

Process Improvement:
Resource Management Agency of Monterey, CA



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

Richelle Andrae
Samuel Schmitt

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* denotes content section that will be omitted for RMA

Introduction

Our client for this project was the Resource Management Agency (RMA) in Monterey County, California. RMA provides a range of functions for citizens including management of infrastructure, public works, planning, housing and permits to support construction and economic growth. The agency's vision is to "enhance the quality of life and economic health of the community by providing responsive, efficient and high quality public services and to promote good stewardship of natural and man-made resources."

Recently, the RMA has engaged in an initiative called *Managing for Results*, a continuous performance management tool designed to maximize the impact of resources utilized across county services. As part of this initiative, the agency's Permit Center asked us to help with a performance management project they were working on. The goal of this project was to categorize and analyze the data that the Permit Center had collected over the last six months and develop management recommendations based on this analysis.

Currently, the Permit Center functions as a location for customers to ask questions and file paperwork with the site's permit technicians. However, what's discussed in these meetings or "appointments" can vary widely depending on each customer's specific needs. Since customers are served on a walk-in basis and might not have prior experience with RMA's permit process, the Permit Center's employees often don't know what the customers need until they arrive. Upon arrival, customers will stop at the Permit Center's reception desk and state their reason for visit, which is recorded by the receptionist. Then, each customer waits until a permit technician is available to see them. Once a permit technician becomes available, the customer can spend anywhere from 5 minutes to two hours with the permit tech depending on the complexity of the customer's needs. Throughout this process, all relevant times, including the

arrival time, appointment start time, and appointment end time, are recorded in an Excel file, and this dataset is what we were asked to analyze.

Data Cleaning and Categorization

When we received the dataset from the Permit Center, there were a number of things we got to work on right away. The first of these tasks was cleaning the data of any obvious errors. In the time entries, for example, there were several errors that made the appointment time calculation unusable. These could range from something as simple as an incorrect keystroke, like using a semicolon instead of a colon when entering “10:34 AM”, to more routine errors, like failing to denote if the appointment end time was AM or PM. In the latter case, several hundred appointment times were originally unusable because Excel interpreted some entries as “1:30 AM (end time) minus 12:45 PM (start time)”, which can’t be calculated because the start time appears to occur after the end time. These errors and several others had to be fixed if these entries were to be analyzed later on.

After cleaning the data, we then began categorizing the appointments based on the customer’s stated reason for visiting the Permit Center. Although we originally thought this process would be straightforward, it ended up being far more complicated than expected. A primary cause of this complexity was the sheer number of different reasons a customer could have for visiting the Permit Center. These reasons ranged from something as simple as removing a tree to something as complex as building a new house and anything in between. Lacking any prior experience in dealing with these permits, we quickly realized we would need help from the Permit Center to develop any meaningful categories for the appointments. After discussing this topic with our client, we were able to develop the thirteen categories that can be seen below.

Appointment Type Categories:

1. Simple
2. Simple Inquiry
3. Solar
4. Combo Initialize
5. Combo Pickup
6. Combo Revisions
7. Design
8. Discretionary Permit
9. Code Violation
10. Blue Sky Questions
11. Meeting
12. Multiple
13. Miscellaneous

While most of these categories are self-explanatory, there are a few appointment types that are worth describing in more detail. The first of these are the “Simple” appointments. This category is intended to contain appointments that are relatively straightforward and only involve one planning or building task, such as a “tree removal”, “reroof”, or “electrical” permit. When a combination of planning and building tasks are required, however, an appointment is considered more complex and categorized as “Combo Initialize”. This categorization is often used when a customer is working on a permit for a new house or an addition to a preexisting house. Finally, the last appointment type that merits a description is the “Multiple” category. This category is used for meetings where several different permits are discussed. For example, a customer might come in to resolve a code violation, but then also have questions about a solar permit. Since the data we had did not indicate how much time was spent on each permit, we had to represent these meetings with the “Multiple” appointment type.

Using these categories and additional guidance regarding what “reasons” should fall into each one, we then began categorizing the data. To test the accuracy of our categorization technique, we first tried to categorize a sample of 200 entries. Unfortunately, we were only able

to accurately categorize about half of these entries. Part of the problem was that the Permit Center didn't have a standardized way to record the customer's reason for visit, and in some scenarios the receptionist would simply enter exactly what the customer told them. On top of that, there were also still many terms we weren't familiar with, which meant we had to once again ask for help from our client. In total, acquiring enough knowledge to categorize most of the entries took nearly a month and a half, which was far longer than we had originally anticipated.

Once we had acquired a deep understanding of how to categorize the entries, however, developing a sample to analyze was quite easy. First, we ordered the data based on the date and time of the appointment and randomly selected 15% of the entries. This resulted in a sample of 775 appointment entries. Following this selection process, we noted that appointment lengths could not be calculated for roughly 13% of the appointments, so we removed these entries from consideration. Then, using a custom Excel formula, we categorized the appointment types for the remaining 669 entries based on the customer's stated reason for visit and the identifiers we had developed previously. Finally, knowing that the Excel formula we used would not be perfect because of how the data was originally entered, we checked each entry to ensure its accuracy. By the end of this process, we were able to categorize 82.5% of the remaining 669 entries. For the list of identifiers we used for each category, please see the Appendix.

Data Analysis

After the categorization process was completed, the analysis itself was fairly straightforward since we had previously identified a list of questions that our client wanted us to answer. These questions can be found in below.

Questions to answer:

1. What are the descriptive statistics for the different appointment types?
2. What types of appointments take the longest amount of time on average?
3. Approximately how much time is spent on “Simple” permits?
4. How many data entries have errors or other problems?
5. Are the appointments labeled “Express Lane” actually quick?

As each of these questions only involve one “factor”, we planned to analyze this data with a One-Way ANOVA. Using Excel and Minitab, we summarized the data, calculated the descriptive statistics, and created several graphs to display the results. The findings associated with each of the client’s original questions can be found below.

Q1: What are the descriptive statistics for the different appointment types?

Figure 1 shows boxplots of the appointment lengths for each appointment type, while Figure 2 provides the numeric values for the descriptive statistics.

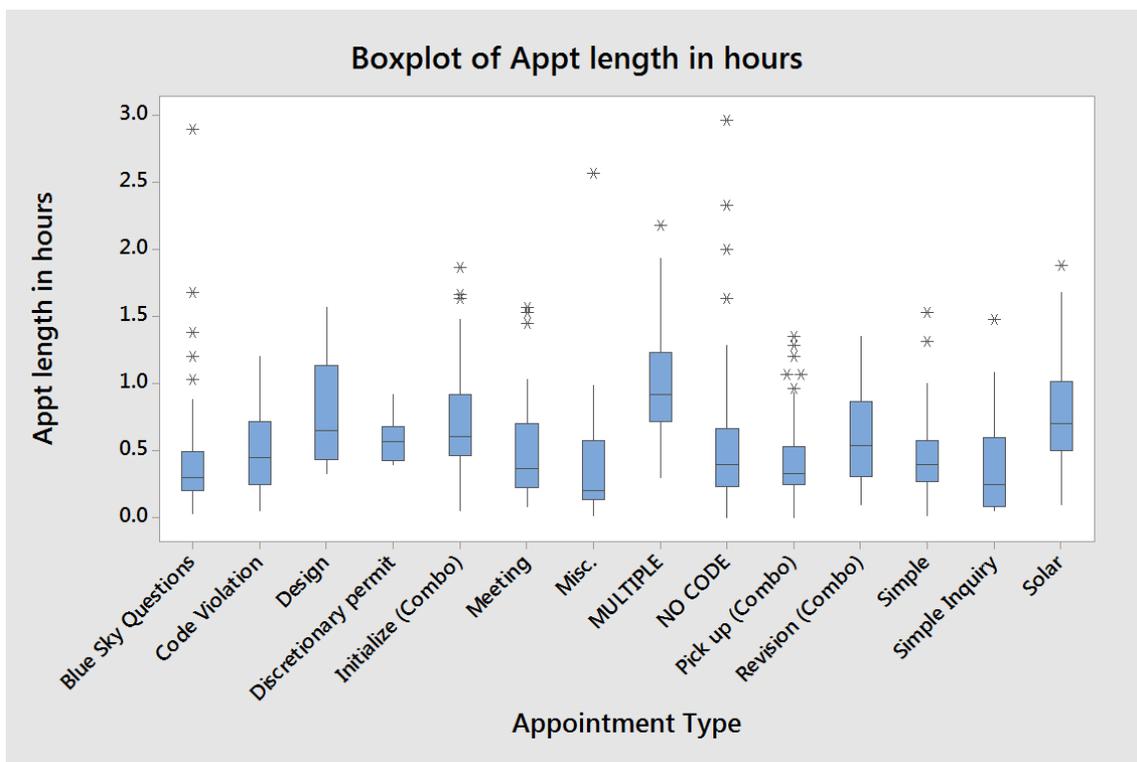


Figure 1: Boxplots for different appointment types.

Appt. Type	Count	Mean	Std. Dev.	Minimum	Q1	Median	Q3	Maximum
Blue Sky Questions	77	0:24	0:24	0:02	0:12	0:18	0:29	2:54
Code Violation	15	0:31	0:20	0:03	0:15	0:27	0:43	1:12
Design	15	0:46	0:22	0:20	0:26	0:39	1:08	1:34
Discretionary permit	6	0:34	0:11	0:24	0:25	0:34	0:40	0:55
Initialize (Combo)	78	0:42	0:22	0:03	0:28	0:36	0:55	1:52
Meeting	38	0:31	0:23	0:05	0:13	0:22	0:42	1:34
Misc.	48	0:21	0:25	0:01	0:08	0:12	0:34	2:34
MULTIPLE	23	1:01	0:31	0:18	0:43	0:55	1:14	2:11
NO CODE	117	0:31	0:27	0:00	0:14	0:24	0:40	2:58
Pick up (Combo)	78	0:25	0:17	0:00	0:15	0:20	0:32	1:21
Revision (Combo)	34	0:35	0:20	0:06	0:18	0:32	0:52	1:21
Simple	106	0:26	0:15	0:01	0:16	0:24	0:34	1:32
Simple Inquiry	11	0:25	0:28	0:03	0:05	0:15	0:36	1:29
Solar	23	0:48	0:28	0:06	0:30	0:42	1:01	1:53

Figure 2: Table of descriptive statistics for different appointment types.

The boxplots were helpful in getting a general feel for the data, but the table was used to draw more detailed insights. The “Count” column, for example, allowed us to quickly determine what categories had a small number of observations, which was useful when choosing what appointment types to analyze in more detail. Other statistics, like the maximum appointment length, were helpful for identifying irregularities and potential outliers in the data. Although we were unable to investigate these outliers given the limited amount of additional information that was available, it was important to consider the distorting effect they could have on the rest of our results. In general, this information helped us better understand the data we were working with and some of its potential limitations.

While most of the findings aligned with our initial hypotheses, there were a few insights that were surprising. The first was that appointments in the category “Blue Sky Questions” appeared to be relatively short. This category was intended to capture instances when customers would come in with broad, open-ended questions, so we had expected that the average appointment length would’ve been much longer. One possible explanation for these short

appointments stems from the categorization process. Since the “Blue Sky Questions” category contains almost all of the appointments where customers indicated they had “questions” of some sort, it’s possible many appointments were categorized incorrectly. Ideally, this category would’ve only been used for appointments that were truly open-ended, but the limited information contained in the customer’s stated reason for visit made it nearly impossible to differentiate between broad and specific questions. It’s therefore likely that many of the appointments in this category were actually specific questions that could be quickly resolved.

Another observation that we did not expect was how long “Solar” appointments seemed to take, and there are two possible explanations for this. The first is that these long appointments were caused by customers bringing in several solar panel permits at one time. According to our client, solar power companies like Solar City have been installing a large volume of solar panels across the county and are often responsible for acquiring the permits for these panels as well. As a result, there appear to be some instances where they use a single appointment to process several permits simultaneously. Since our appointment categories did not account for numerous permits of the same type, it’s possible these kinds of appointments are driving up the average and that an appointment for a single solar permit would take far less time. A second possible explanation relates to how the Permit Center has been handling solar permits. Numerous changes have been made over the last year to streamline the completion of these permits, so the appointment lengths in the sample we used may no longer reflect the Permit Center’s current state. If the Permit Center is interested in differentiating between these two scenarios, they could continue to collect data on “Solar” appointments and compare the findings at a later point in time.

Q2: What types of appointments take the longest amount of time on average?

After inspecting the boxplots and descriptive statistics for all of the appointment types, we narrowed our subsequent analysis to just six appointment categories. The boxplots for these six categories can be seen in Figure 3. These categories were chosen because they were the least likely to have categorization problems and because their sample sizes were fairly large.

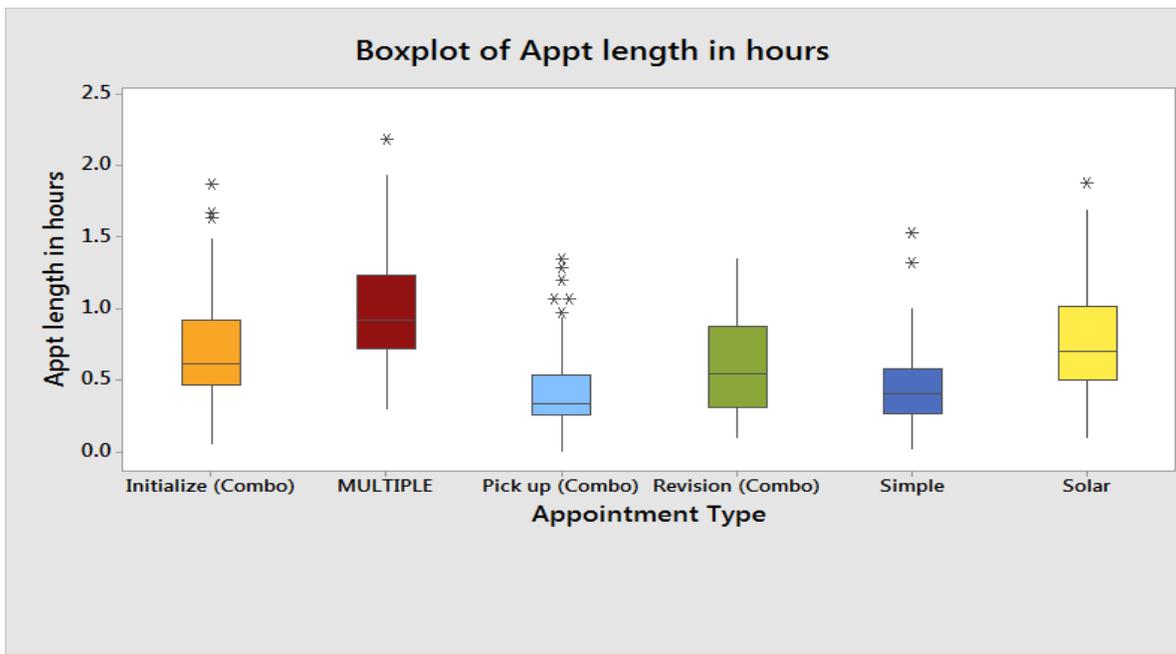


Figure 3: Boxplots for the most frequent appointment types.

Although it appears that the appointments in the “Multiple” category take much longer than all of the others, we wanted to formally test if the means of these appointment types differ by using a One-Way ANOVA. Before drawing conclusions from this analysis, however, we first checked the residuals. From the residuals versus fits plot, which can be seen in Figure 4, it’s clear that the variance in appointment lengths for these different appointment types is not equal.

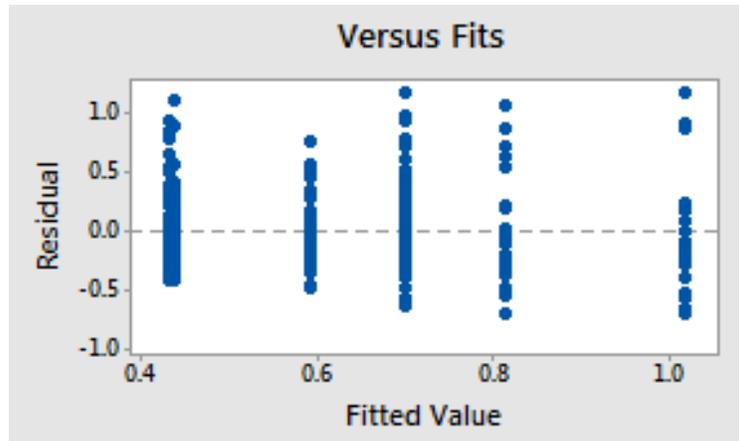


Figure 4: Residuals versus fits plot for One-Way ANOVA.

To get around this problem, we decided to use Welch’s method to perform the One-Way ANOVA because this approach does not require that the samples have equal variance. It’s also worth noting that the normality assumption is not a concern since all of the sample sizes are fairly large. The results of this analysis can be seen in Figure 5 and Figure 6 below.

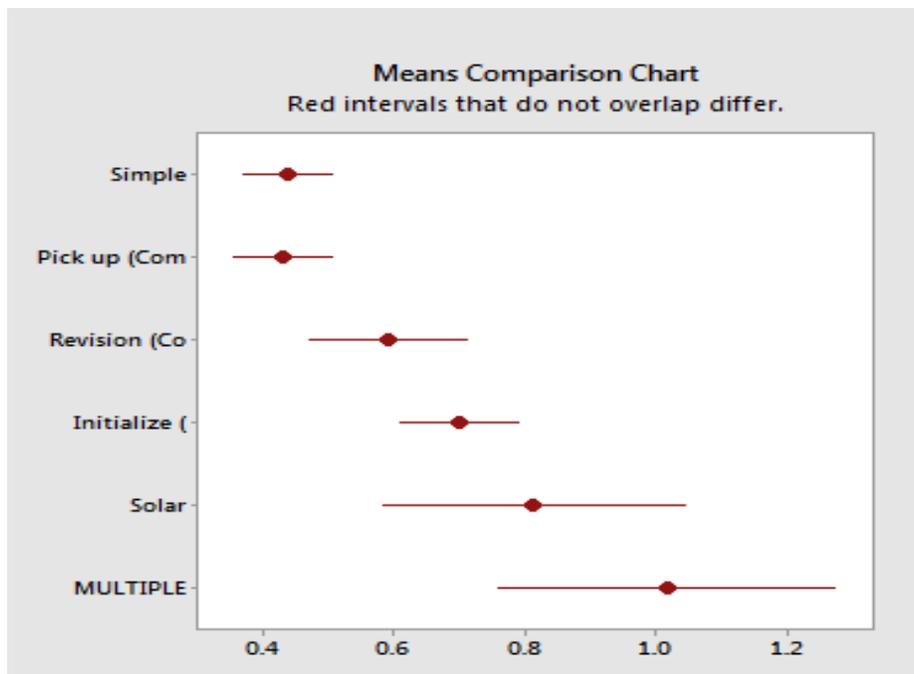


Figure 5: Comparison of appointment type means

#	Sample	Which means differ?		
		Differs from		
1	Simple	4	5	6
2	Pick up (Com	4	5	6
3	Revision (Co	6		
4	Initialize (1	2	
5	Solar	1	2	
6	MULTIPLE	1	2	3

Figure 6: Results of One-Way ANOVA showing which appointment type means differ

Based on this analysis, we can confidently conclude that the means for “Simple” and “Pick up” are significantly different than most of the other appointment types. Additionally, it also appears that the “Multiple” category is associated with much longer appointments, but these times can vary dramatically. Finally, while it seems that the appointment lengths for the “Initialize” and “Revision” categories fall somewhere in between these two extremes, many of these differences are not statistically significant. What this means in practical terms is that there’s a noticeable difference between simple and complex appointment types, but sharp distinctions cannot be made among some of the more complex categories. This finding indicates that while it does make sense to categorize appointments based on their complexity, some categories may not offer any additional insight.

Considered altogether, we think these findings can help the Permit Center better understand how long certain appointments take and what categories are needed when collecting data in the future. For example, it seems both “Simple” and “Pick up” appointments can be expected to take roughly 15 to 30 minutes, so it would probably be reasonable to combine these categories moving forward. Additionally, since the data shows that “Initialize” appointments usually take about 30 minutes to 1 hour, the Permit Center should be able to better anticipate how much time a permit tech needs to spend with each customer, which will be particularly

useful if the Permit Center decides to start scheduling appointments more frequently. Both of these topics are discussed in more detail in the Recommendations section.

Q3: Approximately how much time is spent on “Simple” permits?

To determine how much time is spent on “Simple” permits, we needed to make a few assumptions. First, we needed to estimate how many appointments occur each year. Since the dataset we were provided spanned Q1, Q2, and part of Q3, we assumed it contained roughly 65% of the appointments that would occur in a single year. Dividing the total number of appointments in the dataset by 0.65, we arrived at an estimate of 8,261 appointments for the entire year.

Then, using this estimate and the descriptive statistics we showed previously, we were able to perform some simple conversions to find the number of hours spent on “Simple” permits each year. These conversions can be seen below:

8,261 appointments per year 15.84% simple appointments
26 minutes per simple appointment on average 60 minutes per hour
= **567** hours spent on simple permits each year

Dividing this number by the number of Permit Center employees, we find that each permit tech spends approximately 71 hours on simple appointments each year. This corresponds to nearly two weeks of full-time work for each permit tech and \$8,505 in total opportunity cost assuming an average wage of \$15 per hour. In other words, if the number of these appointments or the amount of time they take could be cut in half, the Permit Center could save a substantial amount of their employees’ time.

Q4: How many data entries have errors or other problems?

Using a PivotTable in Excel, we found that nearly 13% of our random sample had entry errors that made the data unusable. This suggests that the Permit Center should consider better

data entry procedures to avoid these problems in the future. It's also worth noting that this number was recorded after we had already cleaned the data, so it's reasonable to assume that it would be a few percentage points higher if we hadn't made changes to the original data. For the exact breakdown of different appointment entries, see Table A1 in the Appendix.

Q5: Are the appointments labeled “Express Lane” actually quick?

The last question we sought to answer was whether or not “Express Lane” appointments, which are identified by an “X” in the “Express Lane” column of the dataset, took less time than all other appointments. The boxplots showing this comparison can be seen in Figure 7.

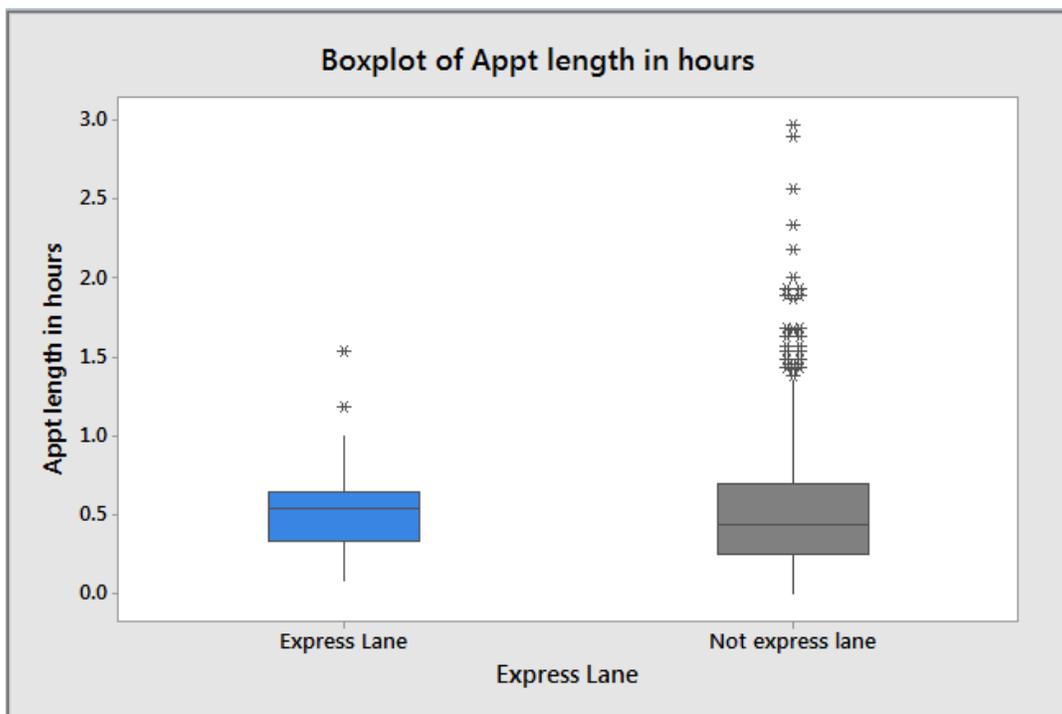


Figure 7: Boxplots comparing “Express Lane” appointments with all other appointments

Based on this graph, there does not seem to be a significant difference between “Express Lane” appointments and other types of appointments. This finding implies that the current

“Express Lane” identifier is not meaningful or has not been used consistently enough to be effective. Considering only 6% of the appointments were marked “Express Lane”, we suspect the latter is true. In the future, when the Permit Center implements the appointment type “pick list”, we think the “Express Lane” identifier could be phased out entirely.

Permit Technician Input

In addition to our data analysis work, we also requested input from the permit technicians to try to understand the cause of long appointment times. As we know from our performance management textbook, performance indicators tell us what happened, but they don’t tell us why it happened. To get a better understanding of why appointment times take such a long time, we decided to use a common process improvement tool known as the Affinity Diagram.

An Affinity Diagram is an extremely simple tool that can be used to brainstorm ideas and identify a list of potential root causes plaguing a process. It’s constructed by starting with a broad, neutral question and asking a group of people familiar with the process to develop a list of responses to that question. In our project, we posed the question “Why do you think appointments take a long time?” to all of the permit technicians and collected their responses individually via email. Once all of the responses have been received, the next step is to sort these responses into groups based on any apparent similarities. Ideally, this sorting step would occur with all of the participants present, but we decided to do this part ourselves because of time and distance constraints. Then, after these groups are decided upon, a “heading” is developed for each group that describes all of the responses in the group. These headings usually consist of short sentences and are often viewed as a concise summary for each group. Figure 8 shows the Affinity Diagram we developed for this project with the “headings” identified in gray.

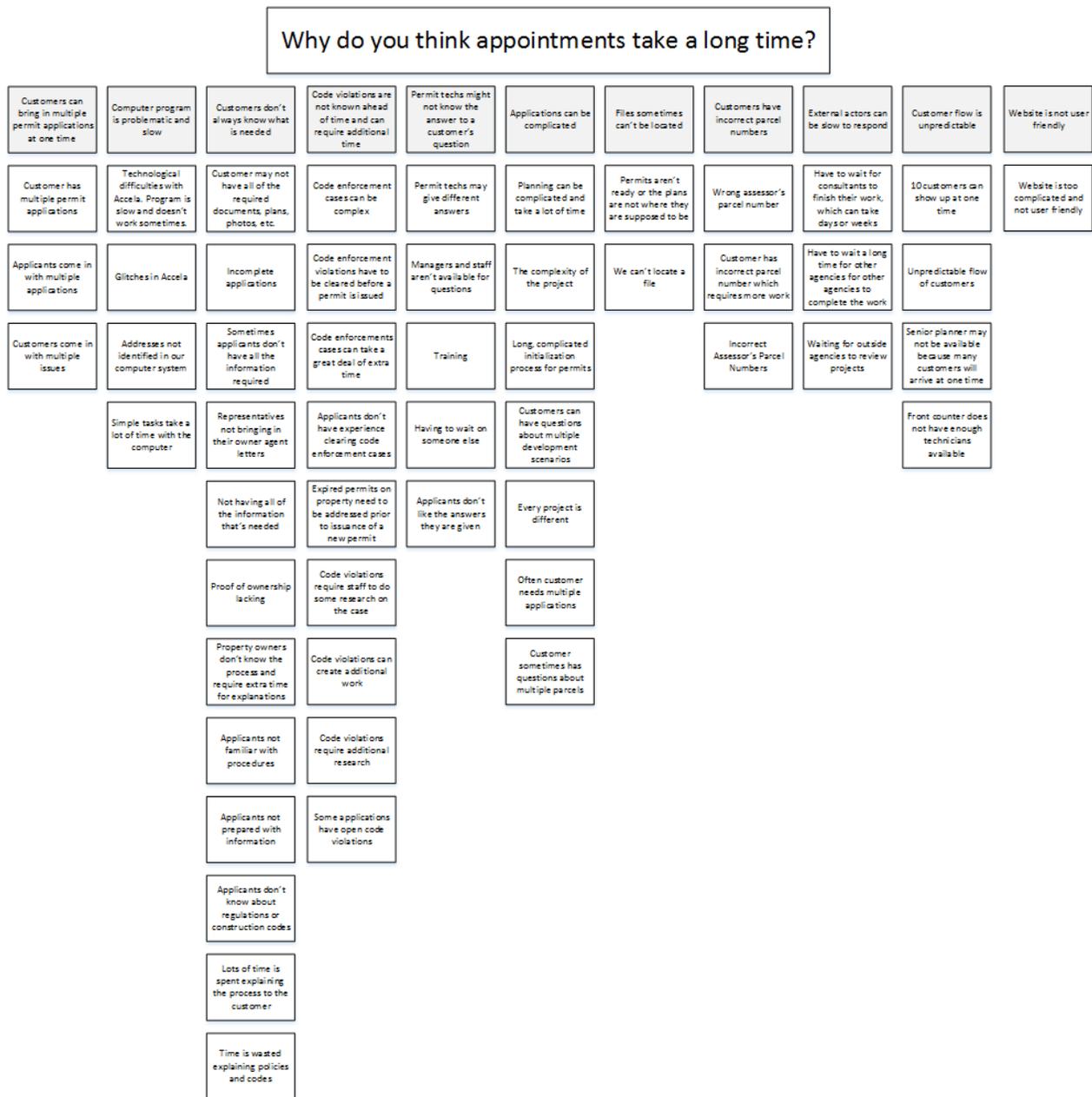


Figure 8: Affinity Diagram developed from permit tech input.

Additionally, the list of headings in the Affinity Diagram can be seen below.

Group headings

- Customers might bring in multiple permit applications at one time
- Computer program is problematic and slow
- Customers often don't know what information they need or how the process works

- Code violations are not known ahead of time and can require additional time
- Permit techs might not know the answer to a customer's question
- Applications can be complicated
- Files sometimes can't be located
- Customers have incorrect parcel numbers
- External actors can be slow to respond
- Customer flow is unpredictable
- Website is not user friendly

In general, reading the permit technicians' responses and constructing the Affinity Diagram helped us better understand the challenges facing the Permit Center. Many of the group headings we identified were not problems we had been aware of previously, and these issues might not have surfaced if we hadn't used this tool. Although not all of these problems are entirely within the Permit Center's control, we think they can serve as a starting point for employees to discuss what is most important to focus on in the future.

Recommendations Based on Permit Technician Input

Using what we learned from the data and the permit technicians, we then came up with several management recommendations that the Permit Center could use to improve their operations in the future. The first set of these recommendations relate to the how the data is collected and used while the second focuses on how performance can actually be improved. For each recommendation, a brief description of the current problem is provided along with an explanation of how it will be resolved.

R1: Refine the current appointment type categories

Our data analysis showed that categorizing appointments based on a customer's "reason for visit" would be valuable for the Permit Center, but it does not seem like all of the current categories are needed. To decide on a final appointment type "pick list", we think it would be

best for the managers and permit techs to look through the data together and discuss what appointment types would be most valuable to record. Since the permit techs weren't consulted when developing the categories used in our analysis, they will likely be able to offer additional insight regarding which of these categories are actually needed.

R2: Have the permit techs record the customer's reason for visit

Once these categories are decided upon, we recommend having the permit techs record the appointment type instead of the receptionist. This recommendation is important because the permit techs mentioned several times how new information is often discovered during the appointment itself. With code violations, for example, the customer sometimes doesn't know about the violation until meeting with the permit tech, which means this information will not be captured unless the permit techs are the ones who categorize the appointments.

R3: Make several changes to the data entry process

In addition to changing who records the appointment information, we also think it would be helpful to make several changes to how the data is entered. The first such change we recommend is replacing the current "reason for visit" field with an "appointment type" field that utilizes drop-down menu functionality. As we learned from this project, categorizing the appointment types retroactively is extremely time-consuming and can be inaccurate. Assuming the Permit Center can agree on how certain appointments should be categorized, having a drop-down menu would eliminate this problem altogether and allow the data to be analyzed more easily in the future.

Similarly, we also recommend that the Permit Center simplify how appointment start and end times are recorded. Currently, there are many opportunities for error when entering this

information, and these errors make analyzing the data more difficult because the entries have to be corrected or deleted. We think the best solution to this problem would be to create a macro in Excel that records the current date and time with the press of two buttons. We've used similar functionality when collecting data in past projects and believe this would make entering the appointment times faster and more reliable because the potential for incorrect keystrokes would be eliminated. Additionally, this approach would automatically record if the time was AM or PM, which means another common data entry problem would also be resolved.

Lastly, we also think that the Permit Center should add two new data fields: one for the number of permits discussed in the appointment and another for any additional information the permit techs want to record. When we were analyzing the data, it wasn't always clear how many permits the customers needed help with, which is important information for the Permit Center to know if they want to better predict how long an appointment will take. Likewise, it also wasn't possible for us to determine what caused some of the outliers in the data. For example, the maximum appointment length for a simple permit was one hour and thirty minutes, but we had no way of knowing why this appointment took such a long time. We think that having a field for the permit techs to enter additional information or "notes" could be used to explain why a specific outlier occurred. Not only would this allow the Permit Center to better understand why certain appointments take a long time, but it could also help them detect recurring problems and reevaluate how they handle these issues. In general, we think these changes to the Permit Center's data collection procedures would lead to more accurate and useful information overall.

R4: Hold “learning forums” each month

What’s arguably more important than the data collection procedures, however, is how the data is actually used. Recognizing this, we think the Permit Center should create more structured processes for analyzing and using the performance data they’re collecting. One possible way to do this is by using regularly scheduled “learning forums” where employees can discuss how to improve performance. Similar to the popular “PerformanceStat” approaches used in various governmental units, the purpose of these meetings would be to review recent performance data and decide on a set of actions items based on the data. For the Permit Center, this might consist of monthly meetings with all employees to discuss what problems occurred since the last meeting and to assess what progress is being made on any improvement efforts. Overall, we think these meetings would help the permit techs learn from each other and share improvement ideas that might otherwise only occur in a one-on-one setting. For more information on these kinds of meetings, we recommend reading the paper “A Guide to Data-Driven Performance Reviews” by Harry Hatry and Elizabeth Davies, which can be found using the following link: <http://www.urban.org/sites/default/files/alfresco/publication-pdfs/1001559-A-Guide-to-Data-Driven-Performance-Reviews.PDF>

Recommendations from Permit Technician Input

Based on the input from the permit techs, along with our own observations in working with the client and reviewing relevant literature, we also developed several additional recommendations for the Permit Center to consider. Each recommendation is based on a problem or concern that was expressed by the permit techs and contains a specific idea for improvement or a call for further investigation. Prior to acting on any of the following recommendations,

however, the Permit Center should first discuss which problems are most important and prioritize their actions accordingly.

R5: Provide clear instructions to customers regarding what information is needed for a permit

The concern raised most frequently by the permit techs is that customers don't know what information is needed or what steps are required to obtain a permit. These discrepancies have often led to customers missing crucial documents and returning multiple times to submit information, which results in wasted time and resources when completing a permit. We believe that providing customers with checklists regarding what information is needed for initializing a permit would help save time for both the customer and public servant. These checklists should include tips on where certain documents can be found, such as online or at another county office, and they should also be easy to use regardless of the customer's familiarity with the process. Ideally, these checklists would be available online and at the Permit Center itself so that customers can easily access the information. Additionally, any customers who call the Permit Center should be directed to view the checklists online so they are more prepared when they eventually visit the Permit Center. Finally, to address the issue of customers being unaware of how the permit process works, a simple flow chart showing the approximate lengths of time required for each step in the overall process should also be provided. Overall, we think these changes would help educate customers on what information is needed so that the time they spend with the permit techs can be used more effectively.

R6: Arrange appointments in advance instead of relying on walk-ins

Another recommendation is to schedule a higher volume of appointments in advance. This would address the challenge that arises due to multiple customers arriving at one time,

which increases wait times and leaves permit techs with less work to do during the “slow” parts of the day. Appointments could either be handled by specialized employees or spread across all staff members, and reasonable appointment lengths could be determined from the appointment type data presented in this report, with longer appointment times reserved for more complex questions. In addition to having customer arrivals spread more evenly throughout the day, encouraging customers to schedule appointments in advance would also be a useful way to remind customers what information is needed for their appointment. If customers scheduled an appointment online, for example, the scheduling tool could direct them to the checklist discussed previously. Similarly, if customers call the Permit Center to schedule an appointment, the receptionist could direct them to this checklist or read it to them while they’re on the phone. Not only would this help build consistency into the Permit Center’s operations, but it would also help ensure customers are prepared for their visit when they arrive, both of which could lead to a decrease in customer wait time.

R7: Seek customer input regarding their priorities and service concerns

An additional recommendation we have is to seek out the “voice of the customer”, which is a concept used in process improvement methodologies to try to understand what the customer wants from the service they’re receiving. By asking the customer for input in a structured survey or a simple feedback form, the Permit Center could better understand their customers’ concerns and desires. This could help identify potential problems or inefficiencies in the process without having to wait for customers to bring it to the attention of individual permit techs. Additionally, this feedback could be collected through a variety of different means. It could be provided via an automatic email following a meeting, presented on a screen within the Permit Center for customers to submit their input directly, or filled out as a brief paper questionnaire. In general,

compiling and evaluating these surveys will help leadership better understand issues from the customer's perspective and decide where they should focus their efforts if they want to improve the customer experience.

R8: Investigate permit technician technology use

Another challenge that was expressed relates to the technology used by the permit techs. While this was not a frequent complaint, it would be helpful for the agency to understand whether this is an ongoing issue, and how much time is spent inefficiently waiting on certain technologies. Is this a frequent problem that can be addressed for time-saving measures, or a slight inconvenience that does not actually result in significant loss of activity? Do staff members have sufficient training on how to navigate and operate computer systems? These questions warrant further investigation to determine whether or not the Permit Center's technology is a primary area of concern.

R9: Investigate current website use

An additional issue expressed by the permit techs relates to the use of the organization's website. While the Permit Center has mentioned that they plan to move solar permits online, this may provide limited organizational benefits depending on how the Permit Center's website is currently used. If customers find the website difficult to navigate, for example, they might avoid using it. At present, what is the customer's first point of interaction with the website? Are they directed to use it through phone conversations, after appointments, or not at all? If the website is not being utilized effectively, seeking customer feedback to resolve this issue and redesign the website to maximize its usefulness would be strongly recommended. Understanding how

customers currently access information about the Permit Center is essential to providing support in the correct format that frees up both the customer and public servant's time.

R10: Investigate code violation issues

Code violations were another concern identified in the permit tech survey that warrants additional investigation. According to the permit techs, customers often learn that they have a code violation on their property or building during the appointment at the Permit Center. This prevents the permit initialization process from moving forward until the code violation is resolved. As a result, customers likely have to return to the Permit Center multiple times in order to finalize all details and receive their permit. We therefore think it would be helpful for the Permit Center to explore how customers currently access information about code violations. Are individuals notified if they have a code violation? If so, how? Is this information stored in a publicly-accessible database, cross-listed with property numbers? Are customers directed to check for code violations prior to a Permit Center visit? Unfortunately, we have little background on how this process currently works, so we recommend that the organization delve further into the code violation issues to determine their severity.

R11: Investigate routing processes

Lastly, the Permit Center may benefit from exploring how their operations align with their partner agencies. When permits are routed to Public Works, for example, is there an efficient process for tracking a permit and determining who follows up for more information? How long are the delays when a permit needs to be routed to other agencies? While routing problems probably do not impact customer wait time, long delays at other agencies would

increase the overall amount of time it takes to process a permit, which is a measure customers likely care about. For this reason, the Permit Center should look into this problem in more detail.

R12: Use process improvement methodologies to make improvements

Since the Permit Center currently does not have a structured way to prioritize problems or resolve inefficiencies, it seems like process improvement methodologies would be useful in many of these scenarios. These methodologies provide a systematic approach to identifying problems in a process and determining the root causes of these problems. For example, some of the information in our “Checklist” recommendation might already be available online, but the root cause could be that customers find it difficult to locate this information on the agency’s website. As a result, putting more information online might not actually resolve the problem because customers still might not be able to find this information. Alternatively, it could be that the information is presented in a confusing or unclear way. If this is the case, customers might be able to find the information, but they might not fully understand what it is telling them. Because we don’t have enough information to provide an answer ourselves, we think these problems are worth investigating further using a process improvement methodology to determine the underlying causes and decide on the appropriate course of action.

Literature Review

Introduction

Assuming the Permit Center is interested in using a process improvement methodology, we think it would be helpful for them to know what the research literature says about the application of these methodologies in the public sector. In the following literature review, we provide a brief overview of how process improvement has been used in the public sector and

describe what factors are most important for its success. While this research is by no means exhaustive, we think our literature review can serve as a starting point for the Permit Center when deciding how to proceed with their own performance improvement initiatives.

Before diving into the literature review, however, it's important to note that there are many process improvement methodologies that exist. Some common ones include Total Quality Management (TQM), Lean, and Six Sigma. Although there are some differences between these approaches, like how Six Sigma places an emphasis on statistics and defect reduction, the underlying frameworks in all of these methodologies are nearly identical, as Figure 9 shows. Recognizing this, some public organizations, such as Minnesota's Office of Continuous Improvement, have deemphasized the differences between these methodologies. As a result, we will refer to these approaches generically using the term "process improvement methodologies" for the remainder of this report.

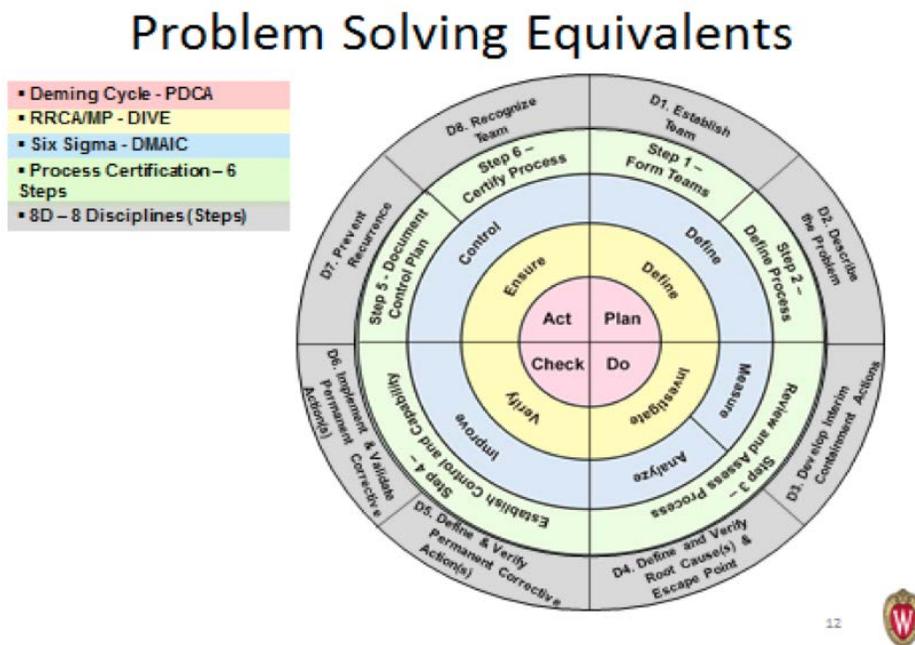


Figure 9: Graph showing the similarities between process improvement methodologies

In general, all process improvement methodologies seek to improve quality, customer service, and efficiency by organizing teams of people with diverse backgrounds and making decisions based on the scientific method. Beyond these basic tenets, though, most methodologies also tend to follow a framework that includes several key steps. While these steps have different names depending on what methodology is used, their underlying purpose remains the same: to identify root causes and decide on appropriate solutions. A generic overview of these steps can be seen below.

Generic framework:

1. Define a problem
2. Determine root causes
3. Develop solution ideas
4. Evaluate and test solution ideas
5. Implement solutions

Since these generic steps serve as the foundation for all process improvement methodologies, we recommend keeping them in mind when reading the literature review that follows. Although we do not spend much time describing the various “tools” that can be used in each of these steps, we feel there is sufficient information about these tools on the internet for those who are interested.

Process improvement in the public sector

While the field of process improvement is rooted in private sector theory and cases, academics suggest that the overall management recommendations are largely transferrable to the public sector. In the mid 1990s, seminal work by Champy, Hammer, Davenport and Short created significant buzz around process improvement in the academic and business world, which eventually caught on in the public sector. Such theories gained attention due to the rise of global competition, increased access to information technology, and the desire for dramatic

improvements of efficiency promised by such approaches. Unlike the private sector, public sector process improvement is often used in response to citizens and legislators that demand increased efficiency for government programs.

When process improvement is implemented, process mapping is where most agencies usually start. Process mapping allows a public agency to elicit innovative approaches to solving performance issues by helping them visualize the entire process and identify where problems occur. Additionally, because it shows what actors are currently responsible for each task in a particular process, process mapping can often lead to greater cross-functional cooperation, simplification of communication, and streamlining of organizational tasks.

Once a process map has been completed, an agency can then question the status quo. According to the early proponents of process improvement, the restructuring of processes should begin by challenging the existing situation, questioning whether certain processes actually add value, and investigating if an alternative process would be better aligned with organizational goals. When restructuring the process, some authors recommend simply altering the current process, but others suggest starting from scratch and modeling a new process based on the ideal, corrected steps. Regardless of which approach is taken, both can lead to dramatic improvements by forcing an agency to decide what processes are most important and what changes would be most beneficial.

However, that's not to say that implementing these process improvement methodologies is always easy. Since processes in the public sector are not connected with bottom-line profit and goal-setting in government agencies often serves a more symbolic role, service gaps can be more difficult to identify. Additionally, private sector systems of finance are generally more flexible than those in the public sector, so performing a cost-benefit analysis can also be more

challenging for government agencies. Finally, extensive regulatory and legislative constraints may tie the hands of many public sector actors, making creative problem-solving more difficult. Although the benefits of these approaches can be substantial, it appears that implementing them in the public sector can sometimes be challenging.

Critical success factors

To ensure the implementation of these methodologies is successful, several scholars identify a number of critical success factors (CSFs).” Some of the most frequently cited CSFs include:

1. Top management commitment
2. Team training on the approach
3. Structures for consistent feedback and double-loop learning
4. Quality data and systems for analysis
5. A culture of learning and growth
6. Alignment of information systems with customer service processes
7. Customer involvement in the process

Additionally, Halachmi and Bovaird provide a theory about process redesign that claims its success depends critically on an organization’s strategic capability prior to beginning a process improvement initiative. They conclude that high-performing agencies are more likely to improve performance through process improvement strategies than those that are low-performing. Such capacity can be determined by three agency qualities. First, does the organization understand the means and implications of process reengineering as transformative and radical? Second, does an organization have the ability to actually implement performance improvements in a comprehensive, cross-departmental approach? If not, change at different paces for various actors may lead to increased confusion, resentment over demands to adapt, and an undermining of organizational synergy. Third, can an organization survive the cultural change

needed to successfully implement process redesign? Are public actors engaged in a shared understanding that accepts new ways to accomplish organizational goals, and allows for adaptation in new processes? If an organization is able to confidently answer in the affirmative to each of these questions, it may be a good candidate for process improvement. Otherwise, the authors suggest that an organization is doomed to fail in embarking on a large-scale reengineering effort.

Beyond these basic characteristics, organizations must also align their information systems with desired customer service outcomes. Specifically, these systems should be built upon the services that are delivered to customers, who are the end recipients of organizational work. In the public sector, this relationship is even more crucial to successful implementation of process management because public sector organizations serve an important role in supporting public services as opposed to profit maximization outcomes. Without alignment of processes and information systems, an organization will not experience the full benefits of process improvement.

Another important finding is that the organizational structure itself must be conducive for process improvement in order to achieve results of increased efficiency and effectiveness. Process reengineering will not be successful in a command and control environment because such a culture stunts the flow of information between hierarchical levels. By reducing communication, command and control cultures prevent problems from being addressed as they emerge. In general, the ability for organizational members to share observed process concerns is essential for a successful process improvement initiative.

Instead of a command and control culture, Radnor and Bucci recommend that organizations become more flexible. A culture of improvement wherein leadership and staff are

each able to express challenges, learn from their mistakes, and adapt accordingly is crucial for the success of process improvement strategies. Management must also be able to communicate effectively with employees and frame process improvement in a way that does not scare staff or induce fear that their jobs will be lost. Without such a cultural shift, process improvement can easily become a one-time exercise employed sporadically that fails to create a lasting impression or enable long-term improvements.

Further CSFs relate to top management support and the empowerment of staff throughout the reengineering process. In a UK survey of 160 staff at a government agency engaged in process improvement, direction from upper level management and openness to adoption of process improvements was cited as the top factor for successful process improvement implementation. According to employees, leadership with a firm understanding of the process improvement methodology, commitment and support of redesign attempts, and an overall 'readiness for change' were the most important success factors. While all employees may not play equal roles in the redesign process, the staff felt that their input was crucial in the redesign exercises.

Challenges

As process improvement reached the summit of its popularity in the late 1990s, several common criticisms of redesign theory emerged. In most cases, the dramatic and transformative goals of process improvement have fallen short. According to one report, some failure rates have been as high as 67%. The traditional difficulty of creating deep, widespread change in public organizations has been an ongoing challenge for the success of process improvement initiatives. On top of that, some critics claim that reengineering is not a novel practice, but has been ongoing to various degrees in agencies before the mid-1990s.

Additional limitations to process improvement strategies can be found throughout the research literature. First, it may be difficult to control large systems of integrated processes. Since it is challenging to map out or break down extremely complex systems, process improvement may struggle to gain acceptance in these kinds of environments. Also, as discussed before, process improvement will not reach optimal levels of success in a command-and-control hierarchy. Staff at all levels of the organization must feel genuinely empowered to express their displeasure or concerns without fear of retribution if a process improvement initiative is to succeed. In a culture of open communication, information cannot be ‘stovepiped’, or stopped at any level of the management chain. Information must reach top administrators who are able to actually transform the organization. Next, managers may find obstacles when responding to customer issues. If policies or regulations restrict the power of public managers, then the opportunity to change an organization’s processes is drastically limited. Finally, any public organization is comprised of a variety of stakeholders, and these stakeholders may have competing priorities that are exacerbated by political goals, cost concerns or social welfare issues. While these conditions do not guarantee that a process improvement initiative will fail, it does seem that they greatly diminish the probability of its success.

Implications for the Permit Center

Based on these findings, we think the Permit Center should consider using process improvement strategies to solve some of their current problems. In this project, we believe we have completed the first step in the generic framework identified previously, and we recommend the Permit Center complete the remaining steps. Specifically, we think it would be helpful for them to use a tool like the “5 Whys” to identify root causes from the list of potential problems we identified previously in this report. Ultimately, we think this would help the Permit Center

focus their efforts on the most important problems rather than the “symptoms” of those problems. Similarly, we think that process mapping exercises may also be useful for showing where inefficiencies or delays are occurring in the Permit Center’s processes, especially when external actors are involved.

Although there are many “critical success factors” the Permit Center would need to consider if they decide to use a process improvement methodology, we think the benefits would vastly outweigh the costs in this scenario. From our experience, it seems the Permit Center has an appropriate culture, tremendous support from management, and sufficient data collection procedures, all of which imply a process improvement initiative would be a success. While the Permit Center and its employees would need to acquire some additional knowledge by reading more about these tools and approaches, we think this is a relatively low hurdle to cross given the potential benefits.

Practical Limitations

While we are confident that the data analysis and recommendations we’ll be providing to the Permit Center will be valuable, there are a number of limitations we encountered throughout the project that we think are worth mentioning. In this section, we reflect on our experience and relate it to our literature review by identifying what critical success factors were missing in our project. Following this discussion, we then describe a few other practical limitations we observed as well.

Although we did have leadership buy-in, access to data, and a client that seemed dedicated to organizational growth and learning, there were several CSFs that were lacking in our project. The first such CSF had to do with the alignment of the Permit Center’s information systems with the customer service processes. In general, we think this project would’ve had far

better outcomes if it had occurred after the Permit Center had reevaluated its data collection procedures. For example, if the data had been categorized according to the “appointment type” when it was originally collected, we would’ve been able to make significant progress in a relatively short amount of time. Instead, we ended up having to clarify many details and ask countless questions in order to categorize each entry, which wasn’t the most valuable use of our time.

Another critical success factor that was missing was extensive staff involvement in the process. Given that we were working remotely, we weren’t able to talk to the permit techs directly and therefore weren’t able to learn as much about the process as we would have liked. Although we asked a lot of questions, much of our time was spent waiting for responses or setting up times to talk on the phone. Had we been able to visit the Permit Center in person, we would’ve been able to have these questions answered as they arose. While we did get some input from the permit techs via email, we think this project demonstrated how valuable in-person interactions can be for this kind of work.

In addition to the CSFs that were missing, there were also some other practical limitations we observed. The first of these had to do with the amount of time we had to complete the project. While we did accomplish our original goals, we weren’t able to complete all the steps of a typical process improvement methodology due to our constrained timeframes. As graduate students, we had several other projects in addition to this one, so it simply wasn’t feasible to dedicate any more time to it than we already did. If we were given another three months to work on the project, however, we think our results would have been even better.

A final challenge in this project was that the client’s original expectations for us were somewhat unrealistic. For example, our client seemed to think that we would’ve been able to

develop meaningful categories for the data without any knowledge of the process, but we quickly realized that this was not possible. If we had developed categories on our own, these categories would have been essentially worthless for the Permit Center and its employees. Similarly, there seemed to be an expectation that we could determine what caused certain outliers in the data, but there was no additional information that would've allowed us to accomplish this task. This suggests that the client hadn't fully considered how this project would unfold, which we know is crucial from our experience in past projects. While we feel we made the most of the situation, we think the project could have been more valuable if the details had been fleshed out prior to the start of our involvement.

Conclusion

Through our collaboration with the Permit Center, we have accomplished all of the objectives that were laid out at the beginning of the project. We have created categories for the appointment types, determined which appointments take the longest amount of time, and developed detailed management recommendations that the Permit Center can use to further improve their daily operations. Additionally, we have also provided them with ample suggestions regarding what topics warrant further investigation and how these issues can be resolved using a process improvement framework. By building off of this work, we're confident that the Permit Center will be able to use their data more effectively to inform their decisions and ultimately improve their performance.

When making these improvements, however, it's important that the Permit Center also pays attention to the other performance indicators that were not mentioned in this report. While our project focused primarily on questions of efficiency, performance indicators related to quality and equity are equally important. Focusing strictly on how long appointments take might

incentivize permit techs to cut appointments short without actually resolving the customer’s problem. For this reason, the Permit Center should make sure it has multiple performance indicators that provide a well-rounded assessment of their work. Indicators such as the “number of return visits”, “customer satisfaction”, and “total time required to receive a permit” could be a few ways to capture this information, but qualitative assessments such as feedback from customers might also be useful. Overall, we think approaching the Permit Center’s problems from a variety of different perspectives will lead to the best results when seeking to improve performance.

Appendix

Data entries	Count	Percentage
Data is usable	669	86.32%
Entry error	99	12.77%
“No show”	7	0.90%
Grand total	775	100%

Table A1: Breakdown of data entry problems.

Categorical Identifiers

<u>Blue Sky Questions</u>
question
general information
quest.
ques.
discuss permit
wants to know about

<u>Code Enforcement</u>
violation
courtesy notice
CE fees
CE case
code enforcement
13CE
14CE
15CE
16CE
12CE
11CE
10CE
Thomas

<u>Revision (Combo)</u>
revision
changes
change scope
existing
plan change

<u>Simple</u>
reroof
re roof
re-roof
gas line
water heater
tree
electric
marked express
furnace
plumbing
single trade permits
siding
stucco
exterior finish replacement
reroof
dry rot
early utility connection

HVAC
utility
H-VAC
expired
emergency
grading
extension
extend
turn in sets
otc
over the counter
concrete slab
correction
resubmittal
transmittal
submit plans
recheck
submit plan check
submitting plans
turning in plans
turn in plans
elect.

<u>Pick up (Combo)</u>
pick up
picking up
pick-up
pick
issue
issuance
pull

<u>Solar</u>
solar
PV
photovoltaic

<u>Discretionary Permit</u>
shore
lot line adjustment
application request
app request

<u>Misc. Building</u>
temp occupancy
refund fees
job card
demo
temporary occupancy
certificate of occupancy

back check
irrigation water tank
plans stamped
duplice permit card
plan check
BPH
fee estimate
pay fees
reinstate CP
signing off
sign off
stamp

<u>Misc. Planning</u>
easements
landscaping
parking variance
marijuana
reinstate PLN
planning review

<u>Inquiry</u>
submit corrections
truss calculations
school form
dropping off rough estimates for permit fees

truss calcs
check status
status
following up
soils report
elevation certificate
truss
checking on
checking on submittal
signed off
signing off
sign off
check on

<u>Initialize (Combo)</u>
start
submit
new
apply
submittal
built ag structure
new house
remodel
fire damage repair
mobile home
plan submittal

proposed submittal
special event
corporate event
event
applying for permit
rebuild
re-build
deck
commercial
addition
carport
re-model
fire repair

<u>Design</u>
design
design approvals
DA
retaining wall