AMPLA – TURNING SCADA DATA INTO INFORMATION

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ABSTRACT

Accessing the knowledge hidden in vast quantities of raw data collected from Supervisory Control and Data Acquisition (SCADA) systems over the years has been difficult. Goulburn Valley Water set out to rectify this situation by installing an appropriate system to store data and provide tools to assist interpretation.

Goulburn Valley Water implemented "Ampla" after an extensive investigation and successful pilot.

The nature of the system allows users to obtain and manipulate historical data, applying their knowledge and experience to turn data into useful information. This presents both operators and management with a new view of their operational assets. It provides greater insight allowing action to be taken to improve the Corporation's operational effectiveness.

KEYWORDS: - SCADA, Data, Information, Database, History, MES, Reports, Ampla

1.0 INTRODUCTION

The ability to monitor and control a large number of assets distributed over a significant area has allowed Goulburn Valley Water to derive excellent value from its SCADA system over several years. Information gained from analysis of data acquired by the SCADA system is essential in the management of water and sewer sites across the Corporation's region. However, accessing the knowledge hidden in vast quantities of raw data has been time consuming and problematic.

Goulburn Valley Water's first SCADA system was installed in 1996 and came with a customised reporting system. This eventually became unsupported and, soon after, unusable. This left the Corporation without appropriate access to SCADA data for many years and a number of labour intensive activities were used to collect and analyse data. In 2004, towards the end of the implementation of a second SCADA system to cover the Southern area of the Corporation, a project was initiated to improve access to SCADA data.

The main objective centred on the Corporation desiring to move from the existing "install and fix" mode of operations to using the data to improve and optimise operational systems. To achieve this the Operations IT team, responsible for managing SCADA at the Corporation, was tasked with the following:

- Introduce SCADA reporting across all SCADA systems
- Appropriately collect and store historical data
- Provide visualisation tools to:
    - Access the data to ease the process of deriving meaningful information
    - Self-service so that users can obtain information without having to request it from the SCADA team

Favourable characteristics of a potential solution would include:

- Ease of use, including minimal interfaces based on web or spreadsheet access
- Capable of interfacing with disparate systems, such as water quality or asset management
- Off-the-shelf and user configurable
- Make use of existing data

2.0 DISCUSSION

Time constraints necessitated research into user requirements and solutions to be conducted concurrently. It was found to be advantageous to have user requirements uppermost while considering solutions.

Existing users of SCADA data within the Corporation were consulted initially on a one-on-one basis and then brought together in a workshop environment to ensure their needs would be met.

Table 1: ***Uses for SCADA data at Goulburn Valley Water***

Area	Description
Hydraulic modelling	Flow/pump information is used to calibrate water/sewer models for planning and design
Water Quality	Quality information from production sources can be reviewed for optimisation purposes and is also required for regulatory compliance.
Operations	Data used for operational reporting, fault finding and optimisation
SCADA maintenance	Information used to ensure SCADA system is operating as required

Four solutions were investigated and ranged from custom built applications (from niche software vendors) to off-the-shelf products (from large software companies). Each solution had different advantages and could have potentially provided a solution.

A detailed analysis was performed and it was decided to pilot Citect's Manufacturing and Execution System (MES) Ampla based on the following:

User:

- Ease of use via user interface
- Ability for users to obtain their own data and create their own views and charts
- Potential to provide all information required
- Potential to display information from other systems if required

Technology:

- Strategic fit with existing Citect SCADA software (Goulburn Valley Water's SCADA software) and off-the-shelf product
- Technology (.Net and SQL Server)

Goulburn Valley Water typically performs pilot programs for major software installations before proceeding with a full implementation. This increases the likelihood of success from an engineering and user perspective.

The pilot of Ampla was very important as it was the first installation in the water industry. The pilot was largely implemented by Citect Professional Services and provided information from one water treatment plant and one sewer pump station. The Operations IT team was able to interface an additional water treatment plant soon after which proved user configurability. The pilot allowed the opportunity to:

- Refine and fulfil user requirements
- Determine performance and storage implications

Throughout the pilot process, an open minded iterative approach was taken which ensured flexibility when developing the solution. The Corporation determined that it was highly likely all the original objectives could be met, deeming the pilot a success.

Consequently, Goulburn Valley Water decided to employ Ampla full scale. The Ampla implementation consisted of the following phases: standards development, configuration (both user and automated) and training.

Goulburn Valley Water engaged Citect Professional Services to assist with Ampla standards development based on what had been learned during the pilot. One of the main features of Ampla is the ability to easily "roll up" information over a number of sites, providing a new level of visualisation. It was important to set the standards at the start to ease configuration and ensure as much value as possible could be derived from the system.

The Operations IT team commenced configuring the system to start collecting information from the SCADA system. Ampla was organised under the three major lines of business within the Corporation: water treatment, waste water treatment and sewer pumping. An automated process was used to configure the approximately 250 sewer pump stations within the SCADA system. The water and waste water treatment plants were set up manually, primarily by the Operations IT group. A data entry level resource was used to complete parts of the implementation.

It is worth noting the challenges experienced during the project:

- The risk associated with being the first water utility to implement Ampla. This was mitigated by performing the pilot program.
- Fulfilling a large range of user requirements. Ampla was able to meet the bulk of user requirements. However it should be noted that Citect's Scada Reports historian was employed for the purposes of capturing high resolution time series data needed for hydraulic modelling.
- Ampla used licensing arrangements based around "reporting points" rather than the traditional tag based licensing. Arguably the largest challenge, requiring significant negotiations with Citect to overcome.

Finally, a number of information sessions were held for staff. Users were able to learn how to use Ampla very quickly. Specific training sessions were held when more information was required.

3.0 CONCLUSION

Ampla provides management and staff of Goulburn Valley Water a near real time overview of their operational assets and the ability to review data over any time period.

Information can be viewed either graphically or as text, and drill down capabilities enable users to look closely at specific issues. Figures 1, 2 and 3 provide some key examples of how Ampla can turn data into information in the Corporation.

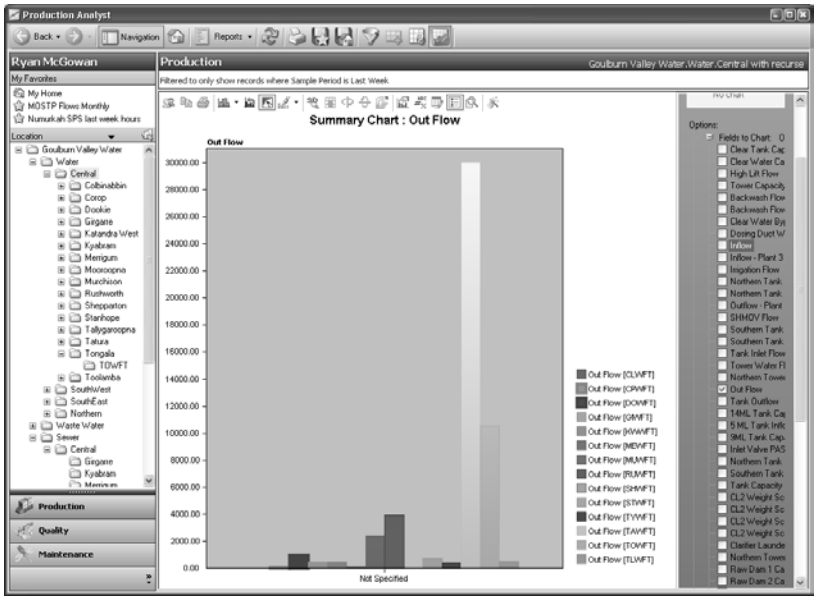

Figure 1: ***Ampla outflow example***

Accumulated flow data can be provided in tabular form and summarised by varying frequencies over a given time frame (for example, daily flows for a month). This can then be placed directly into a spreadsheet for further analysis. A chart can be added with a click of a button to provide a quick insight into the situation.

Figure 1 shows out flow from water treatment plants in an entire district for a week allowing users to view production at a glance. In flow versus outflow for a plant may be easily viewed as well; if the difference is too large it may suggest a process issue.

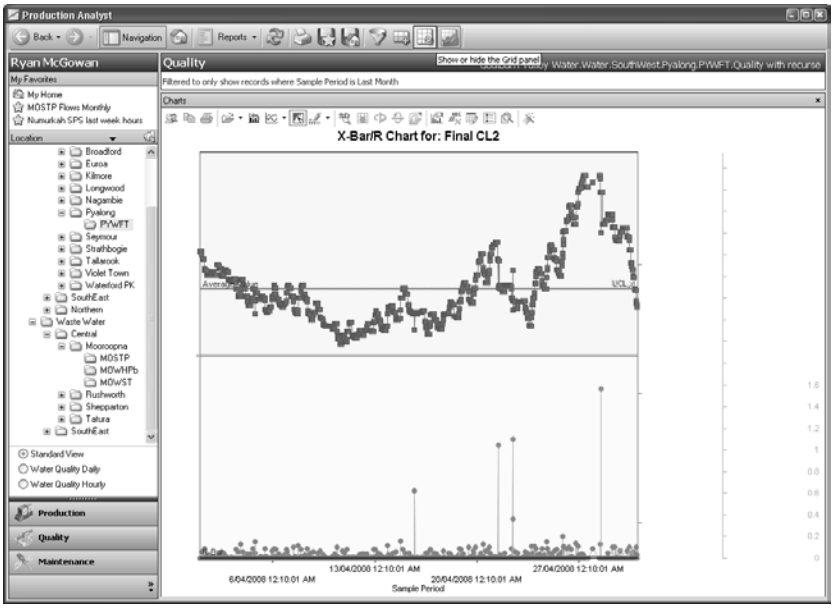

Figure 2: ***Ampla water quality trend example (Final chlorine)***

Figure 2 shows how water quality data can be easily trended over a specified period (in this case a month). Furthermore, if required, individual district or town water or waste water quality information over a specified period can be viewed and quickly display out-of-specification results. This can be used in weekly meetings as a discussion point.

A powerful feature of Ampla is the ability to analyse data in context specific situations. Ampla identifies the process status when recording information, that is, whether the plant was running, stopped or backwashing. This enables certain results to be disregarded, for example if the plant was in backwash.

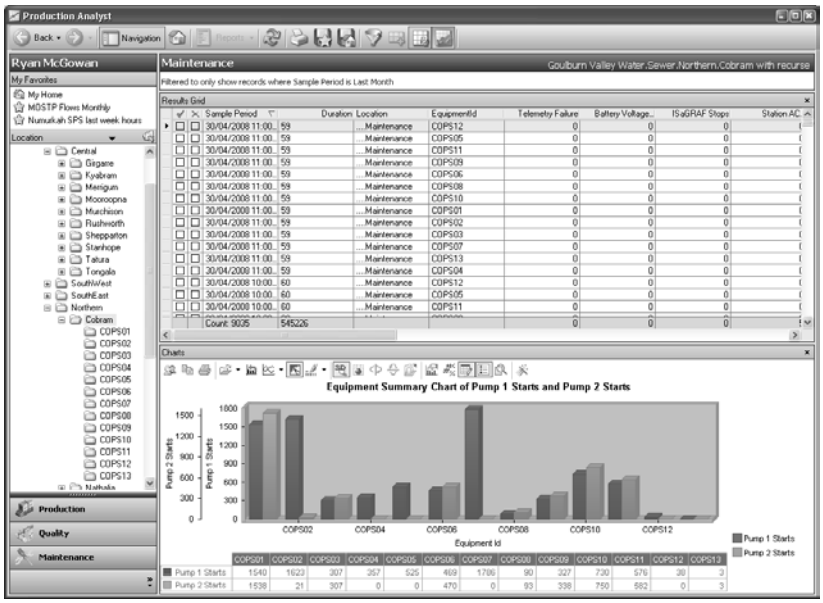

Figure 3: ***Ampla pump starts example***

Over a specified period pump starts or runtime for every sewer pump station in a town or district can be displayed (in this case Figure 3 show starts for a month). Pump 1 in station COPS02 has a far greater amount of starts than pump 2. This suggests the duty rotation is incorrectly set and pump 1 is performing more work perhaps resulting in pump 1 requiring maintenance sooner than anticipated. Derived flow versus measured flow can also be charted against each other. If there is significant difference between the two flows it may suggest either an issue with the flow meter or a pump issue and the station will require maintenance.

It should be noted that while the previous charts were generated with minimal user action they can all be stored as favourites. This means that once a display has been configured it can be simply re-displayed by a click of a button. Furthermore these views can be easily distributed to other users of the system if required.

In the future Goulburn Valley Water has the option to interface Ampla with a number of disparate systems:

- Reticulation water quality systems – analyse information from production to the customer.
- Asset management system – improve pump maintenance. Services can be performed based on usage rather than on a schedule.
- Energy management – compare asset usage to energy costs. Processes can then be optimised accordingly.

SCADA data is now being collected and stored for historical purposes. The self service nature of the system allows users to get their own data and analyse in meaningful ways to provide benefit to the Corporation. User feedback has been very positive and comments include: *"AMPLA is a big improvement"* and *"…what an excellent product… All data requested was found in seconds with a very impressed auditor regarding IT and Ampla"*.

As an off-the-shelf product Ampla is unlikely to suffer the same fate as the original reporting system delivered with the first Goulburn Valley Water SCADA system. This should ensure users have sufficient uninterrupted access to date they require.

Goulburn Valley Water have innovatively applied Ampla to the water industry and harnessed its power. The user friendly nature of Ampla has allowed users to derive benefit with minimal training. It has provided both operators and management the ability to "turn data into information" and present a new view of operational assets. It provides greater insight allowing staff to take action to improve the Corporation's operational effectiveness.

4.0 ACKNOWLEDGEMENTS

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