

A Process to Efficiently Manage Inspections

Harford County, Maryland

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Purpose

Harford County's Department of Inspections, Licenses, and Permits (ILP) works to create streamlined and efficient processes for inspections, licenses, and permits for the construction in the county. These inspections vary depending on the building location and the type and size of construction. ILP inspectors are certified experts, each specializing in a specific type of inspection.

Currently, the process of assigning inspections to the ILP inspectors is done manually based on the location of inspection request and the type of skill required. However, an increasing number of inspection requests from contractors coupled with rapid development has made owing to the manual management of resources increasingly complex; the process of assigning inspections is becoming cumbersome and inefficient. The lack of efficient prioritization means inspectors spend a lot of their time traveling between sites and allocating additional time to inspections that may not be as vital.

In this project, we redesigned the process flow for the administrators and ILP inspectors to help them manage the inspections with minimal overhead. To accomplish this objective, we studied the existing process, learned the roles and responsibilities of each individual and the system, as well as how they collaborated and shared their work. Based on that knowledge, the redesigned process flow optimizes the overall process of inspection management.

Figure 1. Process



Defining the Problem

Collecting requirements

In two requirement gathering sessions with the client we discussed their current work flow, the systems used in their process, the type of tasks assigned to their employees, and how they manage and allocate their resources.

Studying organization resources

To get a detailed understanding of the problems faced by the client, we studied all the documents related to inspection assignment, specifically focusing on how staff are trained for different skills, why they're tasked to a particular region, how the inspections are assigned, how inspections are requested and followed up on, and how the administrator assigns or reshuffles assigned duties.

Problem Analysis

Interviews and surveys with ILP team members

After a understanding the whole system, we identified key stakeholders and scheduled interview sessions with them. Initial interviews focused on individual work routines and how they conduct inspections. Later interviews focused on identifying problems faced by the individual inspectors and feasible solutions.

We had a total of five interview sessions: two sessions with the director to get a general overview of the system and three sessions with the inspectors from different teams, the administrator of the inspection assignment process, and the director again to identify the problems and discuss appropriate solutions.

Data Analysis

We transcribed the interviews and performed qualitative analysis of the coded interviews to identify and understand the problems. We also studied the additional resources shared by the client, to identify loopholes and inefficiencies in the existing system.

Based on analysis and discussion with the client, we found that reshuffling inspections was a major challenge in the process, which leads to the whole process being highly inefficient. The reshuffling process was revealed to be highly erratic with inspectors exchanging duties during any period of the day, not only in the morning. This made redesigning the process more complex as there was no pattern in work flow. The primary challenge was to identify and establish a basic work pattern that can reduce the number of reshufflings throughout the day.

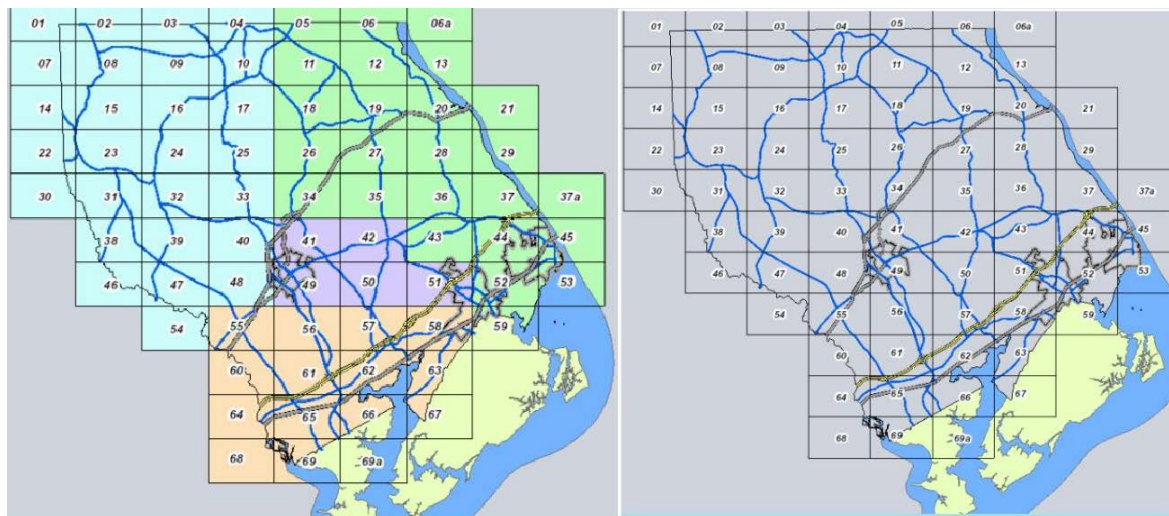
We also learned that there was very little communication between the contractor or owner requesting and inspection and ILP and in a majority of the cases contractor or owner wasn't

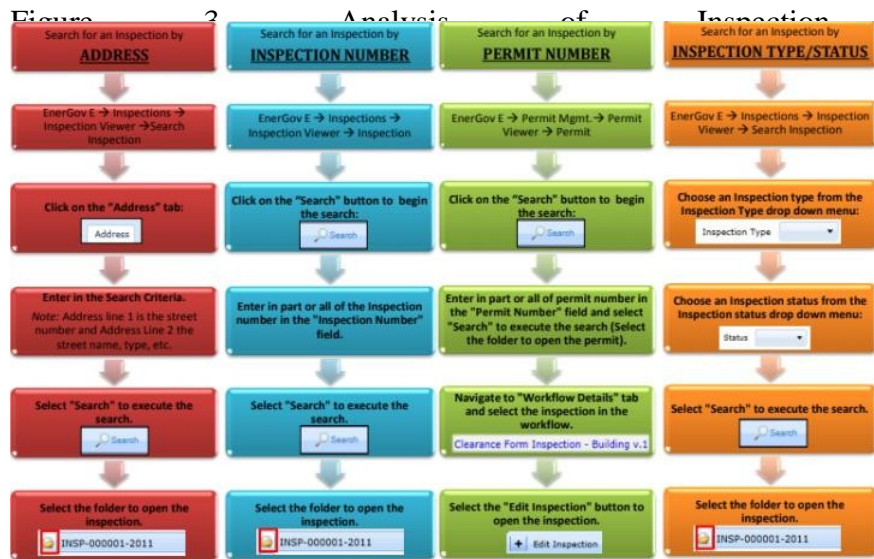
aware of when the inspection was scheduled. This lack of communication was one of the causes of inspection reassignments as the contractor or owner wouldn't be available and the inspection had to be rescheduled, which would conflict with other scheduled inspections. Thus, the inspector had to assign his inspection to another inspector who was available.

Reshuffling was also caused by an inability to predict the time required to complete an inspection. Inspection time is highly variable and depends on the type of inspection, type of property, size of property, skills of an inspector, etc. However, modern computing techniques make it easier to predict the time it might take to perform an inspection.

Inclement weather is also a concern for outdoor inspections or inspections at construction sites. This challenge can be overcome by using weather prediction systems; initially estimating the time to complete an inspection and seeing if there are predicted weather issues that might obstruct the inspection.

Figure 2. Analysis of Inspection Boundaries





Assignment

Process

Generating and analyzing possible solutions

The major issues that ILP faces is reshuffling of inspections by employees after they've been assigned. To overcome this problem, we suggest a few implementable solutions.

Team members internally reshuffle inspections, so tracking the reasons for exchanging inspections a first step.

Tracking reasons for reshuffling

After tracking the reasons for exchanging inspections over some determined time period, those reasons could be analyzed to determine which ones are the most recurrent. A change in the policy or the process could then address those reasons.

For example, one of the primary reasons for exchanging inspections is if the contractor or owner cancels an inspection and reschedules it for a later time. If the originally assigned inspector isn't available, they would exchange with another inspector. This creates issues because the inspectors aren't all qualified to conduct all inspections, which results in delays for other inspections. One solution for this case is to create a tracking tool where the inspectors can log in reasons cancelling inspections. By

analyzing which reasons occur frequently and which inspectors log those cancellations, ILP can identify problems faced by inspectors and take appropriate action, either by assigning inspectors to a new area, or reducing workloads, or planning inspection duties considering reasons for cancellations.

ILP can create a policy to plan the work-load and notify contractors and owners about an inspection. Next, if a client cancels the inspection they knew about in advance, a low priority is assigned to that request and it will be accommodated in the next day's schedule depending on the availability of inspectors.

Conclusion

Many factors—the type of inspection, type of property, size of the property, skills of an inspector—come into play when trying to improve the current assignment system's efficiency. Assigning inspections manually and accommodating all these factors is challenging. However, leveraging modern computing techniques to efficiently assign inspection requests can optimize resource and time constraints.

Historical inspection data can be used to build an artificial intelligence system that can estimate the time required to perform an inspection and estimate the travel time to the inspection site. It can also incorporate the weather forecasting, which would provide alerts to the smart computing system and block times when weather might hinder the inspection process.

Finally, we suggest using other computation techniques like clustering and recommender systems to select the most suitable inspector for each inspection based on the factors mentioned above.