



TaKaDu's Predictive Maintenance Solution

Take your data to the next level!

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As a TaKaDu customer, you're already leveraging your raw data to improve network efficiency, using our Central Event Management (CEM) to detect, analyze and manage events.

But did you know that you can gain additional value from the same data, shared with TaKaDu?

This white paper shows how you can benefit further by implementing our new predictive maintenance solution.

Based on our extensive experience, we have come to understand that every utility has better-performing areas – where DMAs are the right size, and there are enough meters with the right type and size, configured to operate well. We have also realized that these utilities may have other areas operating less effectively.

TaKaDu's new predictive maintenance solution facilitates greater efficiency across the network, identifying areas that are not performing as well, and recommending ways to bring them up to standard. By using data from better-performing areas, we're able to help you prioritize leak detection surveys and detect faulty assets before they emerge as events in the TaKaDu system.

Quarterly review of all DMAs "Area scores"

Export list of DMAs with poor Operational score from the Reporting module

Poor "Data availability" score?

Poor "Jitter" score?

Poor "Sample rate" score? ("Infrastructure score")

Poor "Weekly periodicity" score?

Look for DMAs with "Negative" supply

Are the meters under a given DMA/Zone transmitting/measuring as expected?

Oversized meter?

Meters measured to a satisfactory rate?

- Reservoir/large consumer?
- Missing inlet/outlet?
- Mistake in configuration?

Need to replace/fix meter? Is the meter code updated?

Need to replace meter?

Enhance sample rate?

- Add a meter at the entrance to the reservoir/LC?
- Add missing inlet/outlet meters?
- Update configuration

Update Excel network structure

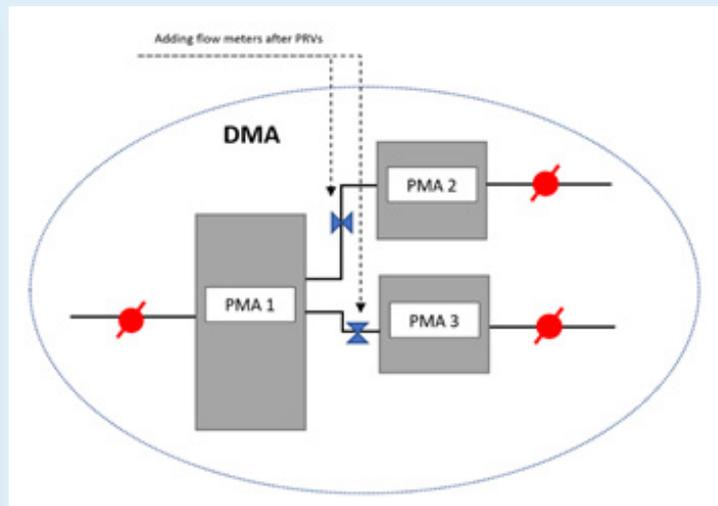
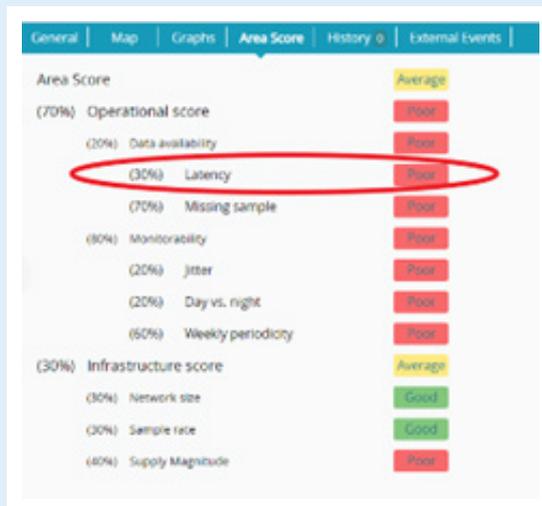
Valid graphs, more quality events, fewer false events

Inefficiency Detection in Weaker Network Areas:

Here are a few examples showing how the solution works in weaker network areas, when:

- The DMA's supply pattern is inconsistent with high variability over time.
- A meter is configured to measure only significant flow changes and, as a result, doesn't measure night flow consistently.
- An ageing meter misses 20% of the samples it was supposed to measure; or
- The DMA is too large, and flow, data, or telemetry events may not be detected as effectively as they are in better configured areas of the system.

Our predictive maintenance diagnoses these weaknesses and guides customers in fixing them systematically, for example, prompting you to: repair or replace meters; update the sampling rate of inefficient meters; add meters in critical points such as at the reservoir outlet or large consumer inlet; or resize large DMAs.



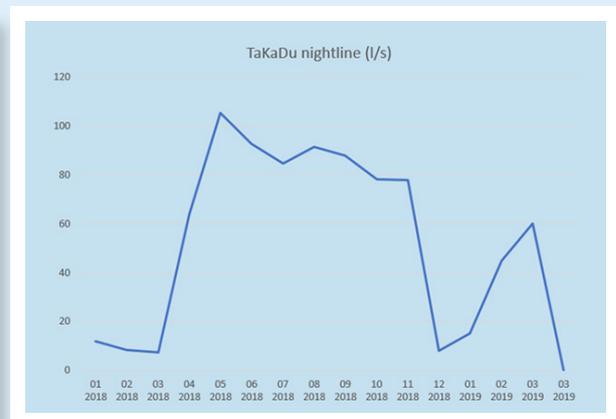
Early Detection of Faulty Assets in Stronger Network Areas

In better-configured areas of the water networks, TaKaDu calculates performance indicators from the meters' raw data. Our predictive maintenance systematically organizes and presents these performance indicators, helping you to take leak detection surveys before TaKaDu events actually occur.

Our new solution can be used to calculate the monthly trend of the following performance indicators: (1) ILI (infrastructure leakage index); (2) volume per connection; (3) customer nightline. You can then use the tool to search for DMAs with a significant monthly growth in all three indicators together – indicating the highly likelihood of faulty assets and imminent occurrence of major events. Based on this information, you can then undertake a detailed leak detection survey.

TaKaDu can also calculate additional performance indicators such as: night flow vs. day flow; non-revenue water (NRW); technical efficiency; pressure changes; leakage value; and incidence of repairs per DMA. Some of these indicators present a trend over time while others help you to compare DMAs.

01/04/2018-30/04/2018	Connections	Target NL	TaKaDu nightline (l/s)	Increase in % of Apr '18 NL from TNL
WILMA - Wesselsbosch N&S	156	0.13	3.24573355	2497%
PERBA - Pongolapondoli North	2166	1.89	37.70918224	1995%
EMAGOP - BHEKOLE (Wesselsbosch East)	784	1.16	19.54922261	1685%
UKHLE - Lathend Hill	2162	2.22	37.13097296	1673%
QKADRI - Cooqunini	0	0.75	11.99335862	1599%
NEKODI - Nkomo Kumbela	384	0.35	5.491778512	1569%
IKODI - Nkomo Springs	408	0.39	5.838948968	1497%
WITLA - Wesselsbosch (East)	1897	6.29	63.84019125	1015%
IKADU - Nkomo Springs	562	0.64	6.223251146	972%
IKODIKI - Nkomo Springs West	1179	1.12	10.14223583	906%
NEKODI - Nkomo Springs	290	1.32	11.19932207	848%
EMAGOP - Pongolapondoli East (Wesselsbosch)	1876	1.67	13.63599339	817%
IKAZIKI - Cooqunini	1074	0.96	7.515301867	783%
IKODI - Pongolapondoli (Wesselsbosch)	1461	1.22	8.913733657	731%
IKODIKI - Pongolapondoli (Wesselsbosch)	1510	1.38	10.01654921	726%
MAKODI - Wesselsbosch (Wesselsbosch)	2290	2.29	16.5009336	721%
QKADRI - Cooqunini (Wesselsbosch)	254	0.24	1.543451128	643%



A Further Glimpse into our Solution

Our predictive maintenance aggregates and organizes information, already existing in TaKaDu, into new processes. These processes are then supported by existing and new reports, for example:

1. Identifying DMAs with supply problems:

- a. Once every three months, a review can be held of all the DMAs with Negative Supply, whereby the DMA's outlet water supply is larger than the DMA's inlet water supply, indicating problems in the DMA.
- b. Investigate and identify the cause, which is likely to be one of the following:
 - i. A large consumer's inlet water has not been measured accurately.
 - ii. The outlet water between a reservoir and the DMA has not been measured accurately.
 - iii. The DMA is missing one or more inlet or outlet flow meters, or they have stopped functioning properly.
 - iv. There is a mistake in the configuration of TaKaDu in relation to the DMA and all its meters.
- c. Repair the problems in the DMA.
- d. Update the configuration in TaKaDu.

2. Missing samples report (TaKaDu produces this report on request):

- a. Calculate the sampling rate and the rate of sending data to TaKaDu for each meter.
- b. For meters with a significant level of missed samples, carry out a thorough review of the meter operation.
- c. Identify and execute the appropriate repair steps.

3. Example of new reports that help prioritize leak detection surveys:

Compare and contrast data in different performance indicators and provide an indication of a leaking area, instead of separate reports on performance indicators.

- Increased nightline vs. targeted minimum night flows
- Number of pressure-exceedance events vs. number of leak events
- Number of repaired leaks vs. water loss volume

As shown in these examples, TaKaDu's predictive maintenance is based on information that already exists in the system. We have learned how to organize this information into systematic processes to assist your decision-making process.

Is this Solution a Good Fit for My Utility?

Whether you are a longstanding or new TaKaDu customer, our predictive maintenance solution enables you to address weaknesses and monitor your network more consistently, through the detection of inefficient or missing meters, and through the resizing of large DMAs. In stronger network areas, it enables you to prioritize leak surveys based on KPIs to detect small events before they evolve into larger problems.

Our predictive maintenance service is flexible and easy to adopt. Deploying the new solution can be done in several ways:

1. Hold a one-off workshop and decide on the areas of improvement.
2. Conduct recurring reviews e.g. once every three months and improve the relevant network sections on an ongoing basis.
3. Carry out rotating reviews of the entire network, covering it entirely over the course of a year, focused on one or more of the three key areas: meters, DMAs, and leak detection surveys.

We will provide special training and support, extracting the relevant reports on an ongoing basis.

Find out more how this solution can help you! Contact our Customer Success team today (udi.geismar@takadu.com).

Location(s)	Data availability	Missing sample	Jitter	Weekly periodicity	Sample rate
Combsville North DMA	Poor	Poor	Average	Poor	Average
COMBSP1 - Ferry Hill High (SARASOTA ROAD)	Poor	Poor	Average	Poor	Good
COMB1001 - Laurel North	Poor	Poor	Poor	Poor	Average
COMB1011 - Kingsley West	Poor	Poor	Poor	Poor	Poor
COMB1012 - North Laurel North	Poor	Poor	Average	Poor	Good
Compass North	Poor	Poor	Poor	Poor	Poor
Conestoga Hill	Poor	Poor	Poor	Poor	Poor
Conestoga South	Poor	Poor	Poor	Poor	Poor
Conestoga West	Poor	Poor	Poor	Poor	Poor
Conestoga North	Poor	Poor	Poor	Poor	Poor
Conestoga East	Poor	Poor	Poor	Poor	Poor
Conestoga South & East	Average	Average	Poor	Poor	Good
COAC	Average	Average	Average	Average	Good
COAC - Conestoga South	Average	Average	Average	Average	Good
COAC - COAC-1001 DMA	Average	Average	Good	Average	Good
COAC - Conestoga West	Average	Poor	Poor	Average	Good
COAC - Conestoga	Average	Poor	Average	Poor	Good
COAC - Conestoga Hill	Average	Poor	Poor	Poor	Good