

Web Enabled Integrated Infrastructure Information System Using Remote Sensing and GIS

Technology Solutions for Distribution Management system



for

Kolkata Environment Improvement Investment Program.
(Kolkata Municipal Corporation)

Overview

Kolkata – “City of Joy, Cultural Capital of India, The City of Processions”

The Kolkata Municipal Corporation (KMC) serves the third largest city in the country covering an area of 201 Sq.KM with 144 wards .

Kolkata Municipal Corporation provides a range of quality urban services to more than 4.5 million static and another 7.5 million floating population.

KMC has a Population density of 26000 Plus Person Per Sq Km.
KMC is the third oldest Municipal Corporation of India.

KMC has 16 different Department integrated under Municipal Administration System. (MAS)

The Length of Water Distribution Network system is around 6500 KM.

The Length of Sewerage and Drainage Network System is Around 5500 K.M

Objective

- Develop system with single point access to entire Infrastructure of KMC.
- Better monitoring, condition assessment, performance and alternative evaluation of entire physical Infrastructures of KMC.
- Provide decision support system integrated with geospatial data
- Provide effective means for graphically conveying complex information of KMC Infrastructure
- Provides user friendly environment accessible over computer increasing efficiency
- Provide a substitute to the traditional use of hardcopy maps.
- Community participation and feedback.

Operation

Wholesale,
Distribution and
Retail Functions

Utility Business
Systems

Property
Meters

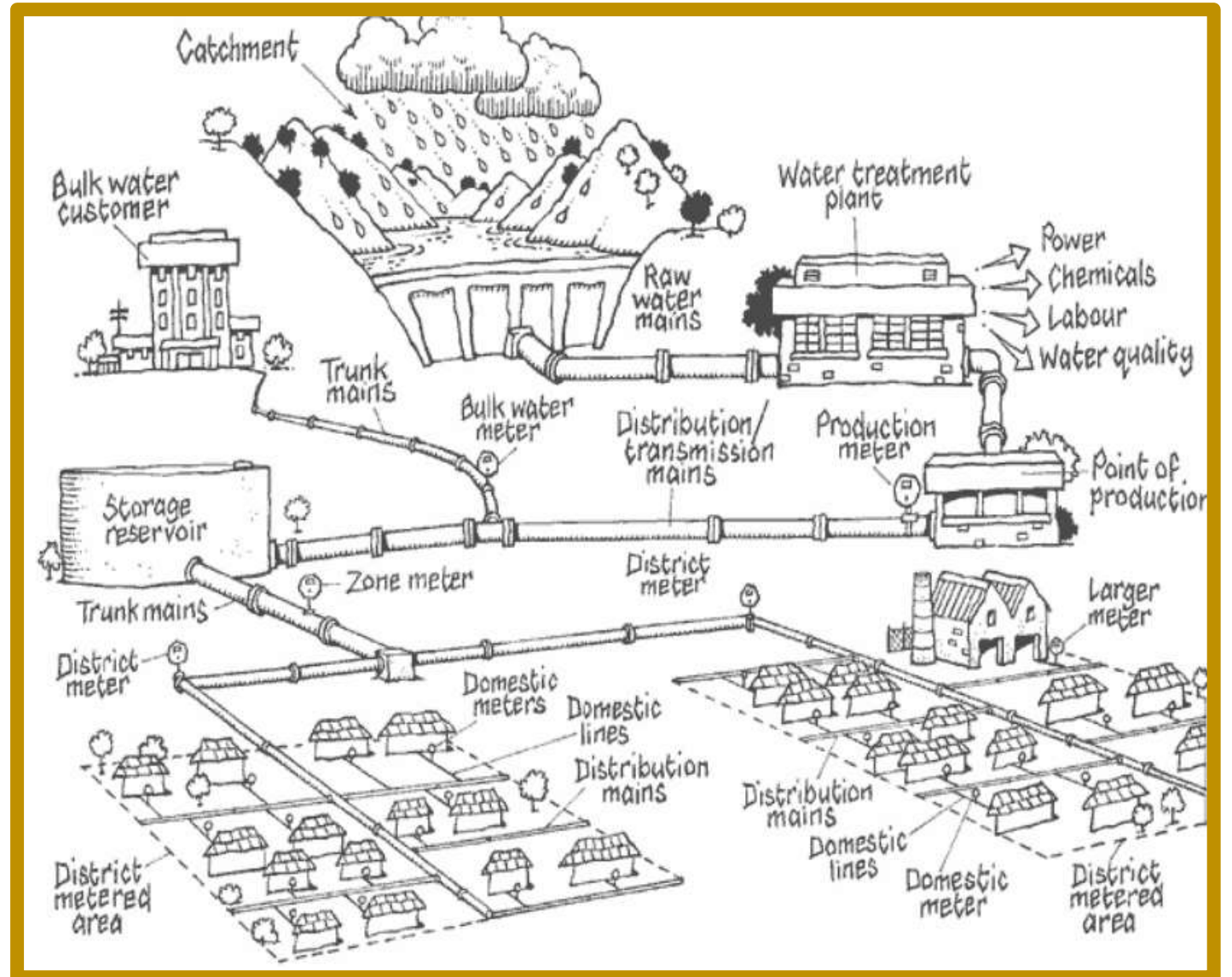
Customer
Relationship
Management

Data
Integration

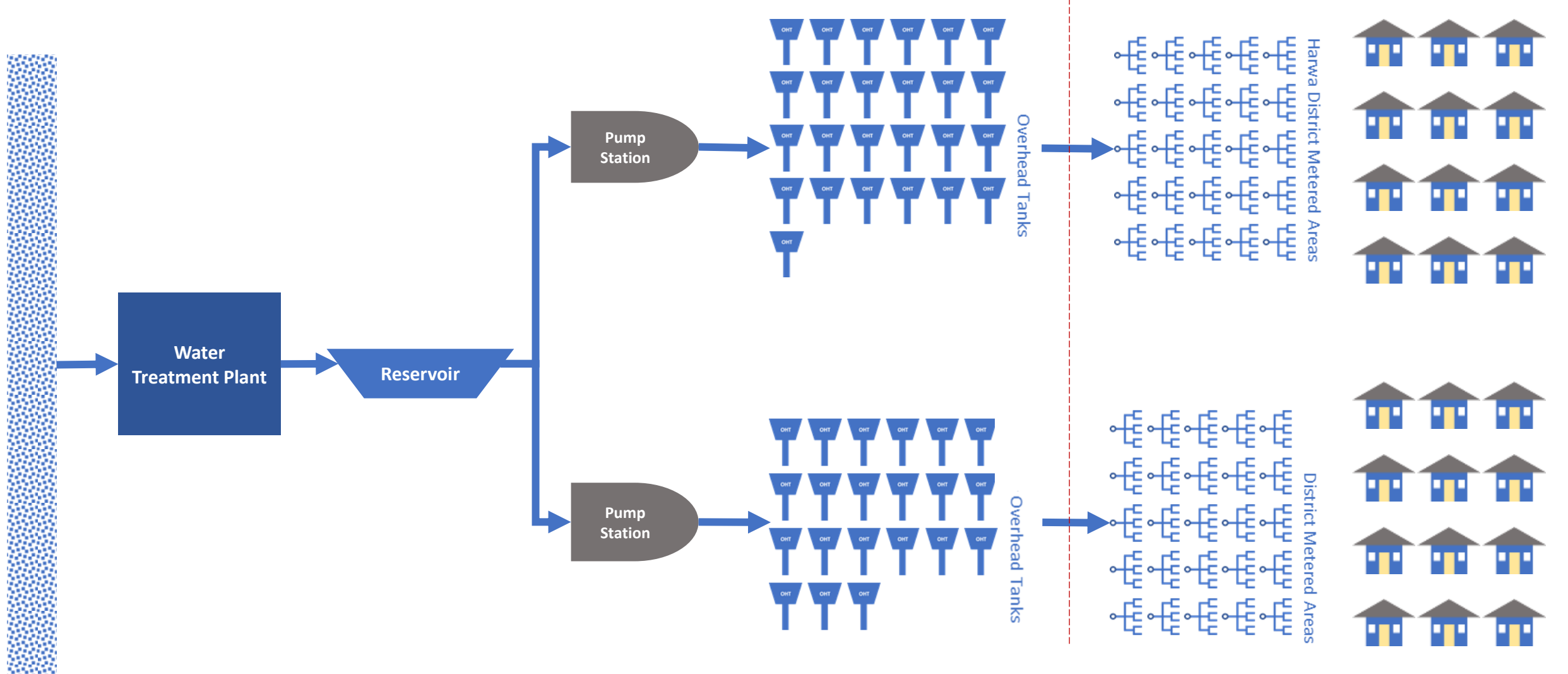
Business Systems

Operation Service

- Delivering Services
- Managing Information
- Utilities
 - Asset Data
 - Property/Customer Data
 - Financial Data
 - Performance Data



Water Supply System



Intake	Water Treatment Plant	Ground Service Reservoir	Pump Stations	Overhead Tanks	District Metered Areas	Meters and Property Connections
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Wholesale Function

Distribution and Retail Function

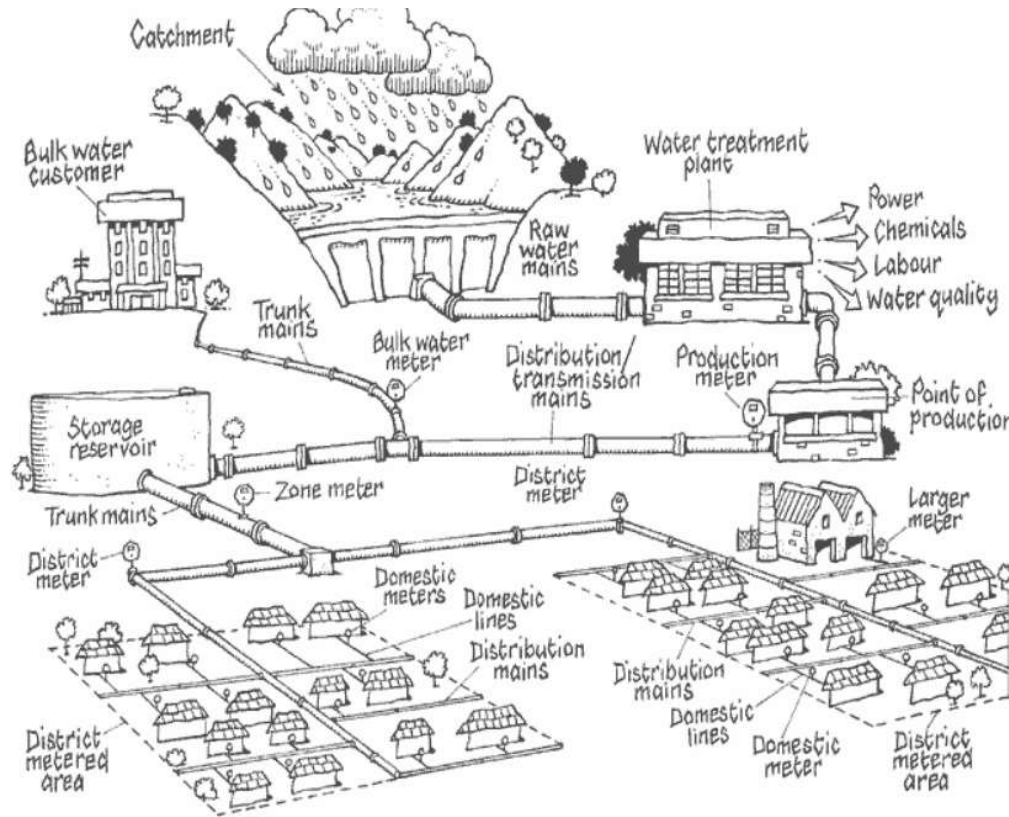
Utility Business Systems

Spatial

- Catchments
- Aquifers
- Bulk Supply Areas
- Supply or Pressure Zones
- District Metered Areas
- Properties

Meters

- Production
- Zone
- District
- DMA
- Bulk Supply
- Property



Financial

Income Statement

- Revenue
- Expenses
- Finance Costs
- Depreciation
- Net Income

Balance Sheet

- Assets
- Liabilities
- Equity

Customers

- Bulk
- Industrial
- Commercial
- Residential
- Institutional
- Billing & Collection
- Enquiry
- Complaint

Assets

- Plants
- Pump Stations
- Storages and Tanks
- Transmission Mains
- Distribution Mains
- Property
- Connections
- Instruments

Customer Relationship Management

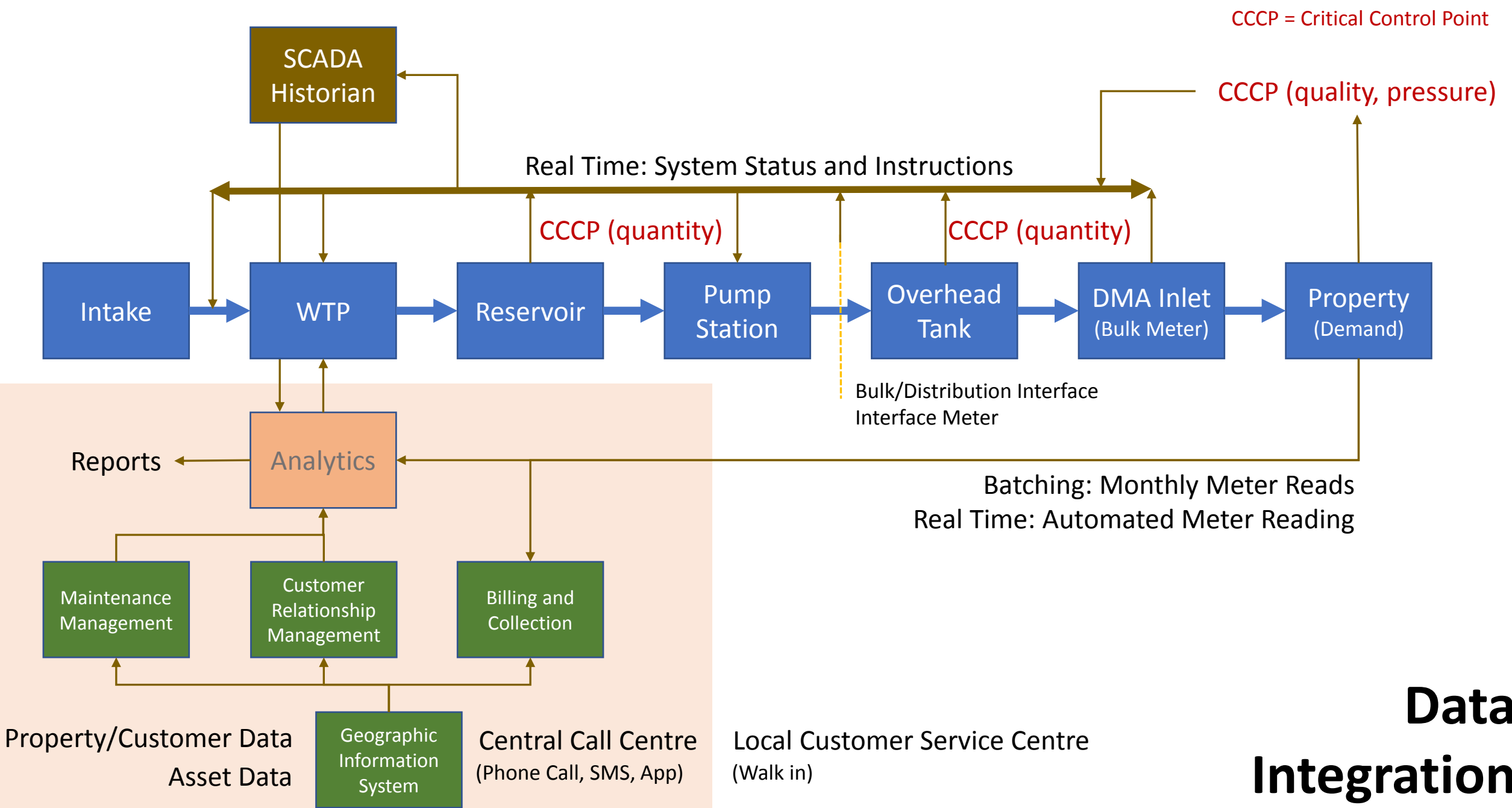


- Web Based Complain Registration & Management System (CRMS) for better monitoring.
- An CRMS App on iOS & Android.
- On Time Response is one of our key deliverables.
- Efficient UP time of 99%
- Interactive & Intelligent Dashboard for Departmental Monitoring
- Industry Standard HR Manual and Training Process for better deliverables.
- Intelligent and Prompt Reporting

Field Mobility

- Mobile App enables field personnel at water utilities for O & M
- view, capture, store, update, manipulate, and
- analyze their networks, facilities, and
- operational data (work order, customer complaints, and inspections).





CCCP = Critical Control Point

CCCP (quality, pressure)

Real Time: System Status and Instructions

CCCP (quantity)

CCCP (quantity)

Bulk/Distribution Interface Interface Meter

Batching: Monthly Meter Reads
 Real Time: Automated Meter Reading

Data Integration

Asset Management System

Finance Management System

Water Network O&M Management System

Design & Construction

- LCC analysis
- Durability
- Vandalism & theft prevention
- Material selection
- Workmanship & construction quality control

- Provide system redundancy
- DMAs construction
- PMZs consideration
- Flow velocity guideline satisfaction
- Water Hammer protection
- Minimize water age

- Storage reservoirs
- Material selection
- Dead-end mains
- Construction procedures
- Sewer pipe placement

Operation

- Proper operational settings
- Operated within capabilities
- Information on state
- Regulation & Bylaws compliance
- Operation strategy compliance
- Records

- Monitoring & Assessment (audit)
- Hydraulic model building & analysis
- Pressure management for regulation satisfaction, NRW reduction and energy saving
- Water metering

- Risk assessment
- Monitoring (routine, recover, receiving water quality)
- Maintaining disinfectant residuals (Re-chlorination, automatic drain)
- Emergency response (water safety plan)

Maintenance

- Condition monitoring
- Preventative maintenance
- Protection of system environment
- Corrosion control
- Cross connection & Backflow prevention
- Records

- Flushing or cleaning of pipes
- Active leak detection & leakage awareness
- Repair (fast, QC, records)

- Cleaning & flushing pipes
- Disinfection & flushing procedures compliance
- Regular cleaning of strainers

Objectives

Physical Integrity

Hydraulic Integrity

Water Quality Integrity

Mgmt. proc. structure

Systems

Procedures

Rules

Rules of Thumb

Planning

B/C Analysis

Implementation & Feedback

Integration

Accountability

Assessing Status

Evaluation

Reporting

PIs

Information collection

Information System

- Integrated System (customer, bill, etc.)
- SCADA, SWM
- GIS
- Network operating & diagnosis system
- CMMS (Asset)

Operating System

- Quantity mgmt.
- Pressure mgmt. (Energy saving)
- Quality mgmt.
- Risk mgmt.

Facility Management System

- Degradation module
- Risk module
- Financial & economic module
- Decision module

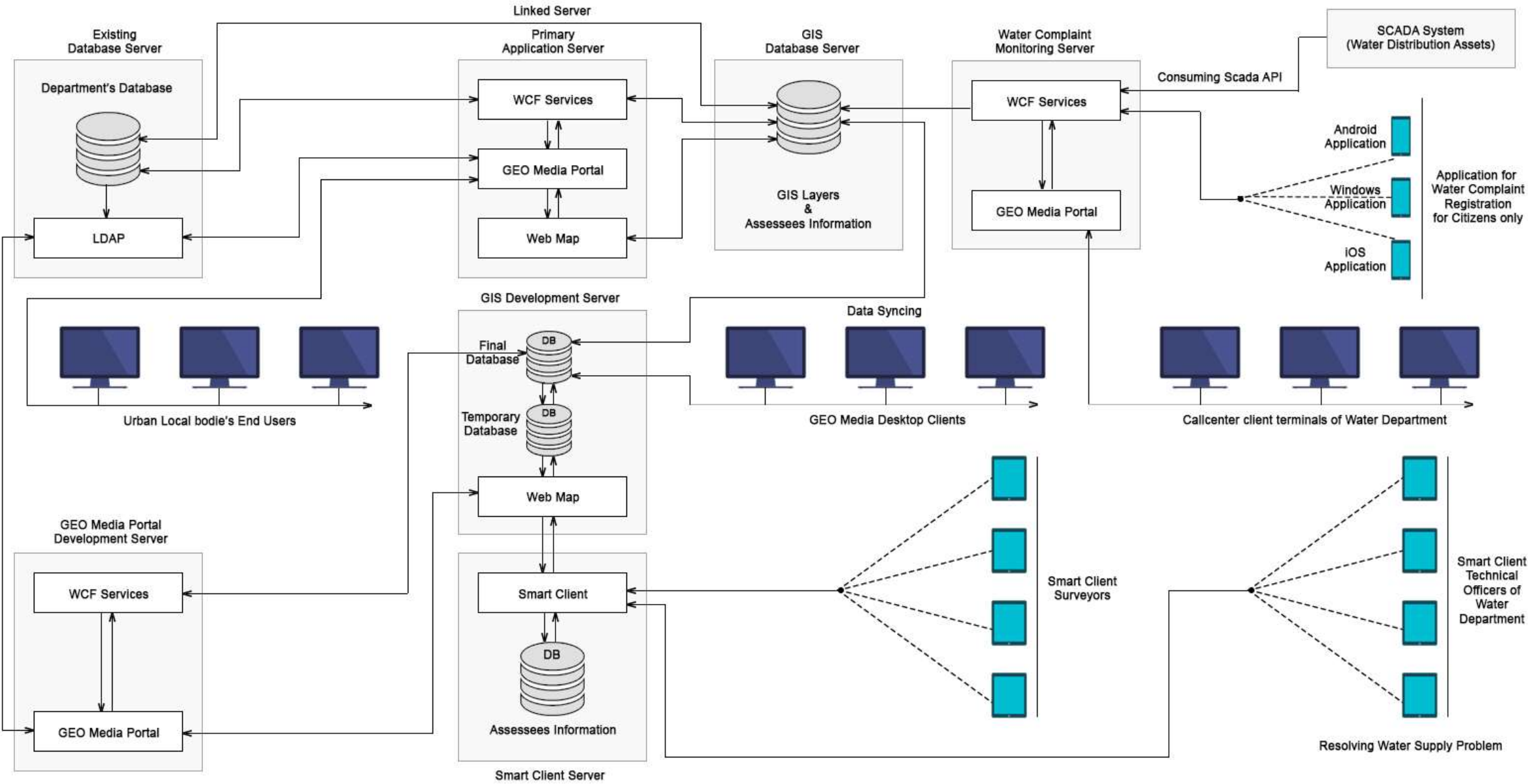
Customer Service System

- Communication with customers
- Billing
- Customer complain management

Training & Technical Support System

- Centralized education center
- Decentralized Technical Support

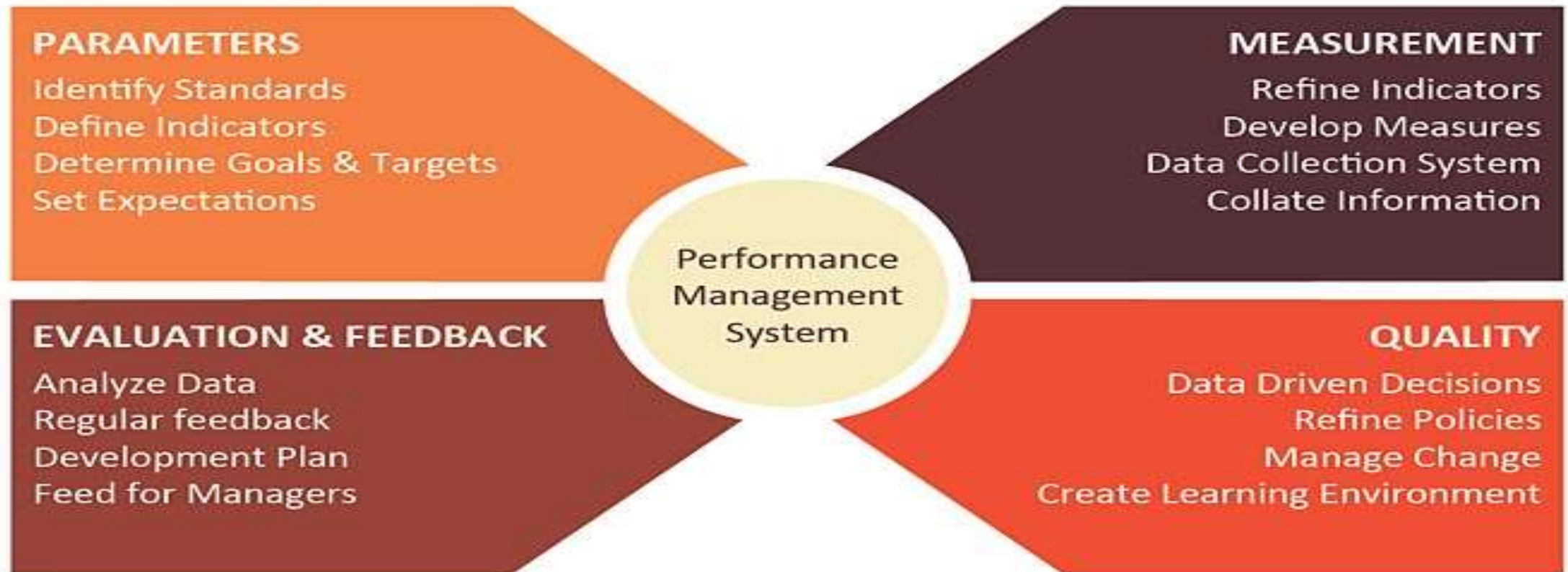
System Architecture





Performance Management

Performance Management System



Single User Interface ADMS

INSERVICE USER INTERFACE

Manage the distribution network	OUTAGE MANAGEMENT <i>Operators</i>	<ul style="list-style-type: none"> ■ Outage prediction, prioritization and restoration planning ■ Outage statistics, IEEE indices calculations and reliability reporting ■ Smart meter validation, restoration verification, last gasp processing 	Trouble Analysis, I/AMI, I/Call, I/Work, Portal
	MOBILE DISPATCH <i>Dispatchers</i>	<ul style="list-style-type: none"> ■ Manual dispatch of same day work assignment of future work ■ Vehicle tracking using GPS information from AVL ■ Mobile dispatch for outage and non outage work orders 	Core CAD
Analyze and Optimize the distribution network	DISTRIBUTION MANAGEMENT <i>Operators</i>	<ul style="list-style-type: none"> ■ Modeling real time operational conditions such as temporary cuts, jumpers, abnormals, keeping prediction model accurate ■ Ad hoc and planned switching with simulation, approvals, logging ■ SCADA integration with ability to issue supervisory control commands ■ Alarm management for digital and range values with event creation ■ Visualization of d flow, distribution state estimation calculations ■ Fault location, fault isolation service restoration ■ Optimization of network ■ Device tagging for clearances, grounding, work protection ■ dynamically generated schematics 	I/SCADA,,

Advanced Distribution Management System Solution

The screenshot displays the ETAP 16.0.0 software interface, which is used for advanced distribution management. The interface is divided into several key sections:

- System Manager (Left Panel):** A tree view showing the hierarchy of components. Under "One-Line Components", there are sub-categories for "Components" (including AC Composite CSD, AC CSD Contact, AC CSD Control Cable, AC CSD Devices, AC CSD Push Button, AC CSD Wires, Battery, Bus - 22, Bus Duct, Cable, Capacitor, Charger, Circuit Breaker, HV - 1, Circuit Breaker, LV, Composite CSD, Composite, Motor, Composite, Network-Contactor, CSD Contact, CSD Contact, Macro-C, CSD Control Cable, CSD Devices, CSD Push Button, and CSD Wires) and "Distribution Components". Below this are sections for "Multi-Dimensional Database" and "Rules & Libraries".
- Map View (Top Left):** A detailed network diagram showing a complex web of distribution lines in various colors (red, green, blue) overlaid on a Google Map. Labels include "MUDA Sports Ground" and "Low Level Water Distribution Tank".
- Google Map for CAD (Top Right):** A standard Google Map view showing the geographical context of the network. It includes a search bar, navigation controls, and a "Synchronize with CAD Map" button.
- Dispatched Events/Work (Bottom Center):** A table listing various events and work orders. The table has columns for "All Crews", "Trouble", "Switches", and "Service".

Unit	Info	Type	St	# DA Events	Time	EWT	Event No	Event Type	Ev Subtyp	Locati
NALLES	CRW	AV	0	208	000					
ALBANCKER	SMAN	AM	0	208	000				Service Center	
LACHP	SMAN	AM	0	208	000				DNE Service Center	
HACKENNEY	SMAN	AM	0	208	000				DNE Service Center	
PITANDM	SMAN	AV	0	208	000				DNE Service Center	
MOONGLAZZ	SMAN	AV	0	208	000				DNE Service Center	
SKORABE	SMAN	AV	0	208	000				DNE Service Center	
VALLGHART	SMAN	AV	0	208	000				DNE Service Center	
WELLSHO	SMAN	AV	0	208	000				DNE Service Center	
WINGDA	SMAN	AV	0	208	000				DNE Service Center	
BUTLERD	SMAN	AV	0	208	000				DNE Service Center	
REITORS	SMAN	AV	0	208	000				DNE Service Center	
MORCHAMIS	SMAN	AV	0	208	000				DNE Service Center	
- Event List (Bottom Right):** A table listing specific events with columns for "Event", "Type", "Subtype", "Priority", "Location", and "Agency Group".

Event	Type	Subtype	Priority	Location	Agency Group
1000008	PUS	CONTRAM	4	0164212528.0003000782.390:000078-0019021 Francis Ave Sweetwood D:20415839	MTN DNE
1000006	PUS	PREDICT	5	0164009385.12038100964480:020981-004324W of Darrington IS of Feig35402324	MTN DNE
1000048	UTM	PREDICT	7	0164009498.3403619073.22014009483-36196990201 GARLAND RD:51626238	MTN DNE
1000043	OTM	PREDICT	7	0164019578.0403612964.950:000687-002863324 8 VTH DR:120710	MTN DNE
1000024	SER	PREDICT	8	0164012416.2563617709.620:04007E-001269410 Herkesea dr:1225987	MTN DNE

“THANK YOU”