



Six Sigma DMAIC Improvement Story

**Black Belt Project Objective:
To Reduce the Percentage of Citation Cases
Lost on Appeal**

Last Updated: 12-16-13

Team: The Enforcers

Bill Busutil (Team Leader)

Mayra Morales

Willie Johnson

Luis Vargas

Joe Bolufe

Asha Ellis

Kenny Fountain

Teri Smart

Ghislaine Johnson

Paul Mauriello (Sponsor)

Michael Moore (Sponsor)



Lean Six Sigma Problem Solving Process

The team utilized the 5-Step DMAIC problem solving process.

DMAIC Performance Improvement Process

Process Step		Description of Team Activities
Number	Name	
1	DEFINE	<ul style="list-style-type: none"> • Select Problem • Identify Project Charter • Develop Project Timeline • Establish Method to Monitor Team Progress • Construct Process Flowchart • Develop Data Collection Plan • Display Indicator Performance “Gap”
2	MEASURE	<ul style="list-style-type: none"> • Stratify Problem (i.e. “Gap”) • Identify Problem Statement
3	ANALYZE	<ul style="list-style-type: none"> • Identify Potential Root Cause(s) • Verify Root Cause(s)
4	IMPROVE	<ul style="list-style-type: none"> • Identify and Select Improvement(s) • Identify Barriers and Aids • Develop and Implement Improvement Plan • Confirm Improvement Results
5	CONTROL	<ul style="list-style-type: none"> • Standardize Improvements within Operations • Implement Process Control System (PCS) • Document Lessons Learned • Identify Future Plans



Identify Project Charter

The team developed a team Project Charter.

Project Charter		
Business Case	Project Name:	To Reduce the Percentage of Solid Waste Citation Cases Lost on Appeal 2. ✓
	Problem/Impact:	Too many citations for illegal dumping and other violations are lost on appeal. This discourages compliance and negatively impacts employee morale in PWWM's Enforcement Section. 1. ✓
	Expected Benefits:	Reduced % of citation cases lost on appeal; improved employee morale; improved compliance.
Objectives	Outcome Indicator(s)	Q1- % of citation cases lost on appeal
	Proposed Target(s)	Target = 15% of citation cases lost on appeal - which is a 48 % improvement from current performance of 29%
	Time Frame:	August 2013 thru December 2013
	Strategic Alignment:	Supports PWWM's Business Plan
Scope	In Scope:	Citations issued by PWWM's Solid Waste Enforcement Section
	Out-of-Scope:	Other Citations
	Authorized by:	Michael Moore
Team	Sponsor:	Paul Mauriello and Michael Moore
	Team Leader:	Bill Busutil
	Team Members:	Mayra Morales, Willie Johnson, Luis Vargas, Joe Bolufe, Asha Ellis, Kenny Fountain, Teri Smart, Ghislaine Johnson
	Process Owner(s):	Willie Johnson
	Mgmt Review Team:	Michael Moore, Paul Mauriello
Schedule	Completion Date:	13-Dec-13
	Review Dates:	Monthly Reviews
	Key Milestone Dates:	See Action Plan



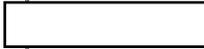
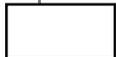
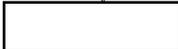
Develop Project Timeline Plan

The team developed a timeline plan to complete the Project.

4. ✓

Legend:	
	= Actual
	= Proposed

WHAT: Complete DMAIC Story Project by Dec.13, 2013

DMAIC Story Process Step	WHEN					
	2013					
	Aug	Sept	Oct	Nov	Dec	Jan
1. Define		  Completed 9/27/13				
2. Measure		  Completed 10/1/13				
3. Analyze			  Completed 10/1/13			
4. Improve				  Completed 12/5/13		
5. Control					 Ongoing	



Monitor Team Progress

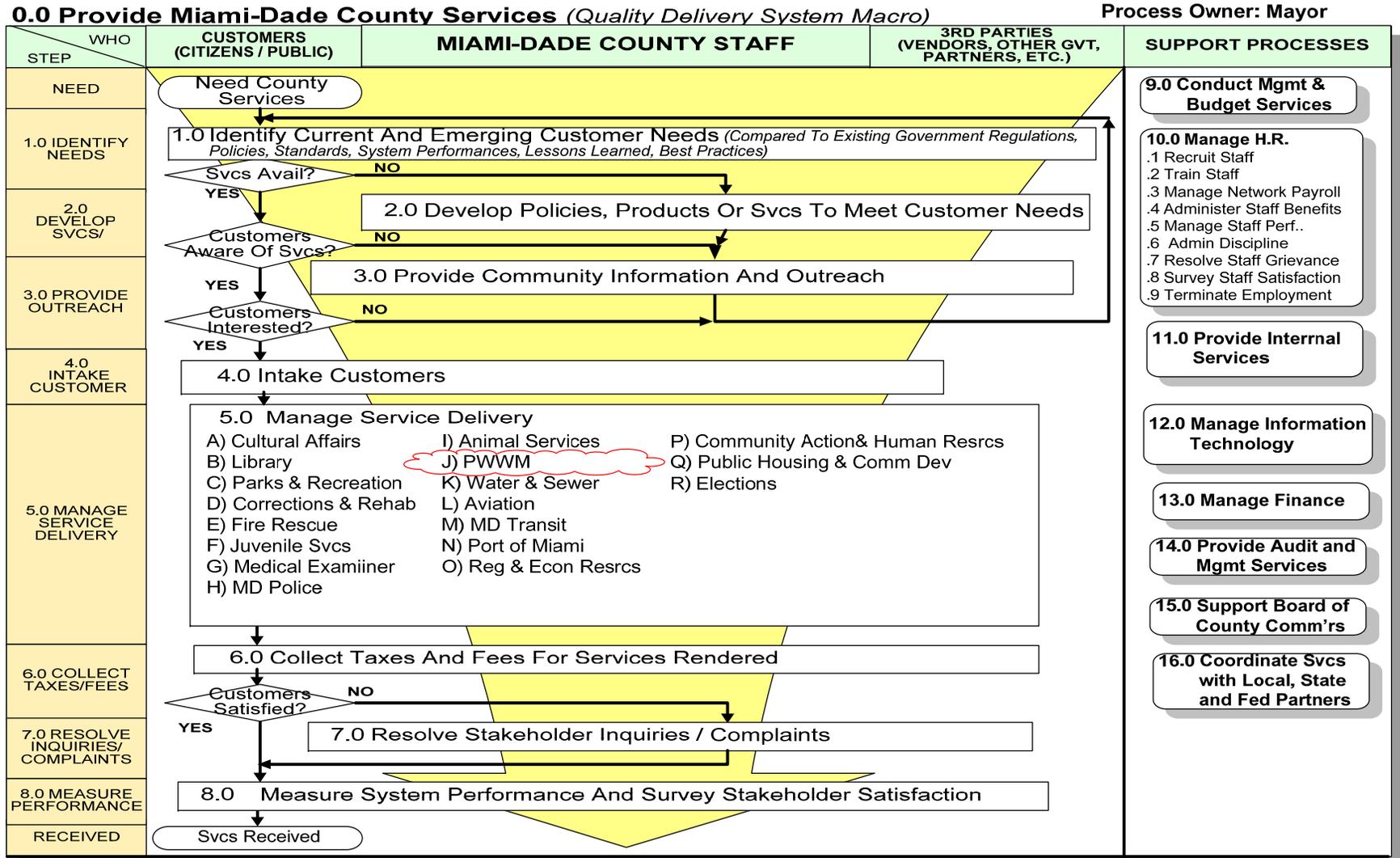
The Team and Management used a Checklist to monitor team progress.

DMAIC Story Checkpoints		
PLAN	Step 1 Define	Objective: Demonstrate the importance of improvement needs in measurable terms.
		1. The stakeholders' need(s) were identified. ✓
		2. The problem can be described as an "object" with a "defect" with unknown cause(s) that need to be identified. ✓
		3. A line graph outcome indicator was constructed that appropriately measures the problem (or gap). ✓
	Step 2 Measure	Objective: Investigate the features of the indicator, stratify the problem and set a target for improvement.
		4. A schedule for completing the five DMAIC Story steps was developed. ✓
		5. Data contained or directly linked to the indicator were stratified from various viewpoints (i.e., what, where, when and who) and a significant dataset was chosen. ✓
		6. A target for improvement was established based on the stakeholders' need. ✓
	Step 3 Analyze	Objective: Analyze the stratified data to identify and verify the root causes.
		7. The impact of the target on the indicator was determined. ✓
		8. A problem statement that describes the "remaining dataset" was developed. ✓
		9. Cause and effect analysis was taken to the root level. ✓
DO	Step 4 Improve	Objective: Develop and implement countermeasures to eliminate the verified root causes of the problem.
		10. Potential causes most likely to have the greatest impact on the problem were selected. ✓
		11. A relationship between the root causes and the problem was verified with data. ✓
		12. The impact of each root cause on the gap was determined. ✓
	Step 5 Control	Objective: Confirm that the countermeasures taken impacted the root causes and the problem; and that the target has been met.
		13. Countermeasures were selected to address verified root causes. ✓
		14. The method for selecting the appropriate countermeasures was clear and considered effectiveness and feasibility. ✓
		15. Barriers and aids were determined for countermeasures worth implementing. ✓
CHECK	Step 5 Control	16. The action plan reflected accountability and schedule. ✓
		Objective: Evaluate the team's effectiveness and plan future activities.
		17. The effect of countermeasures on the root causes was demonstrated. ✓
		18. The effect of countermeasures on the problem (or indicator) was demonstrated. ✓
		19. The improvement target was achieved and causes of significant variation were addressed. ✓
ACT	Step 5 Control	20. The effect of countermeasures on the indicator representing the stakeholders' need was demonstrated. ✓
		Objective: Prevent the problem and its root causes from recurring. Maintain and share the gains.
		21. A method was established to document, permanently change, and communicate the revised process or standard. ✓
		22. Responsibility was assigned and periodic checks scheduled to ensure compliance with the revised process or standard. ✓
		23. Specific areas for replication were identified. ✓
	Step 5 Control	24. Any remaining problems (or gaps) were addressed. ✓
		25. Lessons learned, P-D-C-A of the Story process, & team growth were assessed & documented. ✓



Review Quality Delivery System

The team reviewed the Miami-Dade Quality Delivery System.



The team will focus on a "core" delivery process in the PWWM Enforcement area.



Estimated Costs of Time Spent on Lost Citation Appeals

Annual Cost¹

- Enforcement Officers' time spent on lost citation appeals..... \$63,365
- Supervisors' time spent on lost citation appeals..... \$ 4,652

Total time spent on lost citation appeals..... \$68,017

Footnote:

1. Estimates include personnel costs only.

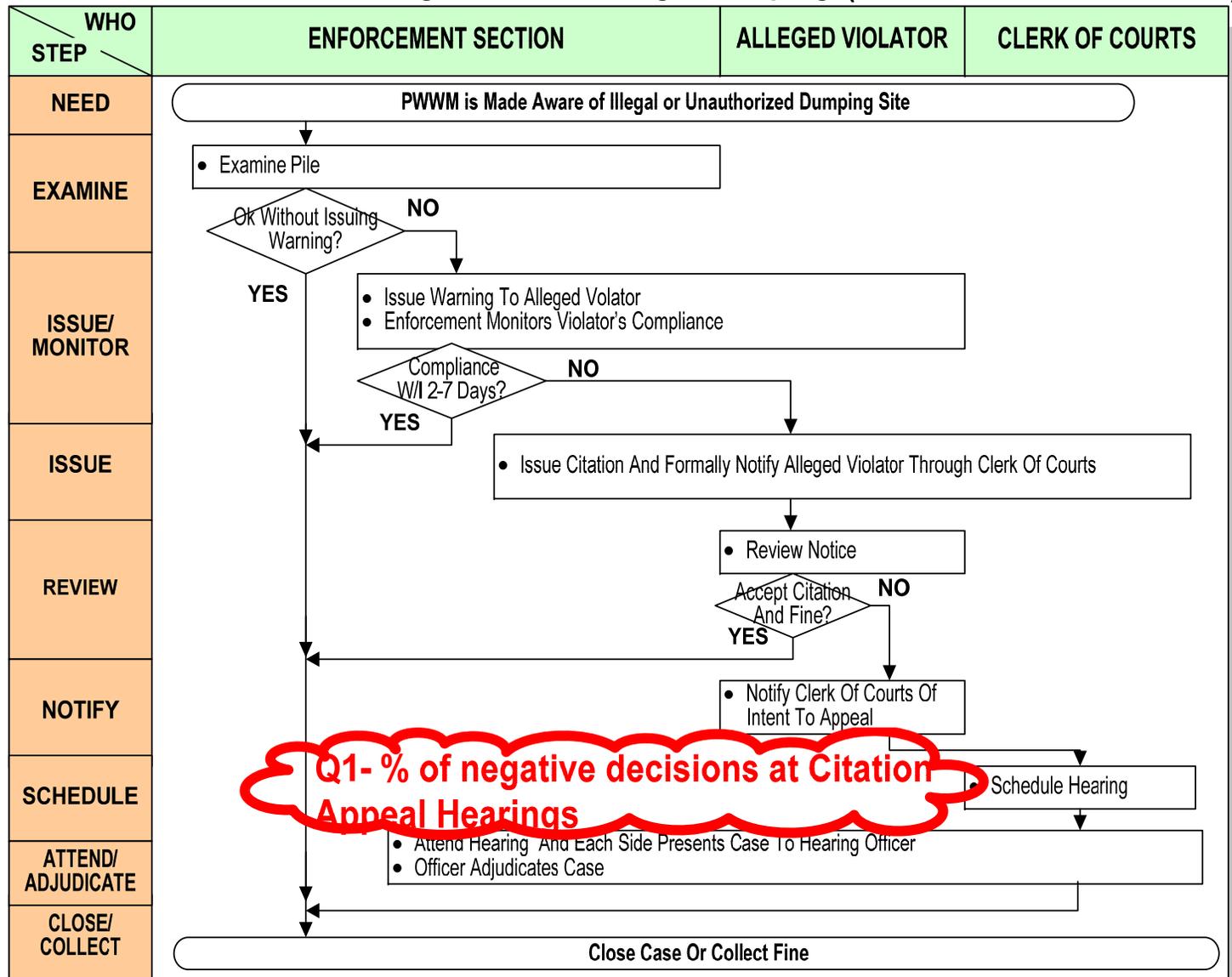


Review Process Flow Chart

The team constructed a Process flow chart describing the Process.

The team looked **closer** at how to capture indicator data.

PWWM – Citation and Hearing Process for Illegal Dumping (Process Owner: Willie Johnson)



Q1- % of negative decisions at Citation Appeal Hearings



Identify Data Collection Needs

The team developed a data collection spreadsheet...

PWWM Citation Appeals Data Summary

BCB	DEMOGRAPHICS												
	WHAT	WHO			WHAT				WHERE	WHAT	WHERE		
	B	C	D	E	F	G	I	J	K	M	N	R	T
Line #	Citation#	Officer Name	Type of Offender	Folio #	Reference #	Code Chapter & Subsection	Size of Pile (yards)	Type of Waste	Type of Offense	District	Vacant/Developed	Folio Address	Dumping Locn Zoning
								Avg					
							0.6						
138	B10062	GREG BETHEL	NON-PROPERTY OWNER		105	15-17	0	MIXED	OTHERS	7	DEVELOPED	10801 SW 109 CT	RESIDENTIAL

MILESTONE DATES					DURATION				OUTCOMES						
U	W	X	Y	Z	AA	AB	AC	AD= Y-U	AE= AA-Y	AF= AC-AA	AG= AC-U	AP	AY	BB	
Date Reported		Date of Warning		Date of Citation		Date of Hearing	Reported TO Warning	Warning TO Citation	Citation TO Hearing	Reported TO Hearing	Hearing Decision	Hearing Officer	Fine \$		
Date	Military Hr	Day	Date	Day	Date	Day	%Mo	%Mo	%Mo	%Mo	%AFFIRMED		Average		
	Avg	%Mo		%Mo		%Mo			Avg Days						
		16.7		5.6		11.1	0.0	-2.0	9.7	92.9	93.5	0.0	\$399		
							P1	P2	P3	P4	Q1				
1/18/13		Fr			1/18/13	Fr		6/27/13			160	160	DISMISSED	JACKSON-HOLMES, FLORA	\$510



Definitions of Citation Appeals Hearing Decisions 3.

“Withdrew” and “Affirmed” are positive Appeal Hearing Decisions:

- **Withdrew:** An alleged violator withdraws his/her appeal
- **Affirmed:** A hearing officer rules in favor of a citation or fine issued by PWWM

“Dismissed”, “Reversed” and “Void” are negative Appeals Hearing Decisions:

- **Dismissed:** A citation or fine issued by PWWM is dismissed at an appeal hearing
- **Reversed:** A hearing officer reverses the charges in a citation issued by PWWM
- **Void:** PWWM decides to discontinue pursuing the charges in a citation

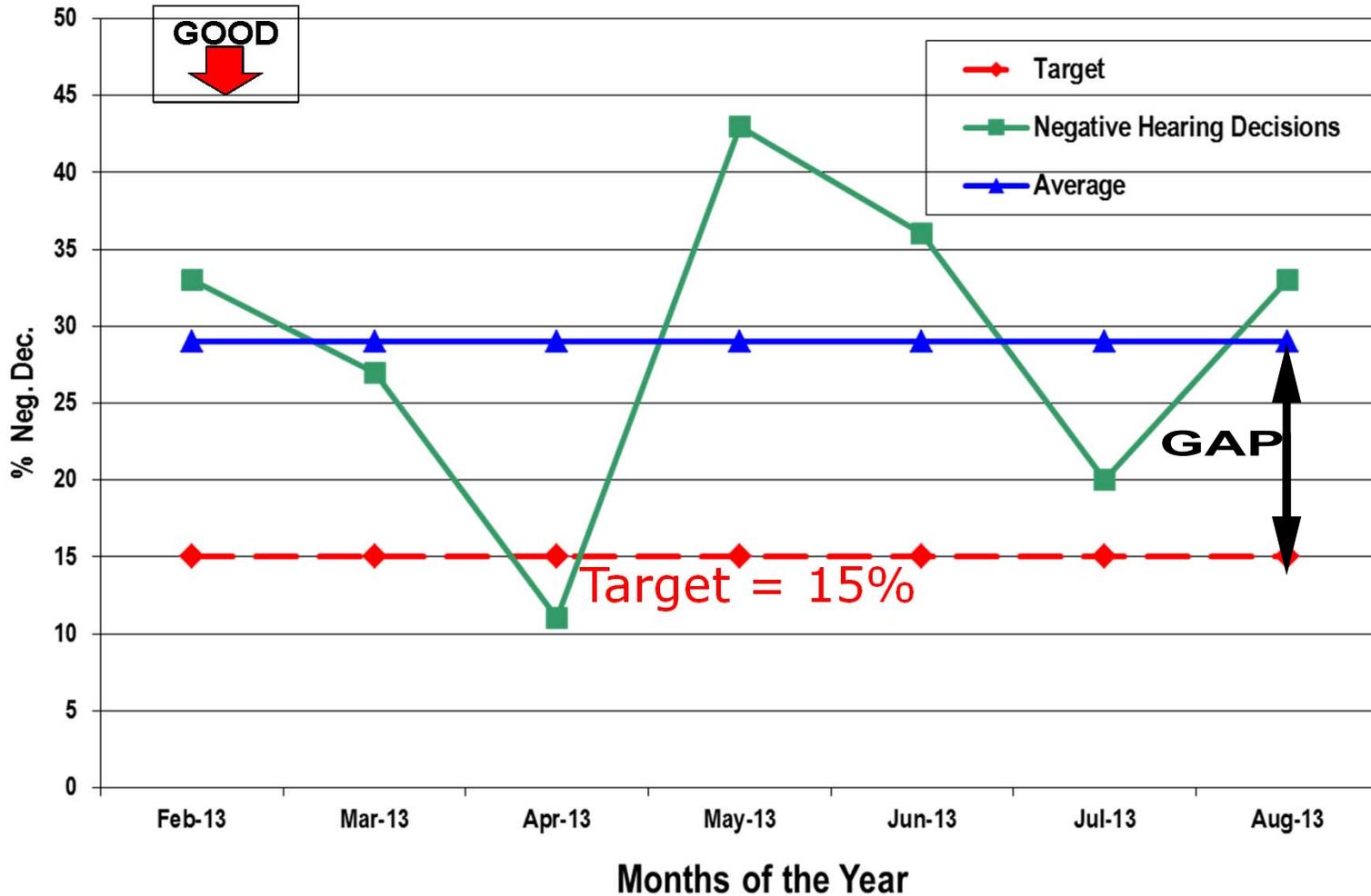
“No Show” is a neutral Appeals Hearing Decision, signifying that the alleged violator did not appear at his/her appeal hearing



Review Selected Indicator

The team collected indicator data and reviewed performance trends:

Q1 - % of Negative Decisions at Citation Appeal Hearings



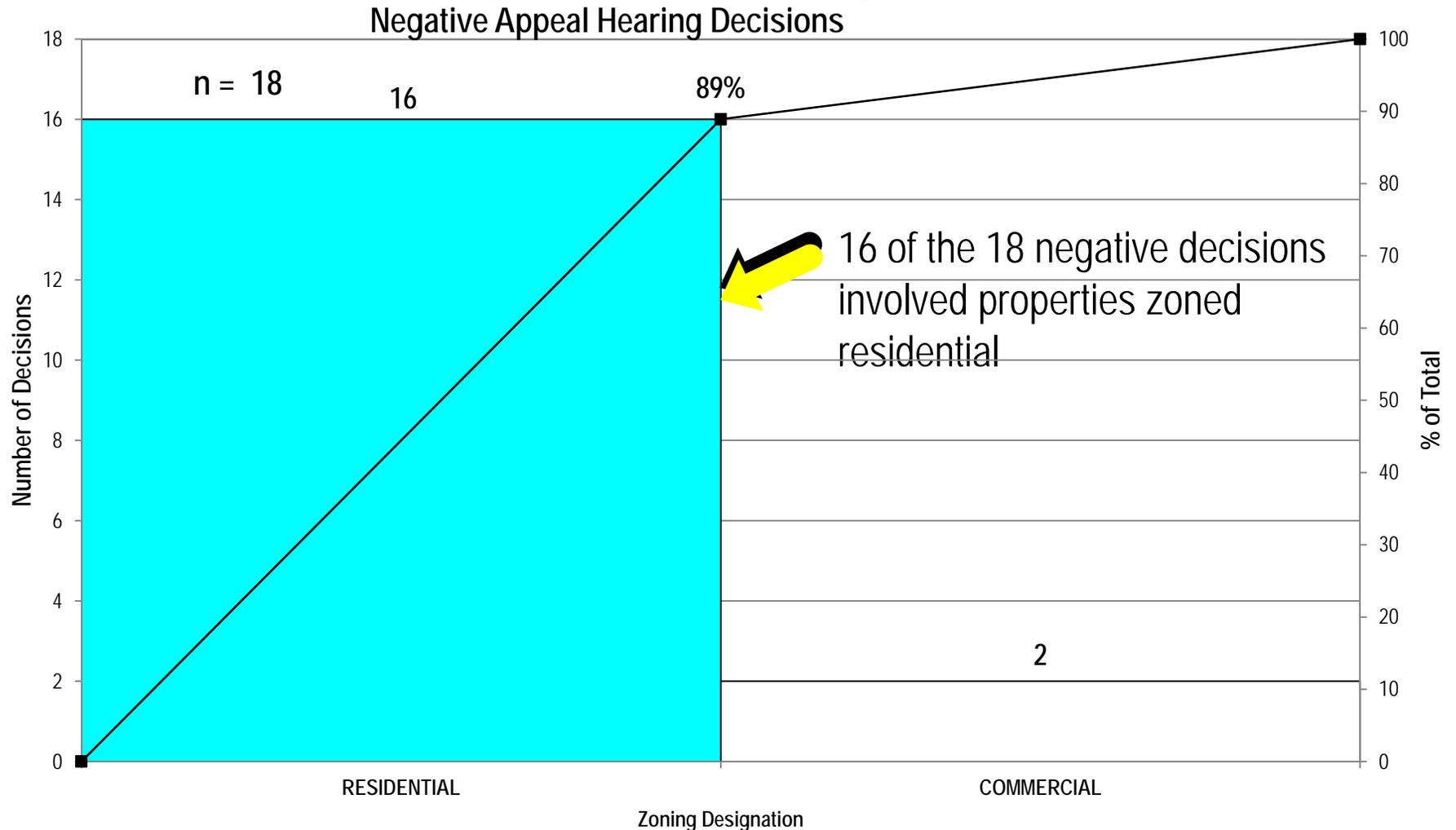
3.

The team looked more closely at the negative appeal hearing decisions.



Stratify the Problem

The team stratified the 18 Negative Appeals Hearing Decisions and found...



Problem Statement: 16 of the 18 negative appeal hearing decisions from February 2013 to August 2013 involved properties zoned residential



Identify Potential Root Causes

The team reviewed 16 cases and conducted Single Case Bore Analysis.

Problem Statement: 16 of the 18 negative appeal hearing decisions from February 2013 to August 2013 involved properties zoned residential

Reasons or Factors (Contributing to Negative Appeal Decisions)	16 Citation Appeals Reviewed																	
	B158156	B132134	B155790	B151270	B158015	B104282	B152872	B158109	B156011	B152711	B158103	B152862	B142968	B156034	B132134	B133573		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1) Erroneous decision by Hearing Officer A					X	X	X						X	X			5	31%
2) Citation issued to wrong property owner B	X	X	X		X										X		5	31%
3) Insufficient evidence D				X								X					2	12%
4) New evidence led to dismissal C									X	X						X	3	19%
5) Business closed same day as citation issued								X									1	6%

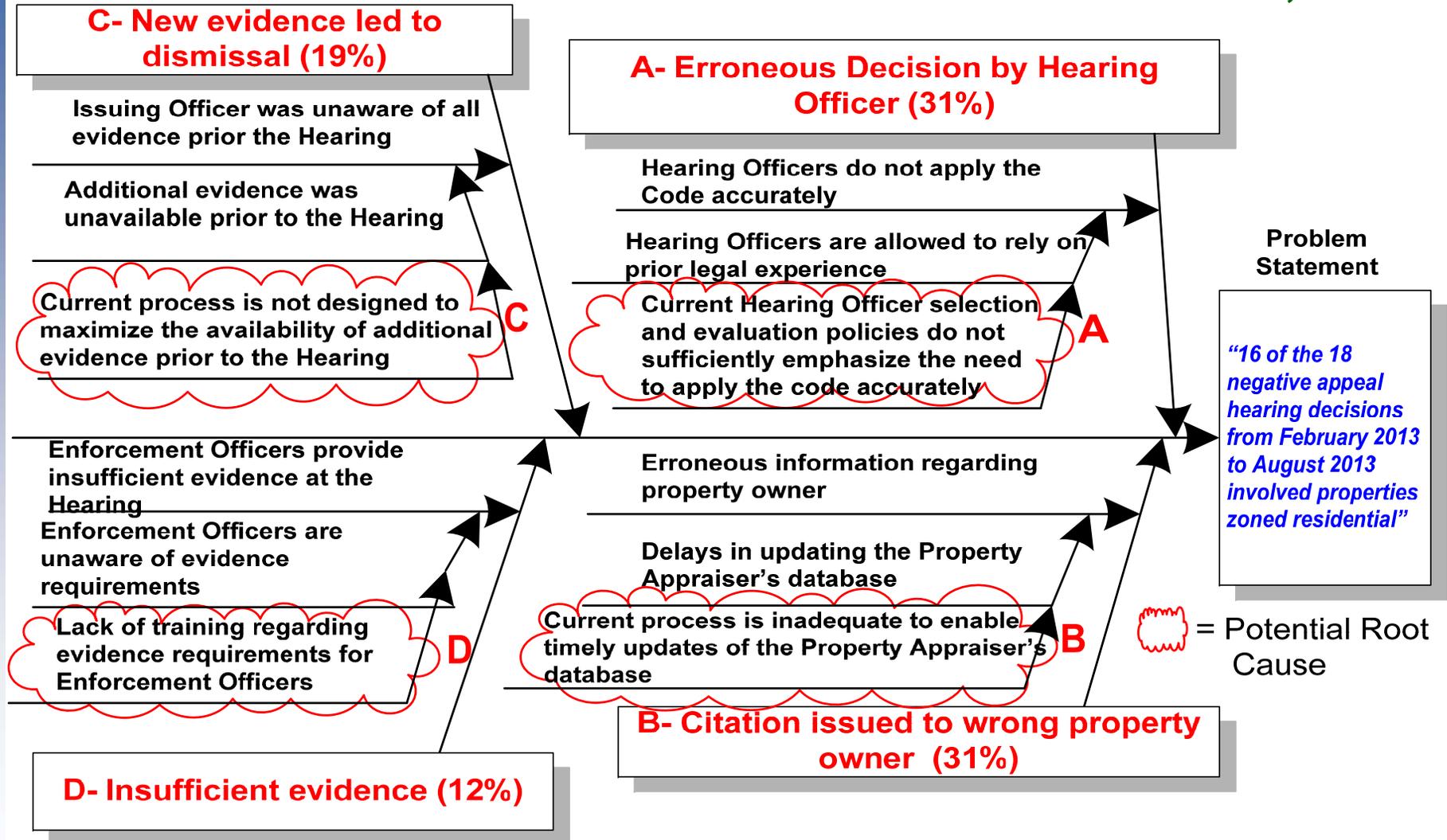
The team identified potential root causes for these 4 factors.



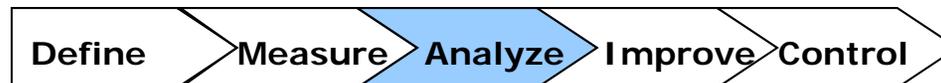
Identify Potential Root Causes

The team completed Cause and Effect Analysis and found...

9.,10. 



The team proceeded to verify these four (4) Potential Root Causes.



Identify Potential Root Causes

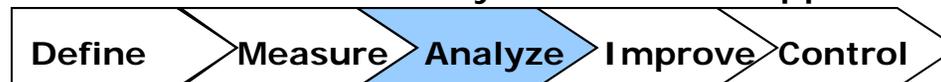
9.,10.

The team randomly sampled 30 appeal cases, developed contingency tables and performed Chi Square Analysis to verify each potential root cause

Summary of Chi Square Analyses*

Potential Root Cause	Chi Square Threshold Value	Chi Square Calculated Value	Root Cause Verified? (Does calculated value exceed threshold value?)
Current Hearing Officer selection and evaluation policies do not sufficiently emphasize the need to apply the code accurately	3.84	20	Yes
Current process is inadequate to enable timely updates of the Property Appraiser's database	3.84	18	Yes
Current process is not designed to maximize the availability of additional evidence prior to the Hearing	3.84	18	Yes
Lack of training regarding evidence requirements for Enforcement Officers	3.84	18	Yes

*Details of these analyses are in the appendices .



Identify and Select Countermeasures

13.,14. 

The team brainstormed many countermeasures and narrowed them down to these for evaluation:

Countermeasures Matrix						
Problem Statement	Verified Root Causes	Countermeasures	Legend:			
			5=Extremely 4=Very			
			Ratings			
			Effectiveness	Feasibility	Overall	Take Action? Yes/No
<p>“16 of the 18 negative appeal hearing decisions from February 2013 to August 2013 involved properties zoned residential</p>	<p>A - Current Hearing Officer selection and evaluation policies do not sufficiently emphasize the need to apply the code accurately</p>	<p>A1- Perform evaluations of Hearing Officers at the conclusion of each hearing docket; and initiate a review process for Hearing Officers after three complaints have been filed against them within one year</p>	4	3	12	Y
		<p>A2- When necessary, have PWMM initiate requests to replace Hearing Officers</p>	5	5	25	Y
	<p>B - Current process is inadequate to enable timely updates of the Property Appraiser’s database</p>	<p>B1- Have the Property Appraiser explore system improvements that would reduce the lag time for updating their database with recent real estate transactions</p>	4	4	16	Y
		<p>B2- Develop an efficient method for PWMM to retrieve recorded documents from the Recorder’s Office</p>	5	4	20	Y
	<p>C - Current process is not designed to maximize the availability of additional evidence prior to the Hearing</p>	<p>C1- Create an attachment to the citation that would enable the alleged violator to call the Enforcement Officer and share information regarding extenuating circumstances or other additional evidence</p>	4	5	20	Y
	<p>D - Lack of training regarding evidence requirements for Enforcement Officers</p>	<p>D1- Have the top two Enforcement Officers design and deliver a training session for all Enforcement Officers on evidence requirements and other best practices</p>	5	5	25	Y



Identify Barriers and Aids

The team performed Barriers and Aids analysis on the selected Countermeasures.

Impact (H, M, L)	Forces against Implementation	Forces For Implementation
H	1) Obtaining cooperation from the Hearing Officers' Selection Board <i>(Supported by A and B)</i>	A) Commissioners' support for countermeasures
M	2) Scheduling logistics for additional board meetings <i>(Supported by A, B and C)</i>	B) PWWM senior management support for countermeasures
H	3) Politics surrounding the Hearing Officer appointment process <i>(Supported by A and B)</i>	C) Funding availability within PWWM
H	4) Obtaining approval for new technology <i>(Supported by A, B, C and D)</i>	D) Potential reduction of voided citations
H	5) Property Appraiser may be unwilling to cooperate re: updating their database <i>(Supported by A, B and C)</i>	
M	6) Possible lack of interest from other County enforcement entities <i>(Supported by A, B, C and D)</i>	
M	7) Possible resistance from Enforcement Officers regarding training <i>(Supported by B)</i>	

The team next sought to incorporate this analysis into their Action Plan.



Develop and Implement Action Plan

Legend:
 = Actual
 = Proposed

The team developed an Action Plan for the Countermeasures.

16. 

WHAT: Implement 6 countermeasures to produce positive outcomes for citation appeals

HOW	WHO	WHEN							
		Jan	Feb	Mar	Apr	June	July	Aug	Sept
1. Develop / Implement Countermeasures									
A2- Develop and implement detailed procedures for PWWM evaluations and Selection Board reviews of Hearing Officers	Willie/Luis		2/28/14						
A3- Develop and implement detailed procedures for PWWM internal reviews and requests for replacement of Hearing Officers	Willie/Joe		2/28/14						
B1- Work with the Property Appraiser and ITD to design and implement system improvements to expedite updates to the Property Appraiser's database	Willie/Luis								9/28/14
B2- Design and implement a method for retrieval of recorded documents from the Recorder's Office	Willie/Luis				4/30/14				
C1- Design and implement the proposed attachment to the Citation	Luis		3/31/14						
D1- Develop and implement a training session on best practices for Enforcement Officers	Asha/Kenny				4/30/14				
2. Share initial benefits with management and secure approval for permanent implementation of countermeasures	Willie/Luis					6/30/14			
3. Communicate/Train Staff in countermeasures and related policies/procedures	Team								9/28/14
4. Establish On-going responsibilities and standardize countermeasures	Willie								9/28/14 +

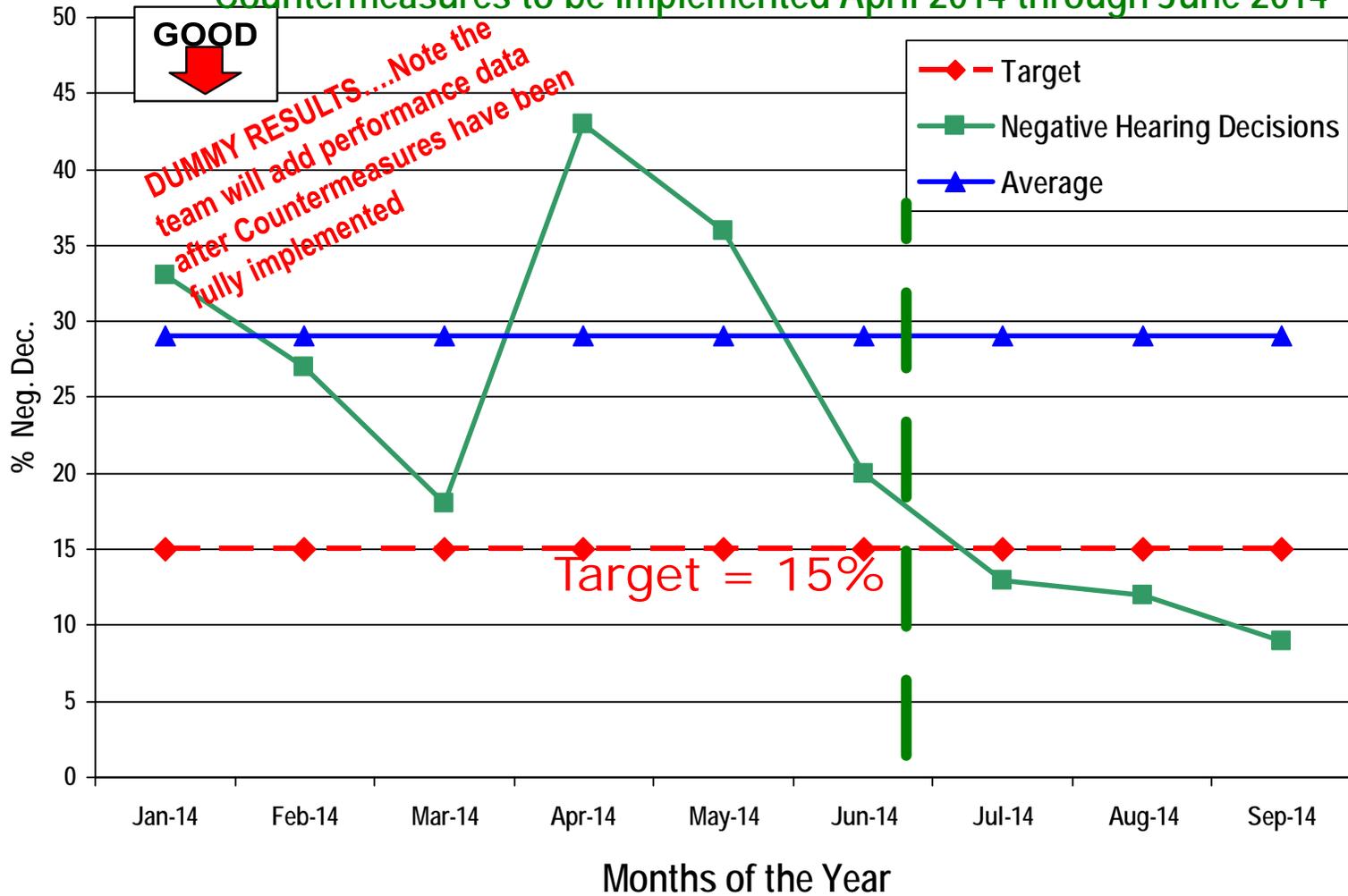


Review Selected Indicator

The team collected indicator data and reviewed performance trends:

Q1 - % of Negative Decisions at Citation Appeal Hearings

Countermeasures to be implemented April 2014 through June 2014

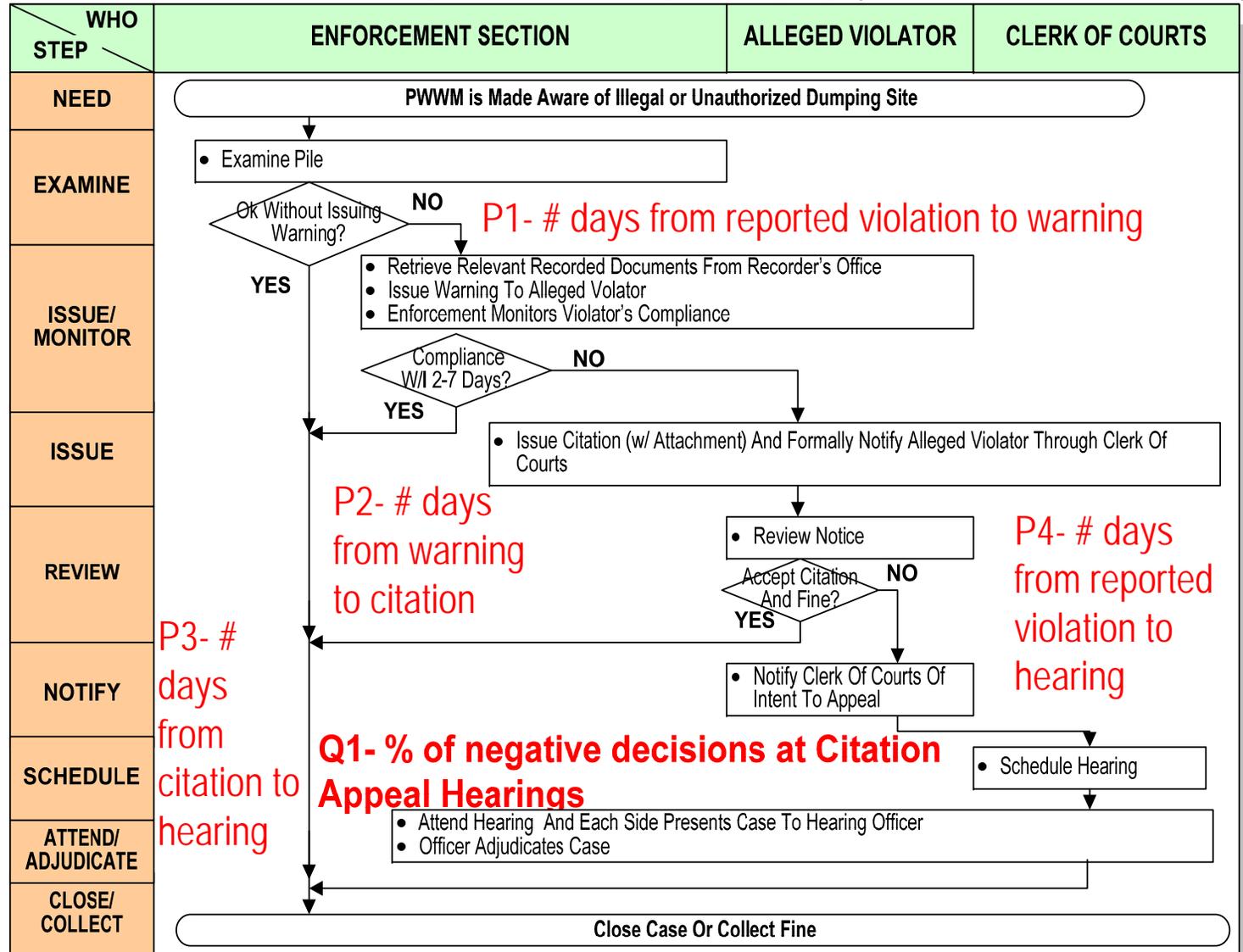


Standardize Countermeasures

21.,22.,23. ✓

The team incorporated the improvements into the Process flowchart.

PWWM – Citation and Hearing Process for Illegal Dumping (Process Owner: Willie Johnson)



Standardize Countermeasures

Process Control System						
Process Name: Citation Appeals			Process Owner: Willie Johnson			
Process Customer: Residents of Miami Dade County			Critical Customer Requirements: Have PWWM successfully adjudicate citation appeals			
Process Purpose: Adjudicate citation appeals			Current Sigma Level: TBD		Outcome Indicator: Q1	
Process and Quality Indicators			Checking / Indicator Monitoring			Contingency Plans / Misc. • Actions Required for Exceptions • Procedure References
Process Indicators	Control Limits	Data to Collect	Timeframe (Frequency)	Responsibility	Quality Indicators	
And	Specs/Targets	What is Checking Item or Indicator Calculation	When to Collect Data?	Who will Check?		
P1	# days from reported violation to warning	3	Dates of reported violations and warnings	Monthly	Enforcement Section Head	• Appeal Process
P2	# days from warning to citation	10	Dates of warnings and citations issued	Monthly	Enforcement Section Head	• Appeal Process
P3	# days from citation to appeal hearing	60	Dates of citations and appeal hearings	Monthly	Enforcement Section head	• Appeal Process
P4	# days from reported violation to hearing	90	Dates of reported violations and hearings	Monthly	Enforcement Section Head	• Appeal Process
Q1	% of negative decisions at citation appeal hearings	15%	Results of appeal hearing decisions	Monthly	Enforcement Section Head	• Appeal Process

Approved: _____ Date: _____ Rev #: _____ Rev Date: _____

The Team looked ahead to the future



Lessons Learned

- Including a combination of knowledge workers and high level decision makers on the project team facilitated assertive discussions and data driven solutions
- A significant effort at the beginning of the project to develop a reliable data set provided a sound launching point for subsequent analysis
- Statistical verification of root causes gave team members a high level of confidence to develop aggressive, creative countermeasures

Next Steps

- Present project results to the project sponsors
- Assist with implementation planning as needed



Appendices

- **Appendix A thru D...** Contingency table(s) statistics for chi square analyses to verify potential root causes



Appendix A – Chi Square analysis to verify the following root cause: *Current Hearing Officer selection and evaluation policies do not sufficiently emphasize the need to apply the code accurately*

Contingency Table Statistics			
Test Results		Table Dimensions	
Confidence Level	0.05	Data Rows	2
Degrees of Freedom	1	Data Columns	2
Rejection Region	3.8		
Test Statistic	20.0		
Dependency?	Yes		
Actual Data			
	Negative Decision	Positive Decision	Total
Erroneous Decision	5	0	5
Correct Decision	0	15	15
Total	5	15	20
Expected Values			
	Negative Decision	Positive Decision	Total
Erroneous Decision	1.3	3.8	5
Correct Decision	3.8	11.3	15
Total	5	15	20



Appendix B – Chi Square analysis to verify the following root cause: *Current process is inadequate to enable timely updates of the Property Appraiser's database*

Contingency Table Statistics			
Test Results		Table Dimensions	
Confidence Level	0.05	Data Rows	2
Degrees of Freedom	1	Data Columns	2
Rejection Region	3.8		
Test Statistic	18.0		
Dependency?	Yes		
Actual Data			
	Negative Decision	Positive Decision	Total
Wrong Property Owner	3	0	3
Right Property Owner	0	15	15
Total	3	15	18
Expected Values			
	Negative Decision	Positive Decision	Total
Wrong Property Owner	0.5	2.5	3
Right Property Owner	2.5	12.5	15
Total	3	15	18
Test Values			
	Negative Decision	Positive Decision	Total
Wrong Property Owner	12.500	2.500	15.000
Right Property Owner	2.500	0.500	3.000
Total	15.000	3.000	18.000



Appendix C – Chi Square analysis to verify the following root cause: *Current process is not designed to maximize the availability of additional evidence prior to the Hearing*

Contingency Table Statistics			
Test Results		Table Dimensions	
Confidence Level	0.05	Data Rows	2
Degrees of Freedom	1	Data Columns	2
Rejection Region	3.8		
Test Statistic	18.0		
Dependency?	Yes		
Actual Data			
	Negative Decision	Positive Decision	Total
New Evidence	3	0	3
No New Evidence	0	15	15
Total	3	15	18
Expected Values			
	Negative Decision	Positive Decision	Total
New Evidence	0.5	2.5	3
No New Evidence	2.5	12.5	15
Total	3	15	18
Test Values			
	Negative Decision	Positive Decision	Total
New Evidence	12.500	2.500	15.000
No New Evidence	2.500	0.500	3.000
Total	15.000	3.000	18.000



Appendix D – Chi Square analysis to verify the following root cause: *Lack of training regarding evidence requirements for Enforcement Officers*

Contingency Table Statistics			
Test Results		Table Dimensions	
Confidence Level	0.05	Data Rows	2
Degrees of Freedom	1	Data Columns	2
Rejection Region	3.8		
Test Statistic	18.0		
Dependency?	Yes		
Actual Data			
	Negative Decision	Positive Decision	Total
Insufficient Evidence	3	0	3
Sufficient Evidence	0	15	15
Total	3	15	18
Expected Values			
	Negative Decision	Positive Decision	Total
Insufficient Evidence	0.5	2.5	3
Sufficient Evidence	2.5	12.5	15
Total	3	15	18
Test Values			
	Negative Decision	Positive Decision	Total
Insufficient Evidence	12.500	2.500	15.000
Sufficient Evidence	2.500	0.500	3.000
Total	15.000	3.000	18.000

