# Building a Flexible Non-proprietary SCADA System
The Story of Chatham County, North Carolina

By Christopher Little, Daniel Clevenger and Kevin Monk

In 2008, Chatham County Public Works was using three different SCADA systems to monitor and control their remote tanks and pump stations. One was a sole-source software and hardware solution that used a unique communication protocol. This meant that only this vendor could expand, upgrade or service this part of the system. In 2009, the new Director of Public Works decided to standardize on VTScada HMI software, which would allow them to communicate with any industry-standard monitoring and control hardware. In this article, Daniel Clevenger of Chatham County and Kevin Monk, of Custom Controls Unlimited describe their experience developing a flexible, user friendly SCADA system that can grow with the county's needs.
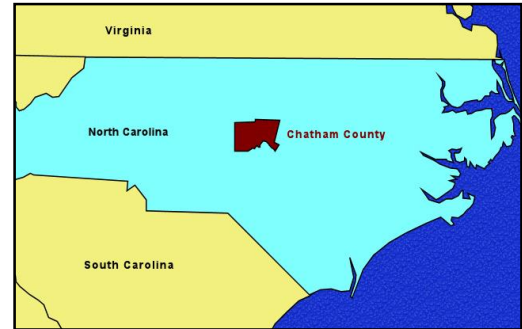

Chatham County, North Carolina

Chatham County Public Works and Utilities serves over 50,000 residents spread over 710 square miles in central North Carolina. As Superintendent ORC, Daniel Clevenger is responsible for the maintenance of the County's water system.

"When I was hired six years ago, we had Wonderware HMI software that communicated with Allen Bradley programmable logic controllers at three remote sites via high-wattage radios." When the utility needed to add a new remote pumping station and water tower, their engineering firm recommended deploying remote telemetry units (RTUs) from Dexter Fortson Associates and the latter used LabView HMI.

"There were things that worked well but there were limitations on what you could do. For example, we wanted to send the raw data from the new RTUs to our existing HMI software application." They wanted to use their Boolean logic to configure it themselves which made it frustrating. "If I wanted to use the tank levels to turn on the high surface pump at my water plant, they could send me an input & an output, but they couldn't send me analog data. It would have been easier for us to have a single HMI that could interface with any PLC. That would allow us to add other kinds of PLCs in the future."

VTScada HMI Software

In 2007, David Hughes became the Director of Public Works for Chatham County. "He did not like the fact that we had to go through a single company for all of our repairs and upgrades." When the utility needed to add a new RTU, Hughes turned to Custom Controls Unlimited (CCU), a Raleigh-based systems integrator. CCU suggested VTScada HMI software from Trihedral, with its integrated library of device drivers that allows it to link together systems made up of a variety of industry-standard RTUs and PLCs. "There are a lot of things I like about it. With VTScada I can use hardware from Allen Bradley, Automation Direct, or whatever I want to use. Also, it is more cost effective than most other HMI manufactures and the licensing is far less complicated." After using VTScada successfully for several months, the utility asked Custom Controls Unlimited to convert the existing DFA system to VTScada.
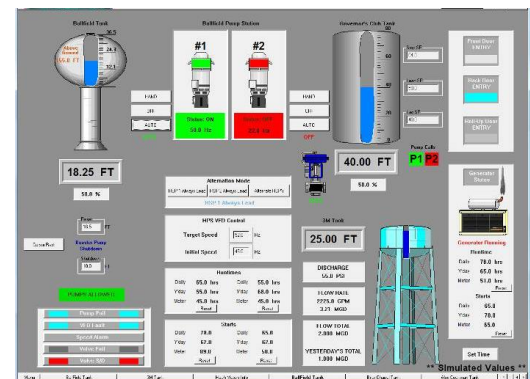
Establishing a Connection

Kevin Monk was the CCU Project Manager for the contract. "First, we needed to be able to communicate with the DFA RTUs. Then we needed to convert the controls from the original LabView application. After that, it was my job to go in and clean up the graphics and make sure that everything was working correctly."

Ray Davies with Trihedral traveled to North Carolina to test the VTScada DFA communications driver. "Ray was a great guy to work with." says Clevenger. "I have some experience with PLCs. I can troubleshoot and do that kind of thing so it was interesting to see the process. He was able to explain what he was doing without it slowing him down."

Davies used the DFA's OpenLink communication protocol specifications to not only communicate with the RTUs; he was then able to optimize communication to leverage advanced VTScada features such as the integrated polling driver.

This solved several problems for Clevenger. "The DFA system would only poll every fifteen minutes. We needed to see the actual system data, like discharge flows from pump station, in real time. When the tank RTU was polled, it would either return a long code that identified the tank site, set points like an on and an off, or VFD running set points. Ray had to go into the program radio logic and make a driver that would communicate with VTScada. He set up logic that would allow me to activate a fast poll mode that would poll every minute if we had a pipe break."

Historical Data Trending

"We completed the Chatham County conversion in August of 2008." says Monk. "The whole process took about three weeks. I commend the effort that Daniel Clevenger and Roy Lowder put into getting this completed. They had a good understanding of how their system ran, which helped a lot. They supported everything we did and were really great to work with. Now they are able to trend their data much more efficiently. Their old HMI did not have that ability."

"I like that [with VTScada] you can trend about anything on the screen that moves." says Clevenger. "Once the trend screen is open, I can go back as far as the system has been logging data. I am not limited. I also like that it can present the data in a graph view or Excel view. The things we had used in the past might only give you a graph. In addition I can now import things such as turbidity information.

VTScada Training Course

Clevenger was able to attend a VTScada training course in Burlington. "I learned a lot about how to do more with the report page. I already knew how to create reports but the course taught me how get really specific about what I wanted. I learned how to import report information into an Excel spreadsheet that has formulas built into it. I learned how to import data into one page and then copy it over to other pages. I haven't yet gotten to where I can add my own sites."

The Future

"Although we still use the original HMI software at the plant, we are trying to get everything budgeted to upgrade the rest of the system to VTScada next year." says Clevenger. "When we do the next upgrade we will be adding a second HMI server. This will provide complete system redundancy and automatic failover should the primary server fail. The whole process went very smoothly. VTScada is very user friendly and that was the most important thing. I'm happy with the system that we now have."

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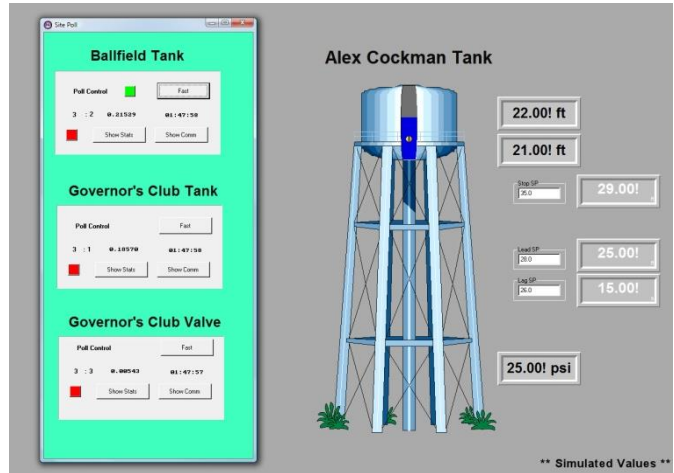
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