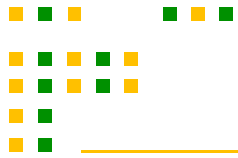


# CEMS – Data Acquisition Systems

How Technology is solving challenges to bring a shift in Regulatory Practices



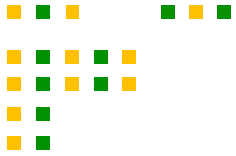
LogicLadder, Gurgaon  
Energy & Environment Intelligence  
Company



# Agenda

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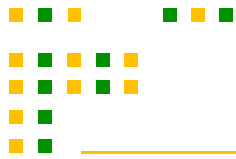
- CEMS – CPCB Initiative & Compliance Guidelines
- How technology paradigm has changed
- Security & Scalability
- CEMS Application Snapshots
- Challenges Ahead



# CPCB Initiative for central monitoring

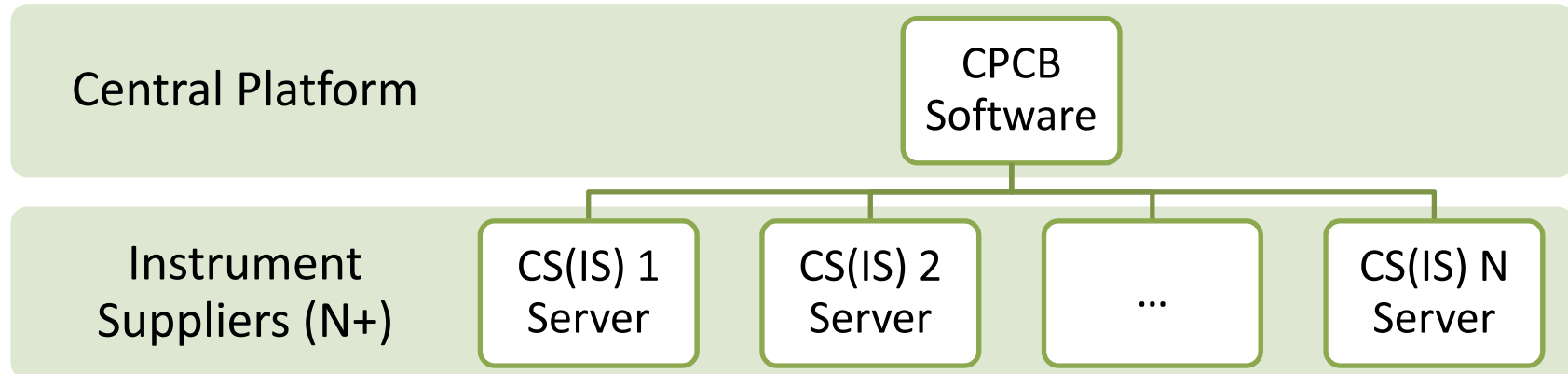
Data driven environment management

Section 5.2 Pg 18 CPCB Guidelines 07-11-2014

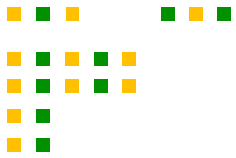


# Central Platform At CPCB

- Acquire data from 22 categories of polluting industries, in a modular and analyzer agnostic way.
- Make data available to various stakeholders.



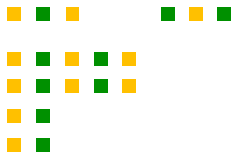
The Instrument supplier layer makes market open for any analyzer or software company to provide solution to the Industry /OEM without changes in existing analyzers.



# The CPCB Guidelines for CEMS Data Acquisition

What's required?

Section 5.2 Pg 18 CPCB Guidelines 07-11-2014



Real time monitoring without any intermediary PC



Accurate timestamps



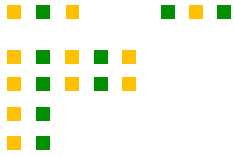
Two way communication (For on demand calibration & Diagnostics)



Data logging in case of communication failure



Multi tenancy and user access – SPCB, CPCB & Data Generator (Industry) ...



Auto report and auto mail generation



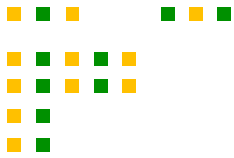
Change request and workflow management for managing analyzer downtime/maintenance and data change requests.



Real time video streaming for ZLD industries

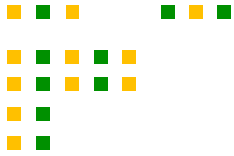


Real time alert over email and SMS.



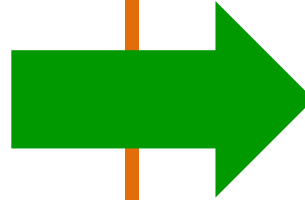
# CEMS DATA ACQUISITION: How technology paradigm is changing?





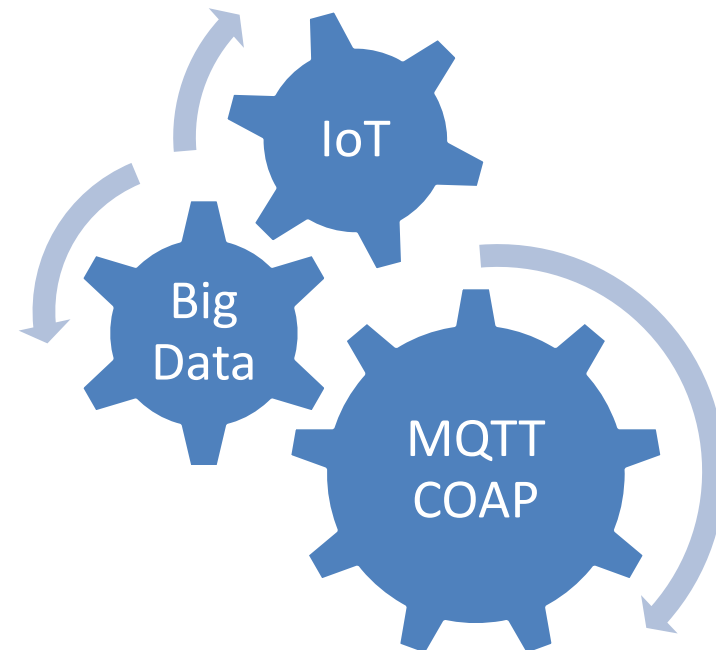
# INTERNET 1.0

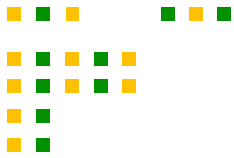
**Client Server -**  
Request response



# INTERNET 2.0

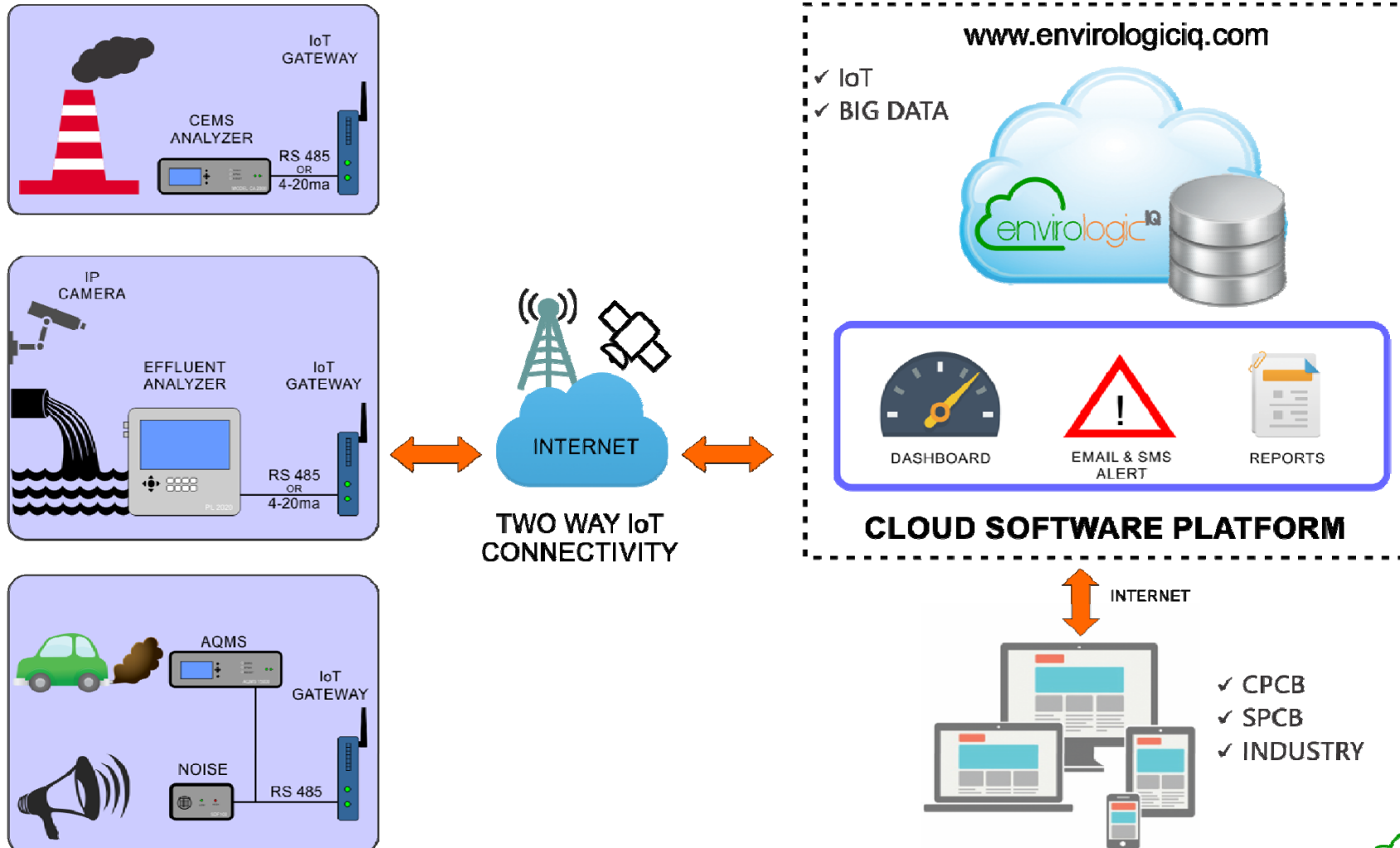
**IoT - Persistent**  
Connectivity with Push  
Messaging

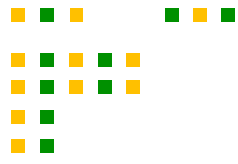




# How it Works?

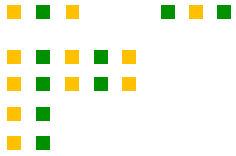
Internet of things (IOT) or Machine to Machine (M2M) platform for remote monitoring, control & management of environment monitoring stations and analyzers over GPRS, satellite and broadband.



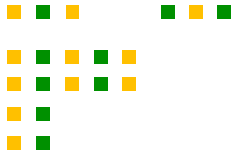


# Data Acquisition Software Platform : What to look for ?

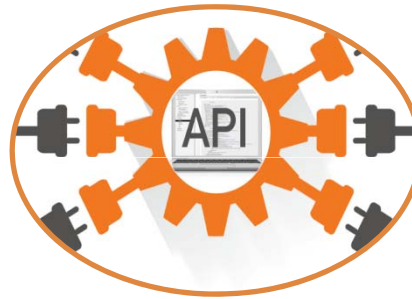
- Should be highly available
- All layers of data transmission should be secure
- Intelligent alarm system
- Scalable
- Reliable
- User Access Control
- Audit logs



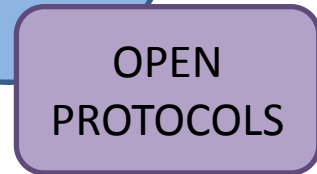
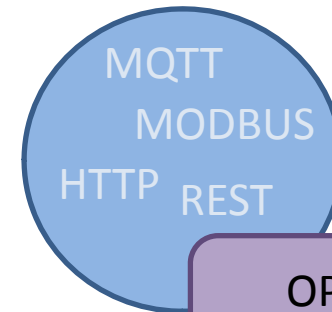
# How secure and scalable is it?



Store large amount of data



Share information with multiple stakeholders



Support any device



Makes Communication Reliable

## SCALABLE & RELIABLE

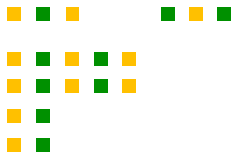


Local Logging on Device to Safeguard against Network issues.



NTP

Makes time stamps accurate



Device to Server Secure  
Communication



Audit Logs

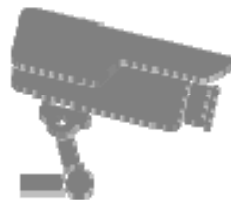


Data Signature

# SECURITY & INTEGRITY



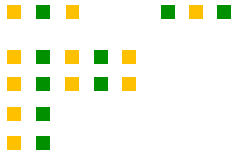
Data Integrity and  
Validation Test



No fixed IP. Secure  
streaming.

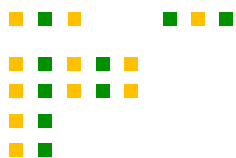


Fraud Analytics



# CPCB Application Snapshots

A sneak peek into the platform



Reports

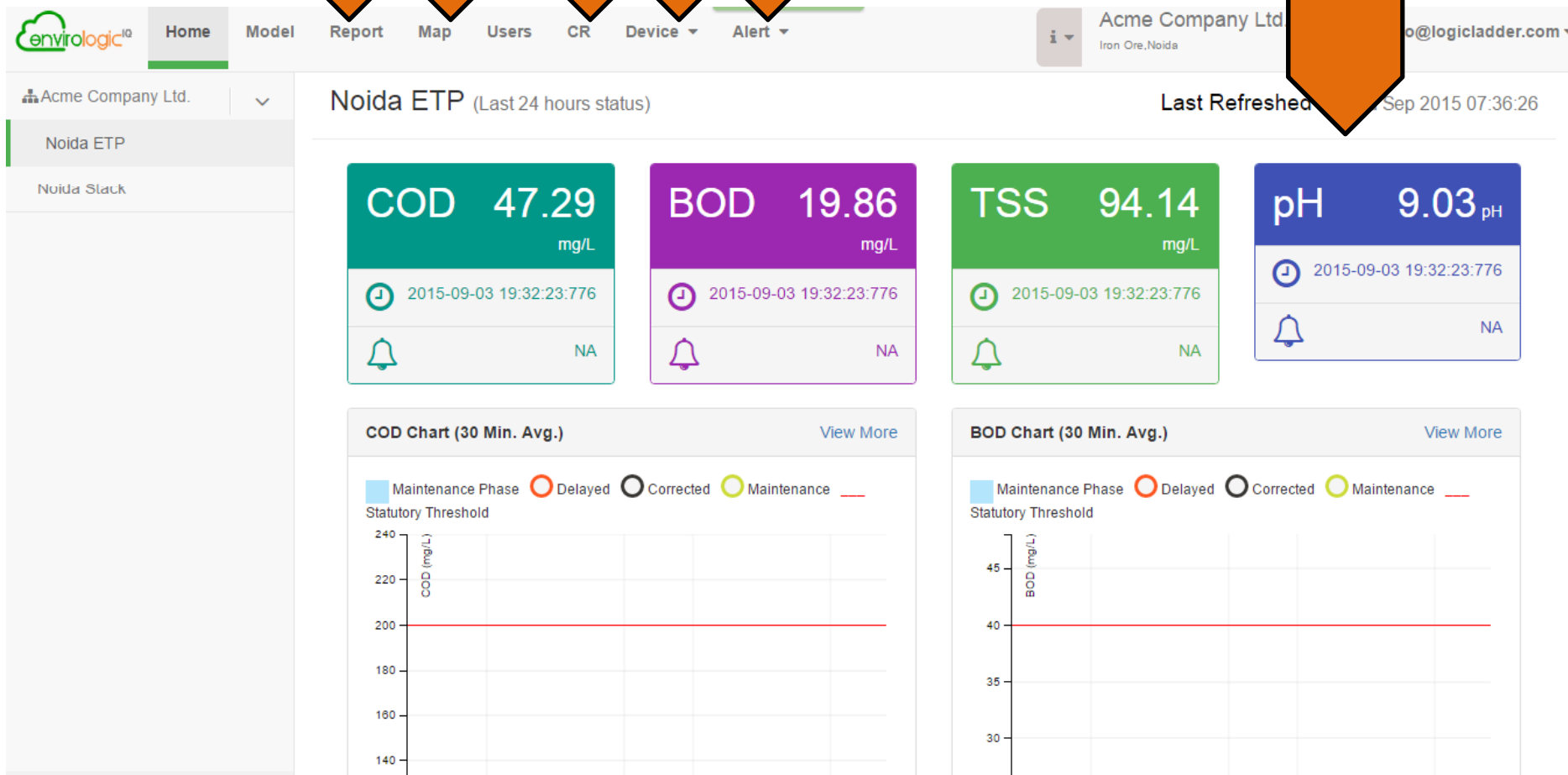
Map

Change Request

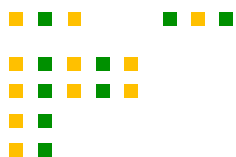
Calibrations

Alerts

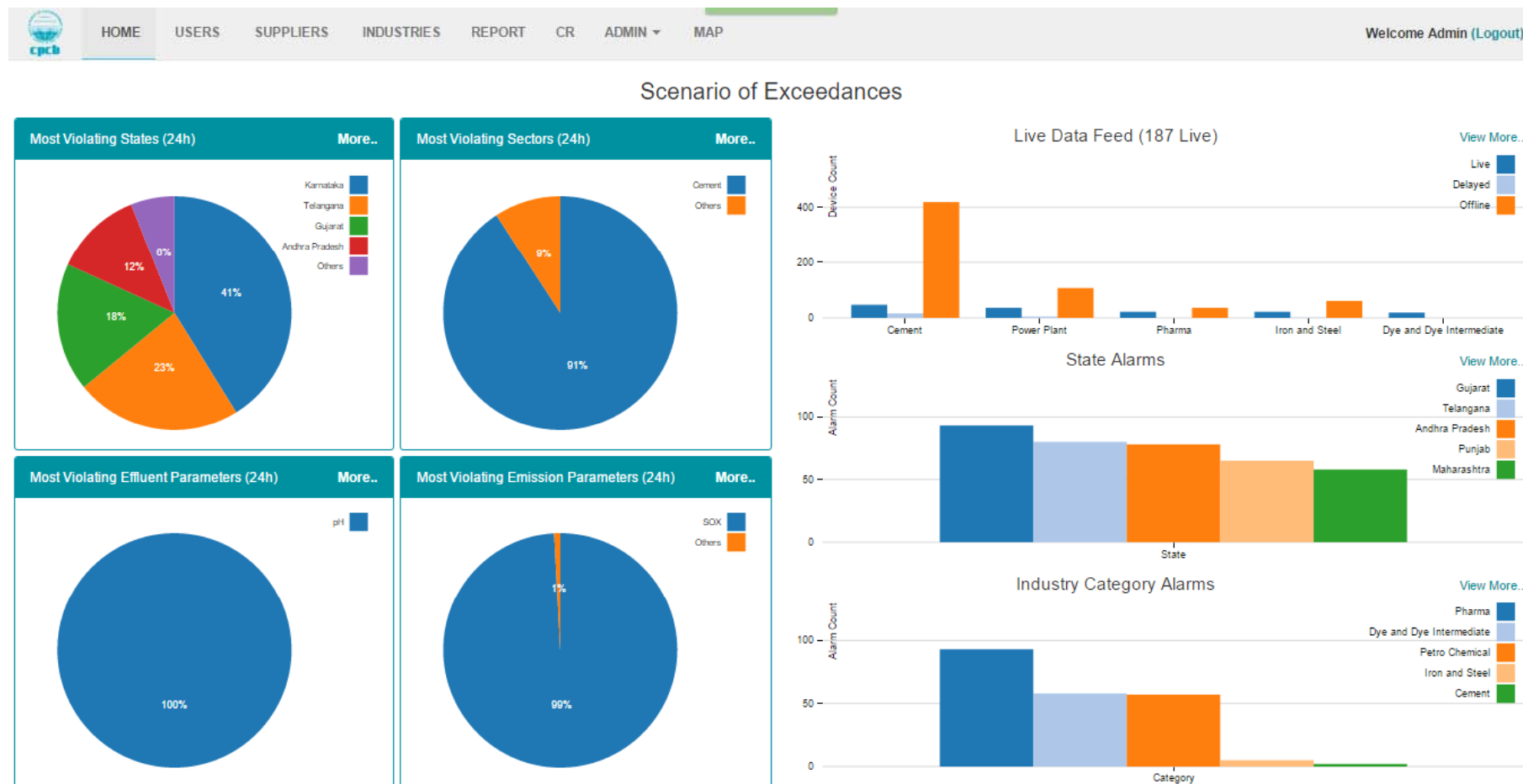
Real Time  
Dashboard

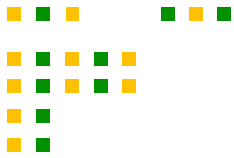






# Dashboard – Quick snapshot of Country Scenario





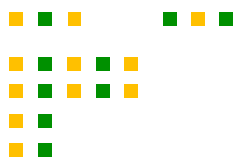
# Map View – Easy Location of Industries

cpch HOME USERS SUPPLIERS INDUSTRIES REPORT CR ADMIN MAP Welcome Admin (Logout)

-- Select -- -- Select -- Cement Emission Filter

Category: Cement  
Industry Name: SDCCL  
City: Digvijaygram  
State: Gujarat  
Address: Shree Digvijay Cement Co. Ltd  
Violation of: -  
[View Detail](#)

Violation  
No Violation



# Hardware – All models supported

Create Supplier User

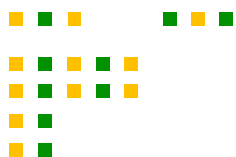
Name

Email Id


Submit

List of Supplier Users

S.No	Supplier Name	User Name	E-mail
1	ForbesMarshal	ForbesMarshal	marshal.forbes@mail.com
2	Nevco	Nevco	nevco@mail.com
3	ESA	ESA	esa@mail.com
4	Chemtrols	Chemtrols	chem@mail.com
5	ThermoFisher	ThermoFisher	thermo@mail.com
6	Swan	Swan	swan@mail.com
7	AaxisNano	AaxisNano	axisnano@mail.com
8	Yokogawa	Yokogawa	yoko@ma
9	Envirotech	Envirotech	enviro@mail.com
10	LogicLadder	LogicLadder	logic@mail.com



# Industry Dashboard – Single centre view of all parameters

HOME USERS SUPPLIERS INDUSTRIES REPORT CR ADMIN MAP Welcome Admin (Logout)

**ACC Limited Bargarh** (Industry Code -Not Available)  
Cement

Bargarh Cement Works Cement Nagar, PO  
Bardol District Bargarh  
Bargarh, Orissa, 768038  
Latitude - 21.3425839  
Longitude - 83.62420099999997

No. Of exceedance (Past 24 hours)  
**0**

Alerts Communicated (Past 24 hours)  
**0**

Located in Ganga Basin?  
**No**




SPCB Regional Office  
Paribesh Bhawan, A/118,  
Nilakantha Nagar, Unit - VIII,  
Bhubaneswar - 751012, Odisha




Industry Representatives

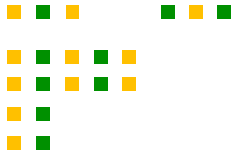
Name	E-mail	Mobile	Landline	Process/Plant Responsible for
No Representative for this Industry				

**Number of Stations (2)**

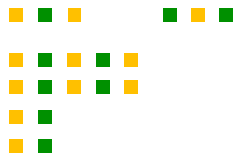
**Kiln (stack)**

 Good Data  Bad Data  Offline [View Data](#)

Parameter	Unit	Diagnostics	Calibrated On	Regulatory Limit Min	Regulatory Limit Max	Analyzer acceptance range Min	Analyzer acceptance range Max	No. Of Exceedance(24hrs)	Alarms Communicated(24hrs)	Device Info
PM	mg/Nm <sup>3</sup>		N/A	-	50 mg/Nm <sup>3</sup>	-	-	0	0	Show Device Info
SO2	mg/Nm <sup>3</sup>		N/A	-	100 mg/Nm <sup>3</sup>	-	-	0	0	Show Device Info
NO	mg/Nm <sup>3</sup>		N/A	-	-	-	-	0	0	Show Device Info



# Challenges Ahead



# Challenges

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Limitations in delivering  
99.99% real-time uptime

99.99% SLA requires multiple actors to work perfectly – Analyzer, Network, Software. Is it possible?

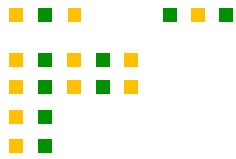
Dependence on third  
parties

Communication of data depends on Internet (mobile & broadband) which is owned by third parties. How do we ensure 99.9% SLA from them?

Gap between Reality and  
Expectations of Industry  
Uses, Regulators

100% data uptime, except for a downtime of some days allowed in a year for maintenance. Is this possible for the Industry to achieve?

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# Challenges

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Incompatible CEMS  
analyzers

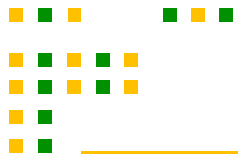
Not all CEMS hardware provides all the  
information that may be required by an  
online system

CEMS communication  
interfaces

Not all analyzers have digital output, 4-20  
mA /analog outputs do not provide  
diagnostic information

Tampering of Data

Tampering of data at Analyzer or  
instrumentation level is difficult to stop.

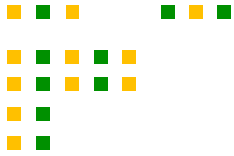


## Conclusion – Way Ahead

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- Use CEMS data for emission trading and other business benefits
- Integrate the CEMS/AQMS data in public domain for health advisory
- Use data to predict environment impact





LogicLadder Technologies Pvt. Ltd.  
401 Unitech Arcadia, South City II  
Sector 49, Gurgaon - India

# THANK YOU

Mayank Chauhan  
[mchauhan@logicladder.com](mailto:mchauhan@logicladder.com)