

05/18/2022

Analyzing Wind Power data in the AVEVA Data Hub (OCS) at EDP Renewables

Sergio Valencia Galán



AVEVA

EDPR - INTEGRATED FLEET

EDPR

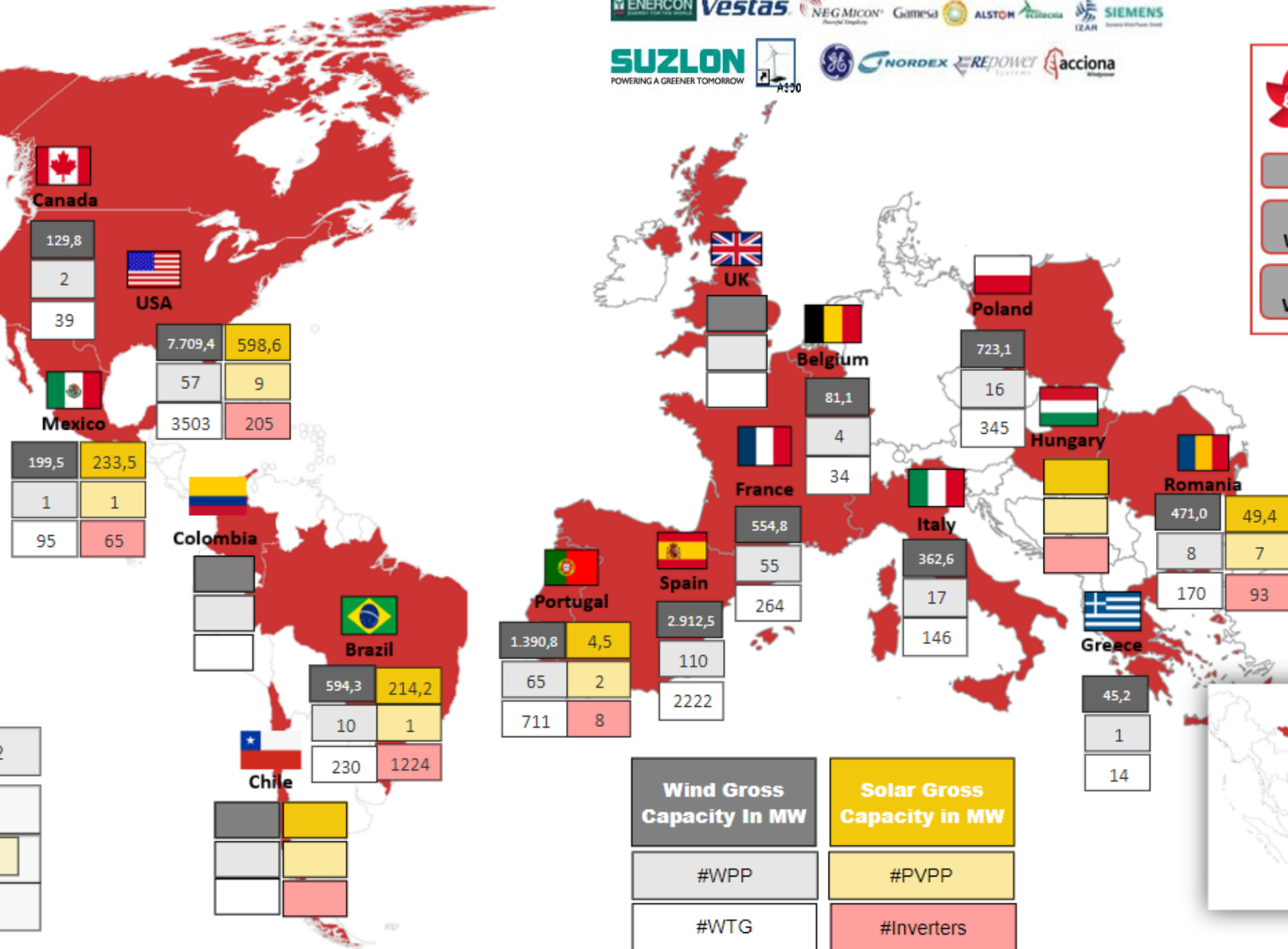


edp renováveis

16.274 MW	
346 WPPs	20 PVPPs
7773 WTGs	1595 INVs

Assets to Date: 28-04-2022

# WTGs	7773	
# OEMs:	15	10
# Turbines Models:	66	



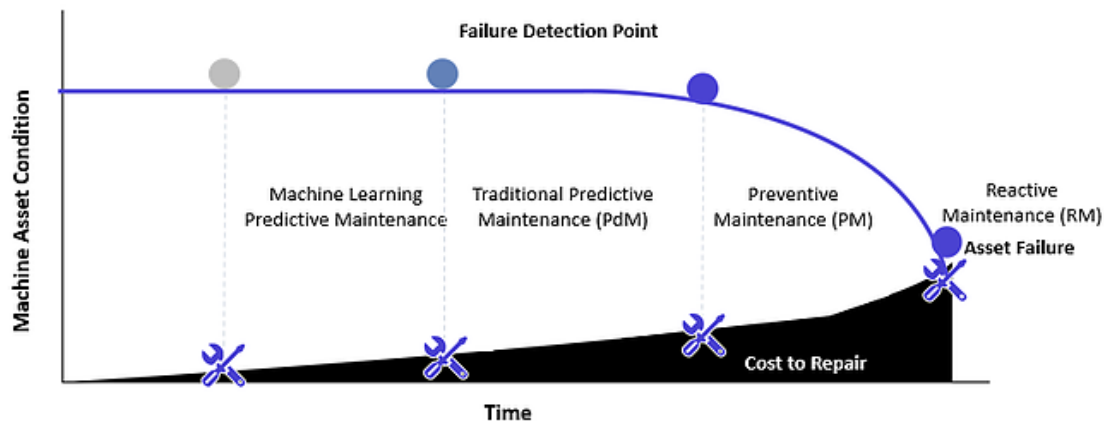
Wind Gross Capacity In MW	Solar Gross Capacity in MW
#WPP	#PVPP
#WTG	#Inverters

Supervised by EDPR's Dispatch Centers



Business Needs -> Big Data Apps and Connections

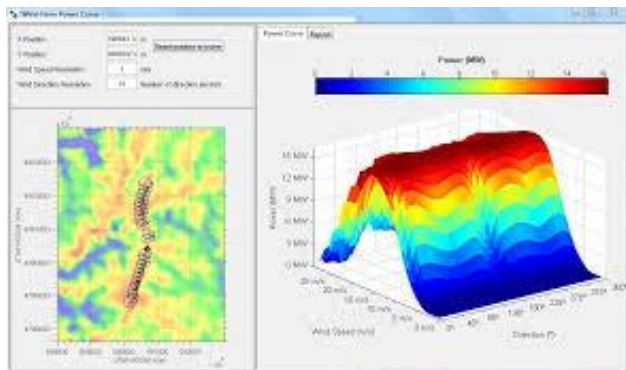
Machine Learning / Predictive Maintenance



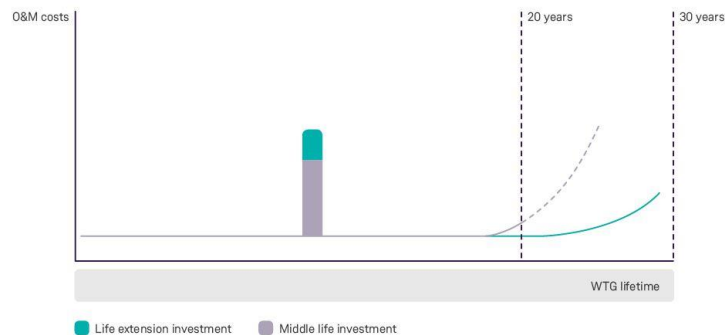
Dashboard on Power BI (Advanced Reporting)



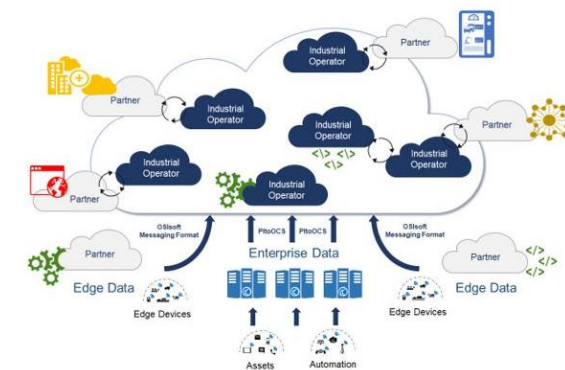
Performance of WTG / INV



Wind Turbine Life Extension



Data Sharing



EDPR REQUIREMENTS

Wind Turbine Life Extension

Data Sharing

Machine Learning

Predictive Maintenance

Dashboard on Power BI

Performance of WTG / INV

WHY USE ADH?

ADH CHARACTERISTICS

API to connect to External Sources
(Big Data: Azure, Google, Amazon)

Multiples Data Sources
(PI Server, Adapters,...)

Easy Connection with Power BI

Support 2M Tags

Supported by AVEVA



WHY USE ADH?

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Wind Turbine Life Extension

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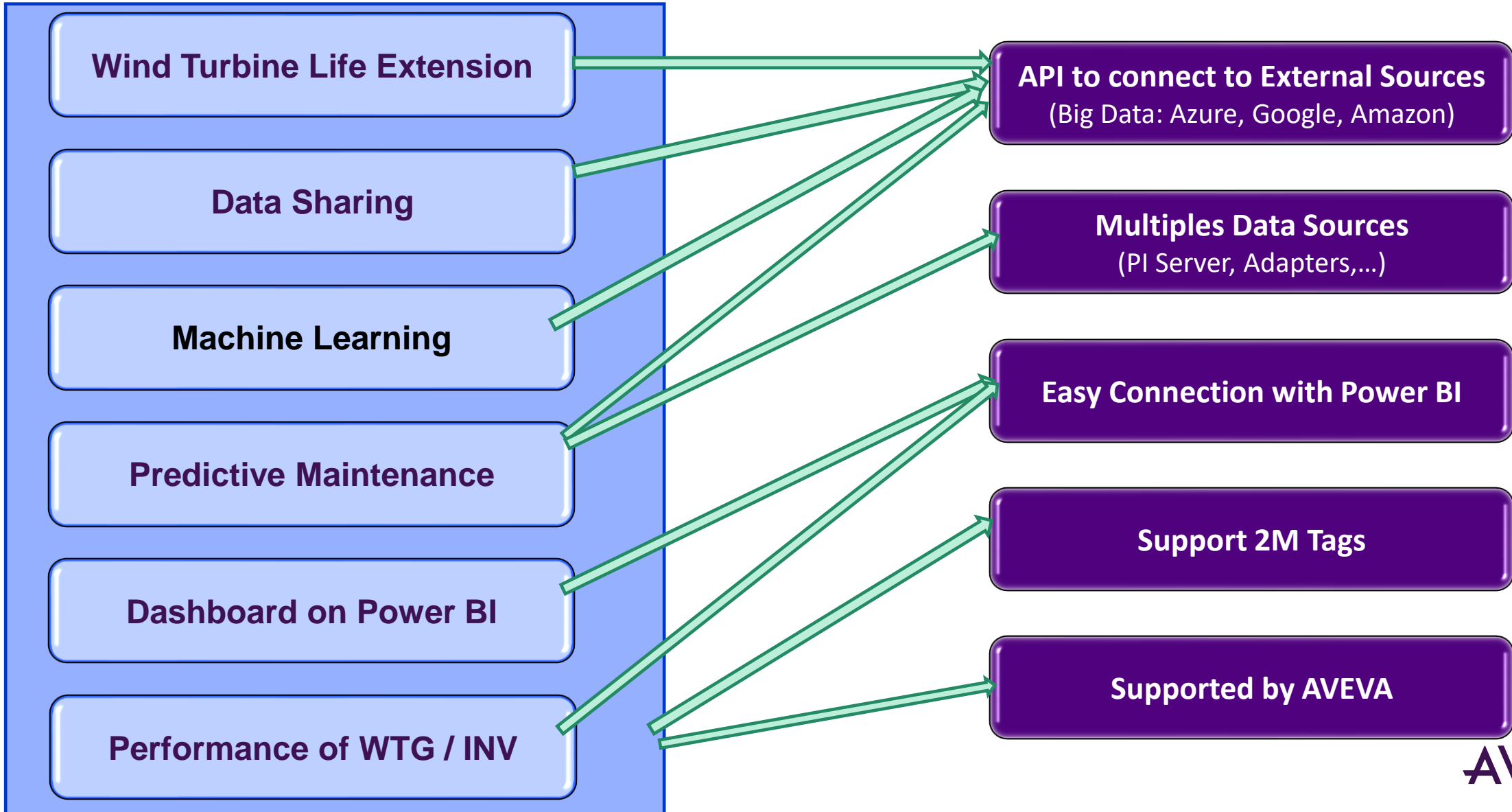
Support 2M Tags

Supported by AVEVA

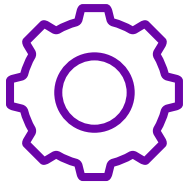
EDPR REQUIREMENTS

WHY USE ADH?

ADH CHARACTERISTICS



How to take advantage of the ADH in your organization



Challenge

Improve Key Processes of the Company using 2M of Tags:

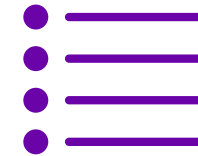
- Machine Learning / Predictive Maintenance
- Dashboard on Power BI with PI Data
- Performance of Wind Turbines
- Wind Turbine Life Extension
- Data Sharing



Solution

Using AVEVA Data HUB (OCS) with 2M of tags on a specific Lighthouse program:

- Configure the Agents
- Troubleshooting in the AVEVA part
- Specific configuration of data views



Benefits

- A Solution supported by AVEVA to connect with Cloud systems and external systems
- Include 100% of the Assets
- Increase the analytic tools to improve our processes

Challenge

Requirements of EDPR's:

- Machine Learning
- Predictive Maintenance
- Dashboard on Power BI
- Performance of Wind Turbines
- Wind Turbine Life Extension
- Data Sharing



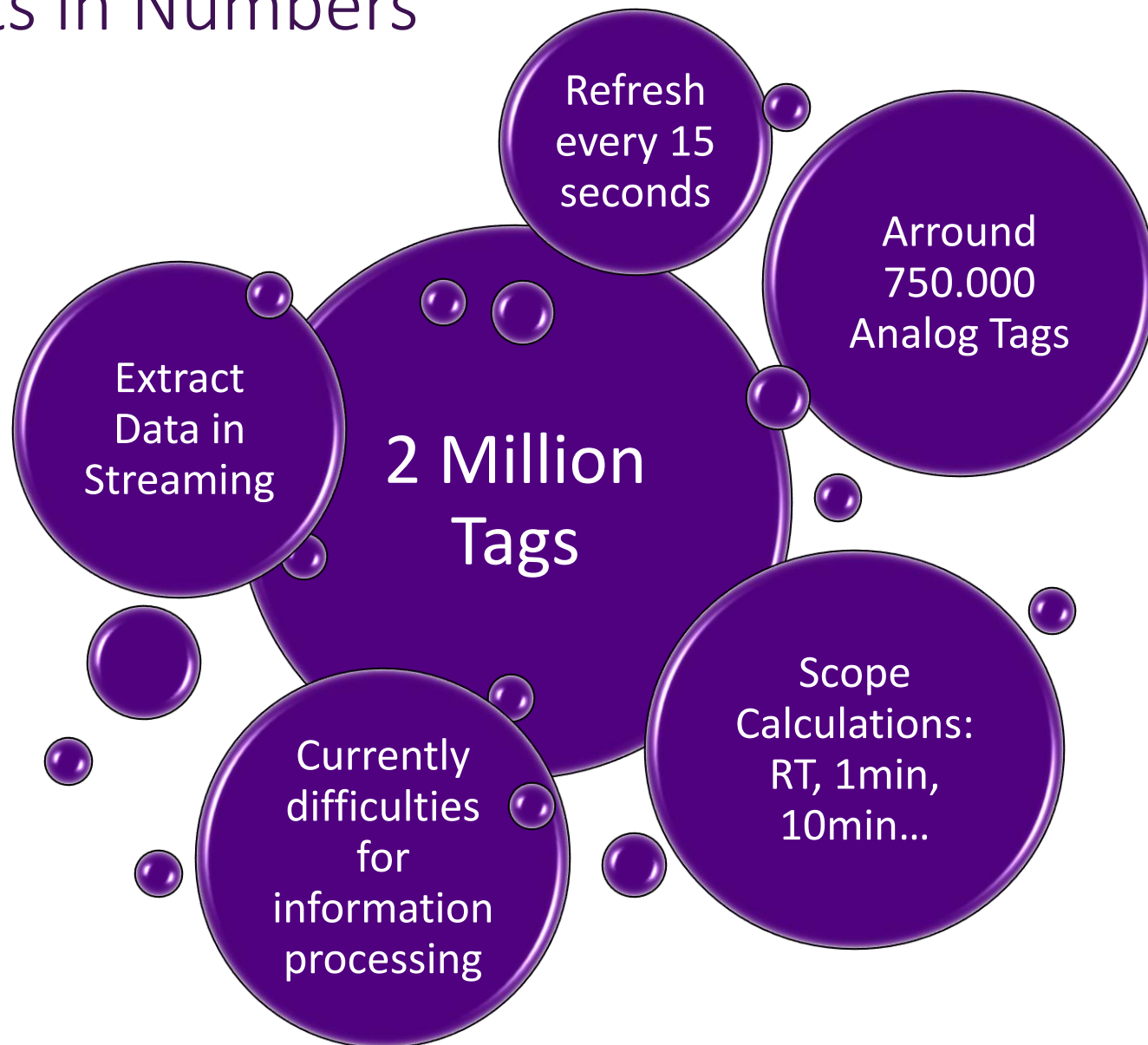
AVEVA Challenge to Adapt ADH for 2M Tags



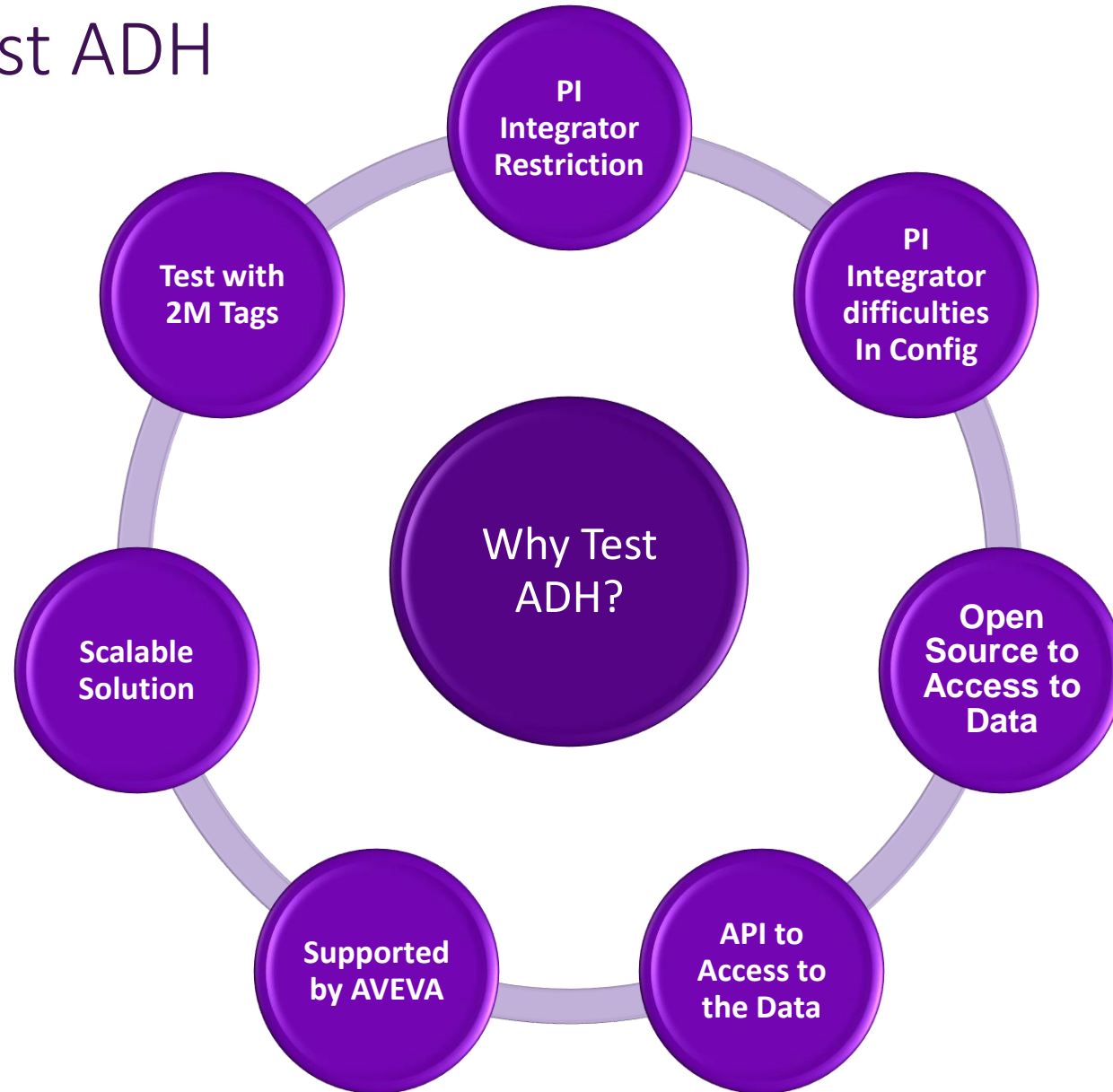
Create an Interface based on AVEVA Solution for Digital Transformation needs

Scope: How to Use ADH capabilities with 2 Millions of Tags

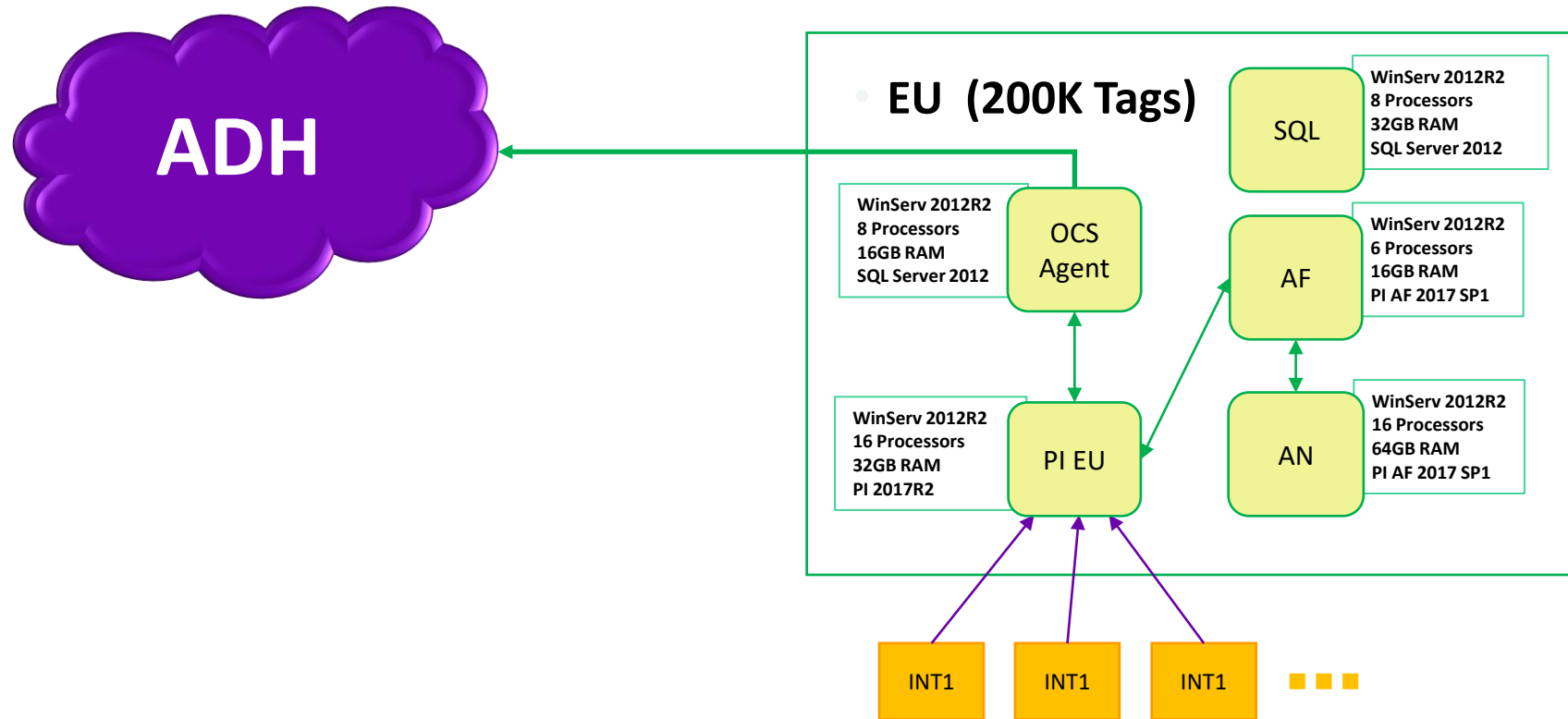
Requirements in Numbers



Reasons to test ADH



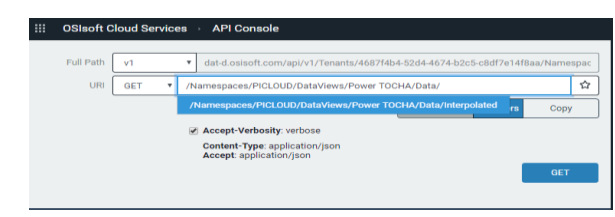
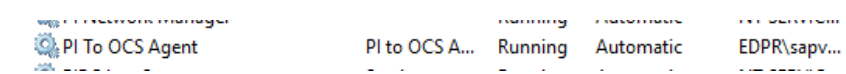
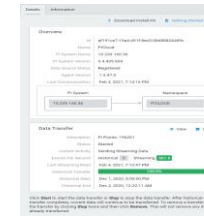
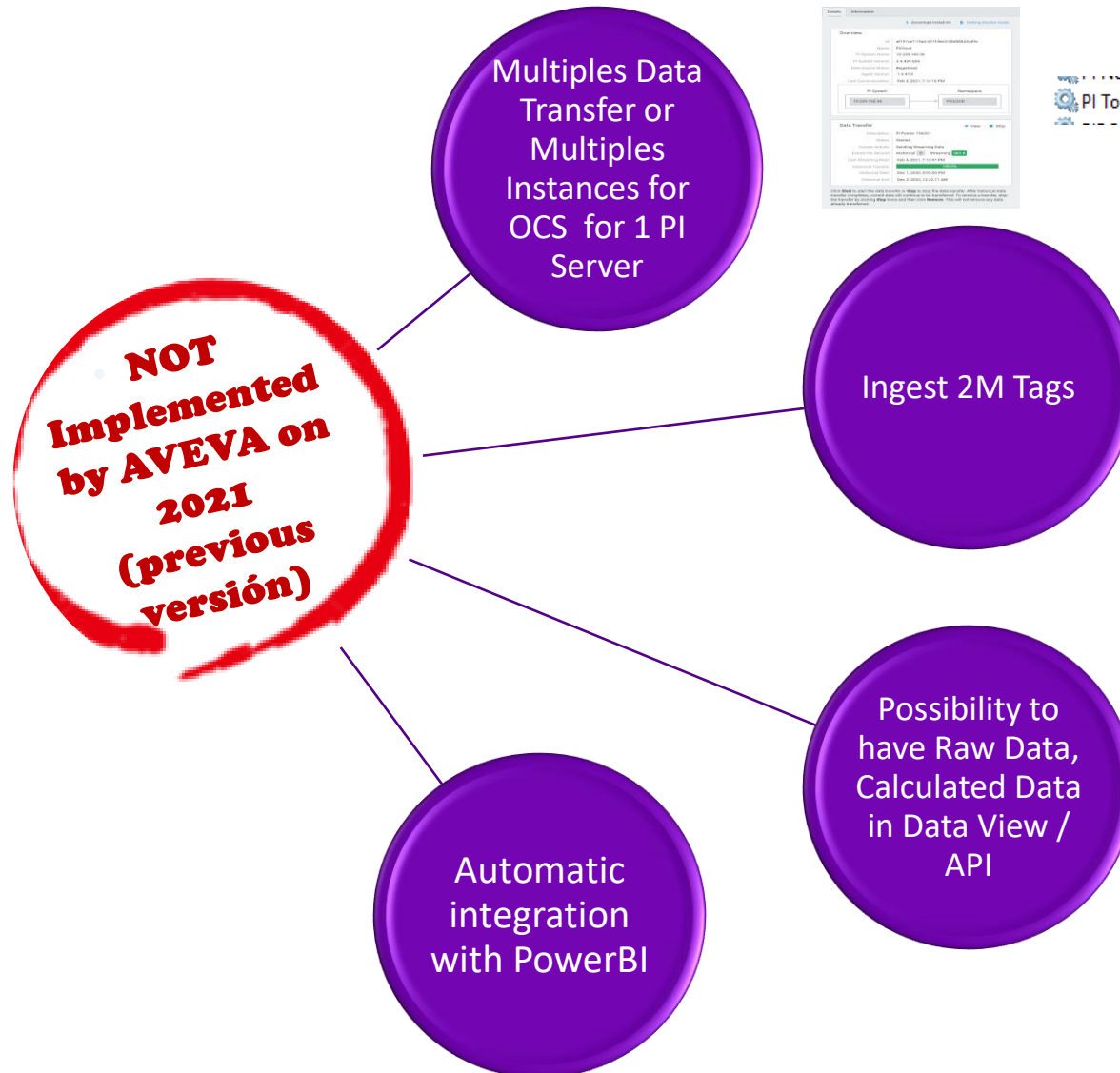
LightHouse with 200K tags on early 2021 (Previous Version)



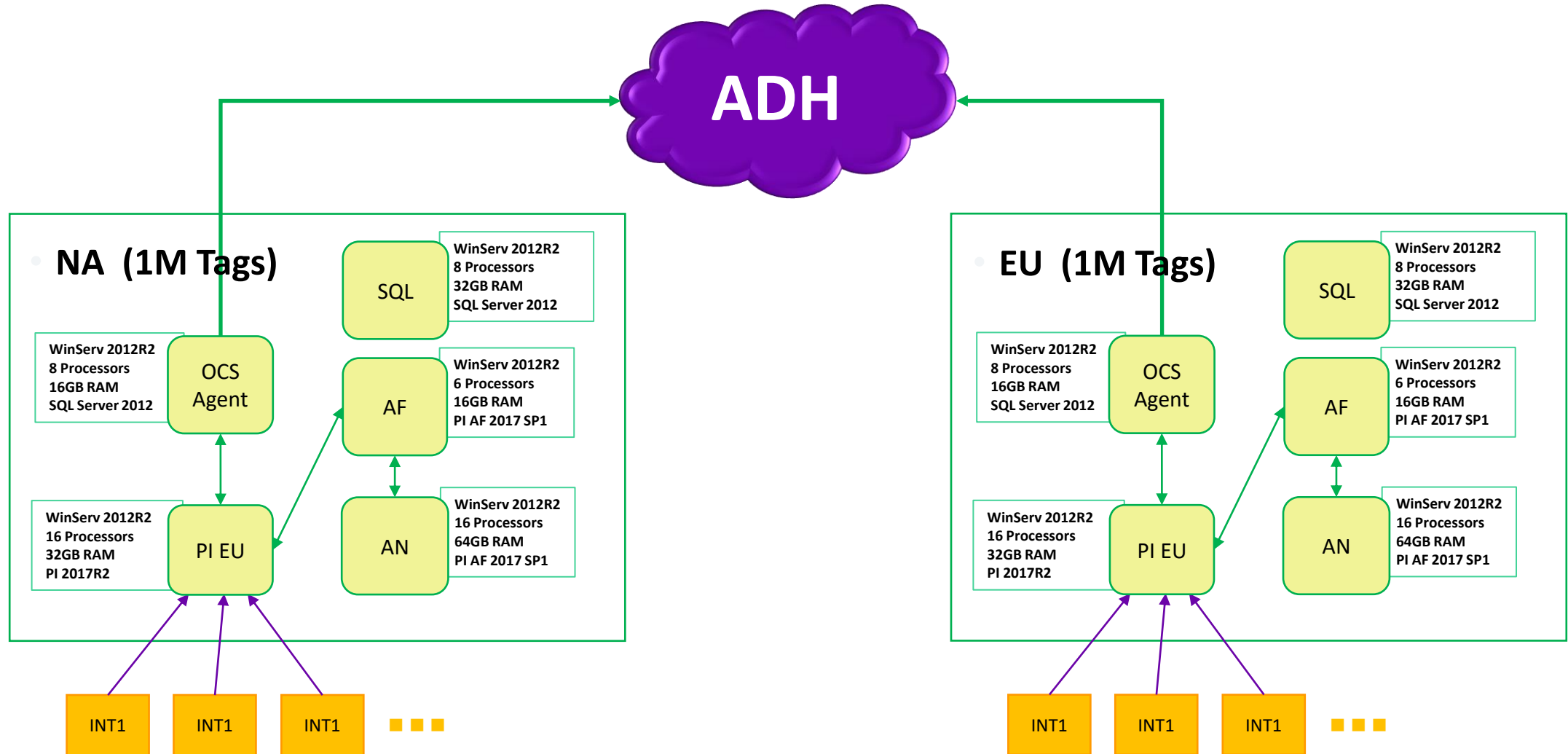
LightHouse with 200K tags on early 2021 (Previous Version)

<u>#</u>	<u>Required Criteria</u>	<u>Results</u>	<u>Pass</u>
1	Speed of data streaming ingress into OCS	Average Delay 15"	✓
2	Speed of Data Archive ingress into OCS	Average Delay 15"	✓
3	Volume	200,000 Tags	✓
4	Historical availability	Historical Recovery in different situations properly	✓
5	Data egress speed availability	For 300 Tags Query on Power BI 7"	✓
6	Historical data egress availability	For 300 Tags Query on Power BI 7"	✓
7	Direct Connectivity using PI Adapters for OPC UA into OCS	Integration problems between PI Adapter and EDPR's OPC UA	✗




LightHouse with 200K tags on early 2021 (Previous Version)



LightHouse with 2M tags on 2021-2022



LightHouse with 2M tags on 2021-2022

#	<u>Required Criteria</u>	<u>Results</u>	<u>Pass</u>
1	Speed of data streaming ingress into OCS		✓
2	Volume	2,000,000 Tags	✓
3	Multiples Data Transfer or Multiples Instances for OCS for One PI Server		
4	Connect with AF Models		
5	Historical availability	Historical Recovery in different situations properly	✓
6	Possibility to have Raw Data, Calculated Data in Data View / API		✓
7	Historical data egress availability		✓
8	Automatic client connectivity with PowerBI		✓
9	Direct Connectivity using PI Adapters for OPC UA into OCS	Integraton problems between PI Adapter and EDPR's OPC UA	

Configure Data Transfers

ces ▶ PI to OCS Agents

TEST_2M

Description ↑	Status	Version	Data Archive	Region	Namesp
Agent_EU_2M	Good	1.8.0.0		WestEurope	TEST_2M
Agent_NA_2M	Good	1.8.0.0		WestEurope	TEST_2M

Showing 1 - 2 of 2

Items per page: 50

Agent_EU_2M

Manage Agent | Transfer Metrics

Agent Overview

Agent Description	Agent_EU_2M
Agent Namespace	TEST_2M
Agent Status	Registered
Agent Version	1.8.0.0
Communication Time	10 may 2022 20:44:50

Transfer Overview

Transfer Name	Transfer_EU_2M
Transfer Description	
Transfer Status	Started
Current Activity	Sending Streaming Data
Last Modified	4 abr 2022 13:56:15

[View Transfer](#) [Remove Transfer](#) [Stop Transfer](#)

Agent_EU_2M

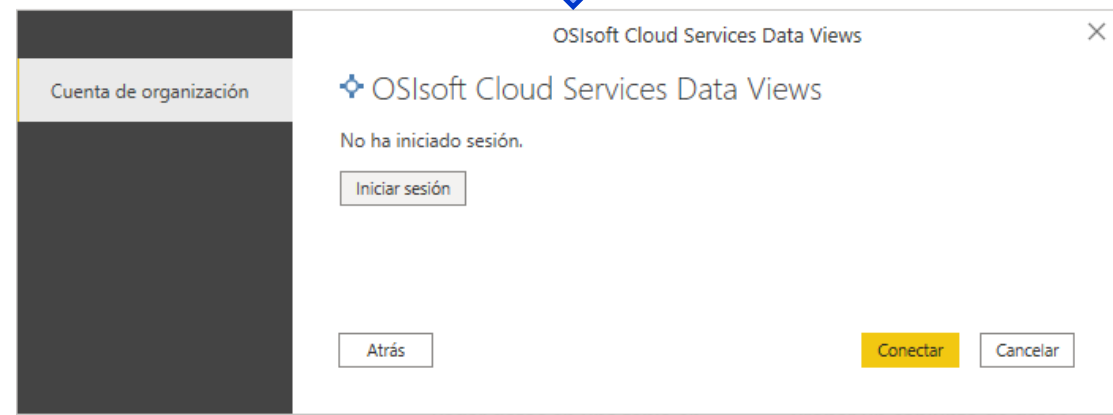
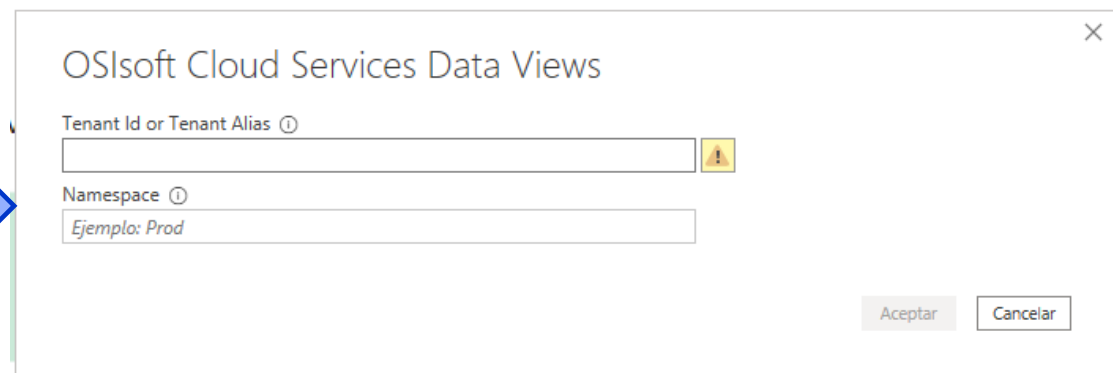
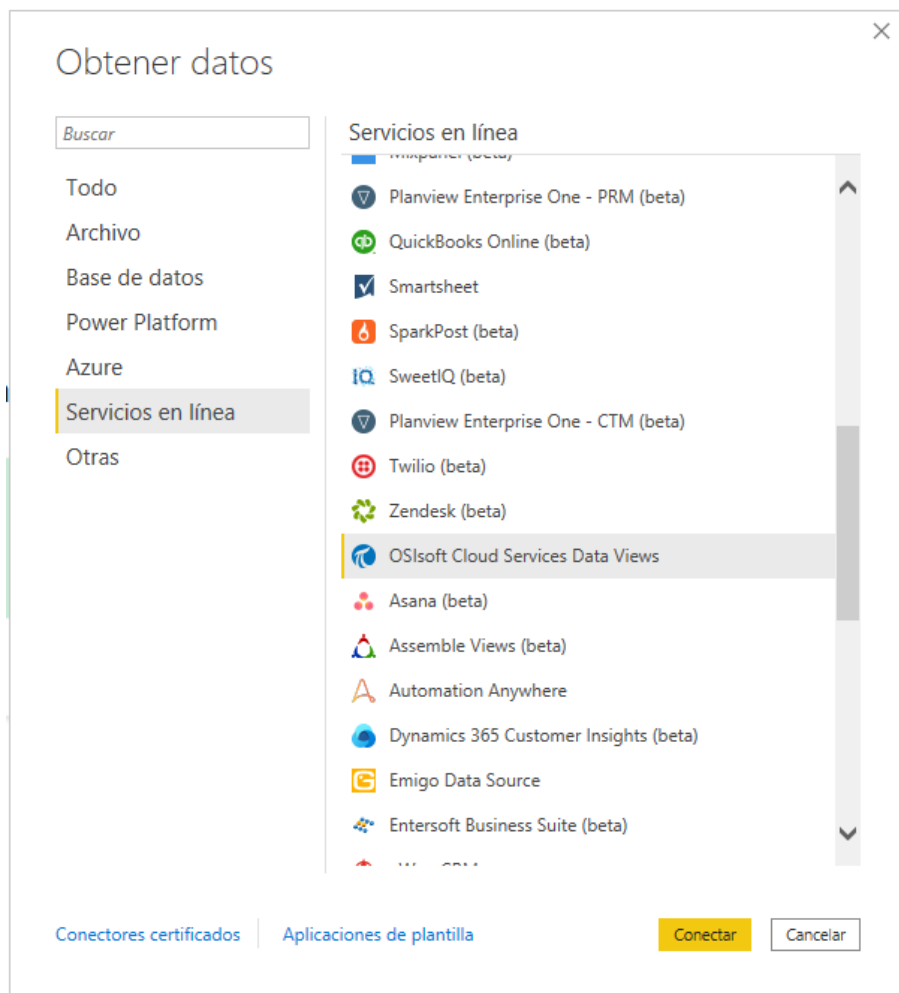
Manage Agent | Transfer Metrics

edprazrppir01

PI Data Archive Server Version	3.4.440.477
Last Streaming Read	10 may 2022 20:43:45
Streaming Events Per Second	1.961
Historical Events Per Second	0
Historical Transfer	100%
Historical Start	1 abr 2022 2:00:00
Historical End	4 abr 2022 16:17:54
Total PI Points in Transfer	1.003.289
Total Points Updated	0
Total Streams Created	0
Total Streams Updated	0
Total Streams Deleted	0
Stream Creation Errors	0
Stream Update Errors	0
Stream Deletion Errors	0

POWER BI Integration

OSIsoft-Cloud-Services-Power-BI-Connector_1.1.0.140.exe



POWER BI Integration

OSisoft-Cloud-Services-Power-BI-Connector_1.1.0.140.exe

Navegador

Opciones de presentación

- edprenewables: TEST_2M [2]
- Interpolated Data Views
- Stored Data Views [402]

- fx digital_0
- fx digital_1
- fx digital_10
- fx digital_100
- fx digital_101
- fx digital_102
- fx digital_103
- fx digital_104
- fx digital_105
- fx digital_106
- fx digital_107
- fx digital_108
- fx digital_11
- fx digital_110
- fx digital_111
- fx digital_112

Start Index: 2022-05-08

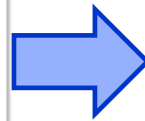
End Index: 2022-05-09

Aplicar | Borrar

digital_11

Timestamp	tag	Value	IsAnnotati
08/05/2022 0:12:59	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 0:18:10	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 0:23:16	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 0:35:04	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 0:40:07	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 0:45:14	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 1:01:16	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 1:06:22	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 1:11:27	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 1:35:14	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 1:40:20	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 1:45:26	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 2:03:07	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 2:08:10	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	
08/05/2022 2:13:15	SUBSTN.BFEIJAO.WSUB.HVM1_TAPDDS.ACQ.AI	0	

Cargar | Transformar datos | Cancelar



Validations by the Cutoff_09.12.21_02 - Power BI Desktop

Archivo Inicio Insertar Modelado Ver Ayuda

edp renewables

Valid Changes | Unvalid Changes

WPP	Valid Changes	Unvalid Changes
Babilónia I	41	
SYSTEM	30	
e351115	11	
Meadow Lake 6	17	
E351488	17	
Arkwright Summit	11	
SYSTEM	9	
E349874	2	
Babilónia II	7	
SYSTEM	5	
e351115	2	
Taverna-Caduta	6	
E347244	6	
Elkhorn Valley	4	
E344509	4	
Turtle Creek	4	
E344213	3	
SYSTEM	1	
Ávila	3	
E346877	3	
Central-Safra	3	
e334407	3	
SYSTEM	3	
Total	539	97

% Valid Changes

0,00 % | 84,75 % | 100,00 %

Unvalid Changes por WPP

WPP	Unvalid Changes
Babilónia I	41
Meadow Lake 6	17
Arkwright Summit	11
Babilónia II	7
Taverna-Caduta	6
Elkhorn Valley	4
Turtle Creek	4
Ávila	3
Central-Safra	3
Cabeço da Rainha	1

Event changed? por Hour_event_changed y Validation_by_Cutoff

Validation_by_Cutoff | Out_of_Time | Valid

Unvalid Changes por event_user

event_user	Unvalid Changes
E351488	17
e351115	13
E347244	6
E344509	4
e334407	3
E344213	3
E346877	3
E349874	2

Visualizaciones | Campos

Buscar

Consultas | Horas | Tabla

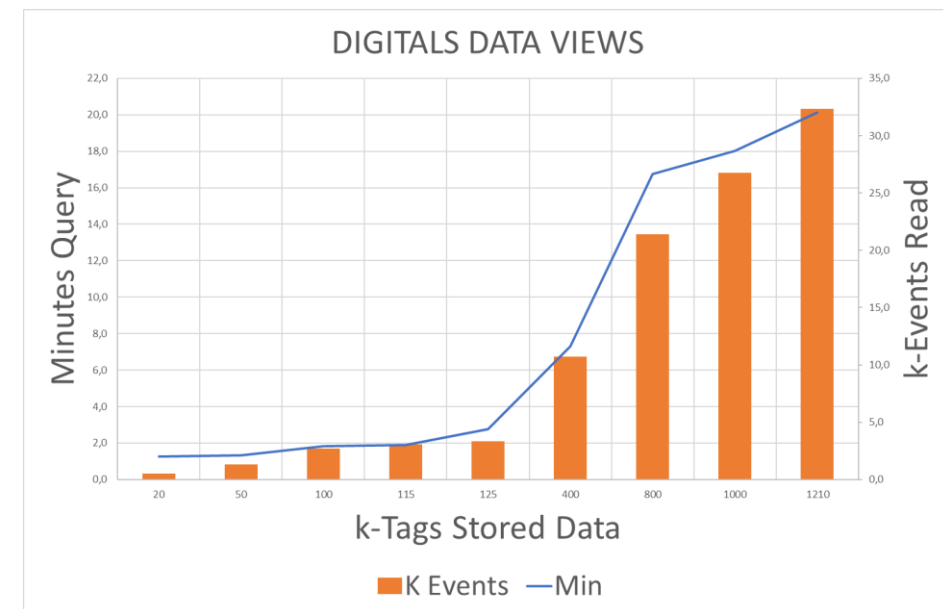
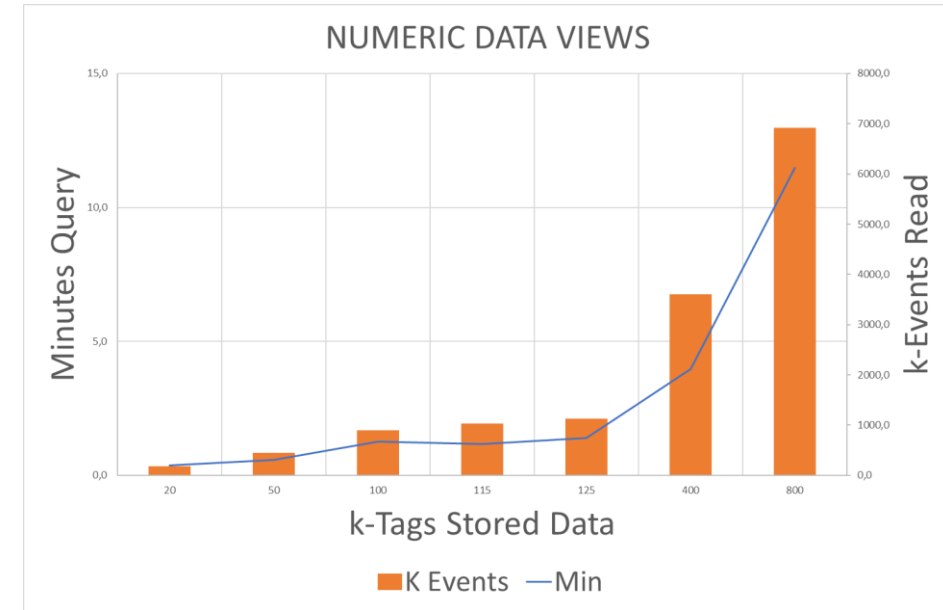
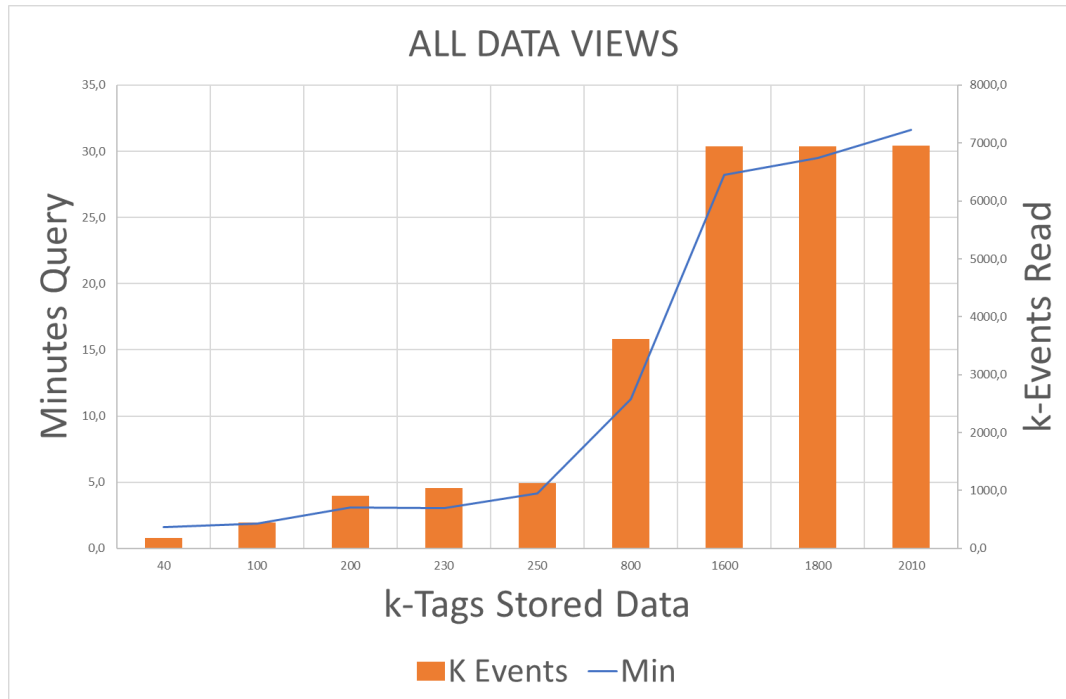
Activar

Actualización disponible (clic para descargarla)

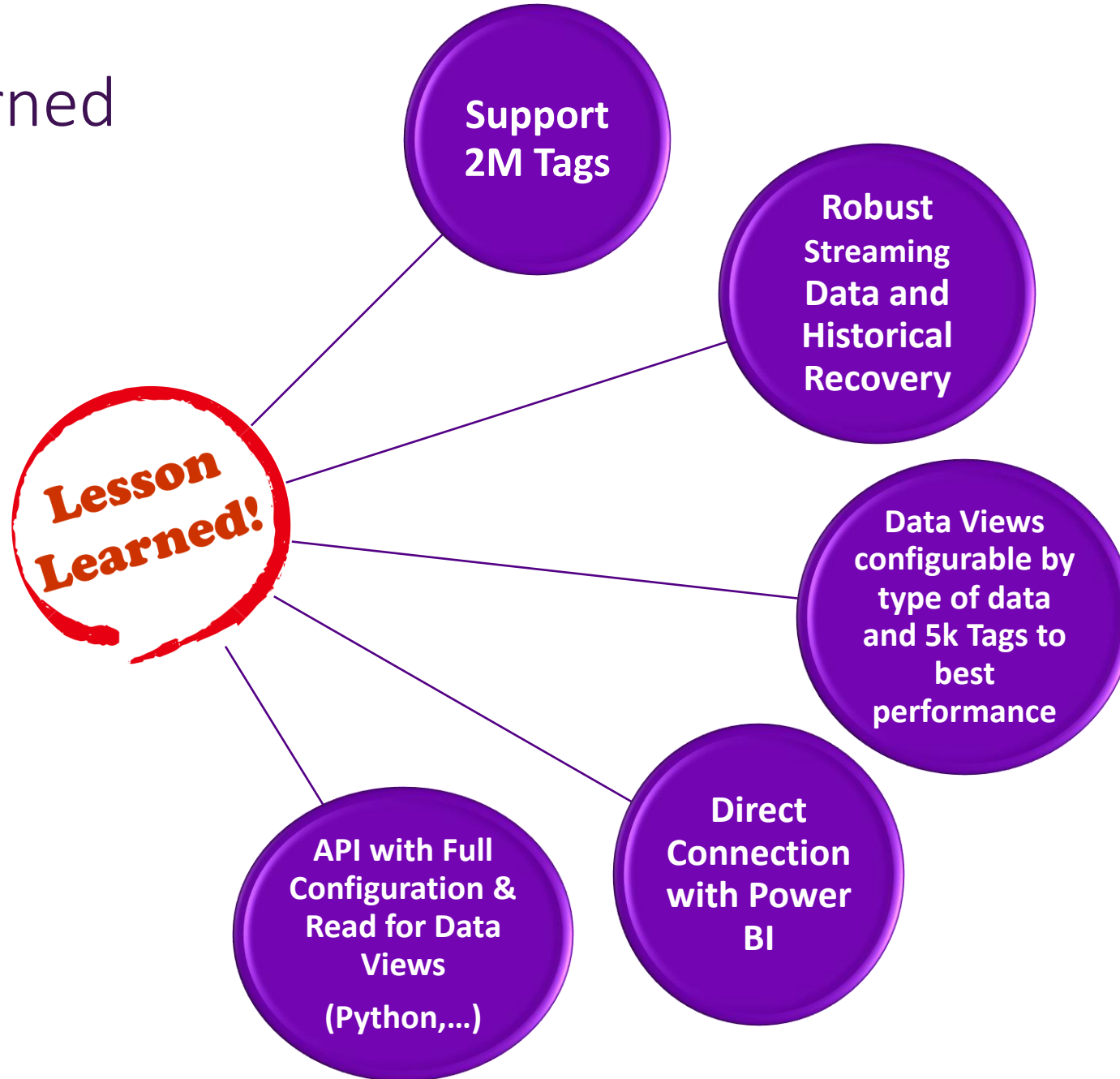
Data Views Queries

AVEVA Recommendations for EDPR's requirements:

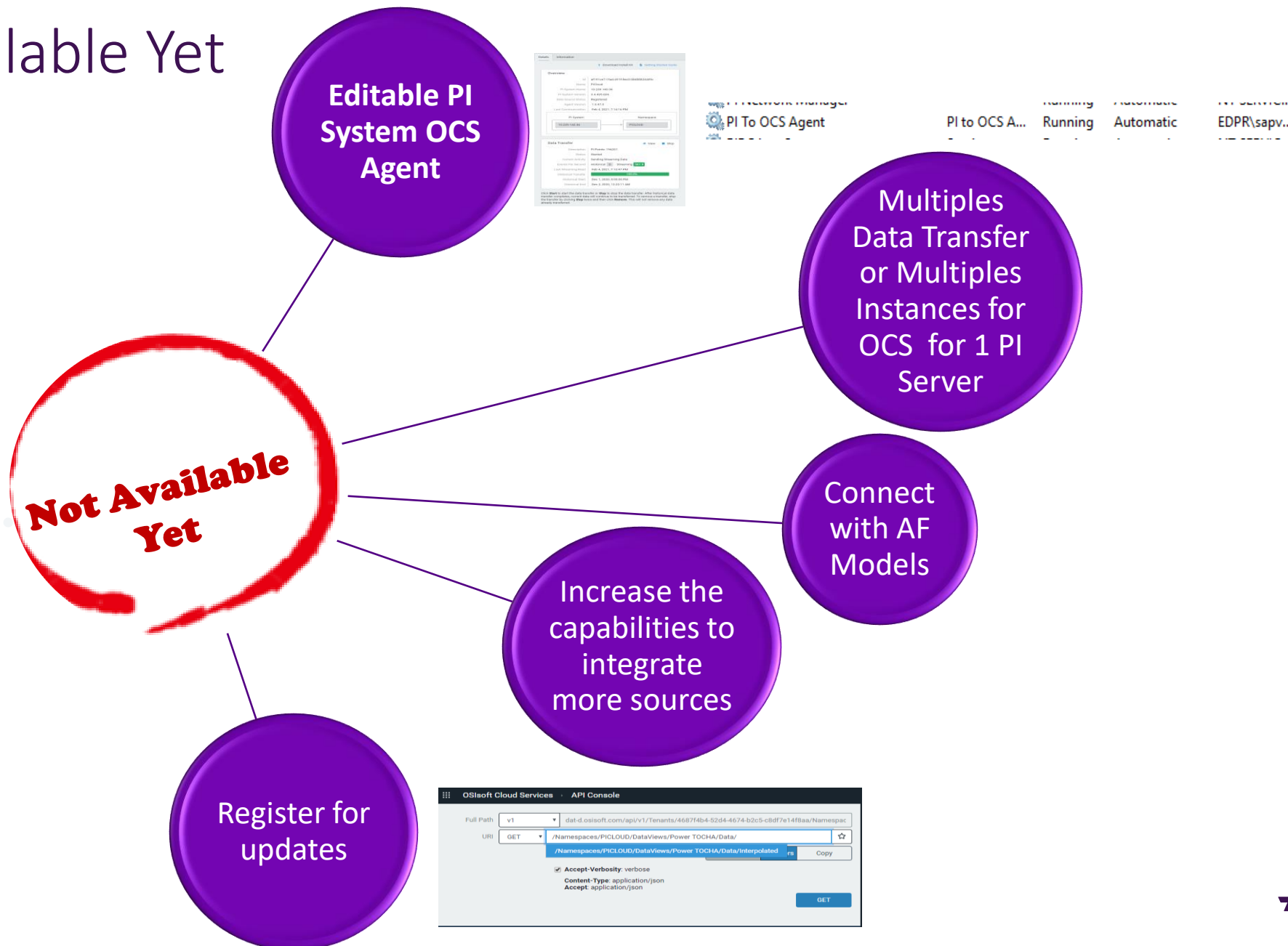
- Data Views with stored values 5kTags (50K data streams for interpolated values)
- Data Views with type of data (Some for Digitals and some for Numeric)
- Test query 1 hour of data



Lesson Learned



Not Available Yet



EDPR GOALS



How to take advantage of the ADH in your organization



Challenge

Improve Key Processes of the Company using 2M of Tags:

- Machine Learning / Predictive Maintenance
- Dashboard on Power BI with PI System Data
- Performance of Wind Turbines
- Wind Turbine Life Extension
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Benefits

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- Increase the analytic tools to improve our processes

“The price of light is less than the cost of
darkness”

Arthur C. Nielsen



Sergio Valencia

ROPI Technical Services Manager (PI Manager)

- EDP Renewables
- svalencia@edp.com

Questions?

Please wait for the microphone

- State your name and company



Please remember to...


Complete the survey!


- Navigate to this session in the mobile agenda for the survey

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 NGIYABONGA
 TEŞEKKÜR EDERİM
 DANKIE
 TERIMA KASIH
 СПАСИБО
 GRAZIE
 МАХАДСАНИД
 GO RAIBH MAITH AGAT
 БЛАГОДАРЯ
 GRACIAS
 ТИ БЛАГОДАРАМ
 TAK DANKE
 RAHMAT
 HATUR NUHUN
 PAKKA PÉR
 HATUR NUHUN
 PAXMAT САГА
 CÁM ƠN BẠN
 WAZVIITA
 FALEMINDERIT
 謝謝
 ТАРАДН ЛЕІВН
 KEA LЕВОНА
 БАЯРЛАЛАА
 MISAOTRA ANAO
 WHAKAWHETAI KOE
 DANKON TANK
 ТАРАДН ЛЕАТ
 SALAMAT
 MATUR NUWUN
 ХВАЛА ВАМ
 MULŢUMESC
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 HVALA
 FAAFETAИ
 ESKERRIK ASKO
 HVALA
 TEŞEKKÜR EDERİM
 OBRIGADO
 DANKJE
 EΥΧΑΡΙΣΤΩ
 GRATIAS TIBI
 ИКУРКУИ
 AČIŪ
 SALAMAT MAHALO IĀ 'ŌE
 TAKK SKALDU HA
 MERCИ
 DI OU MÈSI
 ĎAKUJEM
 GRAZZI
 SIPAS JI WERE
 TERIMA KASIH
 UA TSAUG RAU KOJ
 ТИ БЛАГОДАРАМ
 СИПОС

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Learn more at www.aveva.com