
AVEVAWORLD

AVEVAWORLD

WEDNESDAY, APRIL 9

Dr. Reddy’s Labs & Capgemini:

Journey with Industry 4.0, World Economic Forum, and Global Lighthouse Network

SESS-40

Yasaswi Sirugudi – Dr. Reddy’s Labs
Gopal Gopalkrishnan – Capgemini

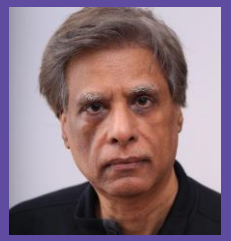
AVEVA

Dr. Reddy's Labs' Journey with Industry 4.0, World Economic Forum, and Global Lighthouse Network

Speakers:

Yasaswi Sirugudi

Associate Director
Core Manufacturing Digital Transformation
Dr. Reddy's Laboratories



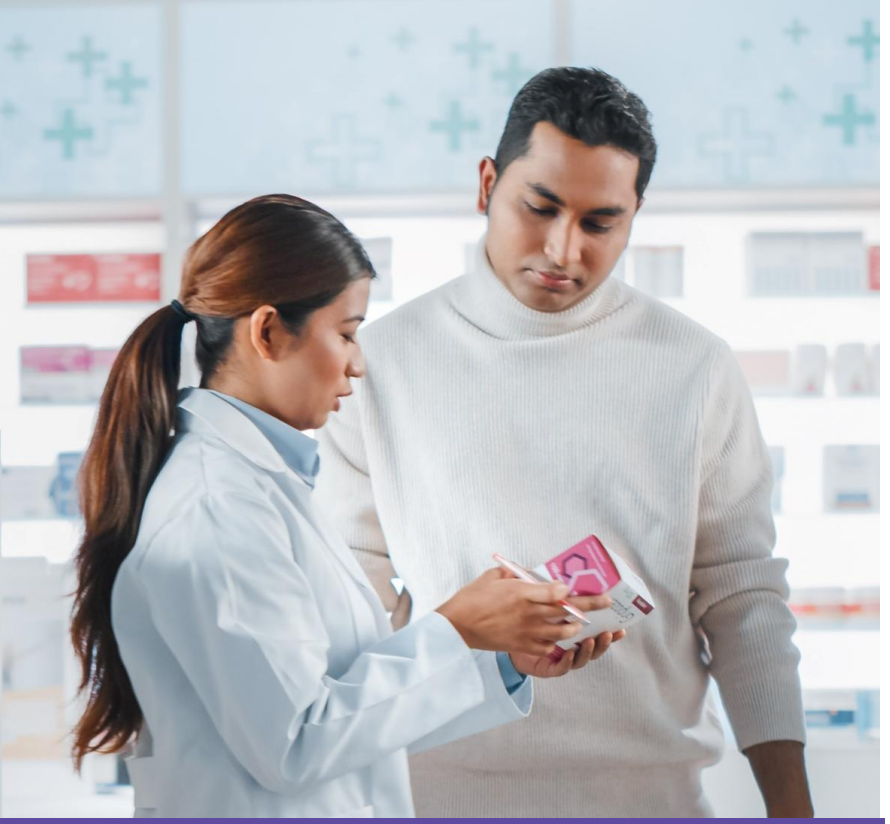
Gopal Gopalkrishnan P.E.

Senior Director
Global Digital Manufacturing CoE
Capgemini Engineering

AVEVA

Capgemini

Dr.Reddy's



Dr. Reddy's Labs' Journey with Industry 4.0, World Economic Forum, and Global Lighthouse Network

AGENDA

01 Company Overview – Dr Reddy's

02 Company Overview – Capgemini

03 WEF Digital Lighthouse Accreditation

04 Manufacturing Operations – Digital Landscape

05 Need for a Data Lake

06 Role of AVEV PI in Dr. Reddy's Digital Strategy

07 Implementation Architecture

08 Range of Use cases serviced by AVEVA PI

Abstract

Dr. Reddy’s Laboratories (Dr. Reddy's) has been investing in various OT technologies - and in 2022, the World Economic Forum (WEF) recognized our Bachupally, Hyderabad site as part of the Global Lighthouse Network (GLN). Project ‘OpsNext’ was initiated in 2020 to transform the plant into an Industry 4.0 (I4) driven WEF ‘Lighthouse’ factory.

We have partnered with Capgemini to scale and roll-out several successful AVEVA PI based initiatives and OT projects such as consolidation/validation of the PI infrastructure, PI integration with Werum/PAS-X MES, and others. Batch Release via expedited Review by Exception has ***led to a 20% reduction in turnaround time***. PI integration with Honeywell BMS/EMS has ***resulted in a 10% reduction in energy*** usage by identifying/isolating unused clean rooms. Real time OEE tracking and proactive CPP (critical process parameters) monitoring (golden tunnel) ***has led to a significant dip in quality deviations***.

Join us as we share the learnings from these and other digital transformation initiatives and I4/WEF at Dr. Reddy's.

8
API Facilities

11
Formulation Facilities

10
Global R&D Centers

2
Biologics Centers

74
Countries

$ 3.3Bn
FY24 Revenue

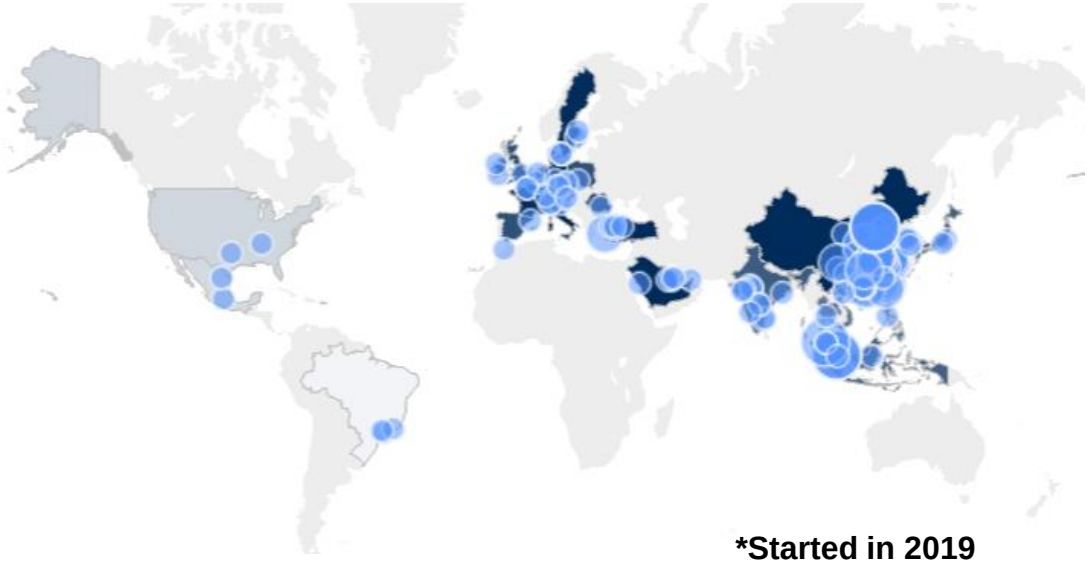
350+
Products

- Sales & Other Offices
- Manufacturing Facilities
- Research & Development Centers
- Headquarters

WEF Digital Lighthouse Accreditation

First pharma facility in APAC to be accredited

2022 – our largest formulation unit FTO3 (Hyderabad, INDIA) - recognized as a Global Lighthouse Network (GLN) site

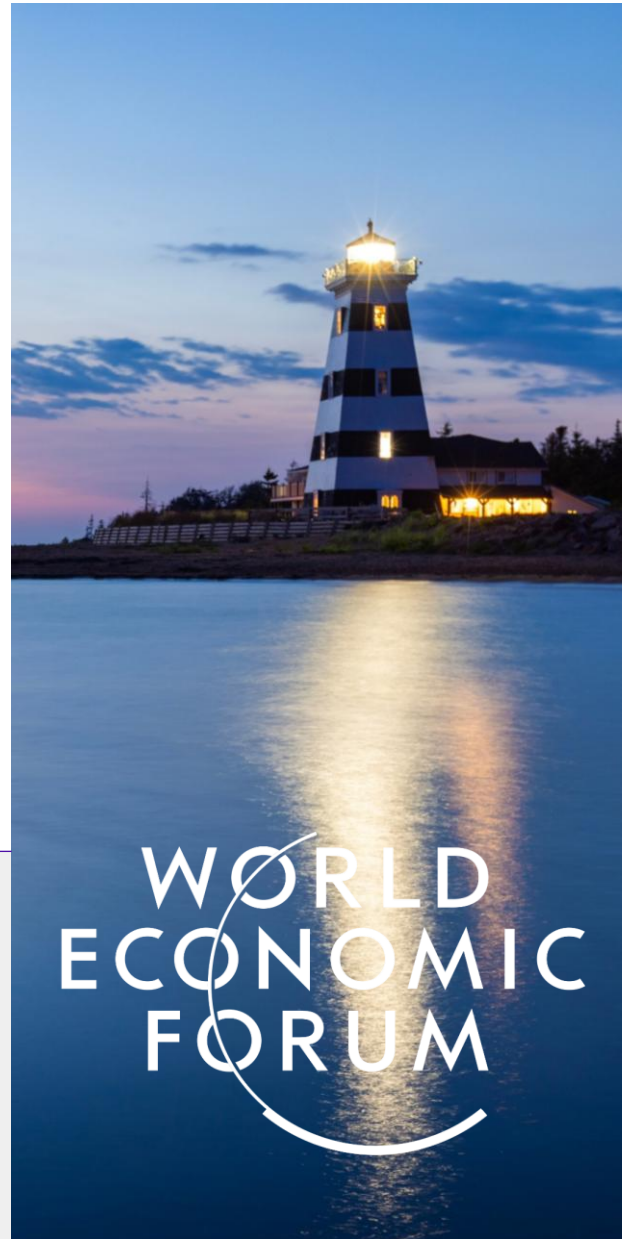


*Started in 2019

Global Lighthouse Network

189
Global

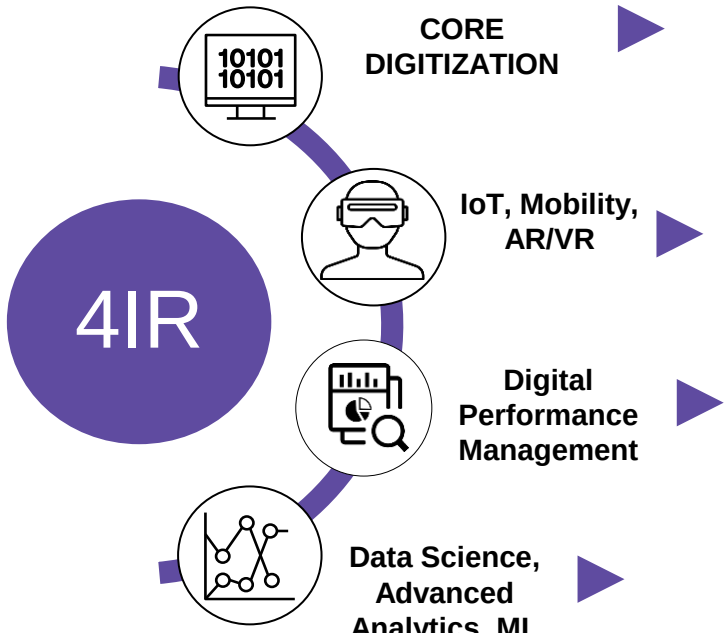
13
Pharma

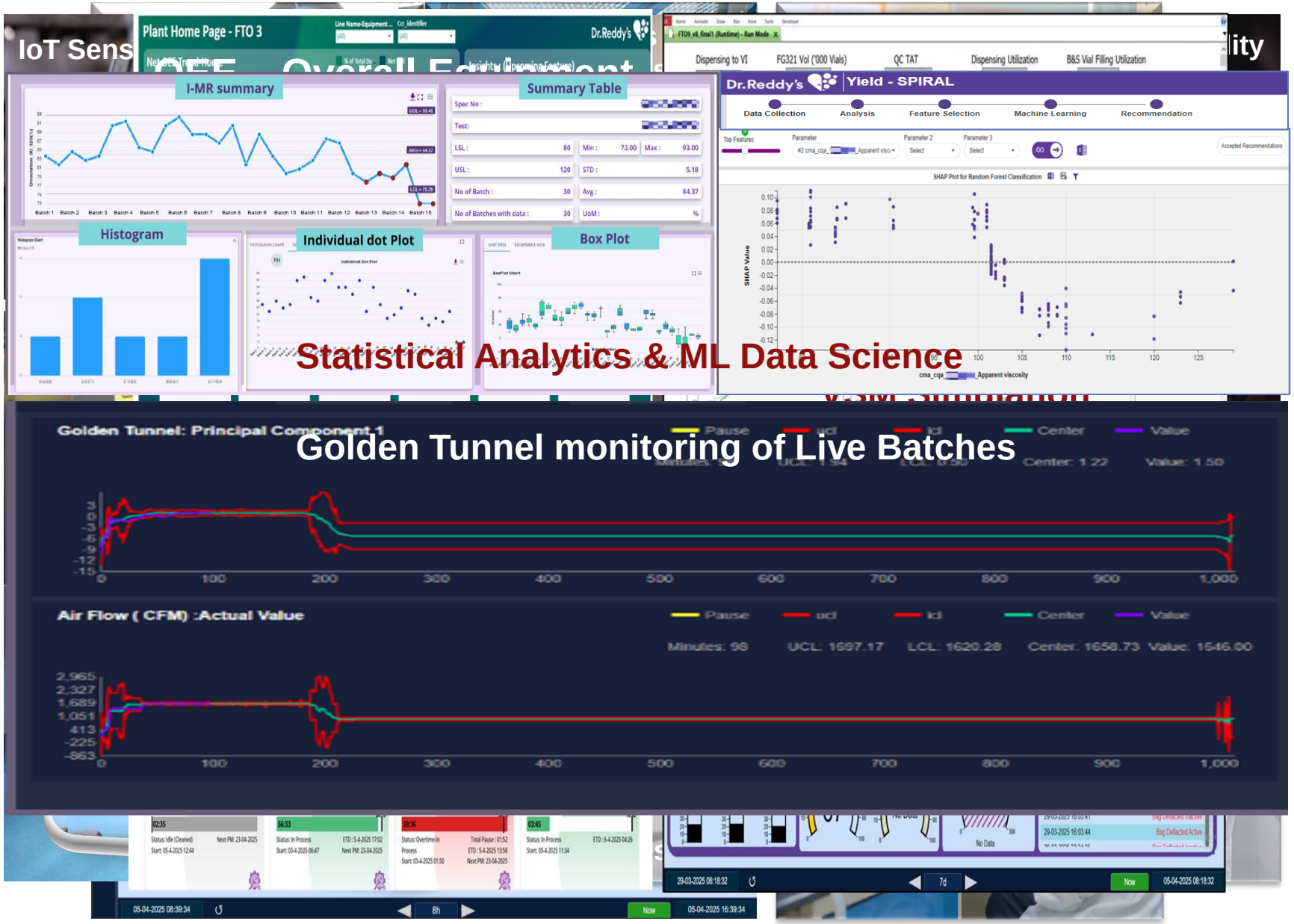


Criteria for Lighthouse

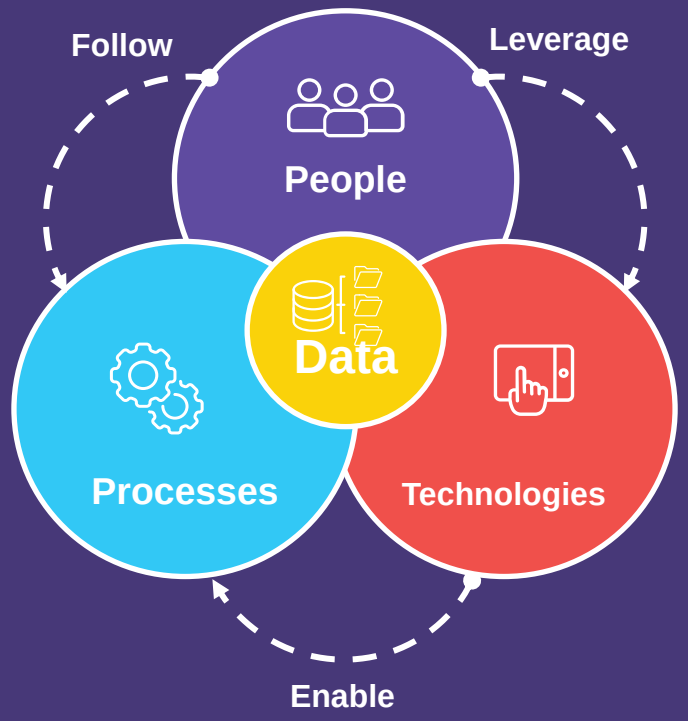
- **Impact achieved**
- **Integrated solutions**
- **Capabilities & enablers**
- **Challenges overcome**

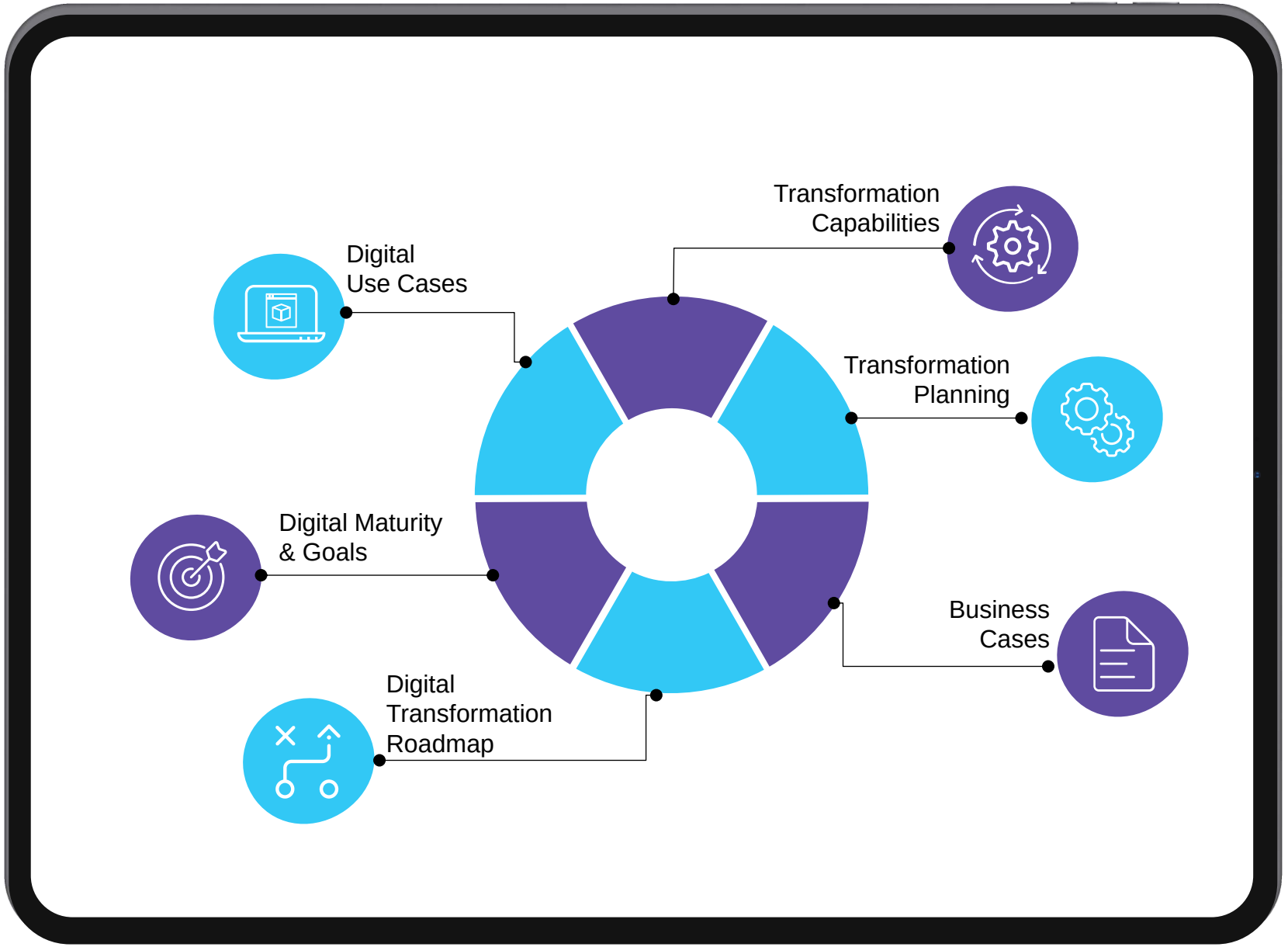
Digital Landscape at Dr. Reddy's



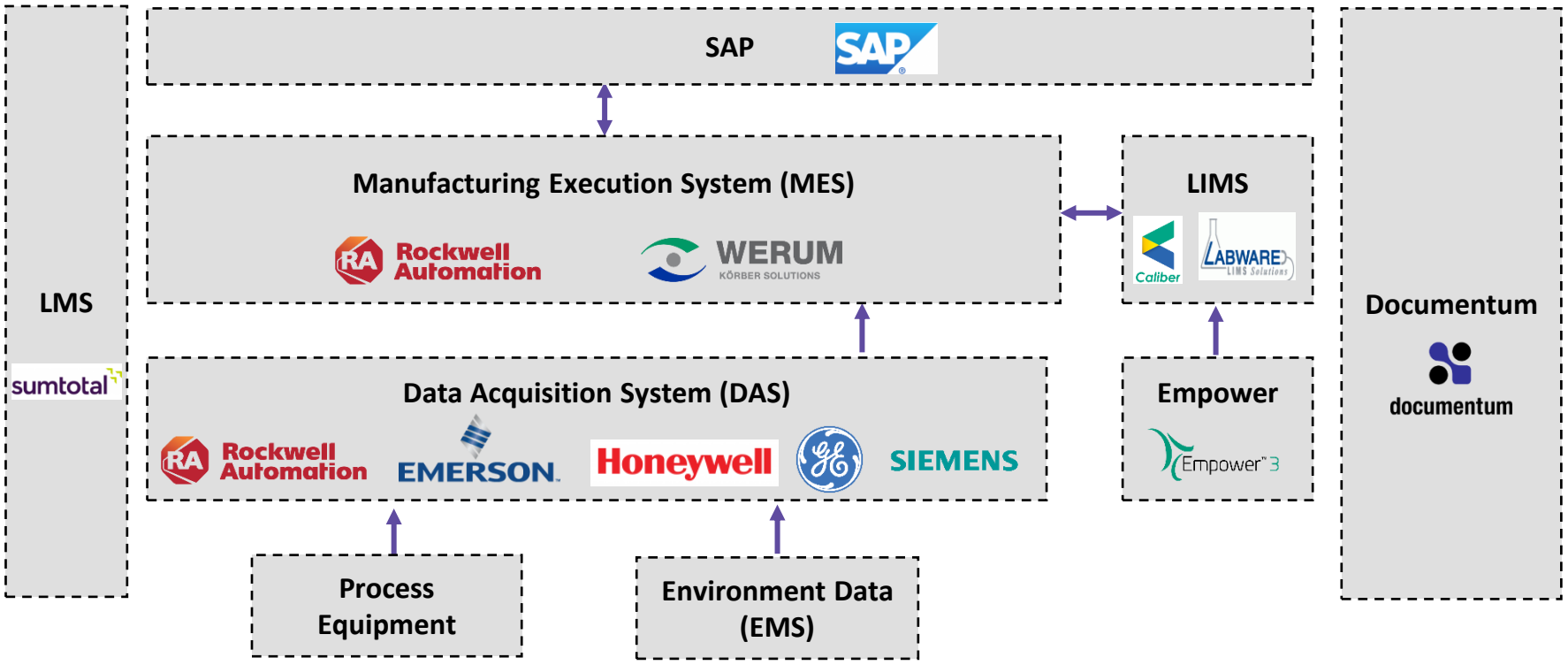


Digitization & Digitalization





Disparate Data Landscape



Challenges

- Govern, interact & pipe multiple data Systems
- Lack of Standardization & Harmonization
- Loss of context

Data in Multiple Source Systems

Varying Data Types & contexts

SCALABILITY

AVEVA PI's role in Dr. Reddy's Digital Strategy

DIGITAL STRATEGY

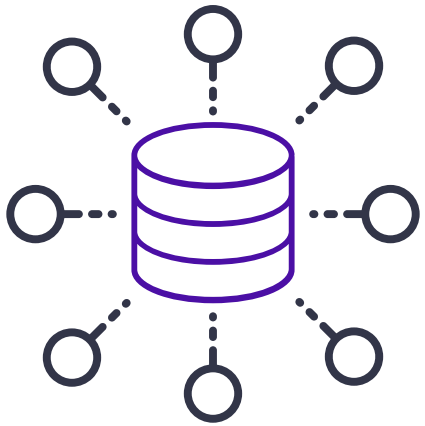
Aggregated Data Infrastructure

11

Operational data foundation

AVEVA

- Equipment System(s) PLC / DCS / SCADA
- Data Acquisition Systems (DAS)
- Facility Systems (HVAC - BEMS)
- IIoT at scale



Other data

- Enterprise Resource Planning
- Manufacturing & Testing Execution (MES & LIMS)
- SCM & CRM (Supply chains & Customer rel.)
- HRM & LDM (Human resources, Capability & Learning)

Integrated Data Infrastructure

Implementation Architecture

Digital & Analytics Applications

Google Cloud

Data Lake
(Storage, Computing, Aggregation & Access)

AVEVA PI

Storage
Data Archive

Contextualization
Asset Framework

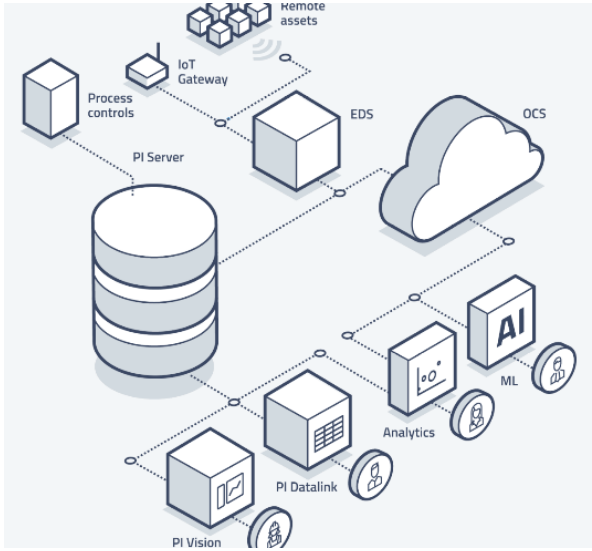
Visualization
Vision

MES

LIMS

SAP

Empower



Kepware OPC Server, Interfaces
(OPC HDA, RDBMS), Gateway, MQTT

Collect
(Interfaces/Connectors)

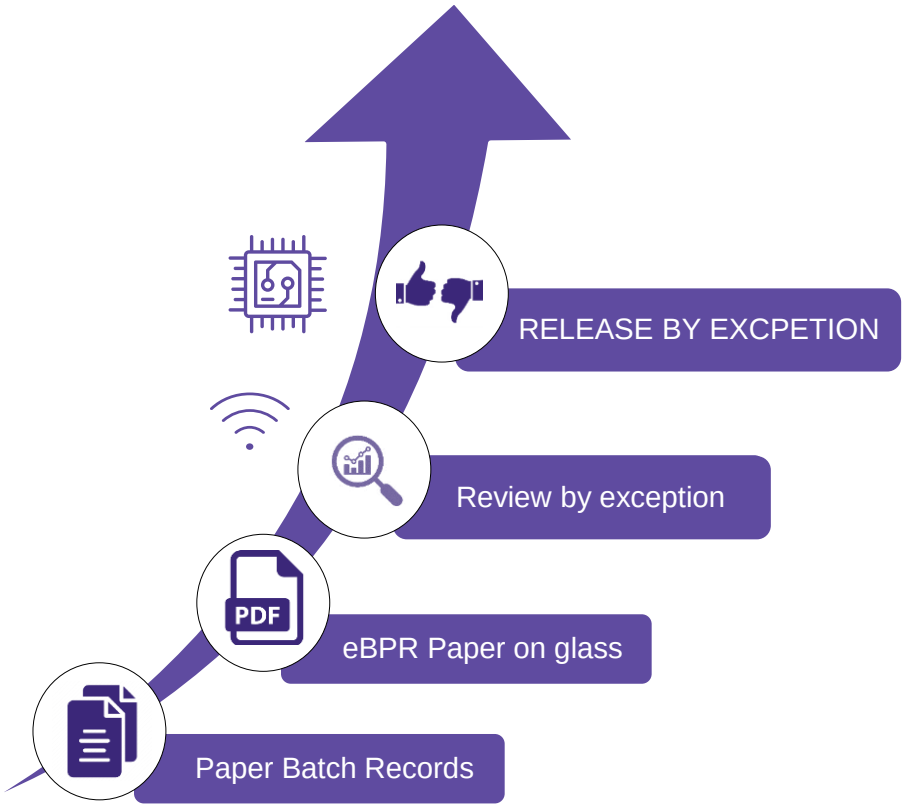
Allen Bradley	Siemens	ABB		Modicon
PLC 1, SCADA/HMI	PLC 2, SCADA/HMI	PLC 3, SCADA/HMI	.....	PLC N, SCADA/HMI
FTView Rockwell	Simatic WinCC	ABB		Schneider
Equipment 1	Equipment 2	Equipment 3	.....	Equipment N

IoT Sensors
Critical Assets/
Field Devices

EMS (Chiller, Pumps, ...)
BMS (AHU with VFDs
SQL DBs

Physical
Devices &
Controllers

Review by Exception to Release by Exception

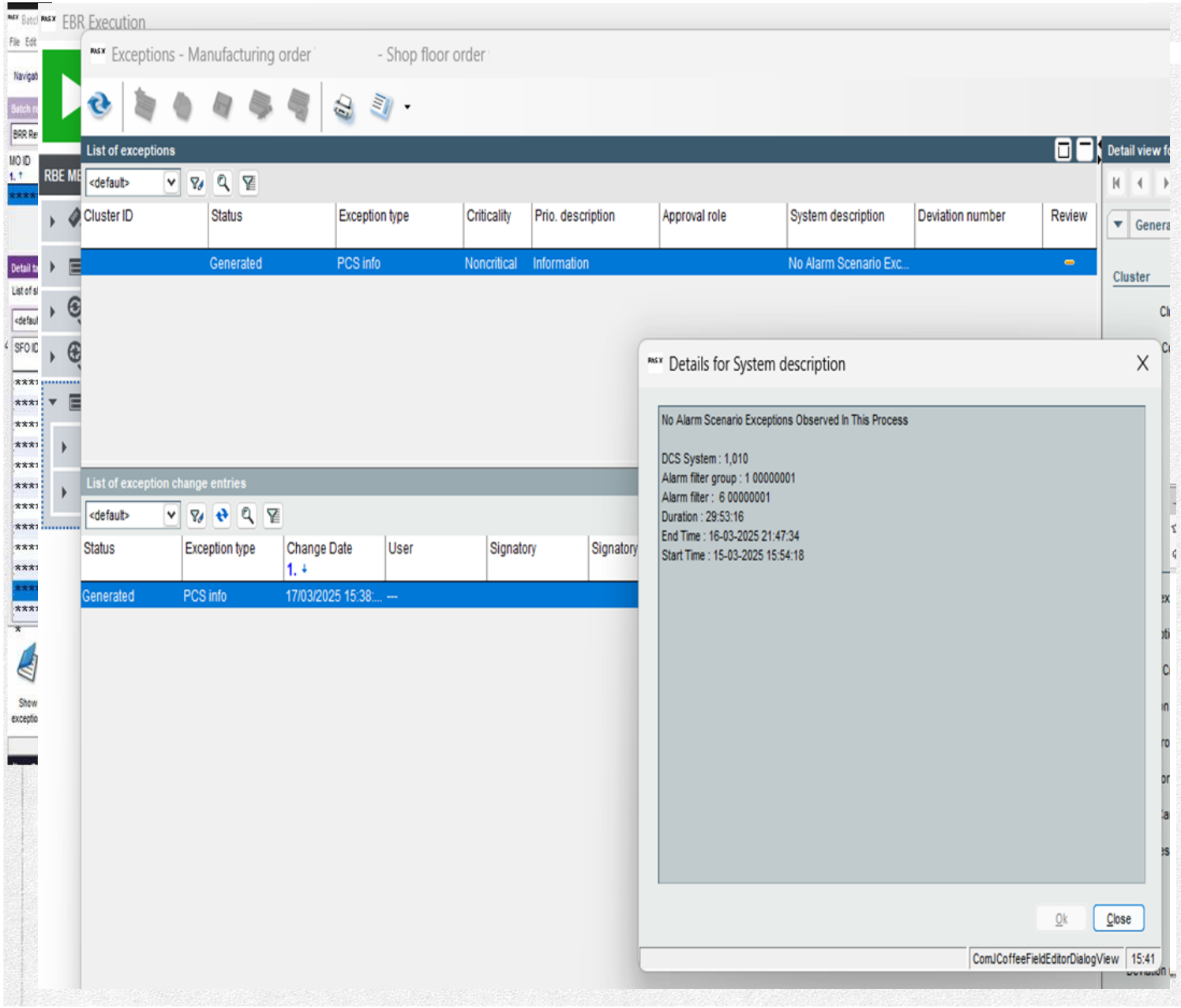


Review & release TAT

400%

Reduction

(from 8 hrs to 2 hrs)



Rapid Investigator to Smart Investigator

Integrated data platform for Investigating **Out Of Specification (OOS) / Out Of Tolerance (OOT)** batches

Making all data readily available in a platform along with the generation of insights to improve the quality of investigations and help identify the right root cause.

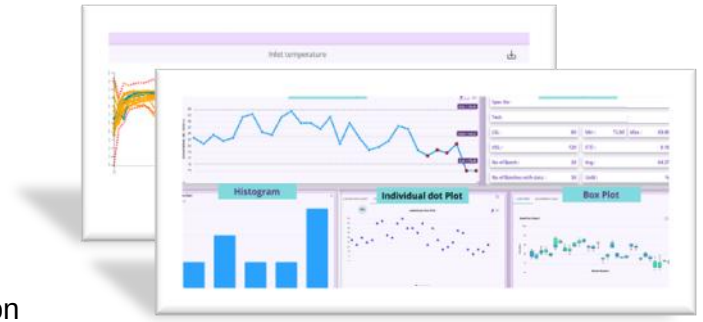
Manual Logging » Assess Impact & Collect Data » Analysis » Report creation » Corrective and Preventive Actions

Quality and Material Attributes

Process Parameters

BMR

Laboratory

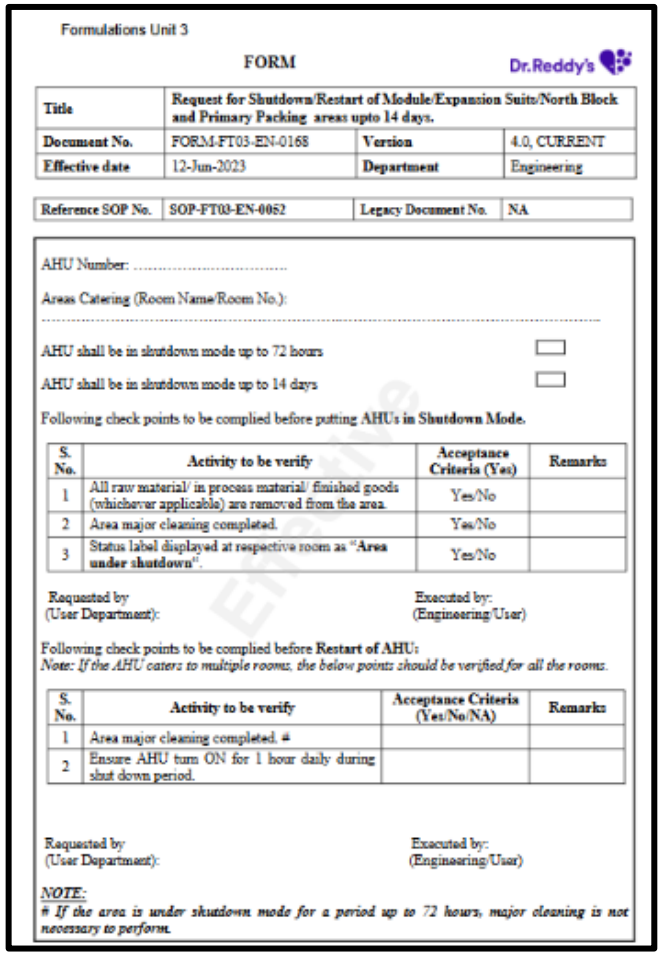


1	Efficiency/Productivity Improvement	All Data on SI Platform	Turn Around Time Reduction
2	Quality of Investigations	% of Investigations with Root cause	Reduction in **Repeat by Cause** Incident

Building Energy Management System Integration

Automated environment control by integrating Honeywell EBMS with MES PAS-X through AVEVA PI

Manual



Formulations Unit 3

FORM

Dr.Reddy's

Title	**Request for Shutdown/Restart of Module/Expansion Suits/North Block and Primary Packing areas upto 14 days.**		
Document No.	FORM-FT03-EN-0168	**Version**	4.0, CURRENT
Effective date	12-Jun-2023	**Department**	Engineering
Reference SOP No.	SOP-FT03-EN-0052	**Legacy Document No.**	NA

AHU Number: .....

Areas Catering (Room Name/Room No.):

.....

AHU shall be in shutdown mode up to 72 hours ☐

AHU shall be in shutdown mode up to 14 days ☐

Following check points to be complied before putting **AHUs in Shutdown Mode.**

S. No.	Activity to be verify	Acceptance Criteria (Yes)	Remarks
1	All raw material/ in process material/ finished goods (whichever applicable) are removed from the area.	Yes/No	
2	Area major cleaning completed.	Yes/No	
3	Status label displayed at respective room as "**Area under shutdown**".	Yes/No	

Requested by
(User Department):

Executed by:
(Engineering/User)

Following check points to be complied before **Restart of AHU:**
Note: If the AHU caters to multiple rooms, the below points should be verified for all the rooms.

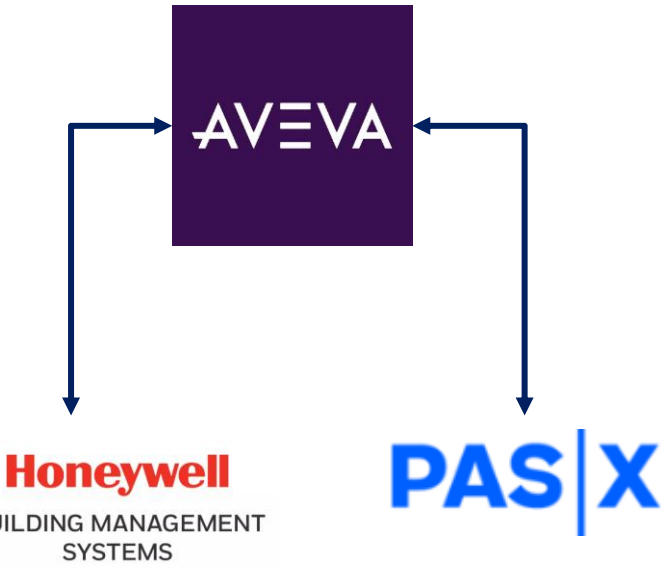
S. No.	Activity to be verify	Acceptance Criteria (Yes/No/NA)	Remarks
1	Area major cleaning completed. #		
2	Ensure AHU turn ON for 1 hour daily during shut down period.		

Requested by
(User Department):

Executed by:
(Engineering/User)

NOTE:
 # If the area is under shutdown mode for a period up to 72 hours, major cleaning is not necessary to perform.

Integrated



Impact

10%

Energy Reduction

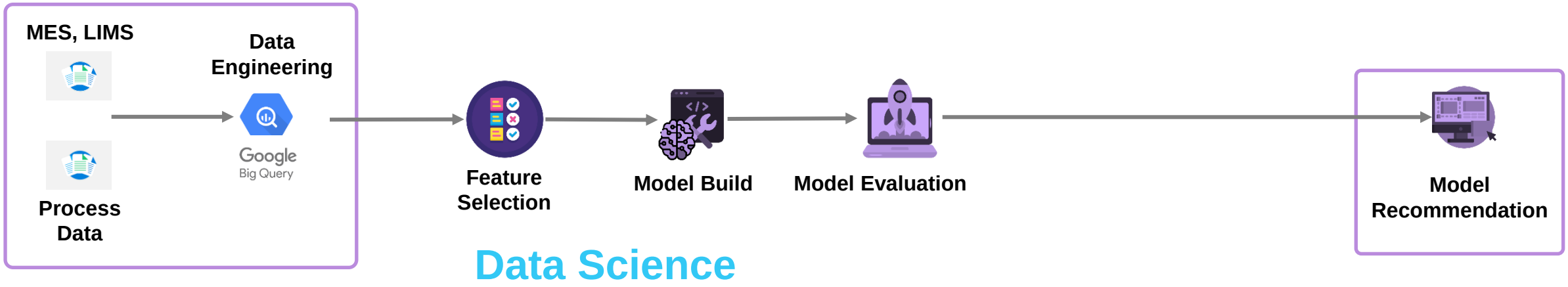
$500K

Annual Savings

Improving Yield & Quality using a ML Framework

1	Identification of impactful and controllable variable with data from DataLake
2	Data-driven decision making to identify optimal ranges for process variables

Orchestrated Data Science pipeline – Application Implementation



Possible target variables:
Yield or Critical Quality Attribute (assay, purity, …)

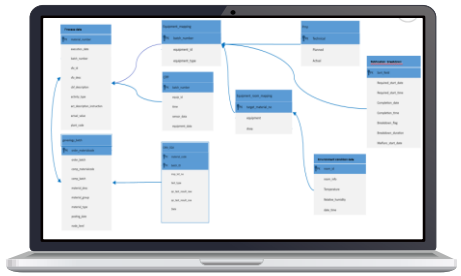
ML Framework (internal)

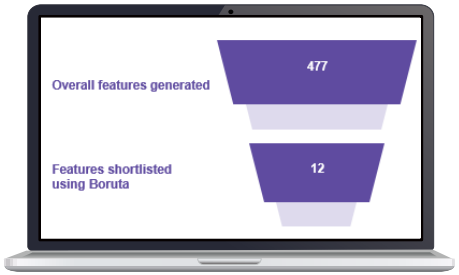
1

Various data from 10+ sources integrated into a clean file at batch level…

10s-100s features considered across batches.

Primary features from multiple sources engineered to useful **synthetic features**



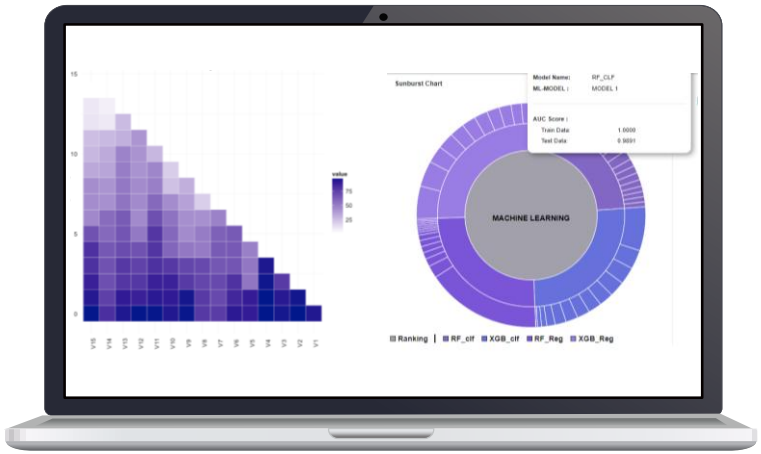


2

…which are prioritized and forwarded for Model building…

We define the **Target Variable**, prioritize significant features using statistical methods.

Machine learning models applied (iteratively) on significant features

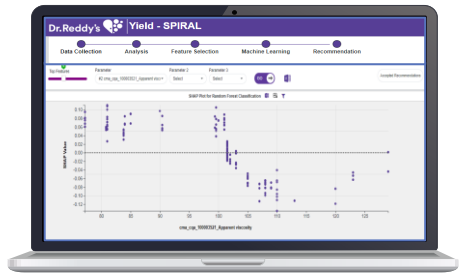


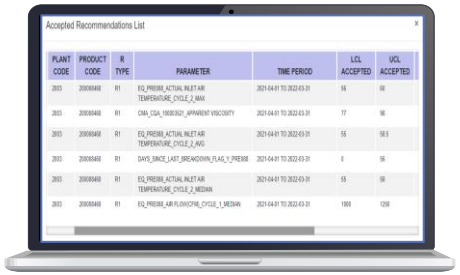
3

…to arrive at optimum parameter ranges

Optimal limits derived from **SHAP plot** for Top performing model

Accepted Recommendations from SHAP plot based on Business Input





ML Framework (internal)

4

….Recommendations are validated for implementation…

Recommendations from platform are discussed with Cross functional teams – operations, engineering, supply chain etc., basis the insight.

Basis feasibility & cost benefit analysis, final accepted recommendations are implemented at shop floor.

5

…Process trials and Compliance Tracking…

Track compliance of recommendations in subsequent batches.

Discuss **Implementation Challenges** & iteratively improve.

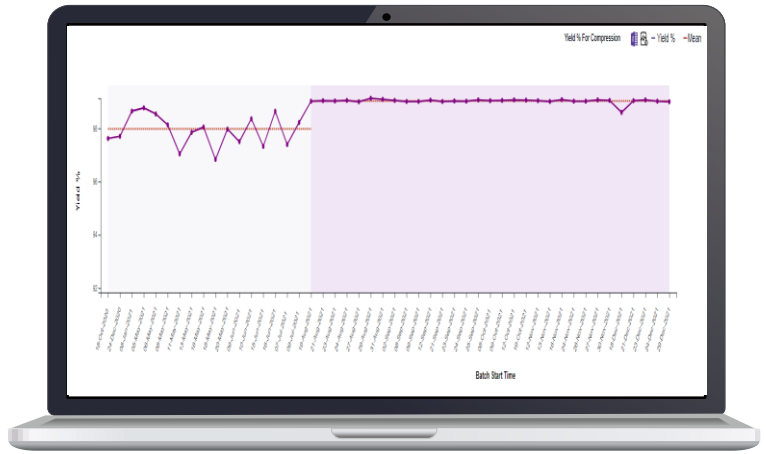
Out of recommended range
Within recommended range

Batch no.	Lot no.	Avg. Drug layering inlet air temperature (°C)	Solution preparation time (min)	Wet pellets hold time (min)	Drying time (min)	Yield (%)
		60-61.5 C	20-80 mins	30-120 mins	50-150 mins	
C2102167	Lot 1	60.31	74	250	177	79.96
	Lot 2	61.03	74	79	279	75.13
	Lot 3	61.06	96	43	191	79.27
	Lot 4	60.31	80	81	224	79.03
C2102168	Lot 1	60.43	68	134	238	81.22
	Lot 2	60.56	84	86	227	76.16
	Lot 3	60.31	80	149	180	81.45
	Lot 4	60.93	69	57	152	80.76
C2102169	Lot 1	60.56	65	22	133	80.99
	Lot 2	60.43	84	41	105	80.41
	Lot 3	60.66	72	34	157	81.1
	Lot 4	60.43	89	17	118	80.53

6

…Measure impact on KPI…

Measure variation in Targeted KPI (Yield/ Quality) to calculate impact.



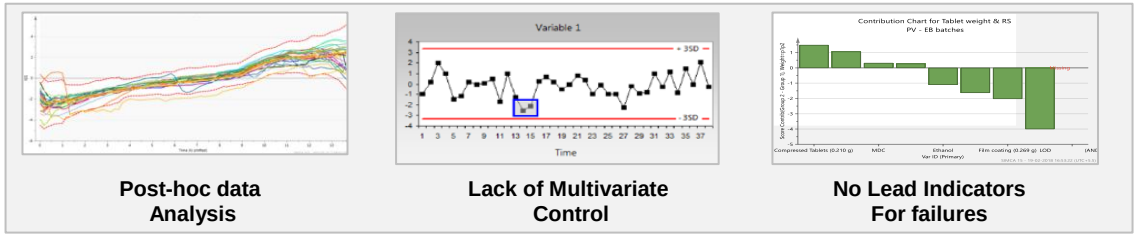
Golden Batch and Golden Tunnel

Online Process Monitoring for guided in-process parameter adjustments

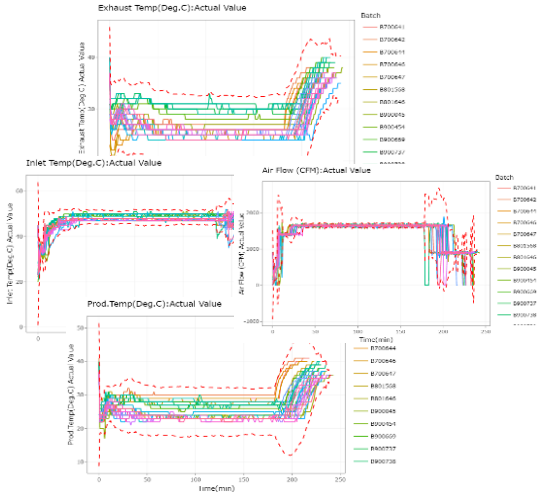
Business Case: Online Process Monitoring to reduce/eliminate Process Parameter(s) variability based on Golden Batch runs

Problem Statement:

- Univariate control is insufficient in a multivariable process
- Post-mortem analysis needs to be replaced with continuous corrective action during live execution of a batch.



Post-hoc data Analysis | **Lack of Multivariate Control** | **No Lead Indicators For failures**

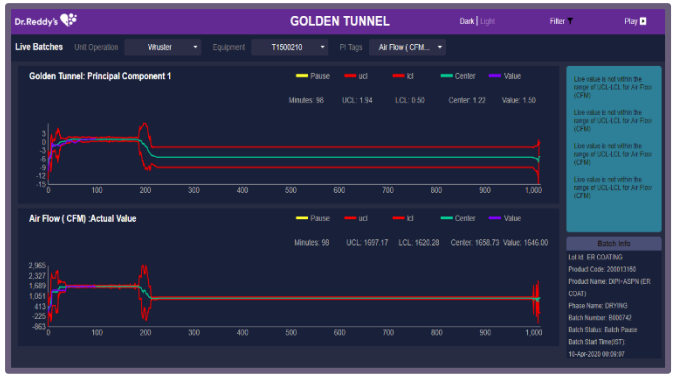


Multivariate Comparison in Real Time

What does it take to

- PI as CPP Data Lake
- PI based Streaming Solution
- Model Development

Golden Tunnel Application



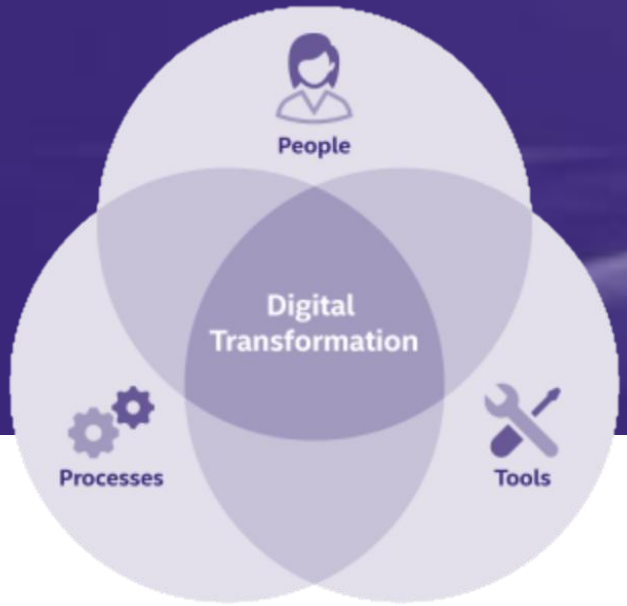
Signals to Adjust Process Parameters

- Eliminate failures due to variability in Process parameters
- Improve Product Quality Metrics

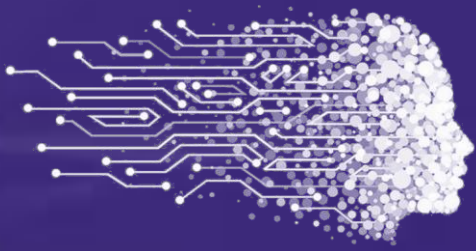
All Products under this concept would automatically be compared against previous golden batches allowing in-batch parametric adjustment CPP as a Failure mode gets eliminated for failures in product quality.

End-to-End Lighthouse

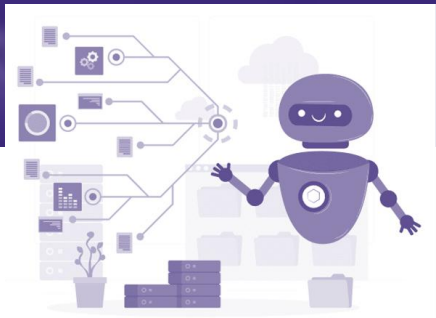
Manufacturing | Quality | R&D | SCM | Finance | Procurement | HR | L&D



People & Process Focus



Gen AI – LLM Assistants



Capgemini Global Alliance Partner with AVEVA

Dr.Reddy's | Capgemini

Capgemini Resources

Explore the latest innovations in industrial intelligence

Intelligent industry lab as-a-Service

Merging engineering and digital capabilities to build intelligent products, services, and operations

Private 5G and edge computing

Enabling real-time, AI-driven decision-making in industrial environments

Smart Factory Lighthouse

Advancing the next generation of autonomous, intelligent, and sustainable factories

Augmented engineering with Gen AI and hybrid AI

Revolutionizing engineering workflows with AI-powered design and development

Factory of the Future

Scaling digital manufacturing through AI, robotics, and predictive analytics.

https://www.capgemini.com/news/events/capgemini-at-aveva-world-2025/

AVEVA PI - Resources

A layered, fit-for-purpose approach to analytics for IoT data in Operations & Maintenance

A layered fit-for-purpose approach to IIoT analytics for process health via process control loops

Layered analytics – simple and advanced machine learning with the PI System

Lessons of simplicity in IIoT analytics for Operations and Maintenance (O&M)

Getting started with IIoT sensor deployment

data-sciencemachine-learning-anomaly-detection-use-case-with-hvac-air-handler

Fit for Purpose - Layers of Analytics using the PI System

Advanced Analytics and Machine Learning Use Cases with Industrial Sensor Data

Q&A

Thank You