MONITORING AND QUALITY ASSURANCE OF ESC INDICATORS

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ABSTRACT

As the economic regulator of the Victorian water sector, the Essential Services Commission (ESC) is required to monitor and publicly report on the performance of Victorian water businesses. Water businesses are subsequently required to submit data annually against key performance indicators specified by the ESC.

This data is then used by the ESC to inform customers about the performance of their water business by identifying baseline performance and benchmark water businesses against each other, with the intention of driving continual improvement within individual water businesses to enhance their own performance over time. It also plays an integral role in informing the decision-making processes of regulatory agencies and government.

After years of Wannon Water using multiple programs and systems to capture, measure and report data for ESC indicators for "Water Network Reliability and Efficiency (REW)" and "Sewerage Network Reliability and Efficiency (RES)" a business decision was made in 2018 to implement Maximo as the single Works Management System.

In December 2019 the Maintenance branch went live with Maximo to capture all work order activity against assets for its Civil, Mechanical and Electrical teams.

Historically, the process of ensuring a high-quality standard of data captured for ESC related work orders was extremely manual and labour intensive, with each work order being individually opened in Maximo and key data points observed and checked for missing or incorrect data.

To enhance and streamline the quality assurance process, Wannon Water has initiated using Power BI reports to gain a holistic visual view of the data to quantify, report and monitor work order quality. This has enabled scanning for missing or misaligned data quicker and visually easier to identify, reducing labour costs. Subsequently, only the work orders that require attention to rectify data issues are addressed, ultimately decreasing the time spent on the quality assurance process.

1.0 INTRODUCTION

Wannon Water went live with Maximo as its sole works management system in December 2019, rolling it out for use within its Maintenance branch. Prior to this, three separate systems were used to dispatch Work Orders and capture details of works completed against specific assets.

A key decision behind the choice of Maximo was its ability to generate workflows that can capture data throughout the journey of a work order from its infancy to completion.

As a water business, Wannon Water is required to annually report against a set of key performance indicators to the Essential Services Commission (ESC). To ensure all the requirements of ESC reporting for "Water Network Reliability and Efficiency (REW)" and "Sewerage Network Reliability and Efficiency (RES)" were captured, a contractor was engaged to develop some customised components and tailored specification questions.

As with any enterprise-wide system or software transition the key to its success is often driven by clearly communicated strategy and change management, however no mater how well planned such a transition is, it is always going to be faced with challenges.

Typical challenges may include:

- The purpose of the transition is poorly communicated, and its benefits are not explained to the end users.
- New systems will always be compared to any legacy systems.
- Insufficient or ineffective training.
- A failure to focus on the employees involved.
- Diminished productivity during adoption phase.

All these challenges can often lead to systemic issues with the integrity and quality of the data captured. With this in mind, a process was adopted where each work order record was manually viewed to ensure all the data was captured and accurate, in particular with ESC related work orders.

A report was also custom designed and developed to allow the export of aggregated data into a spreadsheet for the ESC reporting requirements. Although this combined approach was effective in highlighting some issues with data quality, it was very labour intensive and an inefficient use of time.

Since commencing employment on the February 1st 2022, the works Management System Data Analyst (WMS DA) has been undertaking the quality assurance of all ESC related work orders and being an analyst he has been recording his time spent on activities during the day. Between February 1st 2022 and February 1st 2023 a total of 686 hours has been devoted the quality assurance of ESC related work orders.

In early 2022 with just over two years of Maximo data collected the Maintenance branch began to interrogate the quality of the data captured by visualising it in Power BI. It's often not until the data is aggregated and visualised in this manner that the missing, misaligned or inaccurate data is easily identified. This opened the door for a more effective and efficient way to systemise the quality assurance process for ESC related work orders.

2.0 DISCUSSION

Typically, organisations collect data for two main reasons:

1. to make informed business decisions; and or
2. to meet regulatory compliance requirements.

2.1 Using data to inform decision making

It's not uncommon for organisations to make business decisions driven purely by intuition or gut feel, however with the ever-increasing capacity of technology to assist in capturing, storing and analysing data, more organisations combining their intuition with data to make data informed decisions.

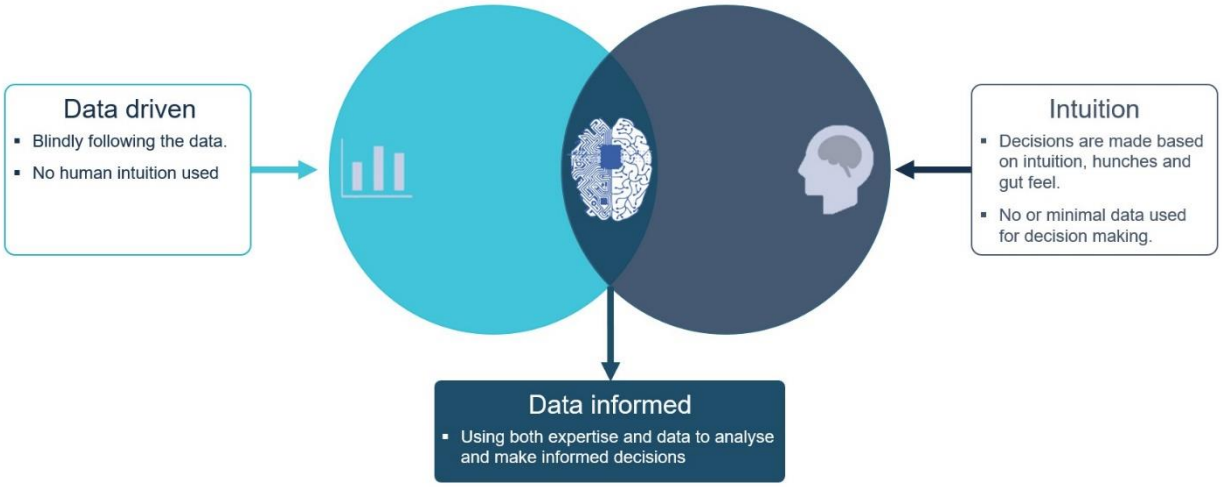


Figure 1: ***Being data informed***

2.2 Using data to meet regulatory compliance requirements

The key performance indicators set by the ESC are used to establish a baseline performance measure for each water business against itself over time and benchmark the 16 urban water businesses against each other.

The ESC states that the main purpose for water businesses to report on performance are to:

- help guide discussions between water businesses and their customers about outcomes to be delivered and performance targets;
- drive competition between water businesses to improve service standards; and
- inform the decision-making processes of water businesses, regulatory agencies and the Victorian Government.

Table 1 demonstrates the specific ESC key performance indicators where the Maintenance branch uses Maximo to capture the data.

Table 1: *ESC indicators that draw data from Maximo*

Water Network Reliability and Efficiency	Sewerage Network Reliability and Efficiency
REW 1: Number of Bursts and Leaks	RES 1: Number of sewer blockages
REW 2: Total minutes to respond to bursts and leaks	RES 2: Total minutes to respond to reported sewer spill or blockage
REW 3: Total minutes to rectify bursts and leaks	RES 3: Total time taken to repair sewer spill or blockage
REW 5: Number of Water Supply Interruptions	RES 5: Number of Customers receiving multiple blockages
REW 6: Number of Water Supply Interruptions restored within 5 hours	RES 6: Number of sewage spills from reticulation and branch sewers
REW 7: Number of Water Supply Customer Interruptions	RES 7: Number of sewage spills from reticulation and branch sewers fully contained within 5 hours
REW 8: Total customer minutes to restore water supply	RES 8: Number of sewage spills to customer properties
REW 9: Number of Customers receiving 1,2,3,4,5 and 6+ unplanned water interruptions	RES 9: Number of residential sewer supply customer interruptions restored within 5 Hrs
REW 10: Number of Residential Water Customer Interruptions exceeding 5 hours	RES 10: Number of sewer spills within a house
REW 11: Number of Residential Water Customer Interruptions during peak hours	

2.3 Importance of quality data

With the increasing reliance on data to inform the decision-making process, the impact of having poor data quality can be detrimental to a business. Figure 3 highlights the impact that poor quality data can have throughout an organisation.

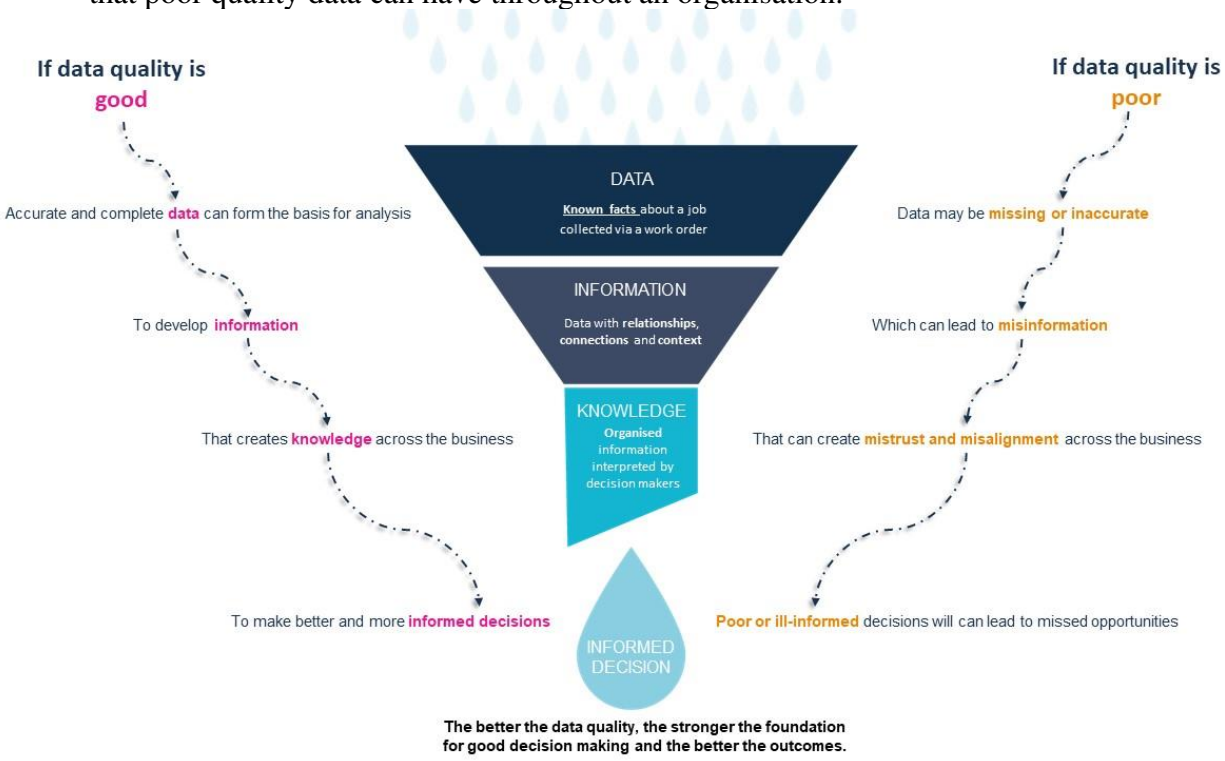


Figure 3: *Impact of poor data quality on decision making*

To ensure the integrity of the data it receives and as a part of its statutory obligations, the ESC undertakes independent regulatory audits on the reliability of the performance data reported by each water business. If poor quality data isn't being identified internally, then it will most likely be exposed during the audit process.

2.2 Streamlining the quality assurance process

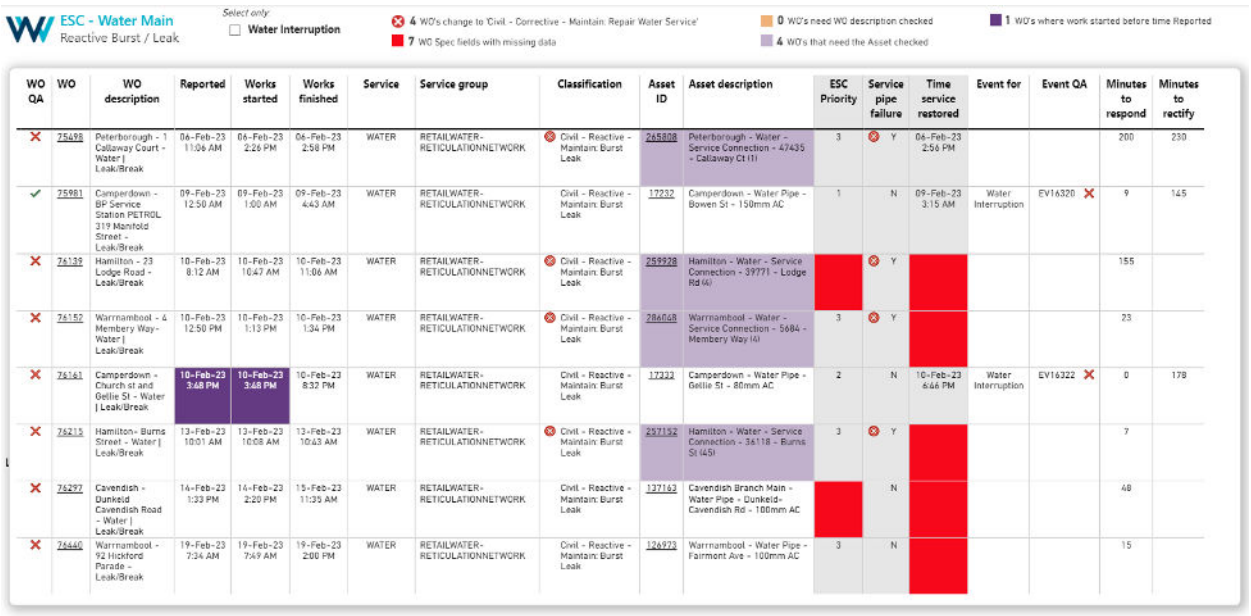
Power BI is an interactive data visualisation software product designed to integrate with and connect to multiple data sources at the enterprise level. Wannon Water has been using Power BI as its preferred business intelligence tool since 2019.

After several months of development, in November 2022 a SQL Gateway data connection was established that would provide Power BI report developers full access to all relevant data tables in the Maximo server with a daily refresh.

Prior to this, access was limited to only a few data fields, which created gaps in the information. As a work around report developers were able to fill the gaps in data with reports exported from Maximo into spreadsheets. While this worked, it created integrity issues. The new data connection has provided one source of truth and enabled reports to be developed for a range of audiences from operators in the field, to the Executive team and the Board.

From a quality assurance perspective, this has allowed the development of interactive reports that flag and quantify errors or gaps in data as shown in Figure 4. A red cross indicates to the report viewer that the work order either has data missing, misaligned or incorrect data entered. The work order number in the "WO" column has a hyperlink that will directly open the work order in Maximo.

Once all the data is at a satisfactory level, a green tick will indicate to the report viewer that this work order is ready to have its status changed from Field Complete to Complete, at which point it will be filtered from the report.



WO QA	WO	WO description	Reported	Works started	Works finished	Service	Service group	Classification	Asset ID	Asset description	ESC Priority	Service pipe failure	Time service restored	Event for	Event QA	Minutes to respond	Minutes to rectify
✗	75498	Peterborough - 1 Callaway Court - Water | Leak/Break	06-Feb-23 11:06 AM	06-Feb-23 2:26 PM	06-Feb-23 2:56 PM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	265808	Peterborough - Water - Service Connection - 47435 - Callaway Ct (1)	3	Y	06-Feb-23 2:56 PM			200	230
✓	75981	Camperdown - BP Service Station PETROL 319 Manifold Street - Leak/Break	09-Feb-23 12:50 AM	09-Feb-23 1:00 AM	09-Feb-23 4:43 AM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	17232	Camperdown - Water Pipe - Bowen St - 150mm AC	1	N	09-Feb-23 3:15 AM	Water Interruption	EV16320 ✗	9	145
✗	76139	Hamilton - 23 Lodge Road - Leak/Break	10-Feb-23 8:12 AM	10-Feb-23 10:47 AM	10-Feb-23 11:06 AM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	259928	Hamilton - Water - Service Connection - 39771 - Lodge Rd (4)		Y				155	
✗	76152	Warrnambool - 4 Membery Way - Water | Leak/Break	10-Feb-23 12:50 PM	10-Feb-23 1:13 PM	10-Feb-23 1:34 PM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	286068	Warrnambool - Water - Service Connection - 5684 - Membery Way (4)	3	Y				23	
✗	76161	Camperdown - Church st and Gellie St - Water | Leak/Break	10-Feb-23 3:48 PM	10-Feb-23 3:48 PM	10-Feb-23 8:32 PM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	17332	Camperdown - Water Pipe - Gellie St - 80mm AC	2	N	10-Feb-23 6:46 PM	Water Interruption	EV16322 ✗	0	178
✗	76213	Hamilton - Burns Street - Water | Leak/Break	13-Feb-23 10:01 AM	13-Feb-23 10:08 AM	13-Feb-23 10:43 AM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	257152	Hamilton - Water - Service Connection - 36118 - Burns St (45)	3	Y				7	
✗	76297	Cavendish - Dunkeld Cavendish Road - Water | Leak/Break	14-Feb-23 1:33 PM	14-Feb-23 2:20 PM	15-Feb-23 11:35 AM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	137163	Cavendish Branch Main - Water Pipe - Dunkeld-Cavendish Rd - 100mm AC		N				48	
✗	76440	Warrnambool - 92 Hickford Parade - Leak/Break	19-Feb-23 7:34 AM	19-Feb-23 7:49 AM	19-Feb-23 2:00 PM	WATER	RETAILWATER-RETICULATIONNETWORK	Civil - Reactive - Maintain: Burst Leak	126973	Warrnambool - Water Pipe - Fairmont Ave - 100mm AC	3	N				15	

Figure 4: ***Example of ESC QA Power BI report***

Other Power BI reports have also been developed to assist the quality assurance process. A Priority 1 & 2 Work Order report includes an option that flags if any ESC related work orders have not moved to a status of Field Complete within five days. Another report visualises each indicators actual results against the targets.

3.0 CONCLUSION

Often reports that have the potential to highlight people's performance, whether good or

bad, are viewed with suspicion. The quality assurance process and the subsequent Power BI reports have not been designed to be used as a "big stick" for non-compliance but to help generate conversations on the importance of data quality and to make data quality a cultural instinct that is owned by each individual.

Significant effort has been made during 2022 to present to all the Maintenance teams to communicate why capturing correct data in Maximo is important and that the data is used to help make informed business decisions on the assets they work on.

Due to delays in the development of the data connection to the Maximo server, at the time of this report the ESC QA Power BI reporting is still in a development / testing phase. However, time savings have already been realised in the quality assurance process. Figure 5 shows a reduction to the time devoted to quality assurance by the WMS DA in December 2022 and January 2023, attributed in part to the use of the report for testing during development as a part of the qa process.

Figure 5: ***Time spent on quality assurance of ESC related work orders by the WMS DA***

This time spent on quality assurance is anticipated to decrease even further once the report is finalised and moved into production. Another measure of success will be the trending over time of the quantified errors and gaps in data. Metrics will be established as a section of the report to see movement over time with the hope that these decrease as awareness of the impact of poor data quality grows.

4.0 ACKNOWLEDGEMENTS

A special thank you to Sally Obst, Fred Sadler, Mick Mahoney, Trevor Carr and Chris Crossland for your support, patience and testing abilities during our Power BI journey. Thanks to all the Wannon Water Maintenance operators for the outstanding work you do in the field and in Maximo. Also a big thanks to Tim Beilby for all the work in developing the SQL Gateway that allows us to bring the Maximo data to life.

5.0 REFERENCES

Essential Services Commission 2022, Water Performance Report 2020–21: Performance of Victorian urban and sewerage businesses, 8 February