Beyond Numbers:
Calculating the Economic Value of the TaKaDu Central Event Management Solution

When any organization is considering a major technology investment, executive managers typically want to see a clear business case justifying the expense. This is true too of water utilities who are considering investing in a Central Event Management (CEM) solution.

To help utilities evaluate the financial justification for investing in the TaKaDu CEM solution, we have developed a methodical way to calculate the economic value prior to making a decision. The approach we propose is based on many years of experience with water utilities around the world.

This article outlines the methodology and presents examples that water utilities can use in making their own calculations.

UNDERLYING ASSUMPTIONS

We recommend dividing the value calculation into four categories that together encompass the main operational aspects:

1. **WATER LOSS REDUCTION**
2. **OPERATIONAL COST REDUCTION**
3. **IMPROVED HUMAN RESOURCE UTILIZATION**
4. **FAST HANDLING OF TELEMETRY AND METER FAULTS**

In each category we recommend making conservative assumptions about the anticipated improvements. As a rule of thumb, one should feel comfortable with achieving the improvements behind every assumption following the deployment of the CEM solution. The sum of the four categories is the total annual projected value and will likely result in a return on investment (ROI) that is 5-10 times higher than annual investment.

The following sections explain the rationale behind each category, the way to calculate the value, and numeric results. We have used a network size of 2,000 km (1,243 mi) that is divided into 50-80 DMAs as our example.

1 WATER LOSS REDUCTION

The value from early detection and repair of leaks is water loss prevention over a long period of time, that would otherwise continue until the leaks eventually burst on the surface and a consumer reports them, or until the utility detects the events through other techniques.

A common perception in the industry is that hidden leaks typically exist for one year before they burst on the surface. Therefore, this is the period we use in the value calculation.

We multiply the daily water loss of the leaks over one year to calculate the total volume of water the solution saves annually. Although the nature of leaks is to grow over time, we took a conservative approach and did not increase the magnitude during the calculation period (one year).

To calculate the value of water loss reduction, start by listing all the water-loss related events you project will be detected and repaired over a period.

The example below (Table 1) shows the estimated savings from water loss reduction for 45 leaks that were detected by a utility using TaKaDu over a period of one year. The cost of water used in this example is $0.0002 per liter. The table shows a partial list of events and their respected values.

For a network size of 2,000 km (1,243 mi) that is divided into 50-80 DMAs, it is reasonable to project detection of 1-2 leaks every month, with an average magnitude of 1.3 liters/second per event.

Table 1 – Example of a partial list of leaks and their corresponding value

Event #	Magnitude [liter/second]	Duration [hour, day, week, month, year]	Calculated water loss [liter/day]	12-month water loss prevention quantity [liter]	12-month savings [$]
1	3.6	0.6	311,040	113,529,600	$22,706
2	4.3	2.4	371,520	135,604,800	$27,121
3	1.8	1,081.0	155,520	56,764,800	$11,353
4	22	3.0	1,900,800	693,792,000	$138,758
5	0.98	959.2	84,672	30,905,280	$6,181
6	11	6.8	950,400	346,896,000	$69,379
7	8.2	0.6	708,480	258,595,200	$51,719
8	2.4	6.9	207,360	75,686,400	$15,137
9	2.9	0.5	250,560	91,454,400	$18,291
10	1.1	5.2	95,040	34,689,600	$6,938
11	0.23	1,093.4	19,872	7,253,280	$1,451
12	0.91	386.0	78,624	28,697,760	$5,740
33 additional leaks				1,892,790,720	$378,558
Total					**$753,332**

2 OPERATIONAL COST REDUCTION

Early detection of leaks and other events is an opportunity for utilities to adopt a proactive approach for their water network maintenance. This means handling leaks early in their evolution when the costs of repairing them and of collateral damage will be lower than they would be with standard (later) leak detection timing. To calculate expected reduction in operational costs with TaKaDu, we recommend considering the following parameters:

1. Projection of the annual number of leak events.
2. The average repair cost when detecting leaks late in their evolution – i.e., bursts.
3. The average repair cost when detecting leaks early – i.e., hidden leaks.
4. The current annual costs of collateral damage from bursts.
5. Projection of the reduction in the collateral damage costs due to early detection of leaks.

Table 2 – Example value calculation of reduced operational costs

		With TaKaDu	**Without TaKaDu**
Number of leak events *	45		
Repair cost			
Unit cost of a common repair [$]			$6,000
Unit cost of an early repair [$]		$3,000	
Total annual cost [$]		$135,000	$270,000
Collateral damage cost			
Reduction due to early detection [%]	10%		
Annual collateral damage cost [$]		$270,000	$300,000
Total costs		$405,000	$570,000
Total savings		**$165,000**	

3 IMPROVED HUMAN RESOURCE UTILIZATION

When using TaKaDu CEM, water utilities gain value from automatic detection of events, automatic prioritization of events, and a professional and friendly user interface that simplifies the understanding and management of network events through their lifecycle and reduces the field service efforts needed to locate them. As such, utilities report improved communication between departments and more efficient use of human resources, both in the office and in the field.

For this section of the value calculation, we recommend considering the following parameters:

1. Annual control room employee cost, shift lengths, number of employees per shift that will use TaKaDu, and the average time an employee needs to detect and manage events before and after deploying TaKaDu.

2. Annual Non-Revenue Water (NRW) department employee cost, shift lengths, number of employees per shift that will use TaKaDu, and the average time an employee needs to detect and manage events before and after deploying TaKaDu.

3. Average number of kilometers scanned to locate a leak, annual number of leaks the field team finds, and the leak detection cost per kilometer [$/km].

4. Size of the leak detection team before and after deploying TaKaDu.

The following table presents the calculations for each parameter.

Table 3 – Example value calculation of improved human resources efficiency

		With TaKaDu	Without TaKaDu
1. Control Room team efficiency			
Annual employee cost [$]	$100,000		
Shift length [hr]	8		
Time spent on event management		2	4
Staff needed	1.00		
Portion of shift needed		0.25	0.5
Cost of control room		$25,000	$50,000
Savings due to increased efficiency		**$25,000**	
2. NRW Department team efficiency			
Annual employee cost [$]	$100,000		
Shift length [hr]	8		
Time needed [hr]		1	5
Staff needed	1.00		
Portion of shift needed		0.125	0.625
Cost of NRW department		$12,500	$62,500
Savings due to increased efficiency		**$50,000**	
3. Leak Detection team efficiency			
Average number of km scanned per leak		6.4	8
Number of leaks to find	45*		
Leak detection cost per km [$/km]	$150		
Annual cost of leak detection team		$51,840	$64,800
Savings due to increased efficiency		**$12,960**	
4. Detection team size			
Leak detection team members		2	3
Annual employee cost [$]	$100,000		
Total annual employee cost		$200,000	$300,000
Savings due to smaller detection team		**$100,000**	
Totals			
Total costs		$289,340	$477,300
Total savings		**$187,960**	

(*) Some of the leak events in the system are caused by multiple leaks in the DMA. Field teams find and repair an average of 1.2 leaks per event.

4 FAST HANDLING OF TELEMETRY AND METER FAULTS

When meters don't send their data because of telemetry problems or meter malfunctions, the ability to monitor the area and detect water loss events becomes very limited. By using TaKaDu CEM, water utilities can detect those events early, allowing fast repair of malfunctioning meters, and hence improve their network visibility (monitoring capabilities) and shorten the duration of the water loss-related problems. This in turn reduces the number and duration of hidden leaks that cause unmonitored water loss.

In this section of the value calculation, we recommend listing the annual telemetry and breakdown events of flow meters, including the projected time to detect and repair the asset failures. With this in mind, we suggest using the following parameters:

1. Average daily water loss cost of leak events.
2. Typical time until telemetry or faulty meter incidents are detected when using TaKaDu.
3. Typical time until telemetry or faulty meter incidents are detected without using TaKaDu.

Table 4 – Example value calculation when shortening the duration of telemetry and faulty meter events*

Event type	Duration with TaKaDu [days]	Duration without TaKaDu [days]	Time saved [days]	Value of lost water ($)
Faulty meter	5.5	8.25	2.75	$126
Faulty meter	20	30	10	$459
Faulty meter	3.1	4.65	1.55	$71
Faulty meter	9	13.5	4.5	$206
Faulty meter	15.2	22.8	7.6	$349
Faulty meter	7.5	11.25	3.75	$172
Telemetry problem	15.4	23.1	7.7	$353
Telemetry problem	10	15	5	$229
Telemetry problem	15	22.5	7.5	$344
Telemetry problem	27	40.5	13.5	$619
Telemetry problem	10	15	5	$229
Additional value from other events				$17,743
Total				**$20,901**

The above calculation is based on the following assumptions:

- Using the data from Table 1, the average daily water loss is 229,000 liters, resulting in a daily cost of leak events of $46 (229,000 liters X $0.0002/liter).
- Detection of telemetry or faulty meter events will take 50% longer than the duration of the events that TaKaDu detects.
- The value of each event equals the time saved multiplied by the average daily water loss cost.

* The list of events in Table 4 is partial. For a network size of 2,000 km (1,243 mi) divided into 50-80 DMAs, it is reasonable to project detection of 50 flow telemetry and faulty meter events annually.

TOTAL ANNUAL PROJECTED VALUE

By calculating projected value across four significant categories, the total annual savings for a 2,000 km (1,243 mi) network divided into 50-80 DMAs is $1,127,193.

Water loss reduction	$753,332
Operational cost reduction	$165,000
Improved human resource utilization	$187,960
Fast handling of telemetry and meter faults	$20,901
Total	**$1,127,193**

As this calculation is based on conservative assumptions in terms of anticipated improvements, savings could easily be more, depending on your utility's goals and resources.

ADDITIONAL VALUE GAINED

In addition to the value categories described so far, water utilities are likely to gain additional tangible and intangible value in the following categories.

Water loss: (1) reduced unauthorized water consumption; (2) burst avoidance.

Operational efficiency of network management: (1) accurate resolution and faster turnaround due to better communication between employees and departments, less overtime, and lower subcontracting costs; (2) data-driven decision making; (3) one truth across the board regarding the network assets' status.

Customer service: (1) higher customer satisfaction through higher service uptime, meeting pressure and water quality regulations; (2) handling problems before the consumers and media report; (3) reduced customer complaints; (4) shorter repair cycles.

Digital transformation to smart utility: (1) agililty with flexibility to grow over time; (2) ability to integrate with other systems in the utility ecosystem and with smart city functions; (3) flexibility to deploy future IoT devices.

Regulatory compliance: (1) meeting regulatory targets through higher network uptime, provisioning of water supply at an adequate pressure and compliance with water quality standards; (2) this could also result in lower penalties.

Human resources: (1) simplified and standardized working processes; (2) faster transformation and adoption; (3) reduced dependency on veteran experts who may soon retire or leave as any user who goes through 1–2-days training can monitor the network and manage events.

Despite the strong likelihood of the above benefits and their high value, their contribution is not included in our conservative and quantifiable approach to calculating the business case.

SUMMARY

TaKaDu Central Event Management is a technological leap and a new 24/7 paradigm in that it offers water utilities better visibility and easy handling of events and incidents in the network. The CEM leverages the data collected from the network, provides highly automated data analytics, eliminates some of the siloed work and streamlines communication between departments and employees, while also standardizing procedures and processes in the office and field.

Consequently, utilities obtain new benefits through detection of smaller leaks early on in their evolution, lower repair and collateral damage costs, improved utilization of human resources, and better monitoring of the network.

With this value calculation document, we propose a methodology to express those benefits in monetary units. Although there are additional benefits to consider and other ways to calculate the value, our experience shows the categories noted in this document enable water utilities we work with to confidently evaluate the case for investing in TaKaDu CEM.

While our example shows a conservative $1,127,193 in annual savings for a network of 2,000 km (1,243 mi) divided into 50-80 DMAs, we understand that all utilities are unique in their composition.

Please contact us, and we'll be happy to help you calculate the projected value for your operation.