SCADA Control Systems Seminar

Selecting SCADA Systems

EMERSON.
Process Management

Selecting SCADA Systems

- 11 rules for success
- Existing or new systems?
- In-plant or remote systems?

11 Rules for Success

1. Assemble a **team** of users
2. The **team** should assign a project champion
3. Each user to independently specify requirements
4. Requirements review by **team** to avoid technical conflicts
5. The **team** should agree to definitions that make sense
6. Learn from the existing system, but don't let it tie you down
7. The **team** should conduct site visits early and often
8. 'Look and Feel' issues are important, but so are other items
9. System configuration, upgrades and maintenance critical
10. The **Team** should refine specifications
11. The **Team** should define the criteria for judging proposals

Topics to be covered

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Requirements

Each user to independently specify requirements

- Each user will have things that are important to them
  - SCADA Technicians may have different requirements than Water Quality
  - Each user may think his requirement is the highest priority

Requirements Review

Team to review all requirements

- There may be requirements that are in conflict
  - Each user must be willing to compromise
  - Project champion to resolve conflicts

Definitions

The **team** should agree to definitions that make sense

- Definitions for some requirements, such as system reliability, system availability, data throughput, etc., can vary greatly.
- Try to define these items using reasonable requirements that can be measured.
  - Reasonable – performance that makes sense when put into the context of the whole system. It is unreasonable to expect data updates of 500 milliseconds on a system that is polling 100 RTUs every two minutes.
  - Measureable – avoid subjective terms like “adding data to the system shall be user friendly”; instead, use statements such as – “data added to the PLC program shall be added to the real time and historical data bases automatically”.

Existing Systems

Learn from the existing system, but don't let it tie you down

- If replacing or adding to an existing system, don't restrict yourself by using requirements of the old system
- Base your new requirements on lessons learned from the existing system
- Understand how (and why) your existing system really works
- Understand how you would like the new system to work
- Change the things that haven't been working well
- Keep (and enhance) the things that have been working well

Flash vs. Substance

‘Look and Feel’ issues are important, but so are other items

- Many users get hung up on ‘eye candy’
- Controlling the system is critical
  - Complete control strategies – Make sure to specify everything that is required to perform the desired control strategy.
  - Robustness – Develop robust control schemes. Define all failure modes. Define back-up control schemes.
  - Testing – require complete testing of all control strategies to be performed prior to acceptance per pre-approved test plans. Tests should include all failure modes and back-up control schemes.
  - Documentation – Require complete, updated control strategies at the completion of the project. Require test plans to be submitted and approved early in the project.

Flash vs. Substance Continued

'Look and Feel' issues are important, but so are other items

- Timely, accurate, and reliable data is vital
  - Complete data – define all of the data required by all of the users of the system.
  - Robustness – require that the data travel through the system with everything that a user needs to know about the data (validity, engineering units, descriptors, etc.)
  - Accuracy – Define where data will be generated. It is better to perform averaging, totalizations, alarming, etc. as close to the process as possible
  - Integrity – Require that any changes made to the system be logged in an accessible manner
  - Availability – require that the same data in the PLC/RTU is available at the host. Require that the historical data, alarm histories, and event logs are available at the PLC/RTU. Require that if communications are lost between the PLC/RTU and Host, the host must be able to recover the historical data when communications are restored.

Long term support

System configuration, upgrades and maintenance critical

- Decide if long term support will be handled in-house or by an outside party
- Invest in the resources required to maintain the system
  - Training
  - Software and hardware support plans
- Require the following deliverables on the project
  - all application level source code (PLC/RTU programs, symbol libraries for HMI, configuration scripts, etc.)
  - Documentation of programs, HMI, etc.
  - Approved test plans for all programs
  - Signed test results for all installed and accepted software

Long term support (continued)

System configuration, upgrades and maintenance critical

- Develop and maintain programming standards – including standard program libraries for the RTU/PLC programs, standard display templates and symbol libraries for the HMI, and standard report templates
- Develop and maintain test procedures. These procedures should include regression testing as well as validation testing
- Keep up with upgrades of operating systems, firmware, programming software, etc.
- Develop and maintain revision control of all aspects of the system – always know how to find (or build) a specific program running in a specific RTU/PLC or on a specific workstation
- Develop a regular schedule for rolling out new versions of programs, including RTU/PLC programs, HMI mimics, etc.

Existing Systems

- Adding to an existing system
  - Make sure new equipment is compatible with existing equipment
  - Select new equipment that can enhance and eventually replace your existing system
- Replacing an existing system
  - Document existing control strategies and database. Include a test plan.
  - Compare this to desired control strategies and database
  - Define what needs to be replaced, what needs to be upgraded, and what can be left in place

New System

- Starting with a clean slate
  - Only limitation is time and money
  - Select a scalable system; start with highest priority items, with a phased plan for expanding the system
- Select most appropriate technology
  - The newest technology is not always the most appropriate
  - Technology good for one application may not be good for your application
- Speak with a lot of users, make plenty of site visits
  - Try to learn from others' mistakes and successes
  - Talk to a number of users of a system, don't limit yourself to the SCADA group.

In-plant vs. remote systems

- Communications media
  - In-plant more likely to have high speed LAN/WAN available – high capacity, high data throughput
  - Remote systems more likely to have low to medium speed networks available – low to medium capacity, low to medium data throughput
- Control strategies
  - In-plant typically has many unique systems, all tied together to perform the plant process. Data is local to the system, back-up schemes more easily implemented
  - Remote systems typically have many locations where control strategies and equipment are identical. Data is often remote from process, back-up schemes not easily implemented