



Lean Thinking Applied to a Microsoft Dynamics GP Manufacturing Implementation

By Peter Kelly, B. Comm.

Manufacturing Resource Partners, LLC

Table of Contents

Introduction.....	3
Making a Microsoft Dynamics GP Manufacturing Operation Lean.....	4
Identifying the Processes.....	4
Increasing Productivity for Sales Order Entry and Shipping.....	5
Reducing the Number of Manufacturing Orders.....	9
Enhancing Stockroom Transactions.....	9
Bringing the Engineering Approval Process Inside.....	11
Streamlining Shop Floor Execution.....	12
Summary.....	13
Disclaimer.....	14

Introduction

As a consultant who has been in the industry for 22 years, I've worked with a lot of manufacturing companies that used a variety of software applications and wanted to become lean. They discovered that the way in which they had implemented their software applications impeded their ability to achieve their business objectives—especially the goal of becoming lean. The purpose of this white paper is to give those of you who are using Microsoft Dynamics GP® in your operations, or are considering using it, guidance on how to implement a lean system in your organization by considering one company's journey toward that goal.

I've assigned the company a fictitious name so I can share its story, warts and all. I don't want to give the impression that this company is worse than any other. For all companies on a lean journey, the road can have many potholes, but if you know how to avoid them, the way can be made smoother.

When it comes to writing about lean thinking I am more of a practitioner than a philosopher on the subject. However, here are a few fundamentals to keep in mind when embarking on any lean initiative.

1. Lean manufacturing is software-independent.

Many clients want to know which software is best for a lean environment. They will look for a particular feature, or even a "lean module," in the software. In my experience there is no software panacea. Lean is not about the software you use but about the processes you implement to make money manufacturing goods.

2. There are many aspects to lean thinking, but mainly it is concerned with removing waste from any business process.

Streamlining processes sometimes involves the software, and sometimes not. While the focus tends to be on manufacturing processes, lean thinking can and should be applied to all processes in your business.

3. When in doubt about what constitutes waste and what doesn't, always look at the situation from your customer's perspective.

Lean thinking asks a fundamental question: What does our business do that the customer is prepared to pay for? A value-added activity is any activity that increases the market form or function of the product or service. These are the things your customers will willingly pay for. They won't willingly pay for activities that don't add value, such as downtime due to a component being out of stock.

4. If you don't know where to begin, just start *somewhere*.

As you'll see in the following story, this company was just beginning to understand the concept of going lean, so starting with large-scale projects, such as a complete overhaul of the business, restructuring the plant floor layout, or moving to one-piece flow throughout its supply chain would not have made sense. Instead, the company started by reviewing a few key business processes, identifying obvious waste in a well-defined area, and working with its existing software applications to remove that waste. Success at this early stage has motivated the company to continue its lean efforts.

With these fundamentals in mind, let's look at one company's journey toward becoming lean.

Making a Microsoft Dynamics GP Manufacturing Operation Lean

Our example company, which I'll call Fabrikam, Inc., had implemented Microsoft Dynamics GP and had been using it in a standard way for a number of years. In implementing the system, Fabrikam had made only minor changes to its existing process flows. As a result, the company's automated system mirrored some of its poorly designed business practices. Fabrikam had even added two people to its stockroom team to handle the new inventory movement transactions it believed its (poorly designed) business processes required within Microsoft Dynamics GP. The company knew this didn't make business sense but wasn't sure how to avoid these costs until a few Fabrikam executives attended a seminar on lean thinking.

Because Fabrikam had added people presumably as a result of the Microsoft Dynamics GP implementation, the assumption was that looking in the Microsoft Dynamics GP processes for waste was a good place to start. That isn't always where the most dramatic gains can be realized, but it is an area where waste can be identified easily. I've done many implementations of Microsoft Dynamics GP manufacturing, I'm a consultant in the area of lean manufacturing, and I have 25 years of manufacturing management experience, so I was invited to review Fabrikam's system implementation for ways in which Microsoft Dynamics GP was adding to the waste in the company's operations. I knew I could help identify other areas of improvement along the way.

Remember fundamental 4 on my list: Just start *somewhere*.. I did not get involved with the traditional methods of Value Stream Mapping, Kaizen, or 5S event planning or execution generally associated with lean initiatives. But the thinking process and collaborative change-implementation style that I used was derived from years of experience leading operations-focused lean initiatives on the factory floors of various organizations.

One of Fabrikam's objectives was to refrain from acquiring any new software because the company felt it was vastly underutilizing the software it had. In my experience, a Microsoft Dynamics GP module called SmartList Builder is a valuable tool, and most of my clients use it. I showed Fabrikam how much more productive it could be with SmartLists, and, on my recommendation, Fabrikam eventually added SmartList Builder to the implementation, specifically to help some of its shop-floor navigation become lean.

Identifying the Processes

Because lean thinking is customer-centric (see fundamental 3), I started as close to the customer as possible, which meant concentrating on sales order entry and shipping. I examined those business processes and drafted a map of them very quickly using Microsoft Visio®. I then overlaid that Visio map of processes with the button clicks and screens that the people handling sales order entry and shipping/invoicing tasks used in Microsoft Dynamics GP.

With lean thinking you must be able to support your decisions to make changes to a company's processes with hard analytical data, not with hunches. This is particularly crucial if you are an outside consultant who goes on-site. Your credibility depends on the accuracy of the data on which you base your recommendations. To provide the required decision support for this first step at Fabrikam, I wrote a couple of reports that provided numerical data to help prioritize the implementation sequence. One report measured on-time delivery of sales orders. This caused quite a stir because the actual on-time percentage was hidden from the overall organization. Another report calculated the number of times an item was built in a year and allowed users

to list all items built and then sort by frequency to determine where the biggest change benefit might lie.

By starting with customer-oriented processes and mapping them out, I was able to identify several areas needing attention:

- Sales order entry and shipping
- Number of manufacturing orders required to build an item
- Stockroom transactions
- Engineering approval process
- Shop floor execution

These areas presented issues with business processes and the way software was being used to support those processes. My goal was to match applications to business processes in a way that allowed Fabrikam to meet its business objectives while using its software most effectively.

Fabrikam had organized an improvement team made up of department heads from the major operational areas (sales, production, engineering, inventory control, and accounting); these team members were in charge of implementing the changes we identified. I started by reviewing my reports with them, and got their approval to start with sales order entry and shipping.

After we had refined my initial Visio map of these processes, the improvement team consulted workers who perform the sales order entry and shipping tasks every day to confirm the accuracy of this map. My job, of course, was to suggest improvements to how the system was being used. In the process of visually mapping out business processes, most companies find a number of other areas where they can remove waste. Fabrikam was no exception.

Increasing Productivity for Sales Order Entry and Shipping

I began with the sales order entry and shipping process to start as close to the customer as possible. During my review, I discovered that the production manager wanted a list of all sales orders that were modified each day. His process for finding this information was labor-intensive and prone to errors: Each day he exported all open orders to Microsoft Office Excel®, summarized them by week, and saved the spreadsheet. The next day, he repeated this process and compared the results to the previous spreadsheet to identify changes in customer requirements. To improve this process, I wrote a business alert that automatically sent an e-mail message to the production manager with a list of all orders that had been edited the previous day (see Figure 1).

Figure 1 Business alerts can be used to send notifications when certain actions or events occur within Microsoft Dynamics GP.

Define Business Alert Formula
Specify the conditions you want this alert to check for.

Operator

=	<	>	+	-	*	Avg	Sum	Min	Between	Like
<=	>=	<>	/	()	Max	Count	And	Or	Not

Table: Column Name:

Constan:

Business Alert Formula

```
SOP10100_T1.SOPTYPE = 2 and
((SOP10100_T1.CREATDDT <> SOP10100_T1.MODIFDT)
AND (convert(char,SOP10100_T1.MODIFDT,1) = convert(char,getdate(),1)))
```

Like many companies, Fabrikam was not generating invoices for shipped orders until the next day. Invoices were being handled by the accounting department, which was very resistant to changing its process. If you have ever tried to change long-established accounting procedures, you'll understand why I chose not to focus on the process but instead addressed the real issue: The open order reports used by the whole plant to manage the operation and communicate order status to customers did not reflect real-time activity.

What I found when I examined the processes was a typical Microsoft Dynamics GP sales order processing and shipping setup that took advantage of the software's extensive functionality but incorporated several unnecessary steps both within and external to Microsoft Dynamics GP.

Within Microsoft Dynamics GP, steps that were unnecessary for this client included:

- Manual determination of individual line-item pricing.
- The transfer of back-ordered line items or partial line items to a new back order document.
- Separate fulfillment.
- Inventory allocation by line item on the sales order.
- Delay of invoicing the shipped orders until the next day.

External to Microsoft Dynamics GP, the organization had developed an elaborate printing process by which the Sales Order Entry (SOE) department informed three other departments that a new order had been entered so those departments could perform their necessary tasks:

- Engineering reviewed the printed sales order to create an “Approval to Proceed” document required by the particular regulatory body for their industry.
- Production used the printed sales order to begin preparing the multiple manufacturing orders (MOs) required to build the product.
- Shipping used the printed sales order to organize its kitting and shipment-preparation efforts.
- SOE itself filed the printed sales order in a manila folder with the customer’s faxed purchase order.

Table 1 is a summary of the setup issues and changes already in place or that Fabrikam is considering.

Table 1 How Fabrikam changed its Microsoft Dynamics GP processes

Process as Initially Set Up	Changes to Process	Observations	Considerations
Manual determination of individual line-item pricing	None yet		Consider the implementation of the Extended Pricing feature in Great Plains to automate this process.
Transfer of back ordered line items or partial line items to a new back order document	Turned off back order process	Simplified process by transferring orders directly to invoices without a back order process at all.	Transferring sales orders to back orders and then to invoices was an unnecessary step for this client. Order visibility was in fact reduced by this process.
Separate fulfillment	Eliminated		There was no value added by this activity that I could determine.
Inventory allocation by line item on the sales order (SO)	Turned off inventory allocation process		Allocating inventory by line item was causing a lot of duplicate order entry because the allocated inventory was required to be reallocated fairly frequently to orders of a higher priority.

Make to Order (MTO)	Turned off	MTO is a nice concept, but I have yet to find a manufacturing operation that likes MTOs to be generated by the Sales Order Entry (SOE) department, except in configured items.	Most of the sales inventory items were set up with an MTO fulfillment method. The organization had changed its mind about this functionality and no longer allowed SOE to generate the MTO, but the unnecessary screen was still popping up on each line item entered.
Engineering / Production printout	Eliminated Turned on SQL Mail, created an e-mail group of all recipients	Now SOE department sends the sales order as a PDF attachment in e-mail to all recipients at once from within Great Plains SOE.	Sales continues to require hard-copy printouts for security purposes. This will be reconsidered in the next Kaizen iteration.
Shipping printout	Eliminated	SOE department put orders into batches identified by ship date.	With Version 8 of Great Plains, the printing of packing lists for shipping in a particular batch is incremental. This was a great little enhancement.
Notice of edited sales orders sent to production manager	Eliminated the old multistep process completely	Wrote a business alert that runs nightly and provides a complete list of edited sales orders by e-mail.	
Transferring sales orders to invoices was delayed until the day following actual shipment.		Moved the transferring of a sales order from accounting to shipping.	Now the invoice creation date reflects the actual ship date, and accounting can still edit the invoice before posting.

These changes took three or four days to implement and had an immediate and noticeable positive impact on the productivity of the Sales Order Entry department. The changes also produced improved information delivery and visibility across the organization. The increase in productivity eventually produced a 25-percent reduction in payroll costs in this department.

Reducing the Number of Manufacturing Orders

After I had worked through the order entry and shipping process, I looked at other business processes, approaching each one from a customer-centric point of view.. Remember, for all processes, you need to start by asking, “What is the customer willing to pay for?”

I decided to move to the items and component parts that get sold most frequently. During this review, I identified a part that had a nine-level bill of materials. Starting from scratch, with no component inventory on the shelf, this item required the completion of 12 manufacturing orders. One key tenet of lean is to simplify processes by flattening the bill of materials as much as possible. I put 8 to 12 hours of thinking into the problem of how to flatten the company’s bill of materials, and held conversations with the engineering and production departments—both offering valuable input.

The initial structure of this particular part of the process was in keeping with the guidelines of good engineering practice (for example, if an item’s form, fit, or function changes, it should be assigned a new part number). The product structure was an exact mirror of the build process for a product, which provided great clarity when examining a bill of materials. But the transaction burden on the organization (involving the stockroom, the production department, and the accounting department) was considerable.

I reviewed the product in detail to determine the points in the transformation process where the customer might like us to stock an individual component as a spare part and was able to flatten this bill from nine levels to two. I used routing in Microsoft Dynamics GP to define the transformation process. This approach not only flattened the bill, but it also reduced the number of required manufacturing orders from 12 to 4. I could have achieved similar flattening results using phantom items in Microsoft Dynamics GP, but routing allowed me to use outsourcing functionality, which has the advantage of auto-creating the associated purchase orders for outsourced activities.

Enhancing Stockroom Transactions

Having had success reducing the number of manufacturing orders, I turned to the stockroom, where I found a number of excellent opportunities to go lean, as shown in Table 2.

Table 2 Lean opportunities in the stockroom

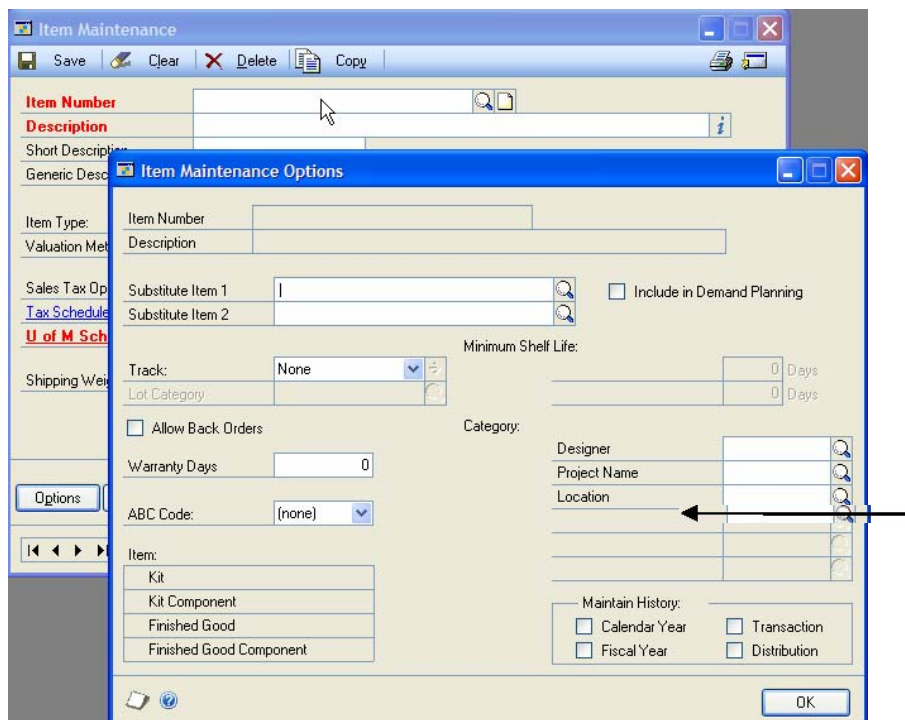
Issue	Number of Items	Resolution
Negative Inventory On Hand	72	Change Microsoft Dynamics GP to not allow Negative Inventory
Negative Bin Quantities	570	Clean up and turn off Multiple Bins

Negative inventory on hand presents a Microsoft Dynamics GP setup issue that I run into often—and it’s a huge time-waster for everyone involved. Negative inventory on hand balances may cause an organization to over-spend on inventory due to the netting affect of the negative quantities. For example, warehouse A has 15 items and warehouse B has -10 items. But an initial glance at the Item Maintenance Options window in Microsoft Dynamics GP shows a net of 5 items. During stock takes, negative inventory on hand leads to undervalued inventory in the general ledger. How inventory goes into negative numbers must be investigated during the correction process, and this can be another time-waster.

Next, I reviewed the need for multiple bins functionality in the warehouse. Stockroom personnel wanted a record of an item’s bin location but didn’t need to track the quantity in each location. To address this requirement, I added location as a user category in the item master in Microsoft Dynamics GP and modified the picking report to include the location from that data field. These changes saved stockroom personnel from having to manage multiple bins within Microsoft Dynamics GP and its associated inventory transactions.

We decided to store bin location in the Item Maintenance Options window as shown in Figure 2.

Figure 2 Bin Location is now stored in the Item Maintenance Options window.



I still needed to address maintaining location visibility for the stockroom personnel. This required some additional item maintenance to handle occasions when an item gets moved to a new location or when an item ends up in more than one location. I

calculated the item maintenance effort based on a quick analysis of put-away activity over a five-day period, and then I compared that to the time savings per issue and per receipt transaction for the same period.

I came to the conclusion that turning off multiple bins would be a justifiable change. I had to convince the stockroom manager, who, like most manufacturing folks, distrusted my calculations. But with a little bit of perseverance, I got approval for the improvement, and we turned off multiple bins functionality. The result was a significant reduction in the number of screens and button clicks stockroom personnel had to go through to complete their daily tasks.

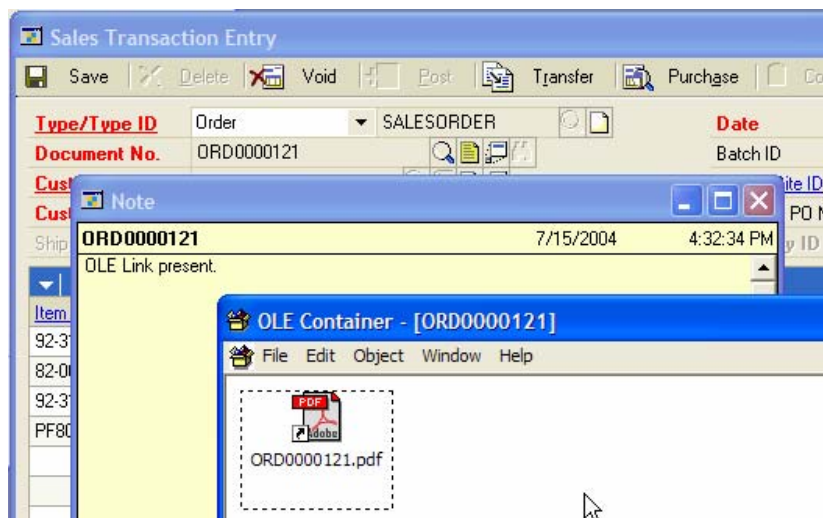
Bringing the Engineering Approval Process Inside

During the review of the sales order entry and shipping process described earlier, I came across an engineering approval process that was taking place outside the Microsoft Dynamics GP system. This external process produced a lot of duplicate data entry and record filing.

Each sales order required a technical review, an ink stamp, and an engineer's signature. I immediately saw the opportunity to use object linking and embedding (OLE) of documents to bring this external process into the Microsoft Dynamics GP system, thereby removing steps and shortening the overall process.

Earlier, I had turned on SQL Mail in Microsoft SQL Server™ and attached the sales order in PDF format (the client already owned Adobe® Acrobat® PDF Writer for Windows) to the e-mail message. Seeing the document in PDF form ignited the imagination of the engineer who approved these documents, and he found a way to apply an electronic approval stamp to Adobe files, with date, time, and user ID dynamically embedded in the stamp (see Figure 3).

Figure 3 A PDF copy of a sales order is attached to that order itself using OLE.



This surge of creative thinking and enterprising action by team members in a lean initiative is very common and is exactly what you hope for. People's spontaneous contributions can generate a number of significant ideas that the team can evaluate and adopt. All you have to watch out for is the team getting distracted by ideas that have very little return.

Streamlining Shop Floor Execution

As a result of the process improvements I had introduced so far—especially the business alert on edited orders that I had created—I had established credibility with the client. Spending time with the production manager, I found another area with duplicate data entry activity and processes running external to Microsoft Dynamics GP.

At this point I suggested that Fabrikam acquire SmartList Builder. There are other similar products on the market, but the GoTo functionality in the Microsoft Dynamics GP product makes code-writing skills unnecessary.

This factory had a simple, magnetic scheduling board that was updated daily by the shop foreman. He walked around the plant recording all the manufacturing orders at each machine. Then, he returned to his scheduling board and represented each machine's workload by moving magnetic blocks—each labeled with its Microsoft Dynamics GP manufacturing order number—to appropriate spots on the board.

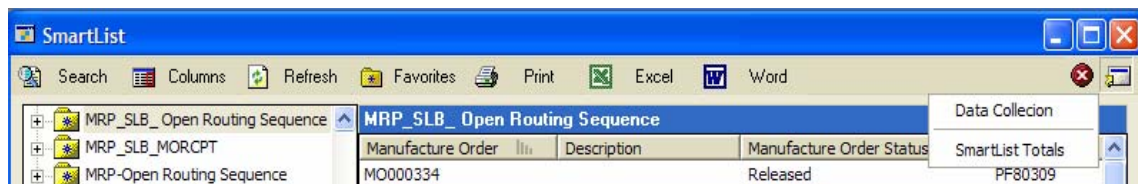
Next, he opened an Excel spreadsheet that basically duplicated his scheduling board, and updated it by entering the new data. Every day he sent this spreadsheet by e-mail to a number of people. As with all manually updated spreadsheets, this one was accurate once a day, if you were lucky.

The routings for most manufacturing orders (MOs) were extremely simple and did not reflect the jobs' machine-to-machine movements through the plant. And, the company wasn't interested in doing any real-time labor-data collection. I knew that if I could convince the organization to use data collection to report on an MO location, I could generate a SmartList export to Excel that could be used to update the scheduling board—and this would eliminate the manual entry of data into the spreadsheet. To be successful, however, I had to streamline the button clicks required to perform data collection.

From past experience using SmartList Builder, I knew I could use it to write a GoTo against a SmartList that would get us to the data collection window in a single click, as well as populate all the necessary data fields in that window. I could also write this GoTo on-site without having to engage a system developer. There would be a tradeoff in button clicks: those necessary in data collection per MO versus those required to update the spreadsheet daily.

I modified a single routing to show the movement across the primary machines, ensured that the WIP Preference Defaults were set to "mark outsourced sequence as done when service is received," and wrote a SmartList that creates a list of all MOs with a routing sequence not marked as done (see Figure 4).

Figure 4 This SmartList shows manufacturing orders with a routing sequence that has not been marked Done.



With the help of Don Kapuscinski, one of my partners at Manufacturing Resource Partners, I also wrote an SmartList GoTo that takes us from the routing sequence on my SmartList directly to the data collection window and preloads the date and time data. Remember, the client was not interested in collecting actual labor data on jobs. So all I had to do in the data collection window was mark the sequence used to

update the system (see Figure 5). Now Fabrikam can track the movement of MOs across machines and through work centers without the shop supervisor having to prepare that manual Excel spreadsheet every day.

Figure 5 This is the WIP Data Collection window, prepopulated, that the SmartList GoTo takes you to.

MO Number	MO000334	<input type="checkbox"/> Done
PF80309	Assy, StarLite GPS Engine	
Routing Name	MAKE	Job Number
Sequence	10	<input type="checkbox"/> Done
Work Center ID	ASSEMBLY	
Data Collection Type	Direct Labor	
Employee ID	1	<input type="checkbox"/> Setup
Labor Code	LABOR- SL	Production Rate- SL
Start Date/Time	7/15/2004	5:35:02 PM
Finish Date/Time	7/15/2004	5:35:02 PM
		Elapsed Time
Pieces Completed	0	HR: MM: SS
Pieces Rejected	0	

Anyone who has experience with data collection (without bar coding) will see immediately that this little bit of work with SmartList Builder accomplishes a significant streamlining of the navigation and data entry process.

Summary

The first step in engaging a company in a lean initiative is applying pure brainpower to the situation. After that, it's a matter of taking measured steps to achieve your lean goals. In the Fabrikam example, rather than implementing a complete overhaul of the business, I recommended we start by reviewing key business processes, identifying areas of waste, and removing that waste using existing software applications.

Prior to my involvement with Fabrikam, the company had added two people to its stockroom payroll to handle the additional workload it believed was the result of its Microsoft Dynamics GP ERP implementation. In reviewing the company's business processes with an eye toward going lean, I identified business processes that were causing an inordinate amount of work within Microsoft Dynamics GP.

Wanting to start as close to the customer as possible, I took a look at the sales order entry and shipping process, creating a business alert that not only improved productivity but also reduced payroll costs. I then examined the number of manufacturing orders the company was generating for its products, reducing that number from 12 to 4. Through SQL Mail, OLE, and Adobe PDF attachments, I was able to integrate the engineering approval process, which had been taking place outside the Microsoft Dynamics GP system. Next, I helped simplify stockroom transactions by adding a location category to Microsoft Dynamics GP and turning off multiple bins functionality. Finally, I streamlined shop floor execution using SmartList Builder to automate previously manual tasks.

Through the application of lean thinking, I helped Fabrikam achieve considerable success in streamlining its business processes and generating productivity improvements. This experience has inspired the company to continue on its own in the journey toward lean.

Disclaimer

© 2005 Microsoft Corporation. All rights reserved. Microsoft Dynamics GP, and Visio are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. The names of actual companies and products mentioned herein may be the trademarks of their respective owners.

All other trademarks are property of their respective owners.

The information contained in this document represents the current view of Microsoft Corporation on the issues discussed as of the date of publication. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented after the date of publication.

This White Paper is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS DOCUMENT.

Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of Microsoft Corporation.

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

Unless otherwise noted, the example companies, organizations, products, domain names, e-mail addresses, logos, people, places, and events depicted herein are fictitious, and no association with any real company, organization, product, domain name, e-mail address, logo, person, place, or event is intended or should be inferred.