ORGANIZER

ISGF India Smart Grid Forum

POWERED BY PARTNER

INVENTIVE®

DISTRIBUTION UTILITY MEET DUM 2024

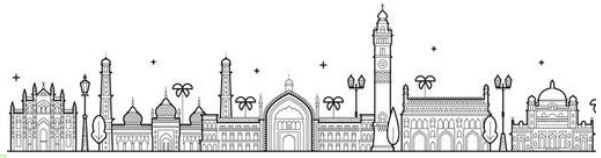
Session : LEVERAGING 250 MILLION SMART METERS TO DRIVE DIGITALIZATION OF DISCOMS

For efficient Utility management by

Data Analytics & Smart Applications

Presented By

Rajesh Bansal, Inventive Software Solutions Pvt Ltd.



About Us

> Inventive has unified stack of solutions having integrated tailored view for all the stakeholders such as consumers, utility companies, monitoring teams etc

- **Presence in 28+ Utilities**
- **More than 100 offices**
- **Monthly Consumer reach #15 Million**
- Workforce of **5000+ Employees**

We appreciate power of meter data. as We understand

- Country Mission
- How meter work
- Various meter data and Alert
- Utility issues, concerns and expectations
- Electricity consumers issues and expectations
- Distribution network operations
- Indian Electricity Act and various directive, gazette related to discom operations.

- **We ISSPL believes in Power of energy meter and energy meter data.**

- ISSPL services to Power utilities:
  - ❖ Meter data download system field services.– Develop special Android based Meter data download system. If no communication port, then develop tailor made OCR based system. If Smart Meter than provide HES and MDM services also.
  - ❖ Data analytics/ usage services: Our services include **AMI and Energy Analytics, Unified Billing system (both Prepaid & Postpaid), Meter Data Management, Theft Detection, Energy Audit, Notification for concern stakeholders – utility field staff and consumers for faster information and action.**

Indian meter data usage company for Indian Utility

Energy Analytics

Leveraging maximum benefits from Data

Inventive Minds at Work

An ISO Certified Company

ISO 9001:2015 | ISO/IEC 20000-1:2018

INVENTIVE® UGO ONE

India Mission - Role of Smart Meter

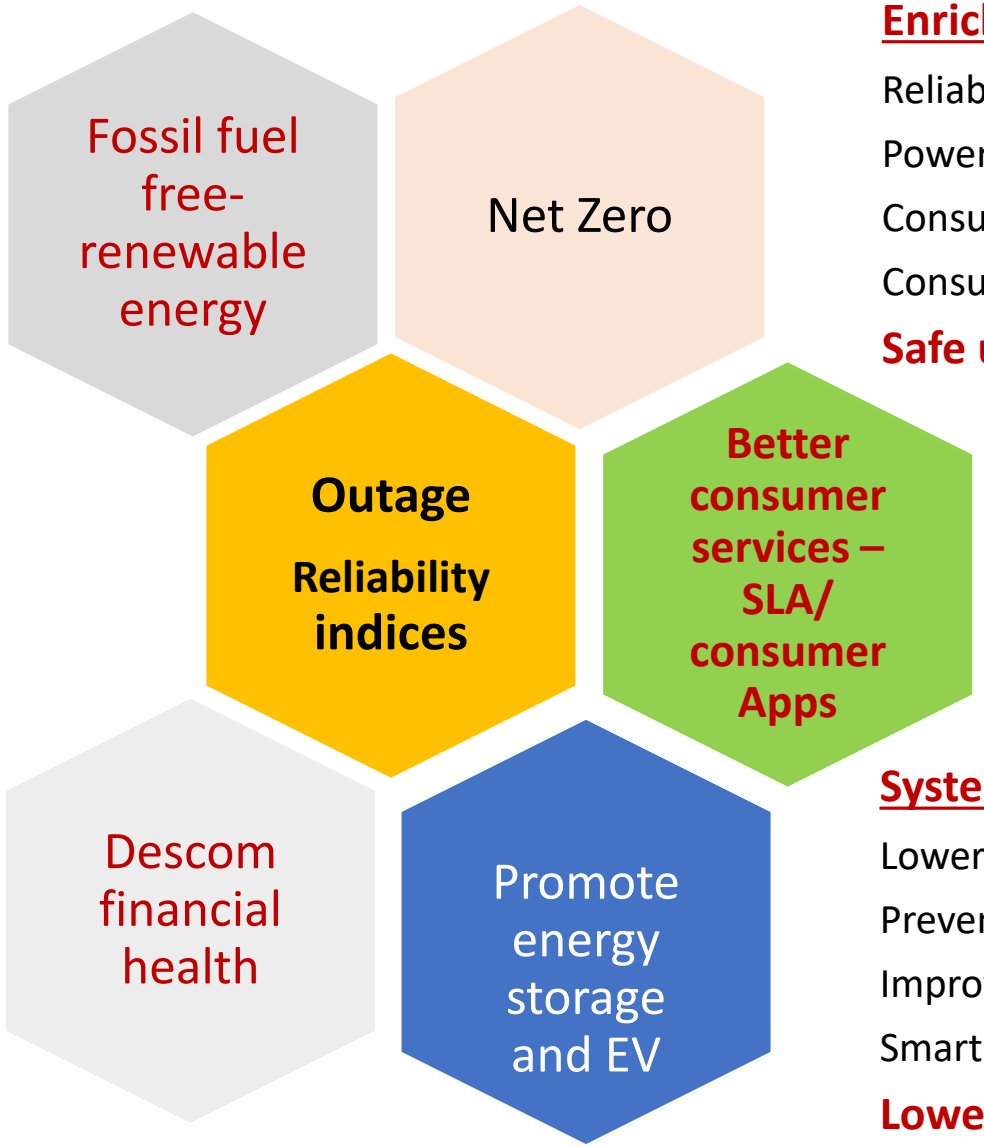
Net Zero

Reduce fossil fuel usage

More renewable energy

Electric vehicle

addressing- Unpredictability/ uncertainty.



Enrich consumer experience

Reliable Power - SLA

Power/ voltage quality

Consumer participation – roof top/ DSM

Consumer apps -- Efficient appliances

Safe usage / zero accidents

System efficiency

Lower loss – improve financial health

Prevent revenue leakage

Improve overall efficiency

Smart City/ smart Grid

Lower technical loss – network optimization

Role of smart meter ……

Smart meters empowers utility with Data and Alerts.

Need is to leverage maximum tangible and nontangible benefits from Data by improving Utility Key operation Area….

Network Optimization

1. Energy Audits reports
2. Network asset capability & loading Study
3. Network health monitoring.
4. Network optimization
5. Technical loss reduction – load balancing
6. Reactive energy control
7. **Smart Apps – involve field staff and faster corrective action**

Loss Reduction

1. Energy Gap/ loss analysis
2. Identify revenue leakage incidences & causes
3. Theft detection analysis
4. Recommendation on revenue leakage protection
5. Flexible tariff/ billing system
6. Social engineering
7. Improving collection efficiency

Demand curve manaegment

1. During peak demand
   - Low voltage, high outages issue
   - Higher Tech loss/ costly power
2. Reduce asset overloading . Peak management
3. Engage consumers - DR
4. **Manage batteries/ EV charging/ Noncritical load.**
5. **Reduce power purchase cost – avoid costly power**

Need is Smart usage of data for Smart Reports and to run smart Apps to maximum financial gains.

Addressing Electrical Abnormalities ……..

DISTRIBUTION UTILITY MEET DUM 2024 | ISGF India Smart Grid Forum

"Electrical Abnormality"

Loading Pattern, network capabilities, defects in workmanship, faulty devises in network, abnormal Consumer behavior etc CAN AFFECT ELECTRICAL PARAMETER & PERFROMANCE OF NETWORK. Any event which can affect the electrical parameter to a level, or can affect the efficiency of network/ appliances/ asset performance or which can cause accident/ damage/ affect life to network assets or results in higher cost and thus **NOT ACCEPTABLE** *is called "Electrical Abnormality".*

Technical loss/ Network optimization :

Voltage drop - Low Voltage	**Phase Voltage unbalance**	**Voltage fluctuations**
Unbalance loading	Phase Load balance	Reactive energy flow
Asset failure – higher outage	**High loss during peak**	**Underutilization of Asset – high CAPEX**

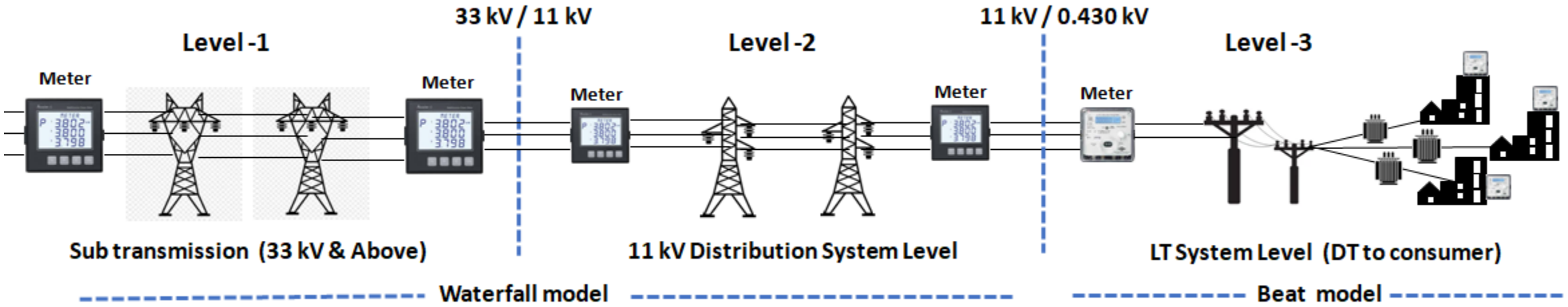
Technical loss Reduction :

Minimise voltage drop	**All DT/ feeder/ phase has balance load**	**Reduce reactive energy flow**

Technical loss Reduction Impact :

- **Lower loss spl during peak – Reduced power purchase cost**
- **Even distribution of load -- Less asset failure-- less Opex.**
- **Optimum network configuration No idle assets – lower Capex.**
- **Better voltage quality – improve gadget life/ performance**

Energy Audit as Various Level



Sub- transmission loss= [Mss – ∑(Mf + Mbc)]

Feeder system loss= [Mf – ∑(MDT)]

DT loss= [MDT - ∑(Md+Mc)]

Where,

Mss = Sub-transmission **33 kV feeder** meter reading
Mbc = Direct **Bulk consumer** meter reading
Mf = 11 KV **feeder** meter reading

Where,

Mf = 11 KV **feeder** meter reading
M_{DT} = **Distribution Transformer** meter reading

Where,

M_{DT} = Distribution Transformer meter reading
M_d = **Domestic consumer** meter reading
Mc = **Commercial consumer** meter reading

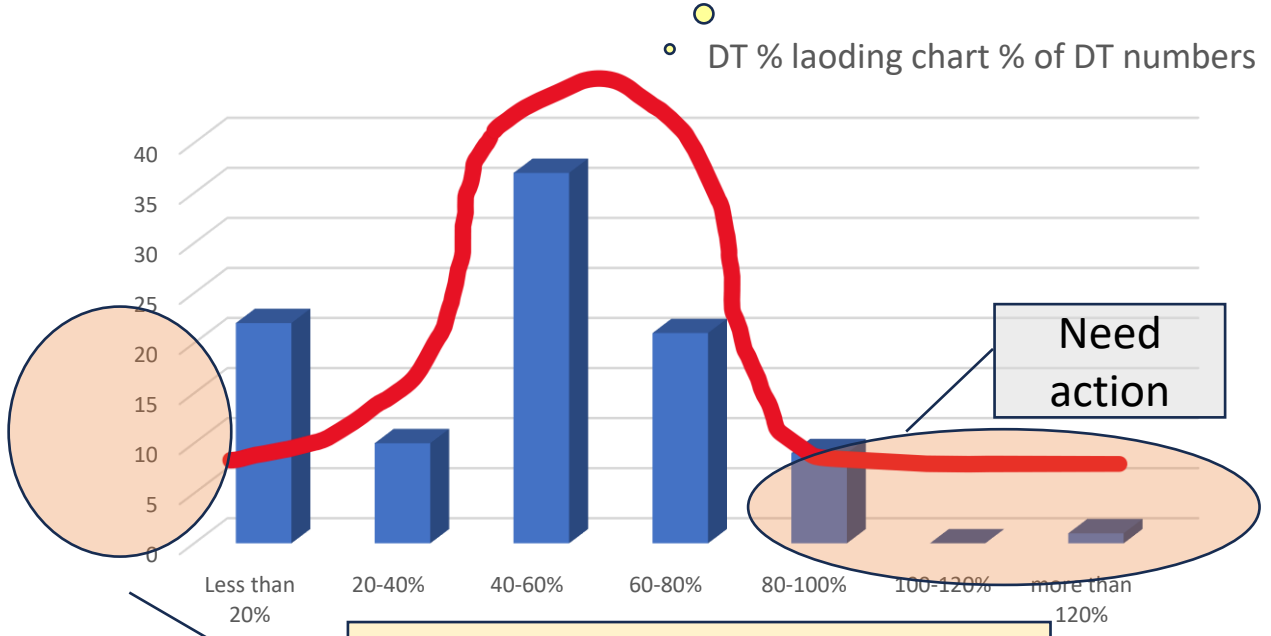
Smart - Applications

Inventive Minds at Work

DT % loading chart ..

Division Name	Total DT Studied	22/06/2022						
		0% to 20%	20% to 40%	40% to 60%	60% to 80%	80% to 100%	100% to 120%	Greater than 120%
2510 - ALAKNANDA	344	36	158	116	33	1	-	-
2511 - KHAN PUR	204	19	37	64	72	12	-	-
2520 - SAKET	837	285	315	150	71	15	1	-
2521 - VASANT KUNJ	567	209	193	102	48	12	2	1
2530 - NEHRU PLACE	322	40	185	92	5	-	-	-
2540 - NIZAMUDDIN	323	63	134	96	30	-	-	-
2541 - SARITA VIHAR	108	24	35	28	19	2	-	-
2542 - NEW FRIENDS CLY	295	74	84	78	48	10	1	-
2550 - R.K.PURAM	190	50	71	55	13	1	-	-
2551 - HAUZ KHAS	216	49	89	71	7	-	-	-
2610 - JANAK PURI	91	13	45	27	6	-	-	-
2620 - NAJAF GARH	436	108	117	128	62	21	-	-
2621 - JAFFAR PUR	16	2	1	4	6	3	-	-
2630 - NAGLOI	16	2	8	5	1	-	-	-
2631 - MUNDKA	363	89	82	94	58	29	6	5
2640 - PUNJABI BAGH	221	45	67	85	24	-	-	-
2641 - TAGORE GARDEN	31	2	13	13	2	-	-	1
2650 - VIKAS PURI	9	-	4	2	2	1	-	-
2651 - UTTAM NAGAR	8	-	5	2	1	-	-	-
2652 - MOHAN GARDEN	89	11	28	40	10	-	-	-
2660 - PALAM	23	3	5	10	5	-	-	-
2661 - DWARKA	618	434	114	38	26	6	-	-
Grand Total	5327	1558	1790	1300	549	113	10	7

Desired Distribution



Next step : plan action for both over & under -loading

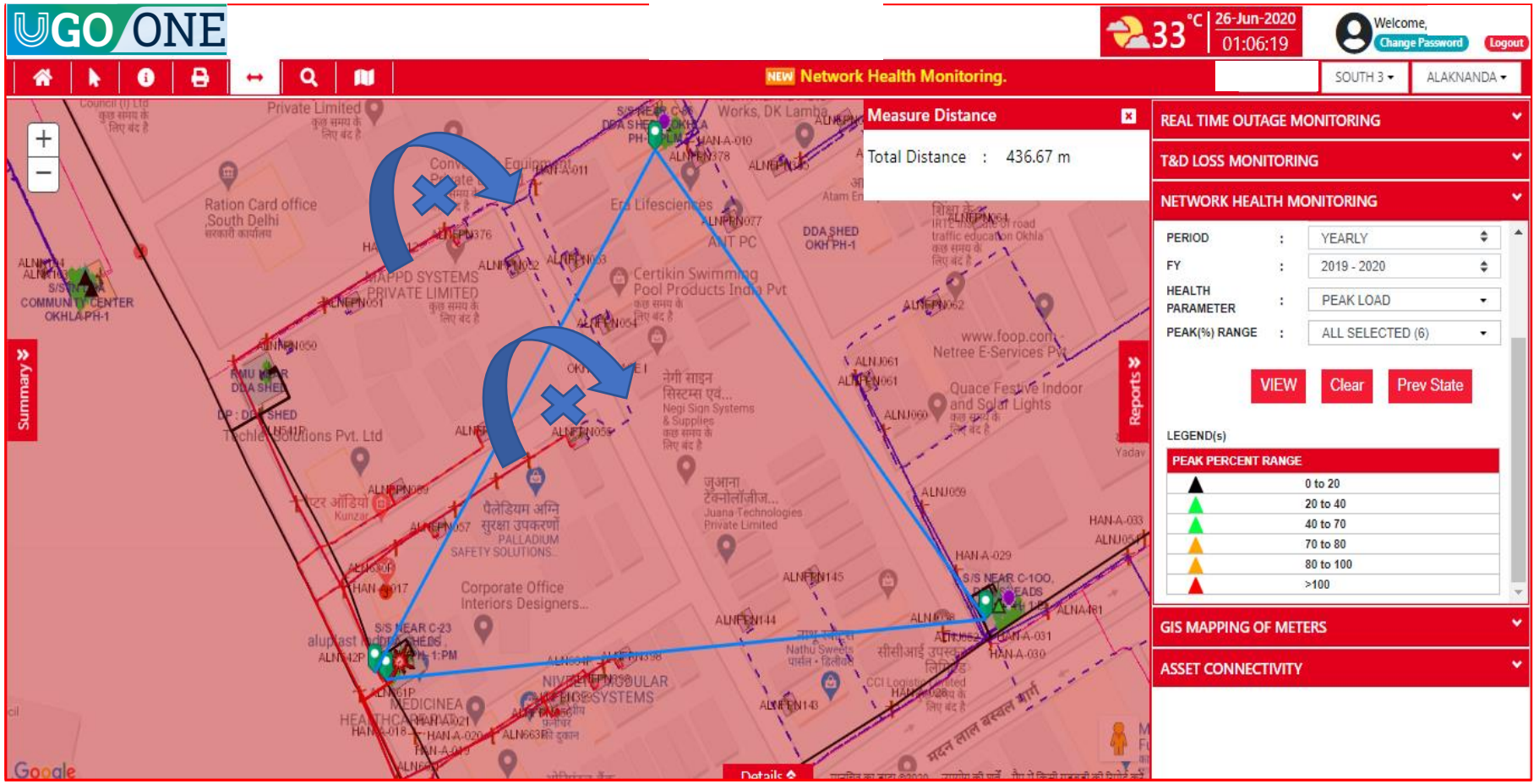
Avoid overload – less failure

Lower technical loss

Load balance

Better utilization

Smart Apps: handling unbalance loading



DT Mapping based on Peak Loading

DT selection for Load balancing

Individual DT info detail

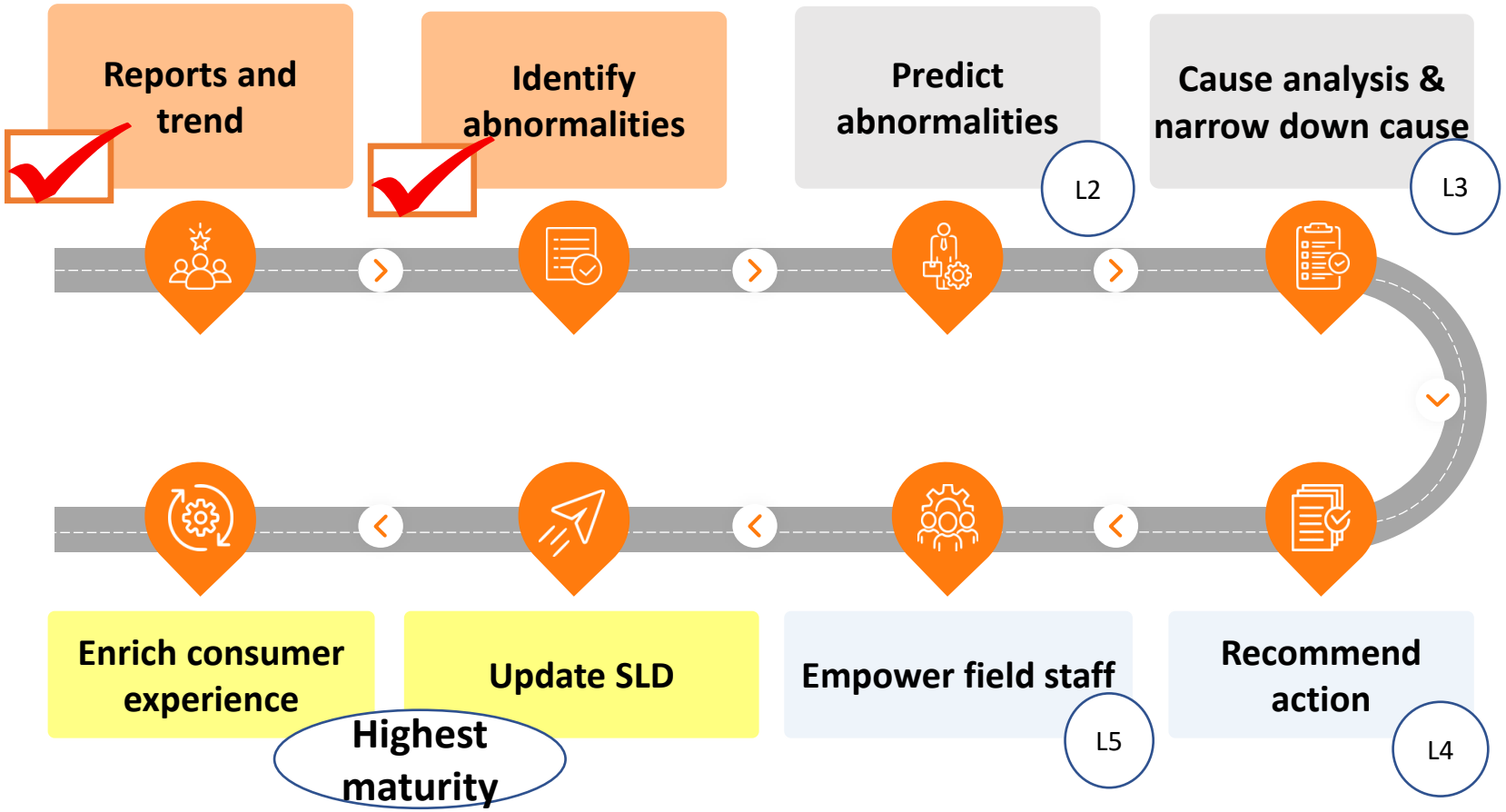
User defined Buffer Range around any Over-load DT and to find adjoining DTs

LT network connected among DTs are highlighted within that range

Nearest DTs can be selected based on distance for Load Balancing

Recommend proposed actions – to field staff .. Load transfer, new inter connector, DT interchange. … Faster/ lowest capex, efficient…… link with "**scheme module**"

INTRODUCTION



Smart meter empowers with online data

Online Data means instant action

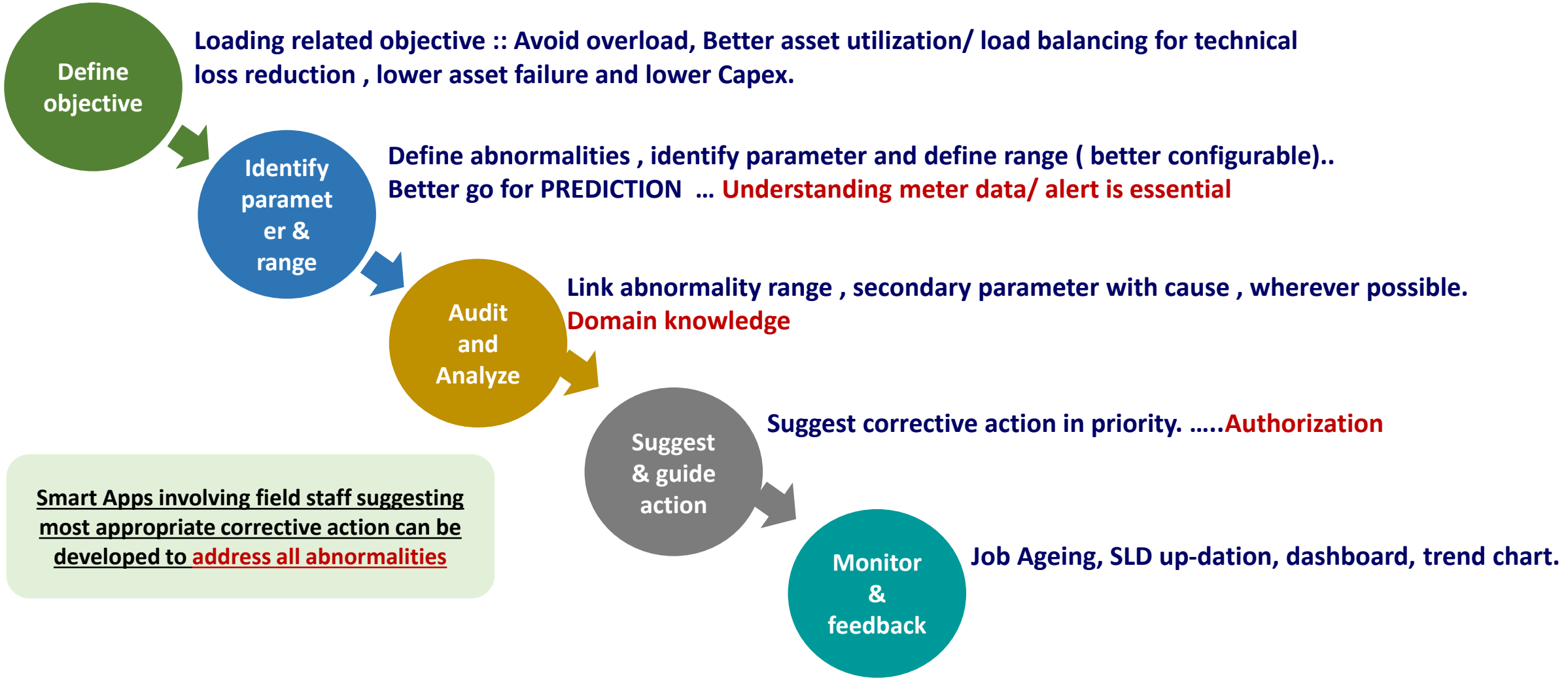
Leveraging gain – involve mass Data report beyond – CEO/ planning

Smart Apps for field force

End user is consumer – enrich his experience - sustainability

To leverage gain – need smart Apps

Smart Applications (Apps)



Smart Apps involving field staff suggesting most appropriate corrective action can be developed to address all abnormalities

Online voltage plotting- to know network health

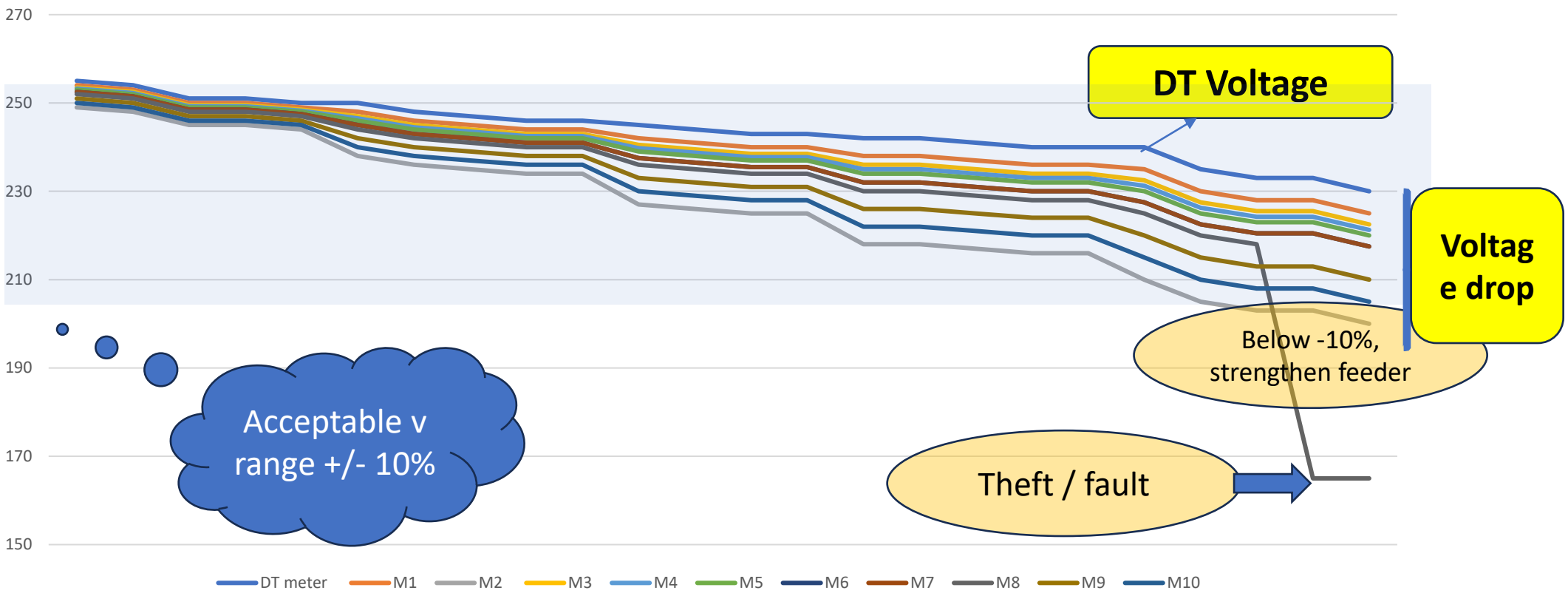
Voltage drop :

- Sudden drop – potential fault
- Large drop – stressed feeder
- Discreate consumer drop - theft

Voltage drop :

- Just by ensuring voltage in Vr +/- 10% , utility can reduce tech loss, failures and thus expenses.
- Better quality means gadget better efficiency/ lower bill

Study of Voltage - Plot Voltage of all meter of a DT including DT meter



High Voltage drop – high technical loss

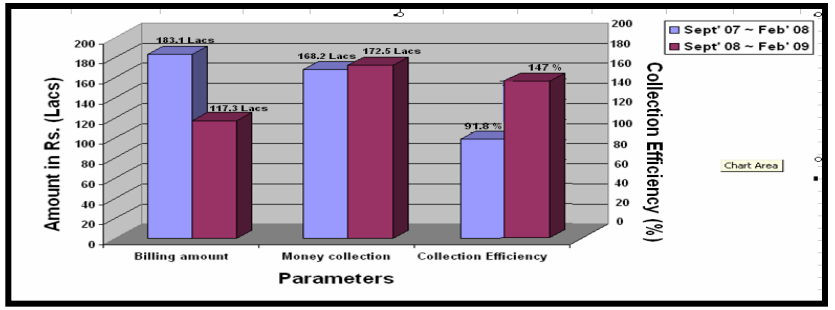
High Voltage drop – Chances of asset failure

Too much drop – loose joint/ fault OR THEFT

Wide voltage range – Need network replanning

Addressing Objectives – Smart Data Analytics

Enriching Consumer Experience.....



Consumer Notification Engine

Offers recommendations & alerts in form of app notifications on:

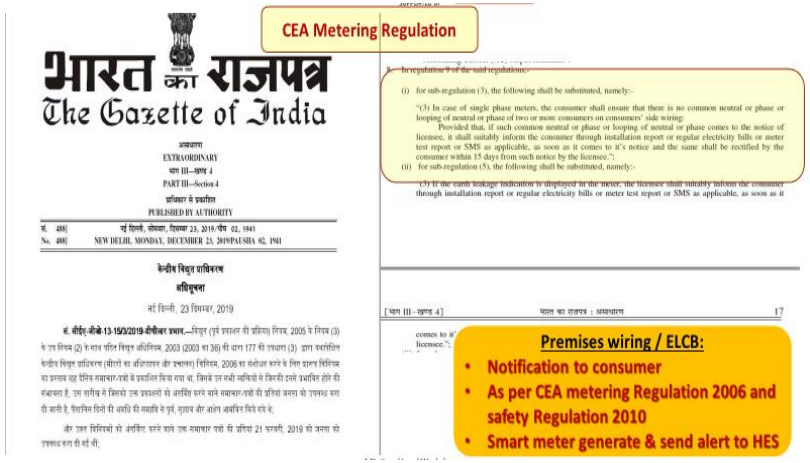
General nature :

- ✓ Bill & Payment related
- ✓ **Energy consumption & Demand**
- ✓ **Supply Outage**

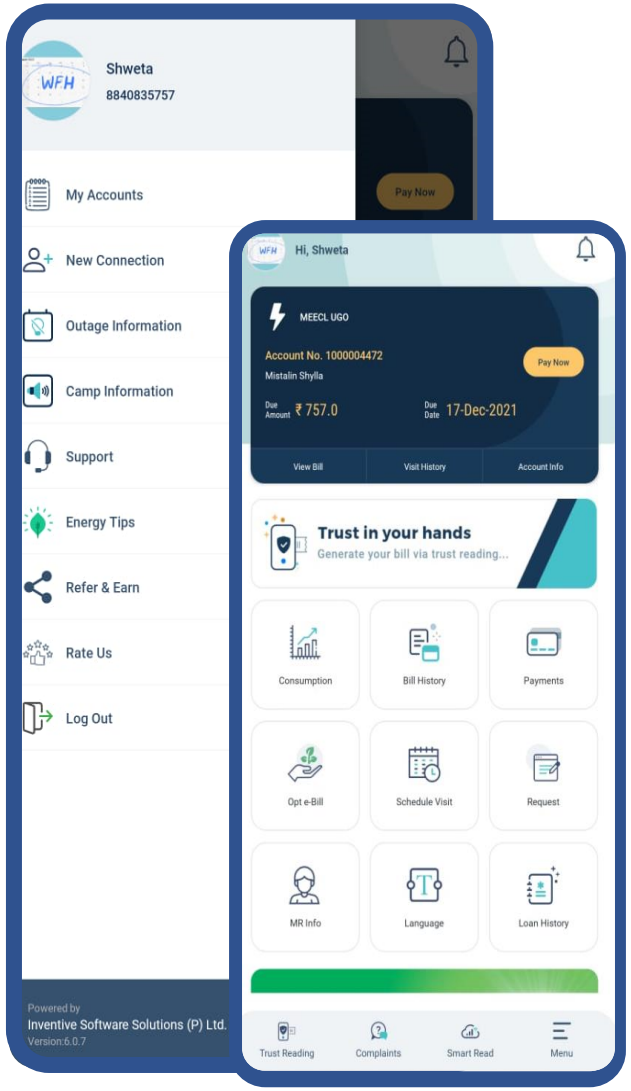
Specific nature :

- ✓ **House Wiring**
- ✓ **Safety and protection**
- ✓ Tampering & Theft alert
- ✓ Guidelines for savings **(Subsidy)**

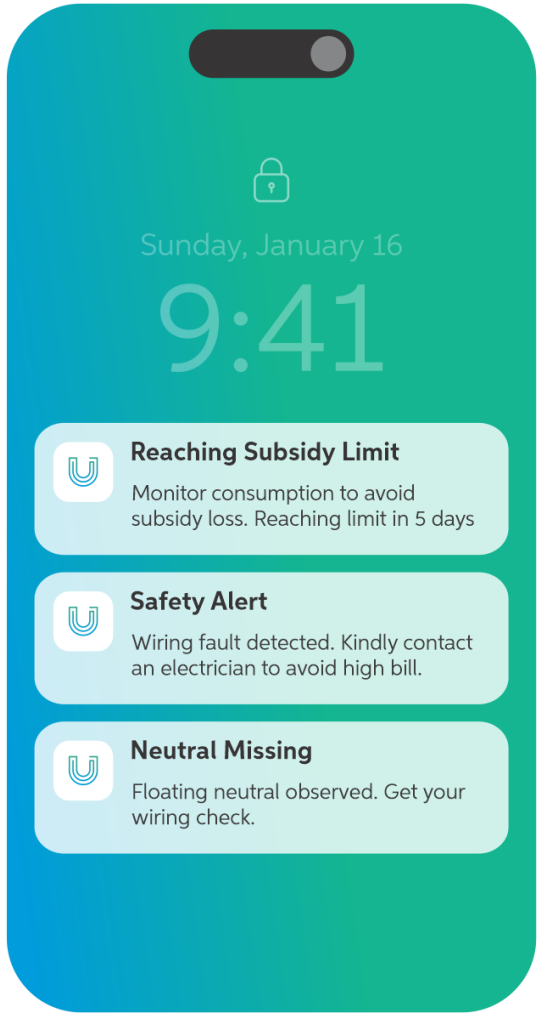
Compliance



Your DG set/ Battery inverter / Roof top generation is not isolated and observed feeding power at XX:XX hrs to grid. This can cause serious accident. Get your wiring repaired through license electrician in TT days and report.



Consumer Notification Templates



Safety Alert

At 18:15 hrs .. You seem to have switched ON xxxxxxx machine. It has leakage of current through its body and thus a potential safety risk.
Kindly get it checked by trained electrician.

Tamper Alert

Dear Customer, System has detected **B-Phase Missing** of Meter Number X012456 at your premises that is not allowed and may be penalize also can cause accident. Please get your meter inspection by certified electrician

Usage Alert Subsidy

Subsidy

In first 11 days you have consumed 75 units. Your Billing consumption is expected around 223 units.
To Avail Free electricity, ensure consumption within 200 Units.
You are suggested …. XXXXXXXXXXX

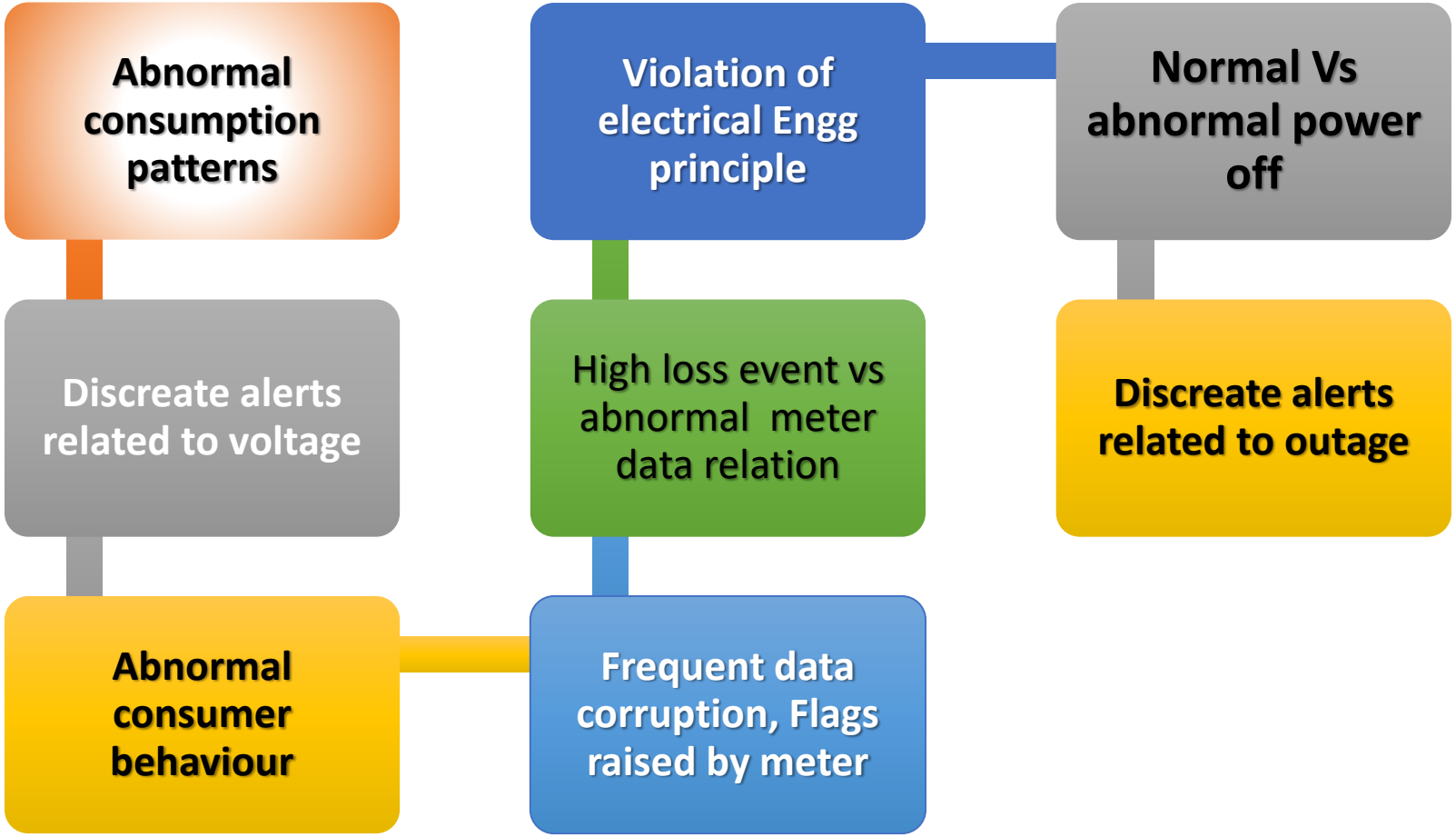
Outage Alert (MCB)

Imagine a consumer getting message on IVRS that " outage at your home " is due to fuse blown/ MCB tripping

Happy consumer – lower theft, lower accidents, engagement – DR/ DSM

AI/ML Use cases……

Theft happens only if something abnormal done with intention – under normal condition meter works OK

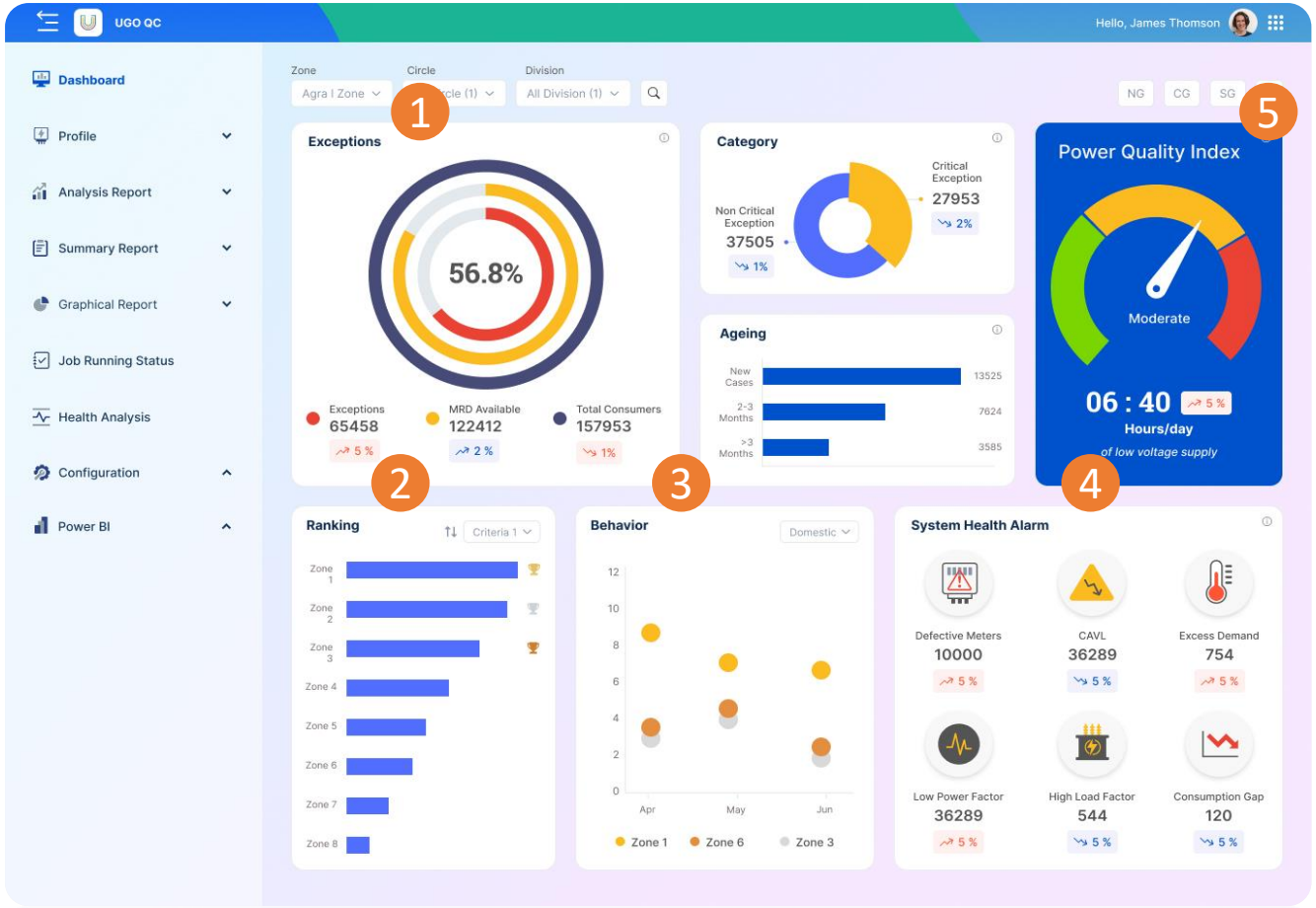


Using domain knowledge, defined logic, abnormalities due to theft can be detected – help to find method & evidence

Meter data & Theft Analytics

1. Emphasizing exception criticality and ageing.
2. Showcasing field monitoring & vigilance outcome.
3. Consumption pattern study to identify load enhancement areas.
4. Critical evaluation of network and asset health.
5. Assessing voltage supply reliability.

Prioritizing loss reduction and revenue protection



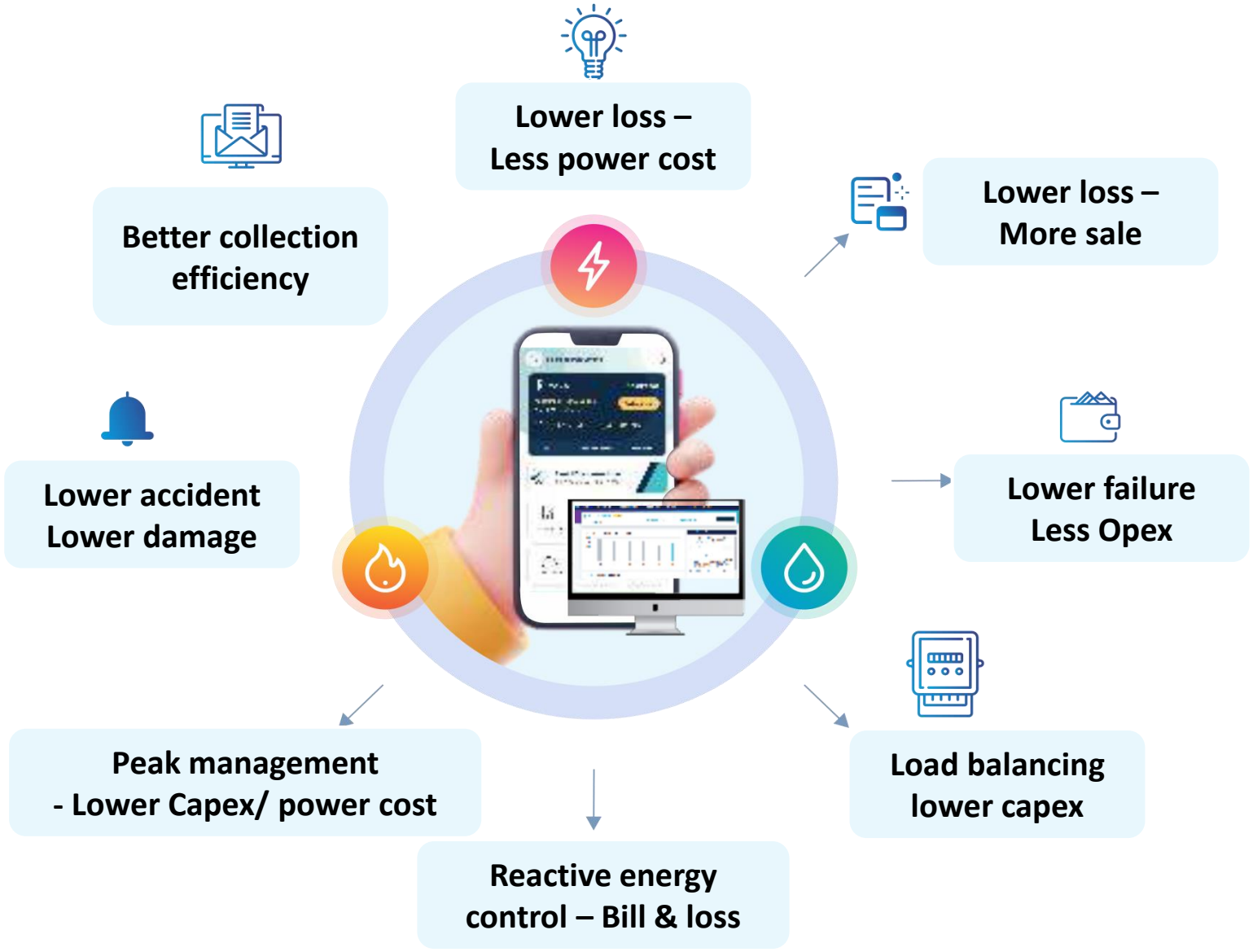
There are multiple theft detection platform/ service provider –**Key is whether they use smart meter capabilities or same analytics tool as used for static meters.**

Smart metering / smart Apps benefits

Non-Tangible

- **Power quality – gadget/ assets – lower failure higher efficiency**
- Lesser accidents – invaluable human life, less damage
- Enrich consumer experience – happy & engaged consumers
- **Reliable power – Mission NET Zero**

Think beyond prepaid, billing and theft, to ensure Positive ROI.



Tangible Benefits

Expense head	% Expense* (India Utility Avg for FY2018-19)	By Leveraging Tangible Benefits from Smart Meters	Remarks	Overall Impact**
Power cost	83%	T&D Loss Reduction	Target 8%. Impact depend upon present loss level	6 to 8%
		Technical Loss Reduction	Smart Apps for Network Optimization	1.5 to 5%
		Peak Power Cost	Peak Demand Reduction due lower technical loss(TL high impact during peak) By Consumer Engagement (DR/ToD) and better efficiency of consumer gadgets	
		Reactive Energy Penalty	Smart Apps for Reactive Energy Compensation	
		Better Forcasting & Scheduling	Smart Analytics on real time data	
O&M cost	6%	Lower Network Asset Failure Less Outages	Lower Technical Loss, Optimized Asset Loading, Network Health Monitoring (Predictive/Preventive)	2%
Finance cost + ROI	7%	Lower CAPEX/Deferment of CAPEX related to Network Lower Power Purchase	Optimum Utilization of Assets, Control over asset capacity Vs Peak Demand	1-2%
Employee cost	8%	Reduction due to lower Outages, no billing activity. However, Utility should divert the manpower for Smart Analytics, GIS, Planning, etc. Capacity Building Programs are required.		Nil
Depreciation	3%	-	-	Nil
Total	107%			90-96%

* Expense w.r.t. Income assuming 100%

** It may be noted that Income taken as reference will also increase

Figures can be varying a lot from Utility to Utility ,However gain in above heads are expected

Conclusion

Smart Metering system empowers the Utility with data & information. Utility can achieve lots of **Tangible benefits by adopting Smart Analytics, Smart Apps** and innovative methods to leverage maximum benefits.

Smart Apps are objective oriented, user friendly, provide end to end solution to all level of Utility employees and also to consumers. **Engagement of field staff and consumers is must.**

To address Utility challenges/ issues and expectations of various stakeholders, Utility **network should now be flexible, smart, configurable and mapped on GIS**. Smart Grid is essential.

India is moving towards **Fossil fuel free Renewable Energy, EVs, Rooftop Solar generation** (PM Surya Ghar). For smooth integration, monitoring and hassle-free operation smart metering is essential.

Net Zero is a very important mission for India. Various transformations and initiatives are expected.
For successful implementation, Smart Metering is must by 2030.

THANK YOU

Rajesh Bansal
Inventive software solutions Pvt ltd.

Mobile – 9350261602