



Waterford Township Department of Public Works

Standardized Workflows Improve Process Consistency and Efficiency



To link its SCADA, Computer Maintenance Management Systems (CMMS) and Document Management Systems (DMS) and to standardize workflow procedures to mitigate the loss of institutional knowledge due to workforce retirements, the Waterford Township Department of Public Works (DPW) implemented Workflow from GE Digital.

Located in the center of Oakland County, Michigan, Waterford Township is known as a Lakeland Paradise for its 34 lakes that surround the area, which covers 35.3 square miles. Over 71,700 Waterford residents rely on the DPW for service

on a daily basis. DPW assets include 360 miles of water main and appurtenances and an overall water/sewer infrastructure that exceeds 80,000 features that require maintenance and work orders.

RESULTS

Effective integration of institutional knowledge and expertise

- Improved process consistency due to electronic standard operating procedures
- Greater efficiency with automatic work order generation
- Faster identification and proper correction of process deviations
- Better operational responsiveness with the ability to manage by exception
- Significant time savings of staff with automated step-by-step work processes



Waterford's Challenges

Like many of its counterparts across the country, Waterford Township has been faced with losing a significant number of DPW staff, some with more than three decades of water and wastewater knowledge, to retirement.

“We were looking for a solution that would link real-time operational data in our SCADA system to our CMMS and DMS to create Standard Operating Procedures and work orders automatically when conditions were met in defined workflow procedures,” said Bill Fritz, P.E., Director of Public Works, Waterford Township.

“With SCADA continually sending real-time operational data through defined workflow procedures, the system automatically identifies abnormalities in operations and creates an Electronic Standard Operating Procedure (eSOP) and work order to ensure proper and timely correction.”

Bill Fritz, P.E., Director of Public Works, Waterford Township



Proactive Approach with Defined Processes

Linking these platforms together also provided the benefit of automatic work order generation based on SCADA data that flowed automatically into Workflow. Prior to the Workflow install, DPW staff had to manually look through operational data for conditions that may have presented a problem, which alarming didn't address. Once identified, work orders would be generated with very little, if any, eSOP to correct the problem. With Workflow, the SCADA data is continuously monitored and when deviations occur, appropriate workflows and work orders are automatically created saving valuable staff hours.

By utilizing real-time SCADA data and Workflow, Fritz said DPW staff are directed in a focused manner to resolve obscure operational problems and their root cause instead of never identifying the problem and/or root cause because that is the way it has always operated.

“Defined events are flagged automatically and consistently, forcing DPW staff to resolve them in a timely manner consistently,” Fritz said. “If you have a sewer pumping station with multiple pumps and one is starting a lot more than another, you have to first be aware that it is happening and then ask yourself ‘Why?’ Workflow does this and creates an eSOP and work order automatically to correct the problem. The same is true for pump runtimes and required maintenance on pumps when they reach runtime maintenance thresholds. This system ensures that we are proactive instead of reactive in nature.”

BY THE NUMBERS

Waterford Township Department of Public Work's Assets:

- 49,000** | Customer Leads
(24,000 Water, 25,000 Sewer)
- 360** | Miles of Water Main and Appurtenances
- 19** | Production Wells
- 2** | Elevated and **1** Ground Storage Tanks
- 11** | Iron Filtration Plants
- 1** | High Service Pumping Station
- 355** | Miles of Sanitary Sewer
- 63** | Sewer Lift Stations
- 15** | Township Buildings
- 5** | Township Cemeteries
- 230** | Vehicle Fleet
- 3,500** | Gate Valves
- 3,400** | Fire Hydrants
- 7,000** | Water Main Segments
- 11** | Water Treatment Plants
- 3** | Elevated and Ground Storage Tanks
- 24,000** | Customer Water Leads
- 8,300** | Sewer Manholes
- 8,500** | Sewer Main Segments
- 64** | Sewer Pumping Stations



The Project

The DPW implemented Workflow from GE Digital to provide the department with the ability to apply logic to SCADA values for work order generation, employ eSOPs and to create inspection forms for data collection.

The goal of the project was threefold:

- 01** Integrate SCADA workflows with Cityworks by utilizing Cityworks Work Order API
- 02** Employ eSOPs to provide a method for documenting proper process and transference of institutional knowledge
- 03** Provide auto task generation by creating a workflow component for SCADA

The project was split into two phases, the first of which centered around automating workflows triggered by two incidents – those based on data coming in from the SCADA system such as pump starts/starts/runtimes and others like sewer station inspections that dealt with specific activities or a regularly occurring schedule such as every week.

The first phase also included the integration of the Work Order API to fully automate work order generation.

Phase two of the project includes the integration of the DPW's DMS, which provides staff with seamless links to documents, drawings, agreements, manuals, etc., that are archived and used to develop additional workflows.



Manage by Exception

The Workflow integration included creation of four main components – the equipment model, events, Workflow templates, and schedules. Creation and utilization of these components create a process-driven workflow for managing by exception.

The DPW first modeled its system in Workflow by linking relevant database tags from the SCADA system. This allowed data to flow in real time from SCADA into defined workflows.

A trigger event was then created to initiate a defined workflow based on conditional expressions or time-based factors.

Condition-based events utilize transferred real-time iFIX tag values such as pump starts



Managing by exception enables DPW to act quickly based on real-time data, using condition-based events to automatically determine whether action is needed.

and stops, pump runtimes, water levels increasing or decreasing out of range, or changes in flow. These events use values stored in the equipment configuration to evaluate expressions to automatically determine whether or not action needs to be taken.

With condition-based logic, events can be triggered based on multiple sets of criteria varying from sub-set to entire categories that must be met for a workflow to be triggered. Logical expressions can also be designed to evaluate criteria defined in the Workflow process such as is one already running for the same event.

Another type of event trigger is time. Time-based events use a data/time expression to determine when an event should be triggered, such as sewer station inspections at set time intervals such as every two weeks.

Automated processes

The next step was to create Workflow templates that contain the procedures and steps for DPW staff to follow when completing the workflow. The procedures and steps can be executed automatically such as having a pump turn on or off or manually through interaction by the user. These procedures and steps can be modified by the workflow authors, and services can be added by the administrator to refine the process.

Finally, schedules are created by defining time-based activities within the Workflow template, if necessary.

When a workflow is triggered, an email is sent to appropriate DPW staff to alert them of the workflow and to provide them with the work order, if defined to be automatically generated. DPW staff can then begin to process the workflow and view all of the details involved.

Real-time SCADA data related to the workflow can also be displayed to aid DPW staff in resolving the event as well as specific eSOPs and documents such as operational manuals.

The eSOPs outline steps to problem resolution in a numbered format and have a “comments” field for the operator to enter information.

The steps guide users through resolution of the issue and have expiration times in place. If a step is not completed in a certain amount of time, escalation processes such as supervisory notifications can occur.

At any time, DPW staff can get a list of completed workflows and check a workflow history to view its details. Managers can develop workflows based on functions of their group. They can also delegate work and see the status of operations by viewing pending workflows.

Additional Efficiencies Ahead

In the future, DPW staff will design workflows to assist in automation of preventative maintenance on equipment such as pumps.

Examples include pump-runtime-driven maintenance such as bearing lubrication and seal inspection. Instead of hoping DPW staff remembers to perform this critical maintenance at a manufacturer’s recommended runtimes, a workflow can automatically be created and a work order generated to ensure it will be done.

“Workflow is more about its potential than anything. If you have an operational process, it can most certainly benefit from a workflow designed to monitor abstract and varied functionality to ensure proper operation and efficiency. No doubt it takes work at the beginning to develop them, but when they are in place, hundreds of DPW staff hours are saved and effective and consistent operations are ensured,”

Bill Fritz, P.E., Director of Public Works, Waterford Township



Learn how Waterford, MI uses GE Digital software to manage water supply.



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