Intensifying digital transformation through the incorporation of the AVEVA™ PI System™ Historian at ISA’s Companies

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Agenda

• About ISA and its Companies
• Challenge, Solutions, and Benefits
• Business Challenge Addressed
• Implementation Details
• Success Stories
• Conclusion
ISA is the largest energy transmission company in Latin America
We transmit energy throughout Latin America while taking care of what you see the least.

In operation:
- 3,430 people
- 48,844 km of circuit
- 106,288 MVA of transformation
- 99.998% Reliability

Under construction:
- 4,671 km of circuit
- 16,451 MVA of transformation

Information as of March 31, 2023

1 ISA 2022 Integrated Report
We transmit energy throughout Latin America while taking care of what you see the least.

In operation
- 3,430 people
- 99.998% Reliability
- 30,350 Miles of circuit
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- 2,902 Miles of circuit
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Information as of March 31, 2023

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We transmit energy throughout Latin America while taking care of what you see the least.

**In operation**
- 4,700 people
- 30,350 Miles of circuit
- 106,288 MVA of transformation
- 99.998% Reliability

**Under construction**
- 4,434 Miles of circuit
- 20,237 MVA of transformation

Information as of March 31, 2023

1 ISA 2022 Integrated Report
Business Challenge Addressed
POWER AND UTILITIES | COLOMBIA

48% of ISA’s companies’ Assets are Monitored by This Implementation

**Challenge**

- Assets and business processes not prepared to achieve the challenges of the electrical grid of the future and the acceleration of the energy transition
- Lack of data and low data quality to develop advanced analytics models
- Needed to improve asset outages and environmental impact through better decision-making model

**Solution**

- Deployed AVEVA™ PI System™ to streamline data collection, access, analysis, and reporting in 6 companies and 3 countries.

**Results**

- 48% of ISA’s companies' assets are monitored by this implementation
- 14 critical high voltage power transformers and 10 STATCOM’s battery banks supervised by 2 real-time digital twins
- Avoiding Extract, Transform, and Load data saved 20 hours per month and accelerated innovation to boost other digital twins’ capabilities

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ISA 2030 Strategy – Four Pillars

Strategy Mobilization Programs

Asset management, renewal, and maintenance: robotics, advanced O&M.

System security and reliability

Intensified digitalization: implementation of digital solutions supported by big data and Analytics...

Digital solutions architecture
Data historian Master Data
APM – Asset Performance Management and Analytics

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APM Assessment

**Asset Performance Management**

- **Asset Strategy and risks**
- **Predictive and forecasting**
- **Reliability Centered maintenance**
- **Condition-based**

**AVEVA™ PI System™**

- **Financially Optimized**
- **Geographic functionalities**

**Coverage Level**
- High
- Medium
- Low

*Source: Self build – Based on: Gartner APM Market Guide

**Operational Data**
- **OT Data**
- **IoT Data**
- **SIGO**

**Work Mgt**
- Alerts and Workflows
Successful Implementation
Project Developed in Stages

Contracting Process
- Technical assessment
- Negotiation
- Conditions for execution- (3 countries, 5 companies)

Governance Model: Continuity, Development and Sustainability
- Support and maintenance scheme
- Implementation and models evolution
- Required team and knowledge.

Information Model
- Assessment of the main data needs
- Define technical data models
- Analytics needs
- Data sources required
- Who is going to use the information?

Architecture
- Fulfill requirements of business
- Scalable architecture at ISA’s companies
- Backups and infrastructure
- Communications and integrations
Benefits
Focused on Data Management and the Continuous Improvement

01. Proactive monitoring in real time to improve decision making in maintenance and operations.

02. Minimize assets maintenance and define assets health based on Analytics.

03. Improve the information availability for all business processes.

04. Cost efficiency and minimize operational risks.
Involved Companies

PI System Implementation

- XM Operator and administrator energy market
- ITCO Transmission company
- TRAN Transmission company
- REP CTM ISAP Transmission company
- ITCH Transmission company

- XM
- ITCO TRAN
- REP CTM ISAP
- ITCH

2010
Aug 2021
April 2022
How did we do it?

Agreements between different cultures and customs
Interfaces and Connectors

ERP - SAP: SAP Enterprise resource planning.
AZURE: Microsoft Cloud platform
SCADA: Supervisory Control And Data Acquisition
PMU: Phasor Measurement Unit
SIGO: Operational Information System. Inhouse Software.
Maneuver sequence protocol: web application that allowe maneuver management. Inhouse Software.
Criteria Implemented
Homologation and Approval

PI TAG Is the key

- Data structure approved for ISA and its companies
- Allows communication between SIGO – SAP and PI
- Facilitates data sharing

Taxonomy and hierarchy

ITCO:SCADA:CERR500:ATRAF01_5A1-411.Estimated
ITCO:SCADA:CERR500:ATRAF01_5A1-411.Q
ITCO:SCADA:CERR500:ATRAF01_5A1-411.Value
Governance and Monitoring

Committees

**Strategic:** Roadmap, resources and ISA2030 alignment

**Tactical:** Agile backlog, prioritize

**Operational - Centralized:** homologation – Support and development
Boosting Digital Twins’ Capabilities
Battery Banks Anomaly Detection Model

- Cells voltages
- Cells temperature
- Cells internal resistance
- Bank voltage
- Bank current
- Bank ripple voltage

PI integrator for Business Analytics

Azure Datalake

Anomaly Detection Model
Battery Banks Anomaly Detection Model

PI integrator for Business Analytics

- Cells voltages
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- Bank current
- Bank ripple voltage
Power Transformers Anomaly Detection Model

- Currents
- Voltages
- Power
- Oil temperature
- Winding temperature

PI integrator for Business Analytics

Web Service

- DGA analysis
- Nominal data

Azure Datalake

Anomaly Detection Model
Power Transformers Anomaly Detection Model

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Power Transformers Loading

Thermal analysis from transformer load, winding, and oil temperatures

It will prevent the transformer from working above it’s capacity, thus, extending the asset useful life.
Loading information based on the current at the ends of the line. It considers the existence of line reactors. It will prevent the transmission line from working above its nominal capacity, thereby reducing operational risks.
Inductive Assets Monitoring

It shows the bushings monitoring condition alarms, the winding and oil temperature levels, and the refrigeration system.

Evaluates the data quality.
Insulated Power Cables monitoring

Generates visual alarms based on sensor diagnostics according to acceptable thresholds.
Another Models Developed

- SF6 Leaks
- ICCP signals quality
- Angular deviation with PMUs and its quality
Conclusion

- Around 400 employees at 6 companies have been trained in the use of PI System tools
- 10 months governance and monitoring running
- 2 digital twins under enhancement
- 17 PI Vision displays
- 7 Asset Framework analytic models
- 6 team members ensuring the value to the business
- 20 hours saved per month due to data processing
Questions?
Please wait for the microphone.
State your name and company.

Please remember to...
Navigate to this session in the mobile app to complete the survey.

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