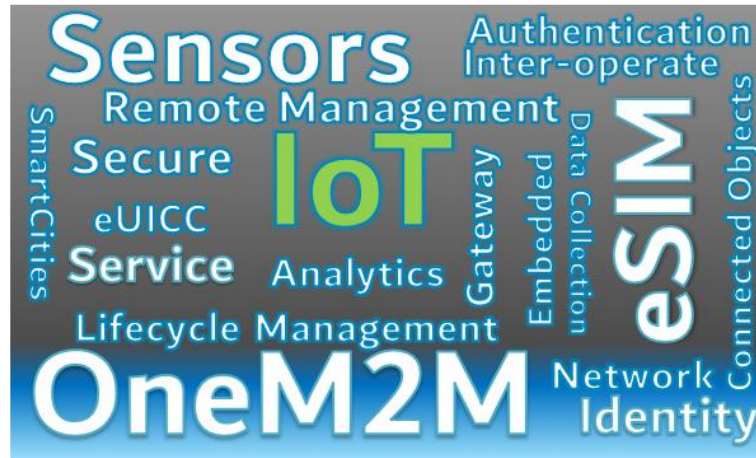




Presentation Title
Identifying the value in Data Science, the new Oil
Presentation to
AI & IOT India 2018
Presentation by
Rajeev Arora, CTO & Co-Founder
Sensorise Digital Services
14 Dec 2018



SENSORISE
Connect & Serve

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It's your doctor - he just
got an alert that you're
having a second
helping of pie.





IoT Proliferation is resulting in a Data Boom

In the coming years,
40% of total data created
will be from sensors.

This includes sensors in iPhones, cars, and other household objects, but it also includes large-scale and multi-million dollar industrial machines like power grids, airplanes, and oil extraction.

Source: Gartner

Data is at the heart of connected services

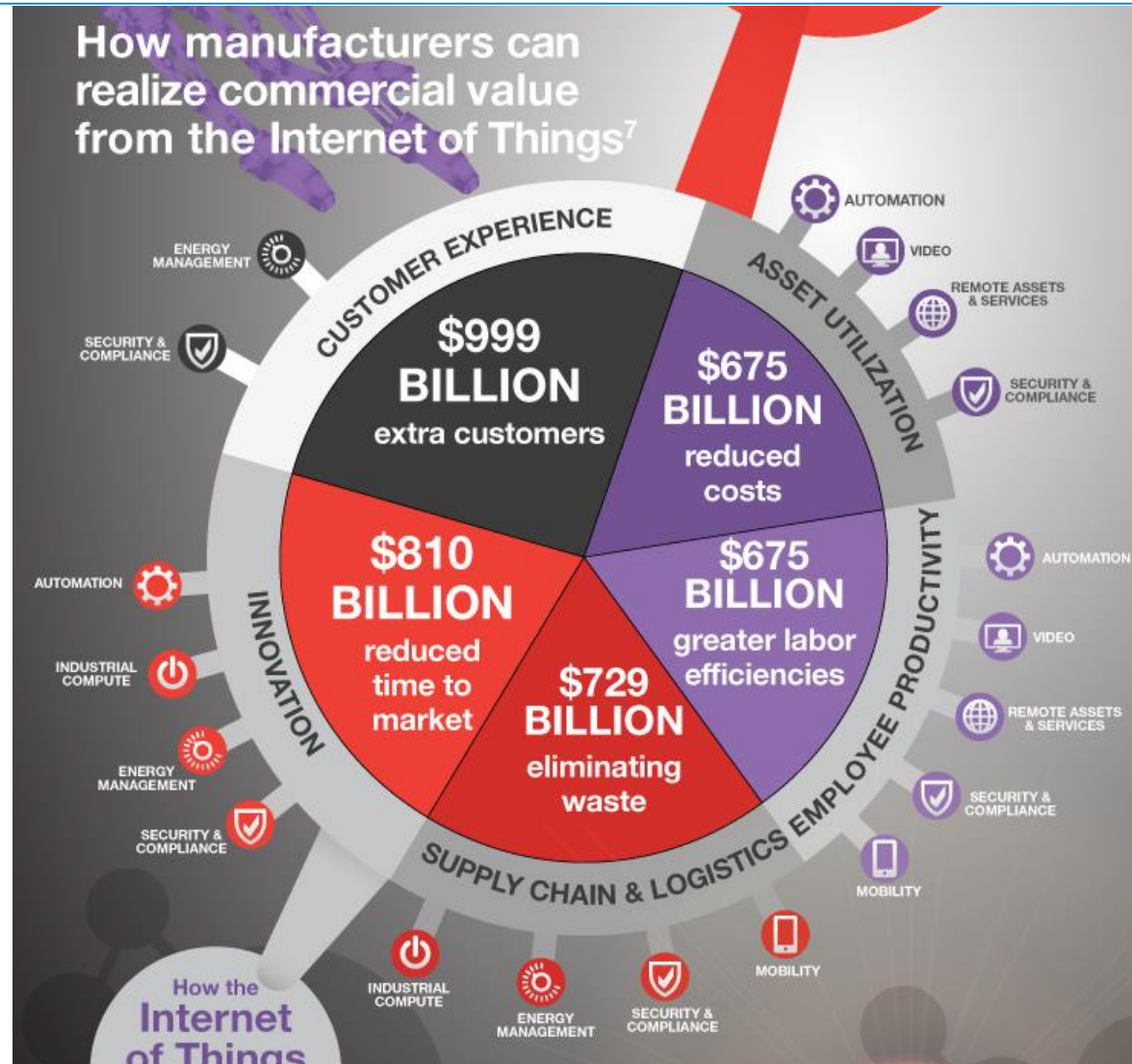




Data is the new oil

Actionable Analytics will unleash tremendous Value

New Value for the new World of IoT





The possibilities include:



Having immediate control
Make changes to complex systems at the touch of a button



Isolating issues
Detecting problem areas earlier allows for better use of personnel



Boosting productivity
Sensors can help detect arising problems and avoid unplanned downtime



Saving costs
Increase efficiency by using accurate and up to date data

NOW 2022⁹

assembly
sensitive
licated

Reduced costs as automated tools become less expensive to manufacture/implement

costly
changes

Increase revenues from greater product variations

tools rely
ception
exterity

Sensors help workers improve product quality

low-cost
employees
and data
skills are
scarce

Socialization of required knowledge flattens skills curve; maximizes access to people with the right skills at lower costs

of key
production;
lack of flexibility among
assembly locations

Reduced waste (materials, energy); greater freedom and agility to reallocate production/optimize inputs

IIOT Solutions for market leadership



Old Business Model

- Machine Parameters received via Reports
- Customer Site Management through Engineer Visits
- Management of Machine Parameters through personal experience & assessment
- Expensive and Slow upgrades to Sites
- Customer dependence on Satake Engineer



- Manage Individual Sites
- Frequent Field visits
- Paper based Insights and Learning
- Long lead time to apply insights to Sites



Unconnected Machines



New Business Model

Central Machine Control

- Near real time Machine Data
- Fast Insights
- Decision Support
- Remote Machine Control



Analytics



Secure Cloud

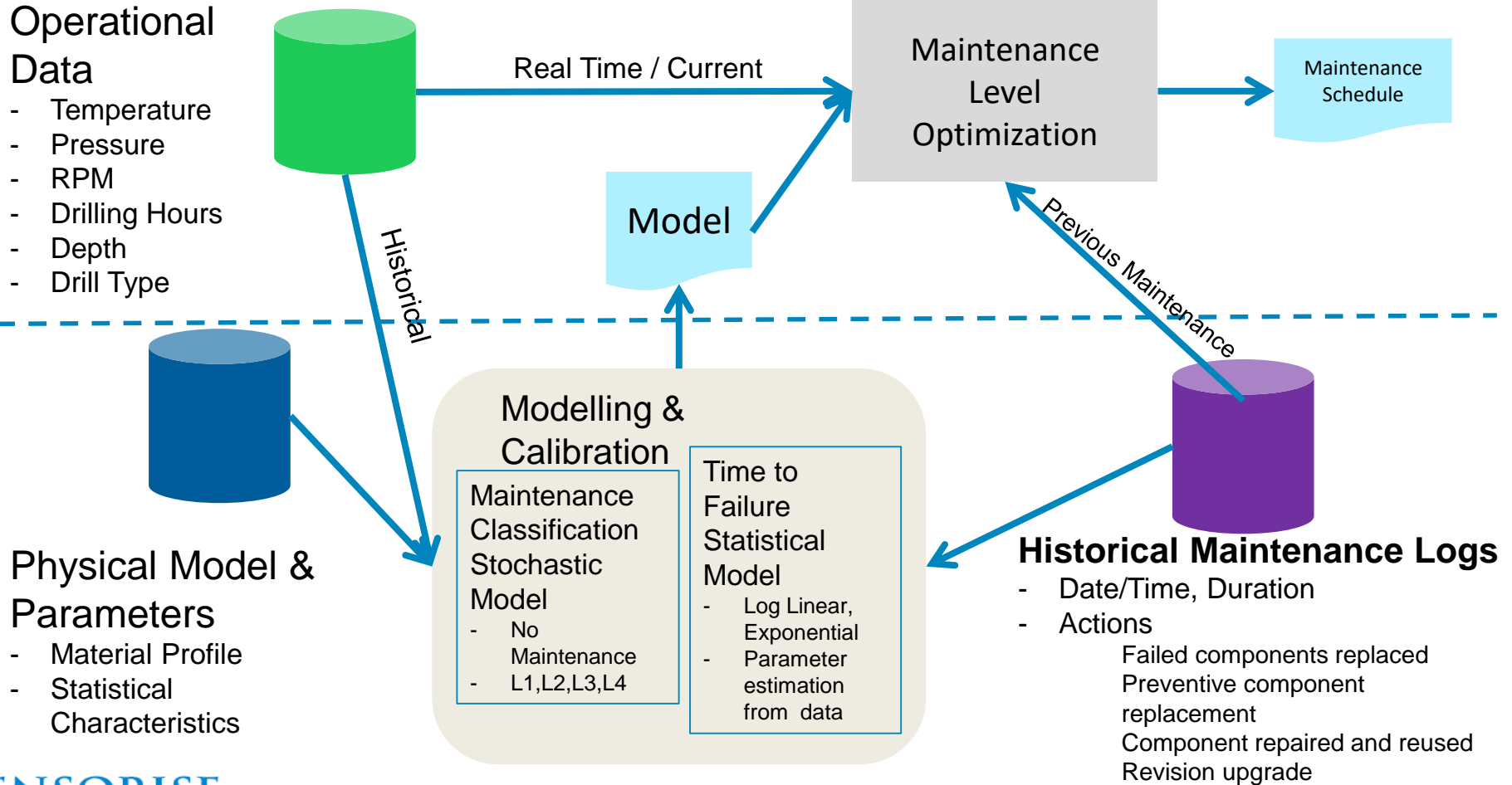


Rules Engine



Connected Machines

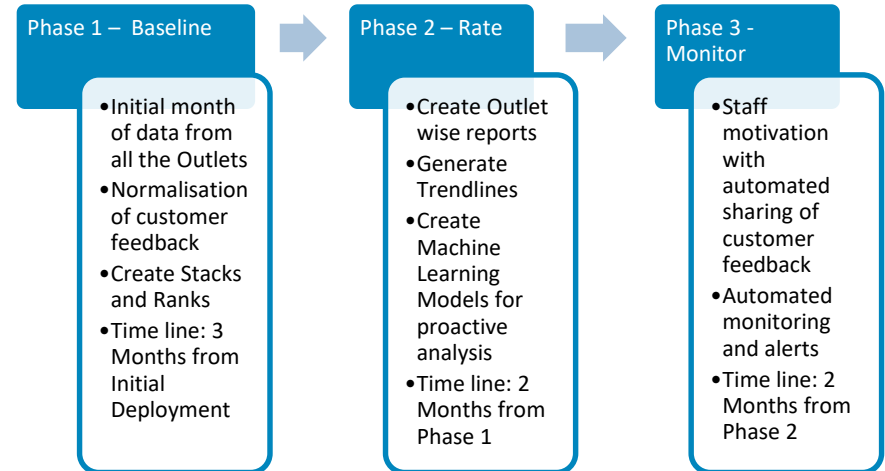
Example Use Case 1 | Condition Based Maintenance Modelling



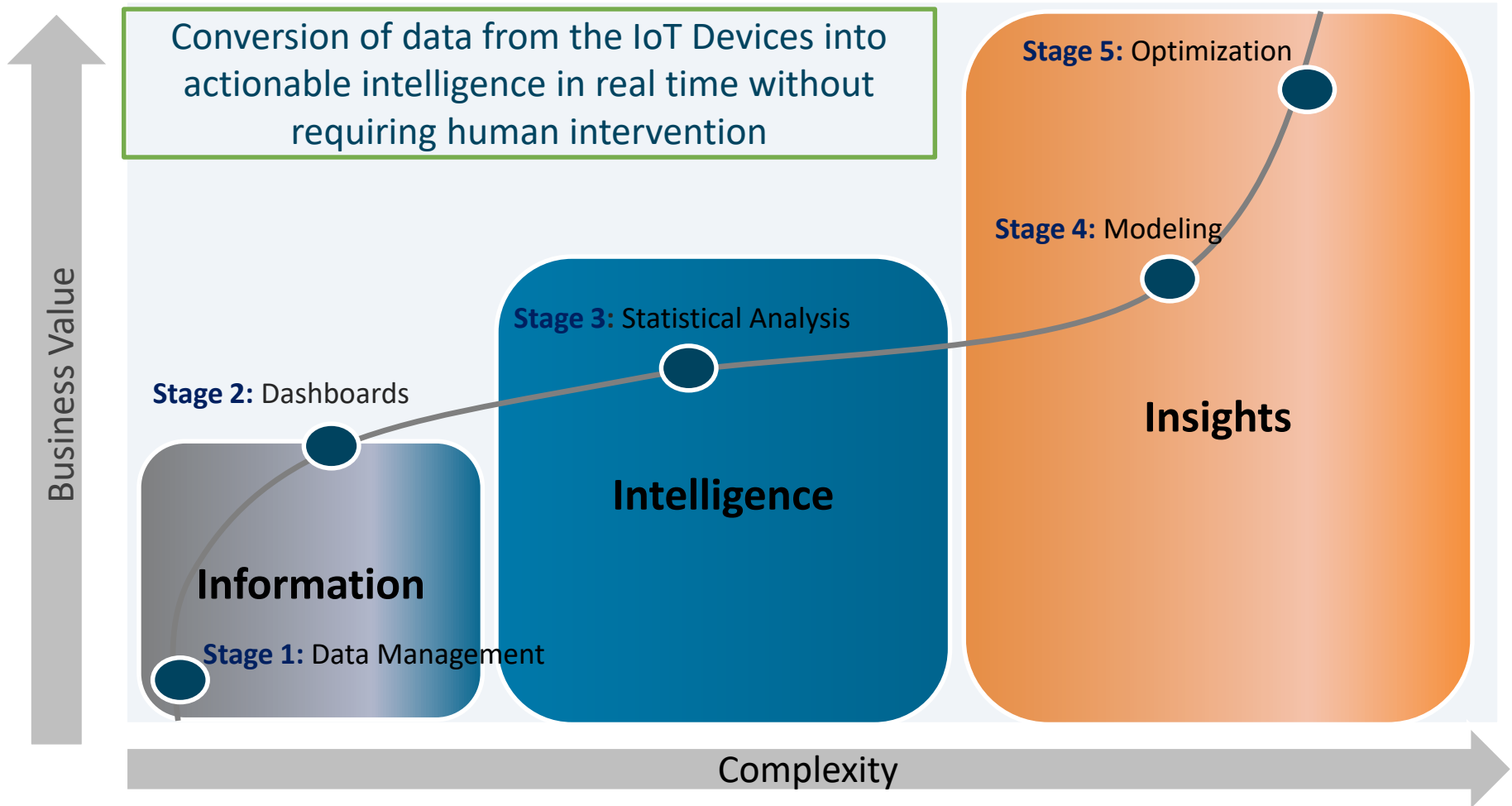
Example Use Case 2 | Customer Feedback Device



- Understanding and Classifying Outlets
 - Behavior Insights
 - Does the site has High, Average, Low or Variable traffic?
 - Are there any Day of Week patterns
 - Are there any Time of Day patterns
 - Objectives
 - Classification of sites by Total Traffic, DOW and TOD Patterns
 - Detect perpetually under performing outlets
 - Proactively discover trends



Five Levels of Analytics Maturity





Enabling IoT Analytics

Getting Ready for Data Driven Journey

Based on experience in building solutions over last 20 years



❑ Hospitality and Airlines

- Demand Forecasting at MS/Day Level
- Price Optimization

❑ Web Analytics

- Click Thru Rate
- Adv placement

❑ Retail

- Demand Forecasting at SKU/Store level
- Merchandize planning and Inventory Allocation
- Price Optimization
- Workforce Planning

❑ Text Analytics

- Sentiment Detection
- Similar words and content

❑ Insurance

- Claim Prediction
- Lapse & Persistency modelling
- Fraud Detection

❑ Automotive

- Driver Behaviour

❑ Machines

- Condition Based Monitoring for Pre-emptive maintenance

❑ Energy

- Predict Solar Power Generation

❑ Image Analytics

- Surveillance



1. Plan incremental journey and be agile



- While keeping the bigger goal in sight, plan baby steps carefully
- Bigger goal may require several models each having its own value
- It is possible that Final goal could not be achieved in acceptable limits
- Focus on bigger goal may eclipse incremental value and project may seem like failure



Big Bang Approach

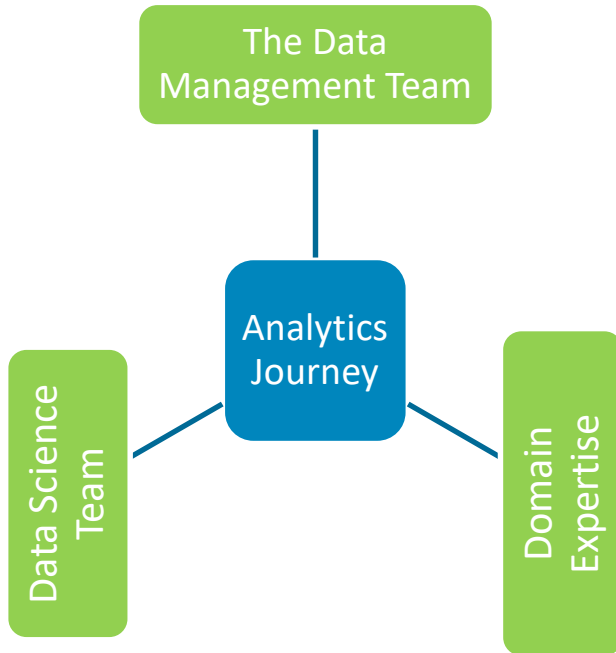
- Data Preparation
 - Cleaning
 - Feature engineering
- Model Fitting
 - Selection of appropriate classification model
 - Validation
- Success or Failure
 - AI/ML does not guarantee success

Agile and Incremental Approach

- Plan several models
 - Normal demand patterns by WOY/DOW/TOD
 - Consumer Classification by Geography, Credit profile, Usage,...
 - Temporal Changes in Consumer behaviour
 - Neighbourhood patterns
 -
- Each of the models delivers value
- Build final classification model using smaller models



2. Setup the right team



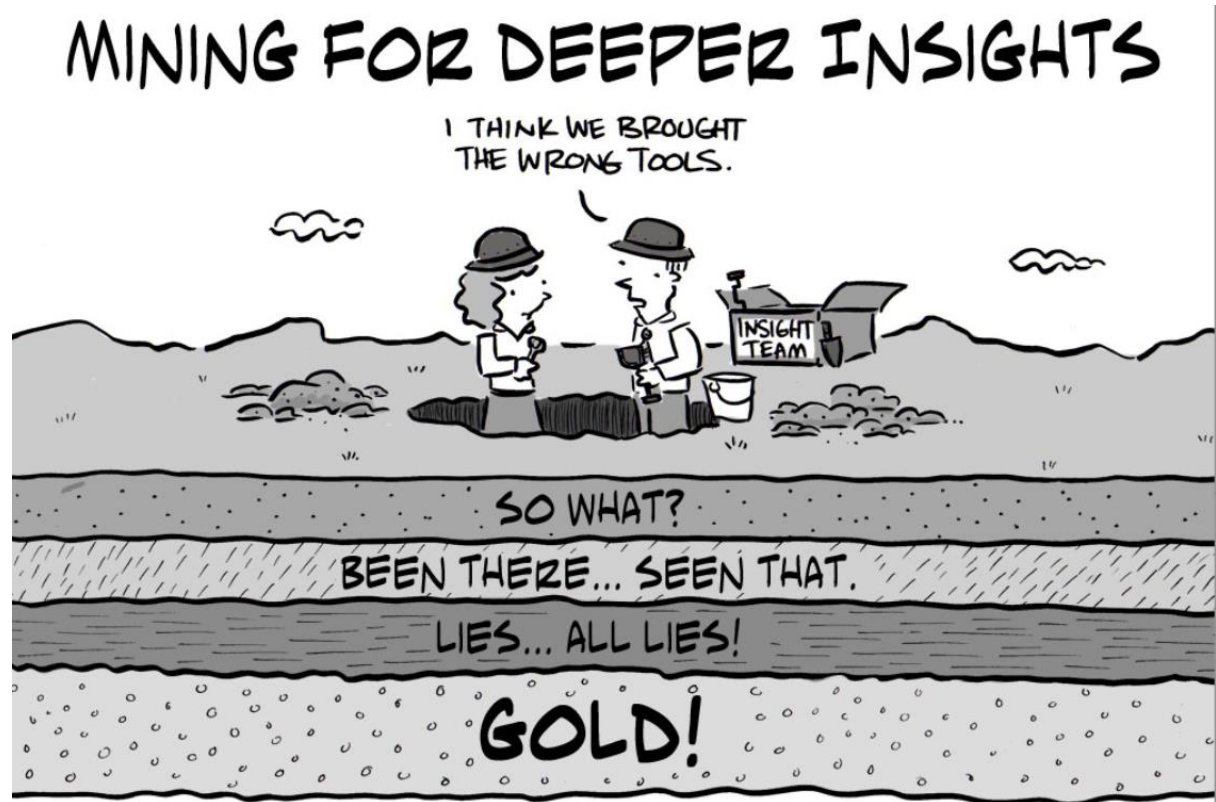
Confluence of Multiple Discipline

- **The Data Management Team**
 - Creates the data warehouse / ETL
 - Integration with various systems
- **Data Science Team**
 - **Statistics & Machine Learning Experts**
 - Data engineering
 - Under the hood knowledge
 - **Tool Experts**
 - Python / R / Tensorflow / Java / ..
- **Domain Expertise**
 - Provides meaning to the model
 - Beer and Diaper Correlation



- Two sets of people
 - Statistical and ML expertise
 - Tool expertise
- On an average 50% to 60% time goes in understanding, cleaning and preparation of the data
- Requires deep understanding of the data and kind of techniques that can be used to extract insights
 - Eg. Anomalies detection and its proper handling is very critical
- Data Scientists who are good at this may not be an expert R/Python programmer

3. Right Tool and Technology





Algorithm Selection

- There is a huge interest in Neural networks & Deep learning
 - Provide a high level of accuracy , precision and recall, Can extract insights from complex data like text, Images
 - But not suitable for use cases with business data, it can result in overfitting and less generalization
- Very common practice to use Time Series to predict Temporal data
 - Proper normalization of data is ignored

Modelling v/s Deployment

- Do not influence modelling tool set with deployment scenarios or vice-a-versa
- Prepare for recoding the models in deployment

Vapnik–Chervonenkis (VC) Dimension

- Normal practice, try one model after another
 - Has to be controlled based on VC Dimension and number of models which can be tried



Outlier Detection

- Common assumption made is that data is generated from Single Distribution, while in reality there could be multiple distributions
 - Very common in demand prediction
- Global Outliers or Local Outliers
 - Low temperature in Summer.
 - At overall level it may not be an outlier but at a local level it is

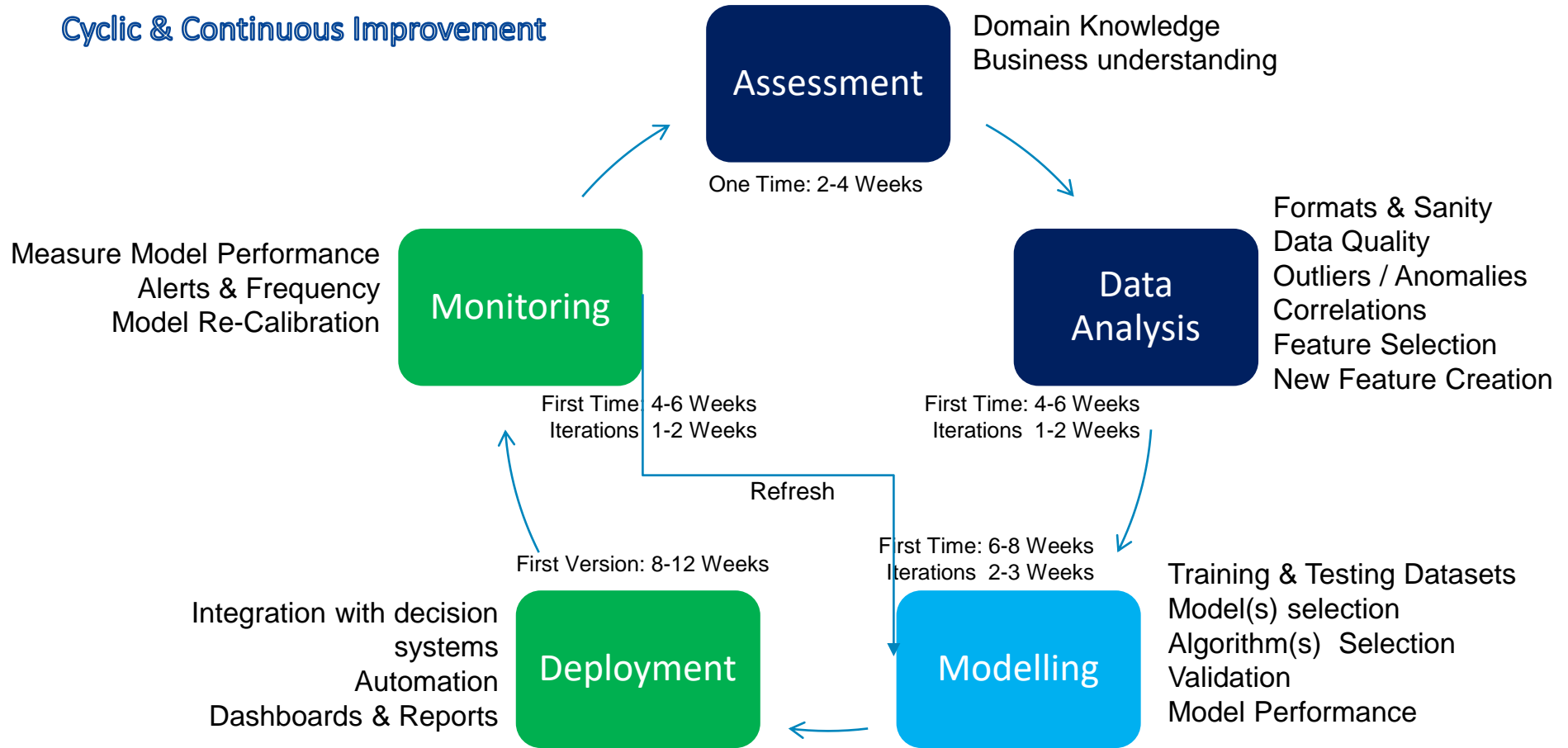
Missing Value Imputation

- Simple imputation techniques
 - May work for natural measurements
- Domain specific imputation
 - Relies of domain expert knowledge
- Pattern based imputation
 - Requires Custom clustering techniques
 - K-means not a suitable method for this purpose

4. Iterative and Continuous Process



Cyclic & Continuous Improvement



Models need to be built, monitored and refreshed regularly



Theft Analytics or Fraud Detection

- In short and medium term fraud cases went down significantly
- Humans are innovative
 - New innovative ways are devised for fraudulent claims
- Cycle begins again

Demand Forecasting

- Business environment changes
- Price Optimization can change the demand levels





5. Customized Product | Analytics Platform

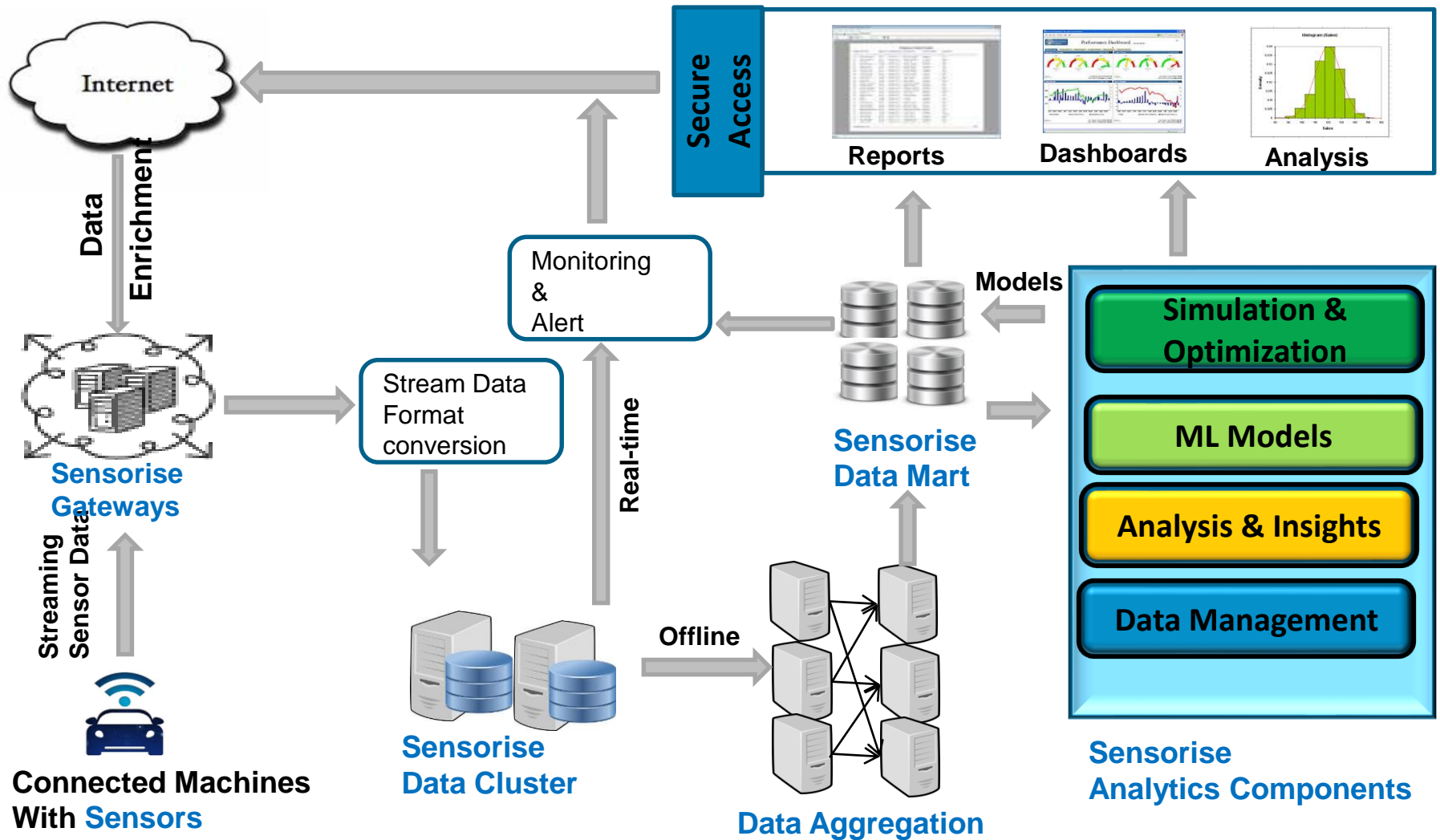
- One size does not fit all
- For the same use case in a different enterprise models could be entirely different
- BI Dashboards and KPIs could be same
- Analytics is NOT an off-the-shelf product
 - It needs to be customized to enterprise need
- Approach the analytics journey with platform approach
- Keep adding capabilities incrementally
- Enterprise specific Analytics Workflows
 - Approval Process
 - Override process
 - Alert handling Process



SenseML

Sensroise Platform Based Approach

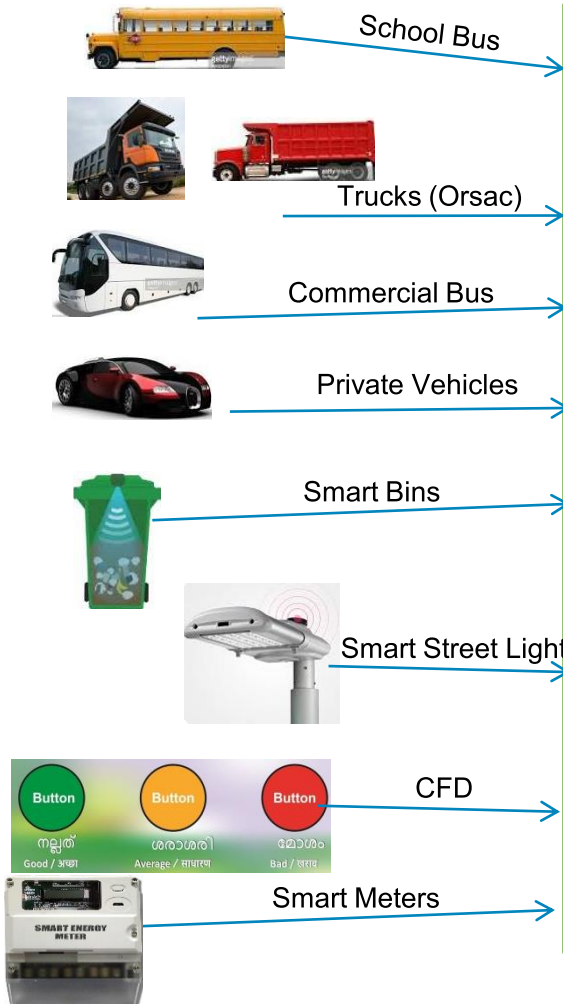
Sensorise | Components of Analytics Framework





Sensorise Data Capture - SenseDCAP

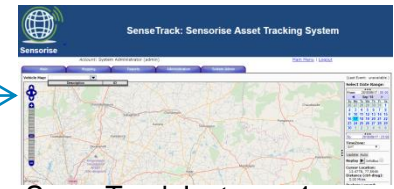
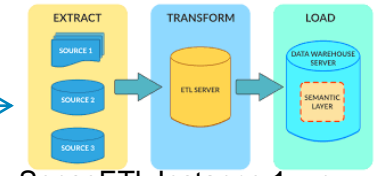
Common Service Layer



Input Protocols : TCP Sockets, HTTP, HTTPS, MQTT

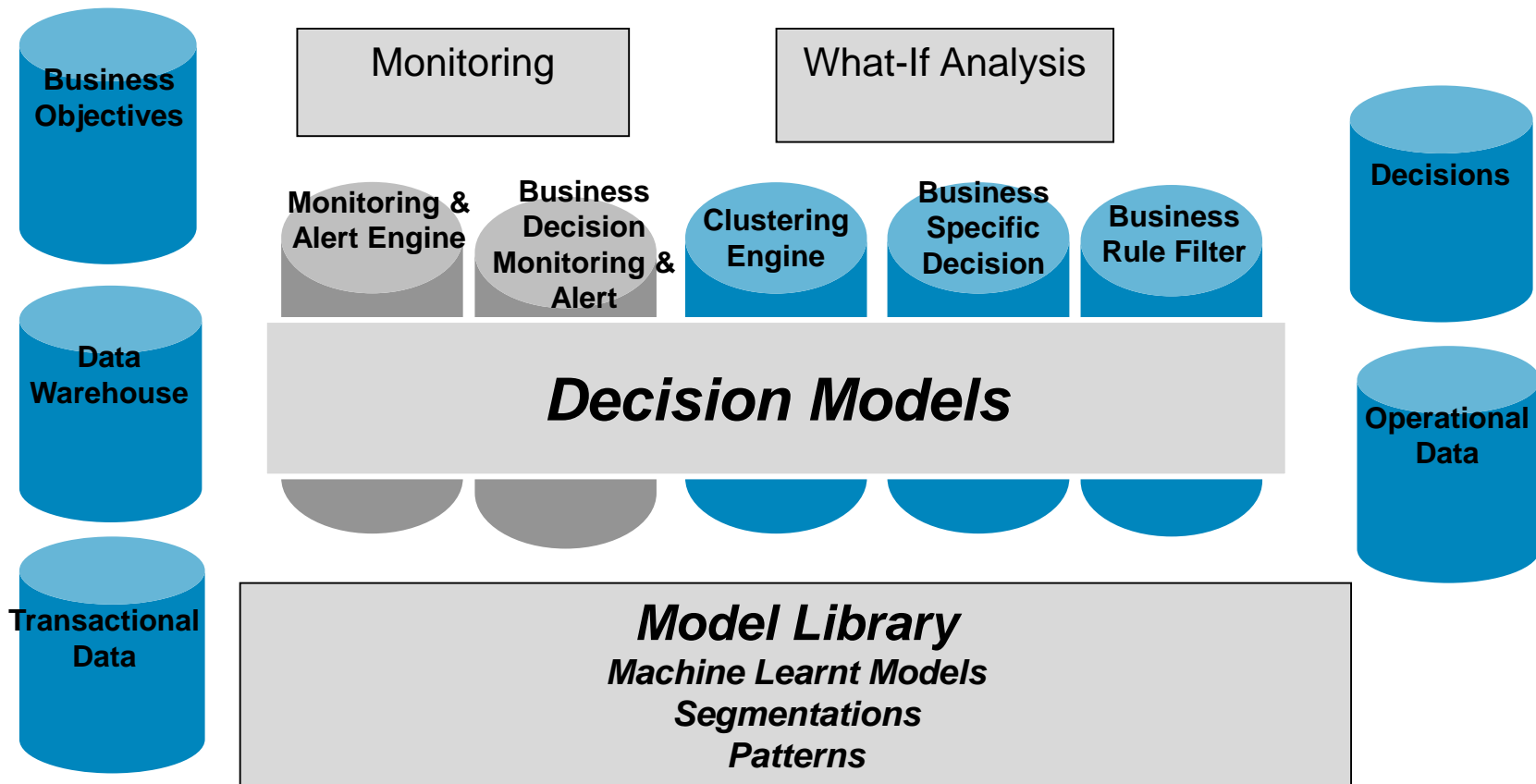
- Setup Configuration
 - Use Case based Schema
 - Source & Target Schema
 - Target Application Subscriptions
 - Device On Boarding
 - Use Case
 - Target Application
- Run-time / Transactional
 - Packet Classification to use case based on Source Schema
 - VTS
 - Basic / AIS140/ ORSAC
 - School Bus / ...
 - IoT Devices
 - CFD / Smart Bin / Smart Street Light / Meters
 - Schema Validation
 - Based on the classification above
 - Schema Transformation
 - Transform to Target Schema
 - Target Application Lookup
 - Based on Device Id
 - Notification to the target Application

Interface Protocols : REST , SOAP





Reporting and User Interactions



Thank You

Connect & Serve

For More information

www.sensorise.net

Contact:

care@sensorise.net





Sensorise Company Profile

Role Model Machine to Machine Service Provider



Who we Are

- A Role model M2M Service Provider
- Strong team with several decades of experience in Telecom, Analytics, Security, Products and Services
- HQ in Noida with PAN India reach

Our Achievements So far

- First company to introduce embedded SIM (QoSim™) and its Life Cycle Management in Indian market. Filed a Patent in Indian, USA and Sweden Patent Offices
- More than 40 OEMs using QoSim™ with over 100 thousand SIMs deployed
- Development & deployment Customer Feedback Device with Portal, Reports , Analytics and field support for Swatchh Bharat Mission in states of Delhi NCR, Haryana and Kerala

Our Differentiator

- End-to-End Service Provider; takes complete responsibility of hardware, embedded Software, Portals, Analytics and Field deployment and support
- Regularly participate and contribute to Standards and Policies for India; ensures our products and Services are always “Standards aware”

Business Lines



• SenseLCM

- GSMA standardised Universal Integrated Circuit Card based solutions
- Factory Ready solderable SIM
- Secure Messaging Gateway
- Remote Management Portal
- Standards based KYC for Mfr and Buyer
- Quality of Service with multi-network Profiles



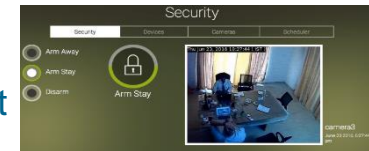
• SenseTise

- Controller and GSM Module based Device
- Factory Ready solderable SIM
- Portal for Public and Secure Administrative access
- Security and Safety features



• SenseMatic

- Z-Wave, Bluetooth, Wi-Fi, LoRa based sensors
- Multi-protocol Gateway
- Secure Portal and Mobile App
- Sourcing and Supply Chain
- Service Management



• SenseML

- AI App for Teenage Health Monitoring
- ML models for Driving Behaviour
- ML models for Demand Forecasting – Power, Retail, Hospitality
- Projects for Childline India for an IoT based Kiosk for destitute Children



Thank You!



16 October 2017

To,
Managing Director
Sensorise Digital Services Pvt Ltd
C 128 Sector 7, Noida - 201301, India
Subject: Association with Sensorise for the development and piloting of the CHILDLINE Kiosk, a sensor based child protection and engagement mechanism by CHILDLINE India Foundation (CIF)

Mr Arora,
Greetings from CIF!

We refer to the proposal jointly developed between CHILDLINE India Foundation (CIF), Sensorise Digital Services, Tata Consultancy Services and Tata TeleServices for the Intelligent Kiosk for Child Protection and Engagement. We had taken up the proposal with the Ministry of Women and Child Development, GOI, for approval.

We are pleased to inform you that the Ministry has conveyed its approval to CHILDLINE for proceeding with the association with Sensorise to accomplish the Pilot phase.

The Ministry has advised us that the funding of the project has to be arranged by CHILDLINE. Since the proposal involves development of complex electronics, sensors, cameras, communications, embedded applications and web portals, we need your assistance in the development of appropriate collateral and project related documents to approach companies which have CSR funds.

The successful conclusion of the six trial deployments within the pilot are critical to enable CHILDLINE to show case the capability of the Child Protection and safety ecosystem including the Ministry of Women and Child Development, Corporates and other welfare organizations. We plan to deploy the intelligent kiosks widely, reaching out to the Children in distressed and Children in need of care and protection at Railway Stations, Bus Stations and public places such as hospitals and Schools etc. The CHILDLINE Management Committee and the Governing Board have already conveyed their consent to the project.

The Ministry and CHILDLINE greatly appreciate the pro bono effort by Sensorise over the last 18 months and request your continued and active support in making this project a reality.

We look forward to your sincere support.

Your Sincere
Dr. Anand T
Executive Director
a member of



50 MOST IMPACTFUL SMARTCITIES LEADERS
(A GLOBAL LEADER)

Presented to
SHARAD ARORA
Managing Director
Sensorise Digital Services Private Limited

1st February, 2018 | Taj Lands End, Mumbai

Presented by
Rishabh
Dr. R. L. Bhatia
Founder, World CSR & Global Responsibility

Endorsed by
Global Responsibility

ODISHA SPACE APPLICATIONS CENTRE (ORSAC)
Department of Science & Technology, Government of Odisha

No. *1763* Date *30/07/17*

To,
The Managing Director
Sensorise Digital Services Pvt. Ltd.
Date: 30 May 2017

30 PREFERRED FOR WORKPLACES

We are a startup, eager to solve complex industry issues using agility, experience, competence, and collaboration.

Security risks: A slight pollution in M2M IoT registration was chosen by industry consultation by DTG on Aug 2016, which has been resolved by the honorable TM for part of 2 Sep 2017. M2M Coexistence. Sensorise was the one big candidate for the Association, Harmonising, Monitoring and Remote product to be able to provide diagnostic information for the customer to not come anxious in case of loss of data. Shared said, "Rishabh was a real information exchange provision and agile and solved the issue in a very short time and he was really helpful. He was able to take right decisions and solve in right fashion."

Work Culture of the Company
Sensorise is a technology driven and most of the team which come on board is highly experienced with decades of knowledge in their field, which come across Telecom, Cloud Infrastructure, and Analytics etc. They love people with an entrepreneurial spirit. They help the people with agile methodology. The company culture follows agile methodology not only for the development process but also in project management. They try to take the team actions that are innovative and appreciate the information exchange. Feedbacks enable everyone to share their views, give or get an idea and discuss it with the team members to meet the goals. The organization encourages their team members to take initiatives and look them up without fail.

Appreciative Dealing Projects
At the moment, Sensorise is participating in the Sharda Bharat Mission project of installing Customer Feedback Devices at the public and community hotspots. They are

IoT Special - February 2017 - GlobalSource Magazine - 1

Sensorise: Enabling the IoT revolution with Multi-Operator Embedded SIM (E-SIM) & M2M Solutions

The industry 4.0 revolution was initiated in when various vision technologies broke machines free from these manes wires, to rise up to what it has become today - the Internet of Everything. The backbone of any IoT/M2M deployment is the M2M connectivity, which needs to be logical, reliable and secure. The reliability of network coverage is a concern in the context, which takes grave proportions when one considers commercial and Para-India mobility. Sensorise is enabling the IoT/M2M by ensuring M2M connectivity from network has also, along various apps with an ecosystem of TSP, M2M & M2M partners, offering flexible, secure and tamper resistant connectivity backed by hardware authentication and TTP based protocols.

The Gen Y values

The Gen Y values are the biggest set of customer focused Quality of Service. We have had a patent in India for managing QoS of M2M devices within a multi operator network, says Sharad. The company has made substantial inputs to the M2M policy framework and Study Reports in India. Working with the Telecom Engineering Centre, Sensorise has contributed a use case to ITU Study Group 20 for vehicle registration, transfer and compliance monitoring using the eSIM, Aadhaar and the mobile identity. "We are bringing our experience in embedded electronics, security, identity, payments and ability to 'hot swap,'" adds Anand Bhargava, the Chief Solution Architect.

For ready to the Future

Incorporated in 2015, Sensorise breathes agile paradigm. The eight people-strong leadership team is wide and credible knowledge base and experience, in all about customer & credible recall of their past peers & customers. Pragmatic, Sarad C.M., a shareholder connectivity and subsequent L16 Cycle Management solution. This customer solution ensures that M2M devices remain connected while moving across telecom circles by automatically connecting to alternate operator's if the primary operator connection is lost. The

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Recognized as

IoT Solution Provider 2018

IoT Solution Provider 2018

The annual listing of top companies providing IoT Solutions in the APAC region

Annle Johnson
Managing Editor

sharad.arora@sensorise.net

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