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Advancements, Optimization and Sustainability for a long-term AMI Vision

Adnan Ali Sheikh

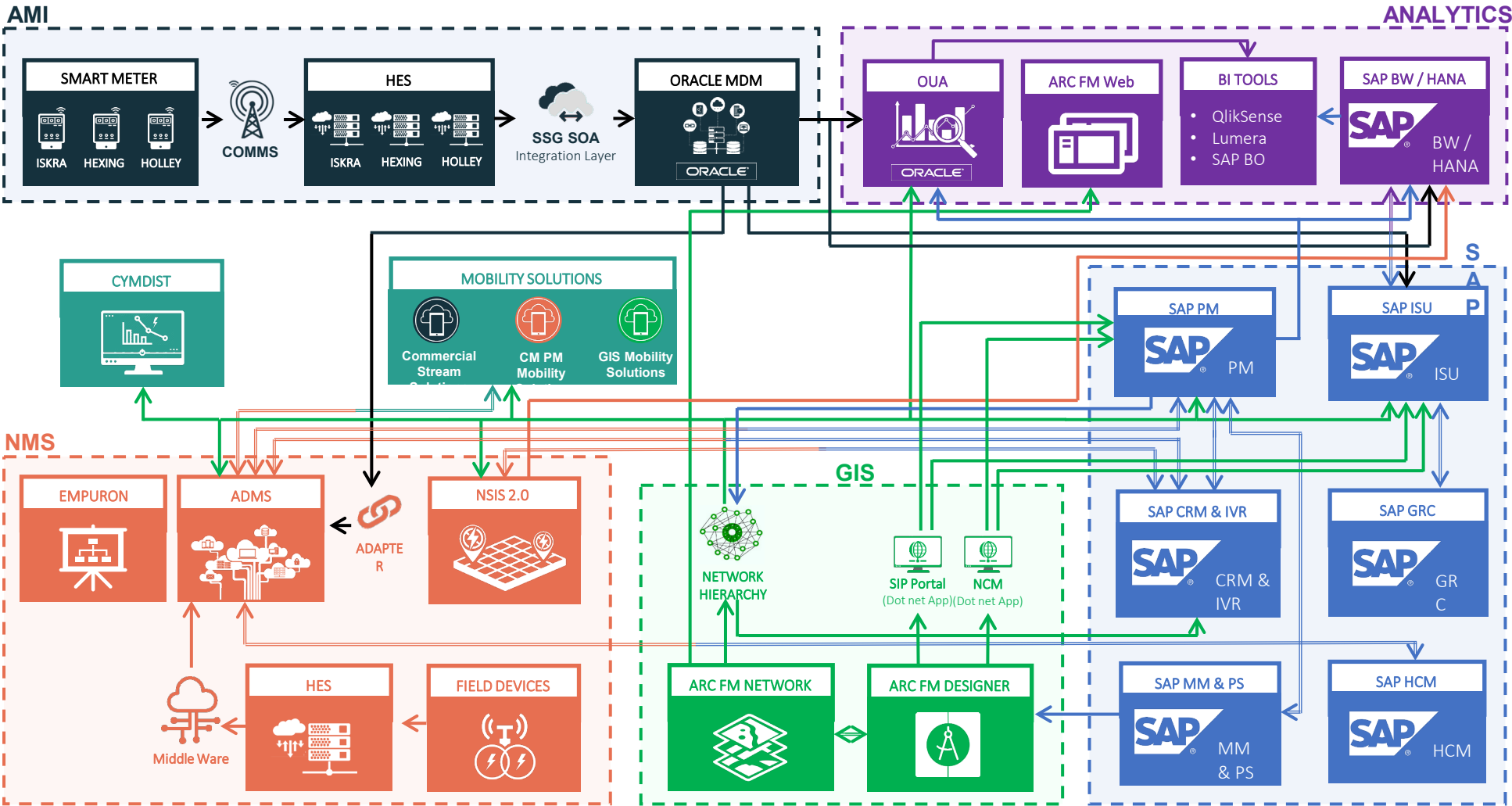**Lead AMI department, K-Electric**

Current Core Benefits of AMI

- Seamless & Automated Billing

- AT&C Loss based on Feeders' Smart Meter Data

- Net Metering

- Overloading & Unbalancing Analysis of PMTs

- On Demand Meter Read

- HT-Loss Calculation

- Reliability Indices (SAIDI, SAIFI, CAIDI)

- Energy Accounting till PMT level

- Calculation of D-Loss on PMT Level

- SIPs based upon Smart Meter Data

- Asset Life Enhancement by proactive PM based on Smart Meter Data

- Network Health Analysis based on Grid Parameters

- Historical Outage Reports

- Revenue Protection via theft/meter Discrepancy Detection

- Prepaid Metering Solution

- DIN Rail Metering Solution

BIG PICTURE - COMPREHENSIVE TECHNOLOGY LANDSCAPE

AMI
- SMART METER
  - ISKRA
  - HEXING
  - HOLLEY
- COMMS
- HES
  - ISKRA
  - HEXING
  - HOLLEY
- SSG SOA Integration Layer
- ORACLE MDM

ANALYTICS
- OUA (ORACLE)
- ARC FM Web
- BI TOOLS
  - QlikSense
  - Lumera
  - SAP BO
- SAP BW / HANA — BW / HANA

SAP
- SAP PM — PM
- SAP ISU — ISU
- SAP CRM & IVR — CRM & IVR
- SAP GRC — GRC
- SAP MM & PS — MM & PS
- SAP HCM — HCM

CYMDIST

MOBILITY SOLUTIONS
- Commercial Stream Solution
- CM PM Mobility
- GIS Mobility Solutions

NMS
- EMPURON
- ADMS
- ADAPTER
- NSIS 2.0
- HES
- FIELD DEVICES
- Middle Ware

GIS
- NETWORK HIERARCHY
- SIP Portal (Dot net App)
- NCM (Dot net App)
- ARC FM NETWORK
- ARC FM DESIGNER

USE CASES

- Smart Metering; Net Metering; DIN Rail; Prepaid Metering
- Auto Billing
- Single source of truth for electrical network
- Provide network hierarchy to KE enterprise systems
- AMI Analytics
- Cross Platform Reporting and Analytics
- Distribution Operations Management Platform
- Customer Relations Management/Interactive Voice Response
- Auto Event Generation in ADMS based on CRM/IVR
- Auto Workorder/ Notification based on ADMS Events
- Auto Workorder/ Notification based on CRM/IVR Tickets
- Realtime field information from SCADA to ADMS
- Employee data for Crew Management
- Meter data for network assessment and PSV Ping
- Mobile Meter Reading | SIR | FMR
- Map enabled Mobile Applications for Data Collection
- Workorders Status and Crews' location
- Crew tracking and Workorder Statuses
- Outage information for workorder creation
- Outage data for analytics
- NSIS' outage information for CRM/IVR
- Feeder Statuses
- Network Planning & BOQs
- Tracking of material with respect to the workorders
- Source of material information for GIS/Arc FM Designer
- Commissioning of network proposal to SAP-PM
- Consumer mapping information to ISU
- Accessibility of GIS network for End Users
- Simulation and Load flow studies
- Source of network diagram for CYMDIST
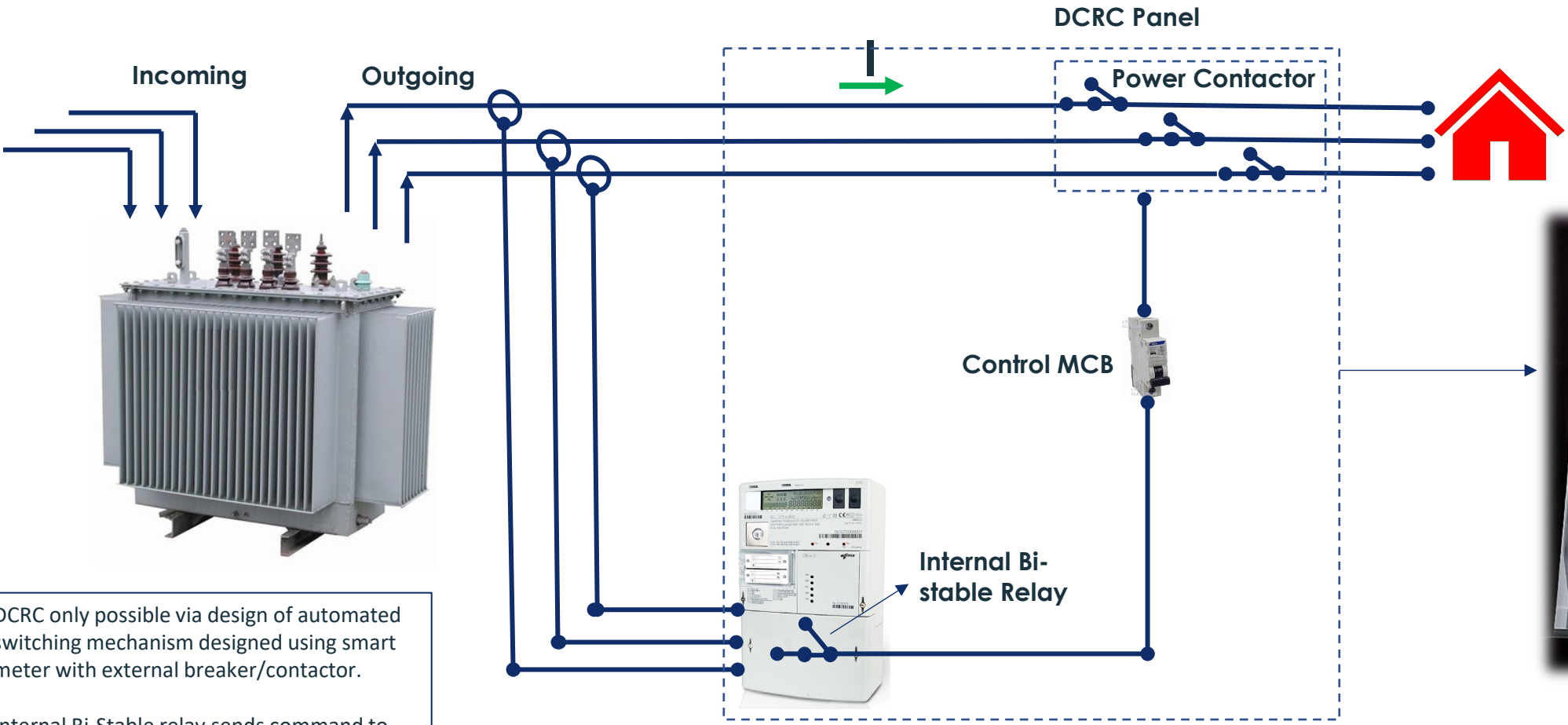- Governance, Compliance and Risk Profiling

Architectural Advancement- Universal Headend
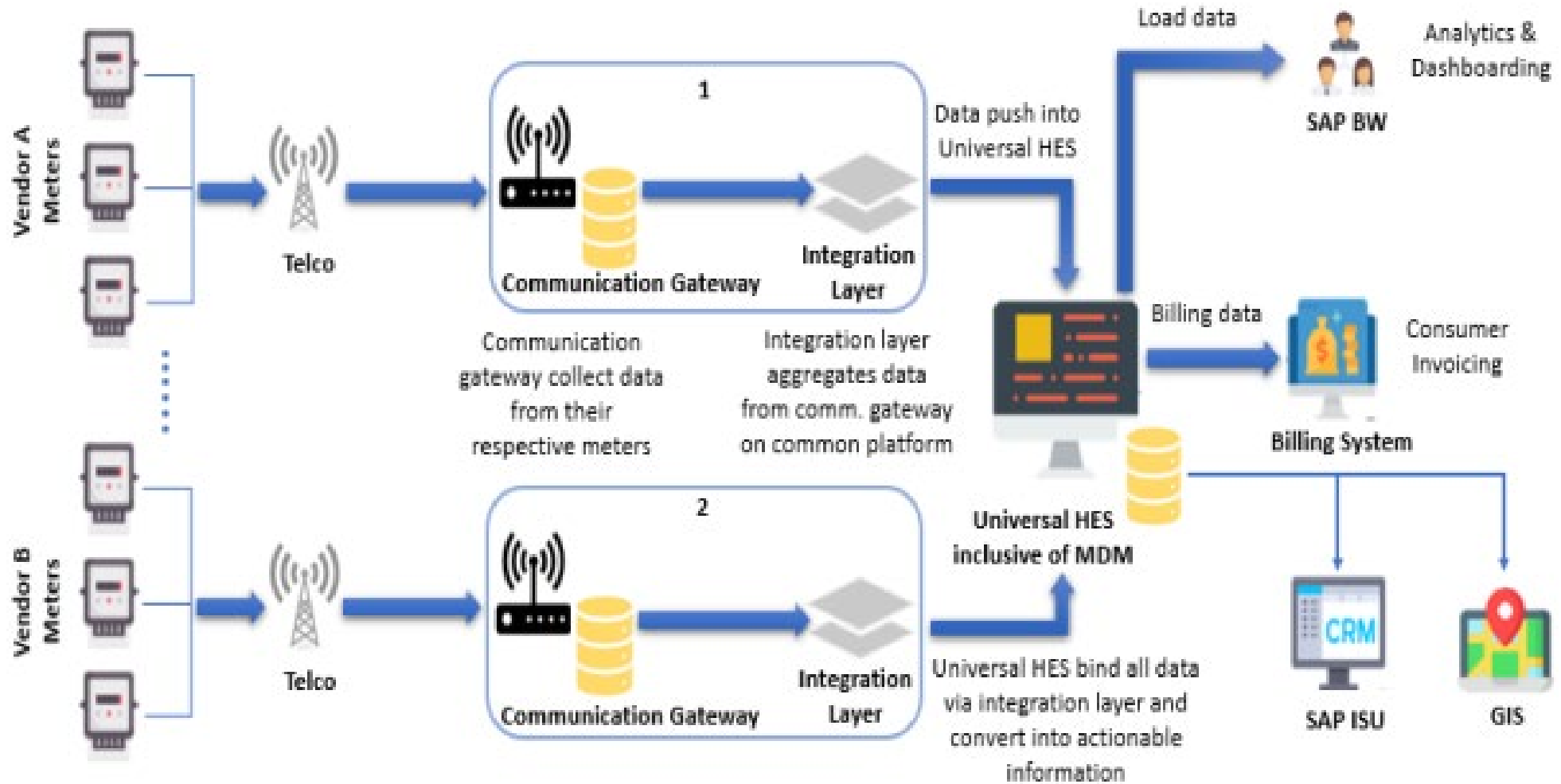
Metering Advancement- Pre-Paid System
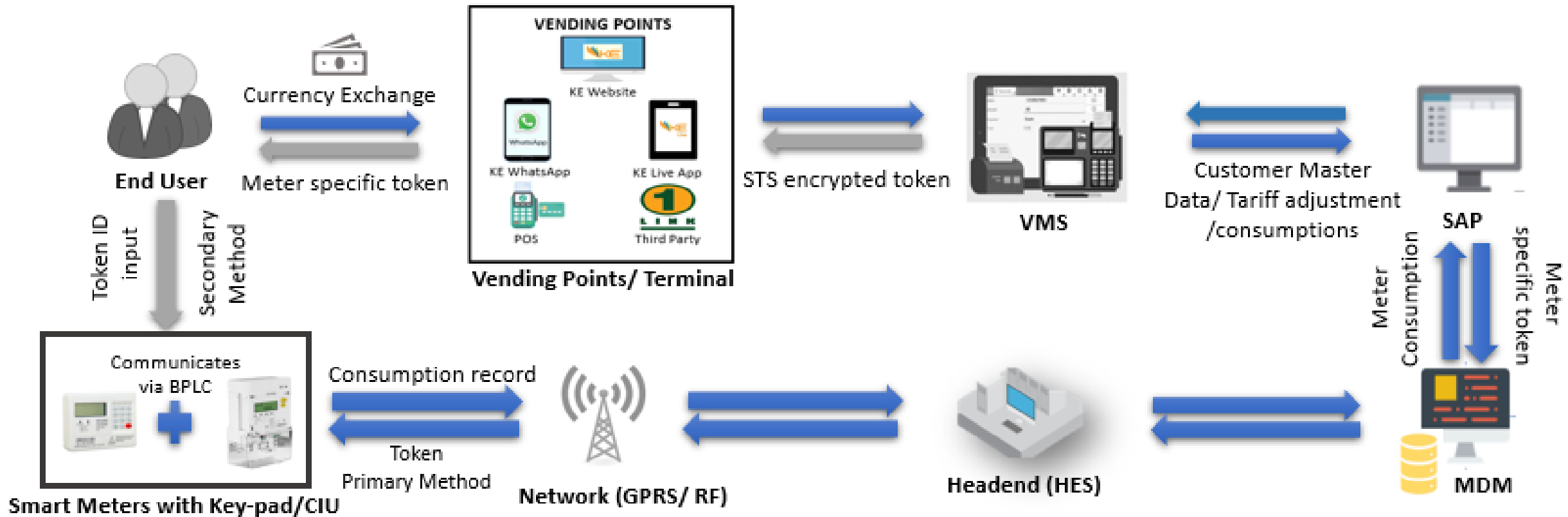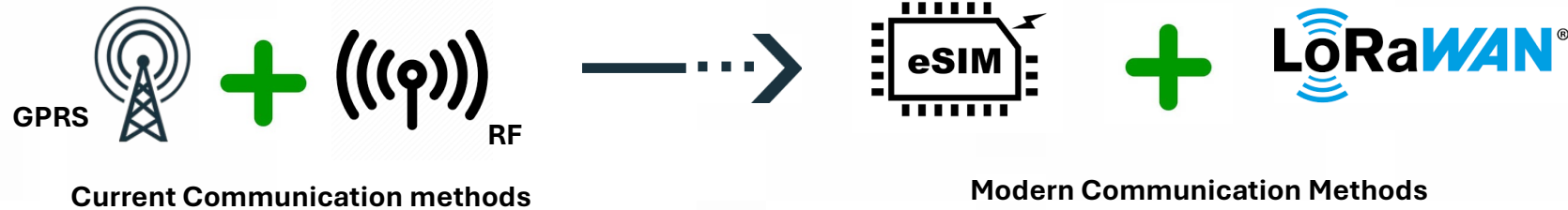
Technological Advancements- DCRC

DCRC Panel

Incoming   Outgoing   Power Contactor

Control MCB

Internal Bi-stable Relay

- ❑ DCRC only possible via design of automated switching mechanism designed using smart meter with external breaker/contactor.

- ❑ Internal Bi-Stable relay sends command to the power contactor via control MCB for switching operations.

- ❑ The above mechanism was designed as part of a DCRC panel with pilots undertaken in Society and Defence Cluster.

Remote Command from Head-End

Remote Command	Internal Bi-stable Relay	Power Contactor
Disconnect	Off	Disconnect
Reconnect	On	Reconnect

8th IERE Webinar on Advanced Metering Infrastructure (AMI)

Communication Advancements

GPRS + RF → eSIM + LoRaWAN®

Current Communication methods   **Modern Communication Methods**

Technology	Description	Advantages	Disadvantages
GPRS (General Packet Radio Service)	Utilizes existing cellular networks for data transmission.	- Widely available infrastructure - Mature technology	- Higher cost per transaction - Higher power consumption - Security concerns - Potential network congestion
RF (Radio Frequency)	Short-range wireless communication between meters and a collector within a specific area.	- Lower cost per transaction - Lower power consumption - Reliable within short distances	- Limited range - Requires denser network of collectors - Not suitable for large-scale deployments
LoRaWAN (Long Range Wide Area Network)	Low-power, wide-area network specifically designed for IoT devices like smart meters.	- Very long range - Low power consumption - Secure communication - Supports large numbers of devices	- Lower data rate compared to GPRS - Requires deployment of LoRaWAN gateways
eSIM (Embedded SIM)	A programmable SIM card embedded within the smart meter.	- Allows switching between different cellular network providers - Improved flexibility and roaming capabilities	- Requires E-SIM-compatible devices and infrastructure - Might have additional costs associated with E-SIM provisioning

Optimization

Communication KPI

Condense Communication tracking to N -1 from N-5 which is near real time
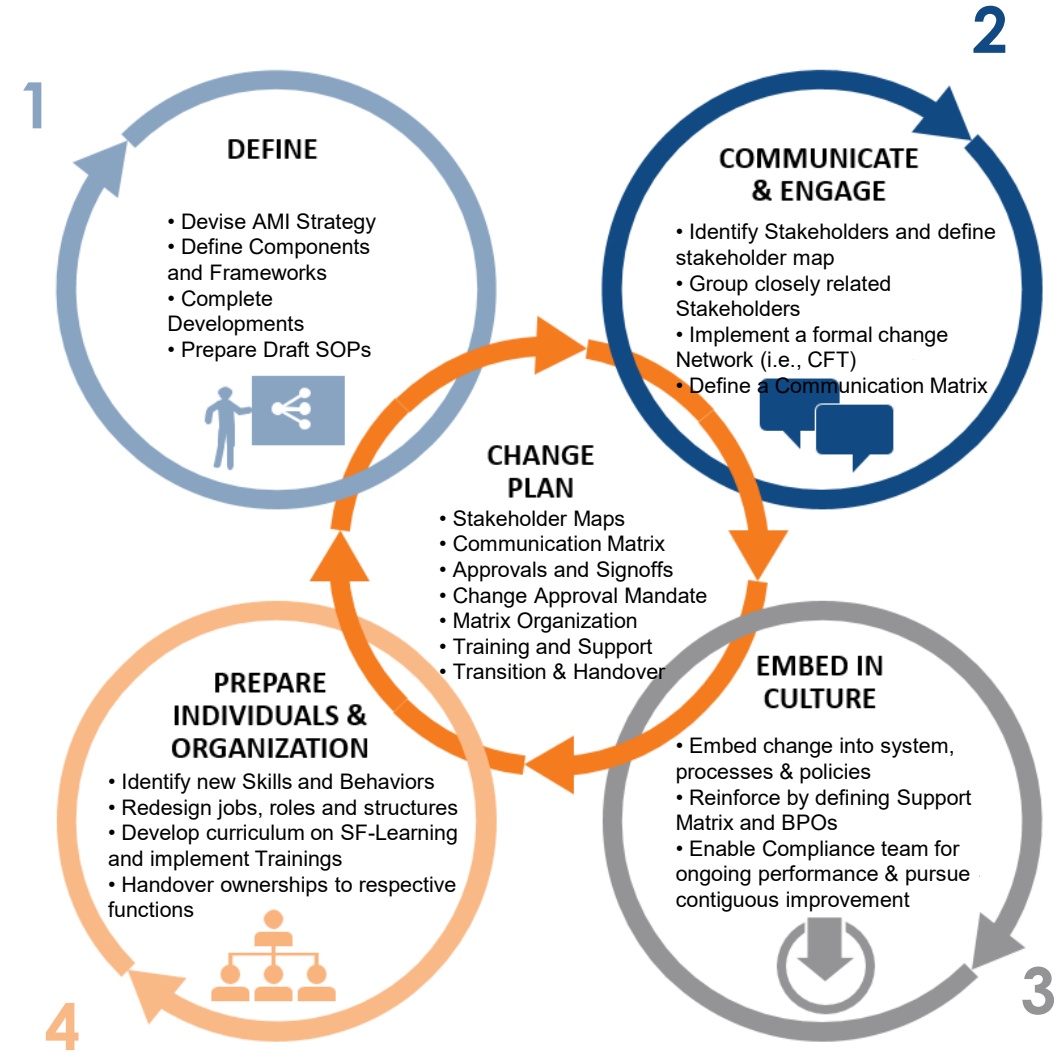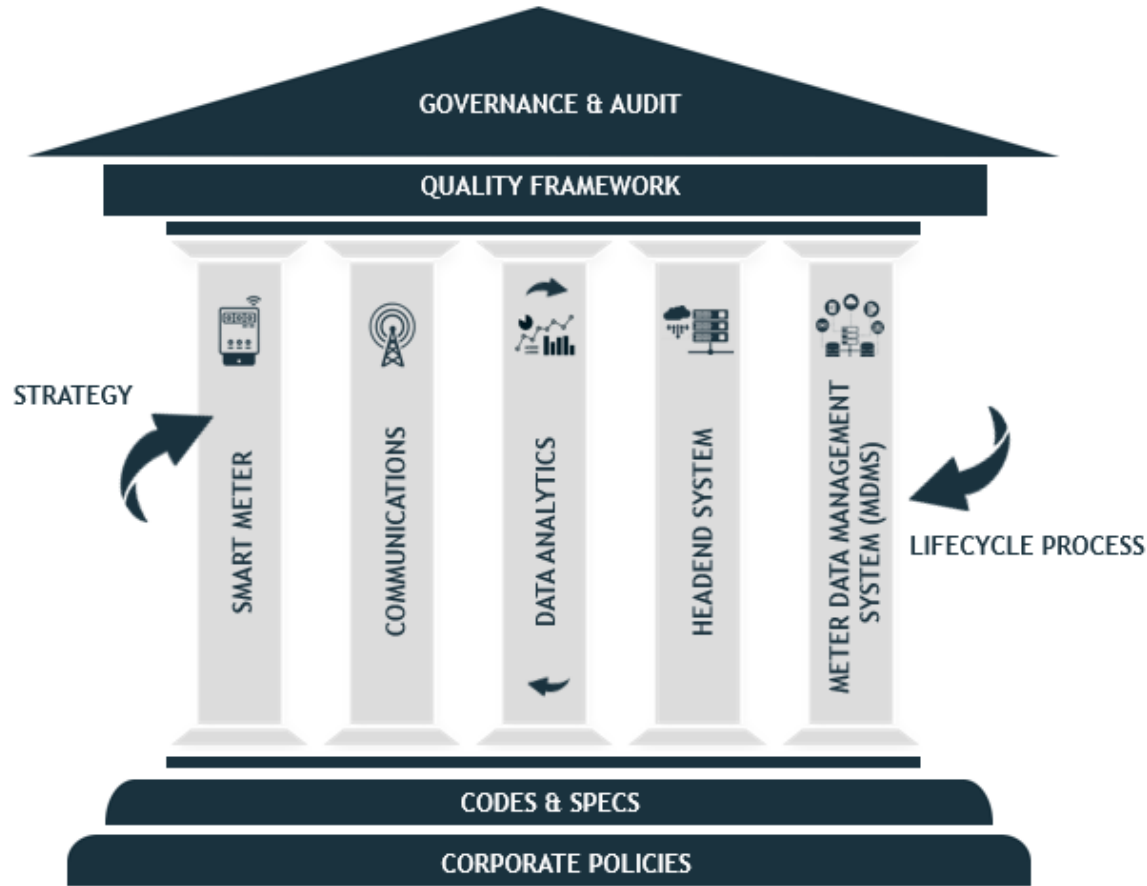
Latency

Improve data transfer speed and transfer rate from 20hrs/day to 5hrs/day.

Data Availability

Condense maximum data availability from N-4 to N-2 for the end-to-end cycle

AMI Sustainability

GOVERNANCE & AUDIT

QUALITY FRAMEWORK

STRATEGY

SMART METER

COMMUNICATIONS

DATA ANALYTICS

HEADEND SYSTEM

METER DATA MANAGEMENT SYSTEM (MDMS)

LIFECYCLE PROCESS

CODES & SPECS

CORPORATE POLICIES

1

DEFINE

• Devise AMI Strategy
• Define Components and Frameworks
• Complete Developments
• Prepare Draft SOPs

2

COMMUNICATE & ENGAGE

• Identify Stakeholders and define stakeholder map
• Group closely related Stakeholders
• Implement a formal change Network (i.e., CFT)
• Define a Communication Matrix

CHANGE PLAN

• Stakeholder Maps
• Communication Matrix
• Approvals and Signoffs
• Change Approval Mandate
• Matrix Organization
• Training and Support
• Transition & Handover

PREPARE INDIVIDUALS & ORGANIZATION

• Identify new Skills and Behaviors
• Redesign jobs, roles and structures
• Develop curriculum on SF-Learning and implement Trainings
• Handover ownerships to respective functions

EMBED IN CULTURE

• Embed change into system, processes & policies
• Reinforce by defining Support Matrix and BPOs
• Enable Compliance team for ongoing performance & pursue contiguous improvement

3

4

Sustainability

Self Sustainability
- This self-enhancement ensures the system's **longevity** and enables it to operate **autonomously.**

Close loop Governance
- The system is also observed in a **closed-loop environment**, it is tracked and **escalated** to all stakeholders, ensuring they work within the **Turnaround Time effectively**.

Operational Excellence
- **Operational excellence** aims to achieves new level of efficiency and **reliability**, ultimately benefiting both the **organization** and its **stakeholders** with AMI data.

DEMO

Thank You