



White Papers

Doreen Evans Associates, Inc.

Implementing Six Sigma for Business Process Improvement using Repository-Based Technology

A New Approach



Six Sigma for Business Process Improvement

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Background

What is Six Sigma

Six Sigma, pioneered at Motorola, helps companies achieve virtually defect-free performance in manufacturing, design, engineering, and business processes through the use of statistical and other means. The fundamental objective of Six Sigma is customer satisfaction through continuous improvement in quality.

For a business or manufacturing process, the Sigma value is a metric that indicates how well that process is performing. The higher the Sigma value, the better. When we say a process is Six Sigma, we are saying it is best-in-class. By reducing the number of defects in products and business transactions, companies achieve higher quality, lower costs, and greater customer satisfaction.

Originally, Six Sigma was only applied to “physical processes,” such as those performed in manufacturing. They were easy to observe, document, analyze and measure, because it was easy to see what exactly was being done, how long it was taking, how great the distance between steps and any delays in the work flow. Six Sigma has now been expanded to include the “knowledge processes” that are not as explicit as the physical ones. Business areas, such as Bid and Proposal, Procurement, and Contract Management among others, are now being included within the Six Sigma projects. The focus may change slightly, from strict measurements to clearly identifying waste in the form of delays and superfluous steps in the flow of work, but the goal remains the same – improvement.

Incorporating Six Sigma into A Large Electronics Manufacturing Company

Our client has committed to Six Sigma as the primary driver for transforming their culture. The approach to Six Sigma is about culture and leadership as well as about changing how to do business and to think about work. To that end, our client is analyzing every business process looking for opportunities for improvement. Their aim is to eliminate variation and waste by concentrating on adding value to the customer, understanding the “value stream” and optimizing it.

The client used the services of Doreen Evans Associates to guide and support this effort. They realized that although Six Sigma offers a wealth of tools and techniques, there was no mechanism for capturing, organizing, maintaining and querying the vast amount of information that gets collected along the way. They wanted to be able to create diagrams to model the flow of current processes as well as to document the definitions of each process step. Once the diagrams were created, they needed the ability to make modifications as new information became available, and then publish the diagrams via the Web for maximum distribution capability.

Additionally, they wanted to be able to “re-use” the knowledge that is acquired during each project and leverage off work that went before. To this end, repository-based technology, along



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with the Six Sigma process, was customized, employed, tested, enhanced, and documented in order to provide a new and improved approach to employing the principles and techniques of the Six Sigma quality initiative.

Support for Six Sigma

Here is a look at how Doreen Evans Associates (DEA) supported the implementation of the initial Six Sigma projects and developed a process for effectively and efficiently conducting future Six Sigma projects.

DEA's Approach Uses Repository-Based Technology for Modeling

Six Sigma endorses a variety of techniques to document the business operations and analyze waste and inefficiencies. It also recommends conducting facilitated work sessions to build models, raise issues, identify problems, and recommend solutions. A vast amount of information can be gathered during a Six Sigma project. The question of where and how to store this information and access it was recognized early on as a major project factor. The issue of what tool would be used for building the Six Sigma models was tantamount. A tool that would satisfy both needs was chosen.

DEA used the business modeling and analysis tool, System Architect, to support the projects and to capture information gathered during facilitated modeling and analysis sessions. This tool was chosen because of its robust modeling capabilities and repository-based technology, which supported DEA's approach of employing technology to maximize the acquisition, maintenance, communication and re-use of knowledge acquired during the Six Sigma projects.

In addition, once the Six Sigma work products, tools, techniques and deliverables were selected from the vast array provided, DEA customized System Architect to reflect the look, feel, and terminology that was familiar to the Six Sigma experts. This factor goes a long way to ensuring consistency, better communication and a shorter learning curve across projects.

The following are some of the models, tools and techniques in System Architect that were used to support the Six Sigma projects:

- ❑ Process Scope
- ❑ Work Flow
- ❑ Functional Hierarchy
- ❑ Business Data Flow
- ❑ Organization Chart
- ❑ Reality Tree
- ❑ Process Observation Form



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All of the above components were created by DEA to reflect Six Sigma techniques and deliverables. For instance the Work Flow diagram type was created based on customizing the Flow Chart diagram available “out of the box” from System Architect. The benefit of this customization is the ability to use the terminology and visual techniques that are common and familiar to the Six Sigma team, therefore fostering clear communication.

As additional Six Sigma techniques and deliverables are identified as important analytical tools for the project teams, System Architect can be further customized to meet these new requirements. The extensibility feature of this repository-based tool is only limited by the creativity of its users.

DEA’s Approach Utilizes Modeling Facilitation

In order to gather information about a particular process, a DEA modeling facilitator leads sessions of small and large groups while a second consultant acts as scribe to capture the information in System Architect. In this way, team members at all levels in the organization contribute as subject matter experts while allowing for the rapid and detailed documentation of existing processes.

Analyzing the Processes

This section takes you through the steps from identifying the high level organizational Functions to the details of the Process Steps.

Functional Hierarchy

The Functional Hierarchy diagram was used as a means of grouping processes together within functions and providing a “big picture” (context) for the Six Sigma projects as they were identified. This context is independent of the organizational structure.

The approach begins by either identifying the major functional groups (top-down) or selecting a Six Sigma project and associated process threads, and retrofitting it into the Functional Hierarchy (bottom-up). This diagram serves as a graphical Table of Contents for the more detailed process threads.

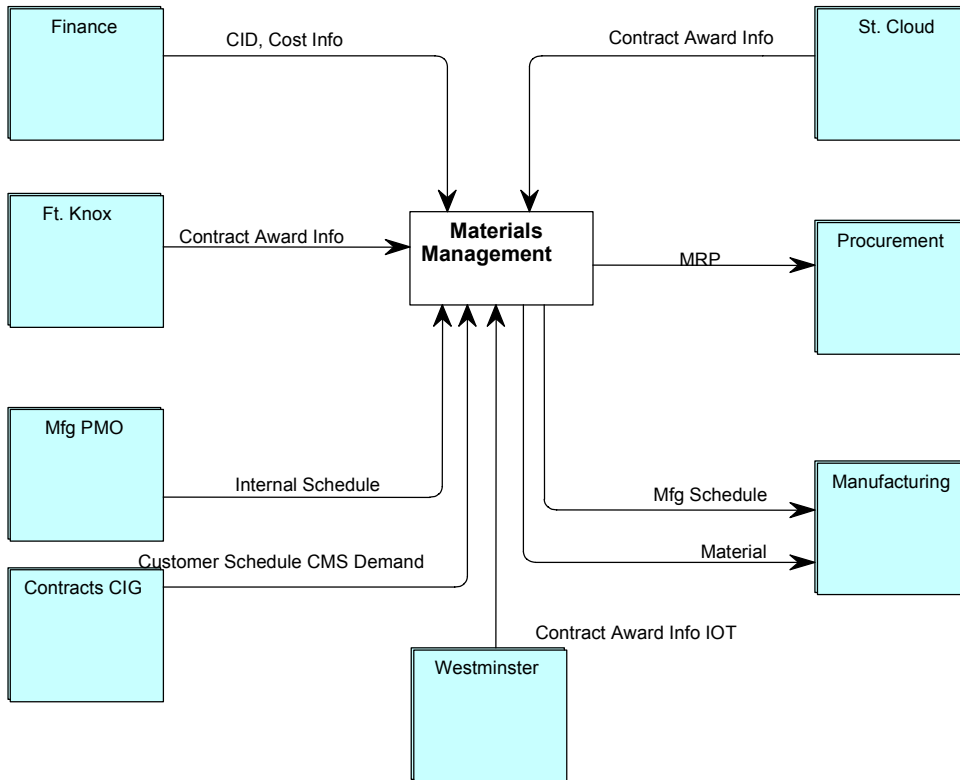


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Sample Process Scope Diagram

Materials Management



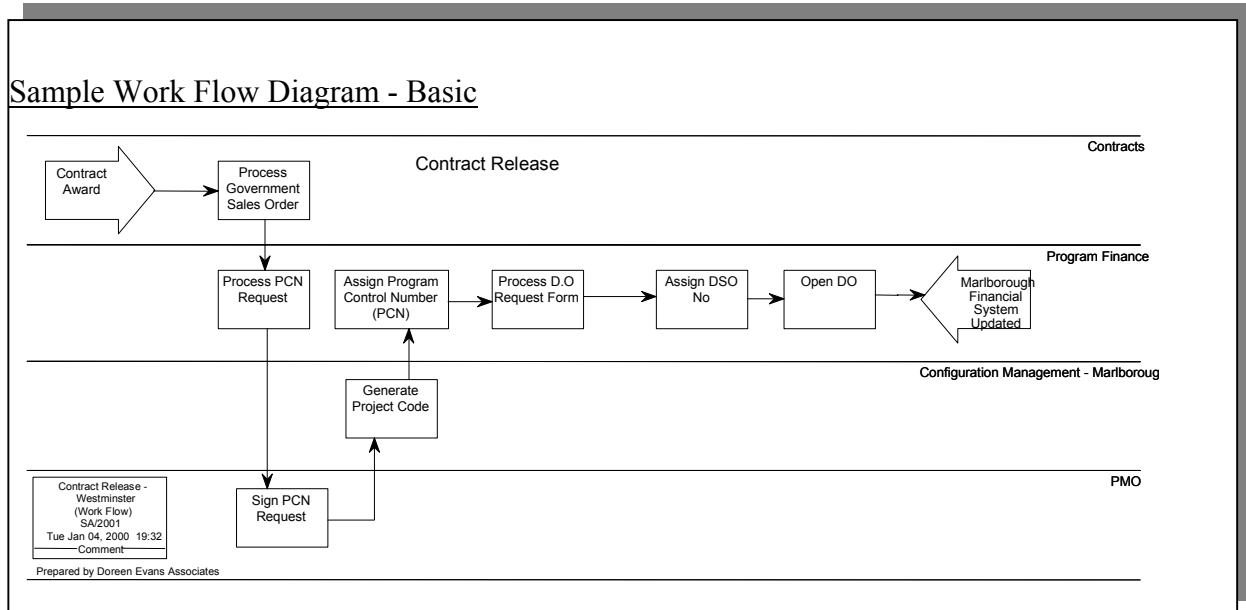
Materials Management
(Process Scope)
SA/2001
Tue Dec 07, 1999 16:57
Comment

Prepared by Doreen Evans Associates

Work Flow

From the Process Scope diagram a series of Work Flow diagrams are created to illustrate Process Steps that make up a flow of work through the Process Thread. The Work Flow diagrams also show the Organizational Units (as horizontal “Swim Lanes”) responsible for performing the processes.

Here is a simple Work Flow diagram (for readability purposes). All Work Flow diagrams begin with an Event (trigger) and end with a Result (outcome). In between are a series of Process Steps within Swim Lanes.



For the Materials Management organization, there are many Work Flow diagrams, one diagram for every process thread. All of the initial Work Flow diagrams describe the current or “As Is” processes.

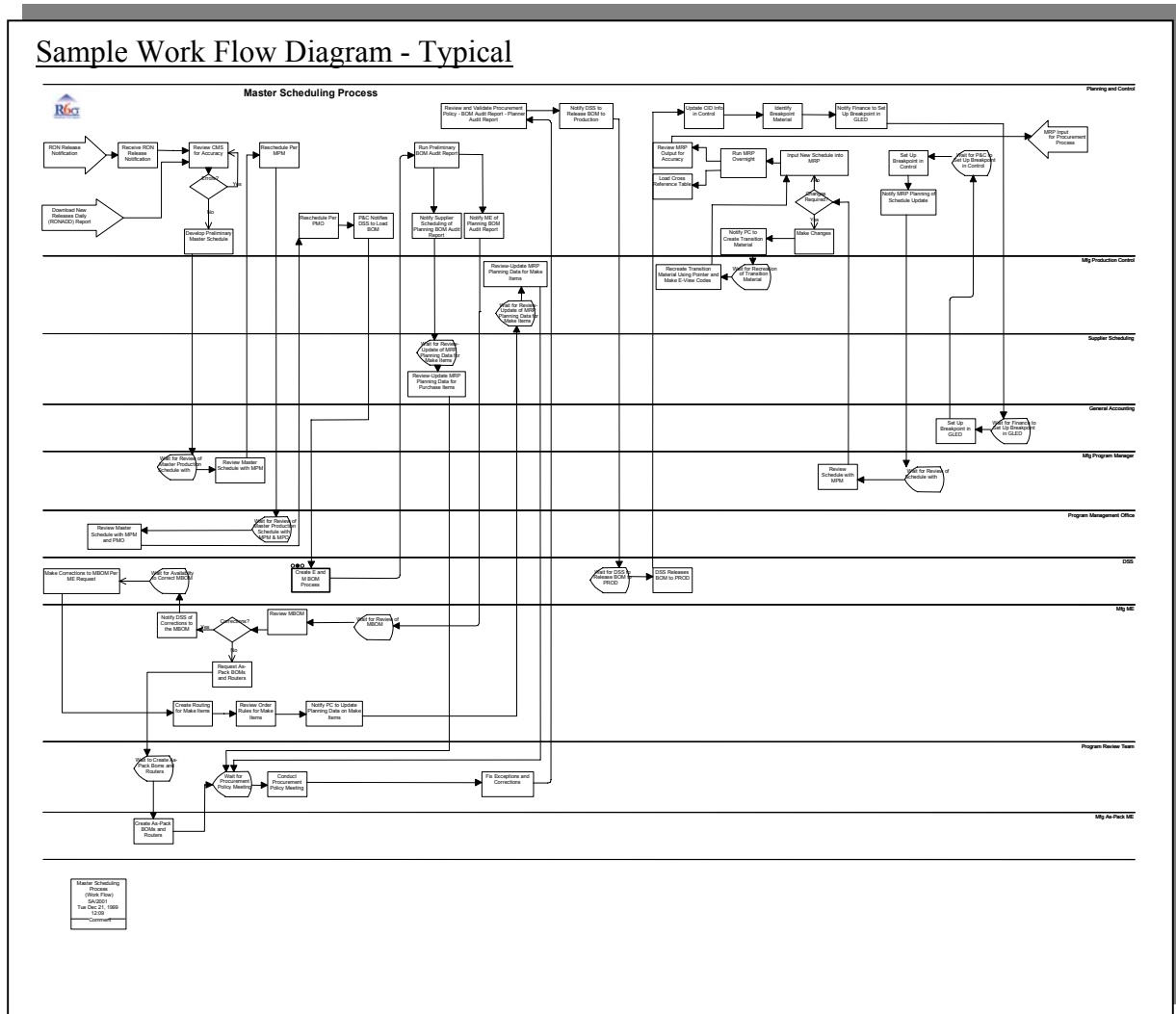
This diagramming technique helps the team members understand and appreciate how different parts of an organization need to collaborate to accomplish a process. It also highlights the inefficiencies, waste and delays.

This diagram, along with the Process Observation Form, is the primary tool for discovering waste. Waste can be seen on the diagram in several ways:

- ❑ explicit delays, shown using the Delay symbol, identify that the work flow is in a “wait” state,
- ❑ unnecessary and superfluous steps,
- ❑ extraneous flows (hand-offs) between organizations,

- ❑ correction loops,
- ❑ authorization loops and bureaucracy.

Here is a typical Work Flow diagram. It includes the same diagram components of the previous sample as well as symbols representing Decisions and Delays.



Process Observation Form

The Process Observation Form is a valuable and intrinsic component of the Six Sigma suite of tools. It is used to document the actual observations made by the Six Sigma expert or business owner as they “walk the process” and observe the flow of work. Each Process Step is described in terms of a number of things:

1. Value to the business; it can be described as value added, planned waste or pure waste



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2. How long the Process Step takes to perform
3. The batch size involved – usually “1”
4. The percentage of time that the Process Step occurs
5. Type of operation – mainly used for physical processes and not knowledge processes with the exception of “Inspection”
6. Type of waste

Once the Work Flow diagram is stable, a blank Process Observation Form is generated from the information on the Work Flow diagram into MS Excel. This form is then completed by the business owner and/or Six Sigma expert who observes the work flow and fills in the details about each Process Step. The completed information is then imported back into System Architect and the definitions of each Process Step are automatically updated and maintained.

When the completed Process Observation Form is generated from System Architect, MS Excel automatically calculates the time percentage of total, total hours per Process Step and total hour for all Process Steps.

Here is a partial view of a Process Observation Form.

Process Observation Form																		
Process: Master Scheduling Process		Tape Title:																
		Time Code Start:																
Operation			Time				Analysis of Time											
Step	Omit	Description	Tark Type Code	Time (HRz)	% of Total	Time for each step	% Occur.	Batch Size	M	A	L	UL	SU	MH	I	O	W	C
Sample Batch (500 part BOM)																		
10		Receive RON Release Notification	V	0.50	0%	0.50	100%	1	A									
20		Review CMS for Accuracy	PL	0.50	0%	0.50	100%	1	M						I			
30		Develop Preliminary Master Schedule	V	2.00	0%	2.00	100%	1	M									
40		Wait for Review of Master Production Schedule with MPM	PW	24.00	5%	24.00	100%	1	M								W	
50		Review Master Schedule with MPM	PL	1.00	0%	1.00	100%	1	M						I			
60		Reschedule Per MPM	PL	0.10	0%	2.00	5%	1	M									
70		Wait for Review of Master Production Schedule with MPM	PW	24.00	5%	24.00	100%	1	M								W	
80		Review Master Schedule with MPM and PMO	PL	1.00	0%	1.00	100%	1	M						I			
90		Reschedule Per PMO	PL	0.10	0%	2.00	5%	1	M									
100		P&C Notifies DSS to Load BOM	PL	0.50	0%	0.50	100%	1	M									
110	Y	Create E and M BOM Process	V			####	100%	1	M									
120		Run Preliminary BOM Audit Report	PL	2.00	0%	2.00	100%	1	A									
130		Notify ME of Planning BOM Audit Report	PL	0.50	0%	0.50	100%	1	M									
140		Wait for Review of MBOM	PW	24.00	5%	24.00	100%	1	M								W	
150		Review MBOM	PL	4.00	1%	4.00	100%	1	M						I			
160		Notify DSS of Corrections to the MBOM	PW	0.03	0%	0.50	5%	1	M									C

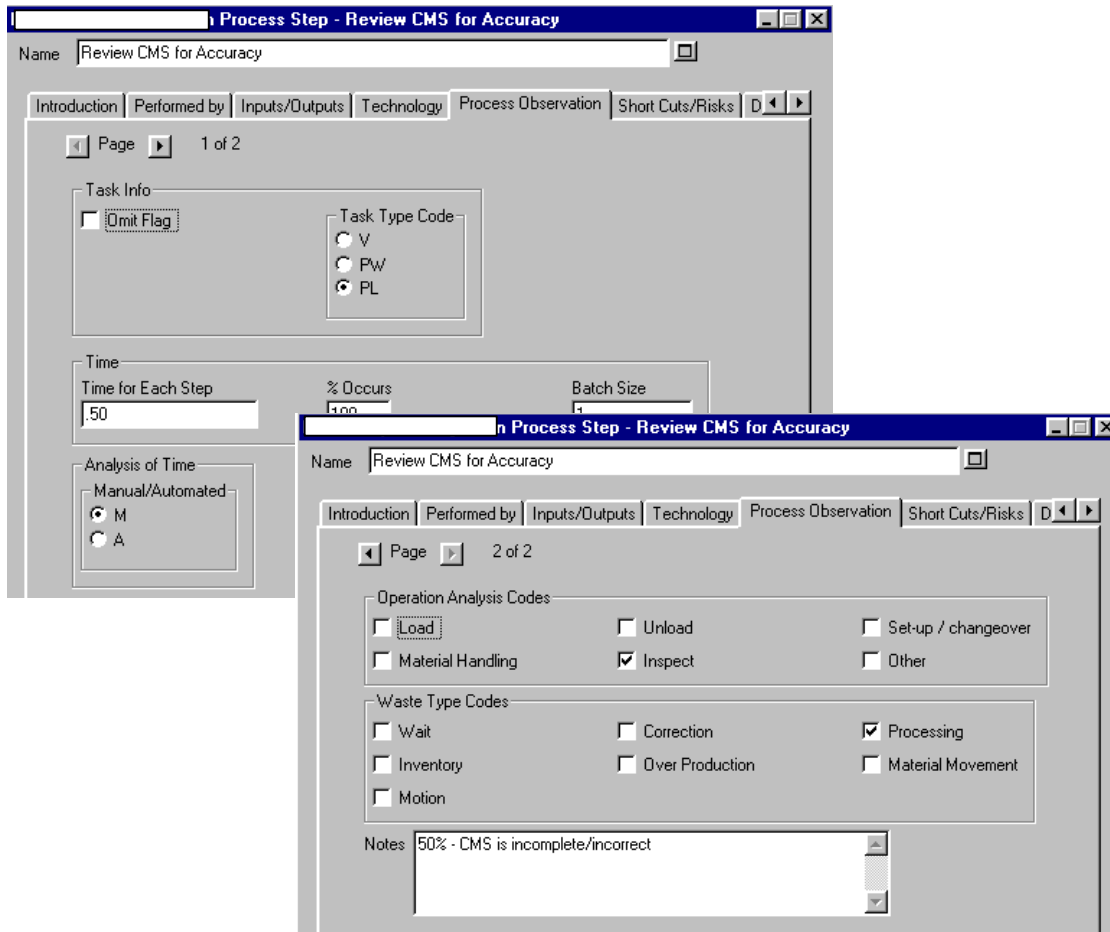
Sample Process Observation Form

Process Step Definitions

Each Process Step and Delay on the Work Flow diagram gets defined and stored in the System Architect repository. These definitions can then be retrieved for future use to:

- ❑ create a new “To Be” Work Flow diagram to model the future streamlined process,
- ❑ report on any information about the Process Steps,
- ❑ share the information within and between organizations,
- ❑ train new employees, who can review the information to become familiar with the process operation.

Sample Process Step Definition



The screenshot displays two overlapping windows from a software application, both titled "Process Step - Review CMS for Accuracy".

The top window (Page 1 of 2) shows the following fields and options:

- Name: Review CMS for Accuracy
- Navigation tabs: Introduction, Performed by, Inputs/Outputs, Technology, Process Observation, Short Cuts/Risks
- Page: 1 of 2
- Task Info:
 - Omit Flag
 - Task Type Code:
 - V
 - PW
 - PL
- Time:
 - Time for Each Step: .50
 - % Occurs: 100
 - Batch Size: 4
- Analysis of Time:
 - Manual/Automated:
 - M
 - A

The bottom window (Page 2 of 2) shows the following fields and options:

- Name: Review CMS for Accuracy
- Navigation tabs: Introduction, Performed by, Inputs/Outputs, Technology, Process Observation, Short Cuts/Risks
- Page: 2 of 2
- Operation Analysis Codes:
 - Load
 - Unload
 - Set-up / changeover
 - Material Handling
 - Inspect
 - Other
- Waste Type Codes:
 - Wait
 - Correction
 - Processing
 - Inventory
 - Over Production
 - Material Movement
 - Motion
- Notes: 50% - CMS is incomplete/incorrect



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Results

As a result of this project, a new understanding of the client's processes has been realized and key business processes have already begun to be improved.

“Through this process the company has gained a far better understanding and appreciation of the current processes and feels empowered with the knowledge to make the necessary changes,” the project sponsor says. “We have gained an insight into the current operations and are aggressively seeking out areas for fast improvement.”

With the integration of a repository – based modeling tool and Six Sigma principles and techniques, the new approach established for conducting Six Sigma business process improvement projects has demonstrated many benefits:

- greatly improves the consistency in documentation and analysis
- provides for a variety of reporting information
- fosters an iterative approach to building and refining models, thereby better ensuring more complete and correct information
- enables quicker turnaround to changes to models
- enables teams to share data across projects
- serves as a knowledge base for future projects

DEA has provided the Six Sigma team with the foundation for successfully implementing Six Sigma. As the work on the Six Sigma projects continues, the business owners are in a better position to more fully understand their processes and the interactions that exist across organizational lines. They have the necessary information to make intelligent decisions regarding the elimination of waste and the streamlining of the business for optimized customer value.

About Doreen Evans Associates

Doreen Evans Associates (DEA) is a professional services firm that focuses on business process improvement. We can help you change a process, build an enterprise architecture, or define requirements for your systems and technologies. Founded in 1992 as a woman-owned, privately-held small business, our mission is to ensure that business need drives solutions.