




Data centers &
Communication
networks



SiaP
COGNUS

INTELLIGENT WAY TO MANAGE YOUR DATA CENTER

Smart, Actionable, IoT-driven solutions for
operational excellence

A 3D digital illustration of three modern skyscrapers in shades of purple and blue. Each building has a glowing Wi-Fi signal icon on its roof. They are set against a circular background of binary code (0s and 1s) and a grid pattern, suggesting a smart city or data center environment.

Astrikos.ai Platforms were founded on the principles of combining Platform Cooperativism and Sustainable Socioeconomic Models for the twenty-first century with **hyperscale** impact, addressing key infrastructure challenges in areas such as **Smart City Urban Analytics, Next Generation Data Centers, Health Infra, Smart Ports, Campuses, Smart Infrastructure and Industry 4.0/5.0**

Geographical Coverage: India, ASEAN, Middle East, North Africa & North America

A photograph of a data centre aisle with rows of server racks on both sides. The racks are filled with equipment and have various colored indicator lights (green, blue, red) glowing. The floor is polished and reflects the lights. In the background, a white door is visible with a green exit sign above it. The overall lighting is dim and blue-toned.

DATA CENTRE BUSINESS DRIVERS

Market Space – Trends – Problem Statement – Solution Statement

DATA CENTRE OPERATIONS : MARKET TRENDS...

GLOBAL GREEN DATA CENTER MARKET RESEARCH REPORT

MARKET INSIGHT	MARKET DYNAMICS	GEOGRAPHICAL ANALYSIS
<p>\$ 234.96 Billion Market size</p> <hr/> <p>CAGR</p>	<p>Driver - The Market For Green Data Centres Is Projected To Be Driven By The Increasing Demand For Energy-Efficient Data Centres</p> <p>Restraint - The Adoption Of Green Data Centres Would Be Constrained By Their High Deployment Costs And Lack Of Public Understanding</p> <p>Opportunity - Emergence Of AI In Cooling And Power Technologies</p>	<p>North America Expected To Dominate The Market</p>

Data Center Market

MARKET SIZE

2022 USD 263.34 Billion

2030 USD 602.76 Billion

Market Growth Will Accelerate at a **CAGR (2022-2030)**

10.9%

GROWTH DRIVERS

- Exponential increase in data
- Rising need for social, mobile, analytics, and cloud services around the world

North America Held the Largest Market Share of **>38%**

PRESCIENT & STRATEGIC INTELLIGENCE
Where knowledge inspires strategy

Global Data Center Power Market

Market Growth Will Accelerate at a **CAGR (2021-2030)**

6.1%

2021 \$19,555.1 Million

2030 \$33,380.1 Million

MARKET SIZE

GROWTH DRIVERS

- Growing number of data centers
- Generation of huge volumes of data
- Rapid cloud service adoption

North America Held over **40%** Revenue Share in **2021**

PRESCIENT & STRATEGIC INTELLIGENCE
Where knowledge inspires strategy

Data Center Market

Growing at a CAGR of **7.10%** Till 2030

Market is estimated to reach **USD 602.76 Bn** by 2030

North America Held the Largest Market Share of **>38%**

Market Overview

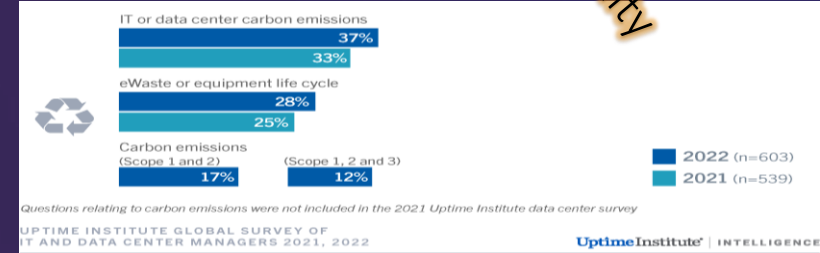
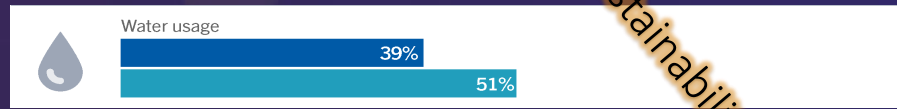
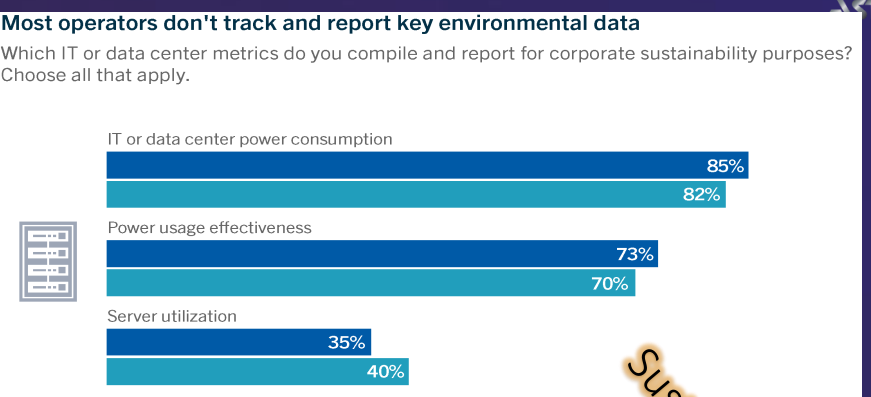
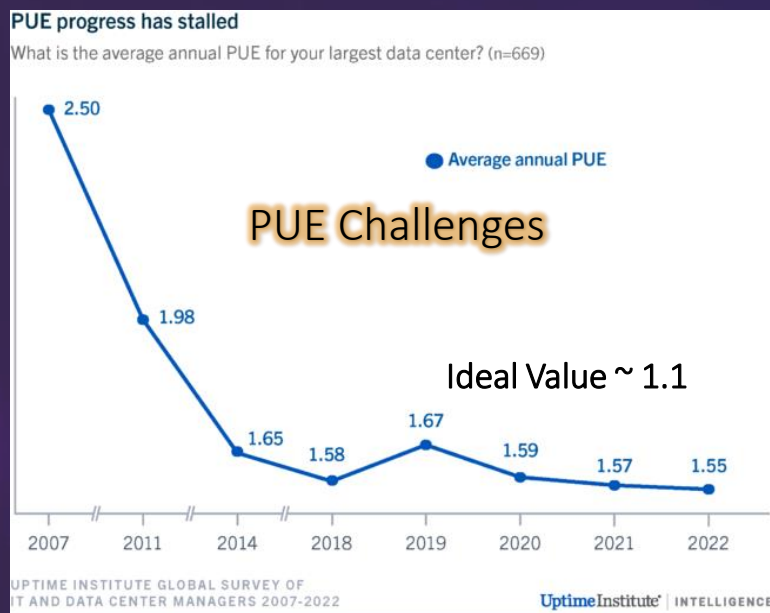
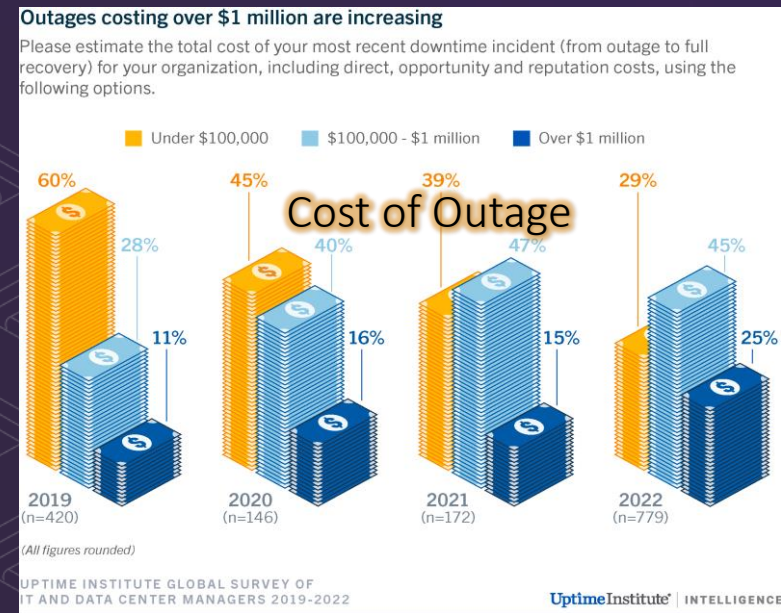
- Role of IT and Telecom Industry in Data Center Setup Is Growing
- Exponential Growth in Data Generation Boosts Infrastructure Demand

Growth Driver

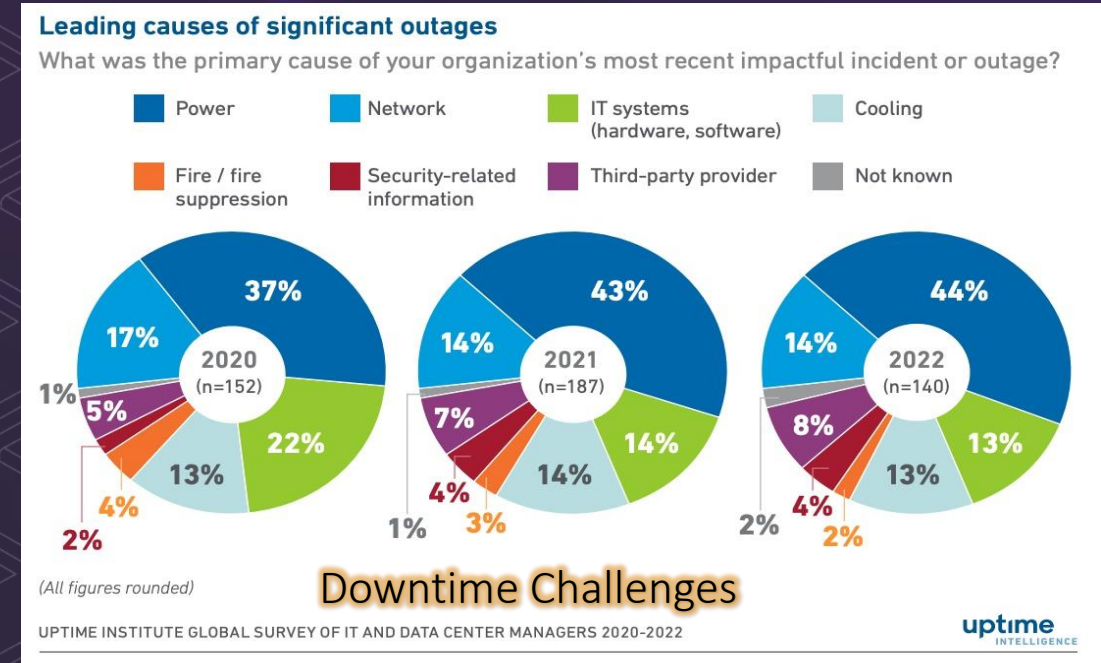
- Rising need for social, mobile, analytics, and cloud services around the world
- Exponential increase in data

PRESCIENT & STRATEGIC INTELLIGENCE
Where knowledge inspires strategy

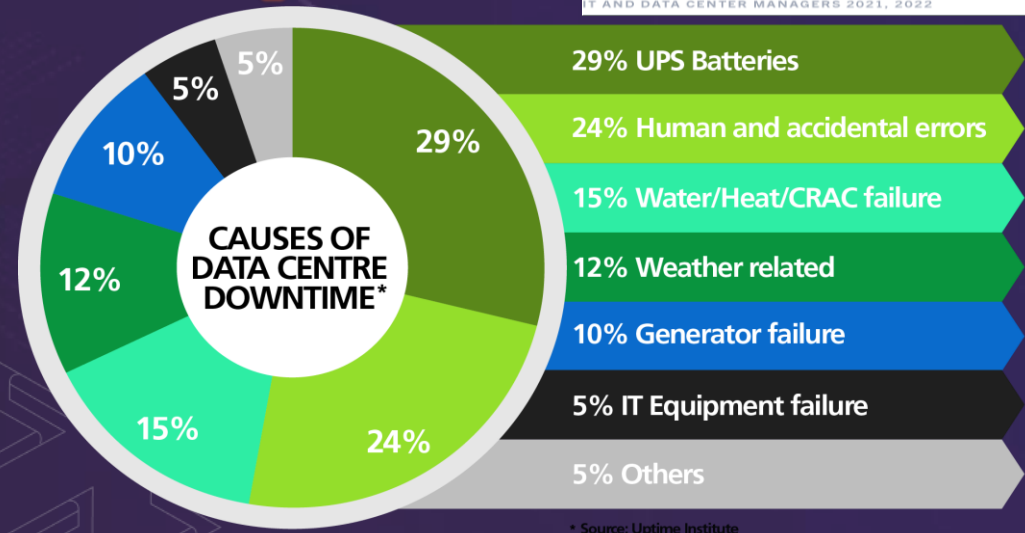
DATA CENTRE OPERATIONS : TRENDS OF CHALLENGES



Sustainability



Asset Challenges



DATA CENTRE OPERATIONS : CHALLENGES & SOLUTION

CHALLENGES IN INFRASTRUCTURE MANAGEMENT

Lack of collaboration across disciplines and departments causes delay in decisions

Discrete accountability and responsibilities management doesn't provide **holistic picture** on lapses of service level agreements (SLA)

High costs on **maintenance** and high spends due to **lack of transparency and lack of insights**

Sustainability is impacted due to lack of **standardization and unintelligent operations**

Energy conservation complexities – high investments and infrastructural design changes and costs involve in that

Complexities involved in Compliance to the global standards

Lack of predictive and forecasting measures

SOLUTION STATEMENT



- Smart Unified Management Platform** across disciplines **speeds up operations by at least 4 times**
- Reduce manual intervention by System Driven Approach** to make equipment talk to the applications (ERP, CRM etc.) to enable **collective process improvement** by about 70%
- Cost reduction** by converging infra elements to financial control systems powered with Predictive Analytics and Insights to reduce **mean time to response (MTR)** – Targeted to reduce **40%** of total trouble tickets
- Self-Assessment framework for **Sustainability Audits and Inspections** – Forecasts for 12 months
- Energy conservation** powered by Data Aggregation and Intelligence – Analyze IoT – OT – IT data (**Ranging 3% - 7%**)
- Self Audit and in-house **Gap Analysis Framework for Compliance** to the global standards:
 - Green infrastructure standards – IGBC etc...
 - TIA / Uptime Institute standards – TIA 498, Tier Standards for Data centres
 - World Council for City Data Standards – ISO 37120/37122 for Smart Cities
 - Sustainable Energy Management standards – ISO 50001
- Actionable Intelligence powered with Prescriptions and Advisories to amend **SOPs**

“INTERNATIONALLY PUBLISHED PATENT”

WO2023021526A1
WIPO (PCT)

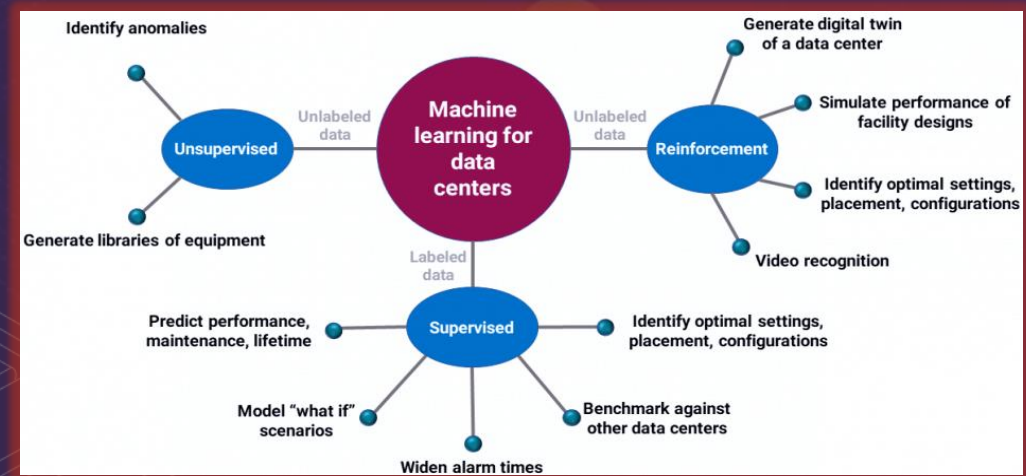
Find Prior Art Similar

Other languages: French
Inventor: Chinmaya Hegde

Worldwide applications
2022 · WO

Application PCT/IN2022/050737 events

- Priority claimed from IN202141022044
- 2022-08-16 • Application filed by Astrikos Consulting Private Limited
- 2023-02-23 • Publication of WO2023021526A1



SCOPE FOR AI/ML IN DATA CENTRES

DATA CENTRE : UNIFIED OPERATIONS MANAGEMENT PLATFORM



SUPPLIER MANAGEMENT

OPERATIONAL SUSTAINABILITY

CUSTOMER MANAGEMENT

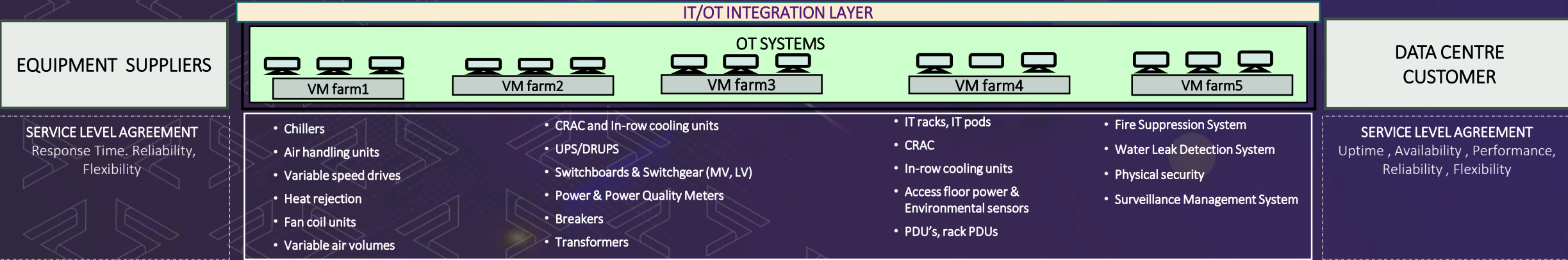


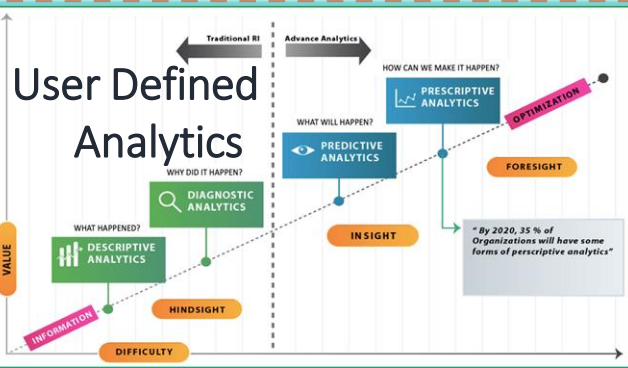
UNIFIED OPERATION PLATFORM

UNIFIED DASHBOARD WORKFLOW DASHBOARDS KPI EVENTS/ALERTS MACHINE CONTROL HISTORIAN

SlaP cognus
AI/ML DATA ANALYTICS PLATFORM

INTEGRATED PORTAL -
SlaP Viz





PRESCRIPTION ADVISORIES & ACTIONS

Energy Advisories

Added power down for SEGMENT 5 between 6:30PM to 8:00PM. PUE improvement by 2.3%. Know More

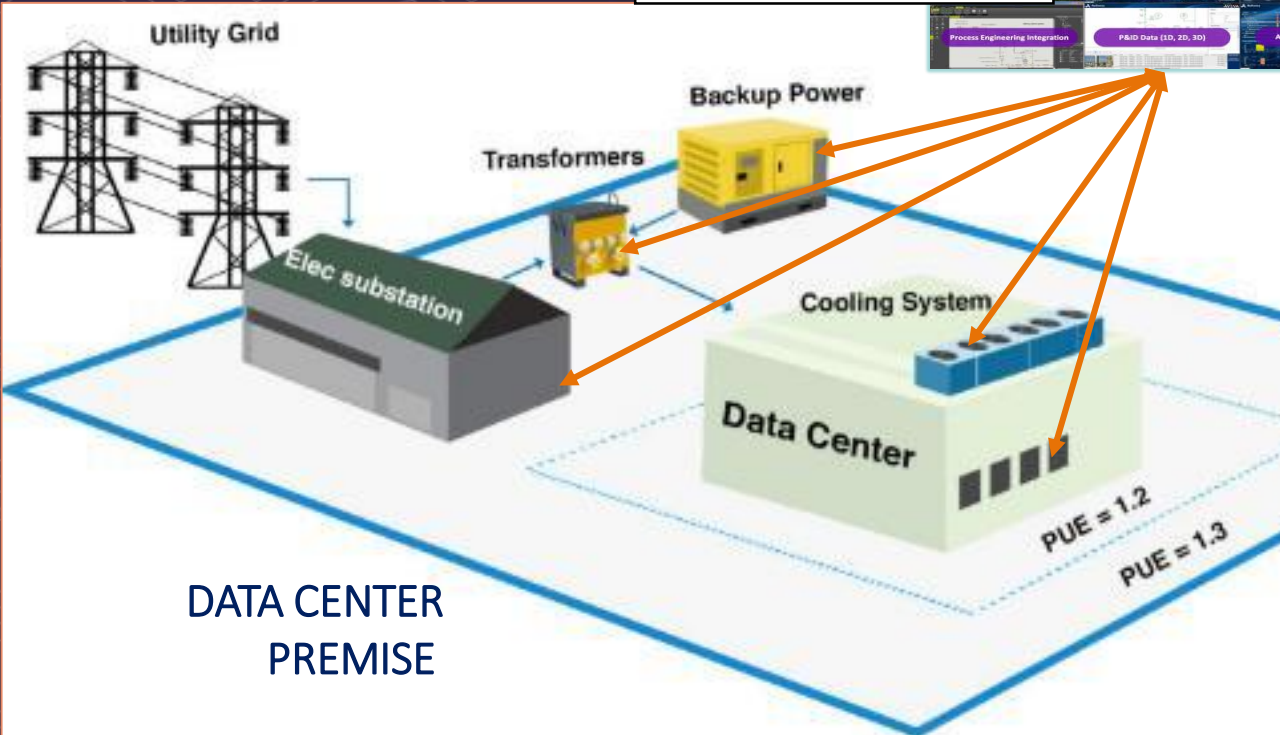
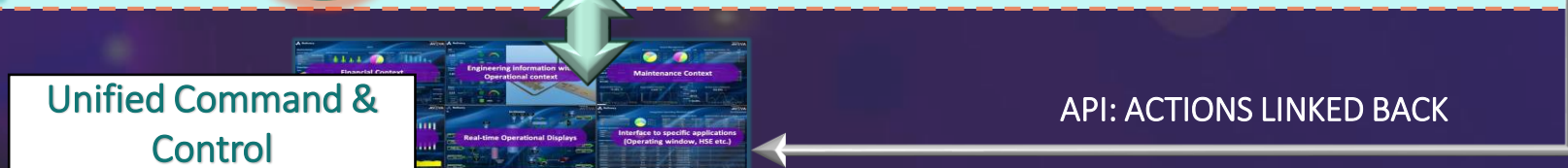
It is advised to schedule a maintenance for:

Switching Panel in LV network (VLT-12) in Main may need maint. Know More

UPS system SAVO-16 battery bank <6> draining at <4> every week... Know More

ACT

- Raise work order for Asset Maintenance Management
- Raise workflow for Business Process Management
- Create a policy for device/equipment Control



LOGS/EVENTS SAVED IN HISTORIAN

```

ASCII
,
MyName,1,Server Local,1,1
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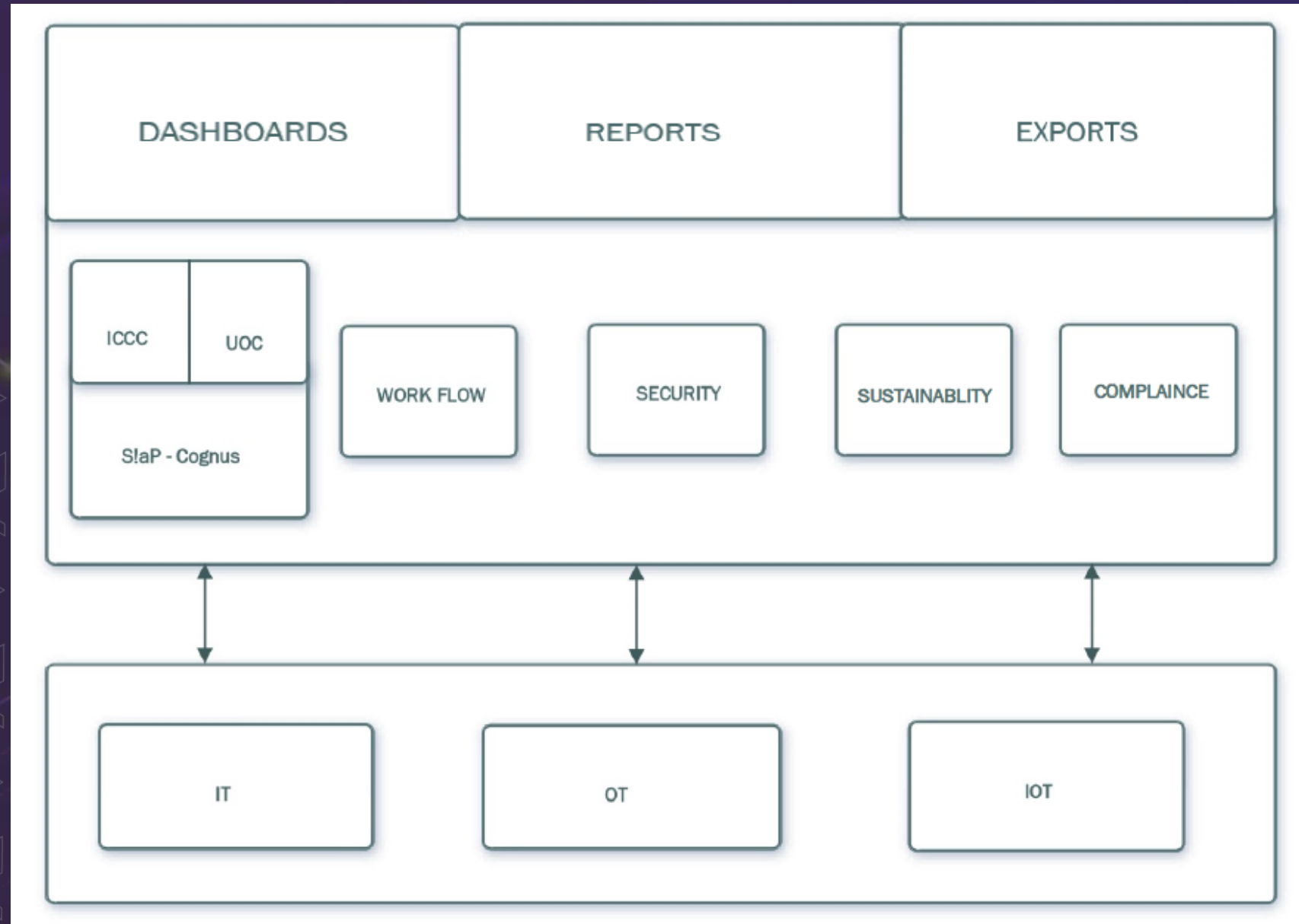


HISTORIAN LOGS EXPORTED

DATA CENTRE: DEPLOYMENT ARCHITECTURE



AI ML DATA CENTRE: Functional diagram



DATA CENTRE Transition :

1. Upgrade Core Infrastructure	Astrikos can play a consultant role and provide technical inputs . Astrikos has established a robust partner eco system including OEMs
2. Implement Data Management and Processing Solutions	Slap architecture has a Historain and a data lake etc in the SlaP Data store (SlaP architecture diagram)
3. Integrate AI/ML Frameworks and Platforms	SlaP Cognus has built in bespoke tools librabry that is used by the SlaP product team and engineering team to develop and manage periodc productreleases
4. Optimize Energy Efficiency and Resource Management	These are features built into the SlaP Cognus product line
5. Enhance Data Center Security with AI	These are features built into the SlaP Cognus product line
6. Monitor, Manage, and Scale AI Workloads	These are features built into the SlaP Cognus product line
7. Train or Upskill Your Team for AI/ML Operations	A Proposal workshop is conducted for a client and followed up with a periodic Touch point meetings which includes training of users.
8. Enable Hybrid or Cloud AI Capabilities	Slap - COGNUS can be implemeted on-prem, on cloud and on a hybrid framework
9. Implement Compliance and Governance for AI	These are features built into the SlaP Cognus product line



Thank you

Suresh Bulusu



9845176559



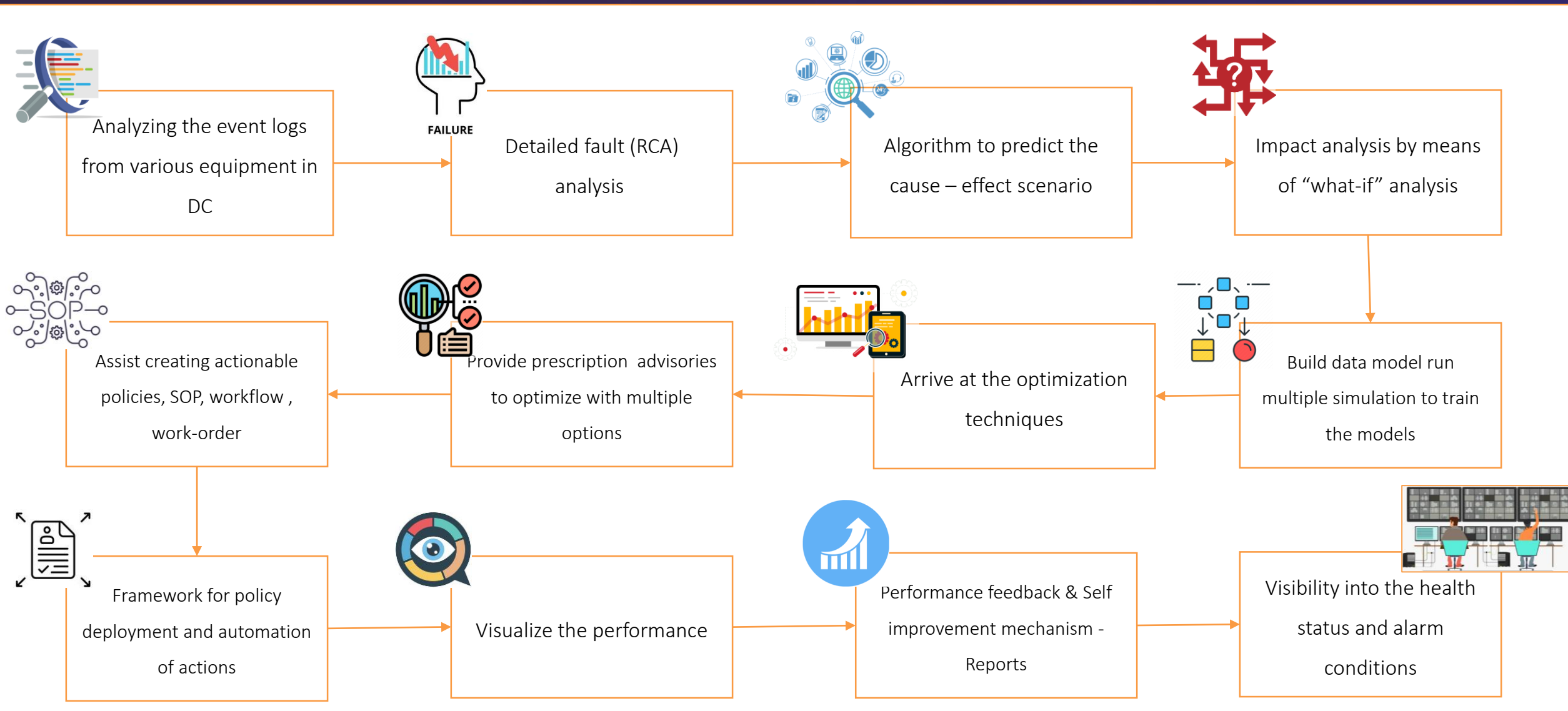
suresh.bulusu@Astrikos.ai



ASTRIKOS

Appendix

SIaP PLATFORM : HOW IT WORKS??



COOLING SYSTEM

Return Air Temperature : 25 °C | Power Consumption : 146 kW

AHU 1 RAT High

RENEWABLE ENERGY

Wind Power

Energy Generation (Last Day) : 3.5 kW | Panel Status : 50 Active

Status : OK

DATA CENTER

Cooling Efficiency : 95% | PUE : 1.34

Status : OK

STREET LIGHTS

Functional lights : 19 | Under Maintenance : 2

Status : OK

CAR PARKING

No of Occupies Slots : 10

Status : OK

3D Building Model

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Subsystem status

PACU-1A Operating Status

Schedule Status:

Operating Status: Manual

PACU-1B Operating Status

Schedule Status:

Operating Status: ---

PACU-1A Sub Temperature (°C)

PACU-1B Sub Temperature (°C)

PACU Control

Master Enable:

BMS/Thermostat Control: Thermostat

BMS Occupancy Mode: Occupied

Changeover Enable/ Time: 48.0 hrs

PACU-1A Control

Ready to Run: Not Ready

Fail Alarm: Normal

Fail Alarm Reset:

Manual Run Command:

Shutdown Command:

PACU-1B Control

Ready to Run: Not Ready

Fail Alarm: Alarm

Fail Alarm Reset:

Manual Run Command:

Shutdown Command:

PACU-1B Sub Temperature (°C)

BMS Temp SP: 16.0 °C

Thermostat Temp SF: Error °C

23.5



COGNITIVE ANALYTICS : PREDICTIVE SOP AMENDMENTS

DC Infra Analytics

DATA CENTER

- Cooling Efficiency: 95%
- PUE: 1.34
- Status: OK

DATA CENTER

- Cooling Efficiency: 95%
- PUE: 1.34
- Racks Used: 90%

DATA CENTER

- Data Center Utilization
- Data Center Aggregate Utilization (milliseconds)
- Network Speed Uplink (Gbps)
- Network Speed Downlink (Gbps)

Energy Analytics

RENEWABLE ENERGY

- Energy Generation (Last Day): 3.5 kW
- Panel Status: 50 Active
- Status: OK

RENEWABLE ENERGY

- Energy Generation: Last Day: 3.5 kW
- Panel Status: Active: 50, Inactive Panels: 14

RENEWABLE ENERGY

- Energy Generation: Last Day: 3.5 kW
- Turbine Status: Active Turbines: 2, Inactive Turbines: 0

RENEWABLE ENERGY CONTRIBUTION

- Renewable Energy Contribution: 32%
- Energy Contribution: Solar 77%, Wind 23%
- Average Capacity Factor: Solar 17, Wind 13

COOLING SYSTEM

Return Air Temperature: 25 °C | Power Consumption: 146 kW

AHU 1 RAT High!

ADV/AHU-1/ID002

Observation
The RAT is found to have an increasing Trend. Forecasts a rise in Return Air Temperature

Possible Cause
Potential causes could include dirty air filters, reduced cold water flow, sensor malfunctions, or increased heat load.

Effect
A rise in RAT may result in reduced occupant comfort, energy inefficiency, and potential system failures

Resolution
Take proactive measures like checking and replacing air filters, inspecting the HVAC system, and ensuring that sensors function correctly.

Actions

- Work Order
- Create new maintenance ticket
- Create new asset management request
- Assign a call centre executive
- Ignore the issue

COOLING SYSTEM

Exhaust Air 32 °C | Fresh Air 24 °C | Chilled Water In 10 °C | Hot Water Out 26 °C | RAT 30.16 °C | Supply Air 24 °C | Air Conditioned Zone

RETURN AIR TEMPERATURE TREND

Return Air Temperature Trend

ADVISORY

HISTORICAL POWER CONSUMPTION

Historical Power Consumption

ADVISORY

HISTORICAL POWER CONSUMPTION

Temperature Trend

Temperature (°C) vs Time (days)

Airflow trend

Airflow (CFM) vs Time (days)

Power consumption Trend

Power (kW) vs Time (days)

AHU Pressure Trend

Pressure (psi) vs Time (days)

Fan speed vs Time

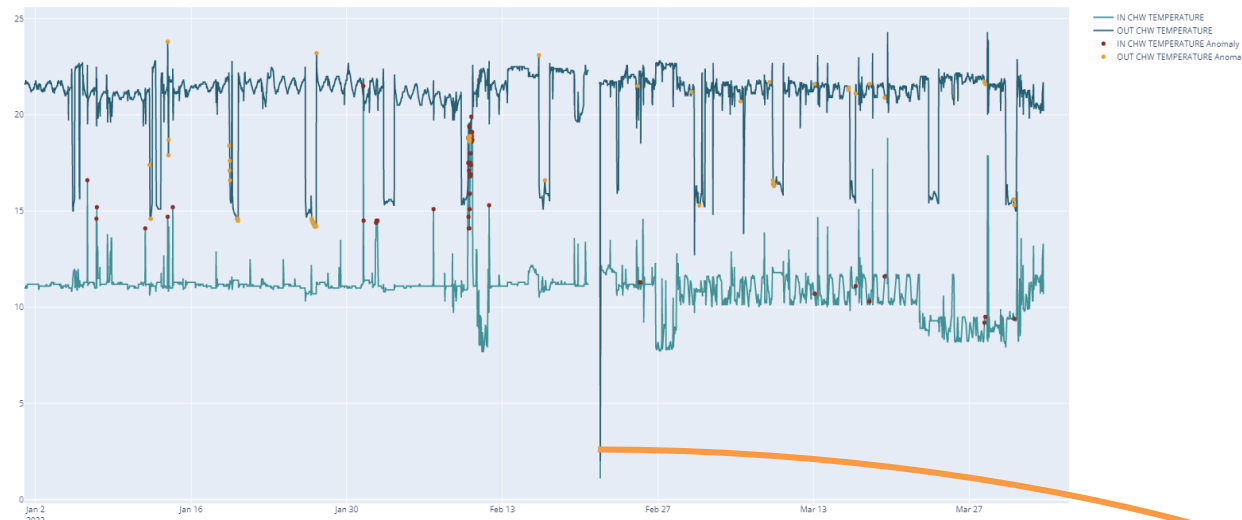
Fan Speed (RPM) vs Time (days)

Correlative Analytics

COGNITIVE ADVISORY: ANOMALY TREND BASED SOP AMENDMENTS



PAHU 1 - Chilled Water Temperature Anomaly Detection



Contamination Parameter : INCHW (0.011), OUTCHW (0.015)

PAHU 1 - Return Air Anomaly Detection

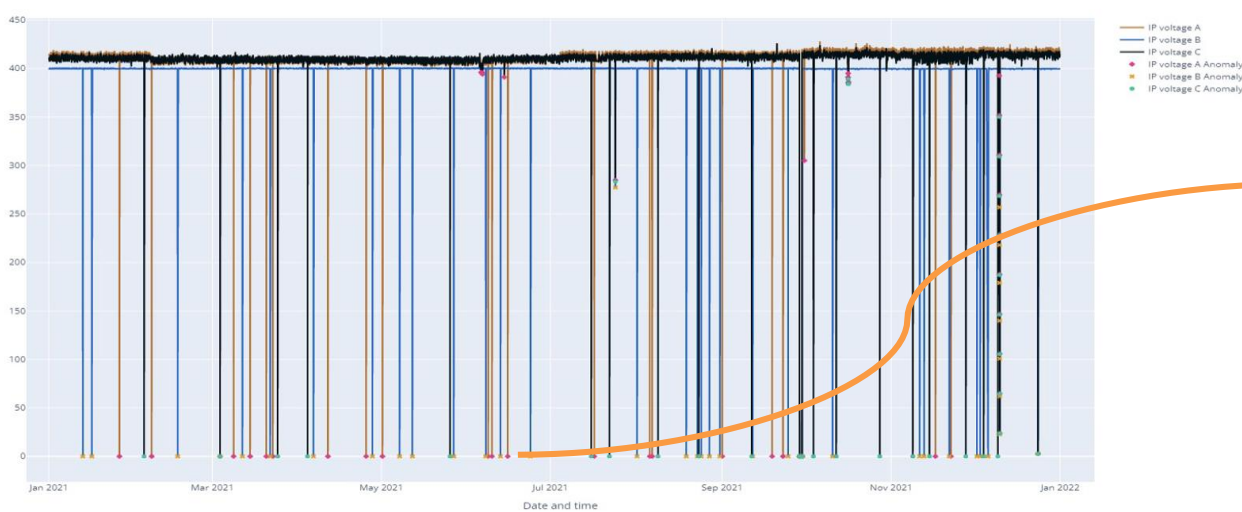


Contamination Parameter : Temperature (0.0087), Humidity (0.0265)

UPS 1.1 - Input Voltage - Anomaly Detection

Contamination Parameter : 0.005

UPS 1.1 3 Phase Input Voltage : Anomaly detection with Isolation Forest



Cognitive Advisories converted into SOP Amendments and Actionable Items

Issue

Anomaly trend suspected in PAHU-1 that calls for an investigation

Track

PAHU

Details

[View Source](#) [View in Map](#)

Recommendation

Manual troubleshooting by technician.

Actions

- Create new work order request [Work Order](#)
- Create new maintenance ticket [Maintenance](#)
- Create new asset management request [Manage Asset](#)
- Assign a call centre executive [Call Centre](#)
- Ignore the issue [Ignore](#)

SELF ASSESSMENT FRAMEWORK: DATA CENTRE STANDARDS



WELL Building Standard Certifications

The diagram displays three levels of WELL Building Standard certification:

- Silver level certification:** achieved by meeting 100 percent of the WELL Preconditions applicable to the Typology in all Concepts.
- Gold level certification:** achieved by meeting all of the WELL Preconditions, as well as 40 percent or more of the Optimization Features.
- Platinum level certification:** achieved by meeting all of the WELL Preconditions, as well as 80 percent or more of the Optimization Features.

ENABLERS FOR SUCCESS

- ❑ Built-in data model framework for assessing more than 130 KPIs of :
 - Green & Sustainability Indices
 - Energy & Power Indices
 - Building Infra Indices
 - Cooling Efficiency Indices
- ❑ The platform acts as in-house Subject Matter Expert:
 - Creates INTERNAL AUDIT actions and reports
 - Realtime data evidencing for all the audit measures and parameters

DC OPERATIONS TRANSFORMATION : GREEN INDEX USECASES

UNIFIED MONITORING

- ❑ Ability to establish the unified monitoring of operations dashboards
- ❑ Ability to define and monitor KPIs
- ❑ All alerts and alarms escalation through workflow to stake holders
- ❑ Ability to track all interdependent operations between departments and make decisions
- ❑ Ability to enhance the underlying systems and add more use cases

- Indoor Air Quality Tracking
- Indoor Air Quality Control
- COX Emission Tracking
- Renewable Energy Indices
- Carbon Neutral Roadmap

Environment Monitoring



- Real Time Energy Monitoring
- BTU Analytics
- Deep HVAC Monitoring
- Lighting and Cooling Monitoring and Control

Energy Management



- Smart Water Meters Connectivity & Management
- Water Quality and Quantity Monitoring
- Billing Management
- Real Time Notifications

Water Management



CENTRALIZED ACCESS TO UNIFIED DATA → REALTIME INDICES AUDIT

- Digital Asset Register
- Workorder Management
- Purchase Order
- Real Time Tracking
- Life Cycle Management
- SLA Monitoring

Asset Management



- Quantity Monitoring
- Segregation Tracking
- Source Monitoring
- Reports & KPI's
- E-Wastage Tracking

Waste Management



- Transportation Management
- Space Management
- People Tracking
- User Experience
- Optimize FM Operations
- Predictive Maintenance

Operations & Maintenance

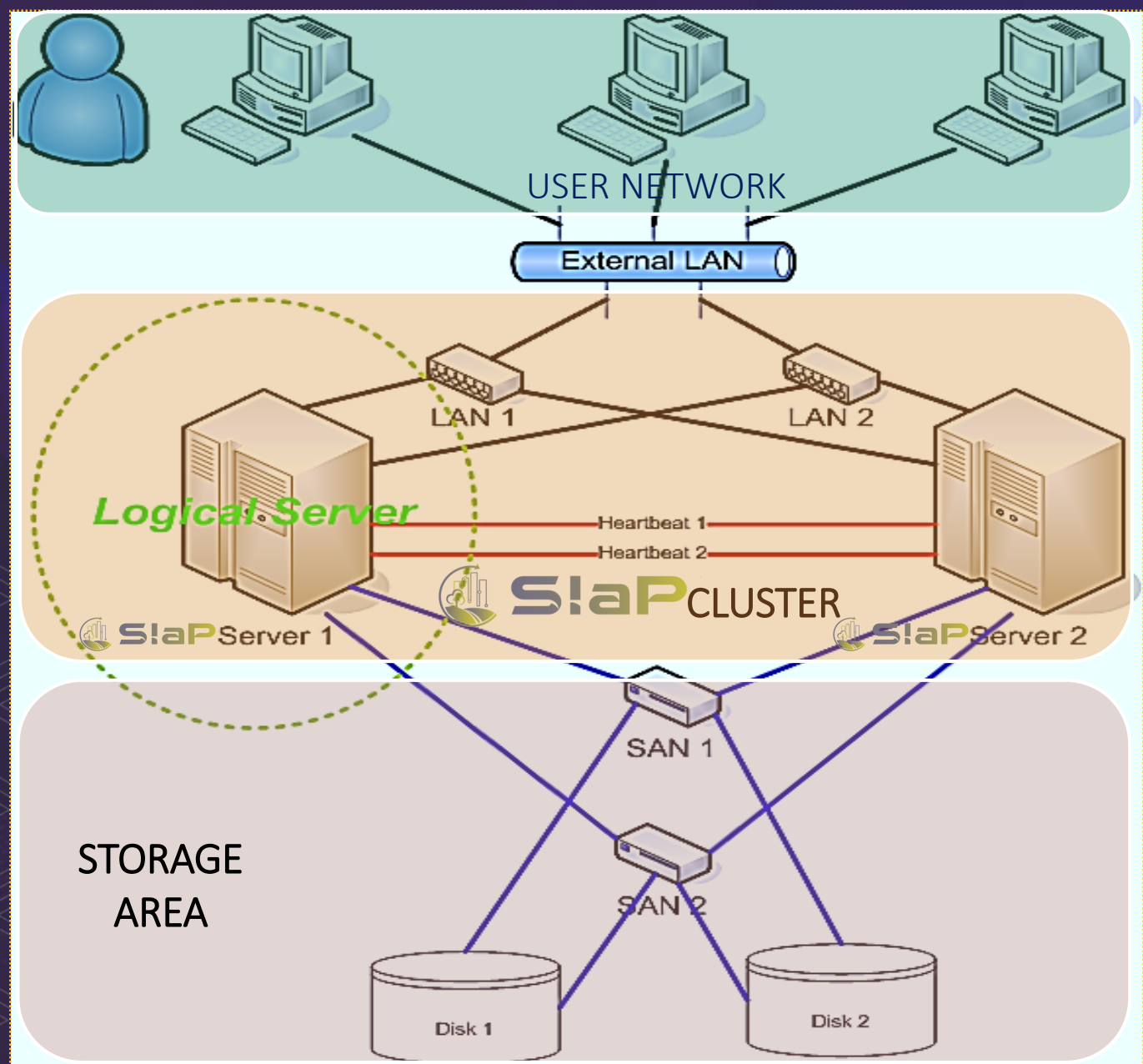


INTEGRATION PREREQUISITES : ALL OT/FACILITY SYSTEMS

Subsystem	Requisite from Subsystem	Parameters
Building Management System	Require OPC or BACnet or REST APIs from BMS to retrieve the historized data	As per standard APIs which covers everything in the aspect of data shareability
System: UPS, CSU, PAHU, PAC, PDU	Require OPC or BACnet or MODBUS or REST APIs to interact and integrate	As per standard all the data that is exposed by the subsystem communication protocol can be consumed
DCIM	Require REST APIs to integrate	As per standard APIs which covers everything in the aspect of data shareability
Other IT Systems	Require REST APIs to interoperate	As per standard APIs which covers everything in the aspect of data shareability

INTEGRATION PREREQUISITES : OTHER SYSTEMS

Subsystem	Requisite from Subsystem	Parameters
ITIL Help Desk Management & Network Management	Require REST APIs from Help Desk Management & NMS to retrieve tickets and FCAPS logs	As per standard APIs which covers everything in the aspect of data shareability
System: ERP, CRM, Contract Management and Financial Control System	Require REST APIs to interact and integrate	As per standard APIs which covers everything in the aspect of data shareability
Enterprise Asset Management System	Require REST APIs to integrate	As per standard APIs which covers everything in the aspect of data shareability
Other IT Systems	Require REST APIs to interoperate	As per standard APIs which covers everything in the aspect of data shareability





INFRA DIGITAL TWINS : IMMERSIVE OPERATIONAL EXPERIENCE

Owner-operators can minimize challenges with the help of digital twins: **1-2% revenue growth, 10-30% increase in planning efficiency, and 10-30% reduction in expenses.** Digital twins provide a single source of truth, allowing you to access data you can trust within minutes.

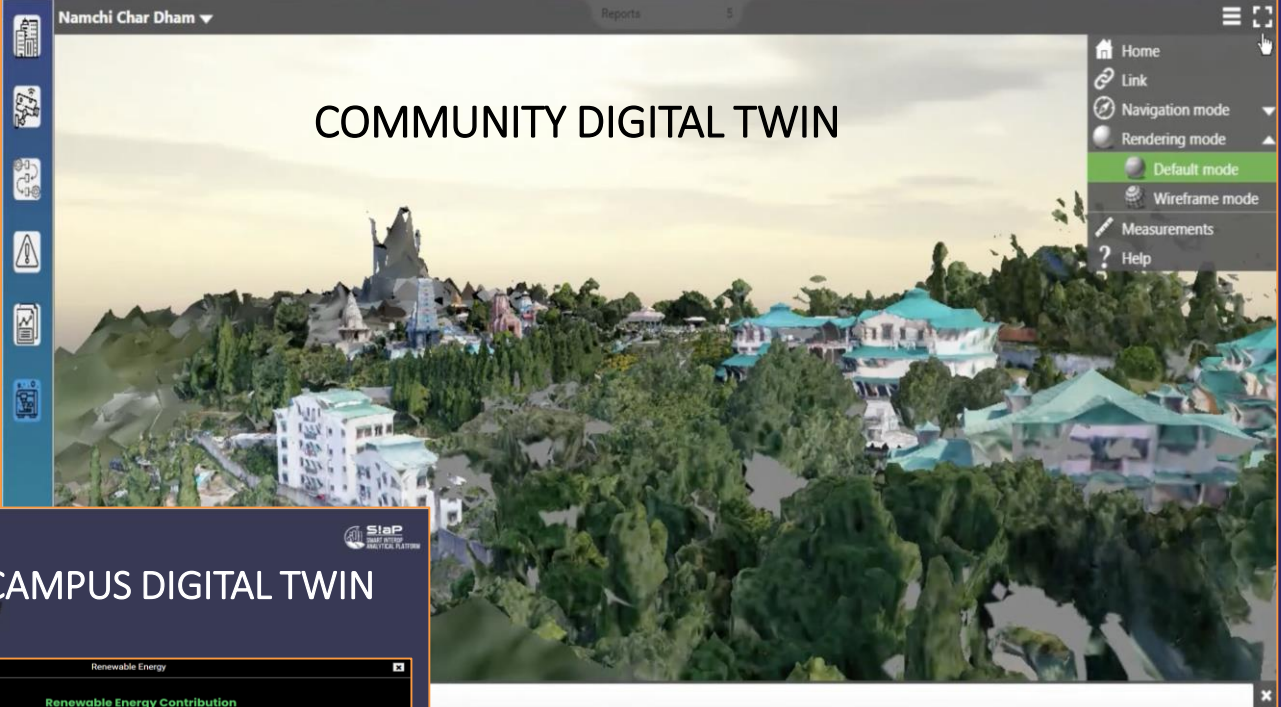
Reduce the decision time to 1 minute, as engineers have the right information at the right time.
(Source: McKinsey)

Reduce project-hours by 15% and keep workers engaged and productive.
(Source: McKinsey)

Increase sustainability goals by lowering energy consumption in existing facilities, thereby increasing return on investment (ROI).
(Source: Ernst & Young)

Digital twin technology provides tangible benefits to a company's P&L

Annual 1% to 2% Revenue growth • Increased fill rates (on-time and in-full) • Increased speed-to-market • Increased strategic sales	Annual 10% to 30% Planning efficiency (SG&A) • Decreased manual intervention, duplication of efforts	One time 5% to 10% Inventory reduction • Improved inventory visibility and reliability
Annual 5% to 10% Increased throughput • Revenue growth • Increased on-time delivery • Increased working capital	Annual 10% to 30% Reduced expenses • Reduced expedited logistics costs • Reduced returns • Reduced fines from shipment delays	Annual 10% to 20% Reduced inventory write-off • Reduced excess, obsolete, damaged inventory



ENABLERS FOR SUCCESS

- ☐ Integrated with real-time data from entities
- ☐ Visual triggering for proactive interventions and actions
- ☐ AI/ML models overlay for simulation of hypothetical scenarios