

GOOD, BETTER, BEST OR BEST FIT?

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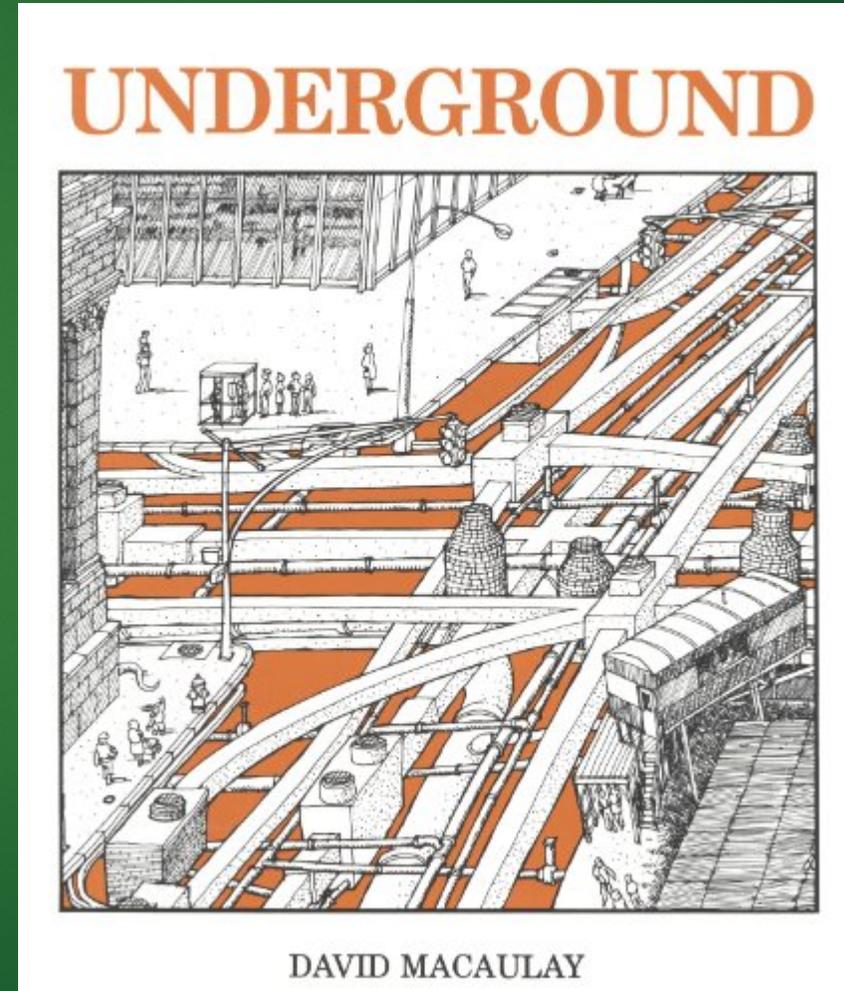
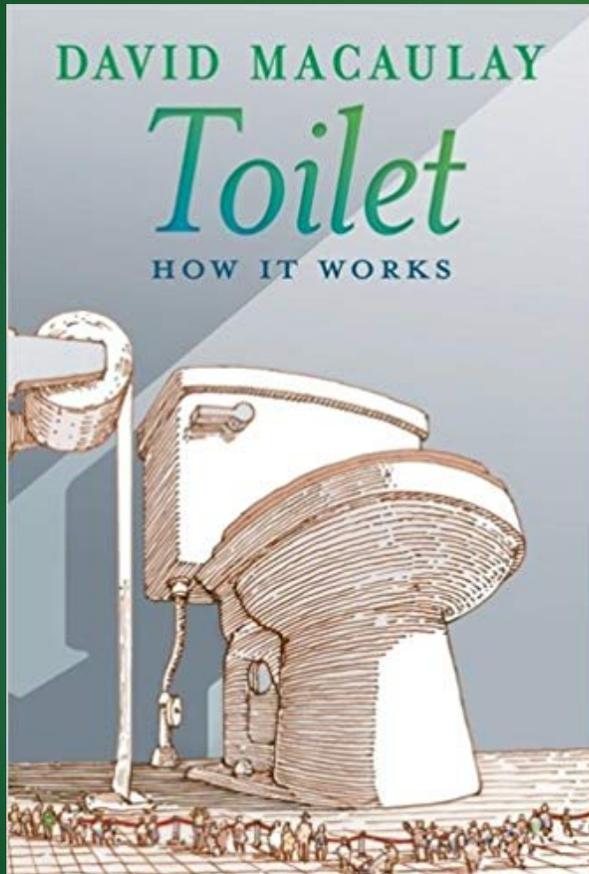


Overview

Rather than thinking of SCADA systems as Good, Better, Best, we should be thinking more about what is the Best Fit.

This presentation takes a look at three different scenarios and discusses what might be the “Best Fit” of SCADA technology for each.

But before we get started, something completely different . . .



Underlying Assumptions



- ▶ Quality hardware, well supported locally, knowledgeable reps.
 - PLCs and Touchscreens
 - Motor Starters, Soft Starts, VFDs, and Motor Control Centers
 - Computers
 - Computer networking equipment
 - Telemetry Radios
 - Instrumentation
 - Alarm dialers

- ▶ Software, professionally written, actively updated, knowledgeable reps.
 - Visualization (SCADA)
 - Alarm Notification
 - Water/wastewater data management and reporting
 - Maintenance scheduling
 - Asset management

Factors

Factors to consider in evaluating what is the
"Best Fit."

- ▶ Facility Scope
- ▶ Staff
- ▶ Data and Reporting needs
- ▶ Management Tools
- ▶ Cost

Scope

Scope of operation

- ▶ Wastewater Only
 - Plant complexity
- ▶ Collection System
 - Number and size of pump stations
- ▶ Water System
 - Number of wells, booster stations, wells, reservoirs, etc
- ▶ Combined Water and Wastewater Responsibilities

Staff



Size and expertise of staff

- ▶ One operator with a back-up from another city/village department
- ▶ Two operators
- ▶ One or two operators with a wide range of responsibilities
 - Water, Wastewater, Streets, Parks, in short everywhere at once, knowing everything about everything
- ▶ Multiple operators with specific areas of responsibility, perhaps shared with other departments
- ▶ Technology experience

Data

Data collection, reporting, and management

- ▶ Operational data collection
- ▶ Regulatory reporting requirements

Management

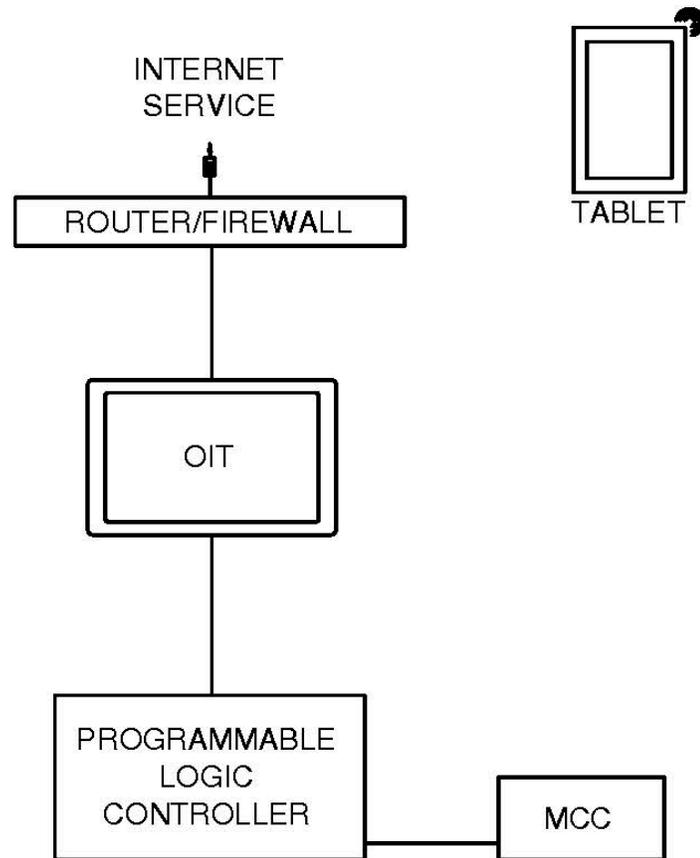
- ▶ Process Management
- ▶ Maintenance Management
- ▶ Asset Management

Now, let's take a look at three Scenarios

Scenario A

- ▶ Small wastewater treatment system
 - One process building
 - One Programmable Logic Controller (PLC)
 - One Motor Control Center (MCC)
- ▶ One full-time operators
- ▶ Back-up or fill-in operator from another department
- ▶ One or two collection system lift stations

Scenario A



OIT

1. SINGLE TOUCHSCREEN

PLC

1. SINGLE PLC

SCADA COMPUTER

1. NONE

REMOTE ACCESS

1. DESKTOP/LAPTOP/TABLET VIA INTERNET CONNECTION TO OIT.
2. ONE PERSON OPERATION

DATA COLLECTION

1. DAILY PRINTOUT DIRECT FROM OIT TO PRINTER
2. DATA STORAGE ON OIT MEMORY, TRANSFERRED TO USB STICK.

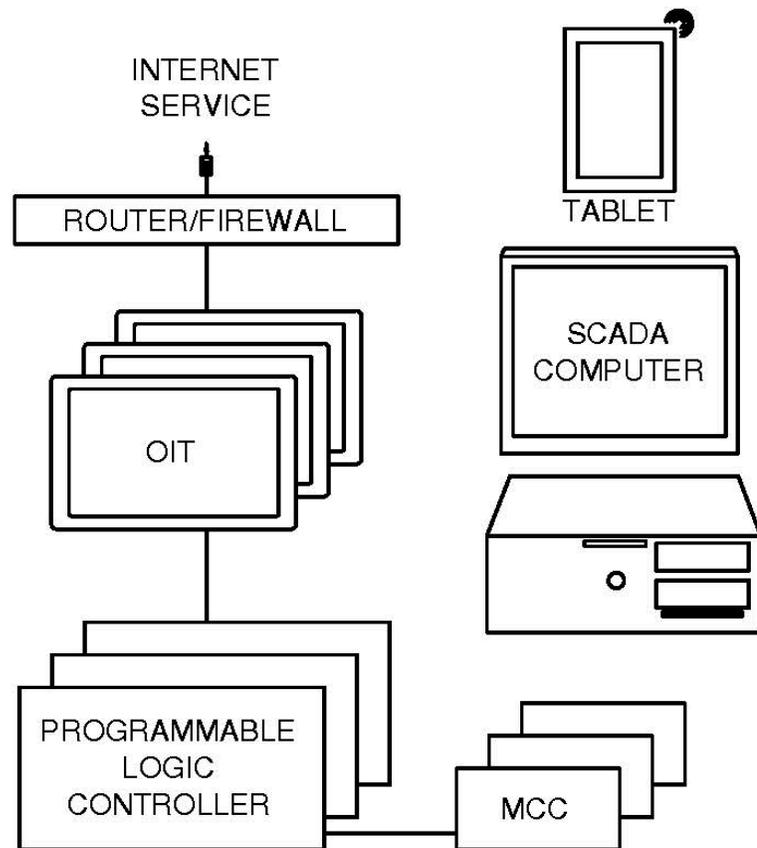
MANAGEMENT

1. MANUALLY COMPILED REPORTS.
2. SPREADSHEETS.
3. MANUAL MAINTENANCE SCHEDULING.

Scenario B

- ▶ Mid-sized wastewater treatment system
 - One to three process buildings
 - One to three Programmable Logic Controllers (PLCs)
 - One to three Motor Control Center (MCCs)
- ▶ One or possibly two full-time operators
- ▶ Back-up or fill-in operator from another department
- ▶ One or two collection system lift stations
- ▶ Water system, two active wells, one tower

Scenario B



OIT

1. MULTIPLE OIT LOCATIONS
2. VISUALIZATION SOFTWARE ON SCADA COMPUTER (WONDERWARE, ROCKWELL, TATSOFT, AND THE LIKE).

PLC

1. MULTIPLE PLC LOCATIONS

SCADA COMPUTER

1. SINGLE COMPUTER, SINGLE LICENSE
2. POSSIBLE SECOND COMPUTER FOR REDUNDANCY

REMOTE ACCESS

1. REMOTE ACCESS OVER INTERNET VIA CONNECTION TO THE SCADA COMPUTER VIA WINDOWS RDP, TEAMVIEWER, LOGMEIN, ETC.
2. MORE THAN ONE OPERATOR, BUT MANAGEABLE

DATA COLLECTION

1. STORED ON SCADA COMPUTER

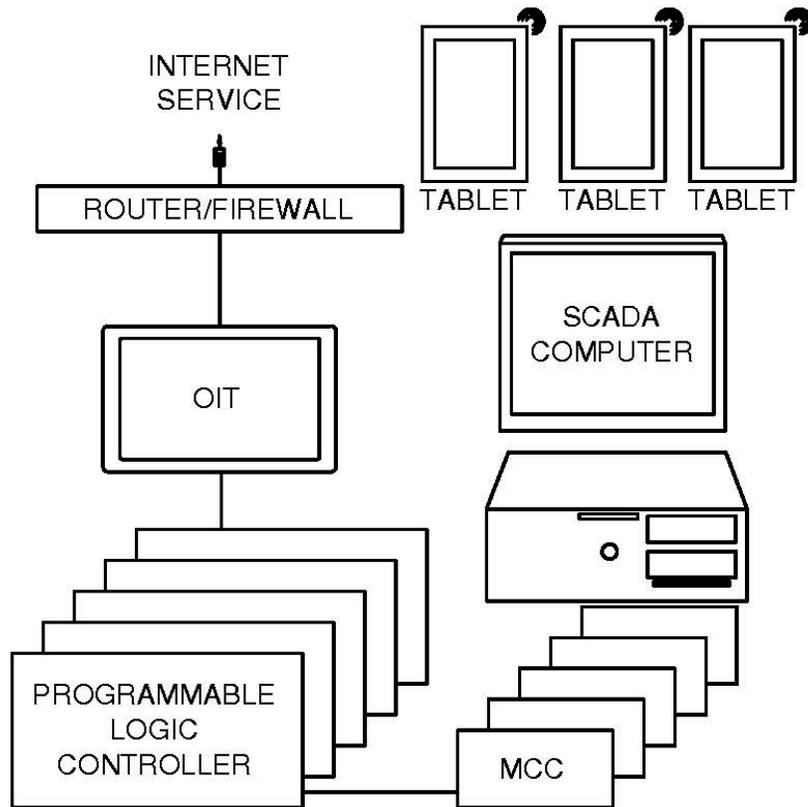
MANAGEMENT

1. OPERATIONAL, HACH WIMS AND THE LIKE.
2. MAINTENANCE - JOBCAL, ALLMAX ANTERO, ETC.

Scenario C

- ▶ Large wastewater treatment system
 - Three or more process buildings
 - Three or more Programmable Logic Controllers (PLCs)
 - Three Motor Control Center (MCCs)
- ▶ One or possibly two full-time operators
- ▶ Back-up or fill-in operator from another department
- ▶ One or two collection system lift stations
- ▶ Water System with multiple wells, reservoirs, elevated storage tanks, water treatment systems

Scenario C



OIT

1. SINGLE TOUCHSCREEN (BACK UP TO PC)
2. NO TOUCHSCREEN (REDUNDANT PCs)
3. TABLETS UTILIZED IN LIEU OF OITs

PLC

1. MULTIPLE PLC LOCATIONS

SCADA COMPUTER

1. SERVER, MULTI USER LICENSING.
2. REDUNDANCY OR HIGH RELIABILITY HARDWARE

REMOTE ACCESS

1. REMOTE ACCESS OVER INTERNET VIA CONNECTION TO THE SCADA COMPUTER.
2. SCADA COMPUTER SOFTWARE AND LICENSING PERMITS SIMULTANEOUS MULTI USER ACCESS.

DATA COLLECTION

1. STORED ON SCADA COMPUTER.
2. SQL SERVER DATABASE AND ADVANCED TOOLS FOR DATA ANALYSIS.

MANAGEMENT

1. OPERATIONAL, HACH WIMS AND THE LIKE.
2. MAINTENANCE - JOBCAL, ALLMAX ANTERO, ETC. ASSET MANAGEMENT ERP/PORTAL, CITYWORKS, ETC.

Best Fit?



So if it's not Good, Better, Best, how do you actually decide what is the "Best Fit?"

The underlying assumption is that quality equipment and instruments are specified. That is, the products provide good service, the service and support people are knowledgeable and responsive, and the manufacturer stands behind their equipment.

Motor Control Center (MCC) and Programmable Logic Controllers (PLC) will be governed by the process and physical plant requirements.

So what's left? It's how you put the pieces together to make the "Best Fit."

So let's review a couple things about putting the pieces together.

OIT



▶ Small System

- Single OIT may be more than adequate.
- Capable of storing data, send daily reports to a connected printer, or send those reports to an ordinary computer in your office.
- Remotely accessible over the Internet from a computer, tablet, or smartphone via "VNC." also possible for the OIT to allow multiple simultaneous remote connections, very similar to a multi-user computer system. Not common, but possible.

▶ Mid-sized System

- Multiple OITs so that you can make adjustments at the respective process area.
- Master OIT in the main service building/lab.
- A SCADA computer will be used to store data rather than the OIT.

OIT (continued)



▶ Large System

- ▶ Whether new construction or an upgrade, the trend has been toward reducing or eliminating OIT in the plant process areas. Eliminating the cost of the OIT and associated cost of programming and configuring can present a significant cost savings.
- ▶ In lieu of multiple OITs
 - A SCADA computer system with redundant computers is provided to ensure reliable access to the process controls.
 - In lieu of OITs fixed in place on control panels in the plant, tablet computers are used to provide access to the same SCADA screens as are displayed on the computer.
 - SCADA software licensing can allow multiple users to access the SCADA system simultaneously.
 - A WiFi network within in the plant provides wireless connections for the tablets.
 - Cellular or WiFi services provide connections for the tablets outside the plant.
 - A word of caution, though - Cellular service quality varies greatly. Select the cellular services that works best in your area.

PLC (and network).



- ▶ Smaller plant, one PLC may serve the entire plant.
- ▶ Mid/Large plant with one or more process buildings, multiple motor control centers may involve two or more PLCs, connected together via an Ethernet network.
- ▶ Retrofit jobs may dictate the use of radios as a cost effective alternative, but underground fiber optic cable is the first choice.
- ▶ Consider that trying to squeeze a few more year's use out of aging technology is usually not worth the trouble, and really doesn't save money in the long run. If in doubt, throw it out.

Remote Access



- ▶ Small System
 - Direct access to the OIT, via Internet and Hardware Firewall
 - Multi-user remote access possible, although not common
- ▶ Mid-sized System
 - Direct access to the OIT still an option
 - If SCADA computer is available, computer access is an option:
 - Windows RDP via Hardware Firewall & VPN
 - 3rd party remote access utility software (LogMeIn, TeamViewer, etc)
 - These options work best with small staff (not competing for access)
- ▶ Large System
 - Computer dedicated to providing remote access to multiple users
 - Same Computer also provides access to tablets within the plant

Data Collection



▶ Small

- Data stored on touchscreen memory and copied onto a USB stick on a weekly or monthly basis, then transferred to an office computer.
- Daily printed report (Runtimes, Flows, Pump Starts, Min/Max, etc.)
- Data automatically transferred to a networked computer for reports via Excel, XL Reporter, Dream Report, Crystal Report, etc.

▶ Mid-sized

- Visualization software (Wonderware, Rockwell, Tatsoft, etc) also provide data collection.
- Multiple concurrent computers for data redundancy.

▶ Large

- Dedicated database server.
- Redundant database storage.

Process Management

- ▶ Small
 - Utilize the same tools used to store the data to create reports which provide process management insight.
 - Tools one step above Excel, such as XL Reporter or Dream Report.
- ▶ Mid-sized
 - Commercial software designed specifically for Wastewater/Water.
 - Hach WIMS can automatically collect data from the SCADA or history database, accept data from lab test results and provide analytical reporting, and electronically report data to the DNR.
- ▶ Large – In addition to Mid-sized characteristics, also
 - Higher level data-base tools, such as Wonderware Historian.
 - Data Analytics – Either custom written analysis tools or commercial applications to sift through the database to find “actionable data.”

Maintenance/Asset



▶ Small

- Manual schedule system for scheduled maintenance based on calendar or runtime meter hours
- Manual record keeping for equipment history, repair information, contacts, etc.

▶ Mid-sized

- Maintenance Management Software
- Collects runtime from SCADA
- Scheduling by runtime or calendar
- Automatic work order generation

▶ Large

- In addition to maintenance, asset management capability
- Parts inventory management
- List of supplies/parts required for procedures
- Extensive record keeping on labor, cost
- Asset valuation, depreciation, Governmental Accounting Standards Board compliant

In Conclusion

- ▶ There are many different ways to arrange the pieces.
- ▶ Technology makes more options available every day.
- ▶ Communication is the key to making sure you get the features and functions that are the Best Fit for your situation.
- ▶ Ask questions. Expect your engineers and vendors to listen. There is to listen and then offer solutions to meet your needs.
- ▶ Cost is somewhat irrelevant. A just like a suit, a poor fit can cost the same as the best fit.
- ▶ Insist on the Best Fit.

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Thank You for your kind attention.



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