Leading the Way: Profile of an Early ESS Deployer
Larry Senn and Washington State DOT (WSDOT)

Describe your ESS deployment. What data are your sensors collecting? Who uses the weather data that your sensor stations collect?
We have a network of 40 SSI (Surface Systems Inc.) stations in our state and we are currently installing another 12 stations. Our stations collect standard air and weather measures, things like temperature, barometric pressure, humidity, wind velocity, pavement surface and subsurface temperatures, and visibility and precipitation data. We have also installed single-frame video cameras at some of our stations so we can visually monitor pavement conditions and traffic flow in key areas of our highway system.

We use our weather data primarily for winter road maintenance operations. Our maintenance managers decide how to best deploy crews and equipment by referencing the data we collect. We are also looking at ways to use weather data to help managers deploy resources more effectively during summer paving operations. Apart from our own operations, WSDOT is a member of the Northwest Weather Consortium and shares resources and data with other consortium members and with the general public through WSDOT's real-time weather web site. Our web site currently displays over 300 weather sites.

Larry Senn is a civil engineer who has 25 years of experience with the Washington State Department of Transportation (WSDOT). During this time he has specialized in the area of electronic and electrical interfaces to transportation projects. Areas of special expertise include SC&DI systems, Traffic Systems Management (TSM), ramp and signal control systems, and real-time Supervisory Control and Data Acquisition (SCADA) systems for highway infrastructure including tunnels and movable bridges.

For the last ten years he has been part of WSDOT's ITS Program Office where he has been involved in projects to improve traveler information through technology, improve maintenance and traffic operations, provide variable speed limit system across a mountain pass, and to provide transit signal priority for a local transit provider.

As part of his work at the ITS office, he recently developed a specification for Environmental Sensor Stations that called for NTCIP communications protocols.

Mr. Senn has a B.S. in Civil Engineering from the University of Washington in 1972.

Why did you decide to use NTCIP standards?
I wanted to simplify the management of our sensing stations. I've witnessed the complications that can develop when you try to manage highway equipment from different vendors, running on different platforms, and on multiple servers. Each time you add a new piece of equipment, you end up creating a new operational scheme, which makes your system even more complex and difficult to operate. I wanted to avoid this with our ESS deployment so we were very interested when Qualimetrics approached us and demonstrated that their ESS devices could communicate with our SSI server using NTCIP standards. This offered us two important things—the ability to continue to run our ESS devices off a single server platform and more flexibility in purchasing.

What challenges did you encounter when you integrated sensors that use ESS/NTCIP standards with your legacy systems?
We really didn't run into any significant problems during integration because we were clear in our RFP (Request for Proposals) about what we expected a vendor to do. The vendor had to provide us with ESS devices that could communicate with our SSI server through NTCIP standards. By using NTCIP as a functional specification, we determined that the requirement was met when the new Qualimetrics sensors were able to communicate with the SSI server and send weather data to the SSI database. We were also fortunate because SSI was very open to working with Qualimetrics during the integration. I recall that there were some issues involving Qualimetrics sensors and SSI object definitions. This took them some time resolve.

Did you hire a consultant to help your agency deploy devices and components that used ESS/NTCIP standards?
We didn't hire a consultant to help with our ESS deployment. Once Qualimetrics demonstrated to us that they could integrate their ESS devices with our SSI server, and we determined that SSI was open to working with a third party using NTCIP, we wrote an open competitive RFP based on a functional specification calling for NTCIP-based communications. So we really didn't need outside help—the integration was worked out between the vendors.

What advice can you give on how to write ESS/NTCIP standards into a procurement proposal?
I think it is important to think about all the functions that you want your devices to perform and then let the vendor worry about implementing the standards that bring you that functionality. I would also recommend that you talk to colleagues who have already worked with NTCIP standards. Ask to look at their RFPs and read how they accounted for standards in their procurements. We only had two vendors respond to our RFP, which I suspect was due to our short, 60-day timeframe to deliver the ESS hardware. I believe we would have had a much greater response if we had allowed more time, maybe six months, so other vendors would have enough time to implement and de-bug the NTCIP protocols.

Has the use of ESS/NTCIP standards had any impact on vendor selection and commodity price for your ESS devices?
Yes, using standards has had an impact. Now we can buy our ESSs from two vendors instead of only one, and this competition, although it is limited, has been enough to drop our per-site costs by nearly half. Before we used NTCIP standards, an ESS site cost roughly $40,000 and we had absolutely no ability to go out for a more competitive bid. Now, we have more flexibility with our procurements and more leverage with our vendors.

I believe that NTCIP standards will help us in the long run because they will enable us to expand our ESS system more rapidly. Only a single server system and database needs to be maintained, which saves on our MIS effort.

-Larry Senn

What benefits do you expect to attain from using ESS/NTCIP standards?
We can deploy more sensing stations because we can get a better price for our ESS devices. This means we can provide a greater range of weather information for our maintenance forces and to the public. This is especially important in a state like Washington that has such a varied topography. For instance, there are areas where elevation changes take place within a relatively small geographical range, which means weather conditions can also change quickly within a short distance. Because our equipment is less expensive, we can purchase and install more stations and provide more comprehensive weather data collection and forecasting.

In what ways have ESS/NTCIP standards affected the operations and maintenance of your sensors?
I can't say that standards have directly affected how we maintain our sensing stations, but because our per-station costs have dropped, we have been able to deploy more ESS stations and to monitor weather conditions along more roadway miles. This does have a direct impact on our operations and maintenance because we have access to more data, across a greater geographical range, and this affects when and where we dispatch road crews and other maintenance resources.

Do systems that use ESS/NTCIP standards add to your capacity to coordinate with ESS or ITS devices used by other transportation agencies in your region?
I believe that NTCIP standards will help us in the long run because they will enable us to expand our ESS system more rapidly. In terms of our internal operations, only a single-server system and database needs to be maintained, which saves on our MIS effort. Also, there is only a single user interface to learn, which can mean a lot if you have a large number of in-house users. Lastly, all the data and information are in a single location.

For your colleagues who might be on the fence about using ITS standards, what is the strongest argument you can think of for using standards soon rather than later?
The cost savings is the biggest advantage. We have been able to deploy more stations around the state, which has had a measurable and positive impact on the quality of the weather data we collect and disseminate.

Note: The U.S. DOT does not endorse the manufacturers listed in this profile. The manufacturers' names appear because they are considered essential to the objectives of the document.