Call Centre

Six Sigma DMAIC Example

Project Identification through VoB

The benchmark data indicated customer satisfaction and business growth do not have a direct relationship to support costs per call. So the companies with the best customer satisfaction and best business growth do not spend the most on support costs per call. In fact, the support costs of $26 per call for the best companies and $30 for the average are lower than the case study company's cost per call of about $36

Y=Call Cost

The Xs are:

Transfer = Average number of transfers (to different agents and help systems) during a service call.

Wait Time = Average wait time during a service call.

Service = Average service time during the call (the time spent getting the answer to the question, problem solving advice, etc.).

Key Elements of Charter

- **Problem Statement:**
- "Competitors are growing their levels of satisfaction with support customers, and they are growing their businesses while reducing support costs per call. Our support costs per call have been level or rising over the past 18 months, and our customer satisfaction ratings are at or below average. Unless we stop – or better, reverse this trend – we are likely to see compounded business erosion over the next 18 months."

Key Elements of Charter

- **Business Case:** "Increasing our new business growth from 1 percent to 4 percent (or better) would increase our gross revenues by about $3 million. If we can do this without increasing our support costs per call, we should be able to realize a net gain of at least $2 million."

Key Elements of Charter

- **Goal Statement: "**Increase the call center's industry-measured customer satisfaction rating from its current level 75 percent to the target level 85 percent by end of the fourth quarter without increasing support costs.**"**
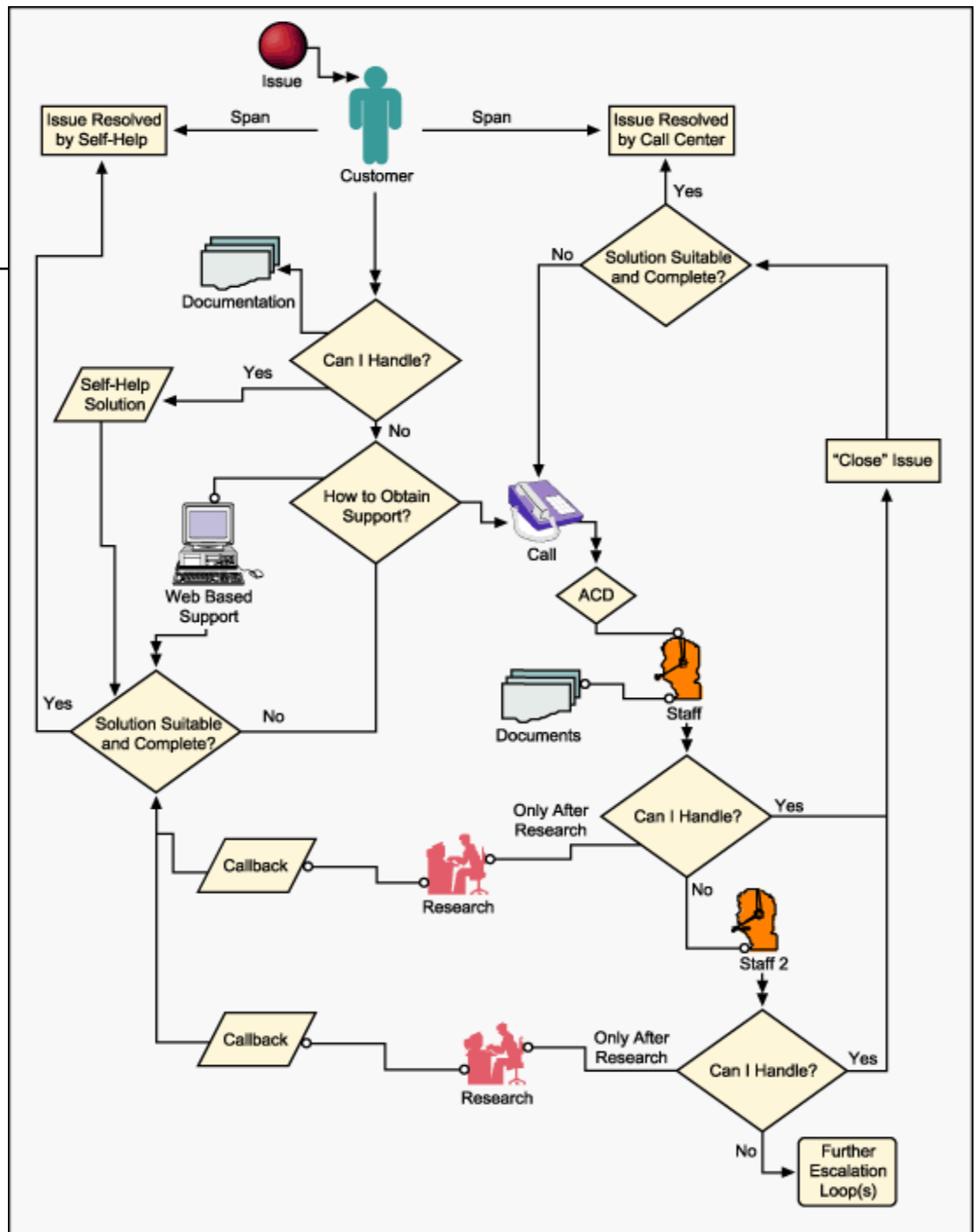
Customer	**O**utput	**P**rocess	**I**nputs *(& Resources)*		**S**uppliers
Client	Call Engaged	(Automated) **Answer Call**	Active Phone Line		**Phone Service Provider**
			Internal Call Switch		**IT Group**
			Switching Software		
	Information in System	(Staff) **Gather Customer Information**	Available Representative		**Call Center Management**
			Call Management Software		**IT Group**
	Escalation Decision	(Staff) **Assess Ability to Resolve**	Database Available		
			Staff Experience/Training		**Human Resources/ Training**
	Next-Level Support Staff Engaged	(Staff) **Transfer Call**	Available Staff for Transfer		**Call Center Management**
	Resolution Information	(Staff) **Gather Resolution Information**	System Documentation		**Documentation Group**
			FAQ Database		**IT Group**
			Client Configuration Information		
		(Staff) **Deliver Resolution Information**	Customer Availability (on Callback)		**Call Center Staff**
Call Center Management	**Call Data Logged to Customer File and FAQ**	(Staff) **Log Call Data**	Call Management Software		
			Staff Availability		
			Staff Discipline		
	Documented Call Resolution	(Automated/Internet) **Confirm Resolution with Customer**	Web Monitor		**IT Group (Web Monitor Application)**
			(Customer) Internet Access		

VOC

| Requirements	Measures
Quickly connect with a helpful person	Wait Time
Get the information I need	Transfers, Service Time
Apply the information, with help if needed	Customer Satisfaction, Support Cost
Understand how to avoid problems recurring	Days to Close

High Level Map

D

Definition and Measure of Y's

M

	Y(s)	Measurement
Primary	**Customer Satisfaction**	1. By industry standard monthly survey 2. The project will require additional, more frequent, case-by-case customer satisfaction data. A measurement system that tracks with the industry survey will be devised and validated.

Secondary	**Support Cost (Per Call)**	The staff time connected with each call:
		    - Call answering and discussion
		    - Case research
		    - Callback time
		will be loaded with a distribution of benefits and infrastructure costs to compute overall support cost per call.

M

Define Performance Std for Y

	Measure	Current Baseline	Target
Primary	Customer Satisfaction	90th Percentile / 70-80% Satisfied	90th Percentile / 85% Satisfied
Secondary	Support Cost Per Call	90th Percentile / $40	90th Percentile / $32
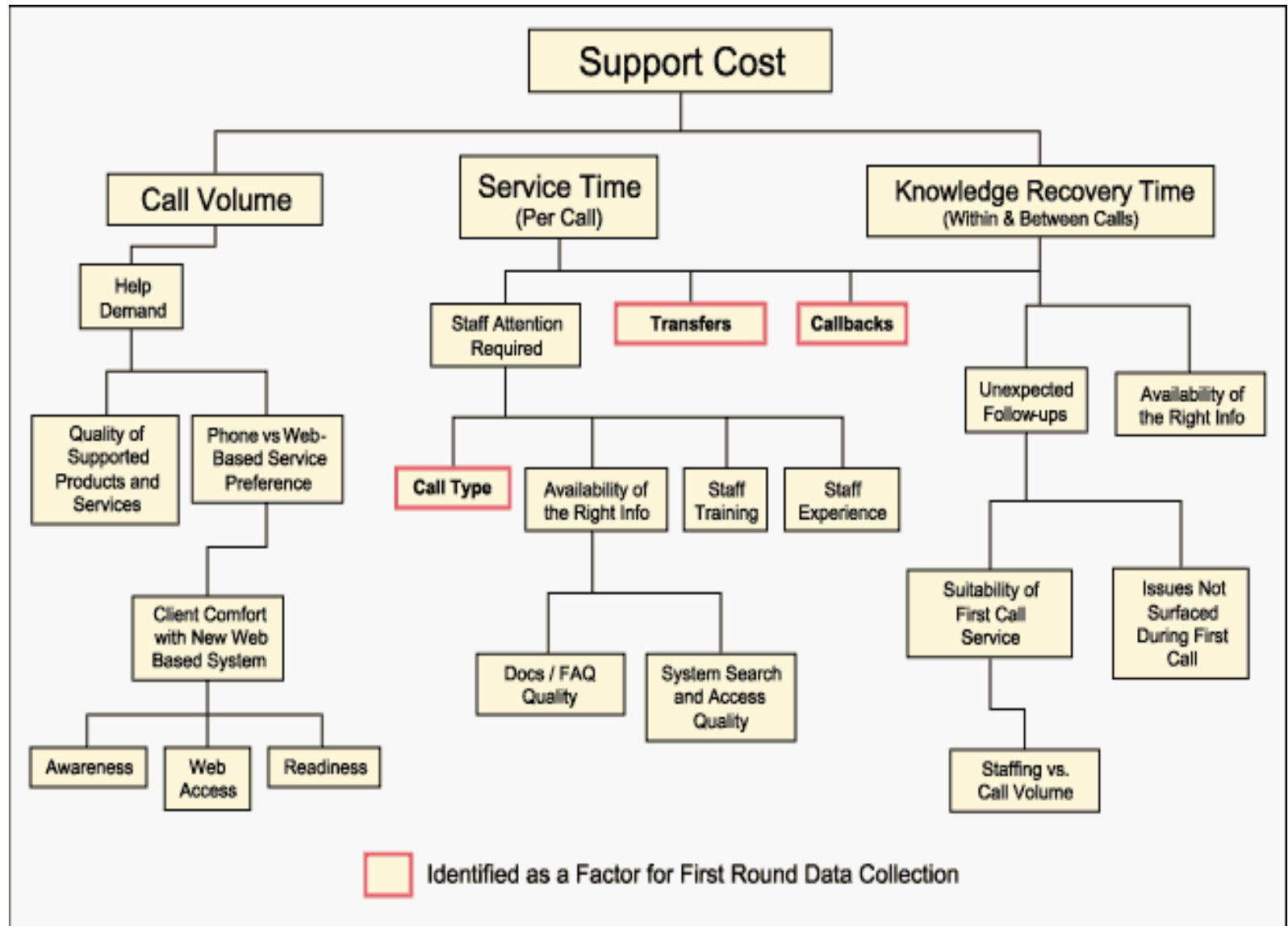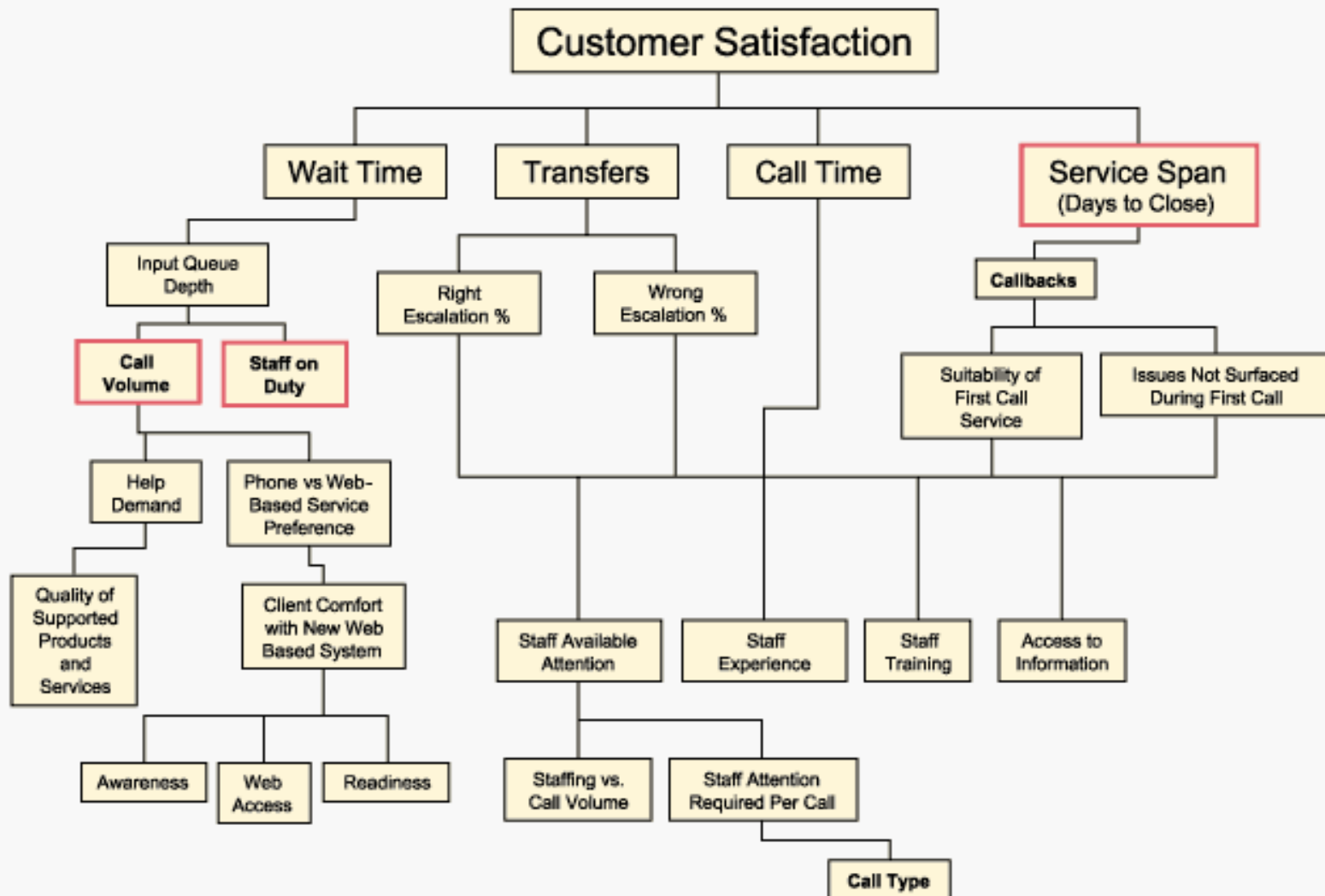
Customer	Output	Controlled (C) Uncontrolled (U)	Process	Inputs (& Resources)	Controlled (C) Uncontrolled (U)	Suppliers
Client	Call Engaged	C	(Automated) Answer Call	Active Phone Line	U	Phone Service Provider
				Internal Call Switch	C	IT Group
				Switching Software	C	
	Information in System	C	(Staff) Gather Customer Information	Available Representative	C	Call Center Management
				Call Management Software	C	IT Group
	Escalation Decision	U	(Staff) Assess Ability to Resolve	Database Available	U	
				Staff Experience/Training	C	Human Resources/ Training
	Next-Level Support Staff Engaged	C	(Staff) Transfer Call	Available Staff for Transfer	U	Call Center Management
	Resolution Information	U	(Staff) Gather Resolution Information	System Documentation	C	Documentation Group
				FAQ Database	C	IT Group
				Client Configuration Information	C	
					U	
		C	(Staff) Deliver Resolution Information	Customer Availability (on Callback)	U	Call Center Staff
Call Center Management	Call Data Logged to Customer File and FAQ	C	(Staff) Log Call Data	Call Management Software	C	
				Staff Availability	C	
				Staff Discipline	U	
					U	
	Documented Call Resolution	C	(Automated/Internet) Confirm Resolution with Customer	Web Monitor	C	IT Group (Web Monitor Application)
				(Customer) Internet Access	U	
					U	

# Cause and Effect Matrix (FDM)

	Rating of Importance to Customer	7	10	8	5	
		1	2	3	4	
Process Step	Requirements > Process Inputs	Quickly Connect with a Helpful Person	Get the Information or Results I Need	Apply the Information, with Help if Needed	Understand How to Avoid the Issue Recurring	Total
Answer Call		9				63
	Active phone line	5				35
	Internal call switch	5				35
	Switching software	5				35
Gather Customer Information		3	9	5	5	176
	Available Representative	5	9	5	3	180
	Call Management Software	5	3	5	9	150
Assess Ability to Resolve		9	9	5	3	208
	Database Available		5	3	5	99
	Staff Experience/Training	9	9	5	5	218
Transfer Call (Optional)		9	9	1	1	166
	Available Staff for Transfer	5	9	9	5	222
Gather Resolution Information			8	8	9	189
	System Documentation		7	5	7	145
	FAQ Database		9	9	9	207
	Client Configuration Info		9	7	7	181
Deliver Resolution Information			9	8	5	179
	Available Customer (On Callback)		7	7	5	151
Log Call Data					9	45
	Call Management Software				3	15
	Staff Availability				5	25
	Staff Discipline				7	35

MSA

Measurement Issue	MSA Assessment
Accuracy • Does the measure agree with the "Truth"?	Comparison with a "Golden Standard"
Repeatability • Does the system always produce the same value?	Same person and measurement tool, measuring the same event or work-product
Reproducibility • Will different people get the same results?	Different people measuring the same event or work product
Stability • Is the system accurate over time?	Tracking the accuracy over time

X bar –R Chart for WT
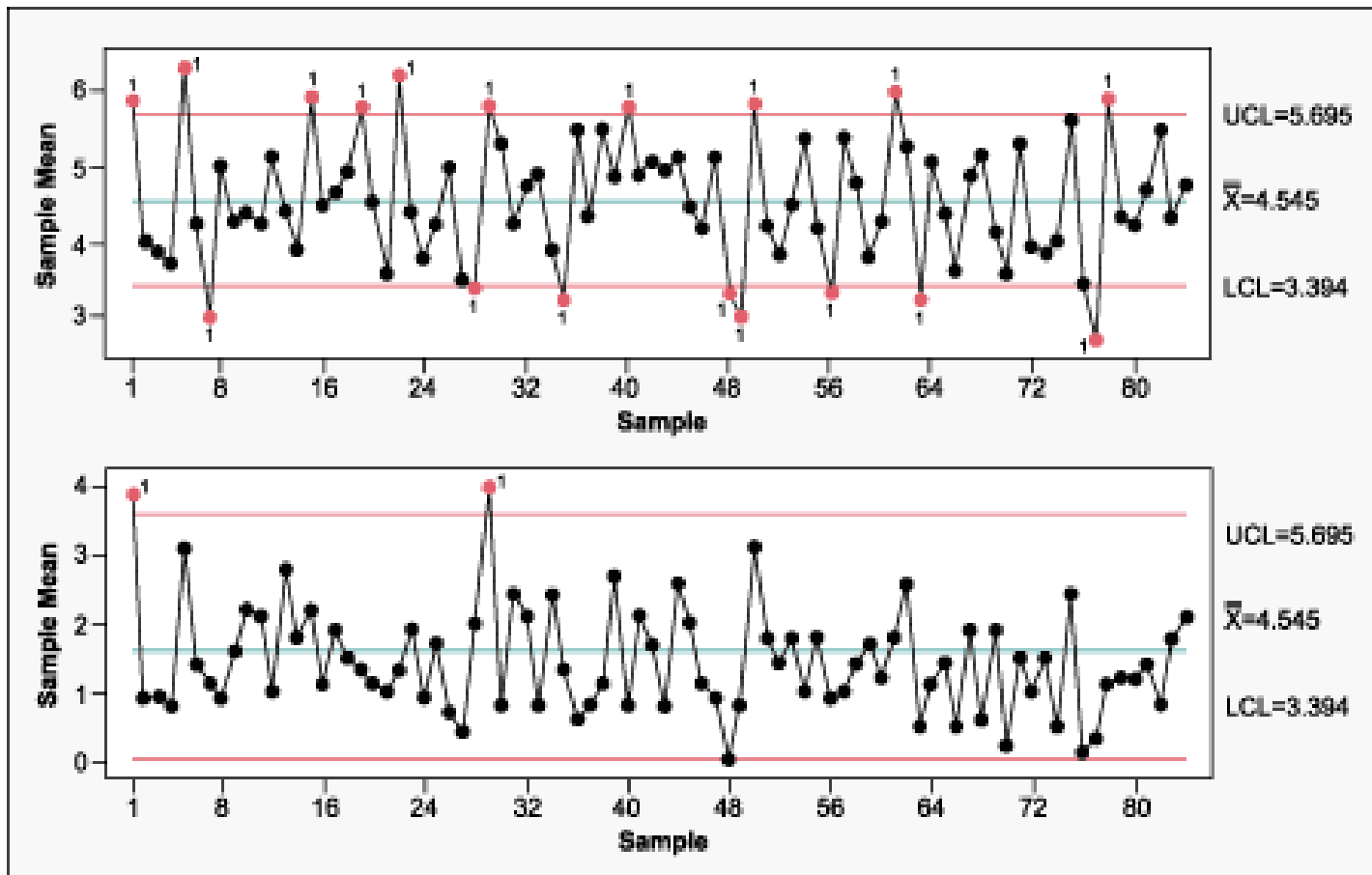
Percentile check

- 75th Percentile = $32.80
  80th Percentile = $33.36
  85th Percentile = $35.42
  90th Percentile = $39.44
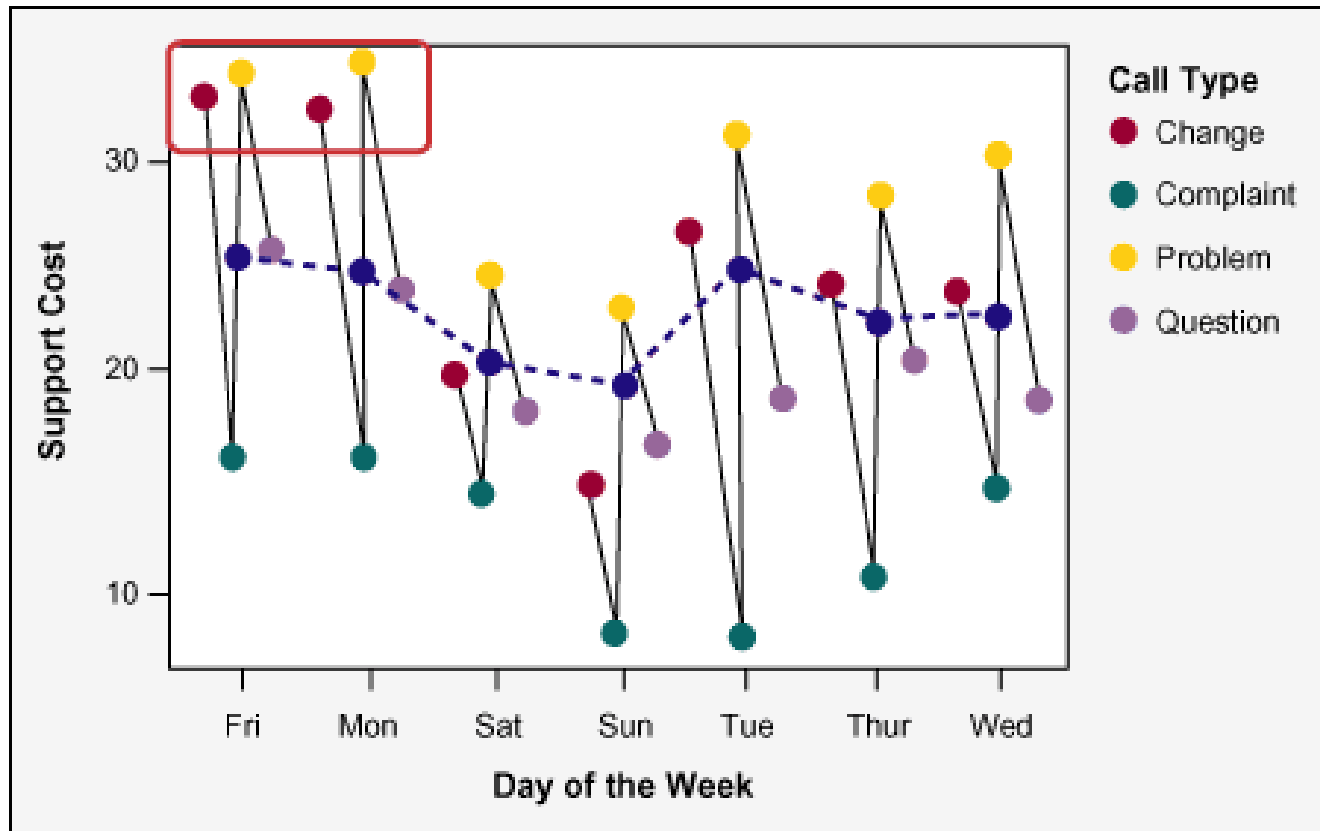 95th Percentile = $42.68
  98th Percentile = $44.73

Analyze

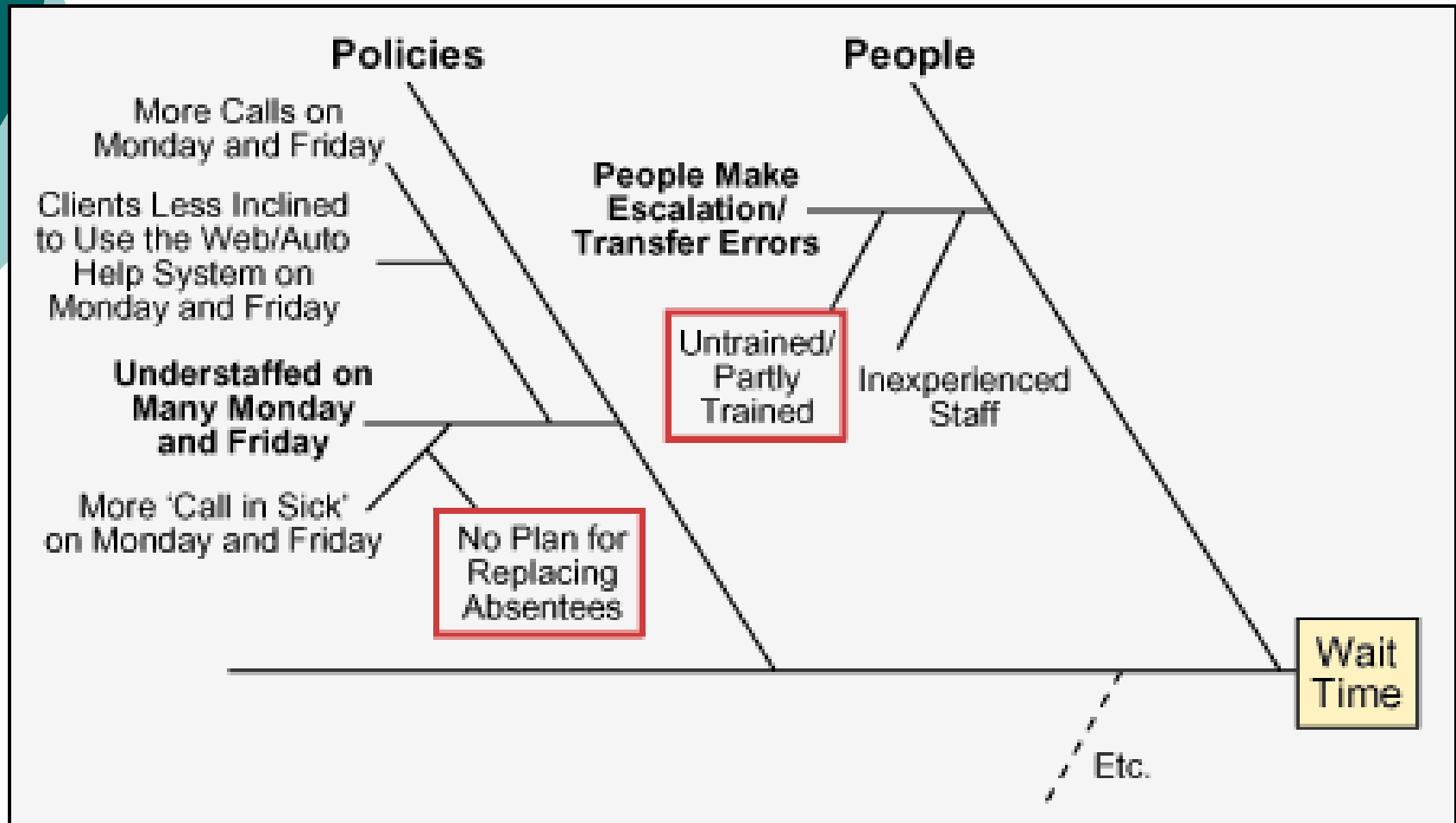| Measure	Capability	Target
Customer Satisfaction	90th Percentile = 75% Satisfaction	90th Percentile = 85% Satisfaction
Support Cost Per Call	90th Percentile = $39	90th Percentile = $32

Multi-Vari Chart

A

The obvious "why's"

1. Why do Problems and Changes cost more than other call types?
2. Why are calls processed on Mondays and Fridays more expensive?
3. Why do transfer rates differ by call type? (higher on Problems and Changes, lower on others)
4. Why are wait times higher on Mondays and Fridays and on Week 13 of each quarter?
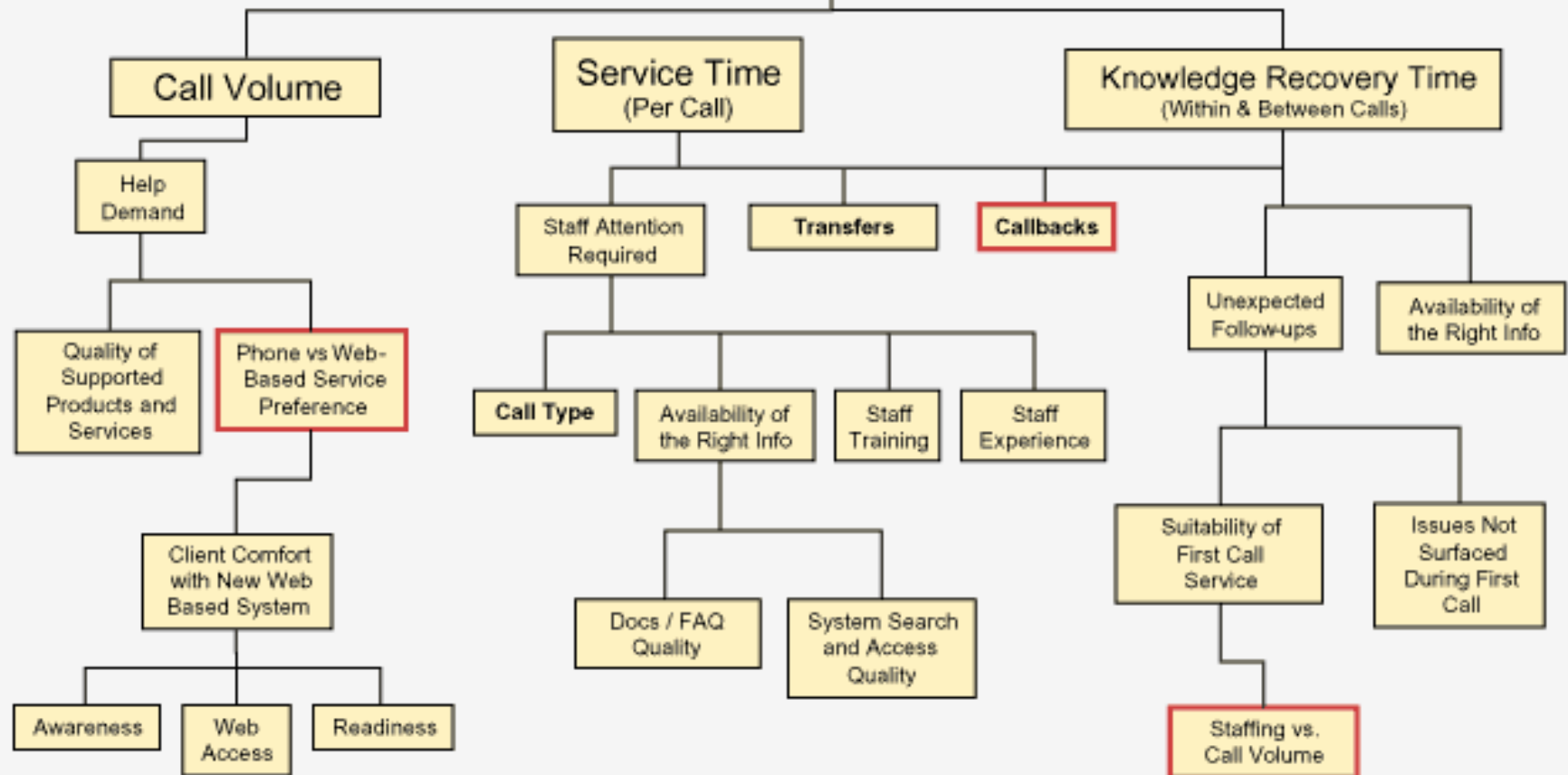
Fish Bone

A

Policies

People

More Calls on Monday and Friday

Clients Less Inclined to Use the Web/Auto Help System on Monday and Friday

People Make Escalation/ Transfer Errors

Untrained/ Partly Trained

Inexperienced Staff

Understaffed on Many Monday and Friday

More 'Call in Sick' on Monday and Friday

No Plan for Replacing Absentees

Wait Time

Etc.

New Insights..

- Volume to staffing ratio – Call volume and staffing had not revealed much when looked at separately. Their ratio may be more interesting.

- Web-to-phone issue call traffic ratio could be computed from the initial data – potentially revealing more insight.

Identify and verify vital x
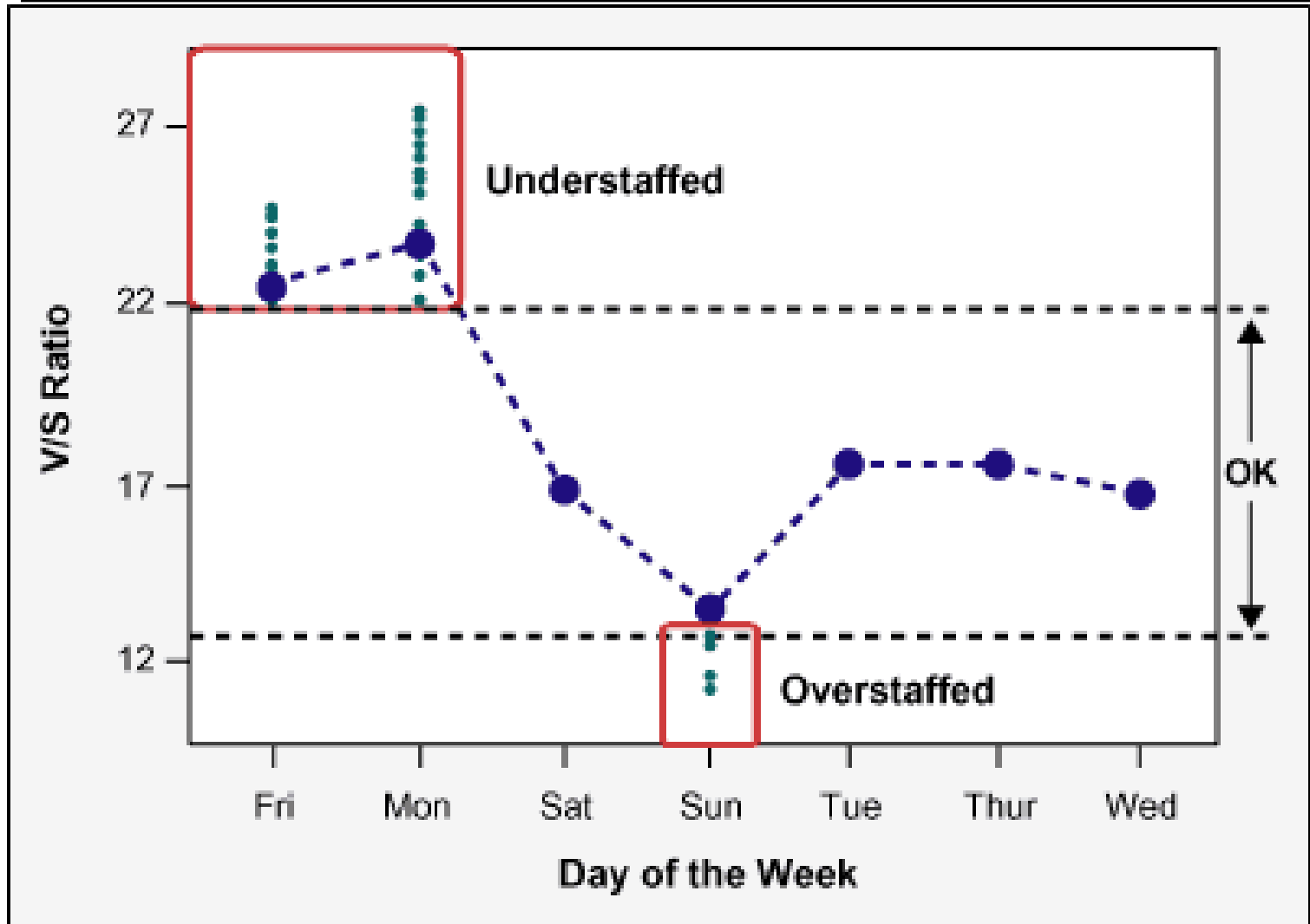
Call backs vs. wait time

- High positive correlation
- Correlation coefficient of 0.96

Identify Solution Alternatives

Driving Xs (from Analyze phase)	Solution Alternatives
Staffing	+ Add staff Mondays and Fridays, reduce staff on Sundays + Develop staffing model + Create on-call list to fill-in for absentees
Web Service Percentage	+ Focus on services that can be done best on the Web + Define and communicate the value proposition to customers + Evaluate incentives to move traffic to the Web
Transfers and Callbacks	+ Improve call center processes to reduce transfers and callbacks without impacting customer satisfaction

I

What are the costs, benefits and risks regarding each CTQ for each of the following stakeholders?

Business: Net value = ($$Benefit – $$Cost) and other benefits and risks.

Customers: Functionality and value.

Employees (as appropriate): Working conditions, interesting work and growth opportunities.

I

CTQs — Highest Level, Smallest Set Needed to Screen the Alternatives ▼		Weight	Current System	Fix the Staffing — First: Increase Friday and Monday Staff, Reduce Sunday	To the Web — Define and Communicate Value Prop, Evaluate Incentives	Master the Game — Reduce Callbacks, Reduce Transfers	◄ Solution Alternatives
Business	Minimize Support Costs	4.5	D A T U M				For Each CTQ… the Team Compares Each Alternative to the DATUM, indicating:
	Minimize Disruption	3					
	Increase Scalability to New Support Business(es)	3.5					Same (S) Better (+) Worse (-)
Customer	Quickly Connect with a Helpful Person	2.5					
	Apply the Information, with Help, if Needed	4					or Score
Staff	Use My Time Well – in a Comfortable Setting Where I Can Readily Please Customers by Providing the Right Help	3.5					
Weighted sum or totals for -, + and S			? + =				
			? - =				
			? S =				

Wait Time vs. V/S ratio

- Simple Regression provided
  $$W = 0.630 + 0.215v/s$$
- The R squared value was 57%

New Account Growth vs. Wait Time

- Simple Regression provided

  N=1.06-.0315 WT
- The R squared value was 62%

The Prediction

○ *The decrease in v/s ratio would lead to WT reduction*

○ *As Is = .63 + (.215 x 23) = 5.57 Minutes*
  To Be = .63 + (.215 x 17.5) = 4.39 Minutes
  5.57 – 4.39 = 1.18 Minute Wait Time Reduction

○ *The likely impact of wait time on new account growth*

○ *As Is = 1.06 – (.0315 x 5.575) = 0.884%*
  To Be = 1.06 – (.0315 x 4.3925) = 0.921%
  .921 – .884 = 0.037% New Account Growth

Cost- Benefit

- *0.037% New Account Growth x 1,484,000 Existing Accounts = 549 New Accounts 549 Accounts x $680 Average Profit Per Account = **$345,870 Incremental Annual Profit***

- *Staff Cost = 14 People x 8 Hours x $30 Per Hour = $4,480 x 50 Weeks = **$168,000*** **$345,870 Incremental Profit – $168,000 Staff Cost = $177,870 Project Net Benefit to Business**
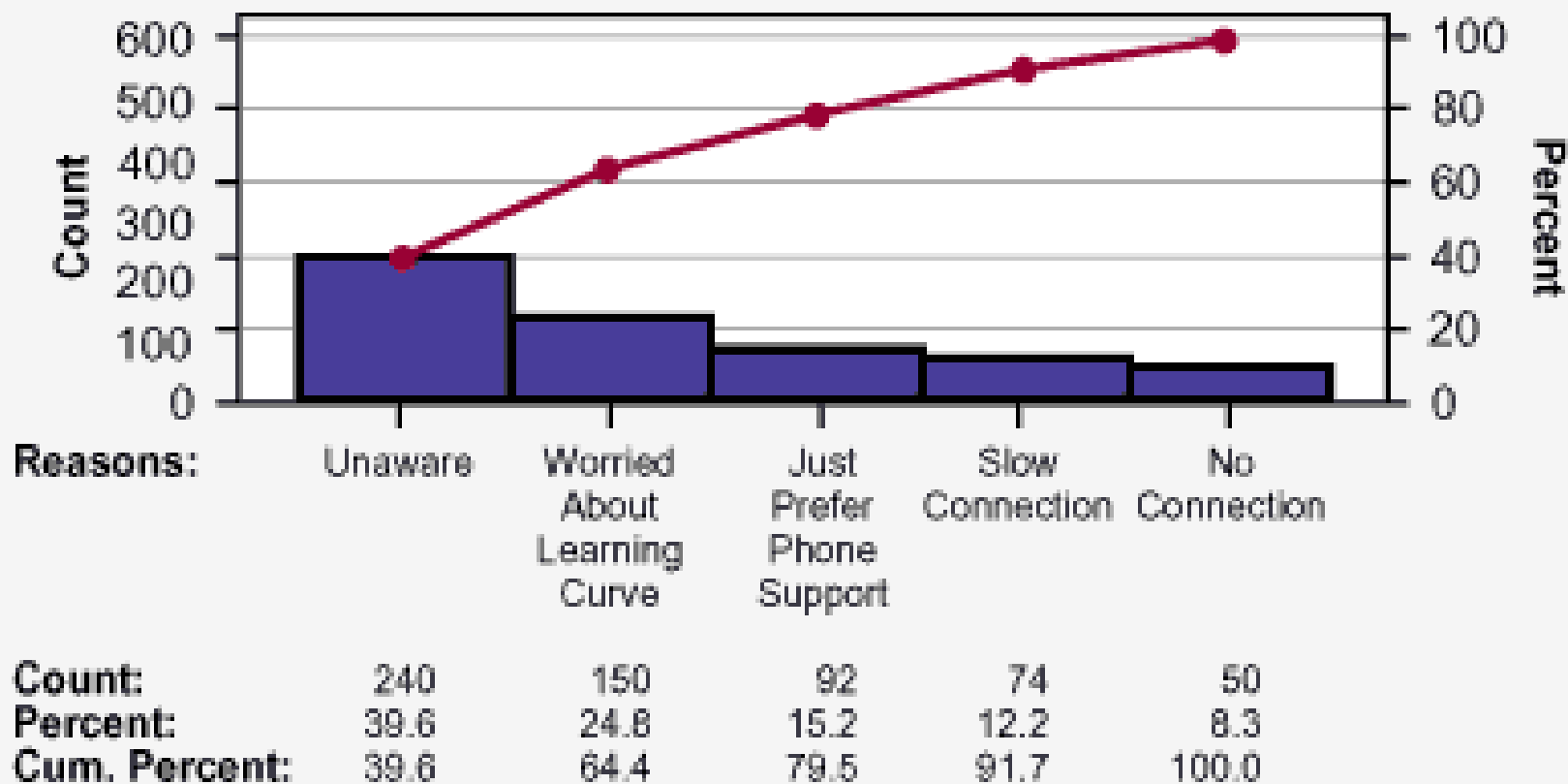
Web Service Implementation Summary

- **Benefit:** $280,080 (savings of $1,167 x 240 days per year).
- **Approach:** Increase client awareness about web service and help clients see how easy it is to use.
- **Risks:** Verify that the web system can handle increased volume. Verify that customer satisfaction does not slip.
- **Method:** Insert in upcoming mailings describing web services and interface. Announcement on the phone router switch that answers all calls.

Why Clients Don't Use the Web-Help Service

Reasons:	Unaware	Worried About Learning Curve	Just Prefer Phone Support	Slow Connection	No Connection
Count:	240	150	92	74	50
Percent:	39.6	24.8	15.2	12.2	8.3
Cum. Percent:	39.6	64.4	79.5	91.7	100.0

Transfer and Callback Implementation Summary

- **Benefit:** $143,293 (annual savings of $104,233 + additional profit of $39,060).
- **Approach:** In a focus group session with current staff, it was learned that almost half had not been trained on policy and system changes implemented nine months before. The data was stratified by those trained and those not. A t-test was used to compare transfer and callback percentages. The comparison showed that the untrained were more than three times as likely to have high percentages (p=.004). The conclusion was to provide training.

Transfer and Callback Implementation Summary

- **Risks:** No way to calculate how quickly the training will drive the percentage down. There may be a learning curve effect in addition to the training. Also making staff available for training is an issue because training is only done on the first Monday of each month.

- **Method:** Considering risks, the decision was made to train 50 percent of those in need of training and evaluate the impact in a three-month pilot program. If that worked, the second half would be trained in the following quarter.

- **Costs:** One day of training for approximately 15 people in the pilot program = cost of training ($750 per student x 15) + cost of payroll (8 hours x $50 x 15) = $14,850. If fully effective immediately, this penciled out to about half of the potential benefit. Discounting for risk, the team projected a first quarter gross (before costs) benefit of approximately $50,000.

Recommendation

- Start with Staffing (the "quick fix"). It is the fastest and surest way to stem the erosion of business growth. ("We recognize it is costly and not highly scalable (to other centers, other languages, etc.). This should be a first step, with the hope that it can be supplanted as the solution elements in other recommendations reduce staff needs.)

- Web Service Percent. Begin right away tracking the call volume and customer satisfaction with this service mode.

- Transfer and Callback reduction. Start right away. This is a net benefit that should work well in parallel with the first two solution elements.

Pilot Plan

- X's to adjust: Staffing level
  (add five for pilot, full increment to wait for evidence that the plan works)

- Y's to be measured for impact and unintended side effects:
  - Wait time, v/s ratio, customer satisfaction, transfers, callbacks, service time.
  - Compare "new staff" versus "old staff" (hypothesis test).
  - Measure monthly to observe learning curve effect, if any.
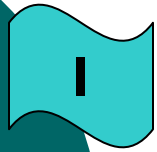
Pilot Plan

○ Measurement system issues: Revise existing sampling plan and data collection process to distinguish new staff from old staff.

○ Because the current customer satisfaction sampling gives only 1 data point per month (not enough to see a change), arrange a special sample – five per day for the first 60 days of the pilot (80 percent from existing staff, 20 percent from new staff).

○ People and logistics issues: Communicate what is happening and why. Emphasize evaluation is not of individuals, but only of overall impact.

Before – After

1. Did the additional staffing, and the resulting change in V/S ratio, impact wait time as expected?

The team looked at the results month by month to see if there was a learning curve effect with the new staff. There was an effect, but the new staff nearly caught up by the end of the third month. During the first month, "new staff" calls took 7 minutes longer than "old staff" calls. During the second month, the difference was down to 2.5 minutes. And by the third month, the difference was about 1 minute.

Two-Sample T-Test for Call Length – Month 1 New & Old

	N	Mean	StDev	SE Mean
M1 New	16	16.95	4.63	1.2
M1 Old	16	10.71	3.74	0.93

Difference = mu (M1 New) - mu (M1 Old)
Estimate for Difference: 6.23750
95% CI for Difference: (3.19750, 9.27750)
T-Test of Difference = 0 (vs not =): T-Value = 4.19   P-Value = 0.000   DF = 30
Both Use Pooled StDev = 4.2102

Two-Sample T-Test for Call Length – Month 2 New & Old

	N	Mean	StDev	SE Mean
M2 New	16	14.70	3.61	0.90
M2 Old	16	12.16	3.51	0.88

Difference = mu (M2 New) - mu (M2 Old)
Estimate for Difference: 2.53750
95% CI for Difference: (-0.03358, 5.10858)
T-Test of Difference = 0 (vs not =): T-Value = 2.02   P-Value = 0.053   DF = 30
Both Use Pooled StDev = 3.5608

Two-Sample T-Test for Call Length – Month 3 New & Old

	N	Mean	StDev	SE Mean
M3 New	16	12.38	4.13	1.0
M3 Old	16	11.28	4.03	1.0

Difference = mu (M3 New) - mu (M3 Old)
Estimate for Difference: 1.10000
95% CI for Difference: (-1.84490, 4.04490)
T-Test of Difference = 0 (vs not =): T-Value = 0.76   P-Value = 0.452   DF = 30
Both Use Pooled StDev = 4.0785

Before - After

2. Did wait time decrease as expected?

- Wait time was lower by 10 percent – just what was expected when the staff was increased by 10 percent.

	N	Mean	StDev	SE Mean
Wait Time	48	5.558	0.978	0.14
New Wait Time	48	5.002	0.823	0.12

Difference = mu (Wait Time) - mu (New Wait Time)
Estimate for Difference: 0.556250
95% CI for Difference: (0.189893, 0.922607)
T-Test of Difference = 0 (vs not =): T-Value = 3.01   P-Value = 0.003   DF = 94
Both Use Pooled StDev = 0.9039

Two-Sample T-Test for Wait Time & New Wait Time

Before After

3. Did the new staff have any impact on transfers?

○ New staff had slightly more transfers, but the number was not statistically significant.

	N	Mean	StDev	SE Mean
M1 New Transfers	48	1.44	1.25	0.18
M1 Old Transfers	47	1.17	1.01	0.15

Difference = mu (M1 New Transfers) - mu (M1 Old Transfers)
Estimate for Difference: 0.267287
95% CI for Difference: (-0.196471, 0.731045)
T-Test of Difference = 0 (vs not =): T-Value = 1.14   P-Value = 0.255   DF = 93
Both Use Pooled StDev = 1.1381

Two-Sample T-Test for Transfers – Month 1 New & Old

Before After

4. Did the new staff have any impact on callbacks?

- New staff had 1.5 times more callbacks. This was a concern. The team needed to determine if this was a learning curve issue, and if not, how the additional callbacks can be controlled.

	N	Mean	StDev	SE Mean
Callbacks	48	0.625	0.789	0.11
New Callbacks	48	2.19	2.64	0.38

Difference = mu (Callbacks) - mu (New Callbacks)
Estimate for Difference: -1.56250
95% CI for Difference: (-2.35186, -0.77314)
T-Test of Difference = 0 (vs not =): T-Value = -3.93   P-Value = 0.000   DF = 94
Both Use Pooled StDev = 1.9476

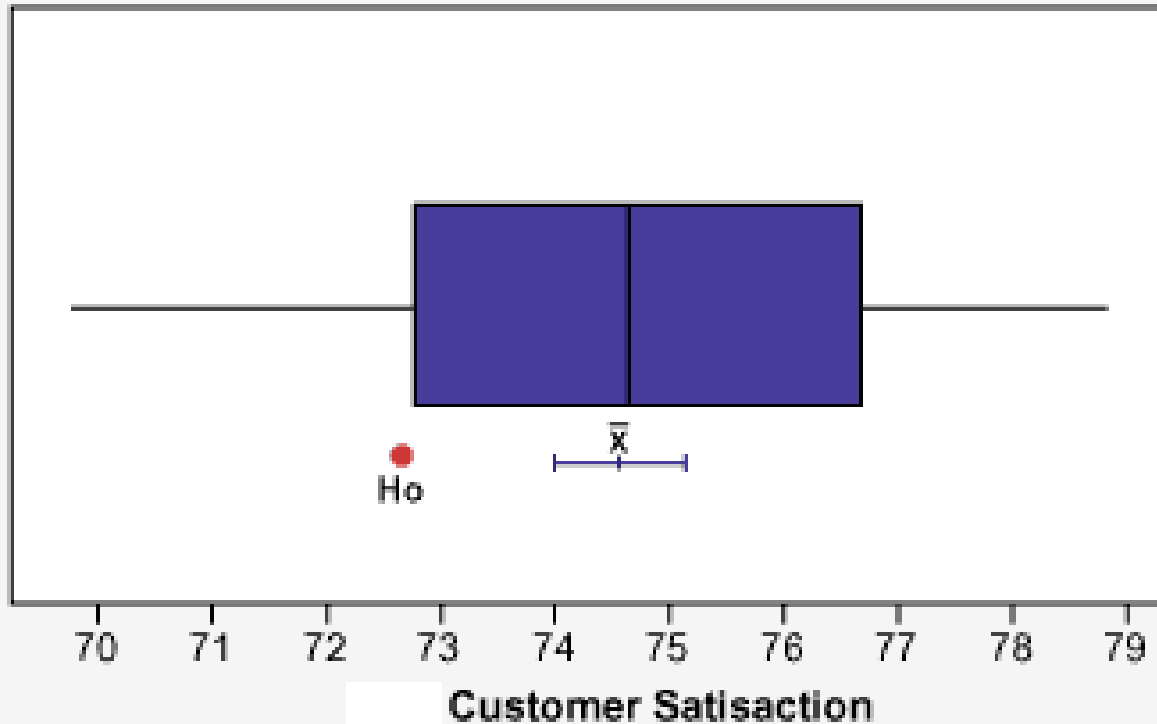**Two-Sample T-Test for Callbacks & New Callbacks**

Before After

5. What happened to customer satisfaction?

- New data on customer satisfaction after the pilot program confirmed the team's expectation of improvement. The company moved from less than 73 percent to about 74.5 percent.

New Box-plot for Customer Satisfaction

Validations

- Wait time was reduced by ~ 10 percent (to 5 minutes).
  - Volume/staff ratio was reduced to 1100/54 = 20.37 (versus. 23 before).
  - Predicted wait time = .63 + (.214 x 20.37) = 5.0 (agrees with actual).
- New staff had longer service time initially, but reached group average in three months (reflects learning curve).
- New staff had slightly more transfers, but not statistically significant.

Validations

- New staff had an average of about 1.5 more callbacks. This may need to be addressed, but is likely related to learning curve.

  - If transfers are the same as before and callbacks increase by
    [.10 x 1.5 = .015 the impact on wait time = 3.68 + (.643 x 1.23) + (.139 x .505)] = 5.41
    (i.e. negligible impact, as before the change the number was 5.40)

- Customer Satisfaction had increased, and the change was significant.

- Conclusion: The Monday staffing pilot program was a success and the team recommended full implementation.

Development of Control Plan

- The management control plan needed to consider individual preferences so as to deliver enough – but not too much – information.

- Operational control information included both controllable and "noise" variables. Operational control information was provided more frequently than management control information.

Determine Improved Capability

C

Measure	Baseline	Target	Current
Business Growth	1%	3%	Requires More Time to Measure
Customer Satisfaction	90th Percentile = 75% Satisfaction	90th Percentile = 85 Satisfaction	Need More Data
Support Cost Per Call	90th Percentile = ~ $40	90th Percentile = $32	~ $35

Determine Improved Capability

Support Cost Baseline	Support Cost Improved
$37.50	$33.40
$36.00	$34.00
$38.40	$33.50
$40.00	$33.90
$39.90	$33.50

Two-Sample T for
Support Costs Baseline vs. Support Costs Improved Process

	N	Mean	StDev	SE Mean
Support Costs Ba	45	37.84	1.84	0.27
Support Costs Im	45	33.722	0.983	0.15

Difference = mu (Support Costs Baseline) - mu (Support Costs Improved Process)
Estimate for Difference: 4.11333
95% CI for Difference: (3.49307, 4.73359)
T-Test of Difference = 0 (vs not =): T-Value = 13.24   P-Value = 0.000   DF = 67

Determine Improved Capability

- **Days to Close** – Team determined the 95th percentile value for the improved process days to close during the pilot was 3 days.

- **Wait Time** –The baseline (calculated during M-A) was 90th percentile = 5.8 minutes, and the improved capability 90th percentile was 4.4 minutes.

- **Transfers** – The team determined the 90th percentile baseline to have been 3.1 or less and the improved process value was 1.9 transfers.

- **Service Time** – Baseline mean service time was 10 minutes with a 95 percent confidence interval of 9.7 to 10.4 minutes, while the improved mean was 8.8 minutes with a 95 percent confidence interval of 8.6 to 8.9 minutes.

Control Charts Implemented - Example Control Chart – Days to close problems
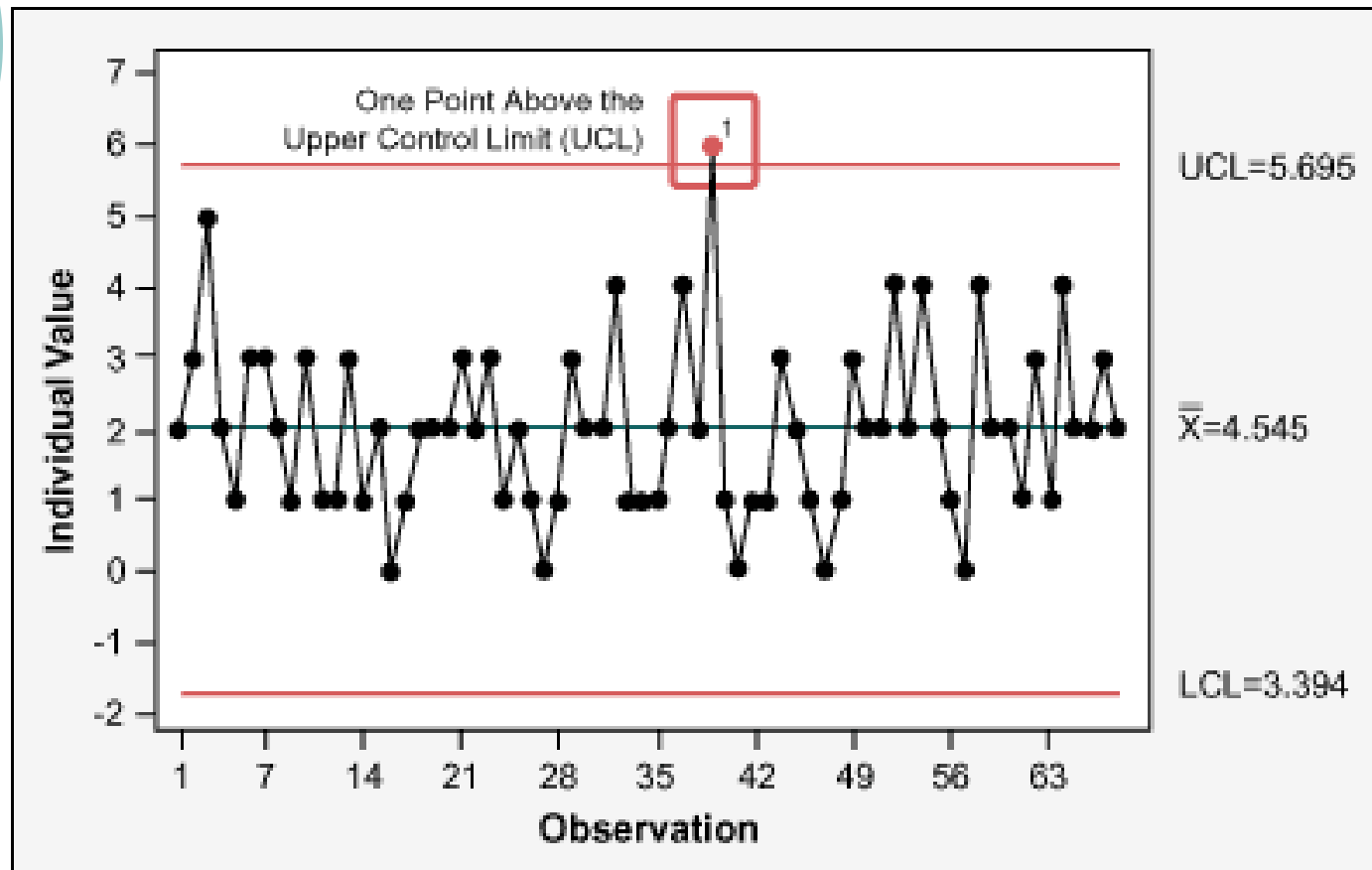
Dashboards created

- Both for Senior VP and the Call Center Manager.
- These covered X's (KPIV's) and Y's (KPOV's)

Transfer Ownership

- Developing and executing a plan to implement the improved process, including any necessary training.
- Developing and executing a communication plan that informed all those affected by the change.
- Conducting a transition review with key managers and staff, making adjustments and improvements they suggested.
- Establishing the timeline and responsibilities for the transfer, and executing the transition process.

Transfer Ownership

- After an agreed interval, validating the financial benefits in conjunction with a representative of the finance department.
- Conducting a project post-mortem from multiple perspectives – the team, the Champion/sponsor, and the financial results. (Emphasis on process improvement, not critiques of individual performance.)
- Archiving in an accessible repository what the project team learned so other teams can benefit from it. (Special emphasis on items that have potential for re-use, and a "road-show" or poster presentation to communicate project results.)

Project Closure

- **Celebrations!** …along with well-deserved acknowledgment of team contributions (both the Six Sigma project team and the operations team).