TECHNICAL ARTICLE

ISA112 SCADA Standards Committee Releases draft SCADA System Workflows & Architecture Diagrams

By Graham Nasby, ISA112 Committee Co-chair

When designing/building, updating, or operating supervisory control and data acquisition (SCADA) systems, the use of end-user facility SCADA standards is an essential tool. It is through the use of common SCADA standards that the inner working parts of SCADA systems are able to function. For example, inside a water facility, SCADA standards are used to define how equipment/instrumentation is wired, how signals are named, how PLCs are programmed, how servers are configured, how data is logged, and how information is presented to operators on computer screens.

But where do the end-user SCADA standards come from? And what defines a good set of SCADA standards? Furthermore, how do I get a copy?

These are all good questions that come up when working with SCADA systems. The answers to these questions can vary considerably, depending on who you talk to.

When working with a large water utility, internal SCADA standards are usually overseen by the organization's PCS (process control systems) group. Usually developed in-house, created by a consultant, or a combination of the two, it is a lot of work to develop a set of facility SCADA standards and keep them up to date. In fact, the work to keep a set of internal SCADA standards current for a large utility is a never-ending task. For smaller utilities, dealing with SCADA standards is also challenging due to limited staff resources, limited budgets, and few publicly available SCADA guidelines. A shortage of qualified staff that have the skills to use and update the standards can also be an issue. Furthermore, in any utility, capital project work can also be challenging SCADA-wise, especially when a utility does not have a full set of SCADA internal standards, or when a utility's internal SCADA standards have not kept up with the times and/or are incomplete.

It seems that whenever Automation Professionals get together, the discussion topic of SCADA standards is a frequent one. Regardless of whether one is with a utility, consultant, vendor, contractor, or system integrator, having a good set of SCADA standards makes working with SCADA systems easier. Being able to use common terminology, techniques and templates has the potential for significant cost savings for everyone involved with SCADA systems.

In any SCADA installation, being able to apply a good set of SCADA standards can go a long way to reducing complexity and/or eliminating the need for custom code. Being able to avoid complexity and reducing the need for custom solutions are sure-fire ways to save costs and increase robustness. Thus, promoting the use of good end-user SCADA standards is something we should be all doing.

For the past year, the ISA's Water/Wastewater Industry Division has been keeping a close eye on a recent initiative by the ISA Standards & Practices department with respect to SCADA systems. Through its role as an international SDO (standards developing organization), the ISA has formed the ISA112 SCADA Systems Standards Committee. The ISA112 committee has been charged with developing an international SCADA standard that provides a set of minimum requirements for the planning, design, construction, and operation of SCADA systems.

Headed by two Canadian co-chairs, Ian Verhappen from CIMA+ and Graham Nasby from Guelph Water Services, the ISA112 committee now has over 150 members from a wide cross-section of industries that use SCADA technology. These include municipal water/wastewater, mining, oil/gas production, pipelines, environmental monitoring, electricity transmission, and telecommunications. One of the benefits of having so many industries involved is that good ideas from one industry can cross-pollenate into others. There are actually more similarities between SCADA applications between industries than there are differences. We are also fortunate that the ISA112 committee has a strong representation from the municipal water sector, including several members of our ISA Water/Wastewater Industry Division (WWID).

The ISA112 committee received its charter from the ISA's Standards & Practices board in 2016. Since that time the committee has continued to grow, with many members from around the world. Currently the committee has members from Canada, USA, England, Chile, Brazil, Germany, Australia, and numerous other countries. The committee also has a good cross-section of end-users, utilities, vendors, consultants, contractors, and system integrators. The committee has also made a point of ensuring that the major SCADA software vendors are involved, so that all viewpoints are considered.

Membership of the ISA112 committee is open to anyone with a SCADA background who is interested in contributing. More information on joining the ISA112 committee can be found at www.isa.org/isa112 . Most committee members contribute by writing content, commenting on current drafts by suggesting revisions, providing examples to illustrate best practices, or assisting with the resolution of submitted comments and proposed revisions. The committee itself holds monthly conference calls, which are supplemented by face-to-face meetings twice per year. Much of the writing/editing work is done offline by committee members.

A major goal of the committee has been to develop a standardized workflow, or SCADA lifecycle, that provides an organized way to apply best practices in the design, development, testing and operation SCADA systems. A major part of this workflow is providing a consistent way in which internal SCADA systems standards can be organized. The ISA112 SCADA workflow has also been developed so that it can be easily applied to SCADA systems ranging from only a few nodes (say, a town water system) to the very large systems that can be found in metropolitan sewage district.

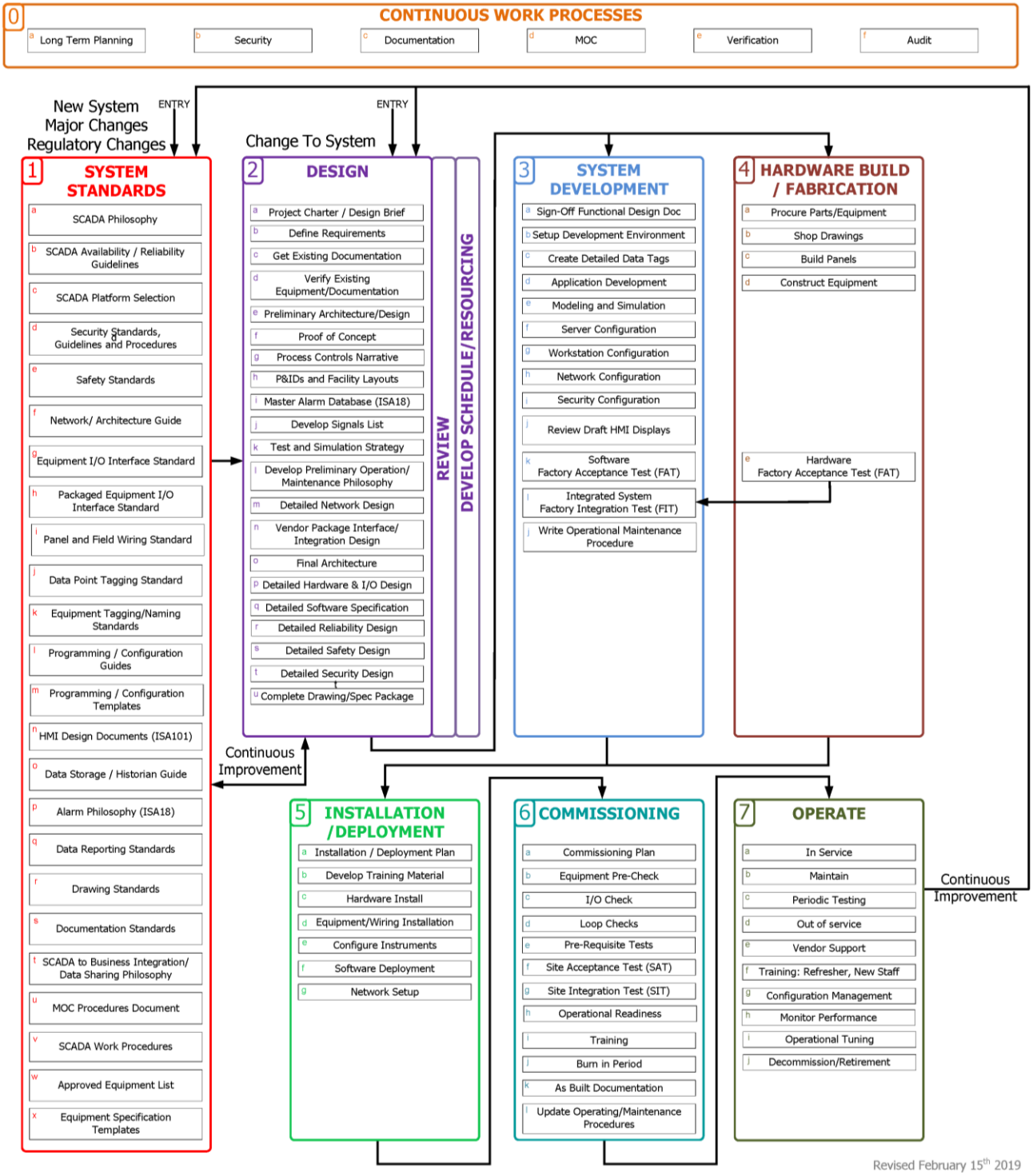

Figure 1 – ISA112 SCADA Systems Lifecycle

Drawing on a technique used in other ISA standards, the ISA112 has created a standardized workflow, or "lifecycle" for the long-term management of SCADA systems. This includes continuous work processes, facility SCADA standards, project-based workflows, and work processes for operating/maintaining the system. The current version of the ISA112 SCADA Systems Lifecycle can be found in Figure 1.

Even though it is in draft form, the ISA112 SCADA lifecycle is currently already being used by several water utilities and other end-users who belong to the committee, as well as by several engineering consultants, system integrators and contractors. The draft that is shown in Figure 1 represents the end product of over a dozen drafts that have undergone full committee review and refinement. The diagram will continue

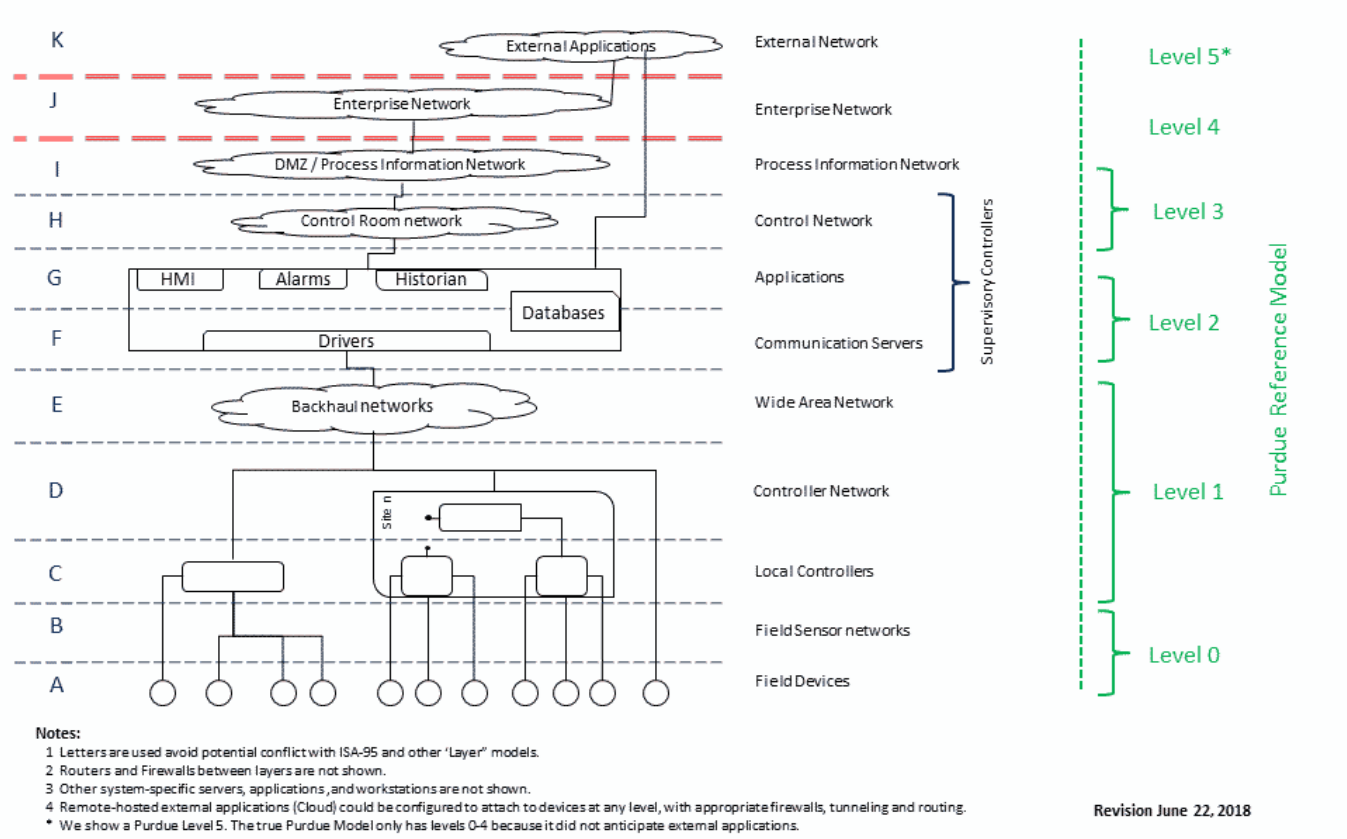

Figure 2 – ISA112 SCADA System Architecture Model

to be developed as the committee completes its work by writing the text of the ISA112 SCADA Systems Standard.

Another goal of the ISA112 committee has been to establish a set of common SCADA terminology, architecture models, and workflows to enable the design, construction and operation of SCADA systems to be done more efficiently, consistently, and robustly.

Many of the capital-project-oriented members of the committee are looking forward to defining a robust set of standardized SCADA terminology that can be used to more clearly define requested features in SCADA specifications – to the benefit of both purchasers of SCADA systems and to those who supply/develop them.

The current draft of the ISA112 SCADA architecture model can be seen in Figure 2. This diagram is soon to be accompanied by a list of standardized SCADA terminology that will form the definitions section of the ISA112 document.

The ISA112 SCADA systems standards committee has now been active just over two years. In that time it has developed a SCADA lifecycle model, reference architectures, and a draft table of contents for the upcoming ISA112 SCADA standard.

The committee is now engaged in the process of writing the first drafts of the text that will form the core of the ISA112 SCADA Systems Standard. This writing and editing phase is expected to be very active for the next two years, then to be followed by several comment rounds where all committee members will have a chance to further refine/contribute to the document as it takes shape.

The ISA112 committee actively welcomes additional members to help with the writing and development of the document text. If you are interested, please contact the committee co-chairs Ian Verhappen and Graham Nasby via the ISA112 committee website at www.isa.org/isa112/

As the ISA112 SCADA systems standard develops, the ISA Water/Wastewater Division will continue keeping a close eye on the ISA112 committee and its draft documents, both to contribute our water/wastewater division know-how and to ensure that our municipal water community can make the best use of this soon to be available SCADA resource document.

About the Author

Graham Nasby, P.Eng, PMP, CAP holds the position of Water SCADA & Security Specialist at City of Guelph Water Services, a publicly owned and operated water utility located in Guelph, Ontario, Canada. Graham is the co-chair of the ISA112 SCADA Systems standards committee, and a voting member of the ISA18 and ISA101 committees. He is also a member of the Automation Committee of the Ontario Water Works Association (OWWA). Contact: graham.nasby@guelph.ca