning systems and simulation to assess the impact and formulate a response, integrated enterprise and supply chain applications and workflow to communicate through the supply chain, manage the response and monitor quality and performance, Infor ERP ^{VISUAL} gives you the visibility, tools, and capabilities to meet the challenge and succeed.

While it is important to have Lean operations, it is now also important that manufacturing operations and the supply chain are flexible and prepared to react to change. Together, this Lean, flexible, and efficient operation will allow your facility to continue to reduce operational costs, increase cash flow, increase company value, whether public or private, and most importantly, grow your business on a global basis.

About Infor

Infor delivers business-specific software to enterprising organizations. With experience built in, Infor's solutions enable businesses of all sizes to be more enterprising and adapt to the rapid changes of a global marketplace. With more than 70,000 customers, Infor is changing what businesses expect from an enterprise software provider. For additional information, visit www.infor.com.

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