Background

Condition Assessment is key to maintaining functioning assets and subsequently delivering value to San Francisco Public Utilities Commission (SFPUC) customers. Understanding this, SFPUC's Wastewater Collection System Division procured funding in 2011 to staff and deploy vacuum and closed-circuit TV (CCTV) trucks to assess the condition of the entire SFPUC collection system.

During the first few years of this program SFPUC achieved targeted miles of condition assessment, but in recent years, this assessment rate has tailed off. SFPUC needed a way to optimize condition assessment to best utilize their finite resources and return to the targeted condition assessment rate.

Several reasons were proposed for the reduction in productivity including:

- Easy assets were done first; now only hard assets remained.
- Workforce turnover and vacancies.
- Equipment reliability issues.

Improvements were also identified as solutions that would increase efficiency:

- Perform coding in the office as opposed to on the trucks (for the PANORAMO camera)
    - While the camera crew is in the field, a third person could be back in the office coding the previous day's work. This change would impact the camera equipment as it would be utilized more, and more footage would be collected.

Case Study Description

The SFPUC applied the Utility Analysis & Improvement Methodology (UAIM) to the Collection System Condition Assessment improvement project. After process definition, an As-Is workshop was held to understand the current condition assessment processes and surface details that would help tailor improvements. The main findings of the As-Is workshop and later analysis were:

- Not all pipes need to be cleaned. Smarter pipe prioritization can accelerate the process and result in more efficient cleaning.
- Filling up on gas in the morning takes a long time. Simplifying fill-up will allow more time for assessment.
- Bigger isn't better: TV vans are a better choice versus trucks.
- Safety is improved by coding in the office. There is no need for additional personnel in the van/truck or on-site.
- More time is spent filling out work orders in Maximo than coding. Inefficiency in related processes can have a large impact.
- There are too many information systems steps (or mouse-clicks). The end-to-end information processing can be streamlined. This might be an automation opportunity.
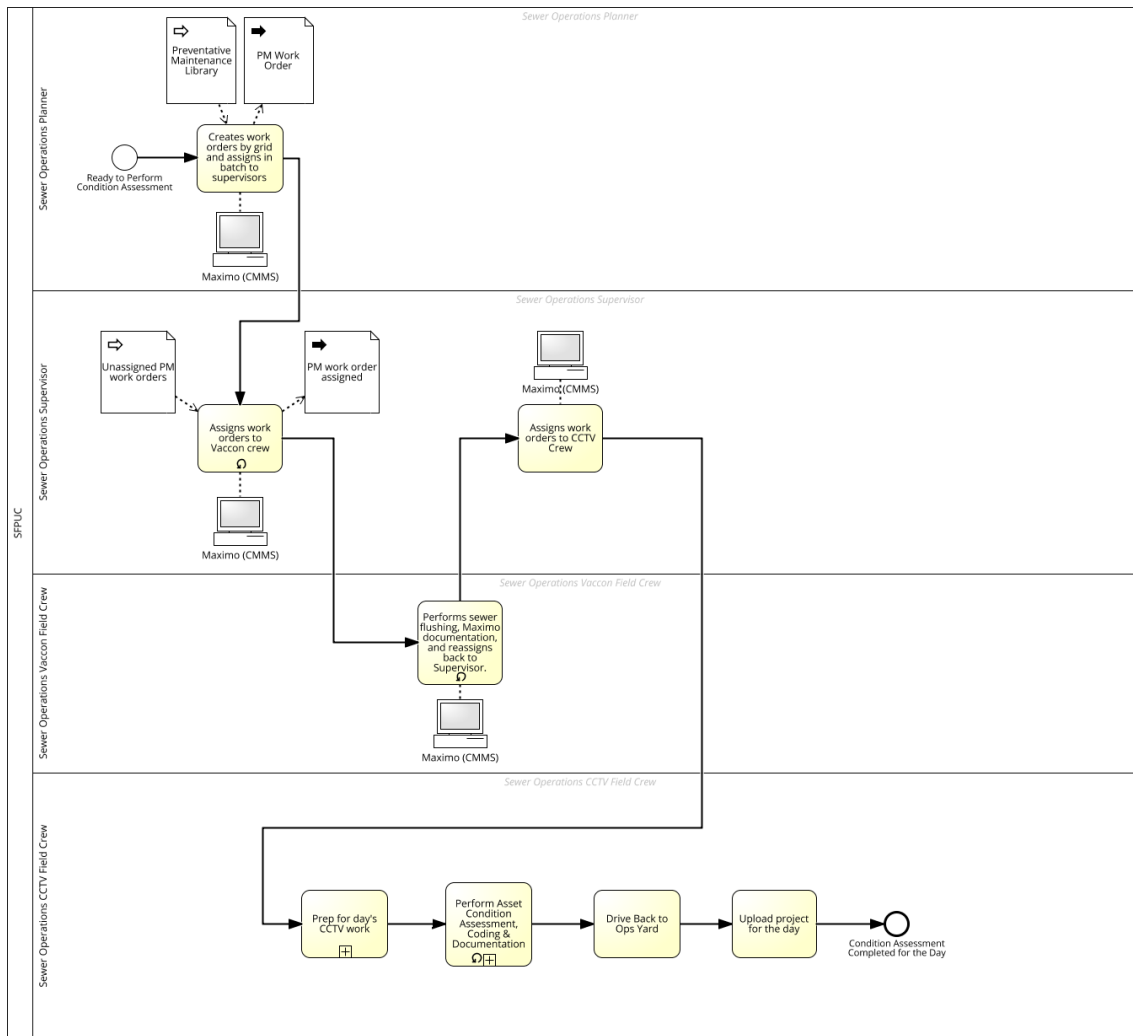
Figure 1. As Is: PM PANORAMO Condition Assessment Overview.

Following the As-Is model development, To-Be process meetings and analysis were conducted. Improvements in all three columns of the UAIM matrix were identified including:

- Business process
  - Code in the office
  - Mobile gas fill-up
- Technology
  - Determine which pipes need to be cleaned first
  - Maximo work order streamlining
  - Systems interface for Maximo and WinCan software
- People
  - PACP (Pipeline Assessment Certification Program) coding training required of all service workers

While developing the To-Be process, staff realized that the desired improvements would require an increased reliance on the Maximo software. The software could assist showing which sewers needed to be cleaned first versus those that don't, and track which videos have been captured-only versus captured and coded. Also, the interface between Maximo and WinCan needed improvements to streamline use.
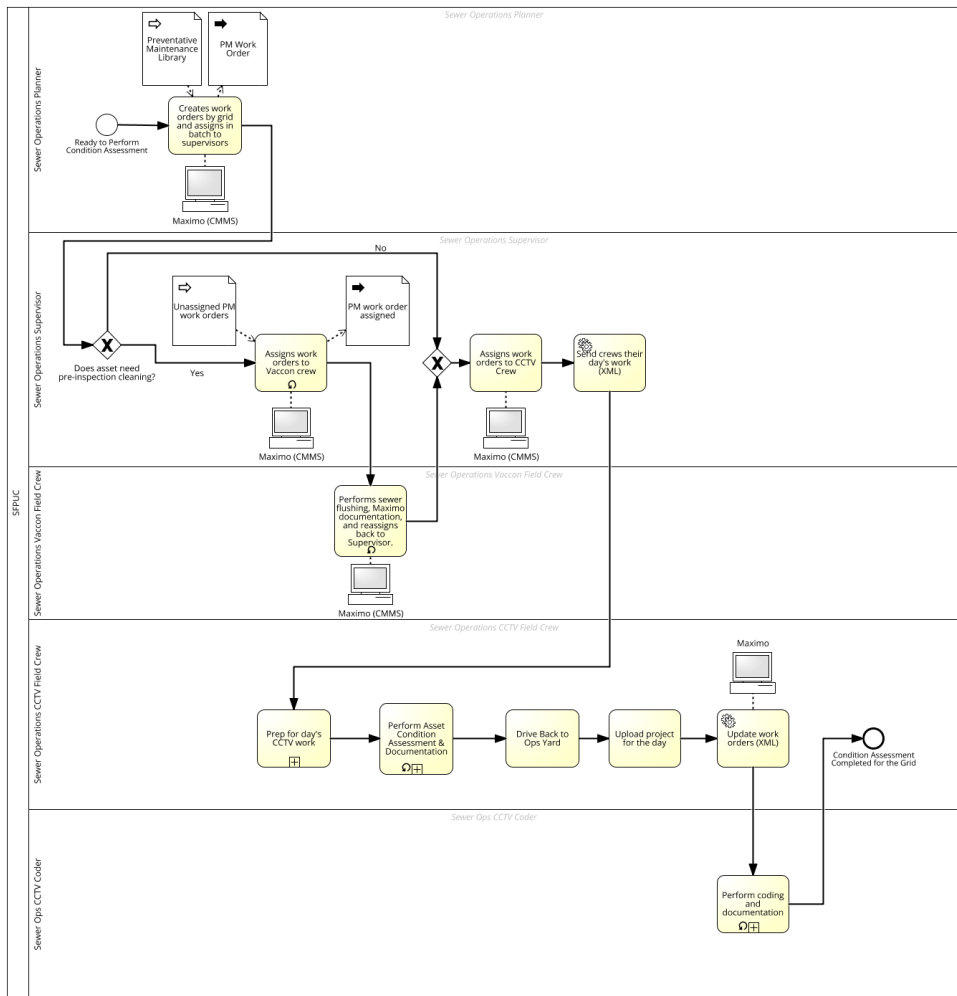
Figure 2. To-Be PM PANARAMO Condition Assessment Overview.

These results confirmed previous findings that the SFPUC Maximo systems needed improvements motivated by the following factors:

- User morale was low.
- Slow performance speed and too many clicks.
- Work order streamlining.

The technology advantages of improving the bottlenecks presented by the software indicated a useful project pivot and a step-wise way to proceed. The project team determined that it would be necessary to first fix the issues with usage of Maximo, then the condition assessment process could proceed.

The technology strategy was to "Go mobile." This translated into federation of databases on mobile devices to achieve much faster performance. Mobile devices enabled better offline availability of both data and software, and increased automation opportunities. Updated user interfaces (Apple iOS) simplified work for the sewer service workers.

Although the strategy was technology-focused, there are impacts to people, business processes, and the software. The new software platform and direction created an opportunity to provide all

parties involved with improved training. It also created an emphasis on how new data will benefit the entire SFPUC Wastewater Collection System division. The technology changes forced the staff to be specific about definitions for each data item and utilize classifications for better metric tracking and daily reporting.

Successful Strategies

The Business Process Model and Notation (BPMN) 2.0 standard was a useful tool in SFPUC's Maximo mobile development process improvements. BPMN provided an easy way to disseminate information about the new direction and processes. It also forced the team to ensure business process decisions were made before the information systems were designed. It helped SFPUC find opportunities for automation and provided a "double check" for process and information system consistency. For SFPUC staff, it documented exactly what would be done and acts as a roadmap for developing training materials.

Lessons Learned & Ongoing Challenges

Business process improvement is a common activity; however, institutionalizing continual improvement requires a structured set of methods and consistent communication to staff within SFPUC. For example, we learned that As-Is meetings could be improved by ensuring that all stakeholders, including high level managers and service workers, were present in the same room. The meetings benefit from a facilitator, detailed meeting guidelines, and allowing sufficient time to address all relevant topics.