OCTOBER 25, 2023

UTE's experience with the AVEVA™ PI System™

UTE monitors high voltage transmission assets with the AVEVA PI System in Uruguay

Ing. Ezequiel Frontini, UTE TRASMISIÓN

AVEVA

Ing. Ezequiel Frontini

Exploitation Technical Management Analyst

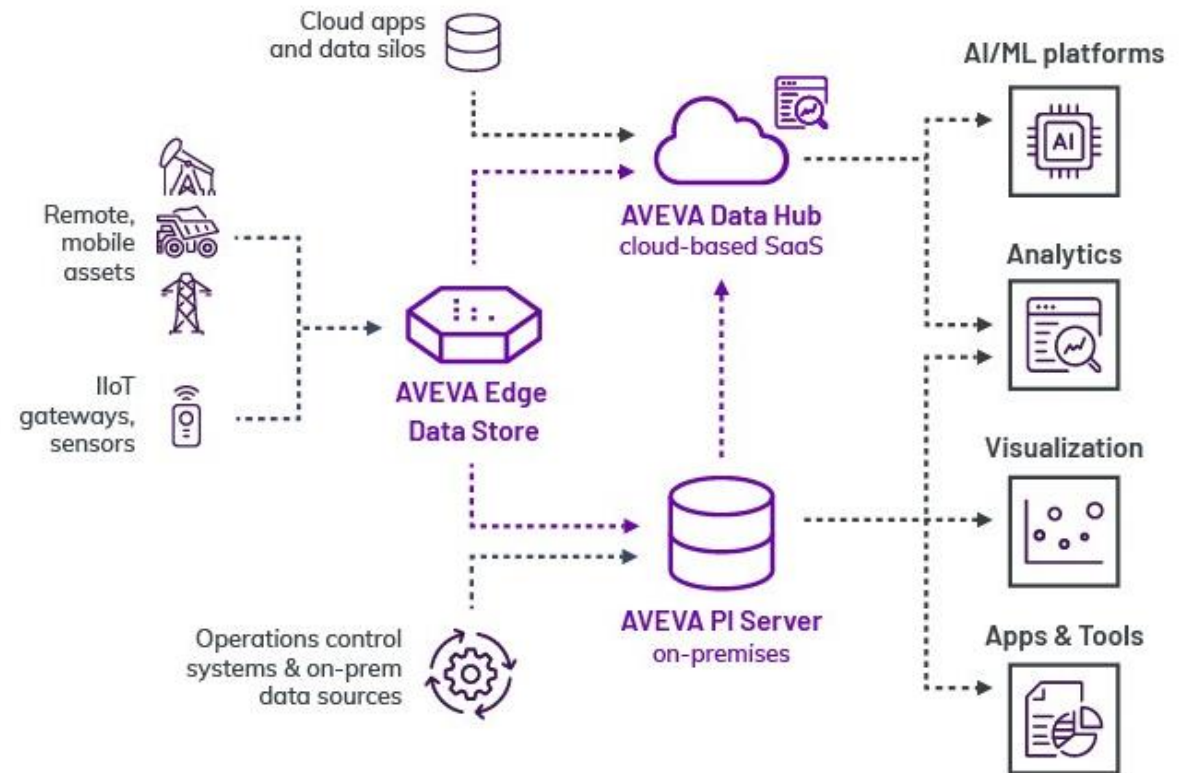- UTE TRASMISIÓN
- edfrontini@ute.com.uy

AV≡VA

Data management solution

AVEVA PI System™

AVEVA PI Vision™

Cloud apps and data silos

AI/ML platforms

Remote, mobile assets

AVEVA Data Hub
cloud-based SaaS

Analytics

IIoT gateways, sensors

AVEVA Edge Data Store

Visualization

Operations control systems & on-prem data sources

AVEVA PI Server on-premises

Apps & Tools

AVEVA

URUGUAY →

AVΞVA

UTE
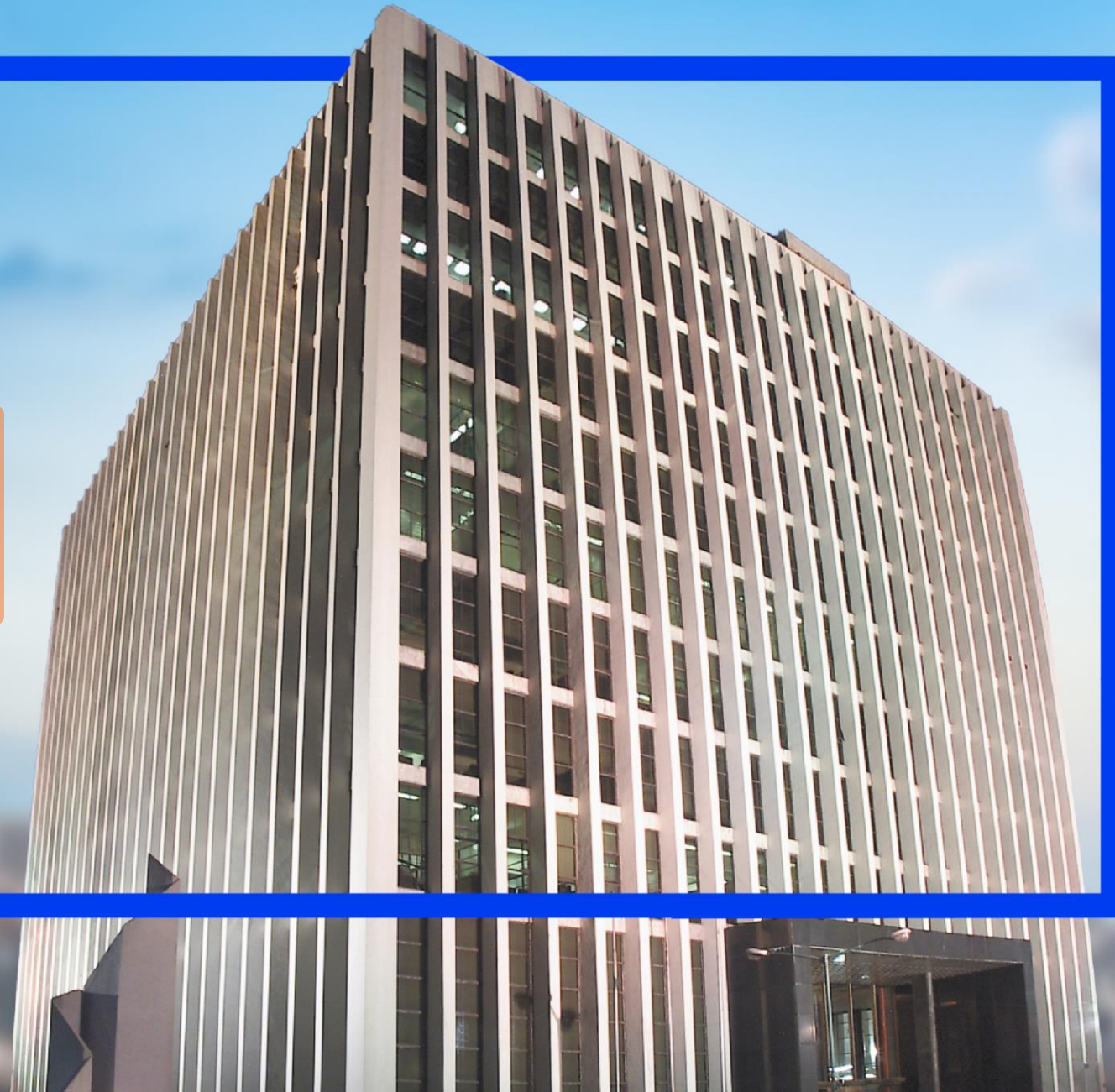
Leader in LATAM

Consumer satisfaction & perceived quality

AVEVA

Company	Score
UTE-UY [1]	86,0
CHEC-CO [2]	82,3
AES-SV [3]	81,9
CELESC-BR [4]	81,7
CNFL-CR [5]	80,3
COPEL-BR [6]	80,2
ICE-CR [7]	80,0
EEGSA-GT [8]	79,8
CEMIG-BR [9]	76,2
CRE-BO [10]	75,0
EEQ-EC [11]	68,5
EDESUR-DO [12]	67,9
ANDE-PY [13]	65,3
DELAPAZ-BO [14]	57,8
HDNA-PE [15]	56,2
ELOR-PE [16]	54,5
ENOSA-PE [17]	50,8
ELSE-PE [18]	48,1
ELCTO-PE [19]	38,8

RESULTADO CIER - 72,2

REPÚBLIC.

81,6
79,4
78,7
77,9
75,7
75,6
74,6
74,4
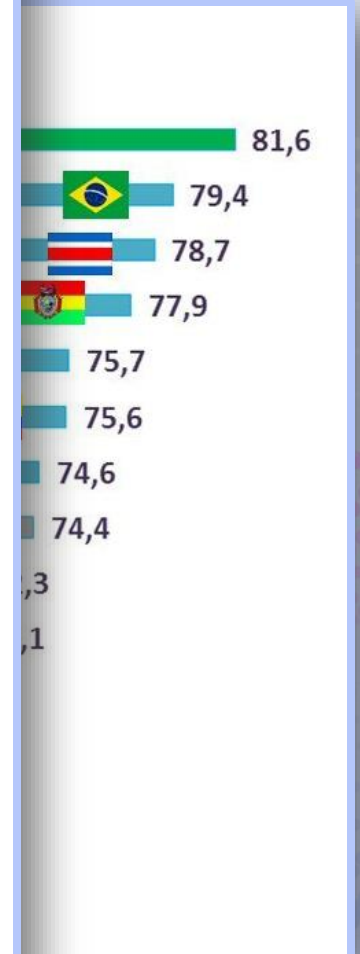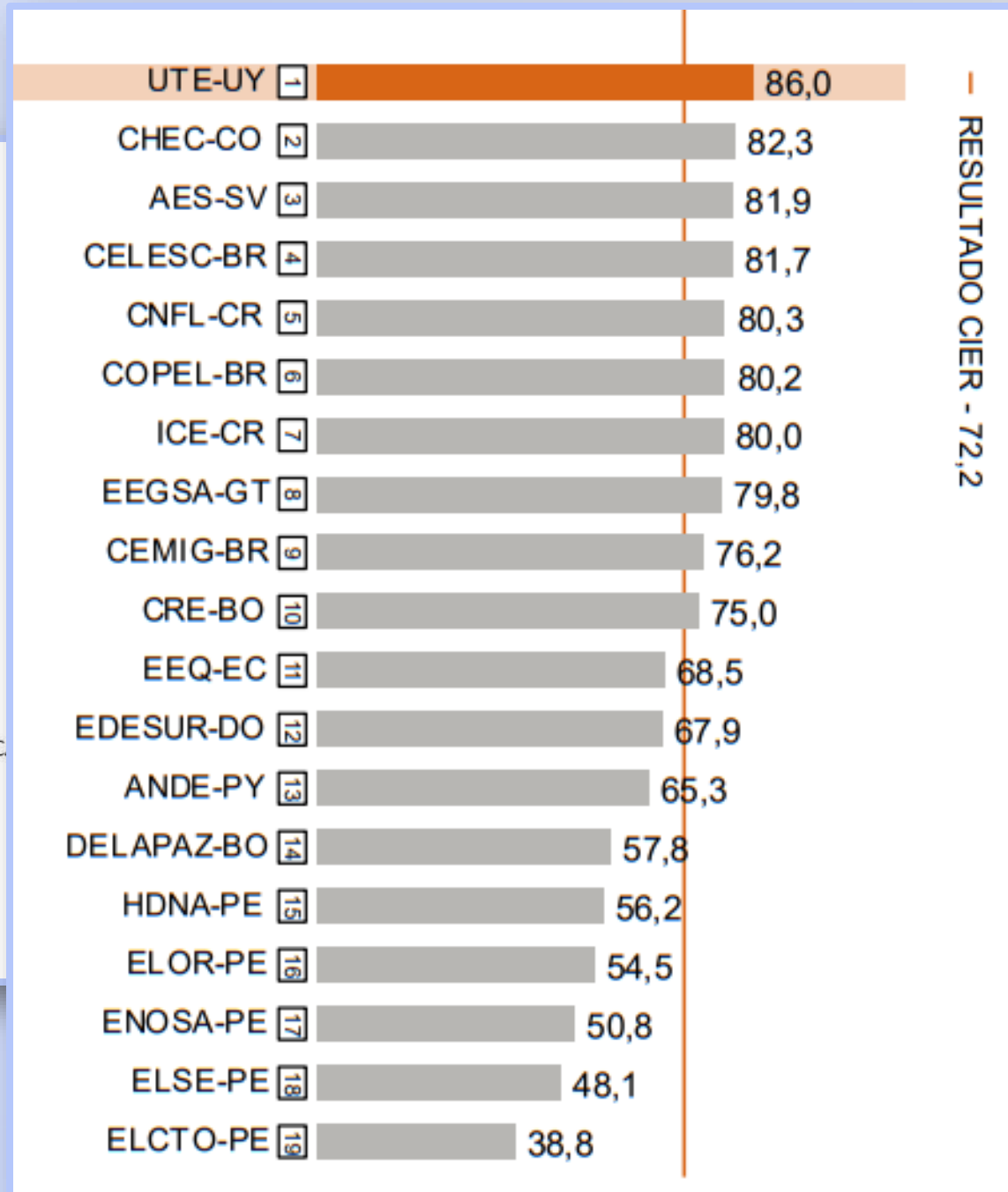
Transition to renewable energy

97% Renewable sources
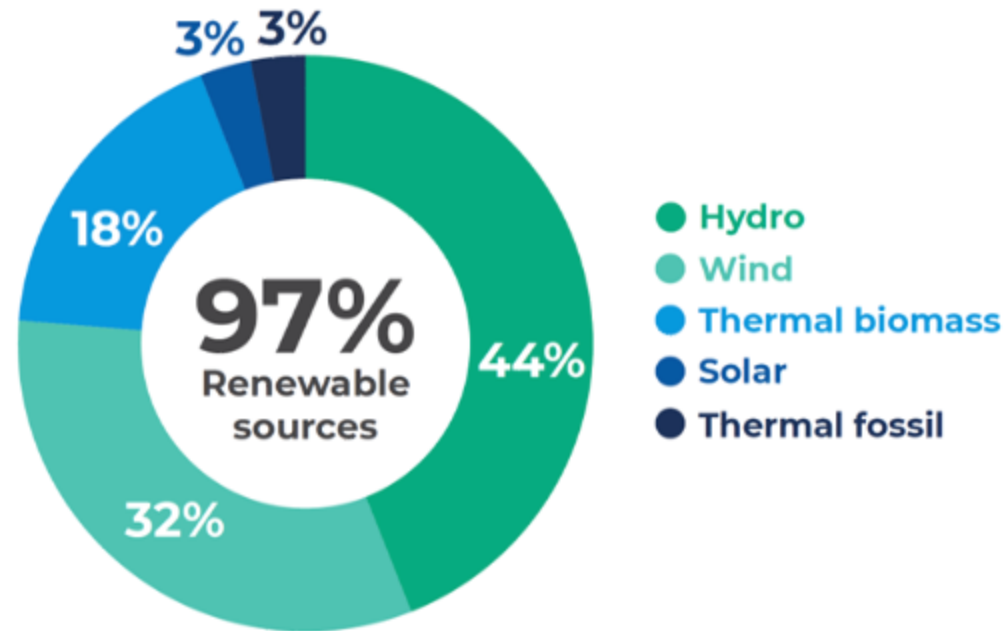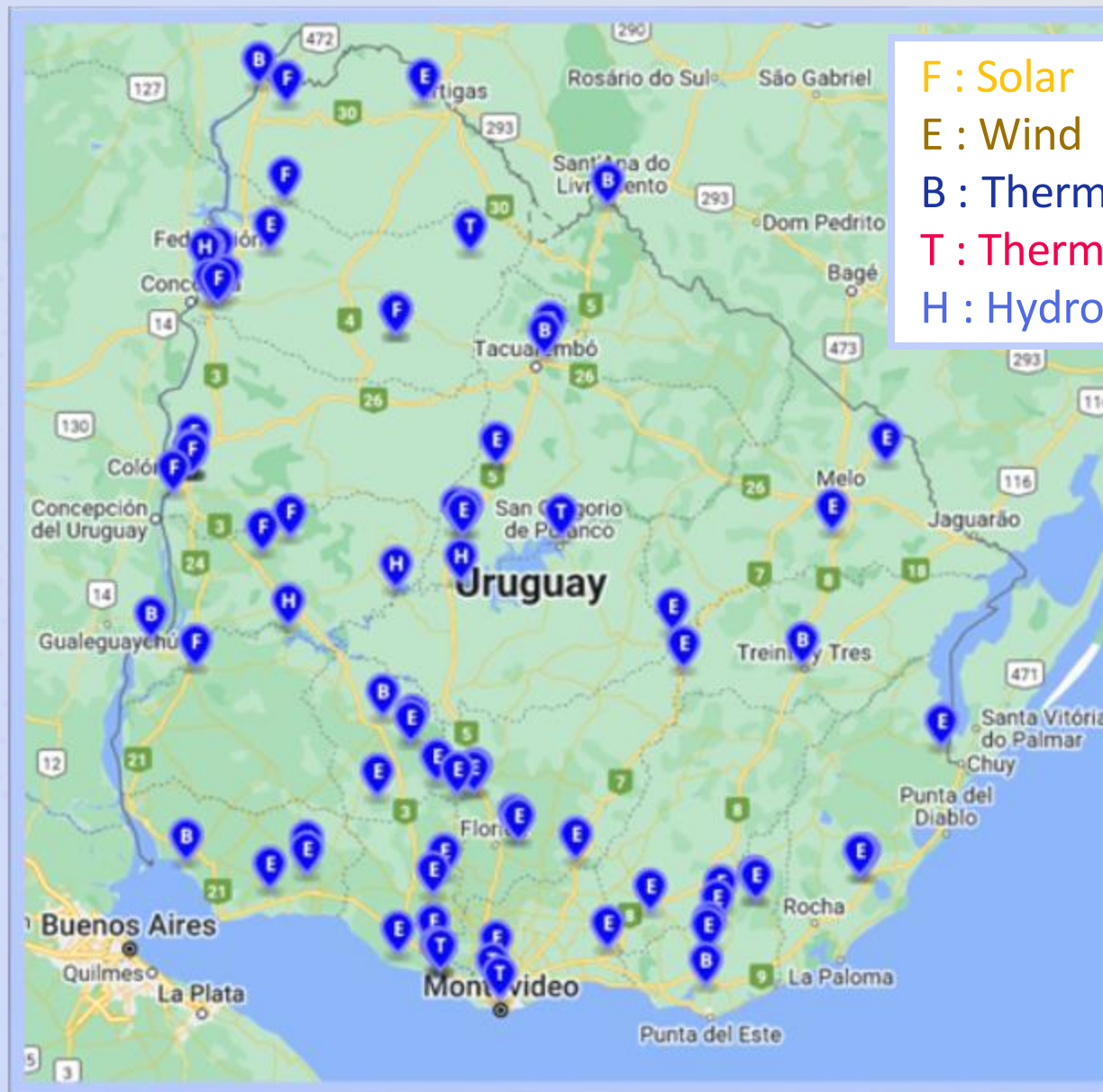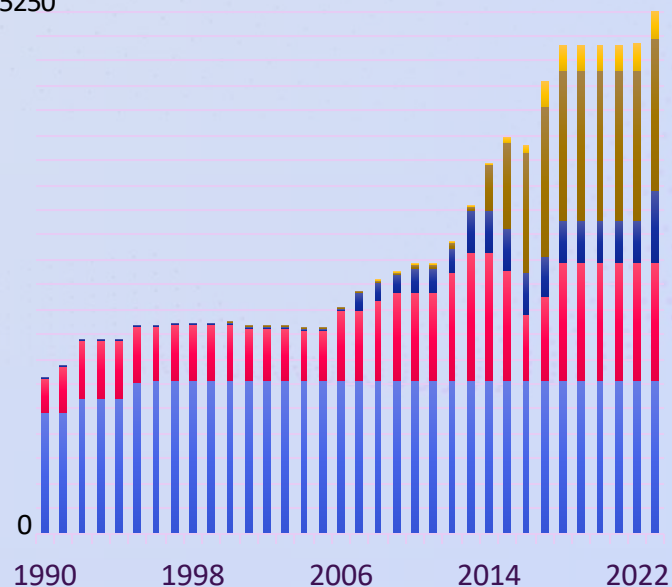
- 44% Hydro
- 32% Wind
- 18% Thermal biomass
- 3% Solar
- 3% Thermal fossil

Figure 2: Electric power generation in Uruguay - Average for the years 2017 to 2020..

Source: MIEM (ben.miem.gub.uy).

Distributed generation

Installed Power [MW]

UTE - Trasmision
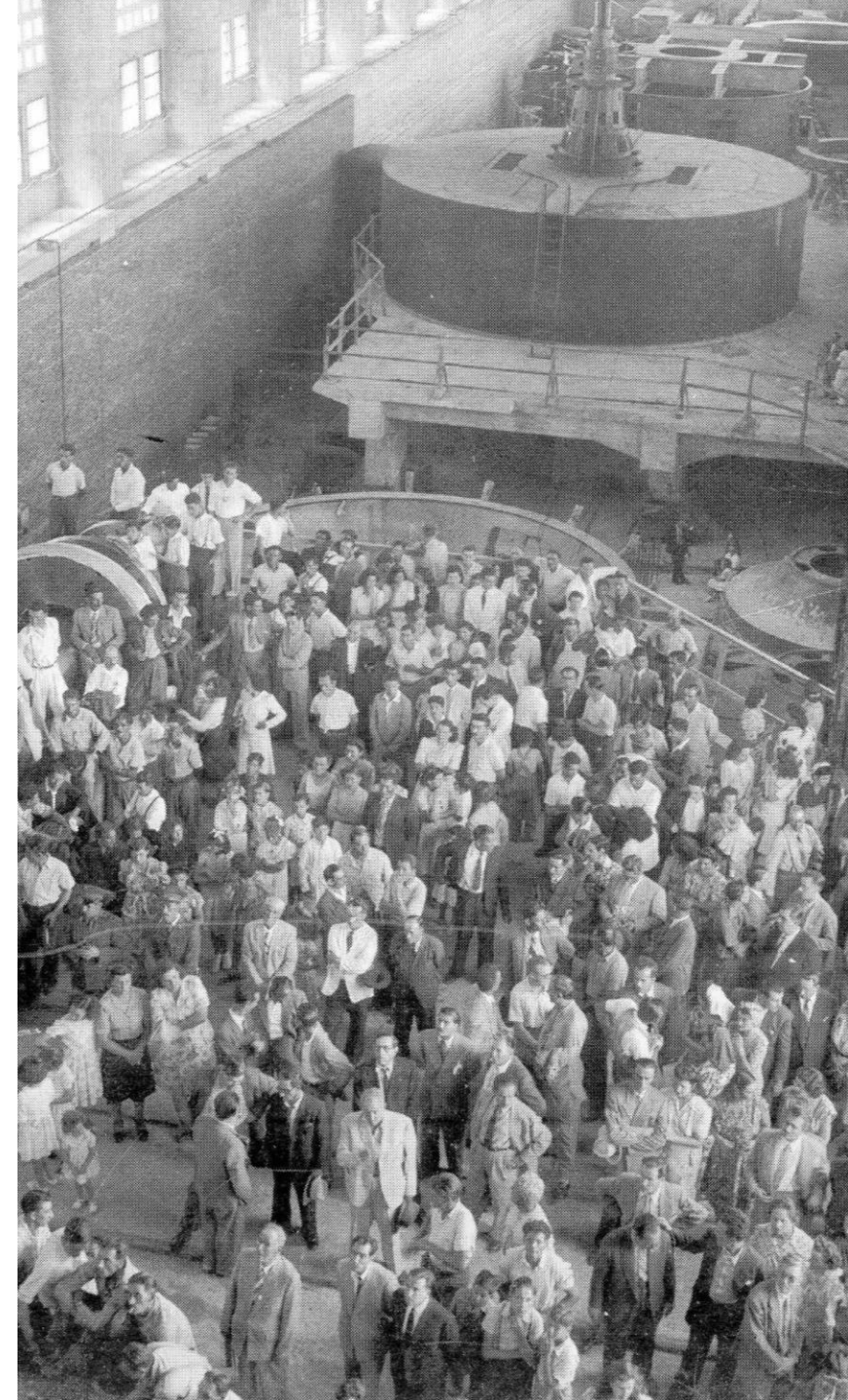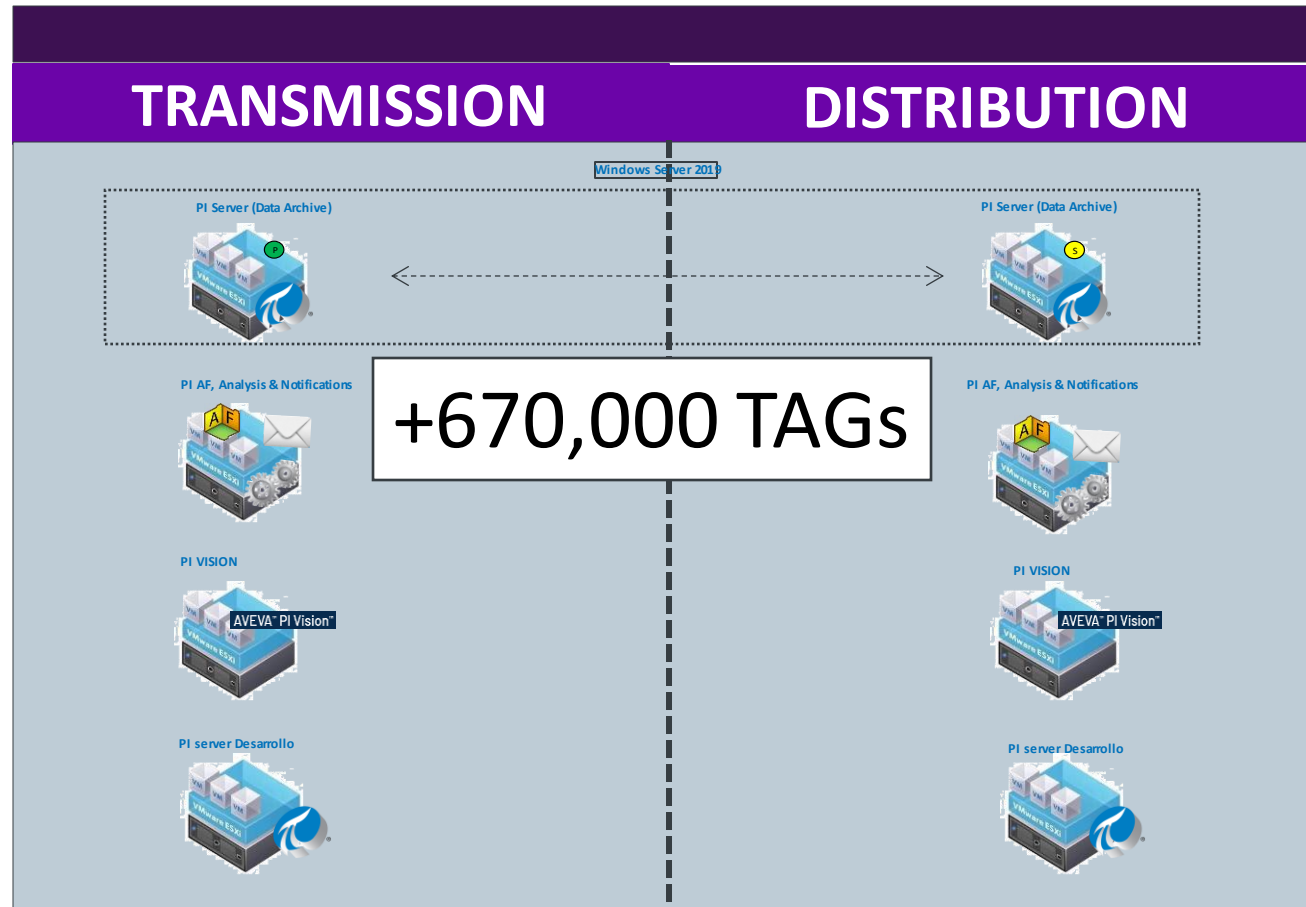
Western Regional Center

- Covers the Northwest of Uruguay
- Serves public and private generation
  - 500,000 population involved
  - Up to 500 km by national route
  - 1,270 km Power lines installed
  - 31 High voltage transformers

AVEVA

PI Collective Architecture

TRANSMISSION	DISTRIBUTION

Windows Server 2019

PI Server (Data Archive)

PI Server (Data Archive)

+670,000 TAGs

PI AF, Analysis & Notifications

PI AF, Analysis & Notifications

PI VISION

AVEVA™ PI Vision™

PI VISION

AVEVA™ PI Vision™

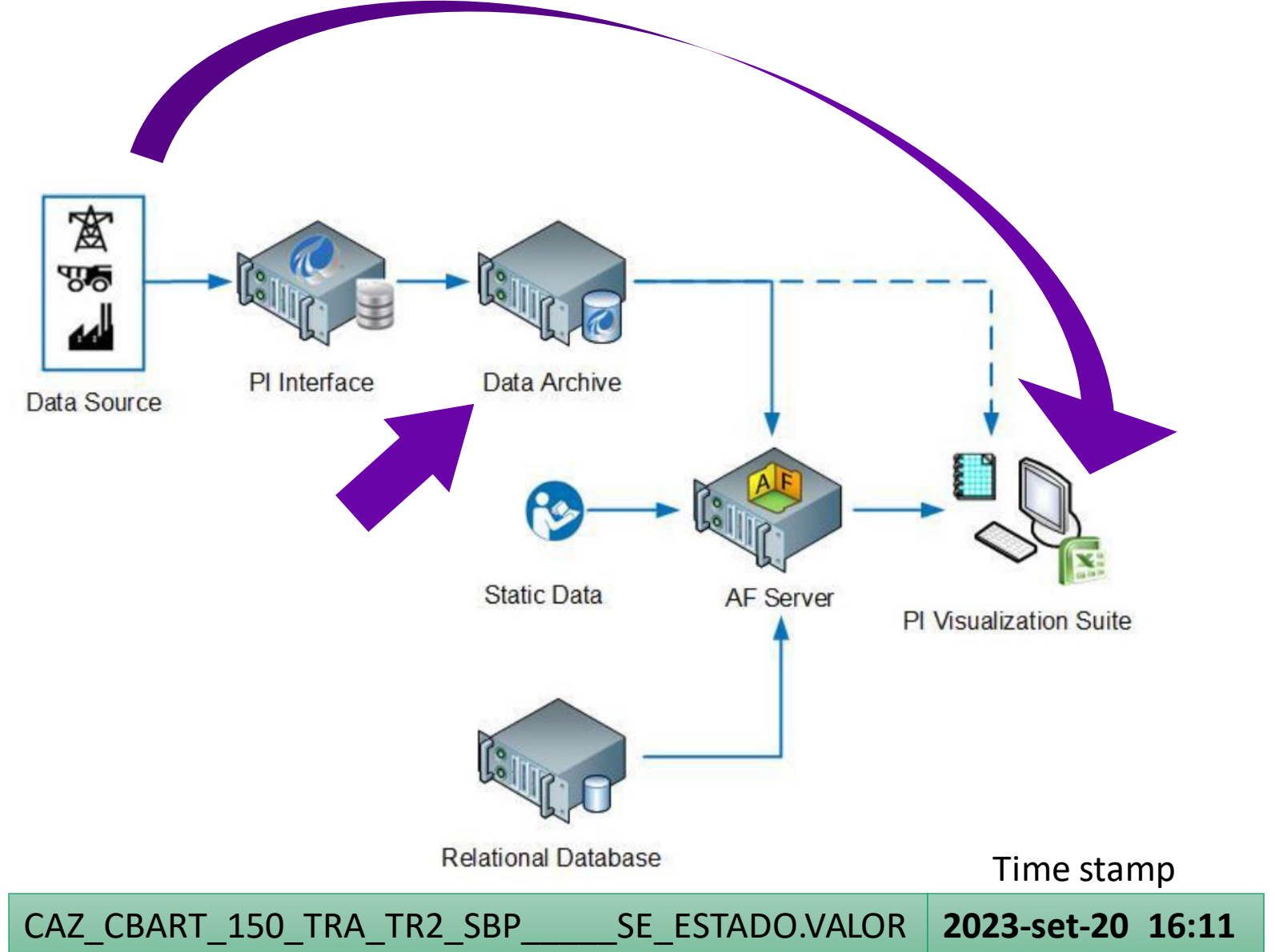PI server Desarrollo

PI server Desarrollo

TAG

Is a unique storage point for time series data in the PI Server (Former Data Archive).

>>> A place to storage data to be consulted later <<<

Example:

Time stamp

CAZ_CBART_150_TRA_TR2_SBP_____SE_ESTADO.VALOR	2023-set-20 16:11

*Como visualizer datos de PI System, página 5.

PI System in UTE Trasmision

How does it impact our work?

Before	After

Periodic maintenance was carried out without considering the equipment usage/condition

Data is crossed with PI System records to adjust maintenance based on the information on the equipment usage/condition
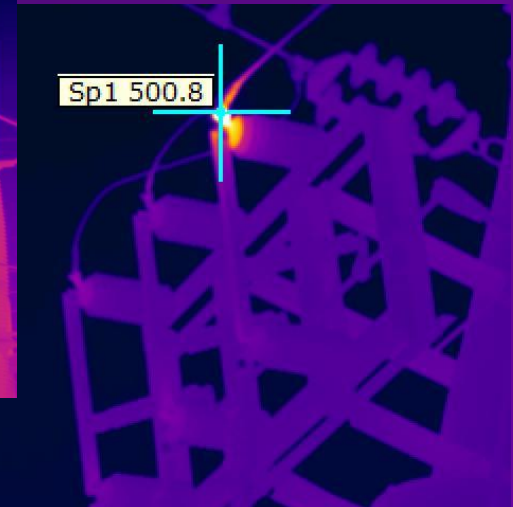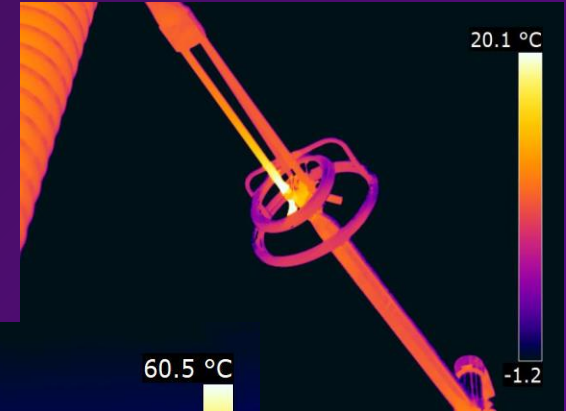
AVEVA

Potential issues

Goal: Operate all disconnectors at least once every 2 years

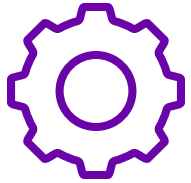**Scope:** More than 600 disconnectors

AVEVA

Request:

"Maintain all disconnectors at least once every two years"
"Stay updated"

ute

Challenges

- Improve work procedures to facilitate response and optimize human resources
- High fidelity in the reports done
- Generate autonomy to obtain data

Solution

- Develop an Excel document that consults PI data for all the disconnectors and returns a list with the date of the last movement of each one.
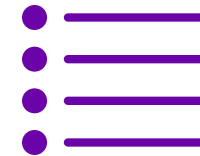
Benefits

- Immediate results
- Real picture
- Plan customized to the need
- More time gained to address other challenges

AVΞVA

PI Solution

Zona	SE	kV	Ultimo Movimier	TAG	Descripción
Zona 1	ARA	30	2020-Nov-27 16:54	CAZ_CBARA_030_RA1_BBR_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 30
Zona 1	ARA	30	2020-Nov-27 16:54	CAZ_CBARA_030_RA1_BBR_SLN_____SE_ESTADO.VALOR	LINEA | 30 kV Ra
Zona 1	ARA	30	2020-Nov-27 16:51	CAZ_CBARA_030_RA1_BBR_SPT_____SE_ESTADO.VALOR	TIERRA | 30 kV Ra
Zona 1	ARA	30	2021-Jun-21 15:20	CAZ_CBARA_030_RA1_CNS_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 30
Zona 1	ARA	30	2021-Jun-21 15:17	CAZ_CBARA_030_RA1_CNS_SLN_____SE_ESTADO.VALOR	LINEA | 30 kV Ra
Zona 1	ARA	30	2021-Jun-21 13:09	CAZ_CBARA_030_RA1_CNS_SPT_____SE_ESTADO.VALOR	TIERRA | 30 kV Ra
Zona 1	ARA	30	2021-Jun-15 09:08	CAZ_CBARA_030_RA1_DIS_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 30
Zona 1	ARA	30	2021-Jun-15 10:53	CAZ_CBARA_030_RA1_DIS_SLN_____SE_ESTADO.VALOR	LINEA | 30 kV Ra
Zona 1	ARA	30	2021-Mar-16 08:41	CAZ_CBARA_030_RA1_DIS_SPT_____SE_ESTADO.VALOR	TIERRA | 30 kV Radial Distribucion 1 Señales Puesta a Tierra | Arapey
Zona 1	ARA	30	2020-Nov-19 07:48	CAZ_CBARA_030_RA1_LAV_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 30 kV Radial Col - Lavalleja Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	30	2020-Nov-19 07:49	CAZ_CBARA_030_RA1_LAV_SLN_____SE_ESTADO.VALOR	LINEA | 30 kV Radial Col - Lavalleja Señales Seccionador Linea | Arapey
Zona 1	ARA	30	2020-May-07 11:15	CAZ_CBARA_030_RA1_LAV_SPT_____SE_ESTADO.VALOR	TIERRA | 30 kV Radial Col - Lavalleja Señales Puesta a Tierra | Arapey
Zona 1	ARA	30	2021-Mar-18 08:17	CAZ_CBARA_030_TRA_TR1_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 30 kV Trafo 1 Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	30	2021-Mar-18 08:18	CAZ_CBARA_030_TRA_TR1_SNE_____SE_ESTADO.VALOR	NEUTRO | 30 kV Trafo 1 Señales Seccionador de Neutro | Arapey
Zona 1	ARA	30	2021-Jun-15 12:33	CAZ_CBARA_030_TRA_TR2_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 30 kV Trafo 2 Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	30	2021-Jun-15 12:37	CAZ_CBARA_030_TRA_TR2_SNE_____SE_ESTADO.VALOR	NEUTRO | 30 kV Trafo 2 Señales Seccionador de Neutro | Arapey
Zona 1	ARA	150	2021-May-24 15:39	CAZ_CBARA_150_ACO_AC1_SBA_____SE_ESTADO.VALOR	BARRA AUX. | 150 kV Acoplador 1 Señales Seccionador Barra Auxiliar | Arapey
Zona 1	ARA	150	2021-May-24 16:10	CAZ_CBARA_150_ACO_AC1_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 150 kV Acoplador 1 Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	150	2020-Oct-06 15:29	CAZ_CBARA_150_LI1_CFL_SBA_____SE_ESTADO.VALOR	BARRA AUX. | 150 kV Línea 1 CFL Señales Seccionador Barra Auxiliar | Arapey
Zona 1	ARA	150	2020-Oct-07 09:36	CAZ_CBARA_150_LI1_CFL_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 150 kV Línea 1 CFL Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	150	2020-Oct-07 09:36	CAZ_CBARA_150_LI1_CFL_SLN_____SE_ESTADO.VALOR	LINEA | 150 kV Línea 1 CFL Señales Seccionador Linea | Arapey
Zona 1	ARA	150	2020-Oct-07 09:43	CAZ_CBARA_150_LI1_CFL_SPT_____SE_ESTADO.VALOR	TIERRA | 150 kV Línea 1 CFL Señales Puesta a Tierra | Arapey
Zona 1	ARA	150	2018-Oct-25 18:05	CAZ_CBARA_150_LI1_TGO_SBA_____SE_ESTADO.VALOR	BARRA AUX. | 150 kV Línea 1 Tomas Gomensoro Señales Seccionador Barra Auxiliar | Arapey
Zona 1	ARA	150	2020-set-15 07:46	CAZ_CBARA_150_LI1_TGO_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 150 kV Línea 1 Tomas Gomensoro Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	150	2020-set-15 07:46	CAZ_CBARA_150_LI1_TGO_SLN_____SE_ESTADO.VALOR	LINEA | 150 kV Línea 1 Tomas Gomensoro Señales Seccionador Linea | Arapey
Zona 1	ARA	150	2020-set-15 14:28	CAZ_CBARA_150_LI1_TGO_SPT_____SE_ESTADO.VALOR	TIERRA | 150 kV Línea 1 Tomas Gomensoro Señales Puesta a Tierra | Arapey
Zona 1	ARA	150	2021-Mar-18 08:15	CAZ_CBARA_150_TRA_TR1_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 150 kV Trafo 1 Señales Seccionador Barra Principal | Arapey
Zona 1	ARA	150	2019-Abr-08 15:21	CAZ_CBARA_150_TRA_TR1_SBY_____SE_ESTADO.VALOR	TRANSFERENCIA | 150 kV Trafo 1 Señales Transferencia | Arapey
Zona 1	ARA	150	2021-Mar-18 08:15	CAZ_CBARA_150_TRA_TR1_STR_____SE_ESTADO.VALOR	TRAFO | 150 kV Trafo 1 Señales Seccionador Trafo | Arapey
Zona 1	ARA	150	2021-Jun-09 16:24	CAZ_CBARA_150_TRA_TR2_SBA_____SE_ESTADO.VALOR	BARRA AUX. | 150 kV Trafo 2 Señales Seccionador Barra Auxiliar | Arapey
Zona 1	ARA	150	2021-Jun-15 12:31	CAZ_CBARA_150_TRA_TR2_SBP_____SE_ESTADO.VALOR	BARRA PRIN. | 150 kV Trafo 2 Señales Seccionador Barra Principal | Arapey

382	Less than 1 year
68	Between 1 and 2 years
65	More than 2 years
110	Border

Impact on the analysis

Manually	Automated
1 week = 40 hours	1 hour

■ Before
■ After

+97.5%

AVEVA

Other examples

Temperature detection in Transformer

Analysis of unexpected breaker openings

Studies Transformers and Lines load's

| Fecha	Radial x23			Radial Bola de oro			
	Corriente	Estado	I_Neutro	Estado	I_R	I_S	I_T
27-Ago-20 18:56:00	160,7	Cerrado	0,35	Cerrado	87,4	55,9	56,2
27-Ago-20 18:57:00	161,1	Cerrado	0,35	Cerrado	89,9	56,0	56,3
27-Ago-20 18:58:00	161,4	Cerrado	0,35	Cerrado	92,5	56,1	56,4
27-Ago-20 18:59:00	161,8	Cerrado	0,35	Cerrado	95,1	56,2	56,4
27-Ago-20 19:00:00	162,1	Cerrado	0,35	Cerrado	97,7	56,3	56,5
27-Ago-20 19:01:00	161,9	Cerrado	0,35	Cerrado	100,3	56,3	56,6
27-Ago-20 19:02:00	161,5	Cerrado	0,35	Cerrado	102,8	56,4	56,7
27-Ago-20 19:03:00	161,1	Cerrado	0,35	Cerrado	105,4	56,5	56,8
27-Ago-20 19:04:00	160,6	Cerrado	0,35	Cerrado	108,0	56,6	56,8
27-Ago-20 19:05:00	160,5	Cerrado	0,35	Cerrado	110,6	56,6	56,9
27-Ago-20 19:06:00	160,7	Cerrado	0,35	Cerrado	113,2	56,7	57,0
27-Ago-20 19:07:00	160,8	Cerrado	0,35	Cerrado	115,7	56,8	57,1
27-Ago-20 19:08:00	161,0	Cerrado	0,35	Cerrado	118,3	56,9	57,2
27-Ago-20 19:09:00	161,1	Cerrado	15,27	Cerrado	120,9	56,2	56,1
27-Ago-20 19:10:00	161,3	Cerrado	46,98	Cerrado	123,5	51,9	51,8
27-Ago-20 19:11:00	64,4	Cerrado	78,69	Cerrado	126,1	47,5	47,6
27-Ago-20 19:12:00	1,6	Abierto	0,08	Abierto	3,9	3,7	4,0
27-Ago-20 19:13:00	-0,4	Abierto	0,08	Abierto	8,3	8,0	8,7
27-Ago-20 19:14:00	-0,4	Abierto	0,08	Abierto	12,7	12,3	13,5
27-Ago-20 19:15:00	-0,4	Abierto	0,08	Abierto	17,2	16,5	18,2
27-Ago-20 19:16:00	-0,4	Abierto	0,08	Abierto	21,6	20,8	22,9
27-Ago-20 19:24:00	-0,4	Abierto	0,08	Cerrado	57,0	55,7	56,5

AVΞVA

KEEP GOING!

"IF YOU CAN DREAM IT, YOU CAN DO IT"

WALT DISNEY CORP.

Our dream today:
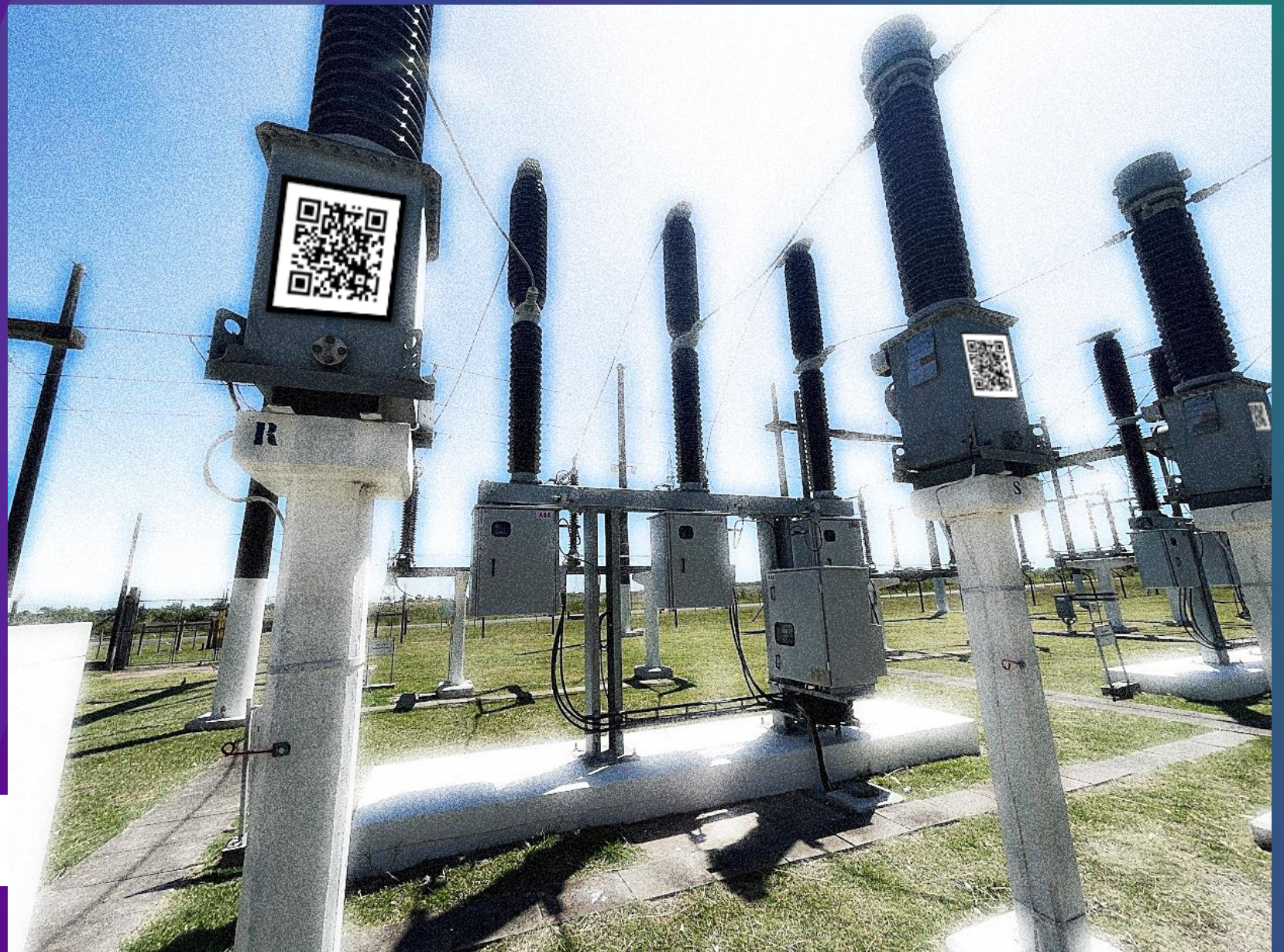
AVEVA

Next steps...

Generate SCADA PI Vision → Ensure access to links → Place QRs signages

Available

EARLY NEXT YEAR

AVΞVA

DEMO

© 2023 AVEVA Group plc and its subsidiaries. All rights reserved.

This presentation may include predictions, estimates, intentions, beliefs and other statements that are or may be construed as being forward-looking. While these forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could result in actual outcomes differing materially from those projected in these statements. No statement contained herein constitutes a commitment by AVEVA to perform any particular action or to deliver any particular product or product features. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect our opinions only as of the date of this presentation.

The Company shall not be obliged to disclose any revision to these forward-looking statements to reflect events or circumstances occurring after the date on which they are made or to reflect the occurrence of future events.

AVΞVA

linkedin.com/company/aveva

@avevagroup

ABOUT AVEVA

AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

Learn more at www.aveva.com

AVEVA