



## Disruptive Technology in the Distribution Sector

19.11.2021



- **Artificial Intelligence and Machine learning**
- Robotic Process Automation
- Robotics , Drones , VR &AR

# NLP BASED MACHINE LEARNING MODEL @ ECARE



## INTELLIGENCE BUILT ON DATA

5 years of historical data has been leveraged to build an intelligence to auto categorize the email complaint and create interaction record in SAP CRM. The Ecare supervisor is not required to read all the inbound emails. ML model reads all inbound emails and place in different bucket and align it to Ecare agents.

## RESPONSE TIME REDUCTION

The type of machine learning used in this case is "Supervised machine learning" of type "Classification". With recent development, It effectively brought down the response time of replying to an email from 15 mins to 7 mins.



## COMPETITIVE ADVANTAGE

During the covid crisis, there were over 8 times more email complaint arriving at CRM every day. It was only with the help of AI/ML NLP based model, those mails could be auto segregated and made it possible to reply to consumer in bulk. It enabled us to keep this channel working. While the other utilities succumb to the unprecedented number of email complaints and stopped replying altogether to customer email queries.

# Sentiment Analysis using Big data Analytics for Customer's feedback through various platforms



Name	A	Primary Score	Receives	SMS Sent	Email Sent	People Connected	Responses	Response Rate %
City South		4.9	183	Invitations: 127 Reminders: 132	Invitations: 15 Reminders: 8	130	9	0.07
East South		3.9	1343	Invitations: 1034 Reminders: 1038	Invitations: 1 Reminders: 1	1034	87	0.08
West		4	1446	Invitations: 1018 Reminders: 1119	Invitations: 3 Reminders: 2	1029	68	0.07

How was your experience at the Customer Relationship Centre?



- Creating a system for analyzing all consumer feedback (verbatim, emotions) received through various platforms (PTF, VOC, Email, Social Media & through other channels)
- Identifying negative mentions about a Business or Service / events on social media platforms, Spotting angry consumers on the verge of starting a social media crisis
- Identifying positive users who, for example, are more likely to become our brand ambassadors
- Analyzing each & every rating submitted by the consumer under PTF for the subsequent questions & giving results in dashboard question wise, zone wise, rating wise etc.
- Save time and effort because the process of sentiment extraction will be fully automated.

# Sentiment Analysis using Big data Analytics for Customer's feedback through various platforms



## Big Data Analytics



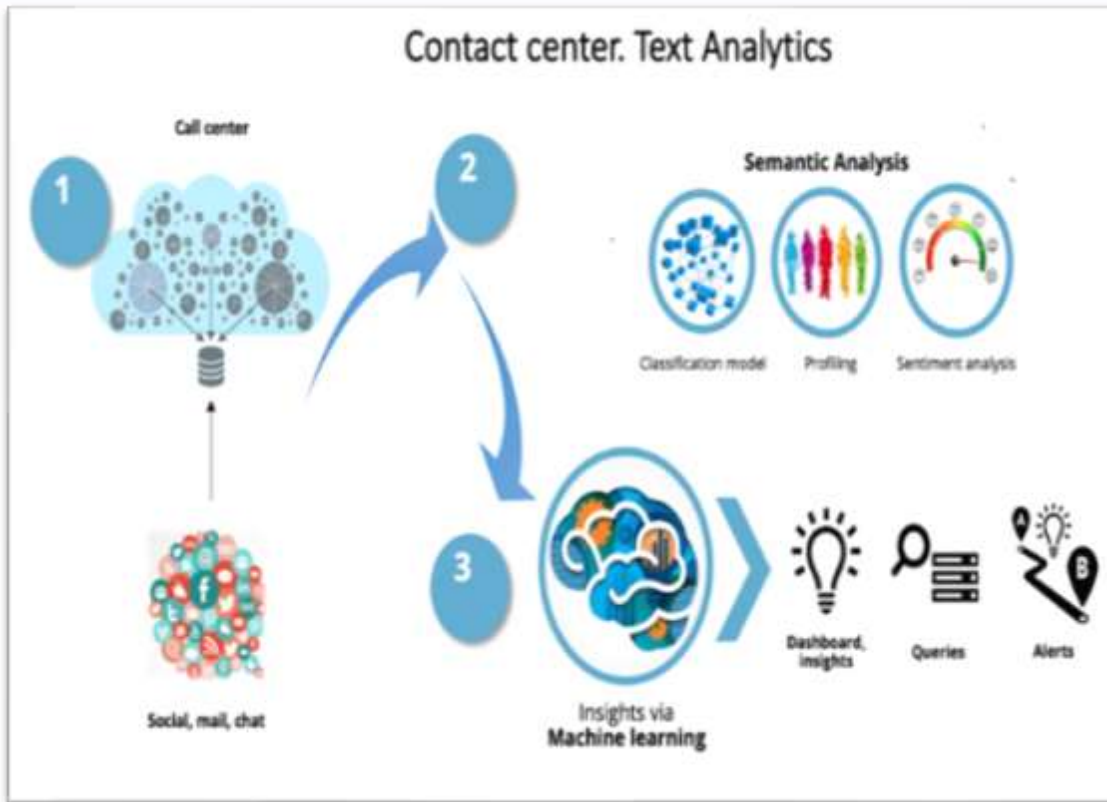
Study of Customer Sentiment using:

- Artificial Intelligence (AI)
- Natural language processing (NLP)
- Knowledge representation techniques (knowledge graphs)
- Machine Learning (ML)
- A single dashboard for Customer Sentiment

**1<sup>st</sup> Power  
Utility In  
India**

**E-mail Response Management System(ERMS) of Mumbai Distribution** already enhanced through AI-ML NLP having customer sentiment value captured – Positive, Negative & Neutral.

# Implementation Modalities



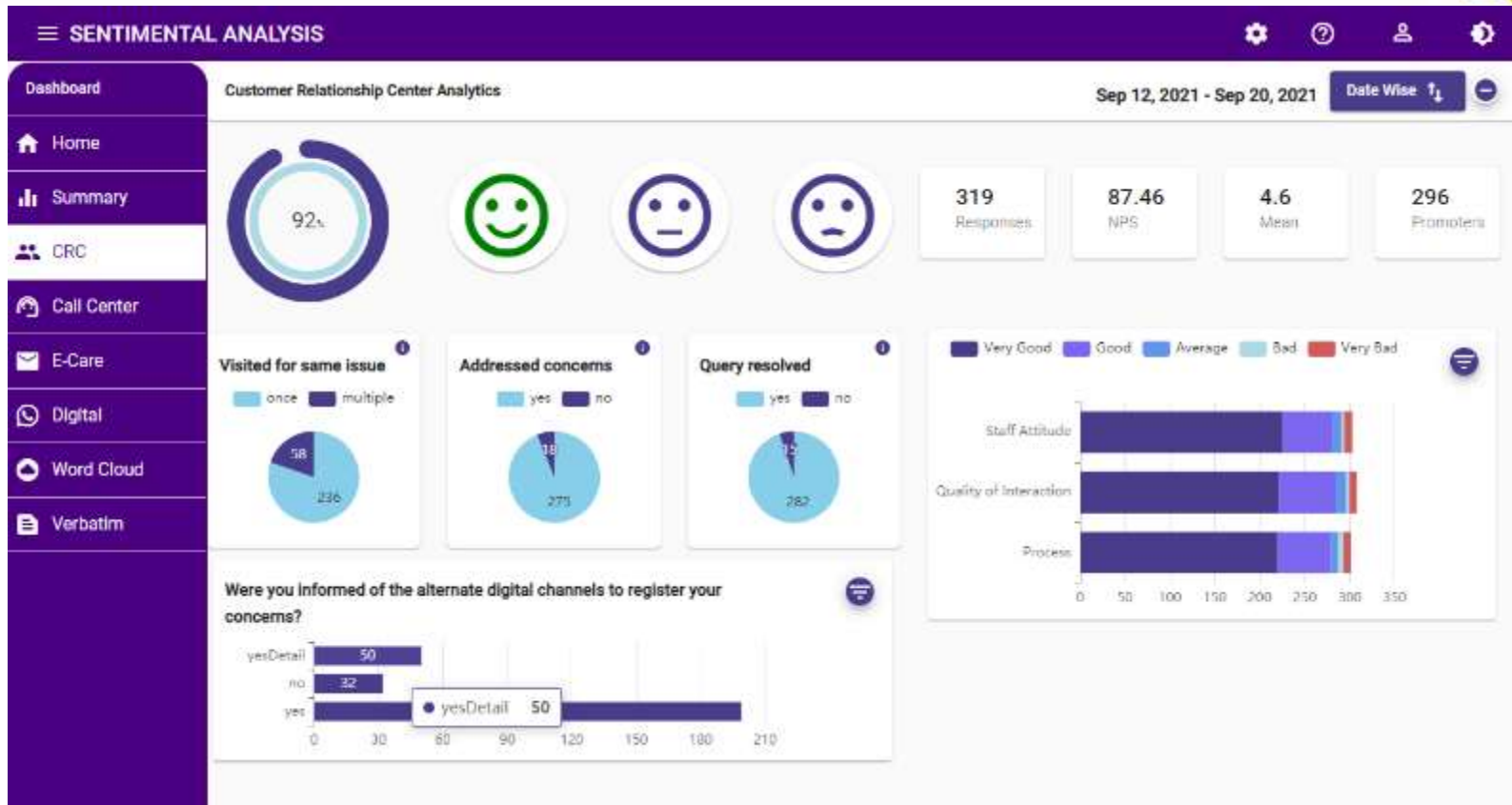
***Calls received at the Call Centre – Speech to Text Analysis***

***VOC, PTF Comments, Social Media comments including WhatsApp Chats***

# Dashboard



TATA POWER







## DESCRIPTIVE ANALYSIS

3 years of historical data has been leveraged to Learn a pattern of calls at the Call Center With the help of data in SAP CRM and BCM.

Analyzing the reason of Call Volume spread across Year, Monthly, Daily and Hourly basis.



## PREDICTIVE MODEL

Predictive model tries predict the caller patterns, by using Descriptive analysis and Time series forecasting Time series Forecasting is used to improve the accuracy

Data Sources from CRM for customer related data and SAP Contact Center provide call in patterns in time Related intervals

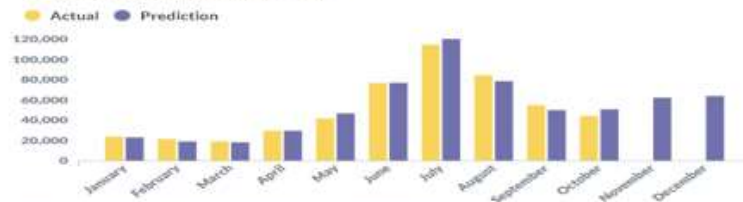


## Current Outcome:

1. Compared to manual accuracy , a daily automated predictive algorithm delivered 83-85% accuracy
2. Prediction enhanced to identify and exclude impact due to rare events through day wise and shift wise comparison of patterns through combination of timeseries models & non parametric classification of rare events

## Outcome

### Month wise Forecasting of calls



### Day wise Predicted Call Volume at Tata Power



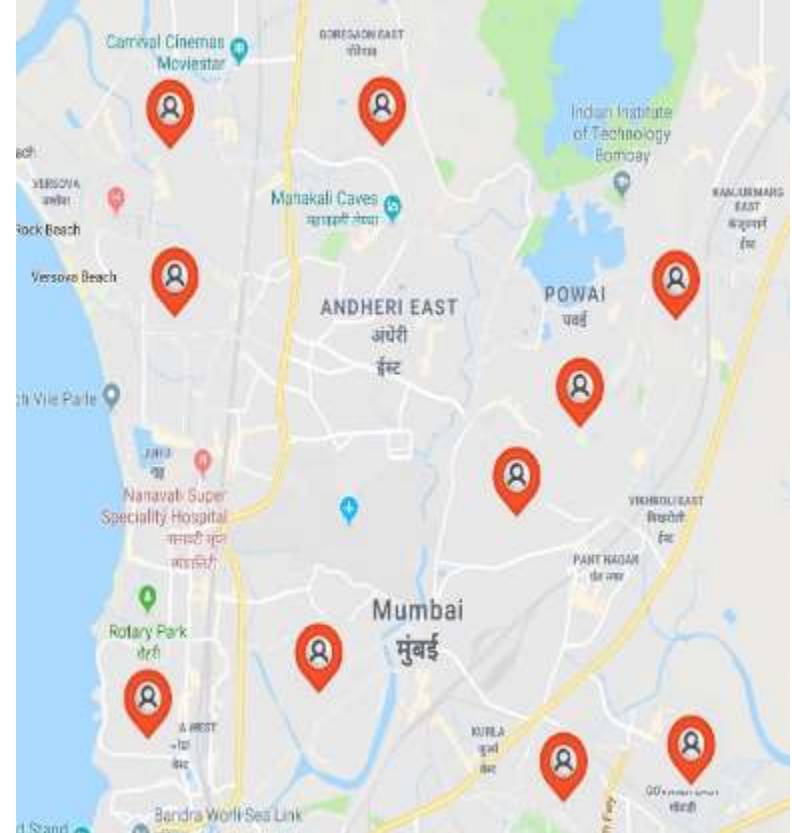


# SMRD (Smart Meter Reading and Dispatch App)

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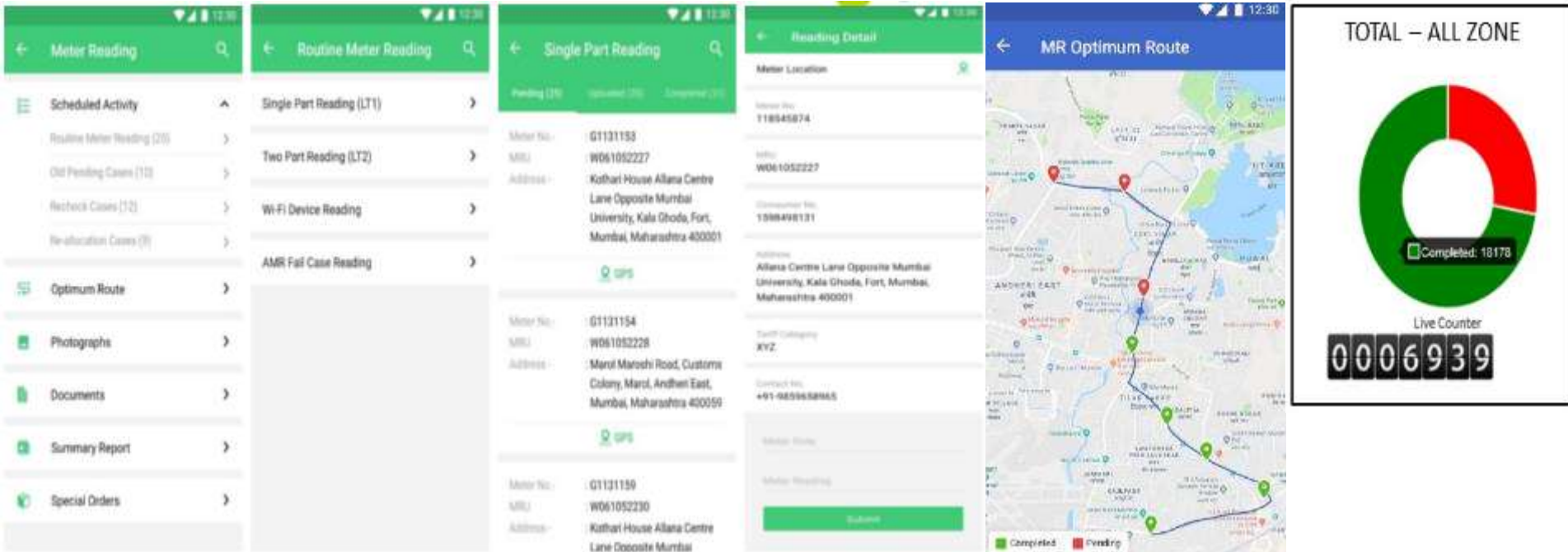
SMRD is a product mobile application along with web application that will provide a platform for following activities:

- 1) Capturing meter reading of all types of consumers and online updation of the same in SAP through staging server.
- 2) Capturing status of meter reading done through various methods like – manual, AMR, Wi-Fi Device etc. and updating the same in web application.
- 3) Capturing bill distribution status and updating the same in SAP through staging server.
- 4) Spot Billing (Online)
- 5) Spot Collection (Online)
- 6) Providing guidance to field staff through Google map interface
- 7) Providing various services to supervisors through web application.
- 8) Capturing other documents delivery status and same to be uploaded in SAP.

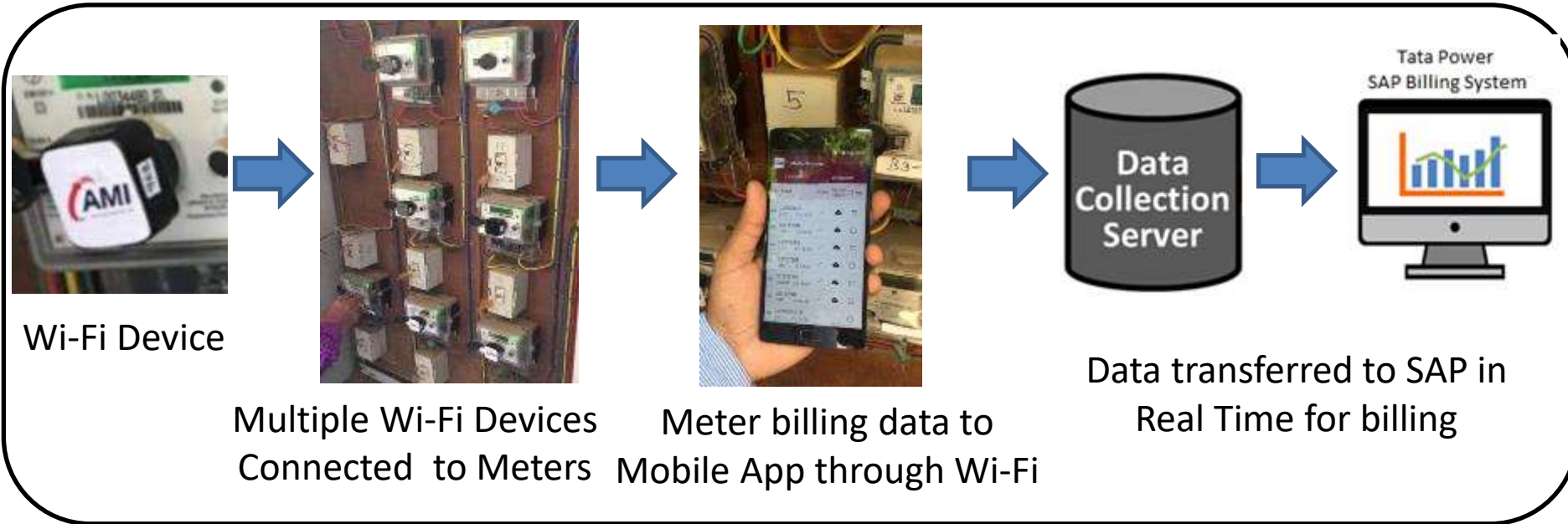


# SMRD (Smart Meter Reading and Dispatch App)

TATA POWER

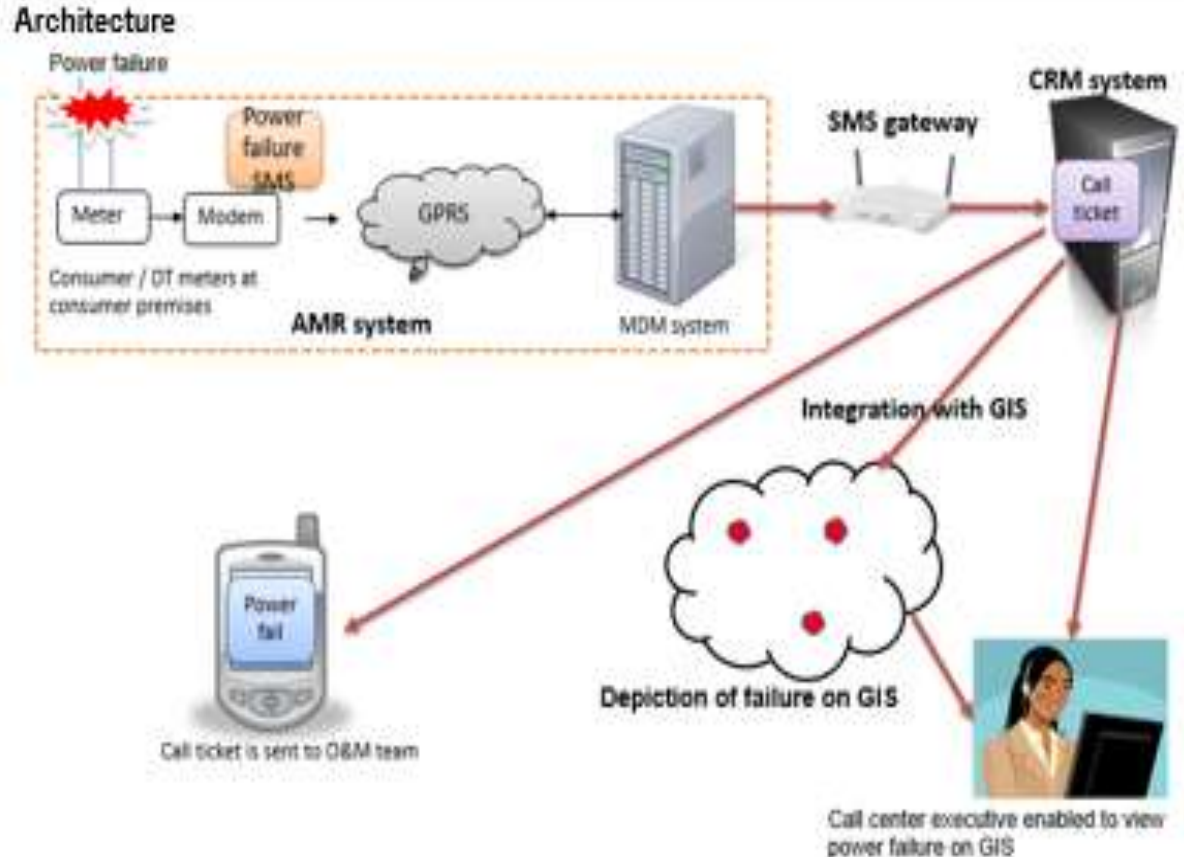


Wi-Fi device and Mobile Application developed for Meter reading and data transfer for Real Time billing.



# maRC (mobile assisted GIS for Restoration and Care)

- ❖ Tata Power in its pursuit for adopting technology has deployed new system **maRC (mobile-GIS assisted System for Restoration and Care)** for technical complaint management.
- ❖ The new system is having some features which are in line with **modern e-commerce and cab-aggregators by which customer is able know the ETA(Expected time of arrival)** of technician attending the fault and also able to track his location in real time on map.
- ❖ The maRC system apart from huge performance enhancing for complaint resolution is now able to get the first hand feedback on experience of Customer directly from his mobile.



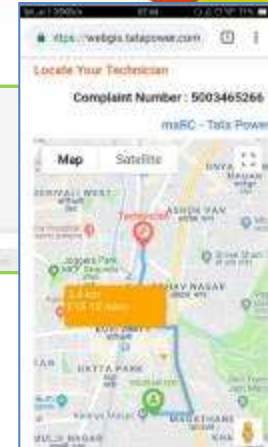
Deployment of automated descriptive statistical daily report for better review.

## Deployment of Run time Repeat Complaint analysis and alerts

[illegible][illegible]

1. **Fetch Rows:** Your Completed  
 to order is 3000887.790  
 To find out location of your nearest  
 please click here  
[http://www.3000887.790.com/](#)  
[http://www.3000887.790.com/](#)

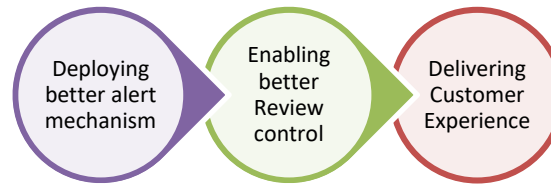
Some Transactions may vary your  
 location is 3000887.790  
 the location of your



SMS for Customer showing location of Technician who is scheduled for restoration service with

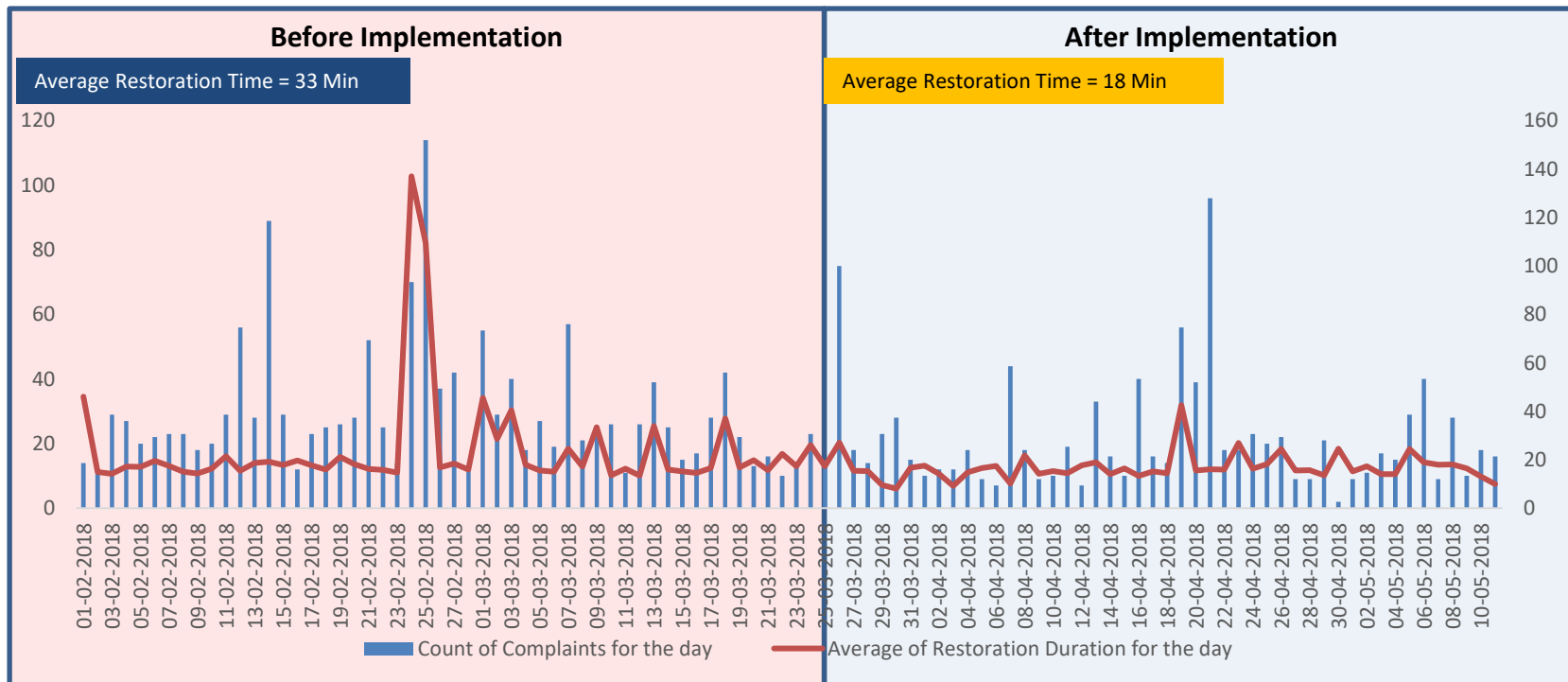


Immediate feedback from customer on service rendered in resolving power failure complaint





## LT Complaints – Impact of Implementation (50 days before/ after)





# IOT Enabled Monitoring System for Non-Automated Unmanned Remote Substations for Reliability Improvement



## Move Platform



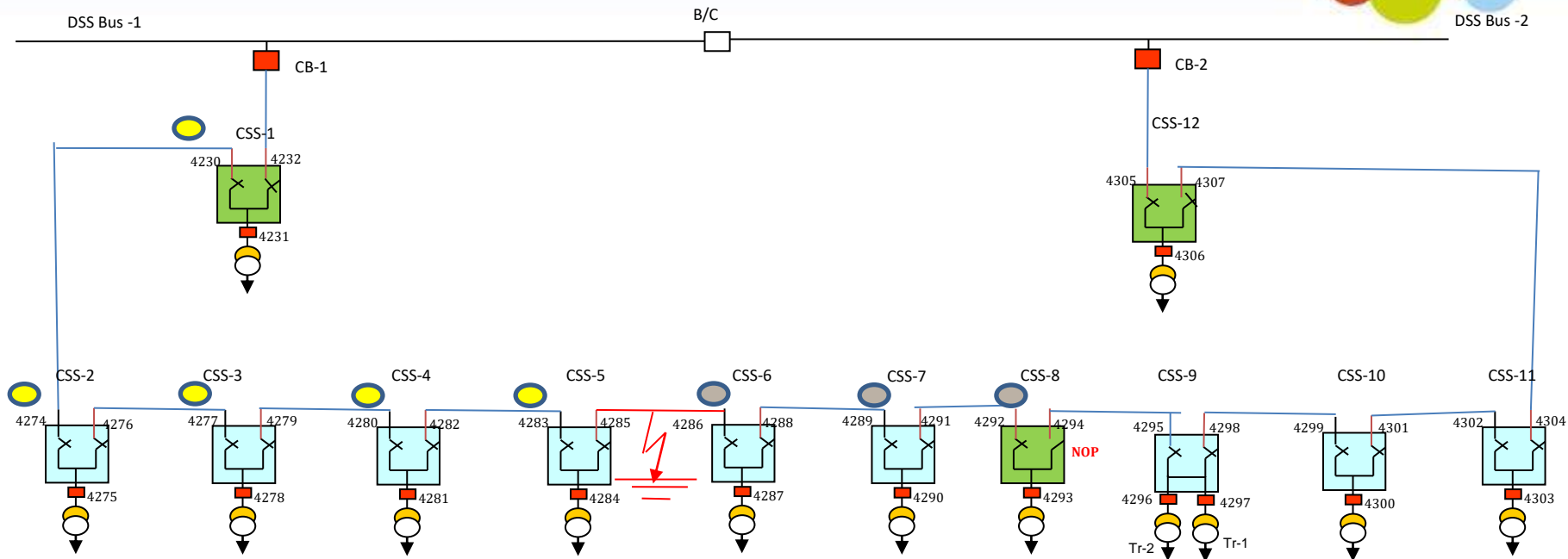


Illustration Purpose



FPI – Fault Passage Indicator

## Filter Data

Date From  Zones

Date to  Fault Type

To view network data

☒ Auto-Refresh

Search

Export

Asset	Zone	FPI Indication Status	HT/LT Breaker Trip Status	DT Trouble Status	SF6 Low Status	Battery level	Date	Time	ACTIONS
CSS 31267	ZONE 2	OK	ALERT	OK	OK	85%	2018-07-30	12:32:00	View NW Data SMS Status Email Status
FPI BOX 32876	ZONE 3	OK	OK	OK	OK	30%	2018-07-30	11:15:00	
DSS 31267	ZONE 2	ALERT	OK	ALERT	OK	60%	2018-07-30	10:05:00	

Pagination &lt;&lt; &lt; 1 2 3 .... 10 &gt; &gt;&gt;

If no faults are captured for a transmitted data packet then shows okay

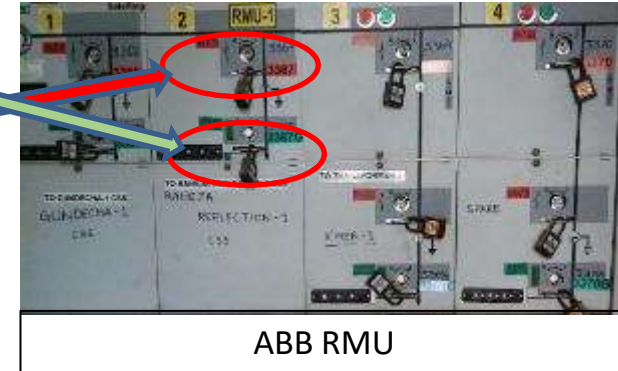
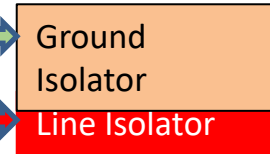
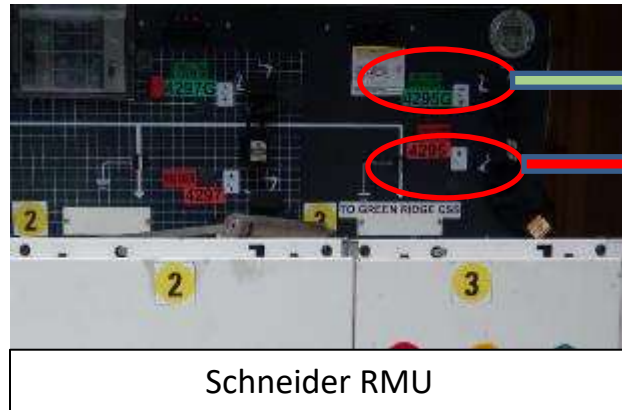
Whether SMS and email has been sent out for these fault

# Potential Impact of the Project



- a) Reduction 20% to 40% restoration time (& CAIDI) by the way of reduction in travelled distance by FDEs
- b) Reduction in Carbon footprint due to less distance travelled by FDEs for restoring the faults - 138kg of Carbon per year.
- c) Customer delight due to faster restorations & reduction on loss of their business.
- d) Commercialization of the solution by extending the service to HT customers

- RMU Operations are done by Fault Duty Engineer (FDE) (alone) in 3 shifts.
- There are possibilities of wrong operations, which can lead to damage to equipment and even fatality
- One of the Investigation Report on wrong operations, suggested that someone to repeat isolator numbers loudly before operations are done.
- Innovative solution of Interactive RMU Kit provides following to avoid wrong operations
  - **Voice Assistance before operations**
  - **Electro - Mechanical Interlock to avoid grounding of live part**



## Voice Assistance to Switchgear operator- Demo



Initial Sample Kit Video

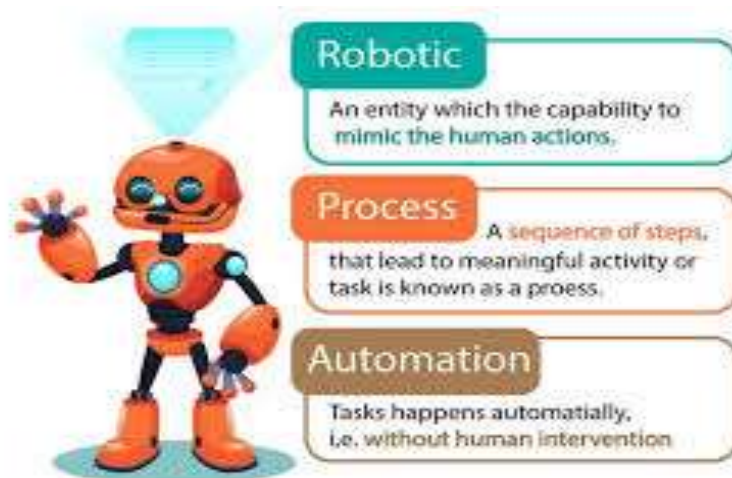




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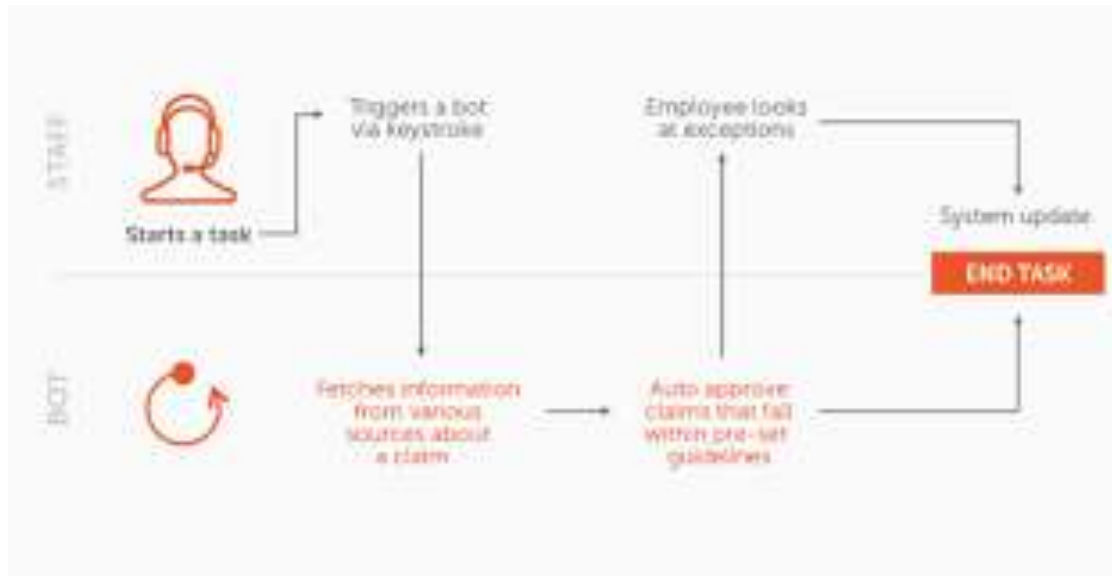
What is RPA ?



# Use Case of RPA

## Automation Anywhere Architecture

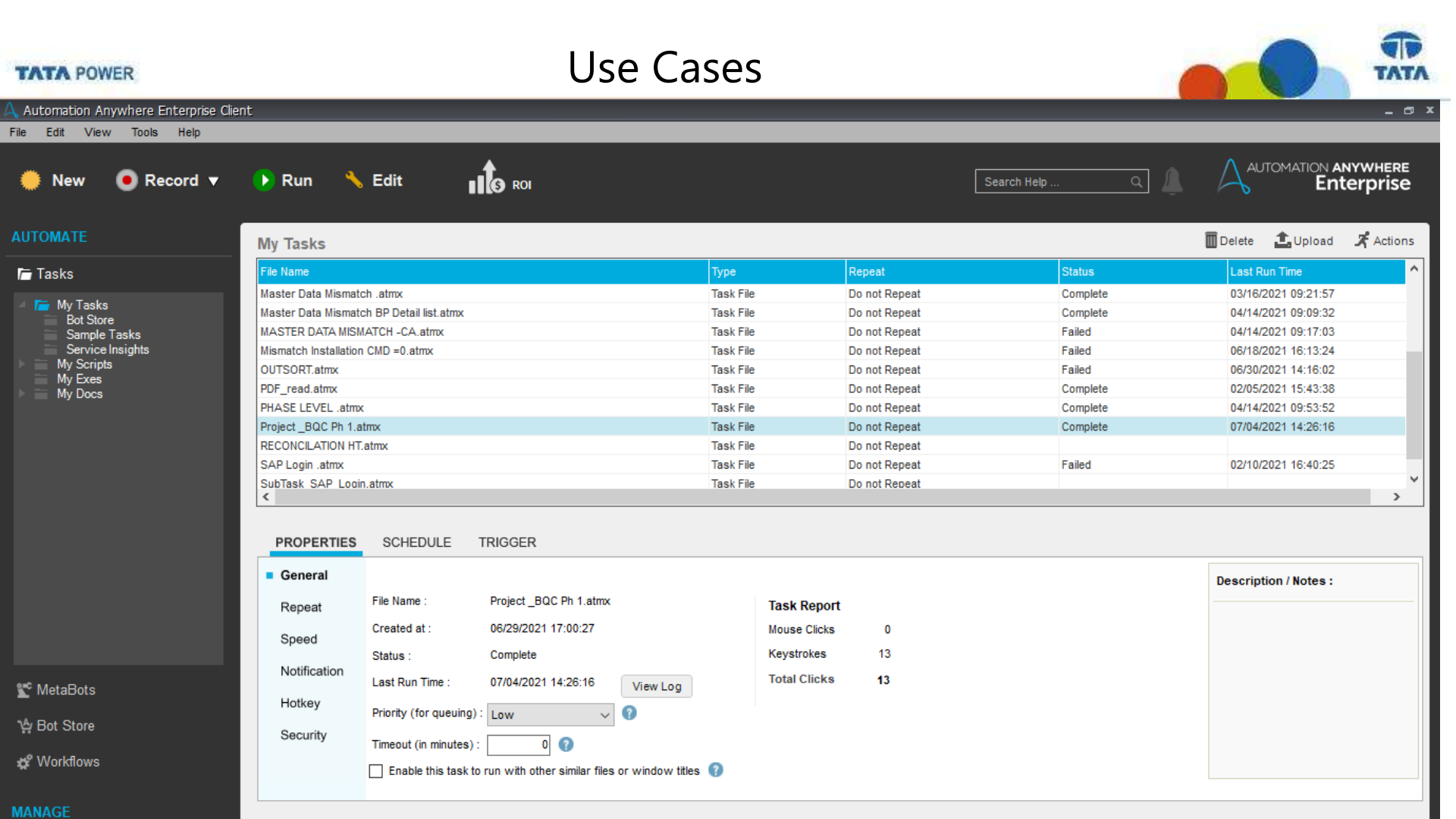
MindMajix



### Task Bot Creation :

- Video recording mode.
- Edit steps with manual coding.
- Time lag between multiple steps.

- RPA Bots auto login in system & extract all 3 reports & Append in one file.
- Analysis in excel carried out automatically as per logics given and judgement is given by BOT.



# Use Cases



## AUTOMATE

### Tasks

- My Tasks
- Bot Store
- Sample Tasks
- Service Insights
- My Scripts
- My Exes
- My Docs

### My Tasks

Delete Upload Actions

File Name	Type	Repeat	Status	Last Run Time
Master Data Mismatch .atmx	Task File	Do not Repeat	Complete	03/16/2021 09:21:57
Master Data Mismatch BP Detail list.atmx	Task File	Do not Repeat	Complete	04/14/2021 09:09:32
MASTER DATA MISMATCH -CA.atmx	Task File	Do not Repeat	Failed	04/14/2021 09:17:03
Mismatch Installation CMD =0.atmx	Task File	Do not Repeat	Failed	06/18/2021 16:13:24
OUTSORT.atmx	Task File	Do not Repeat	Failed	06/30/2021 14:16:02
PDF_read.atmx	Task File	Do not Repeat	Complete	02/05/2021 15:43:38
PHASE LEVEL .atmx	Task File	Do not Repeat	Complete	04/14/2021 09:53:52
Project_BQC Ph 1.atmx	Task File	Do not Repeat	Complete	07/04/2021 14:26:16
RECONCILIATION HT.atmx	Task File	Do not Repeat		
SAP Login .atmx	Task File	Do not Repeat	Failed	02/10/2021 16:40:25
SubTask SAP Login.atmx	Task File	Do not Repeat		

### PROPERTIES SCHEDULE TRIGGER

#### General

Repeat  
Speed  
Notification  
Hotkey  
Security

File Name : Project\_BQC Ph 1.atmx  
Created at : 06/29/2021 17:00:27  
Status : Complete  
Last Run Time : 07/04/2021 14:26:16  
Priority (for queuing) : Low  
Timeout (in minutes) : 0  
☐ Enable this task to run with other similar files or window titles

View Log

#### Task Report

Mouse Clicks 0  
Keystrokes 13  
Total Clicks 13

#### Description / Notes :

# Task BOT – Action List



Automation Anywhere Enterprise Client - Workbench [My Tasks\Project \_BQC Ph 1.atrac]

File Edit View Debug Tools Help

New Record Run Save Enable Debugging Set SnapPoint

Search Help ...

Commands MetaBots

CATEGORIES VIEW ALL

- Database
- Delay
- Email Automation
- Error Handling
- Excel
- Files/Folders
- FTP/SFTP
- If/Else
- Image Recognition
- Insert Keystrokes
- Insert Mouse Click
- Insert Mouse Move
- Insert Mouse Scroll
- Internet Connection
- Launch Website
- Log To File
- Loop
- Manage Windows Controls
- Message Box
- Object Cloning
- OCR
- Open Program/File
- PDF Integration
- PGP
- Play Sound
- Printers

Project \_BQ...

Actions List NORMAL VISUALIZE

Undo Redo Edit Delete Copy Paste Actions

FILTERS ☒ Mouse Moves ☒ Keystrokes ☒ Mouse Clicks ☒ Delays ☒ Other Windows All Find Text...

- 1 Open: "taskkill.exe /f /im saplogon.exe"
- 2 Delay: (5 sec)
- 3 Open: "C:\Program Files (x86)\SAP\FrontEnd\SAPgui\saplogon.exe"
- 4 Wait for Window to Open ("SAP Logon 750") (Wait up to 12 seconds - For Window to Open)
- 5 Object Cloning: Set Text of TextBox "" in window 'SAP Logon 750'; Value:"ECP [SPACE]"; Source: Window; Play Type: Object
- 6 Keystrokes: [ENTER] in "SAP Logon 750"
- 7 SAP Integration : Set Text on GuiTextField 'RSYST-BNAME' in window 'SAP'
- 8 SAP Integration : Set Text on GuiPasswordField 'RSYST-BCODE' in window 'SAP'
- 9 Keystrokes: [ENTER] in "SAP"
- 10 Delay: (5 sec)
- 11 If Window Exists ("License Information for Multiple Logon") Then
- 12 SAP Integration : Left Click on GuiRadioButton 'MULTI\_LOGON\_OPT1' in window 'License Information for Multiple Logon'
- 13 SAP Integration : Click on GuiButton 'btn[0]' in window 'License Information for Multiple Logon'
- 14 Comment: Please enter the conditional commands here
- 15 End If
- 16 Delay: (5 sec)
- 17 SAP Integration : Set Text on GuiOkCodeField 'okcd' in window 'SAP Easy Access - User Menu for Kedar Sharad Mahajan'
- 18 Keystrokes: [ENTER] in "SAP"
- 19 Delay: (5 sec)
- 20 SAP Integration : Click on GuiButton 'btn[17]' in window 'List of Outsourced Billing and Invoicing Documents'
- 21 Delay: (5 sec)
- 22 SAP Integration : Click on GuiButton 'btn[17]' in window 'List of Outsourced Billing and Invoicing Documents'
- 23 SAP Integration : Set Text on GuiTextField 'V-LOW' in window 'Find Variant'
- 24 SAP Integration : Click on GuiButton 'btn[8]' in window 'Find Variant'

18 tasks | Username: aa\_creator\_3 (Online) | Status Enabled by SMART Automation Technology | 10:18 05-07-2021



- Artificial Intelligence and Machine learning
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# UAV BASED VISIO-THERMAL INSPECTION OF 11KV SUBSTATION



Visio- Thermal Inspections of Power distribution Transmission Network is performed to find out the hotspots in the overall network which are strong indication of the minor/major ongoing or incoming faults in the network, visual inspection includes

- spotting of vegetation,
- faulty or irregular components,
- deterioration of components ,
- potentially hazardous conditions such as tilting of the poles, sparking in the poles.

## EQUIPMENTS & SOFTWARES USED

- a. Drone – QUADCOPTER
- b. Thermal Sensor – FLIR VUE PRO RADIOMETRIC , 19mm industrial grade sensor
- c. RGB Sensor – 1” CMOS, 20M camera, 4k resolution
- d. Flir Application for calculation of spot temperature

## *Methodology:*



# DETAILED PICTURES OF HOTSPOTS AND PROJECTED ISSUES

## Visual defects-

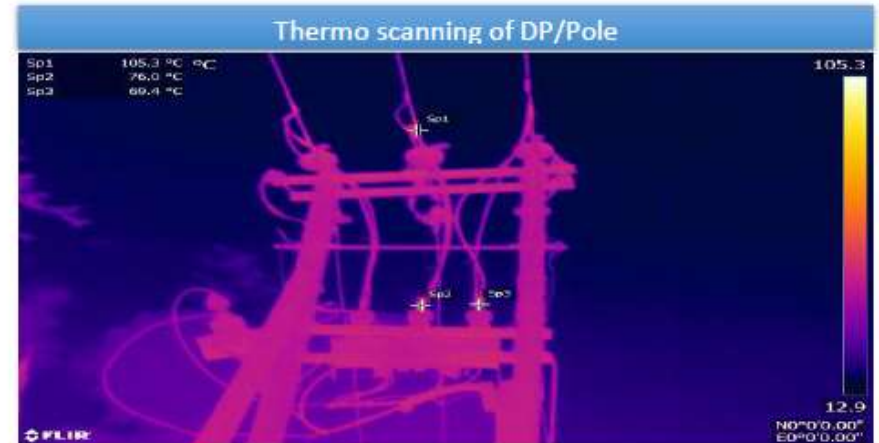
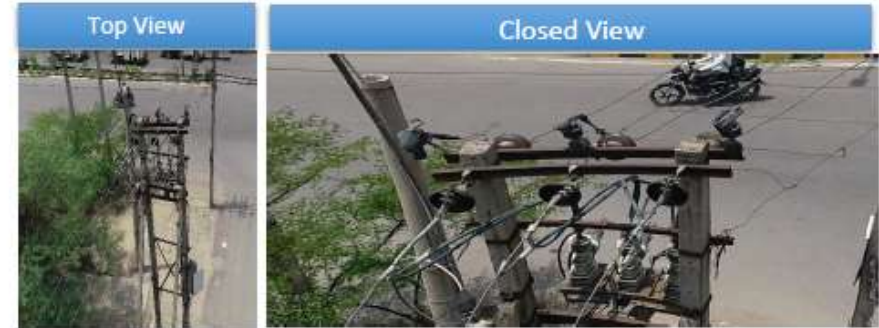
- A. Flash marks observed on the surface of disc insulator( R phase)
- B. Main line HT jumper are connected with binding wire
- C. Jumper of GO switch is of bare type
- D. Existing sleeve installed on the conductor is torn
- E. Fencing and locking arrangement is not ok.

## Thermal defects.

Critical Hot spot observed on one phase.

THERMAL DEFECTS	
S.NO.	HOTSPOT
1.	SP1 – 105.3 °C
2.	SP2 – 76.0 °C
3.	SP3 – 69.4 °C

POLE/DP NO.HT521-41/23 & HT521-41/24.



# Training & Evaluation using Virtual Reality

Training module using Virtual Reality (VR) with Interactive & Immersive way to learn and training using Hand Controllers and Voice Overs which includes below mentioned details:

- I. Working at Height
- II. Lockout & Tag out
- III. Electrical safety
- IV. HIRA/JSA( Job Safety Analysis)
- V. Mobile crane safety



# Training & Evaluation using Virtual & augmented Reality



Virtual Reality Hardware i.e. Oculus Quest 2



Trainee wearing the VR for Training and other



Virtual Environment Training Reference Images



Selection of various equipment and safety process while working



**Thank You!**

