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5 rules to ensure sustainable data management platform deployment

Building a Robust Data Foundation

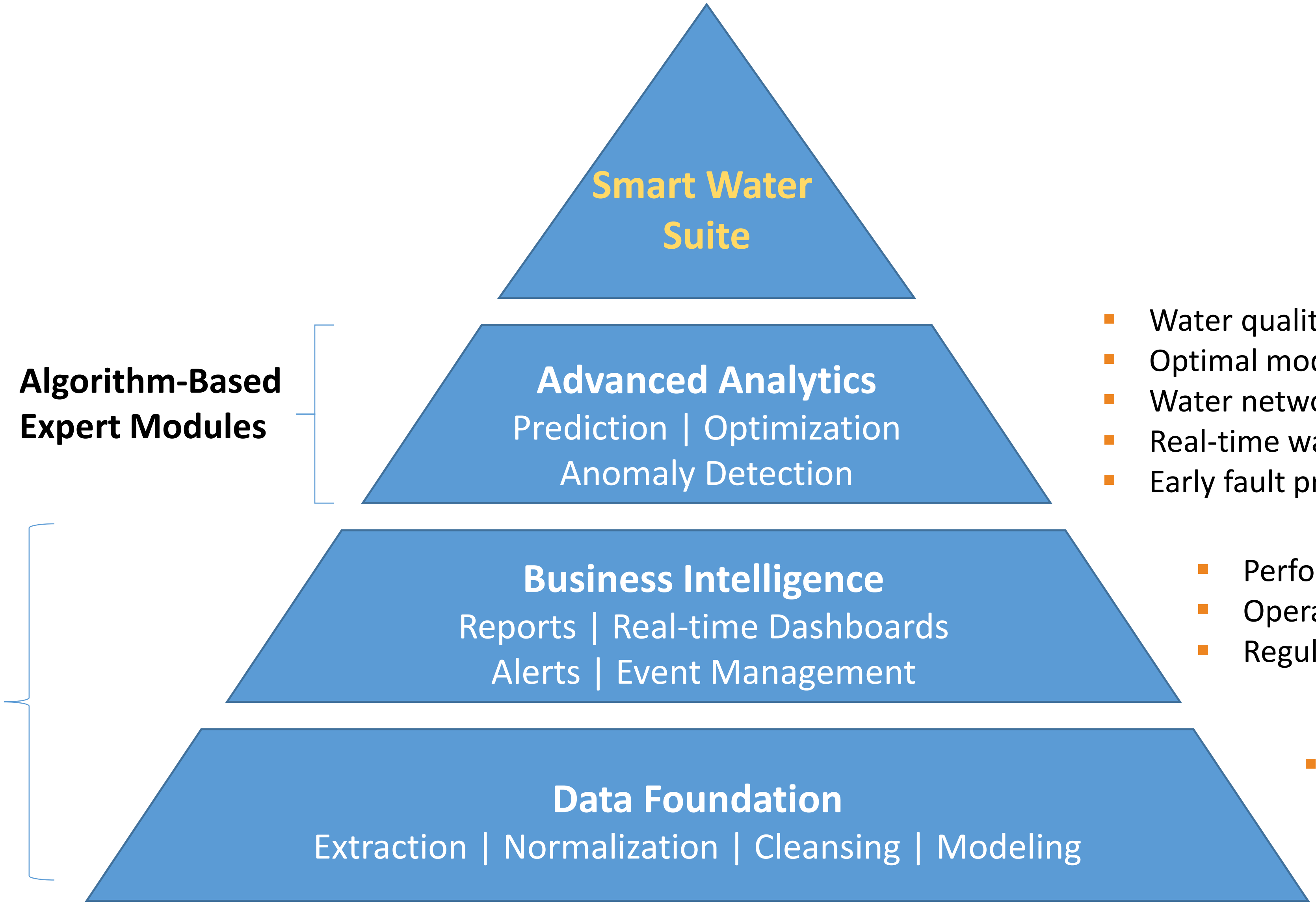
Natan Zuta, CEO, May 2019

Overview

- A leading provider of **data management and analytics solutions for the utilities sector**
- A quality group of engineers, software & algorithm experts with **vast water experience**
- More than **100 installations**, world-wide
- Operating since 2007

Proudly serving some of the largest water treatment, wastewater treatment and desalination facilities in the world while helping to protect surface water quality and security

IOSight's Smart Water Suite



Smart Water Suite

Algorithm-Based Expert Modules

Advanced Analytics
Prediction | Optimization
Anomaly Detection

- Water quality monitoring
- Optimal mode of use
- Water network optimization
- Real-time water balances in DMAs
- Early fault prediction

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Core Platform

Business Intelligence
Reports | Real-time Dashboards
Alerts | Event Management

- Performance improvement
- Operational efficiency
- Regulatory Compliance

Data Foundation
Extraction | Normalization | Cleansing | Modeling

- Reliable and meaningful data

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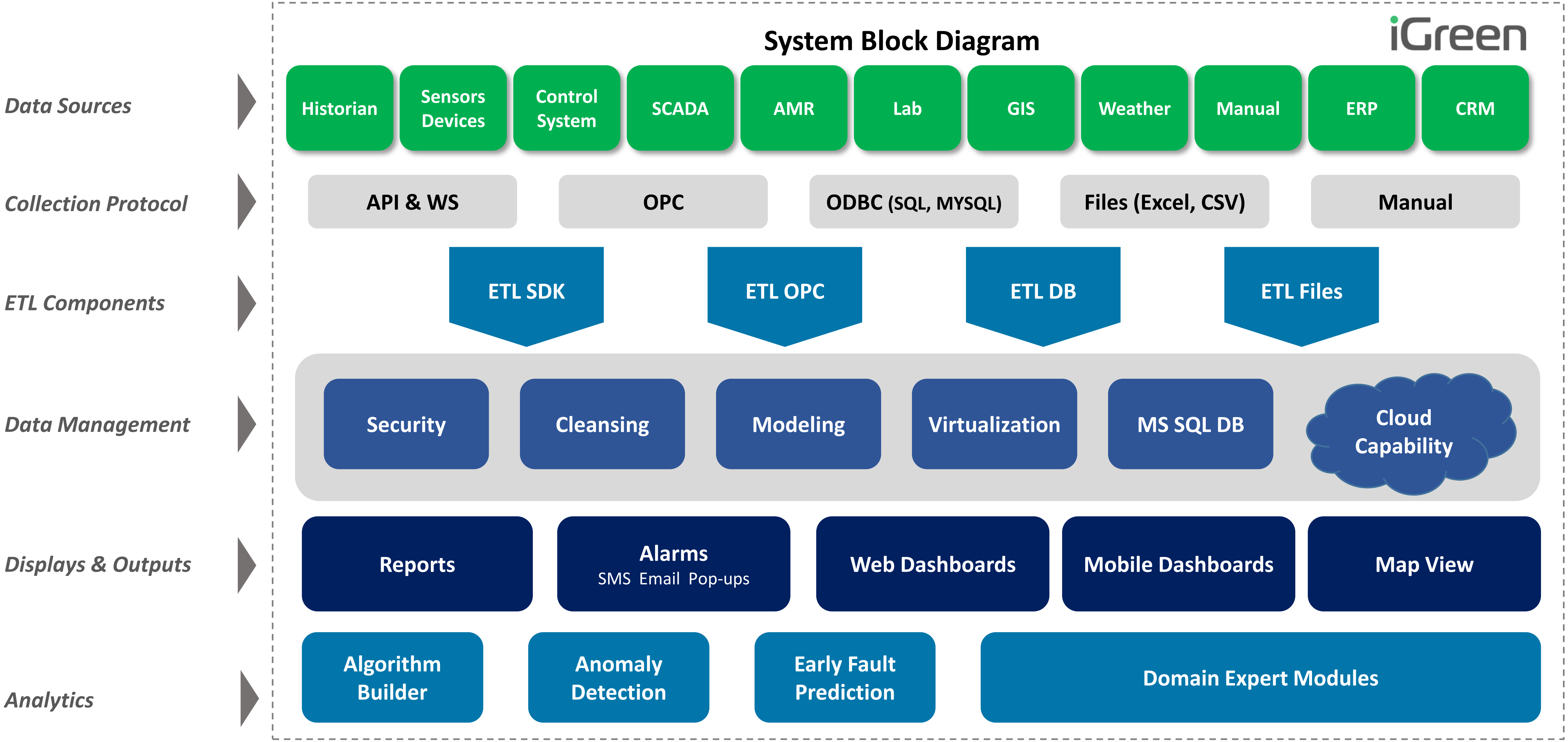
iGreen - System Architecture



System Block Diagram

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Data Sources: Historian, Sensors Devices, Control System, SCADA, AMR, Lab, GIS, Weather, Manual, ERP, CRM

Collection Protocol: API & WS, OPC, ODBC (SQL, MYSQL), Files (Excel, CSV), Manual

ETL Components: ETL SDK, ETL OPC, ETL DB, ETL Files

Data Management: Security, Cleansing, Modeling, Virtualization, MS SQL DB, Cloud Capability

Displays & Outputs: Reports, Alarms (SMS Email Pop-ups), Web Dashboards, Mobile Dashboards, Map View

Analytics: Algorithm Builder, Anomaly Detection, Early Fault Prediction, Domain Expert Modules

Data normalization fundamentals

Why do projects fail?

- An **incidental approach** to data science
- A **bottom-up** attitude

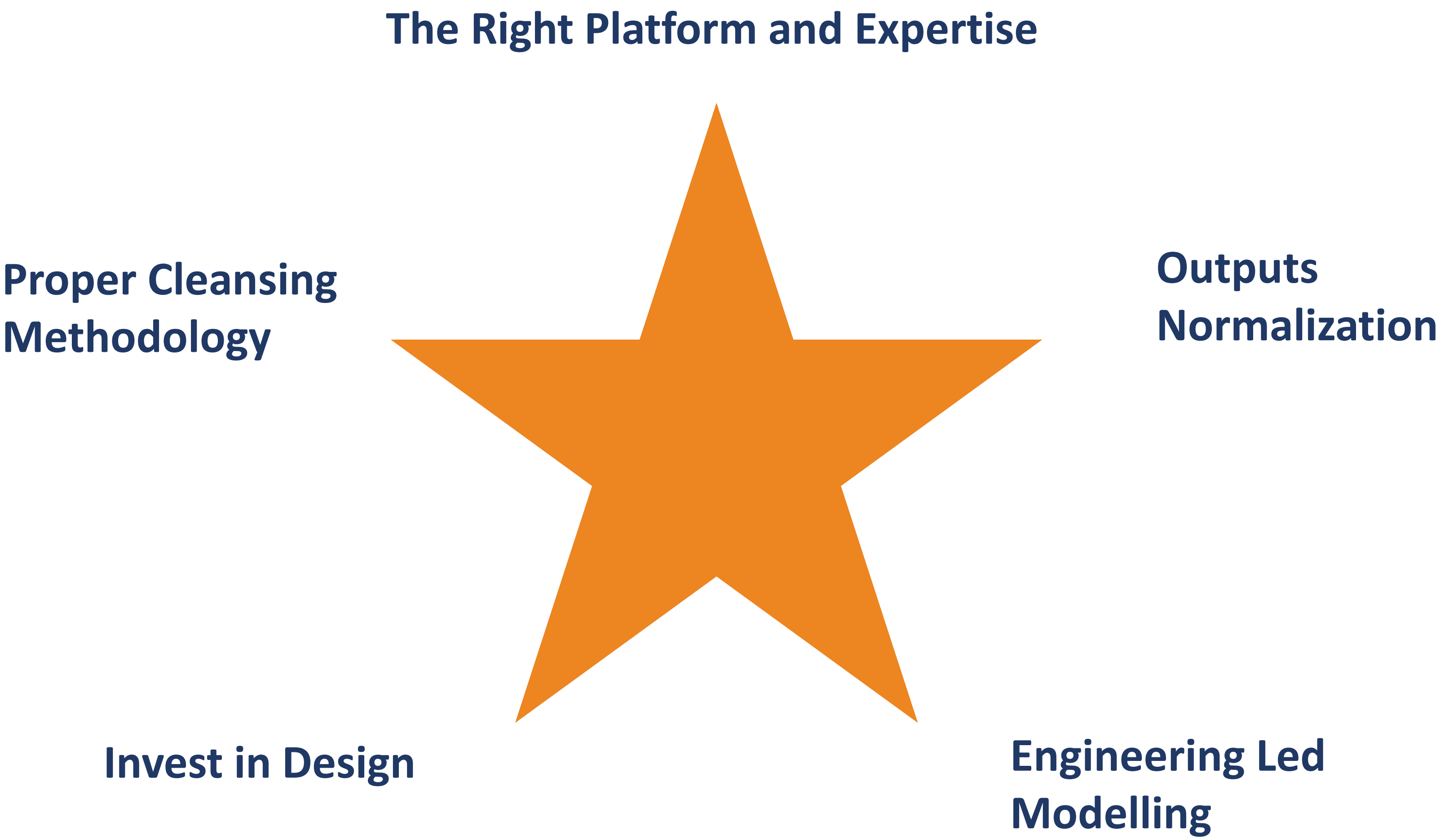
Data normalization fundamentals

Doing it right

- Data should be **reliable**
- The system should be **accessible and easy to use**
- **Long-term performance** should be taken under consideration from the inception of the project
- **Team and management** - An ongoing maintenance of the system requires a trained team, data integrity ‘watch dogs’ and mainly – continuous involvement from the user

- **Coherency** - The BI system (e.g. reporting/ dashboarding, analytics) should be integrated in the DB and must reflect the data model
- **Future analytics** must go through the **validated data base**

5 Rules for successful data projects



The Right Platform and Expertise

Proper Cleansing Methodology

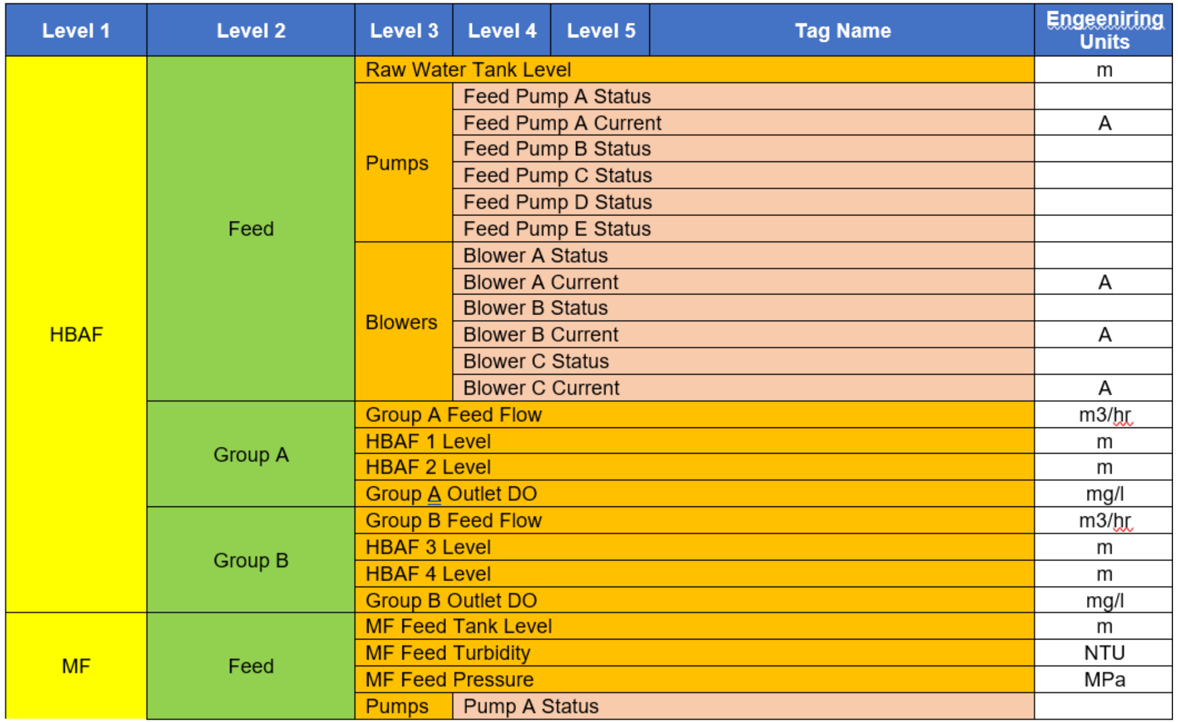
Outputs Normalization

Invest in Design

Engineering Led Modelling

Rule # 1

- **Invest in the design stage**:
  - Prepare a **thorough base of design** spec
  - Define a product tree that will be **intuitive for the users**
  - **Agree** with the customer on the basic reasons/ **triggers** that initiated the project and secure a continuous use
  - **Agree** with the customer on the **initial outputs**



Level 1	Level 2	Level 3	Level 4	Level 5	Tag Name	Engeeniring Units
HBAF	Feed	Raw Water Tank Level				m
		Pumps	Feed Pump A Status			
			Feed Pump A Current			A
			Feed Pump B Status			
			Feed Pump C Status			
			Feed Pump D Status			
			Feed Pump E Status			
		Blowers	Blower A Status			
			Blower A Current			A
			Blower B Status			
			Blower B Current			A
			Blower C Status			
			Blower C Current			A
	Group A	Group A Feed Flow				m3/hr
		HBAF 1 Level				m
		HBAF 2 Level				m
		Group A Outlet DO				mg/l
	Group B	Group B Feed Flow				m3/hr
		HBAF 3 Level				m
		HBAF 4 Level				m
		Group B Outlet DO				mg/l
MF	Feed	MF Feed Tank Level				m
		MF Feed Turbidity				NTU
		MF Feed Pressure				MPa
		Pumps	Pump A Status			

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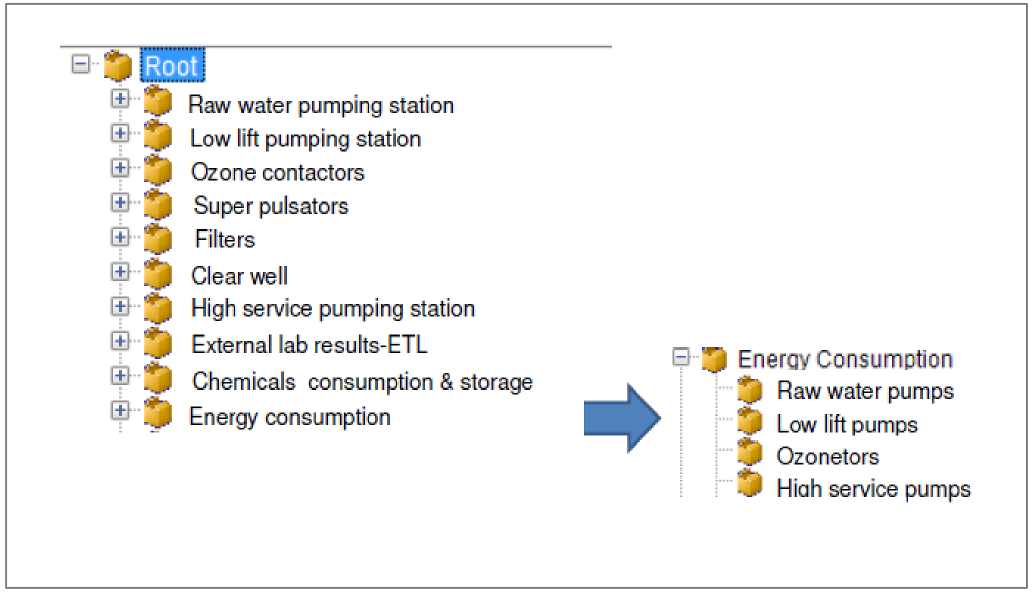
Rule # 2

- **Engineering-led modeling**
  - Prepare a **product tree** that reflects the **engineering aspects** on the system (rather then the automation aspects)
  - Collect only the necessary tags
  - Virtualize missing tags or unreliable processes (like Pump in rest status while flow parameter showing results
  - Standardize unit and tag properties (no of digits, categories, formulas etc.)
  - Minimize sampling rate



- Root
  - Raw water pumping station
  - Low lift pumping station
  - Ozone contactors
  - Super pulsators
  - Filters
  - Clear well
  - High service pumping station
  - External lab results-ETL
  - Chemicals consumption & storage
  - Energy consumption

- Energy Consumption
  - Raw water pumps
  - Low lift pumps
  - Ozonetors
  - High service pumps

Rule # 3

- **Use a proper cleansing methodology**
  - **Pre-processing** based on a predefined rule base
  - **Avoid** values that are in **mis-match** with the process (e.g. concentration of less the 0 ,etc.)
  - **Reject** data collection of repeating values with **no significant** change (dead band, change)
  - **Create calculated tags** that are based on a validated tested algorithm
  - **Compare** aggregated data and multiple sources of data that refers to the same entity (e.g., manual meters VS AMI), and document the logical 'right' value

Rule # 4

- **Outputs normalization**
  - Try to **be consistent** with formulas online VS reporting and dashboarding rule base
  - Build **frequently used calculated tags** to be used on multiple outputs
  - **Be coherent** when building balances and complicated formulas and reports
  - **Do not create dependency** on data that has to be extracted repeatedly with growing volumes – it will eventually miss the original performance objectives
  - **Do not launch** complex analytics-oriented projects before ensuring the data is 100% reliable and normalized!

Rule # 5

Choose the right platform and implementation team

- It should be **all in one** – collect- cleanse- store- present and analyze
- It must be **easy to use and configurable** so that the direct user will be able to take control on a certain point of time and take it forward independently
- The implementors must be **engineers that can understand** the need to the extent of possessing basic know how of what's best for the client
- **Data replication does not go together with normalized data!**
- Make sure the system **alerts** on missing datasets, anomaly results and duplications

Remember: Preparing the actual report or dashboard should be a straight-forward procedure – if you invest more than that – there is either something wrong on the deployment methodology or in choosing the platform

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Thank You