LEAN SIX SIGMA BLACK BELT PROJECT (Company A)

SHAN FARID

NOTE – For Confidentiality, the Company's Name has been Removed from slides

AGENDA

Define

Measure

Analyze

Improve

Control

Results

DEFINE

BACKGROUND

Company A Acquired Major Competitor, Company B (2011)

Company B - $7 Billion Annually (Utilized SAP System)

Company A - $3 Billion Annually (Utilized Oracle & FAS Systems)

SAP

ORACLE
JD EDWARDS

Sage
Fixed Assets

D DEFINE **M** MEASURE **A** ANALYZE **I** IMPROVE **C** CONTROL

***FAS (Fixed Asset System)**

SMART OBJECTIVE

SPECIFIC VALUE
- Quality of FAS Database

UNIT OF MEASUREMENT
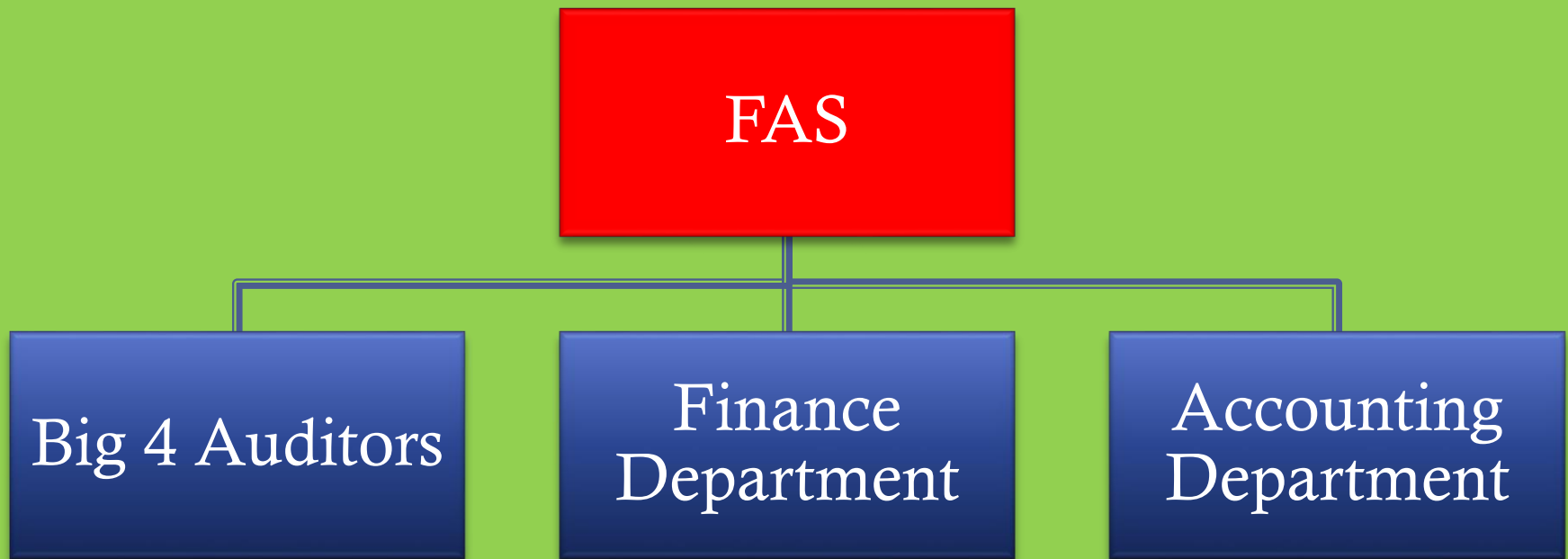- Time

MEASUREMENT
- Actual Measurement

CURRENT VALUE
- Over 6 Weeks

DESIRED VALUE
- 2 Weeks

FAS' SIGNIFICANCE

FAS

Big 4 Auditors

Finance Department

Accounting Department

MEASUREABLE OUTCOME

PROBLEM

Current FAS Reporting Process is 6 Weeks & Must Be Reduced

MEASUREMENT

Time (Number of Weeks)

GOAL

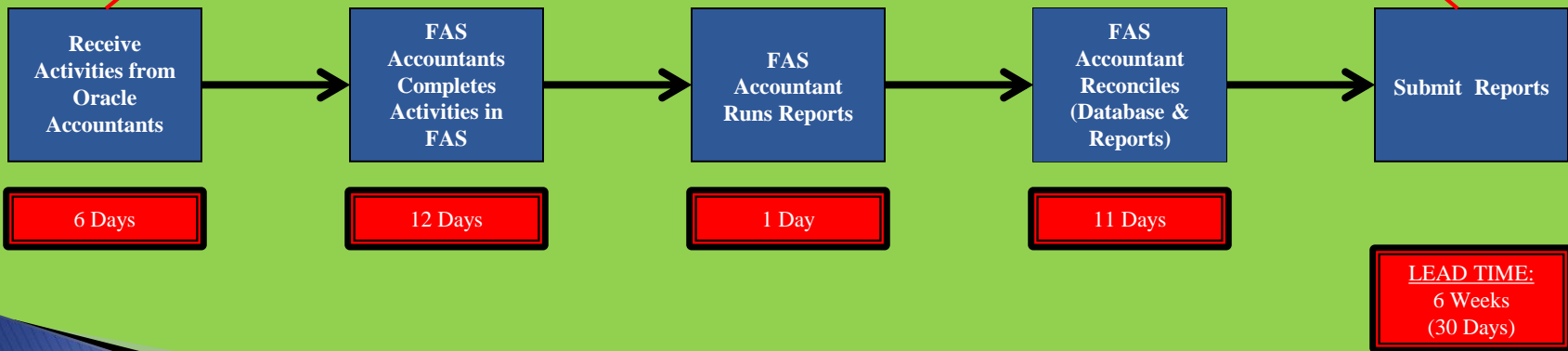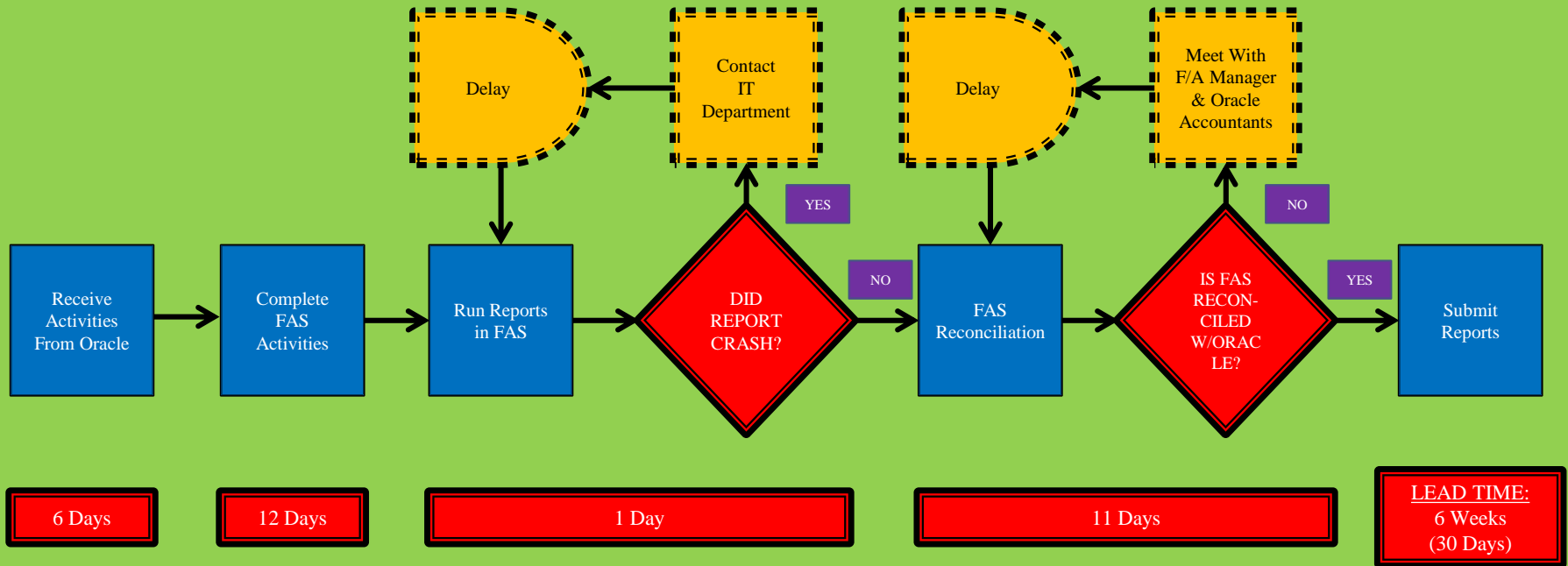New FAS Reporting Process of 2 Weeks

DMAIC
DEFINE MEASURE ANALYZE IMPROVE CONTROL

CURRENT STATE

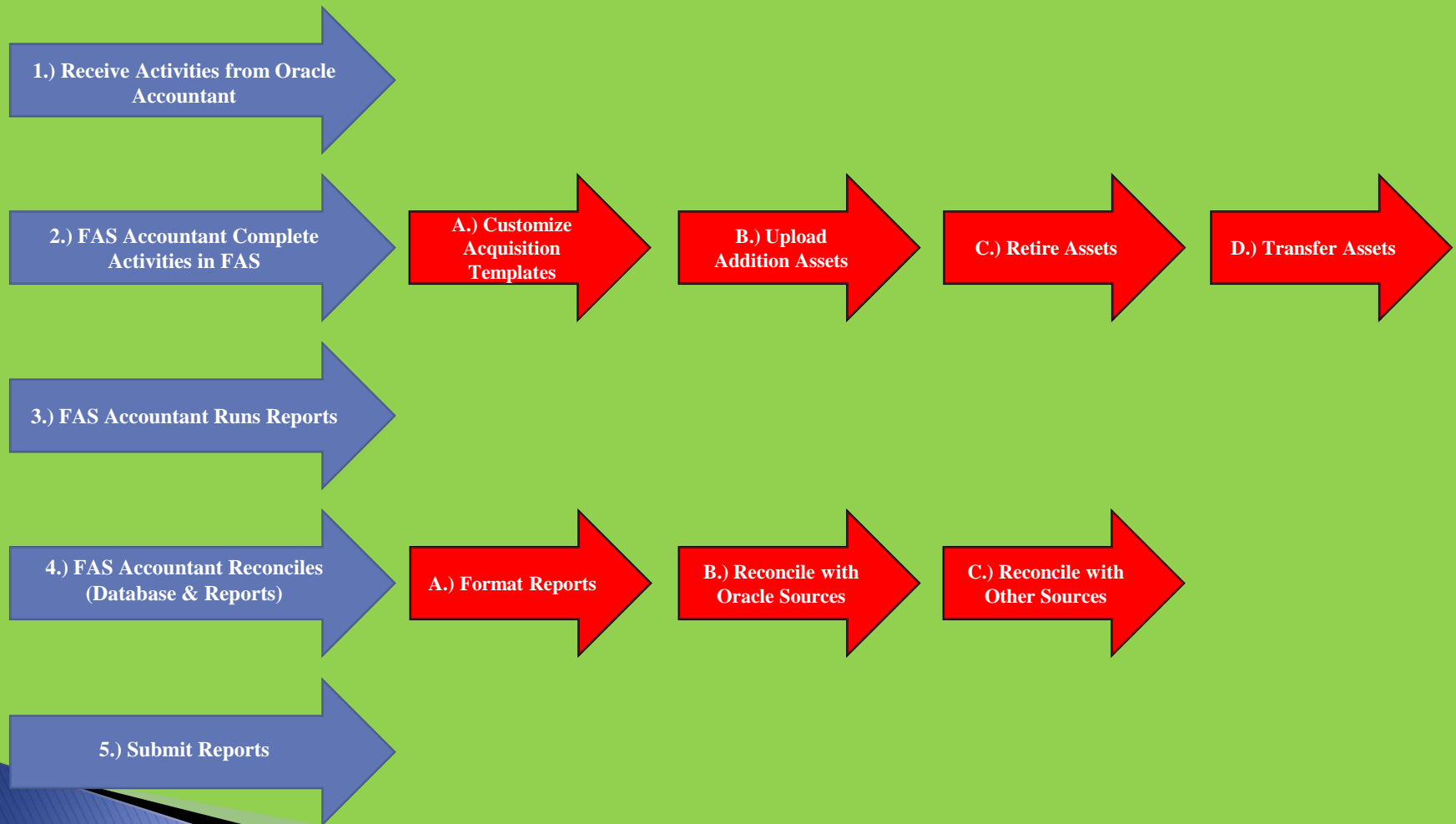| SUPPLIERS	INPUTS	PROCESS	OUTPUTS	CUSTOMERS
- Managers	- FAS System		- Monthly Transaction Reports	- Fixed Assets Department
- Directors-	- SAP System		- Updated & Reconciled Database	- Tax Department
- Oracle Accountants	- Oracle System			

Receive Activities from Oracle Accountants	→	FAS Accountants Completes Activities in FAS	→	FAS Accountant Runs Reports	→	FAS Accountant Reconciles (Database & Reports)	→	Submit Reports

6 Days		12 Days		1 Day		11 Days		

LEAD TIME:
6 Weeks
(30 Days)

D DEFINE M MEASURE A ANALYZE I IMPROVE C CONTROL

ORIGINAL PROCESS

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                    ┌ ─ ─ ─ ─ ─ ┐        ┌ ─ ─ ─ ─ ─ ┐              ┌ ─ ─ ─ ─ ─ ┐        ┌ ─ ─ ─ ─ ─ ┐
                    │           │        │  Contact  │              │           │        │ Meet With │
                      Delay        ◄────     IT                       Delay        ◄────   F/A Manager
                    │           │        │ Department│              │           │        │ & Oracle  │
                    └ ─ ─ ┬ ─ ─ ┘        └ ─ ─ ─ ─ ─ ┘              └ ─ ─ ┬ ─ ─ ┘        │Accountants│
                          │                    ▲                          │              └ ─ ─ ─ ─ ─ ┘
                          │                    │ [YES]                     │                    ▲ [NO]
                          ▼                                                ▼                     │
```

| Receive Activities From Oracle | → | Complete FAS Activities | → | Run Reports in FAS | → | DID REPORT CRASH? | —[NO]→ | FAS Reconciliation | → | IS FAS RECON-CILED W/ORACLE? | —[YES]→ | Submit Reports |

| 6 Days | | 12 Days | | 1 Day | | 11 Days | | LEAD TIME: 6 Weeks (30 Days) |

DEFINE · MEASURE · ANALYZE · IMPROVE · CONTROL

BOTTLENECKS WITH SUB-PROCESSES

1.) Receive Activities from Oracle Accountant

2.) FAS Accountant Complete Activities in FAS → **A.) Customize Acquisition Templates** → **B.) Upload Addition Assets** → **C.) Retire Assets** → **D.) Transfer Assets**

3.) FAS Accountant Runs Reports

4.) FAS Accountant Reconciles (Database & Reports) → **A.) Format Reports** → **B.) Reconcile with Oracle Sources** → **C.) Reconcile with Other Sources**

5.) Submit Reports

SUB-PROCESSES EXAMPLES

CUSTOM ACQUISITION TEMPLATE

FORMAT REPORTS

MEASURE

DRIVERS OF PERFORMANCE

Number of Assets Activity
- Retired & Transfer Assets Increasing (Merger)
- Addition Assets Increasing (Acquisitions)

Amount of Training
- Trained > 1 Week
- Trained < 1 Week

Server Time
- Not Busy (<10AM, >4PM)
- Busy (10AM-4PM)

Ratings
- Ratings Increase As Assets Activity & Reconciliation

Number of Outside Sources Used
- Big 4 Reports
- RockTenn Historical Reports

Number of Report Crashes
- Size of Report
- Busy Server Time
- Other People on FAS

OVERALL PROCESS TIME

DMAIC: DEFINE **MEASURE** ANALYZE IMPROVE CONTROL

ANALYSIS

Purpose

- Assessing the capability of the current process and system bottlenecks with the goal of determining strategies to reduce failure rates
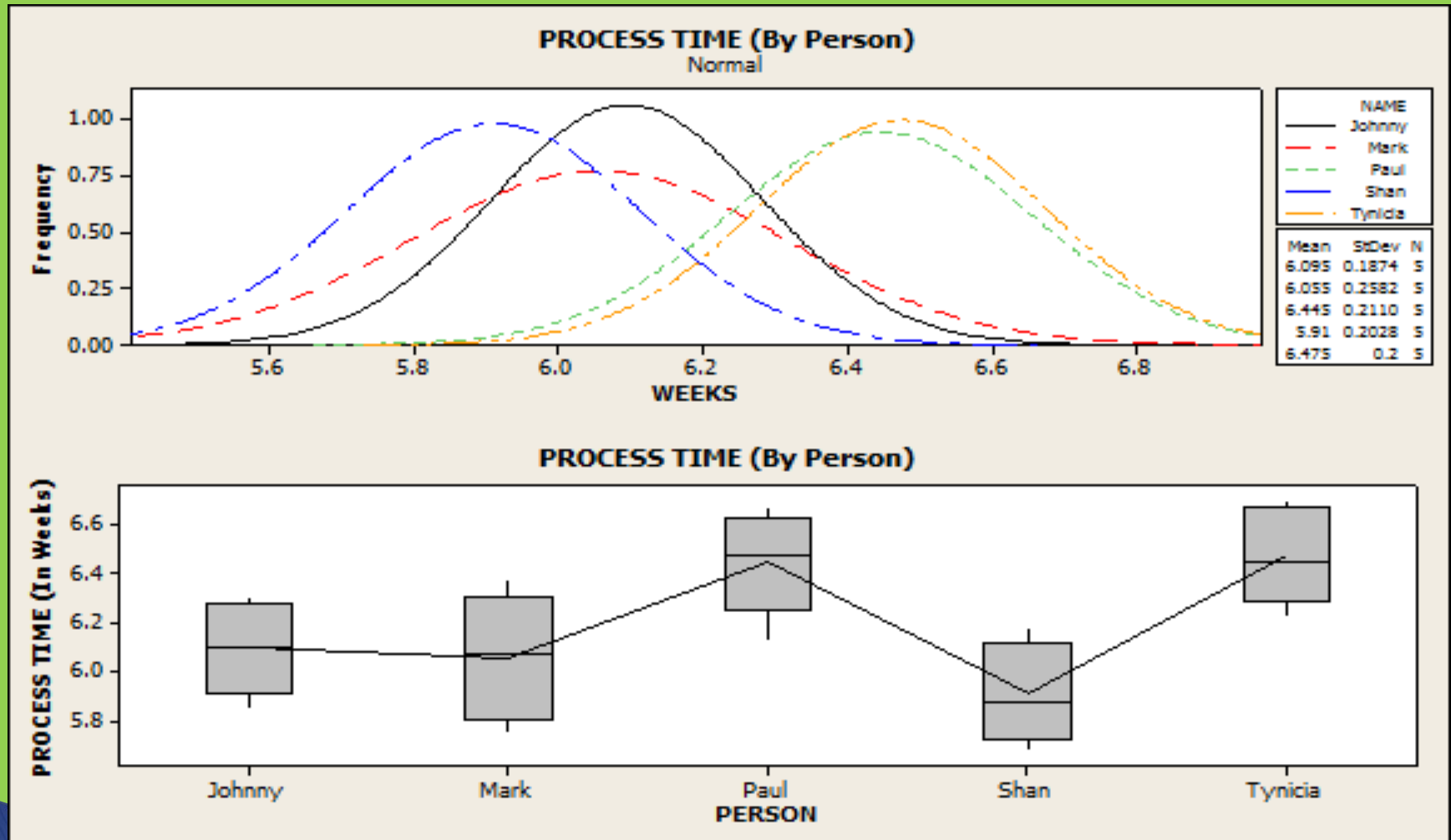
Data Collected

- Measured average reporting rates by several Company A employees:
  - Johnny N. (Senior Tax Accountant)
  - Mark L. (Senior Fixed Assets Accountant)
  - Paul K. (Tax Accountant)
  - Tynicia B. (Year-Up Intern)
  - Shan F. (Consultant)
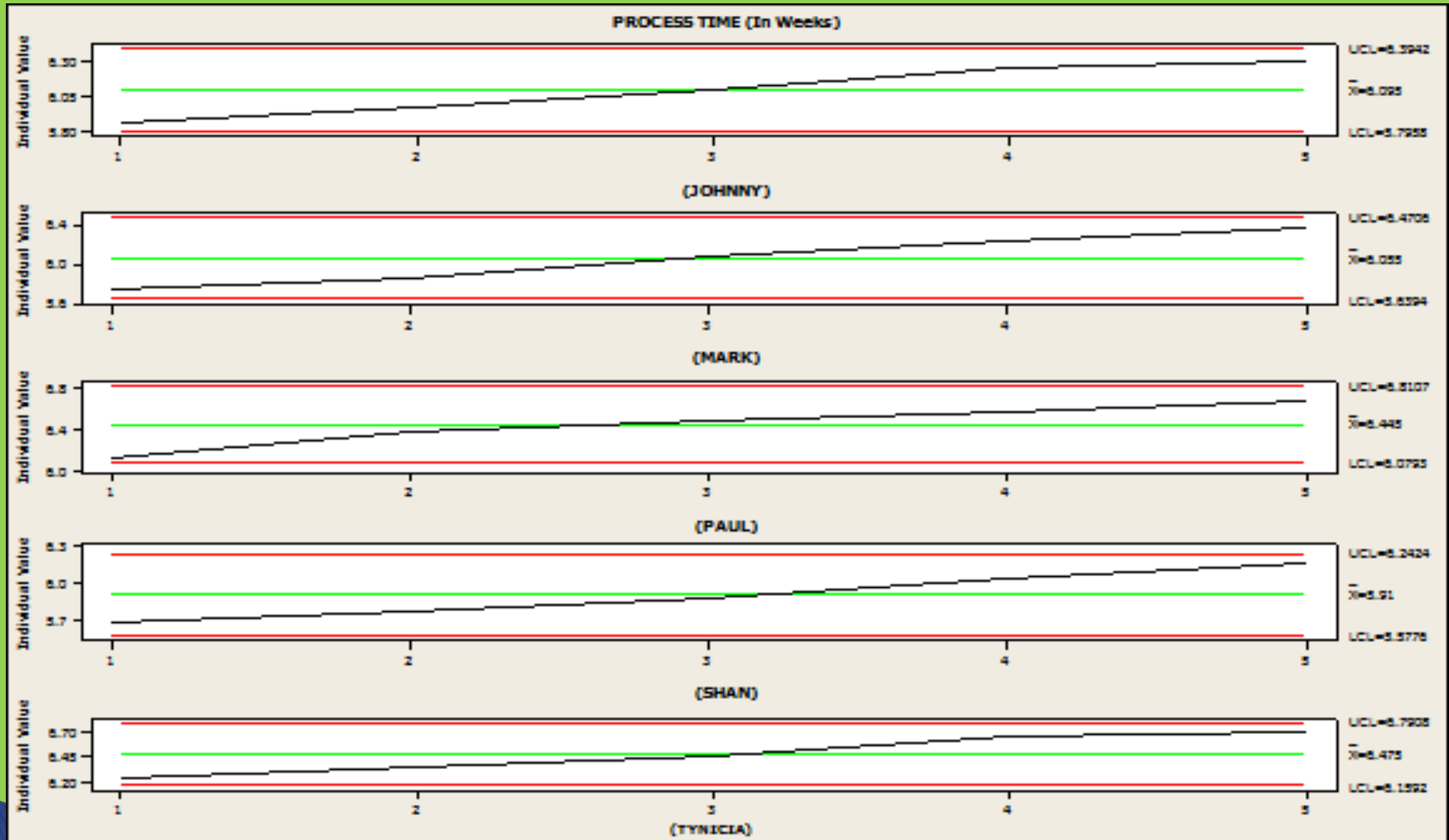
Data Analysis Approach

- Histograms, Box-plots, X-Bar charts, Scatter Plots, and Regression Analysis
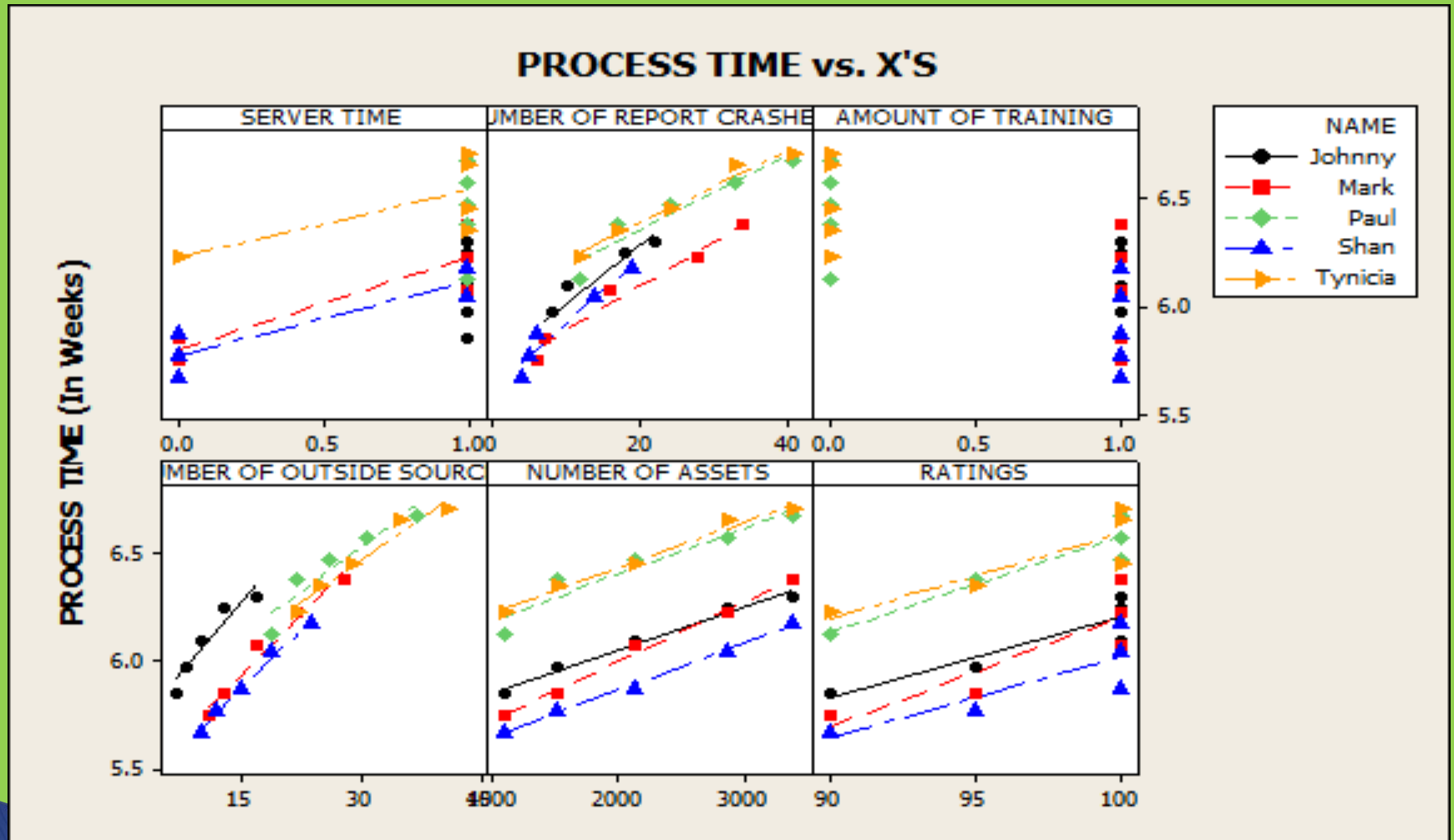
LEAD TIME ANALYSIS

LEAD TIME ANALYSIS

PROCESS TIME (In Weeks)

LEAD TIME vs DRIVERS

PROCESS TIME vs. X'S

ANALYZE

ANALYSIS OF FAILURE MODES

												Action Results					
Item	**Function**	**Potential Failure Mode**	**Potential Effects or Failure**	**S v r t y**	**Potential Causes of Failure**	**O c r n c**	**Current Controls for Prevention/ Detection**	**D t c t n**	**R P N**	**Recommended Action**	**Responsibility and Target Completion Date**	**Action Taken**	**S v r t y**	**O c r n c**	**D t c t n**	**R P N**
Overall Process Time	Customize Acquisition Templates For Each Subsidiary	Upload Incorrect Addition Assets	Deleting Incorrect Assets & Redoing Activity	8	Too Many Custom Templates	9	None	1	72	Standardize Templates						0
	Retire Assets	Retire Incorrect Assets	Un-Retiring Incorrect Assets & Redoing Activity	7	Manual Activity	10	None	1	70	Benchmark with Oracle & SAP (Automate Activity)						0
	Transfer Assets	Transfer Incorrect Assets	Un-Transfering Incorrect Assets & Redoing Activity	7	Manual Activity	10	None	1	70	Benchmark with Oracle & SAP (Automate Activity)						0
	Run Reports	Report Crashes	Re-running Reports	5	Size, Server Time, Others on FAS	10	None	1	50	Get New Server						0
	Reconcile w/Oracle Reports	Not Enough/Clear Information	Delay in Reconciling	5	No Contact w/Oracle Accountants	10	None	1	50	Oracle Training						0
	Reconcile w/Other Reports	Not Enough/Clear Information	Delay in Reconciling	5	No Explaination	10	None	1	50	Explaination						0

FMEA Template for AIAG and Six Sigma

FAILURE MODE EXAMPLE

Item	Function	Potential Failure Mode	Potential Effects or Failure	Svrty	Potential Causes of Failure	Ocrnc	Current Controls for Prevention/ Detection	Dttn	RPN	Recommended Action	Responsibility and Target Completion Date	Action Results				
												Action Taken	Svrty	Ocrnc	Dttn	RPN
Overall Process Time	Customize Acquisition Templates For Each Subsidiary	Upload Incorrect Addition Assets	Deleting Incorrect Assets & Redoing Activity	8	Too Many Custom Templates	9	None	1	72	Standardize Templates						0

PREDICTION MODEL OF LEAD TIME

Regression Statistics

Regression Statistics	
Multiple R	0.98890407
R Square	0.977931259
Adjusted R Square	0.970575012
Standard Error	0.051560512
Observations	25

ANOVA

	df	SS	MS	F	Significance F
Regression	6	2.120497246	0.353416208	132.9388837	6.5605E-14
Residual	18	0.047852754	0.002658486		
Total	24	2.16835			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	5.208222197	0.473691071	10.9949765	2.03546E-09	4.213034185	6.203410209	4.213034185	6.203410209
SERVER TIME	0.054387977	0.037042674	1.468251938	0.15929426	-0.023435792	0.132211747	-0.023435792	0.132211747
NUMBER OF REPORT CRASHES	0.013628132	0.003505237	3.887934345	0.001078016	0.006263902	0.020992361	0.006263902	0.020992361
AMOUNT OF TRAINING	-0.410250486	0.060724486	-6.755931783	2.48868E-06	-0.537827897	-0.282673074	-0.537827897	-0.282673074
NUMBER OF OUTSIDE SOURCES	-0.010544227	0.004929997	-2.138789626	0.046412905	-0.020901768	-0.000186687	-0.020901768	-0.000186687
NUMBER OF ASSETS	9.55484E-05	4.37348E-05	2.184722762	0.042377727	3.66501E-06	0.000187432	3.66501E-06	0.000187432
RATINGS	0.009779279	0.005327112	1.83575633	0.082970361	-0.001412567	0.020971125	-0.001412567	0.020971125

D M A I C
DEFINE MEASURE ANALYZE IMPROVE CONTROL

IMPROVE

MISTAKE-PROOFING

STANDARDIZATION
- Acquisition Templates (Uploading Acquired Assets)
- Created Tutorial (Training)

BENCHMARK
- Automate Transfer/Retirement Activities in FAS

OTHER
- New Server
- Cross-Training (FAS & Oracle)
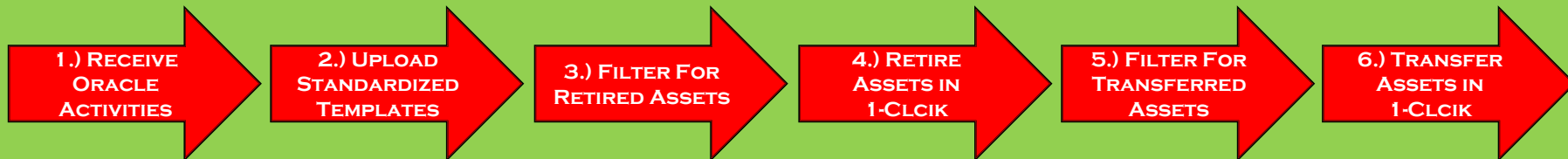- Manager Involvement
- Consolidate Reports

STANDARDIZATION

TRAINING TUTORIAL

D DEFINE **M** MEASURE **A** ANALYZE **I** IMPROVE **C** CONTROL

BENCHMARK

ORACLE/SAP ASSET ACTIVITIES

1.) Input Activities → 2.) Filter For Retired Assets → 3.) Retire Assets in 1-Clcik → 4.) Filter For Transferred Assets → 5.) Transfer Assets in 1-Clcik

FAS ASSET ACTIVITIES

1.) Receive Oracle Activities → 2.) Upload Standardized Templates → 3.) Filter For Retired Assets → 4.) Retire Assets in 1-Clcik → 5.) Filter For Transferred Assets → 6.) Transfer Assets in 1-Clcik

DEFINE MEASURE ANALYZE IMPROVE CONTROL

OTHER SOLUTIONS

New Server

- <u>Hurdle:</u> Cost of Server
- <u>Success Measure</u>: Reduction in System Crashes

Cross Training

- <u>Hurdle</u>: Time Commitment and Scheduling
- <u>Success Measure</u>: FAS Reconciliation Cycle Time Reduction
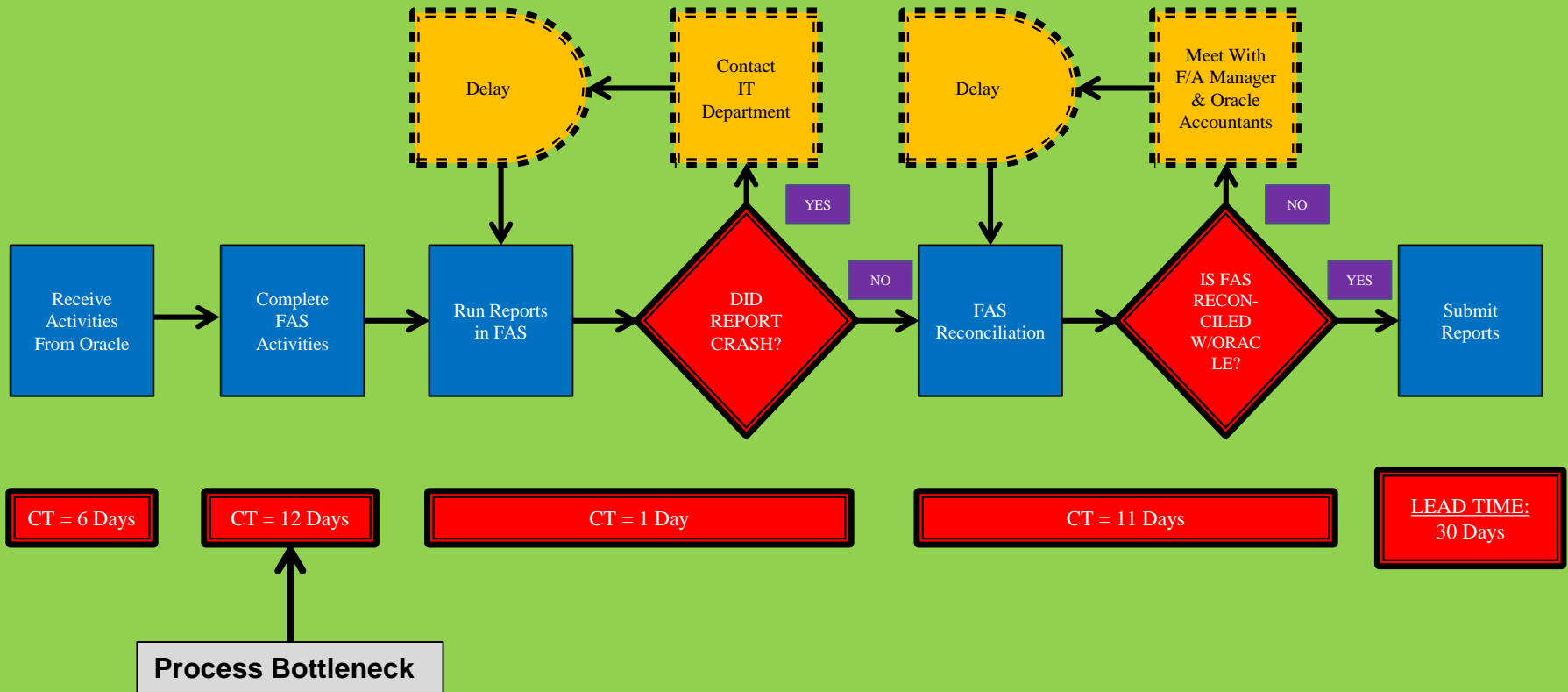
Earlier Manager Involvement

- <u>Hurdle</u>: Buy-In and Commitment to Process Improvement
- <u>Success Measure</u>: FAS Reconciliation Cycle Time Reduction

Consolidated Reports

- <u>Hurdle</u>: Correctly Identifying Relevant Metrics
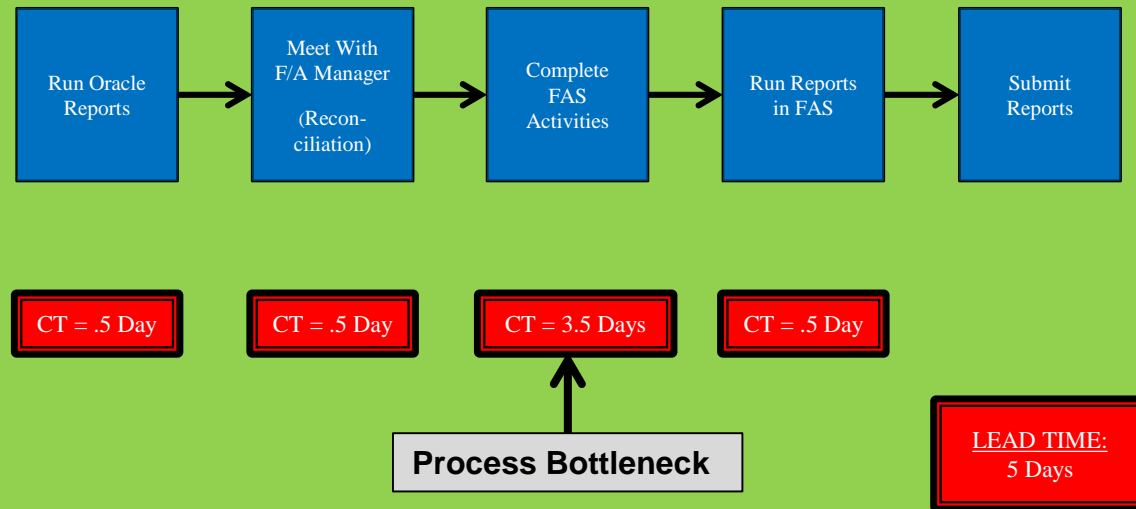- <u>Success Measure</u>: FAS Activity Completion Reduction

D M A I C
DEFINE   MEASURE   ANALYZE   IMPROVE   CONTROL

CONTROL

ORIGINAL PROCESS

Delay → Contact IT Department

Delay → Meet With F/A Manager & Oracle Accountants

Receive Activities From Oracle → Complete FAS Activities → Run Reports in FAS → DID REPORT CRASH? (YES / NO) → FAS Reconciliation → IS FAS RECON-CILED W/ORACLE? (NO / YES) → Submit Reports

CT = 6 Days
CT = 12 Days
CT = 1 Day
CT = 11 Days
LEAD TIME: 30 Days

Process Bottleneck

Throughput Time: 30 Days
Cycle Time: 12 days
Throughput Rate: .167 Reports/Week

D M A I C
DEFINE MEASURE ANALYZE IMPROVE CONTROL

NEW PROCESS

| Run Oracle Reports | Meet With F/A Manager (Recon-ciliation) | Complete FAS Activities | Run Reports in FAS | Submit Reports |

CT = .5 Day | CT = .5 Day | CT = 3.5 Days | CT = .5 Day

Process Bottleneck

LEAD TIME: 5 Days

Throughput Time: 5 days
Cycle Time: 3.5 days
Throughput Rate: 1 Report/Week

D M A I C
DEFINE MEASURE ANALYZE IMPROVE CONTROL

SUMMARY

PROCESS MEASURE	ORIGINAL PROCESS	NEW PROCESS	% CHANGE
CYCLE TIME	12 days	3.5 days	**71%**
THROUGHPUT TIME	30 days	5 days	**83%**
THROUGHPUT RATE	.167 Report/Week	1 Report/Week	**599%**

RESULTS

OPERATIONS
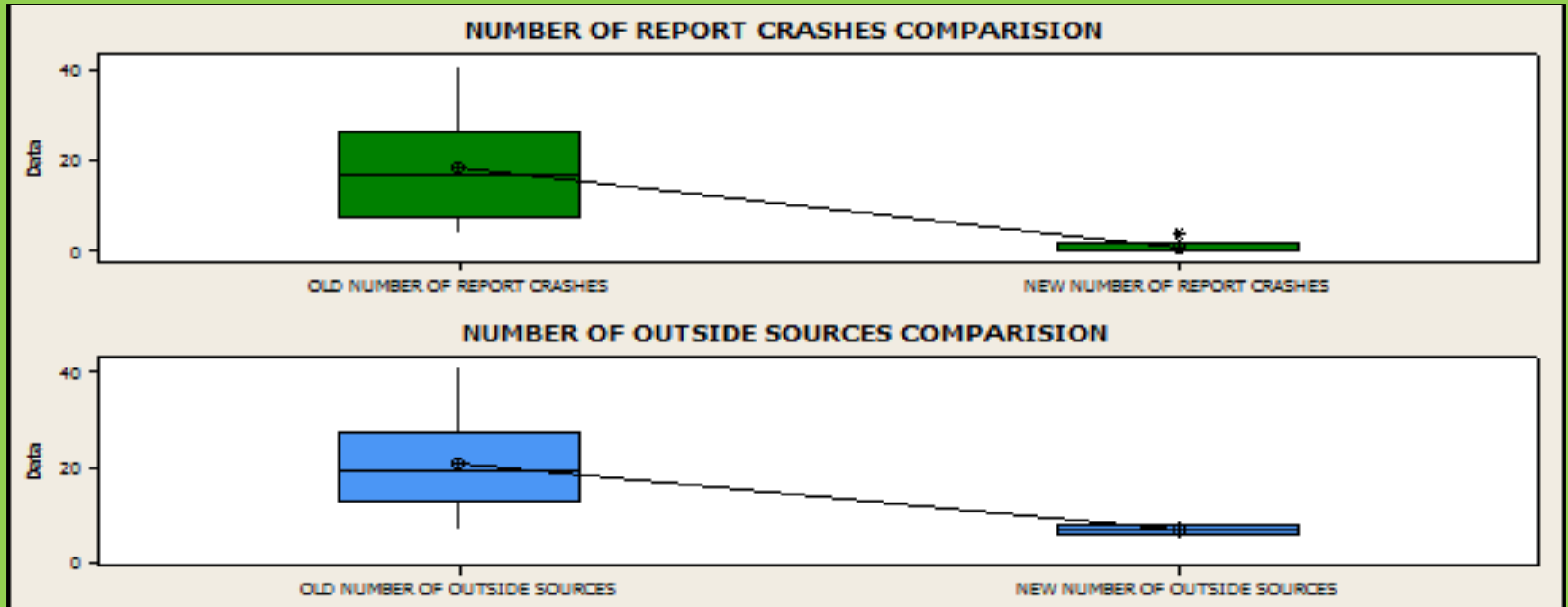
STATISTICAL IMPROVEMENT

Two-Sample T-Test and CI: OLD PROCESS TIME, NEW PROCESS TIME

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Two-sample T for OLD PROCESS TIME vs NEW PROCESS TIME

                      N      Mean    StDev   SE Mean
OLD PROCESS TIME     25     6.196    0.301     0.060
NEW PROCESS TIME     25    0.8850   0.0439    0.0088


Difference = mu (OLD PROCESS TIME) - mu (NEW PROCESS TIME)
Estimate for difference:   5.3110
99.7% lower bound for difference:   5.1363
T-Test of difference = 0 (vs >): T-Value = 87.42   P-Value = 0.000   DF = 48
Both use Pooled StDev = 0.2148
```

Two-Sample T-Test and CI: OLD NUMBER OF REPORT CRA, NEW NUMBER OF REPORT CRA

```
Two-sample T for OLD NUMBER OF REPORT CRASHES vs NEW NUMBER OF REPORT CRASHES

                           N    Mean    StDev   SE Mean
OLD NUMBER OF REPORT CRA   25   18.3    11.4      2.3
NEW NUMBER OF REPORT CRA   25   0.88    1.17      0.23


Difference = mu (OLD NUMBER OF REPORT CRASHES) - mu (NEW NUMBER OF REPORT
     CRASHES)
Estimate for difference:   17.44
99.7% lower bound for difference:   10.87
T-Test of difference = 0 (vs >): T-Value = 7.63   P-Value = 0.000   DF = 48
Both use Pooled StDev = 8.0830
```

Two-Sample T-Test and CI: OLD NUMBER OF OUTSIDE SO, NEW NUMBER OF OUTSIDE SO

```
Two-sample T for OLD NUMBER OF OUTSIDE SOURCES vs NEW NUMBER OF OUTSIDE SOURCES

                          N    Mean    StDev   SE Mean
OLD NUMBER OF OUTSIDE SO  25   20.52   9.36      1.9
NEW NUMBER OF OUTSIDE SO  25    7.00   1.44      0.29


Difference = mu (OLD NUMBER OF OUTSIDE SOURCES) - mu (NEW NUMBER OF OUTSIDE
     SOURCES)
Estimate for difference:   13.52
99.7% lower bound for difference:   8.07
T-Test of difference = 0 (vs >): T-Value = 7.14   P-Value = 0.000   DF = 48
Both use Pooled StDev = 6.6993
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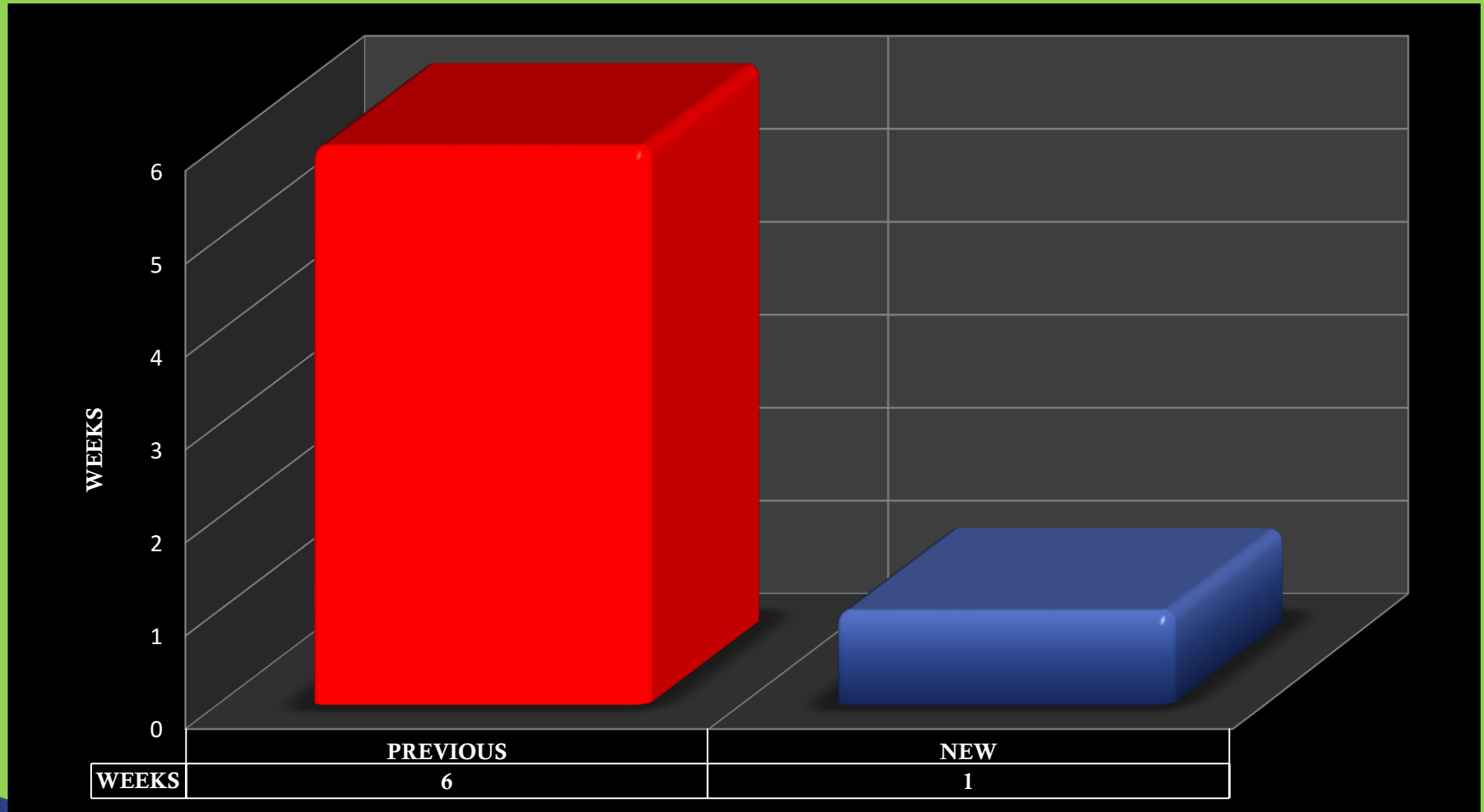
OPERATIONAL IMPROVEMENT

WEEKS	PREVIOUS	NEW
WEEKS	6	1

FINANCIAL IMPROVEMENT