DIGITISING DRINKING WATER OPERATIONS

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ABSTRACT

This paper highlights the benefits of a digital transformation approach to water operations by leveraging digital technology to achieve improved operational efficiency and communication across teams. Through the use of both Google's Appsheet platform, and Papyrs, our digital development team has created user-friendly interfaces to improve the efficiency of water treatment operations.

The Google Appsheet developments allow team members to conveniently complete inspections and update task statuses remotely, eliminating the need for manual documentation and enhancing operational efficiency. Further, our Papyrs knowledge management system (KMS) provides remote and fast access to Plant Operation Manuals, instructional videos, risk assessments and site information.

Previously, approximately 1000 pages of plant operating documents were produced in hard copy format across 24 Hunter water treatment plants each month, tallying to a staggering total of 12,000 pages printed annually. By transitioning to online data collection and reporting, the water treatment operations are able to not only promote environmental sustainability but also bring substantial cost savings and organisational efficiency through the elimination of manual document handling and storage.

A key feature of the Appsheet development is its ability to provide a centralised view of operational tasks due. This promotes transparency and collaboration, enabling operators to prioritise and allocate team resources effectively. Operational data is not double handled, improving efficiency and reducing the risk of errors. The app's automatically generated reporting streamlines the task progress and completion tracking process. All task data is consolidated into a comprehensive report. This report serves as a valuable tool for assessing team efficiency, identifying bottlenecks, and making decisions for process improvement.

1.0 INTRODUCTION

The digitisation of drinking water operations streamlines communication channels, fostering collaboration among team members and encouraging swift information exchange. The implementation of digital tools optimises time management, allowing for improvements in task allocation and tracking. Managers are able to observe the efficiency of tasks carried out, providing opportunity to better allocate time and resources into specific tasks and areas of operation. Asset management is greatly facilitated, as digital platforms can provide real time visibility into resources such as chemical usage, stock levels and laboratory consumptions, in turn leading to cost savings.

In June 2014, Veolia obtained an Operate and Maintain (O&M) contract with Hunter Water, commencing the operation of 6 water treatment facilities, and 18 wastewater treatment plants in the Hunter Region of NSW. The contract created over 65 positions within Veolia, adding to the almost 300 Veolia employees within the Hunter region. The area of the O&M contract covers 5,366km, with a population of over 600,000 people in Cessnock, Lake Macquarie, Maitland, Newcastle, Port Stephens, Dungog and Singleton local government areas. Veolia is responsible for treating and delivering safe, high-quality drinking water, as well as treating several millions of litres of wastewater within the Hunter every day. In order to achieve this, Veolia is continuously enhancing their skills in asset

management, water treatment, facility operation, and technological development.

At the beginning of the contract, over 1000 Standard Operating Procedures were consolidated into 21 Plant Operation Manuals with the intention of space saving. Over the past few years, those manuals became complex, large and unwieldy. In 2015, Veolia's Manager of Systems Reporting Risk & Compliance created a Client Portal using the Google Sites platform for the Hunter Water Contract. The portal was developed as a collaborative platform to be used by all staff within the contract, providing access to up to date information, tools and relevant documents for water operations.

In June 2022, it was determined that a new knowledge management system platform for the Hunter Water Contract Team was needed. To improve the efficiency of our Water Operations team, an online KMS, using Papyrs, was developed to replace the previous Google Sites platform. This KMS hosts the individual procedures for each water treatment facility, with version control, search functionality, and mobile accessibility.

Water treatment operations collect large quantities of data on paper, spreadsheets and documents. A key step toward improving the efficiency of water treatment operations is the ability to access and use this data. As most of the data collection is conducted out in the field, away from a computer or entry point, efficient data collection and access can be difficult. At Veolia's Water Treatment Plants (WTPs) in the Hunter, tasks were originally completed and information entered onto paper, then again entered into a digital system. This time between completing a task and recording it, is something that Veolia wanted to improve on. In 2022, Leveraging Google's Appsheet platform, Veolia's digital development team created several user-friendly applications that allow water operators to complete and track their daily tasks, enter data efficiently, and provide information to Hunter Water as required within the contract.

This paper highlights the benefits of a transformative approach to drinking water operations, including enhanced accessibility, communication and collaboration, and task management.

2.0 DISCUSSION

2.1 Finding the right document management system for the job

In pursuit of efficiency and productivity within the Water Line of Business, our Digital Operations Team set an objective to discover the best suited platforms for a web-based knowledge management system (KMS), and suitable app development software. For the KMS, the key objective was to create a system that could host individual procedures with version control, QR Code Access, and remote accessibility. The content stored on the KMS needed to allow operators and maintenance staff to access the information in the field, without compromising readability. Some of the KMS systems considered in this research period included New Google Sites, LumApps, Papyrs, Document 360, Confluence, Notion, ProProofs, Flowlu and Zoho Wiki. The search for the right technology solution landed upon Appsheet and Papyrs.

Among the options considered, Papyrs emerged the leader in regard to usability, functionality, intuitiveness, security and value for money. A feature of Papyrs that was beneficial to the water treatment team included the ability for staff with no IT background to be able to create, edit and manage content on the site. Papyrs has a simple Drag & Drop editing interface that allows users with minimal to no IT experience to manage the pages. These pages then transfer smoothly between desktop and mobile viewing, allowing water

treatment operators to access the information at any location day to day. Before finalising the choice to utilise Papyrs, a trial period was conducted, allowing teams and individuals to test the systems functions and usability. The trial provided insights that allowed for improvements to be implemented into each version of the KMS.

From late 2022 to early 2023, Veolia's water treatment team in the Hunter Region trialled the Papyrs document management system while conducting routine tasks such as Filter Inspections and Water Source Changeovers. Operators were instructed to view Standard Operating Procedures (SOP's) on their mobile device and Desktop PC, and report any issues with compatibility or usability. As a result of this trial period, some pages on Papyrs had their alignment changed, links updated and images cropped to allow better viewing on mobile devices. In 2023, Grahamstown's water team conducted an annual water source changeover with Hunter Water. The SOP for this task was reviewed during the procedure on a mobile device, removing the need for operators to print a paper copy of the document. In summary, this trial confirmed that Papyrs enabled water operators to access relevant documents remotely, while improving the efficiency of task completion.

2.2 Discovering an application development platform

The Digitising Water Operations project also included the goal to find a platform with the ability to develop applications that are accessible to operators on a mobile device, tablet or PC. The key objectives for the project include client satisfaction, reduced costs for data collection, revealing insights from data, supporting plant operation decisions, and decreasing the workload of water treatment operators. Some app development platforms that were considered included Factor, GoPaas, and Manual Logger, as demonstrated in Table 1.

Table 1: Internal Assessment of options for application development platforms.

Feature	Factor	Appsheet	GoPaas	Manual Logger
Ability to define a plant/site/contracts and a hierarchy of data entry forms	Yes	Yes	Yes	Unsure
Email alerts when a value is over a threshold	Not yet.	Yes	Yes	Yes
Data entry validation	Yes	Yes	Unsure	Unsure
Entry forms customisable	Yes	Yes	Yes	Yes
Data entry can be done offline	Yes	Yes	Unsure	Unsure
Entry forms can be completed by batch, copy and paste from Excel/Google Sheets in various formats	Yes	No	Yes	Unsure
Entry forms can be a selection of checklist	Yes	Yes	Yes	Unsure
Supports over/under detection limit notation for water quality data	To check	Yes	Yes	Unsure
Working on a mobile device (smartphone, tablet) through an app or web page	Prism on Android only	Yes	Yes	Yes
Scheduling of activities and works, allocation of resources to job scheduling	No	Yes	Unsure	No

Safety check-lists (equipment, risk assessment, CSE, Trenching, Permits etc.) to be done electronically and attached to the job including GPS and time stamp.	Yes	Yes	Unsure	No
Support activities (traffic control, waste disposal etc.) dockets to be attached to the job	No	Yes	Unsure	No
Scanning of QR Codes and Displaying Equipment Information	In the roadmap.	Yes	Yes	No
Links to external document	Yes	Yes	Unsure	Unsure

Appsheet was selected as the best option suited to Veolia's goals, with Factor being a closely considered alternative. The key reason for choosing Google Appsheet was cost; at the time of assessment, Factor was €20,000 per worksite. Additionally, the integration between Appsheet and Google Workspace products such as Google Space and Gmail, was an advantageous feature. The Digital Project Specialist in Veolia ANZ's Operations Excellence team was a driving force behind the application development project, and views the greatest benefit of Appsheet to be "*the speed of information transfer and obviousness of [identifying] gaps in task completion. Greasing the wheels in terms of both information capture and retrieval makes everyone's lives easier, meaning we ultimately improve our operations".* (Ref: Jarrod Hodge, Digital Project Specialist)

2.2 Digital Tool Development and Use

Utilizing the Appsheet platform, our development team created several user-friendly applications that support mobile, tablet, and web access, leveraging data sources to facilitate efficient task management and completion. The major app developed by Veolia's Digital Team is the Water Line Of Business (LoB) App. This app is used on a daily basis at all of Veolia's drinking and wastewater treatment plants in the Hunter Water Contract. Other applications created in Appsheet that are being utilised by water treatment operators include Backwash Observation Recording, Reservoir Inspection App, and an On-Call Log. Each of these applications allow operators to add data on their mobile device, sending the information directly to reporting software, data storage, or communication channels.

The Water LoB Site Inspection App is the largest application currently available to Veolia's Hunter team. It allows team members to conveniently complete inspections and update task statuses remotely, eliminating the need for manual documentation and enhancing operational efficiency. One key feature of the Water Site Inspections app is its ability to provide a centralized view of tasks remaining for a defined time period, along with a comprehensive history of completed tasks. This promotes transparency and collaboration among team members, enabling them to prioritize and allocate resources effectively.

At Grahamstown Water Treatment Plant, a task that must be completed daily is '*Inspect Chemical Dosing Areas',* as shown in Figure 1. In the App, this task appears as a widget where operators can source relevant documents such as SOP's, tutorial videos, general instructions, and historic information. Operators are prompted to mark off the task as complete, add comments, or report tasks that cannot be completed.

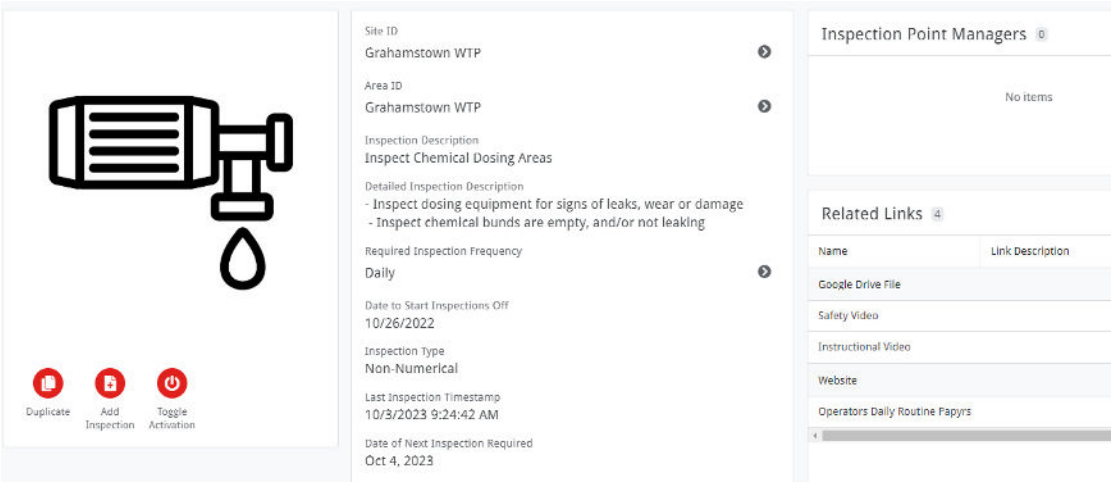

Figure 1: Screenshot of how the task 'Inspect Chemical Dosing Areas' appears within the Appsheet Development 'Water LoB Site Inspections'.

Upon submission of an inspection by an operator, the task information is seamlessly integrated into an automatically generated report, tracking task progress and displaying trends. Tableau is the reporting software that Veolia have chosen to utilise currently, however alternatives have been considered such as Power Bi, a data visualisation tool by Microsoft. This report serves as a valuable tool for assessing team efficiency, identifying bottlenecks, and making data-driven decisions for process improvement.

Alongside Veolia's approach to streamlining data entry and document storage, Hunter Water are building a Data Lake to facilitate efficient data transfer and communication within their team, as well as through the contract. A major goal of developing applications such as Water LoB Site Inspections within Veolia is the ability to transfer controlled data into, out of, and through the Hunter Water Data Lake. This will allow operators to report information on site, managers to administer changes, and the client, Hunter Water, to view the efficiency and capabilities of Veolia's operations.

2.3 Communication facilitated within Appsheet

Appsheet also serves as a powerful tool for demonstrating team efficiency and communication within water site operations. Two current applications created through Google's Appsheet are linked directly to a Google Spaces chat, allowing users to communicate directly from the application to a broader team. The Water LoB Site Inspections app can alert team members of incomplete tasks, as shown in Figure 2, improving the communication between operators and managers. This enhances communication channels, facilitating better coordination and problem-solving within the team.

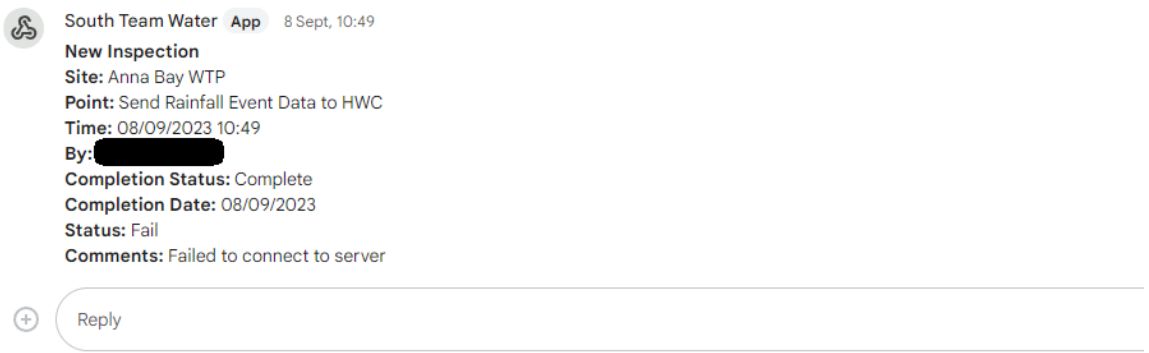

Figure 2: Example of a failed task within Water LoB Site Inspections, sending an instant notification to the Veolia Water Team.

Further, a simple application was created using Google Appsheet that allows on-call operators to swiftly record an event that occurred within the water treatment plant. This event log is sent to Google Sheets for storage and to enable historic data access. An alert is finally sent to the Google Spaces chat updating team members on potential plant failures, shut downs or issues. Within the alert is the ability for operators to set a stand down period, alerting team members of when the on-call operator will return to work if a stand down period is required. This process facilitates easy and effective communication within a team, allowing operators to complete a 2 minute form to alert relevant management, rather than sending out several updates. After a trial period, it was found that this method has the potential to provide a more productive communication channel when operators are called out to site late at night, where fatigue may influence their ability to pass on messages to the rest of the team.

3.0 CONCLUSION

Finding the right technology to improve water treatment operations can be a challenge. This paper has outlined Veolia's trial and development of several knowledge management systems and application platforms. Google's Appsheet and Papyrs provided the ability to enhance the communication, collaboration and information exchange between Hunter Water and Veolia. The implementation of these digital technologies allowed for improvement in time and resource allocation within water treatment operations; facilitating time saving and removing double handling of documents. By following a transformative approach to water technology, water treatment bodies can significantly improve their daily operations.

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5.0 REFERENCES

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