



International Association
of Water Service Companies
in the Danube River
Catchment Area



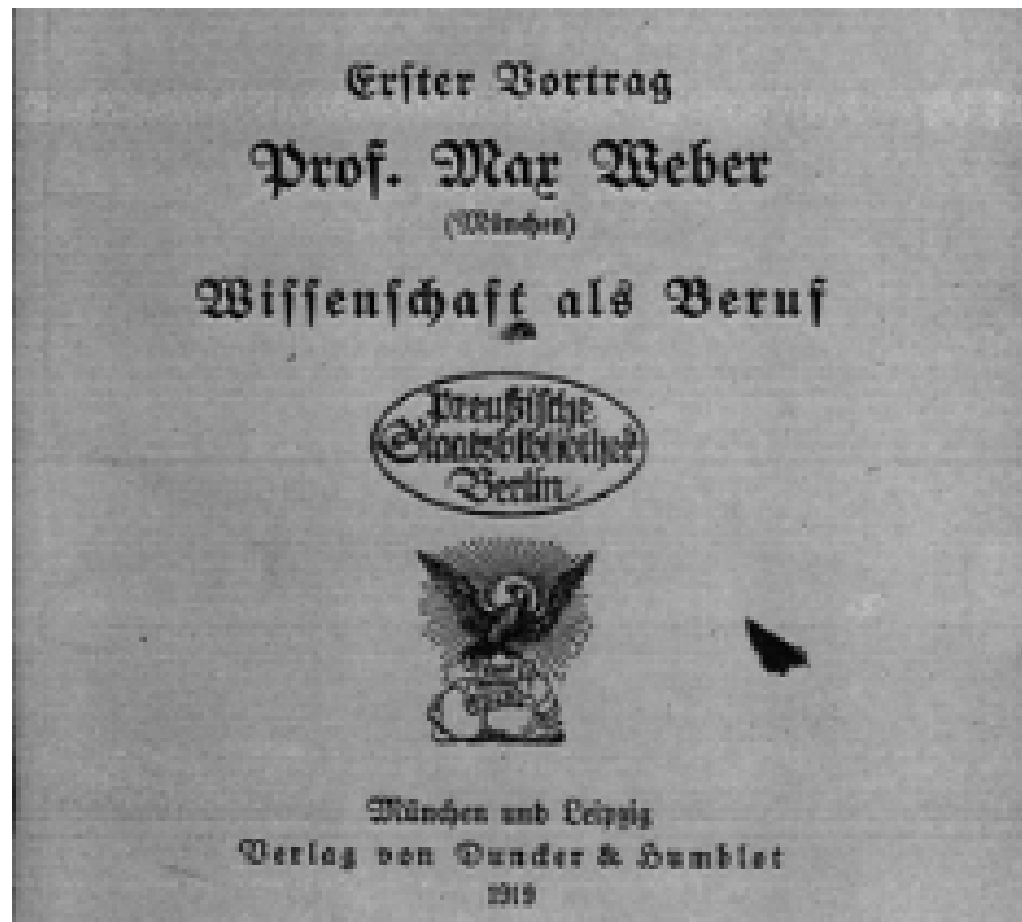
Utility Management Training

UMT Reflections on Knowledge

BJC 2023

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Knowledge and Science as Vocation



Sources of Knowledge

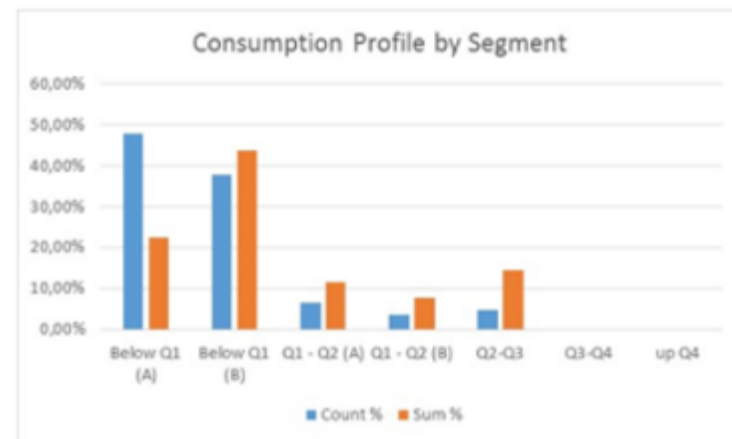
Sources of Knowledge

- Pilot projects
- Technology vendors & partners
- Challenge established concepts

Pilot (example: consumption profiling)

Example 2: Residential Block

	group	count	sum	Count %	Sum %
Below Q1 (A)	<0,2	19082	2217	47,75%	22,48%
Below Q1 (B)	0,201 - 0,4	15088	4306	37,75%	43,68%
Q1 - Q2 (A)	0,41 - 0,51	2567	1143	6,42%	11,59%
Q1 - Q2 (B)	0,52 - 0,62	1371	764	3,43%	7,74%
Q2-Q3	0,625-16	1858	1430	4,65%	14,50%
Q3-Q4	16,1 - 20	0	0	0,00%	0,0%
up Q4	>20	0	0	0,00%	0,0%
total		39966	9859		

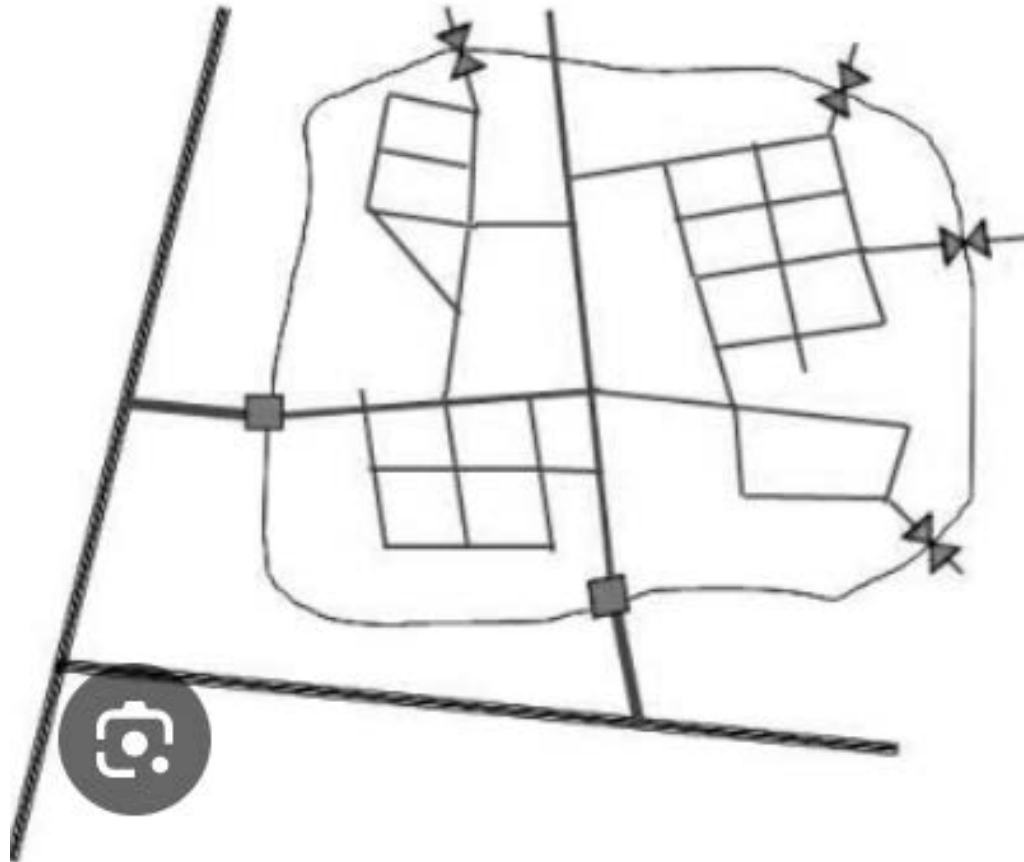


Two thirds of the consumption is below Q1. There is a great risk of meter under-registration. For better analysis the segment below Q1 is further split into two sub-segments. The risk in the lower one is even bigger. It is highly recommended that the consumption at such low flow (i.e. Q1/2) be tested separately.

Technology partners

- High-precision metering: ultrasonic vs. electro-magnetic vs. combined vs. other...
- AMR/AMI: GSM vs. LoRa vs. Radio vs. ...
- Metering points: what else can you measure there
 - pressure
 - water quality
 - temperature
 - noise
 - ...

Challenge Established Concepts (1)



Challenge Established Concepts (2)

- Limitation of physically-defined DMAs:
 - hydraulic and water-quality issues
 - cost (cost to establish; O&M costs)
- Advancement of technologies: IoT and pattern recognition
- Ready for Virtual DMAs?

Expected Developments

What is Next

- Curated data sets
- Patterns and insights
- Prompt engineering
- Collaborative decision making

Curated Data Sets

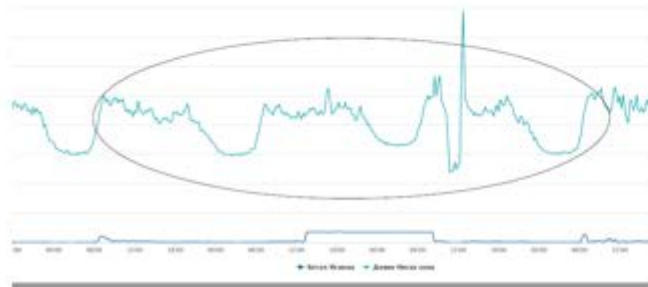
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Contract number	Contract date	Meter installed	Meter diameter	Category	Service class	Area	July 2015	June 2015	July 2014	Difference vs. June 2015 (in m3)	Difference vs. July 2014 (in m3)	% Difference vs. June 2015
2	1	2006-01-01		0,5	Budget	With meter	Area 1	0	258	272	-258	-272	
3	2	2012-05-15	2014-08-28	0,5	Domestic	With meter	Area 1	4	0	100	4	-96	100%
4	3	2006-01-01	2011-04-06	0,5	Budget	With meter	Area 1	20	60	101	-40	-81	-200%
5	4	2006-01-01		0,75	Budget	With meter	Area 1	20	46	87	-26	-67	-130%
6	5	2014-06-21	2014-06-21	0,5	Domestic	With meter	Area 1	6	0	68	6	-62	100%
7	6	2014-01-09	2014-01-09	1	Domestic	With meter	Area 1	19	20	74	-1	-55	-5%
8	7	2014-05-09	2014-05-09	0,5	Business	With meter	Area 1	5	1	60	4	-55	80%
9	8	2006-08-04	2013-12-10	1	Business	With meter	Area 1	108	126	158	-18	-50	-17%
10	9	2006-08-04		0,5	Business	With meter	Area 1	53	87	103	-34	-50	-64%
11	10	2006-07-27	2015-02-06	0,5	Domestic	With meter	Area 1	0	20	50	-20	-50	
12	11	2011-07-20	2014-11-04	0,5	Domestic	With meter	Area 1	3	13	50	-10	-47	-333%
13	12	2006-07-27	2011-06-17	0,5	Domestic	With meter	Area 1	0	3	45	-3	-45	
14	13	2006-08-04	2014-04-18	0,5	Business	With meter	Area 1	0	54	45	-54	-45	
15	14	2006-08-02		0,75	Business	With meter	Area 1	15	112	59	-97	-44	-647%
16	15	2006-07-27		0,5	Domestic	With meter	Area 1		11	11	-11	-11	
17	16	2006-07-27		0,5	Domestic	With meter	Area 1		10	11	-10	-11	
18	17	2006-07-27	2012-02-22	0,5	Domestic	With meter	Area 1	19	23	24	-4	-5	-21%
19	18	2012-08-17		0,75	Domestic	With meter	Area 1	17	20	22	-3	-5	-18%
20	19	2006-07-26	2011-11-21	0,5	Domestic	With meter	Area 1	15	22	20	-7	-5	-47%
21	20	2006-01-01		0,5	Domestic	With meter	Area 1	15	24	20	-9	-5	-60%
22	21	2006-07-27		0,5	Domestic	With meter	Area 1	14	16	19	-2	-5	-14%
23	22	2009-05-26		0,5	Domestic	With meter	Area 1	14	22	19	-8	-5	-57%

Patterns and Insights



Easy detection of meter bypassing (or other cases of theft)

A good practice for revenue assurance is the daily tracking of demand patterns of hotels, large industrial customers and others. In this example, a direct theft was detected as the customer used to switch off the legal supply every now and then.



Matching atypical end-user consumption on the DMA profile

In this case the per-minute profile of a single large customer showed a demand of 2 liters per second that was directly visible on the DMA profile. Without looking at it a network manager could immediately interpret this as hidden/background leakage.

Prompt engineering (1)

How can I define which water meters are inaccurate?

Ah, the classic water meter accuracy conundrum. A few ways you could try to identify inaccurate meters:

- Compare the meter reading to estimated water use for that property. If there's a significant discrepancy, the meter could be faulty.
- Inspect the meter for any signs of damage, rust, or other physical issues.
- Perform a meter test to see if the meter is registering correctly.

Pi Talk with Pi



Prompt engineering (2)

What are the typical metering inaccuracies at low velocity of mechanical water meters?

A typical issue with mechanical water meters is that they tend to be less accurate at low flow rates. This is because the design of the meter requires a certain amount of water flow to "turn" the mechanism inside the meter. If the flow rate is too low, the meter may not register the flow accurately. The exact threshold for when this inaccuracy begins varies depending on the specific type of meter, but in general, it tends to be around 0.3 to 2 feet per second of flow. So, if the water flow is below that range, the meter may not be able to provide

Collaborative Decision Making



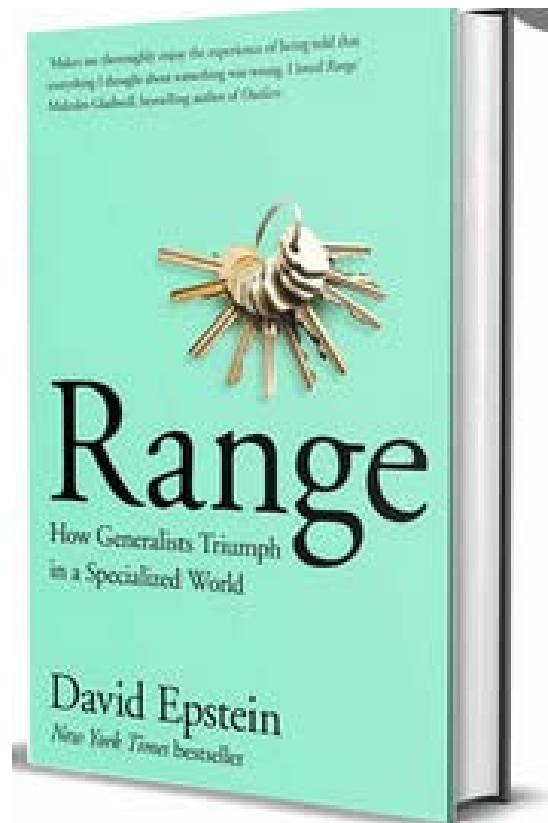
Regulation and Compliance:
Is the meter in metrological validity

Finance:
- Do we lose money from meter under-registration
- What is the lifecycle cost

Operations:
Can we use the readings for more frequent water balance

Customer Service:
Can we read remotely to reduce disruption and improve service

Build Knowledge by Applying Range



Thank you

Utility Management Training program @ IAWD

<https://www.iawd.at/eng/danube-toolbox/d-leap/programs/utility-management-training/>

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