Lean and Six Sigma
Example: Project Report

Project Name:
Project Leader:
Project Champion:

D*efine*
M*easure*
A*nalyze*
I*mprove*
C*ontrol*

Project Problem and Goal Statement

Problem Statement:
Lower than expected billability, also described as Excessive Bench Capacity, results in chargeability variances and negatively impacts services margins by approximately $100,000,000 per year.

Goal Statement:
Improve billability from current 60% to 70% while maintaining planned fee adjustment. Corrective action plan will be prepared by June 200X, implemented by July 200X. Benefits will be evaluated 6 and 12 months following implementation.

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Operational Definitions of Key Terms

AR: Accounts Receivable
Accounts Receivable: Monies owed to us by a customer for goods and services provided.
AP: Accounts Payable
AR Representative: Employee responsible for tracking monies owed to us by a customer.
Accounts Payable: Monies owed by us to a vendor or supplier for goods and services received.
Backorder: Product or service that was ordered by a customer but not delivered due to out of stock situations.
Check: Any form of payment from a customer to us.
DSO: Days sales outstanding. (Ending AR for Period * Days in Period) / Sales for Period
Progress Bill: A temporary billing file that "holds" the invoice until all tasks have been completed.
Retainage: Monies that are owed to us and retained by the customer to ensure specific performance of the contract and warranty claims are completed.
SOP: Standard Operating Procedure.
Waiver: A legal document releasing our ownership of the products and services sold.

Expected Results – Business Case

Relevant Metrics: *(Usually these are associated with quality-effectiveness, efficiency, time or cost.) Some common metrics are:*

Response Time (minutes, hours, days …) Cycle Time (minutes, hours, days …)
Downtime (minutes, hours, days …)
Correctness (of information or data) or Error Rate (%)
Billability (%)
Efficiency (%)
Document Error Rate (%) Defect rate (%)
Availability (of systems) (%, Mean Time Between Failure, Mean Time to Repair)
Cost of Poor Quality ($)
Rework ($) Repair ($)
Warranty ($) Expedite ($)

Improvement Targets:

50% reduction in cycle time
Increase System Availability from 88% to 98%

Operational/Strategic Impact:
$60,000,000 improvement to bottom line (this would seem to be a large undertaking)

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Expected Results – Business Case

Operational and Strategic Impact:

Hard Benefits: $145k or 1.82 FTE can be delivered in AMP from improved customer contact data. Wasted labor time spent in AMP on finding correct contact data for problem resolution estimated to be 5 min/defect on approx 1656 defects per month or $100k per annum. Wastage of labor in the customer satisfaction survey of 3 mins per defect or $24k per annum. Reduced wastage in billing disputes (125/month @ 15 mins each) or $20k per annum

Soft Benefits:
Improve customer satisfaction from less wrong contacts. Improved service performance through less time loss in tickets including wait time.

Business Case - COPQ calculation

Group	# of pers.	Time/ Year	# ECO/	Rat		Time/ ECO
D				$77.08	$1127	14.6 hrs
Config.	6.9	12083.6 hrs	1066	$65.82	$746.10	11.3 hrs
ECC	8	2558.4 hrs	1066	Avg:	$315.09	0.3 hr

Cost: $2,088 / ECO

Total ECO Cost $2,226,006

Roles and Team Membership

Project Champion or Sponsor:

Project Team Leader or Black Belt:

Project Team Members:

Ad Hoc Members or SMEs:

Project Plan

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High Level Process Map (SIPOC)

Supplier	Input	Process	Output	Customer	CTQ Critical to Quality
• Customer	• Order from Customer	•Place Order	• Order Acknowledge	• Billing Department	• Correct Order / OTC
• Billing Department	• JDE System	•Send out Invoice	• Invoice	• Customer	• Billing Matches PO or contract pricing
• Customer	• Customer AP Department	•Process PO for Payment	• Check	• AR Department	• PO matches Invoice
• Accounts Receivable Dept.	• Payment	•Apply Payment to Invoice	• AR Report	• Management	• Payment matches Invoice

Define

Measure

Analyze

Improve

Control

Project Y (or Ys) in Y = f (x)

Y1 = Percent of 24-hour orders processed by end of business next day.

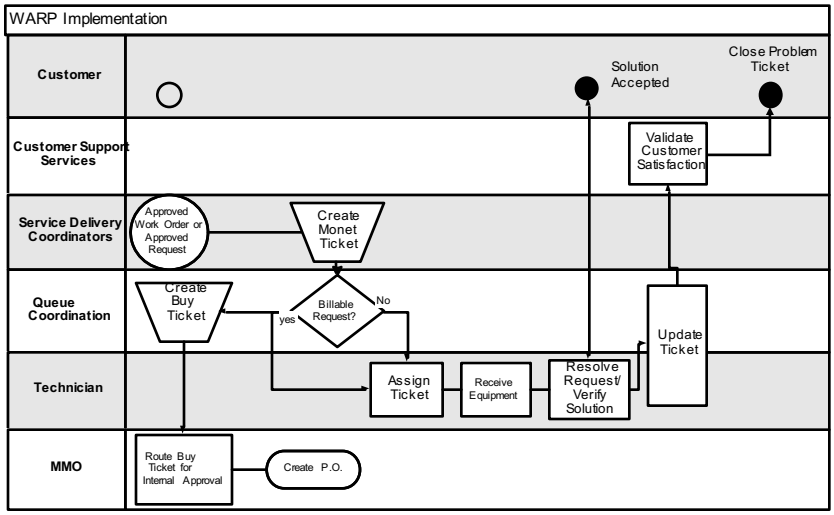
Y2 = Percent of 48-hour orders processed by end of business second day

Detailed Process Map

Process Decomposition Using

Swim Lane Business Modelling

Detailed Process Map



Process FMEA

OBSERVATION:

Controls not in place for many processes

PROCESS FMEA
(Potential Failure Modes and Effects Analysis)

Item Name:		FMEA Team:	Prepared by:
Accounts Receivable			FMEA Date (Orig): May 30, 2004 (Rev.): 11/15/2004

Process Step	Key Process Input	Potential Failure Mode	Potential Failure Effects	SEV	Potential Causes	OCC	Current Process Controls	DET	RPN	Actions Recommended
What is the process step?	What are the Key Process Inputs? (KPIV's)	In what ways can Key Inputs go wrong? (Process fail to meet requirements)	What is the impact on the Key Output Variables (customer requirements) or internal requirements?	How Severe is effect to the customer?	What causes the Key Input to go wrong? (How could the failure mode occur?)	How frequent is cause likely to Occur?	What are the existing controls that either prevent the failure mode from occurring or detect it should it occur?	How probable is Detection of cause?	Risk Priority # to rank order concerns	What are the actions for reducing the Occurrence of the cause, or improving Detection? Should have actions on high RPN's or Severity of 9 or 10.
CFS rep. will monitor accounts at least weekly to determine risk and appropriate course of action if needed.	SOP for the CFS rep., reporting plan and follow-up by supervision.	CFS rep. does not monitor accounts on a timely basis, no SOP in place to set time frames for notification.	Money is not collected on a timely basis, effecting cash flow and profitability.	8	Lack of training, performance expectations not set, no regular reporting system and lack of follow-up by supervision.	8	Data warehouse account receivables reports. These are not generated automatically but need to be requested by user. Weekly conference call with sales to discuss top ten delinquent accounts.	8	512	
All invoices are deemed past due after 30 days, even when different terms are specified in the contract	SOP for the CFS rep., reporting plan and follow-up by supervision.	Customers are contacted even when not past due according to contract terms	Customer satisfaction is lowered. Unnecessary time and effort by CFS rep. is spent following up on amounts not past due.	8	This policy has not been reviewed on a regular basis to update to reflect the current customer base	8	None	8	512	
No difference in the current process for channels of distribution or project type to reflect different contract terms	SOP for the CFS rep., reporting plan and follow-up by supervision.	Contract terms vary to type of project and customer.	Customer satisfaction is lowered. Unnecessary time and effort by CFS rep. is spent following up on amounts not past due.	8	This policy has not been reviewed on a regular basis to update to reflect the current customer base	8	None	7	448	
Entering PO dollar information accurately.	Accurate Invoices	Incorrect invoice entered into system.	Customer will not pay inaccurate invoices on a timely basis.	8	Lack of training, performance expectations not set, no regular reporting system and lack of follow-up by supervision.	8	None	8	512	
Frequency of customer contact	SOP for the CFS rep., reporting plan and follow-up by supervision.	No current standard work or SOP to specify standards for frequency of customer contact	Money is not collected on a timely basis, effecting cash flow and profitability.	8	Lack of training, performance expectations not set, no regular reporting system and lack of follow-up by supervision.	8	No regular reporting and follow-up system established.	9	576	

Plan for Data Collection (Measure Phase)

- How many customers not on current pricing?
- How much revenue have we missed due to not being on current price?
- How many customer back charges (credits) have we incurred?
- What is the cost of those back charges?
- Do we have back charge reasons in a database?
- What impact does poor execution of the contract have on Account Receivables?

Measure	Definition	Who	Where	Quantity
No. of customers not on current pricing	Customers that are not on current contractual pricing.	Smith	Pricing Tracker Database	All current customers
$ revenue shorfall due to not on current pricing	Estimated revenue that was lost due to not passing a price increase to the customer after contract expiration.	Smith	Pricing Tracker Database	Year to date
No. of back charges	What is the year to date number of back charges we incurred.	Smith	Data Warehouse	Year to date
Back charge cost	Total Charges that the customer billed us back plus the transactional costs of $100 per document	Smith	Data Warehouse	All the back charges, year to date
Credit requests (backcharge reason codes)	A categorization of the errors which are easily accessed in a database.	Jones	Credit Requests	All the back charges, year to date
Account Receivables	Has the poor execution of a contract created elevated account receivables	Jones	A/R Reports	Negligible

Data Collection Plan – Measure

Data Collection Plan

Data Collection Objective:
"To collect data to identify areas to analyze (purpose, goal or expected outcome) for the WROC Availability Processes (process or product)."

	What to Measure				Develop Operational Definitions and How to Measure							
					Operational Definition		Sampling Plan				Collection	
Ref #	Measure Name	Type Measure	Data Type	Stratification	What	How	What	Where	When	How Many	Collection Method	Who collects
1	FMEA - 7	Likert Scale (1-5)	Categorical	By Team	Knowledge of what the WROC minimum and expected SLA values	Survey	Email/Web	WROC	Twice for Project (baseline and post-implementation) and as needed afterwards	All WROC staff affecting availability (Operations, Admins, CF, Data Mgmt, WROC Manager, DBA)	Email	
2	FMEA - 8	Likert Scale (1-5)	Categorical	By Team	Knowledge of where performance to the SLA specifications is at any time	Survey	Email/Web	WROC	Twice for Project (baseline and post-implementation) and as needed afterwards	All WROC staff affecting availability (Operations, Admins, CF, Data Mgmt, WROC Manager, DBA)	Email	
3	FMEA - 9	Likert Scale (1-5)	Categorical	By Team	Knowledge of when to use additional time without impact to SLA values	Survey	Email/Web	WROC	Twice for Project (baseline and post-implementation) and as needed afterwards	All WROC staff affecting availability (Operations, Admins, CF, Data Mgmt, WROC Manager, DBA)	Email	
4	FMEA - 11	Minutes	Continuous	By Month for Planned and Unplanned	Knowledge of months that exceeded allowable minutes that could have been shifted to next month to avoid penalties	Population for last month	Original downtime data	Official SLA Performance Data	For past 12 months	Last 12 months results of total minutes of outage	Spreadsheet of previous 12 month data compared with shifting of minutes to next month	
5	FMEA - 30	Minutes	Continuous	By OS, Planned, Unplanned Data Source	How many minutes of the last month's outage was caused by configuration issues	Get the Sysadmins to answer that question	Sysadmin investigation	Sysadmins	For past 30 days	Full poulation of outages	Spreadsheet - Sysadmins will investigate and report minutes. Then compare.	
6	FMEA - 23	Minutes	Continuous	By OS, Planned, Unplanned Data Source	How many minutes of the last month's outage was caused by inherited architecture with single points of failure causing multiple outages	Get the Sysadmins to answer that question	Sysadmin investigation	Sysadmins	For past 30 days	Full poulation of outages	Spreadsheet - Sysadmins will investigate and report minutes. Then compare.	
7	FMEA - 16	Count	Categorical	By OS, by location	How many servers on the validated critical server list match the DW for classification	Manual comparison	DW vs. Critical server list - classifications (test/def. location, etc.)	employee Smith	ASAP, for whole Critical server list - WROC servers	100% of critical server list	Comparison done by employee Smith	

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Validate Measurement System

Validate Measurement System

- Tested 5 contractor payroll sheets with a mix of errors or none
- 3 Field Service Reps reviewed sheets
- FSRs graded for error and type
- Compared FSRs to themselves for repeatability
- Compared FSR to Expert (Manager) for accuracy

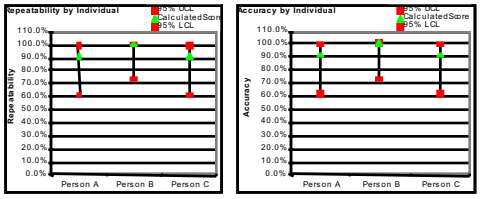
Validate Measurement System

Statistical Report - Discrete Data Analysis Method

DATE: 27/02/2004
NAME: Help desk
PRODUCT: defective contacts
BUSINESS help desk

Source	Repeatability			Accuracy		
	Person A	Person B	Person C	Person A	Person B	Person C
Total Docs Inspected	12	12	12	12	12	12
# Matched	11	12	11	11	12	11
False Positives				0	0	0
False Negatives				0	0	0
Mixed				1	0	1
95% UCL	99.8%	100.0%	99.8%	99.8%	100.0%	99.8%
Calculated Score	**91.7%**	**100.0%**	**91.7%**	**91.7%**	**100.0%**	**91.7%**
95% LCL	61.5%	73.5%	61.5%	61.5%	73.5%	61.5%

	Overall Repeat. and Reprod.	Overall Repeat. Reprod. & Accuracy
Total Inspected	12	12
# in Agreement	10	10
95% UCL	97.9%	97.9%
Calculated Score	**83.3%**	**83.3%**
95% LCL	51.6%	51.6%



Notes
Observed that the results on Tues were less accurate than Mon and that person B made no mistakes

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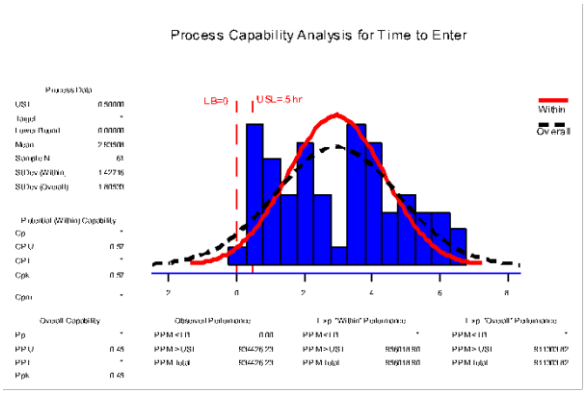
Measure Process Capability

- **Capability for Time (hrs) : Cpu= -.57, Cpk=-.57 (short term)**
- **Process is NOT CAPABLE**



Measure Baseline Performance

CURRENT

COPQ: $1,177,000

PPM or DPMO: 572,840

Sigma Level: 1.29

GOAL

COPQ: $588,500

PPM or DPMO: 286,420

Sigma Level: 2.05

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Measure Baseline Performance

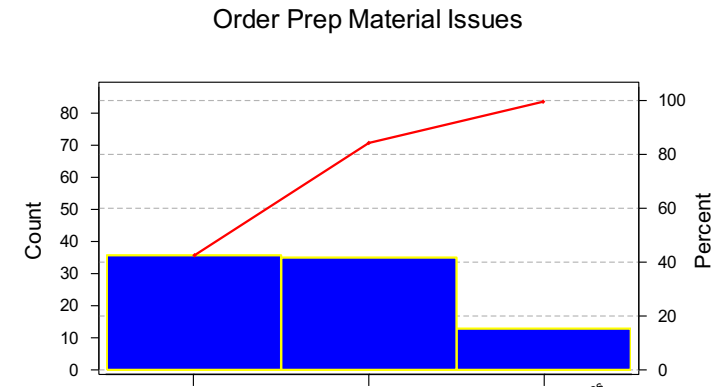
Baseline Process Measures

	Incomplete	*Non Compliant*	*Compliant*
Americas	9.52%	38.10%	52.38%
Asia/Pac	0.00%	0.00%	100.00%
MEUA	0.00%	100.00%	0.00%

Baseline Process Sigma

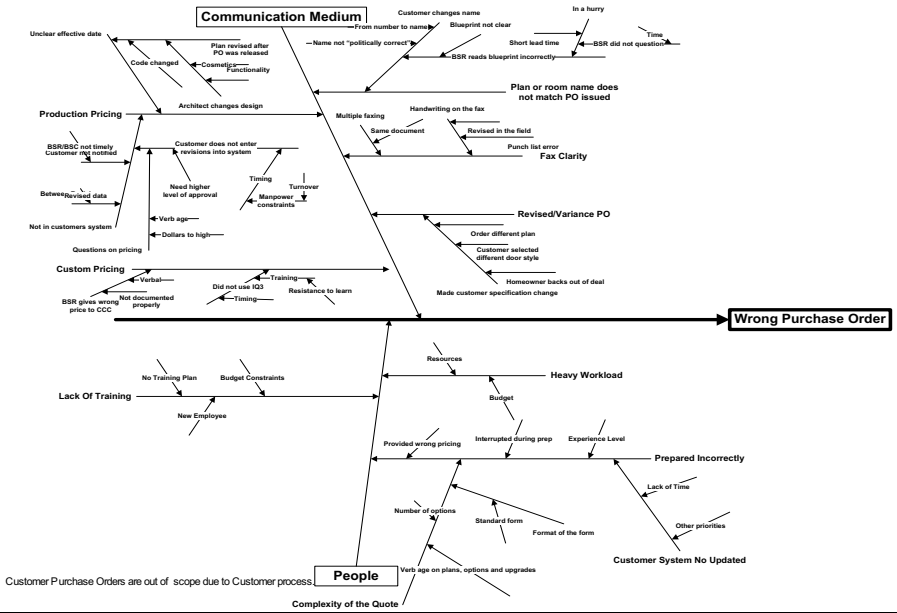
DPMO = 510,638
Defects = 51.06%
Yield = 48.94%
Process Sigma = 1.47

Pareto Diagram

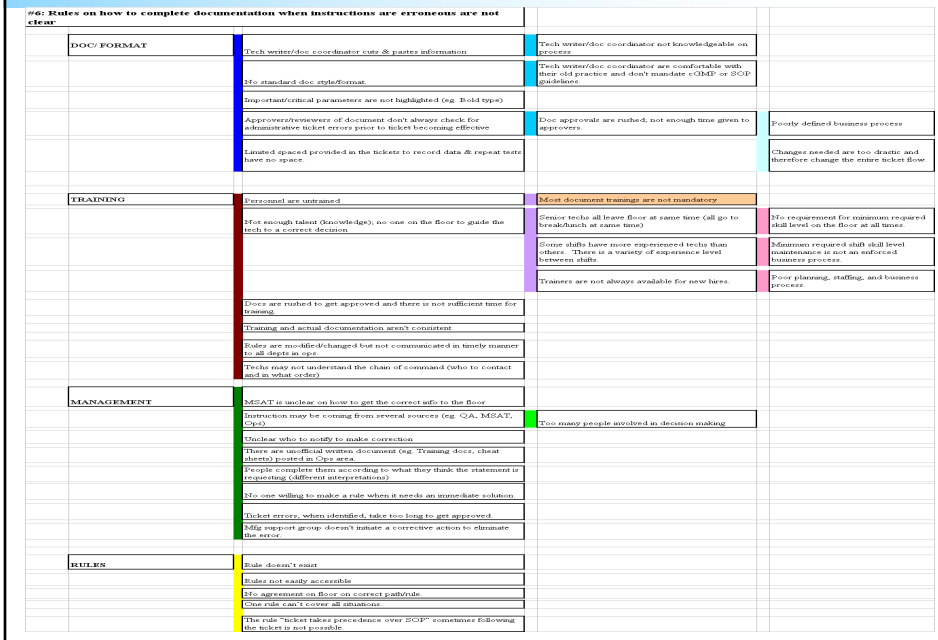


Defect	PO Issues	Masterbook Issues	Non Masterbook Issues
Count	36	35	13
Percent	42.9	41.7	15.5
Cum %	42.9	84.5	100.0

Cause-Effect Diagram on Vital Few categories



Excel-based Example: Cause-Effect Diagram 4



Potential X's --Theories to be Tested

X_1: Is there a difference in error rate by type of document?

X_2: Is there a difference in response cycle time by product type?

X_3: Is there a difference in win rate by region?

X_4: Is product knowledge related to years of experience ?

X_5: Is win-loss independent of industry knowledge.

Define
Measure
Analyze
Improve
Control

Theories to be Tested – Manual Invoices

X_1: Low transaction limits on VISA cards cause defects

X_2: The site not being on JD Edwards causes defects

X_3: The current high rework levels cause defects

X_4: The product or service purchased causes defects

X_5: The supplier not accepting VISA causes defects

X_6: The site/ operation affects the level of defects

X_7: The supplier affects the level of defects

X_8: Ease of process at time of purchase causes defects

X_9: Training/ Awareness causes defects

Data Collection Plan for Manual Invoices

DATA COLLECTION PLAN FOR ANALYZE PHASE

Ref	Theories To Be Tested (Selected From The C-E Diagram, FMECA, and/or FDM)	List Of Questions That Must Be answered To Test Each Selected Theory	Where Applicable, State The Null and Alternative Hypotheses		Tools To Be Used	Data To Be Collected					
			H_O	H_A		Description Data Type	Sample Size, Number of Samples	Where to Collect Data	Who will Collect Data	How Will data Be Recorded	Remarks
1	Transaction limits on VISA	Does the defect level depend on transaction limits placed on our VISA cards?	Manual Invoices are independent of Visa transaction limits	Manual Invoices are not independent of Visa trans limits	Contingency Table ∝Chi Square Test	Location, Person, transaction limits, total limit, Mgr's attitude, What was purchased, price	99	JDE, FirstView, Purchaser	Lisa & Mara	Data collection form	
2	Site not on JDE	Does the defect level depend on the site being on JDE?	Manual invoices are independent of site being on JDE	Manual invoices are not independent on site being on JDE	Contingency Table ∝Chi Square Test	Site/ origin of purchase	76,000	JDE, FirstView, Purchaser	Lisa & Mara	Data collection form	
3	Acceptance rate	Does our poor acceptance rate in general contribute to our defect level?	Manual Invoices are independent of our acceptance rate	Manual Invoices are not independent of our acceptance rate	Test of two proportions	Vendor, goods purchased, Why not ERS?	100	JDE, FirstView, Purchaser	Lisa & Mara	Data collection form	
4	Product/ Service purchased	Does the defect level depend on the product or service being purchased?	Manual Invoices are independent of product/ service purchased	Manual Invoices are not independent of product/ service purchased	Kruskal-Wallis	VISA policy fit, category of goods purchased	Many (1 year's worth)	JDE, FirstView, Purchaser	Lisa & Mara	Data collection form	
5	Supplier doesn't accept VISA	Does the supplier's acceptance of VISA contribute to the defect level	Manual Invoices are independent of supplier's acceptance of VISA	Manual Invoices are not independent of supplier's accept. of VISA	Contingency Table ∝Chi Square Test	supplier acceptance of VISA	99	JDE, FirstView, Purchaser	Lisa & Mara	Data collection form	
6	Site Specific	Does the defect level depend on the site or operation	The means of each site are equal	The means of each site are not equal	Kruskal-Wallis & Anova	% Manual invoices by site or operation by period	Many (10 periods)	JDE,	Dave and Derrick	JDE report to Excel	
7	Affected by Supplier	Does the defect level depend on supplier	Supplier means are equal	Supplier means are not equal	Obvious	% Manual invoices by supplier	Many	JDE,	Dave and Derrick	JDE report to Excel	
8	Ease at time of purchase	Does the ease of certain processes at time of purchase contribute to defect levels?	Manual Invoices are independent of perceived ease of use	Manual Invoices are not indep of perceived ease of use	Survey	What was purchased, emergency of need, comment from purchaser (why)	100	JDE, FirstView, Purchaser	Lisa & Mara	Data collection form	
9	Training/ Awareness	Does the defect level depend on the level of training/ awareness of the purchaser?	Manual Invoices are independent of Training/ Awareness	Manual Invoices are not indep of Training/ Aware	Survey	Comment from purchaser (why)	100	Purchaser	Lisa & Mara	Data collection form	

(Delete this example)

Test of Theories X_1

Theory: Our VISA trans limits restrict usage

Ho: Transaction limits on VISA cards are independent of defect Levels

Analysis:

Chi-Square Test: Within Visa Trans Limits, Outside Visa Trans Limits

Expected counts are printed below observed counts

	Within V	Outside	Total
EC	37	11	48
	35.39	12.61	
Manual	36	15	51
	37.61	13.39	
Total	73	26	99

Chi-Sq = 0.073 + 0.205 +
0.069 + 0.193 = 0.539

DF = 1, P-Value = 0.463

Conclusion: Manual Invoices are independent of VISA transaction limits

(Delete this example)

Test of Theories X_2

Theory: If a site is not on JD Edwards, manual invoices will be higher.
Ho: Manual invoices are independent of site being on JD Edwards

Analysis:

Chi-Square Test: Site on JDE, Site not on JDE

Expected counts are printed below observed counts

	Site on	Site not	Total
EC	37977	399	38376
	36734.55	1641.45	
Manual	35226	2872	38098
	36468.45	1629.55	
Total	73203	3271	76474

Chi-Sq = 42.022 +940.434 +
42.329 +947.296 = 1972.081
DF = 1, **P-Value = 0.000**

Conclusion: Manual Invoices are not independent of site being on JD Edwards

Summary Results of Theories Tested

X_1: Low transaction limits on VISA cards cause defects - **FALSE**

X_2: The site not being on JD Edwards causes defects - **TRUE**

X_3: High levels of rework have stopped us from reducing the defect level - **FALSE**

X_4: Defects are caused by category of purchase - **TRUE**

X_5: The supplier not accepting VISA causes defects - **TRUE**

X_6: The site/ operation affects the level of defects - **TRUE**

X_7: The supplier affects the level of defects – **TRUE**

X_8: Ease of process causes defects - *SURVEY*

X_9: Training/ Awareness causes defects - *SURVEY*

(Delete this example)

Vital Few X's

Manual Invoices

$$Y = f(x_2, x_4, x_5, x_6, x_7)$$

Vital Few X's are:

-- X_2 – **Site not on JDE**

-- X_4 – **Category of Purchase**

-- X_5 – **Non-acceptance of VISA**

-- X_6 – **Site/Operation**

-- X_7 – **Supplier**

Lean Six Sigma Sample Project Report

Define

Measure

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Control

Solutions for Proven Xs

Proven Xs (Causes)	Strategies
• X2: Compliance is dependant on month of expiration.	• To improve % compliance rate, have contracts expire one year from proposal date
• X4: Compliance is affected by the number of resources available.	• To improve our % compliant rate, we need to realign resources and measure complexity by account
• X5: Current process is not being followed.	• To improve their process flow we need to standardize and simplify the process
• X10: You focus on that which you are measured.	• To improve their focus we need to add a % compliant metric for all field sales

Lean Six Sigma Sample Project Report

Solutions Matrix

Possible Solutions

Solution	X1	X2	X3	X4	X5	X6	X7
Enter contract terms into the JDE system that deviate from the standard net 30 days.	X		X				X
Budget for additional CFS personnel to handle increase in business.		X		X			
Utilize progress bill file for those accounts that utilize waivers of lien.	X		X		X		X
Utilize the Builder Invoice for those projects that hold retention.	X		X		X	X	X
Institutue standard collection and customer notification process.		X		X			X
Utilize PCOE for all dealers in the Chicago market.			X			X	
Utilize electronic payment methods to speed up payments of invoices.							X

Descriptions of Possible Solutions, Pros & Cons

Possible Solution	Strengths	Weaknesses
Software Form Solution	Insures complete information Supports standard processes Automatic notification Provides current data for analysis Increases through put time Decreases resource requirements	Huge to develop No scope of work
Link Excel Forms	Insures complete information Increases through put time Supports standard processes Decreases resource requirements	Forms being developed to input direct to JDE

Lean Six Sigma Sample Project Report

Evaluation using Pugh Concept Matrix

Pugh Concept Selection Matix

			Alternative Concepts				
Criteria	**Rating (1-10)**	**Extended Contracts**	**PI Support Material**	**Optimize Process**	**On Salesman MBP**	**Link Excel Forms**	**Training**
Timely Price Increase (CTQ)	**10**	+	+	+	+	+	S
Contract Adherence (CTQ)	**10**	S	+	+	+	S	+
Cost of Price Increase (Admin)	**7**	+	-	+	S	S	-
Resources Required	**4**	+	-	S	S	S	-
Rework Reduction	**7**	+	S	+	S	+	+
Standardization/Automation of Process	**7**	S	+	+	+	+	+
Customer Satisfaction	**10**	+	+	+	S	S	+
Profitability	**10**	-	+	+	+	+	+
Sum of Positives		**5**	**5**	**7**	**4**	**4**	**5**
Sum of Negatives		**1**	**2**	**0**	**0**	**0**	**2**
Sum of Sames		**2**	**1**	**1**	**4**	**4**	**1**
Weighted Sum of Positives		**38**	**47**	**61**	**37**	**34**	**44**
Weighted Sum of Negatives		**10**	**11**	**0**	**0**	**0**	**11**
Weighted Score		**28**	**36**	**61**	**37**	**34**	**33**

Selected Concepts

Evaluation using Criteria-based Selection Matrix

Criteria Based Selection Matrix

			Solution reviewed							
	Solution Decisiontree	weight (9 critical, 1 not significant)	Remove redundant steps	Process to bulk upload data into USD and electronic systems	Return tickets to help desk and fix on fly	Develop alternate contact data source	Increase resources at Help desk to reduce error rates	Improve quality of customer contact data provided	Get help desk to capture data as customer contacts
	difficulty (1 = impossible 9 = easy)		9	7	4	3	1	7	4
rootcause	Redundant customer contacts in USD causing incorrect selection	6	54	42	24	18	6	42	24
	No effective update process exists to update client contact information	7	63	49	28	21	7	49	28
	No effective update process exists to update USD contact information	8	72	56	32	24	8	56	32
	No effective update process exists to update Regional cost center information	5	45	35	20	15	5	35	20
	No effective update process exists to update USD cost center information	4	36	28	16	12	4	28	16
	RESULT	**30**	**270**	**210**	**120**	**90**	**30**	**210**	**120**

Pay Off Matrix

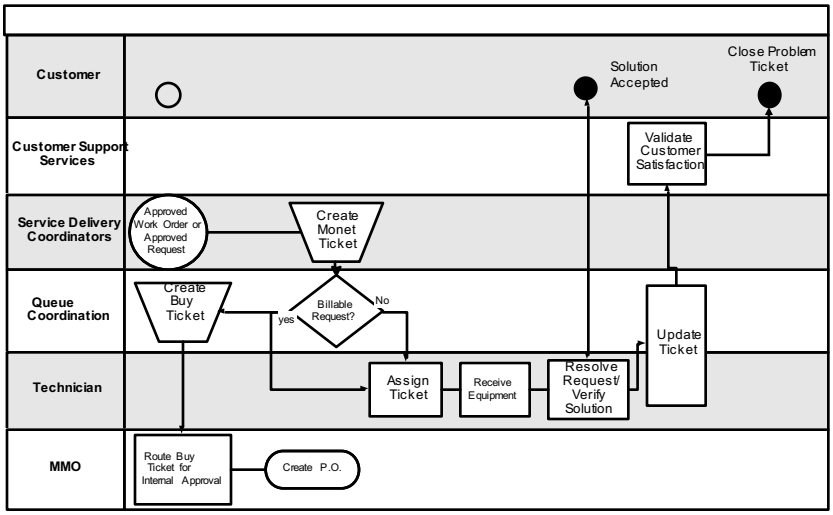
Benefit	Cost / Effort: Low	Cost / Effort: High
High	• Quote sheet • Training	• One person to quote • Products made in house • Improve master books
Low	• Single source	• Improve non-X service margins

Selected Solutions Implementation

#	Key Factor	Description	Improvement Strategy	Solution	Status	Completion Date	Owner
1	Data Collection & Measurement System	Insufficient data collection validation performed on all outages	Enhance Data Collection Process through additional sources and routines. Enhance outage validation procedures.	Implement process enhancement in Data Collection Process to review all valid outages for accuracy before monthly performance is posted. Implement outage validation routine with LOS staff to improve accuracy.	Incorporated DSR daily outage report into outage collection and validation process. Weekly SLA Status meeting implemented which reduced outage validation review process from monthly to weekly. Metric/data collector added verification step to process.	1-Aug 200X	Smith

Lean Six Sigma Sample Project Report

Updated Process Map



Updated Process FMEA

FMEA
(Failure Mode and Effect Analysis)

Item Name:		FMEA Team:	Prepared by:
			FMEA Date (Orig): (Rev.):

Process Step or Variable or Key Input	Defect	Effect on Customer Because of Defect	SEV	Potential Causes	OCC	Current Process Controls	DET	RPN	Actions Recommended	Resp. & Target Date	Actions Taken	SEV	OCC	DET	RPN
Create a ticket	USD Ticket has wrong name	Delays in contacting customer	7	Wrong name selected when very busy	8	none	10	560	Cleans contacts DB to reduce complexity	MS - July	Removed redundant contacts	7	7	4	56
			7	Wong name selected from DB due to too many choices offered	7	none	10	490	Drop covered by prvious						
			7	RMS/SARS/Email info may not qualify who to contact	7	none	10	490	Establish template and new procedures for requests	MS - July	Self ticketing & RMS bulk update	7	2	4	56
	USD Ticket		7	Customer not clear about who should be contacted	4	none	10	280	Drop unlikely a problem						
	Has wrong phone number	delys in contacting the customer	7	Customer at multiple locations - fear of impacting other tickets	8	none	10	560	Set policy - either mobile or fixed phone number	CW - July	HD education	7	2	4	56
			7	Client contact data out of date	10	none	10	700	Synchronize client with USD bulk upload process	MS - July	Self ticketing & RMS bulk update	7	2	4	56
			9	Contact data in USD wrong	7	none	10	630	Correct USD data and maintain	MS - July	Update bulk upload process	9	2	4	72
	USD Ticket		7	Workload and number of decision points may impact quality	6	none	10	420	Drop unlikely a problem						
	Has wrong cost centre number	incorrect billing	9	Data in account/charge incorrect	9	Billing substantiation process	8	648	Synchronize account with USD bulk upload process	MS - July	Bulk upload process	9			
			9	Data in USD incorrect	7	Billing substantiation process	8	504	Correct procedures and data around cost centres	MS - July	Bulk upload process	9	2	4	72

Implementation Plan

Improvement Summary

X = TESTED THEORY
K = KAIZEN EVENT

				START: Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04	Sep-04
X1		**Primer Gram Weight reduction**	Complete	X												
		15.5-16 reduced 12.6-13.1														
X1		**Top Coat Gram Weight reduction**	Complete	X												
		15.5-16 reduced 12.6-13.1														
X8		**Top Coat Air knife and Brush repair**	Complete			X										
		clean frames prior to to coat booth														
X10		**Orange Crayon Reduction at Component Plant**	Complete		X											
		Implement equipment cleaning prior to each shift														
X8	K-1	**Repair Area and Curve 5s**	Jan-04					X								
		Synchronize Conveyor Speeds														
		Seal sanding/repair areas-install dust collection														
		standard environment														
		housekeeping responsibilities and check-off														
X3	K-2	**5s Top Coat and Set Up Reduction**	Feb-04						X							
		hose management														
		eliminate paint build up in booth														
		control simplification / control panel														
X3	K-3	**5s Primer Booth and Set Up Reduction**	Mar-04							X						
		Eliminate On-load Conveyor														
		hose management														
		eliminate paint build up in booth														
		control simplification / control panel														
	K-4	**Scheduling / Improve Yield**	Apr-04								X					
		Streamline Inventory reporting														
		Reduce Overages from Suppliers														
		optimize operator/Sequencing														
	K-5	**In Process Inspection**	May-04									X				
		improve/standardize in process defect tools														
	K-6	**Final Inspection 5s**	Jun-04										X			
		Shorten off-load Conveyor/Materials Flow														
		good & bad boards														
	K-7	**Roll 5s**	Jul-04											X		
		process improvement flatter														
		roll coat equipment & line move														
		slave boards re-design														
	K-8	**Edge Coat / Flatter**	Aug-04												X	
		5s booth														
		improve ergo. For flatter														
		poke yoke overspray at booth														
	K-9	**Glass House**	Aug-04													X
		team leader development														

Implementation Plan

Task	Description	Resource	Task Status (G/Y/R)	Start Date	Finish Date	Adjusted Date
Get agreement on proposal	Meeting with management of business units B and F, as well as, representatives from the Project Management group to get agreement on proposal and set a start date for implementing recommendation.	Smith	G	4/13/04	4/21/04	
Discuss Tools and Guidelines	Meeting with Project Management group to discuss what types of feedback questions are asked currently. Write up a guidance document that may contain possible feedback questions and data analysis examples.	Smith, Project Mgmt Group representatives	G	4/21/04	4/26/04	
Communicate System	Communicate to business units B and F and upper management on new feedback rule.	Jones	G	4/26/04	4/30/04	
Monitor effectiveness	Obtain feedback data from next business process change to test whether the feedback loop helped in implementation process.	Error Proofing Team	G	4/30/04	TBD	

Error Rate Before/After Improvement

Is the Error Rate after improvement significantly different than the error rate before improvement?

Ho: Error Rate is independent of before vs. after improvements made.

Analysis:

Chi-Square Test: Before Improvements, After Improvements

Expected counts are printed below observed counts

	Before Imp.	After Imp.	Total
Late Orders	23	4	27
	15.65	11.35	
On-time Orders	119	99	218
	126.35	91.65	
Total	142	103	245

Chi-Sq = 3.453 + 4.761 +
0.428 + 0.590 = 9.231

DF = 1, **P-Value = 0.002**

P is <.05, Reject Ho.

Conclusion: Occurrence of late orders were lower after improvement than before.

Define
Measure
Analyze
Improve
Control

Lean Six Sigma Sample Project Report

Control Plan

Process Name: Processing of Expedite Orders Date: 4/14/2003

Control Subject	Subject Goals	Unit of Meas.	Sensor	Frequency of Measurement	Sample Size	Recording of Measurement/ Tool Used	Measured by Whom
Processing and Entry of Expedite Orders	90% on-time Entry of Expedite Orders	% Expedite orders not entered before 12:30PM	Sorter	Calculate Daily	All Expedite Orders	P-Chart	Sorter/ Supervisor
Adequate Fax Machine paper level to print faxes	No late orders due to fax machine out of paper	N/A	Sorter	4 Times per day	Population (Two Fax Machines)	N/A	Sorter
Adequate Fax Machine Toner level to print faxes	No late orders due to fax machine out of toner.	N/A	Sorter	4 Times per day	Population (Two Fax Machines)	N/A	Sorter
Distribution of faxed expedite orders to XCC's	Sort and distribute all submitted Expedites every 30 min before 10:30AM. Every 15 min. 10:30 to 12:00	Elapsed Time	Clock/Watch	1 Delivery per 30 min, 1 Delivery per 15 min.	All Faxed Orders on two fax machines	Sorter stamps date/time of distribution on orders	XCC's
Usage of Message Board when XCC is not available	Return time of XCC indicated on message board for every absence >15 min.	Message board used per absence	Sorter	Check every fax distribution cycle	All fax distribution cycles	N/A	Sorter
Elapsed Time to Enter Order	XCC/Keyer enters with-in 30 minutes of receipt (delivery by Sorter)	Elapsed Time	Stamped time and Computer Entry Time	Whenever performance level drops below 90% on a given day	30 Expedite Orders	Data Collection Form	Supervisor

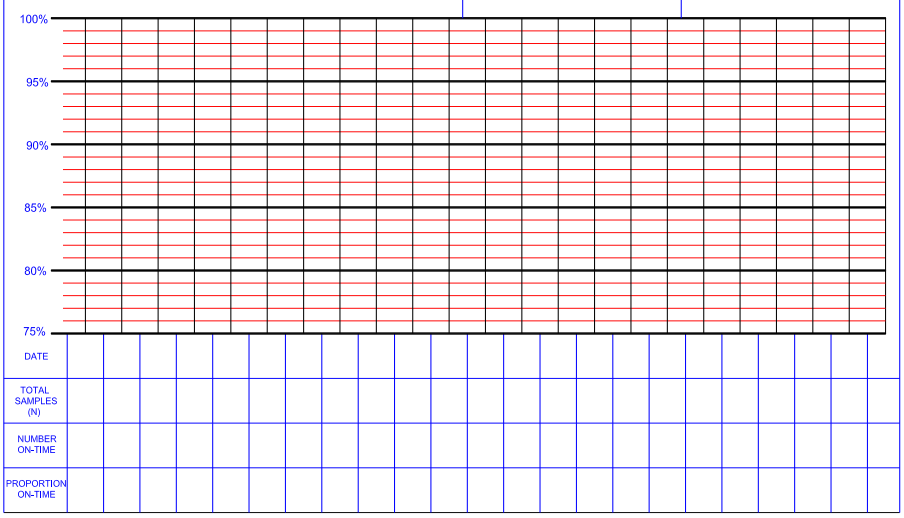
Communication Plan

Stakeholder	**Level of communication**--Storyboard, paragraph update, tollgate summary	**How information is communicated**--1:1, meeting, email, newsletter	**Where information is communicated**--e.g. if during a standing meeting, which is the most appropriate forum?	**Frequency of communication**--every other week, at tollgate, at end of project	**Who is responsible for doing the communication?**	**Dates for communication to occur**	**On Agenda Meeting set on individuals calendar** (Mark when established)
CFO							
Champion							
Staff within departments represented on the team							
Managers who have staff represented on the project team							
Staff within the project department							
Executives							
Steering Committee							
Process Owners							
Overall Organization							
Individual responsible for validating project ROI (CFO, assigned analyst, etc.)							

Lean Six Sigma Sample Project Report

P Control Chart for Order Entry Performance

PROCESS: EXPEDITE ORDER ENTRY	LOCATION: CORPORATE	APPROVED BY:
PROCESS OWNER:	MEASUREMENTS MADE BY:	APPROVED DATE:
AVG. (THIS PERIOD): UCL = 100% LCL =	DATE CONTROL LIMITS/AVG CALCULATED:	AVERAGE SAMPLE SIZE:



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Lean Six Sigma Sample Project Report

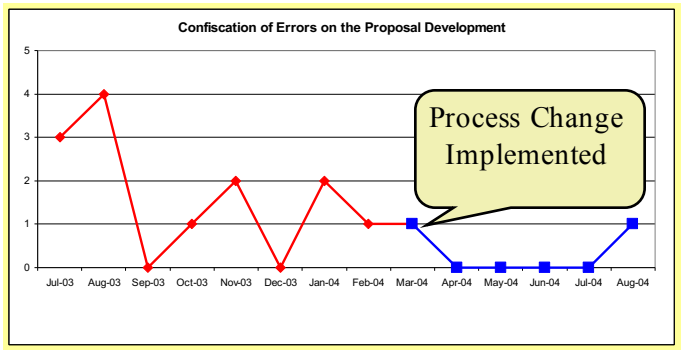
Project Results

Baseline
COPQ = $1,177,000
DPMO = 572,840
Sigma Level = 1.29

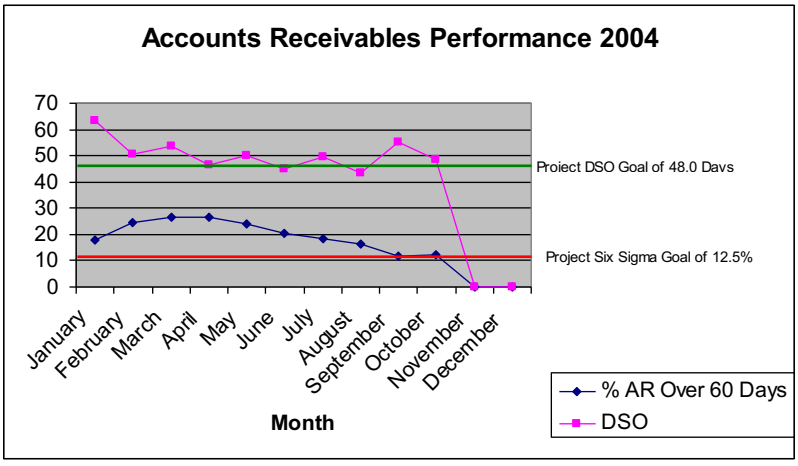
Goal
COPQ = $588,500
DPMO = 286,420
Sigma Level = 2.05

Actual Achieved
COPQ = $516,000
(i.e., saved more than goal)
DPMO = 250,000
Sigma Level = 2.15

Project Results



Results Tracking Performance



Lessons Learned

- Too many on a team makes it difficult to schedule meetings, keep it under five.
- Verify data early in the process. Bad data found later extends project and breaks project focus. Challenge and verify!
- 25% time requirement from green belts is difficult if not offsetting other work.
- A Green Belt should have ownership of the Process or have the project on their MBOs.
- Excellent process to get support to change.

The End

Do not forget to recommend a new project to management

Document Reports and New Processes

Schedule Your Recognition Celebration