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# The Data Democracy as Key Enabling Factor for Digital Transformation Supporting Upstream Asset Operations

Rossi Gianmarco – Cadei Luca – Bottani Cristina

**AVEVA**

1. Eni in a Glance: Eni Basilicata a Giant Brow Oilfield
2. Data Democracy: Challenge, Solution Benefits
3. Data Democracy Enablers
4. Digital Oil Field Development
5. Data Democracy for Energy Management
6. Conclusions

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# Eni in a Glance

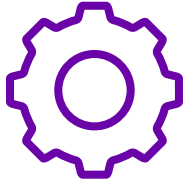


## Eni Basilicata a Giant Brow Oilfield

- *Eni is the Italian **integrated energy company** with the goal to provide a variety of **fully decarbonized products**, combining **environmental** and financial sustainability.*
- **Real case study:**
  - ✓ **Giant Brown Oilfield** in Southern Europe
  - ✓ **Oil & Gas treatment** up to 104.000 boed and 5 MSm3 gas
  - ✓ **High acid content (H<sub>2</sub>S and CO<sub>2</sub>)**
  - ✓ **Sulphur Recovery Unit**
  - ✓ **SCOT and Cansolv system**
  - ✓ **AVEVA PI system**

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# The Data Democracy as Key Enabling Factor for Digital Transformation Supporting Upstream Asset Operations



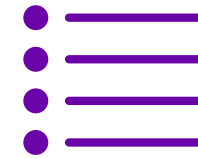
## Challenge

- Actual **energy & environment scenario**, coupled with **digital evolution** of upstream plants, highlights the need for an **advanced monitoring platform** able to integrate and share critical information and operator's knowledge optimizing asset management and decision-making processes.



## Solution

- Development an on-line, real time and dynamic **Digital Oilfield Platform** based on the **AVEVA PI System** deployed on a **Giant Brown Oilfield**.
- Combination of **PI Archive**, **PI AF**, **PI Vision** and **PI Data Link** to replicate the ICCS HMI and create a live monitoring tool



## Benefits

- Creation of a **flexible & collaborative environment** to engage operators into continuous and virtuous **asset optimization process**
- Unlocking true **know-how** potential and **commitment** into the digital revolution.
- Key for **Energy Certification** and **advanced analytics**

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# Data Democracy Enablers



**STORED DATA**



**COMPUTING POWER**



**INTEGRATED TEAM**

HQ  
**+600k**  
TAGS

5 PI servers / collectives with +100 email notification alert  
PI Data Link, PI PSA, PltoPI

Over 10k PI Vision Screens  
+50 PI Interface Connectors

PI  
Vision  
**+10k**

HQ  
**+100**  
PI AF

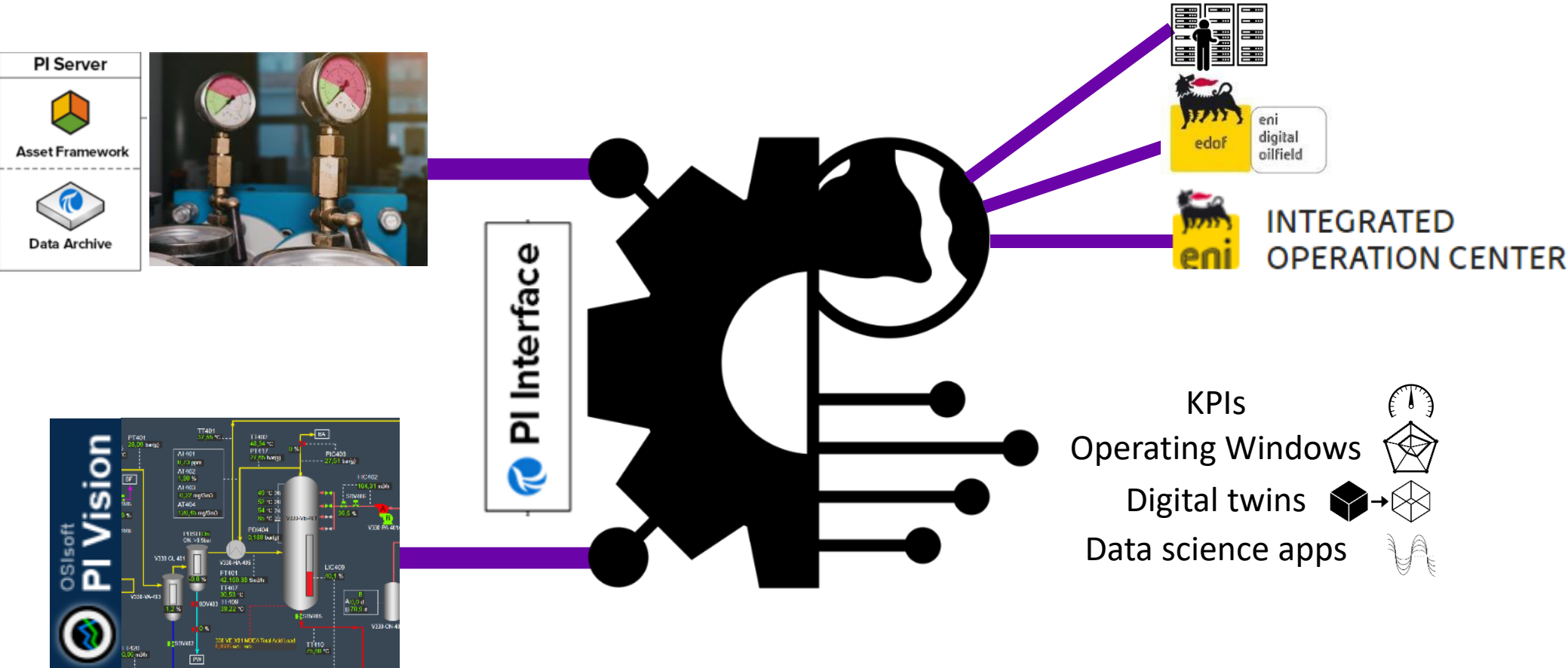
Over 80 PI AF smart asset templates developed and maintained by the SMEs  
+1k PI AF smart assets (used templates) ~13X Scale

4 PI servers / collectives

BU  
**+175k**  
TAG



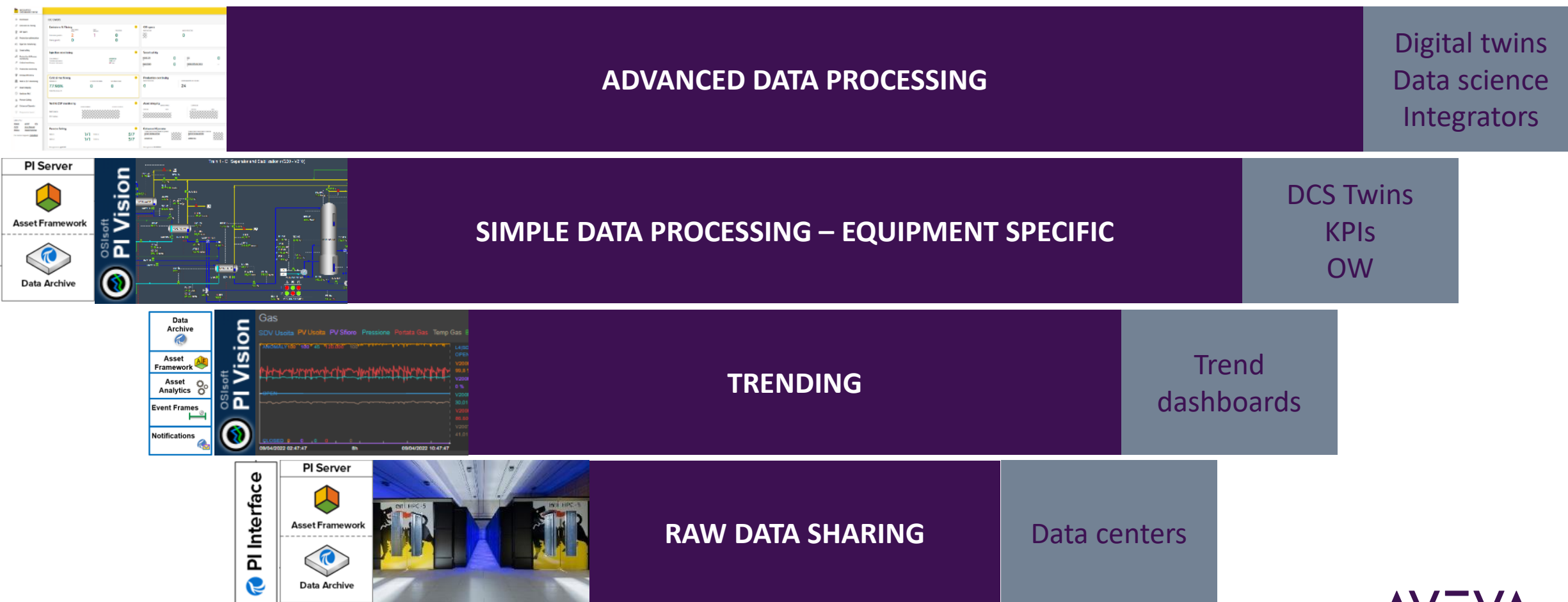
# Data Democracy Enablers



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  - ✓ Upgrading e-DOF Step
    1. 1st e-DOF LAYER: RAW Data Trending
    2. 2nd e-DOF Layer: design workflow - DCS Twins, KPIs, OW, Enhanced Views
    3. 3rd DOF Layer: ADVANCED ANALYTICS
  - ✓ Integrated Operation Center (IOC)
5. Data Democracy for Energy Management
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# Upgrading e-DOF Step

Eni Digital Oil Field layering and levels



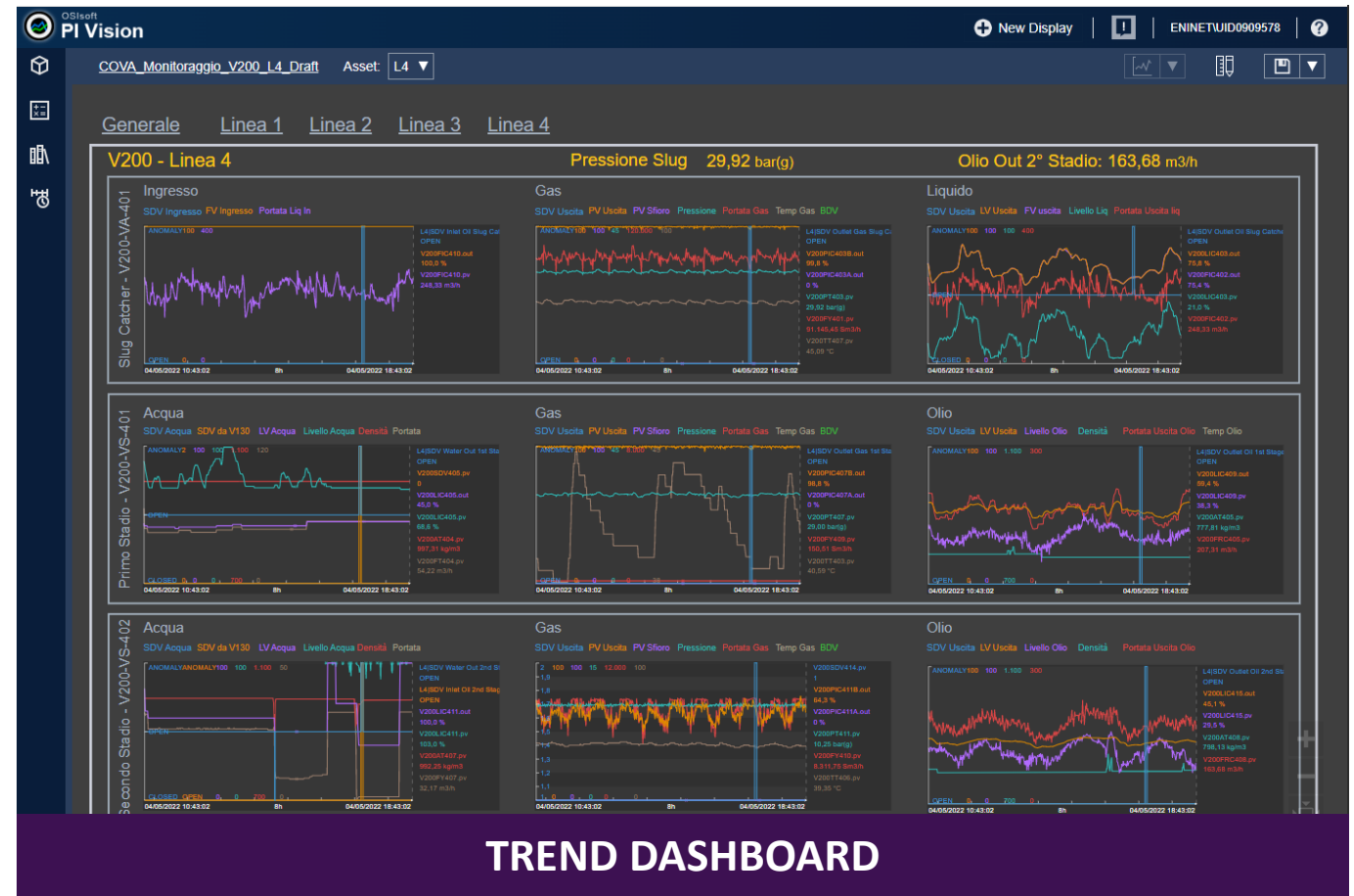
# TRENDING – Trend Dashboard



## 1st e-DOF LAYER: RAW Data Trending

### PRESENT VALUE VS TIME GRAPHICS AND TRENDS

- **Simplest** feature for a DOF platform thanks to **PI Vision**;
- **Interpretation/RCA** needed to identify events;
- Raw tags could be accessed by **any stakeholder**;
- Data availability enables **democratic** continuous improvement.



# SIMPLE DATA PROCESSING – EQUIPMENT SPECIFIC



2nd e-DOF Layer: design workflow - DCS Twins, KPIs, OW

## Historian



### PI Data Archive

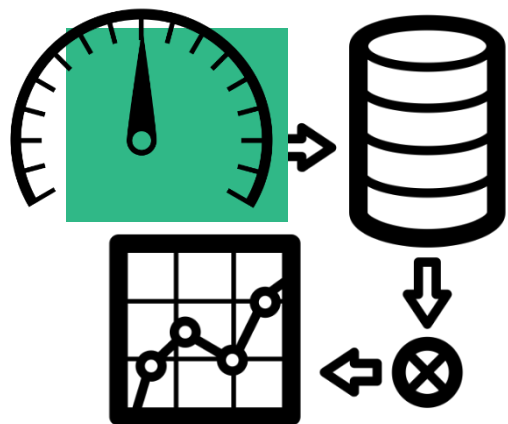
More than 5'000 raw values per asset per second stored in different TAGs

Pressures

Temperatures

Levels

Flow rates



## Engineering



### PI Asset Framework

Raw data are elaborated through application of international standards or basis of design



*Best practices*



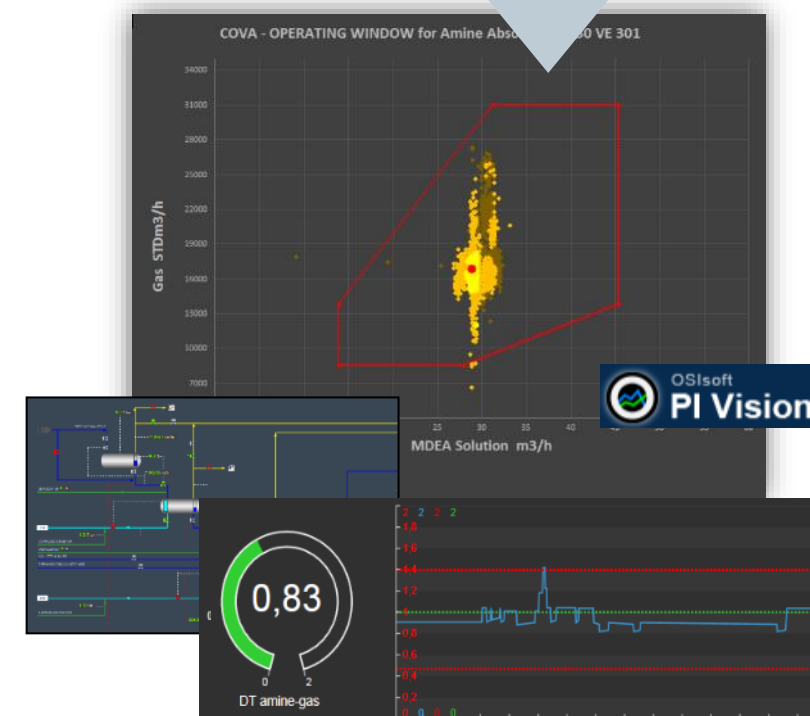
*Internal standard*

## Dashboards



### PI Vision

Implementation and monitoring



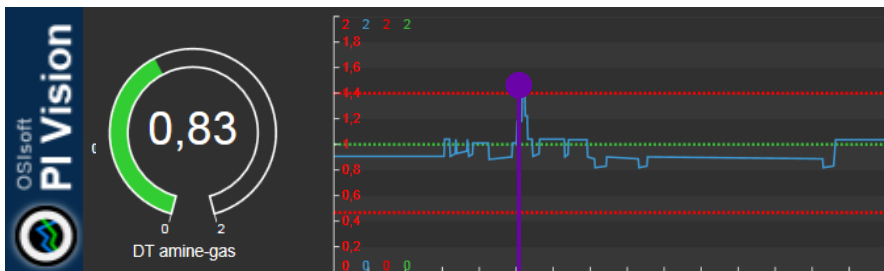
# SIMPLE DATA PROCESSING – EQUIPMENT SPECIFIC



2nd e-DOF Layer: design workflow - DCS Twins, KPIs, OW

## KPI

Easy variables correlation created in **PI AF**  
Continuous monitoring  
Field production optimization  
Operating issues prevention with **PI Event Frames** and **PI Notification**



Correct



Warning



Out of specific



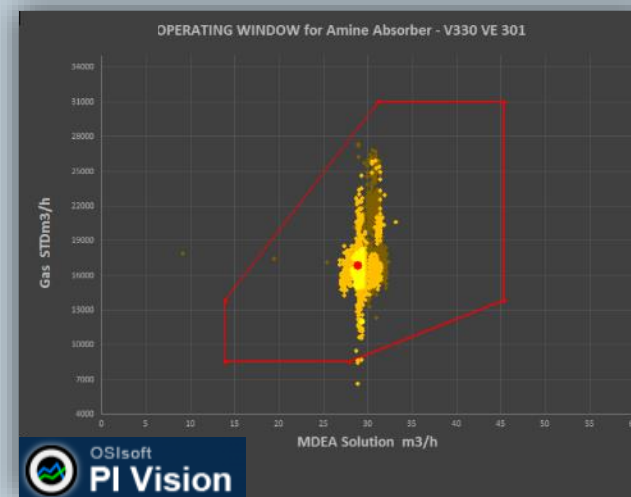
KPI's are defined for:

- Process
- Maintenance
- Asset Integrity
- Energy Efficiency

If a warning appears on eDOF, an **alert mail** will be automatically sent by **PI Notification**

## Operating Windows

Process equipment (Trayed Columns, Compressors)  
Flow Assurance (piping, network)



Operability area of an equipment defined by Project and Company  
Standards troubleshooting and debottlenecking

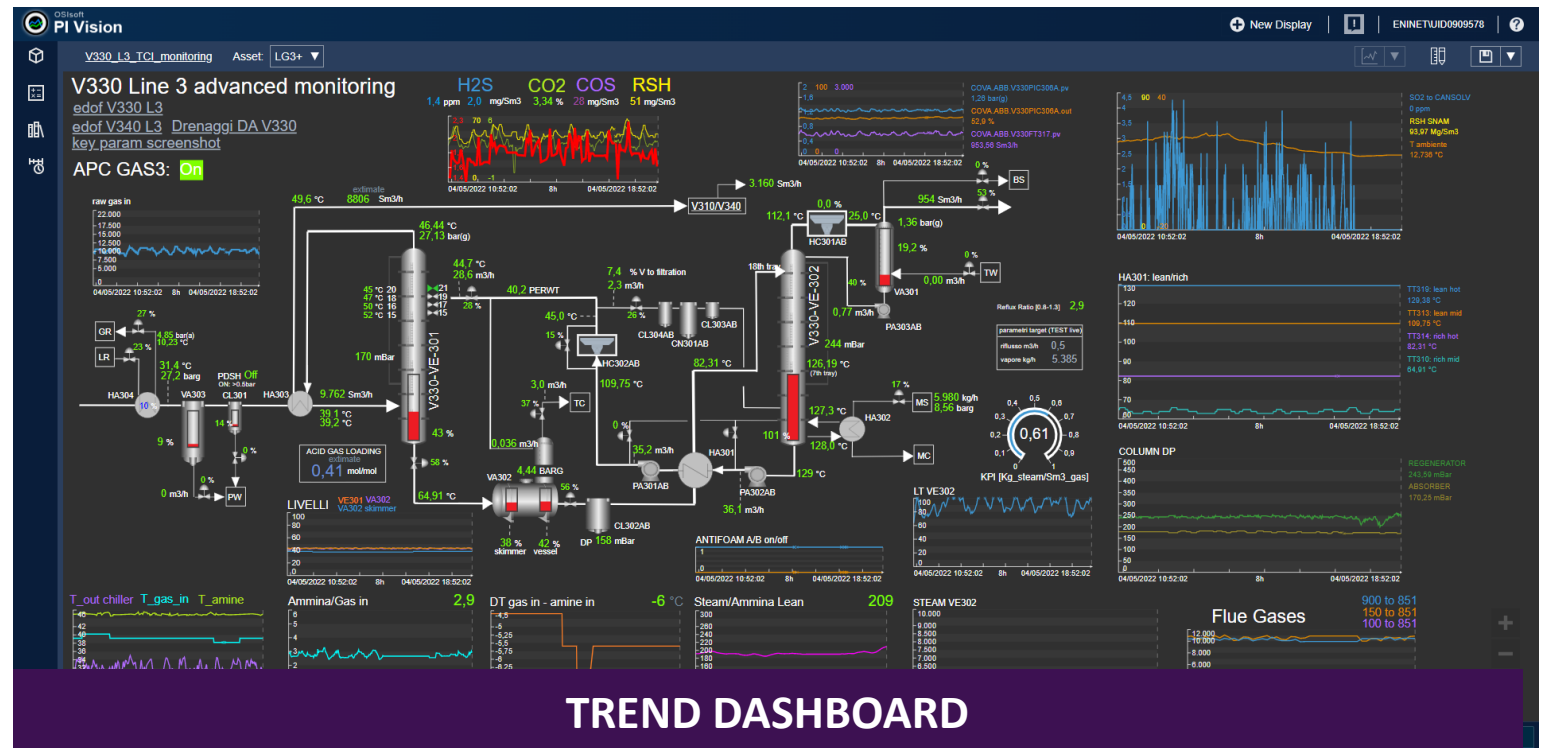
# TRENDING – Trend Dashboard

## 2st e-DOF LAYER: Enhanced Views



## HYBRID GUI WITH RAW TAGS, TRENDS AND KPIS

- Replication of DCS screens accessible via browser
- Integration of OW, KPIs and tags formulas
- Raw tags could be accessed by **any stakeholder**
- Data availability enables **democratic** continuous improvement





# ADVANCED DATA PROCESSING



## 3rd DOF Layer: ADVANCED ANALYTICS

### Historian



#### PI Data Archive

More than 5'000 raw values per asset per second stored in different TAGs

### Engineering



#### PI Asset Framework and Data Science

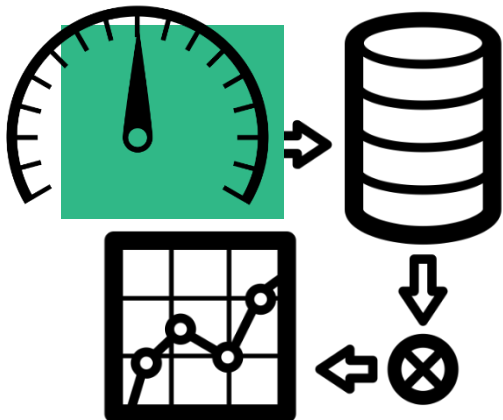
Tailored engineering solutions are elaborated through ad-hoc ICT application to solve and support specific BU needs

### Dashboards



#### PI Vision and Customs

Implementation and monitoring



DATA SCIENCE

AI

PREDICTIVE ALGORITHMS

REAL TIME OPTIMIZATION

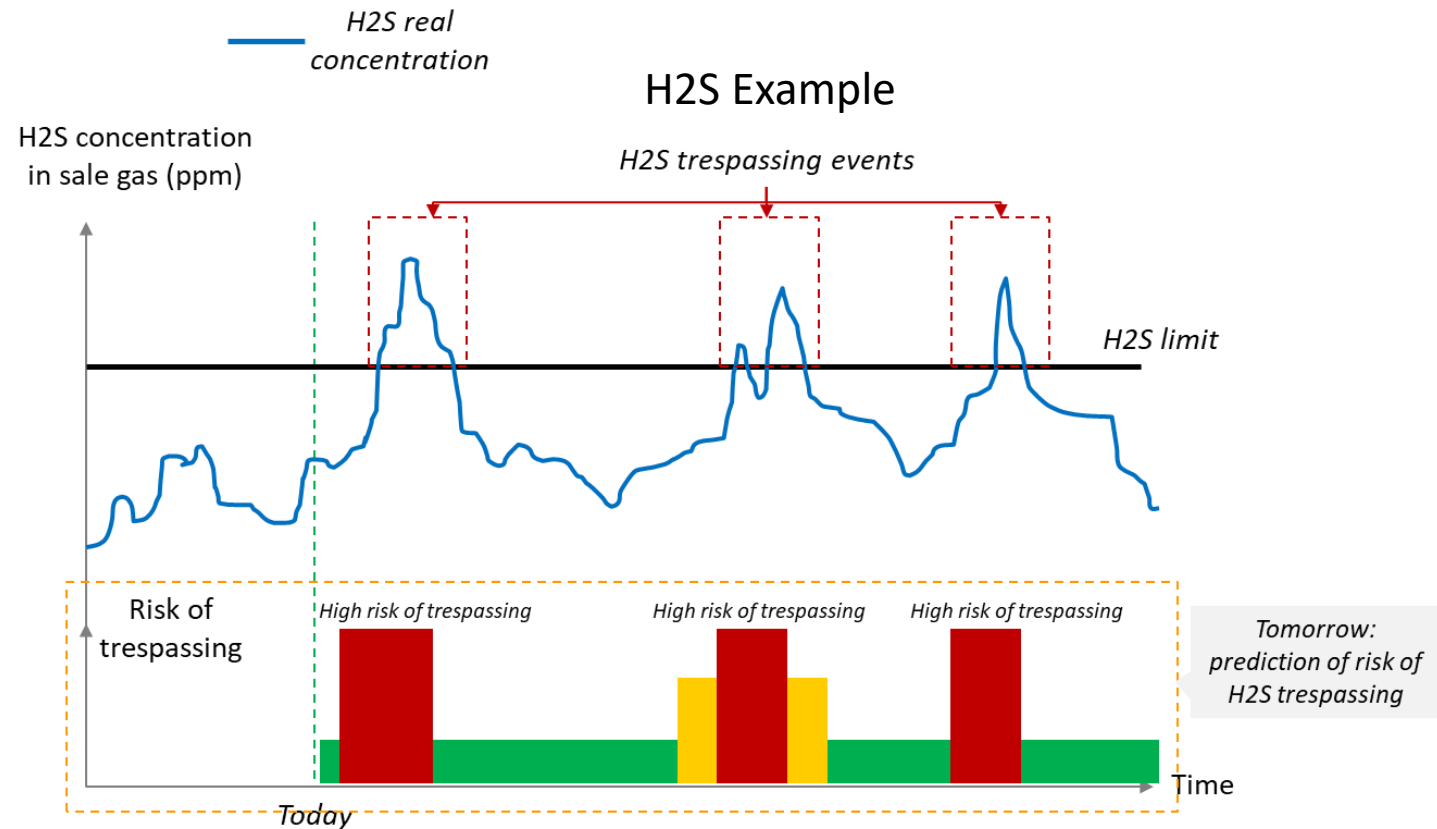
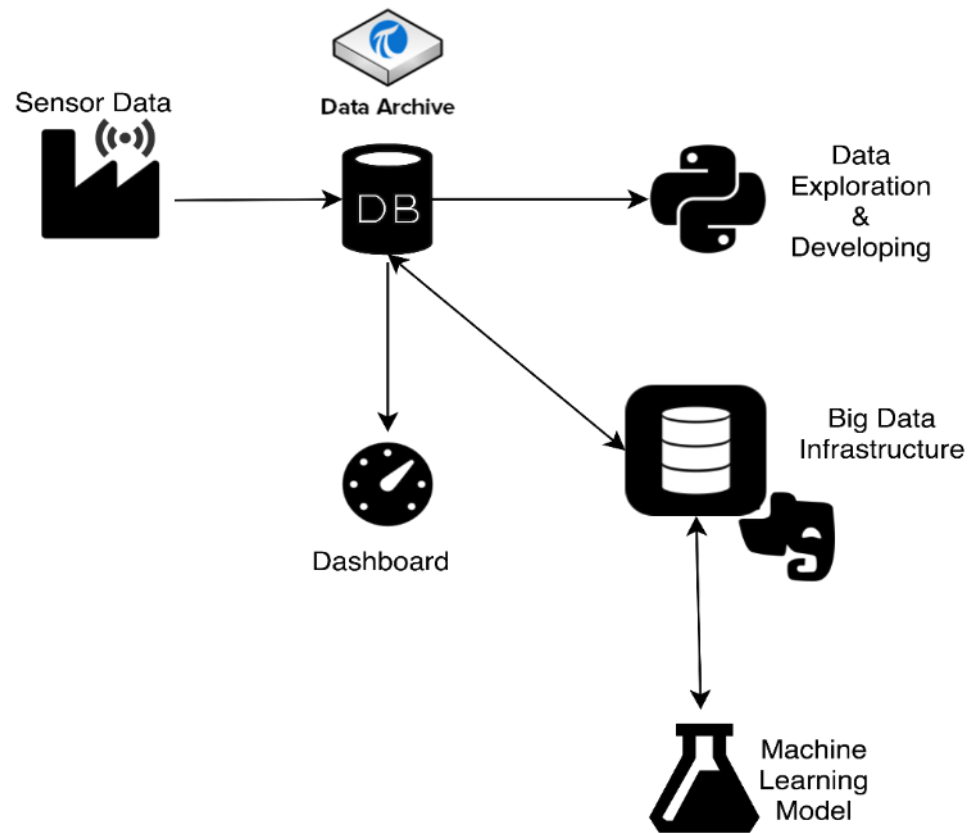
MACHINE LEARNING



# ADVANCED DATA PROCESSING



## 3rd DOF Layer: ADVANCED ANALYTICS



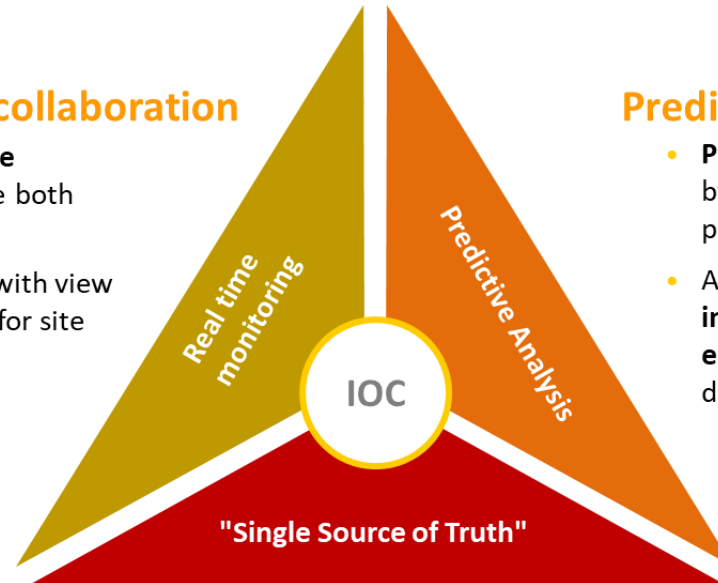
# Integrated Operation Center (IOC)



Boost collaboration and team integration

## Real time monitoring & collaboration

- **Integrated collaborative environment** accessible both physically and digitally
- **Advanced monitoring** with view of main operative KPIs for site optimization



## Predictive analysis & Models

- **Predictive monitoring tools** specific by domain (maintenance, production, HSE, ..)
- Advanced **analytics insights and integrated collaborative environment mirrored** to have live discussions with local Bus

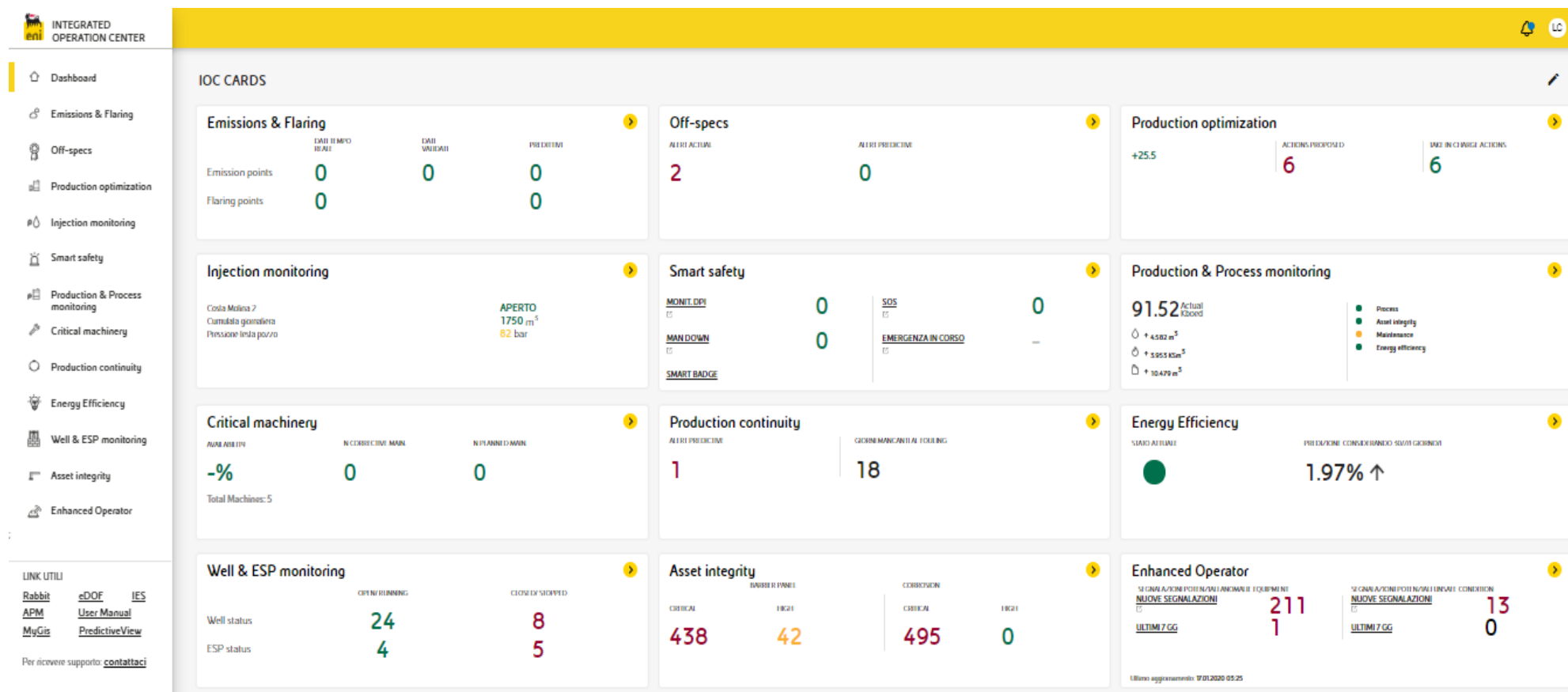
## "Single Source of Truth"

- Access and analyse historical, actual, and predictive data coming from **different sources in one single environment**
- **Activate workflow and manage communication** and collaborations across company level from a unique tool

# Integrated Operation Center (IOC)



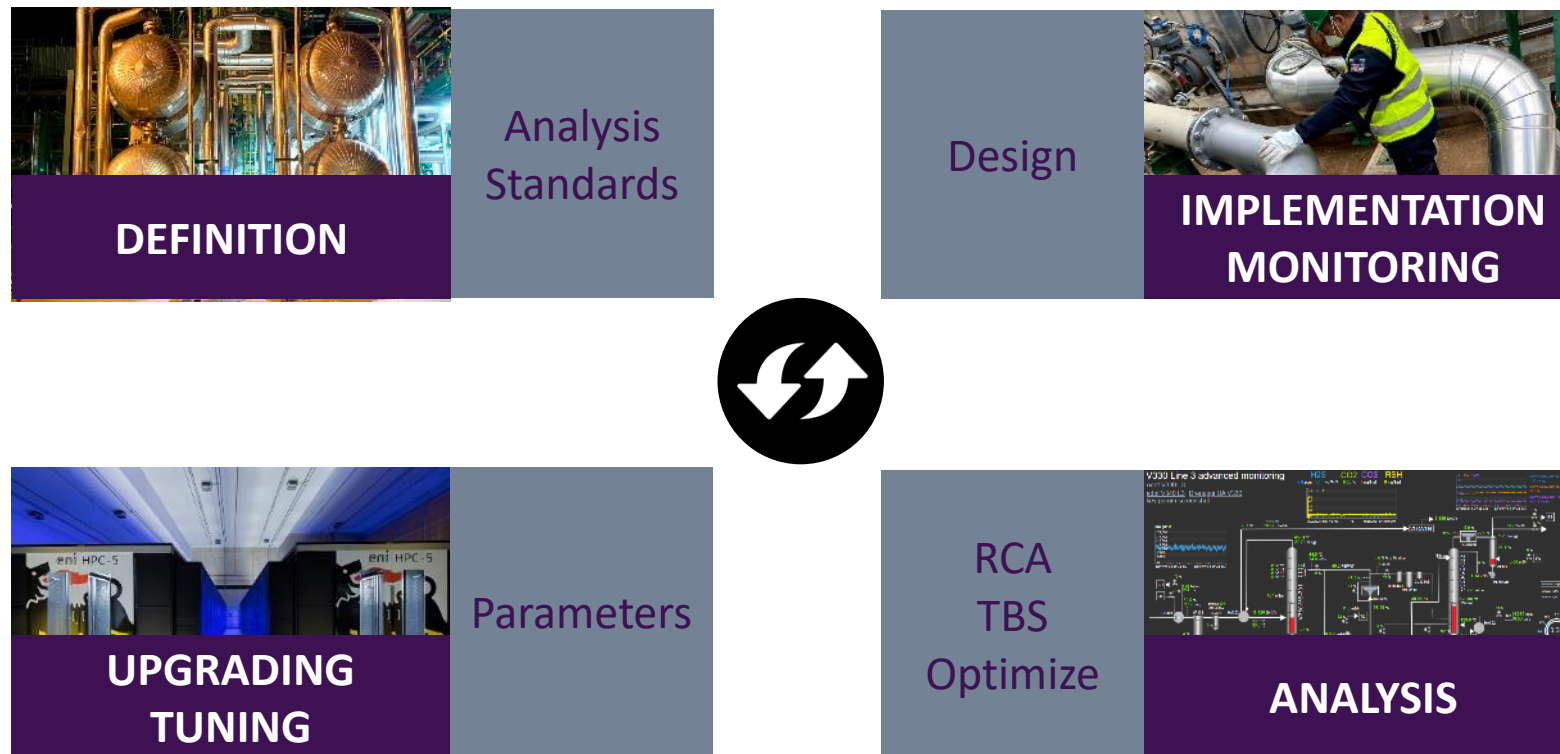
Boost collaboration and team integration



# Continuous Improvement & Modeling



e-DOF layers subjected to continuous tuning according to process variations



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**Data**  
**Democracy**  
**Energy**  
**Management**



ENTE PER LE NUOVE TECNOLOGIE,  
L'ENERGIA E L'AMBIENTE



ISO50001

ENERGY  
MANAGEMENT



FEDERAZIONE ITALIANA PER  
L'USO RAZIONALE DELL'ENERGIA

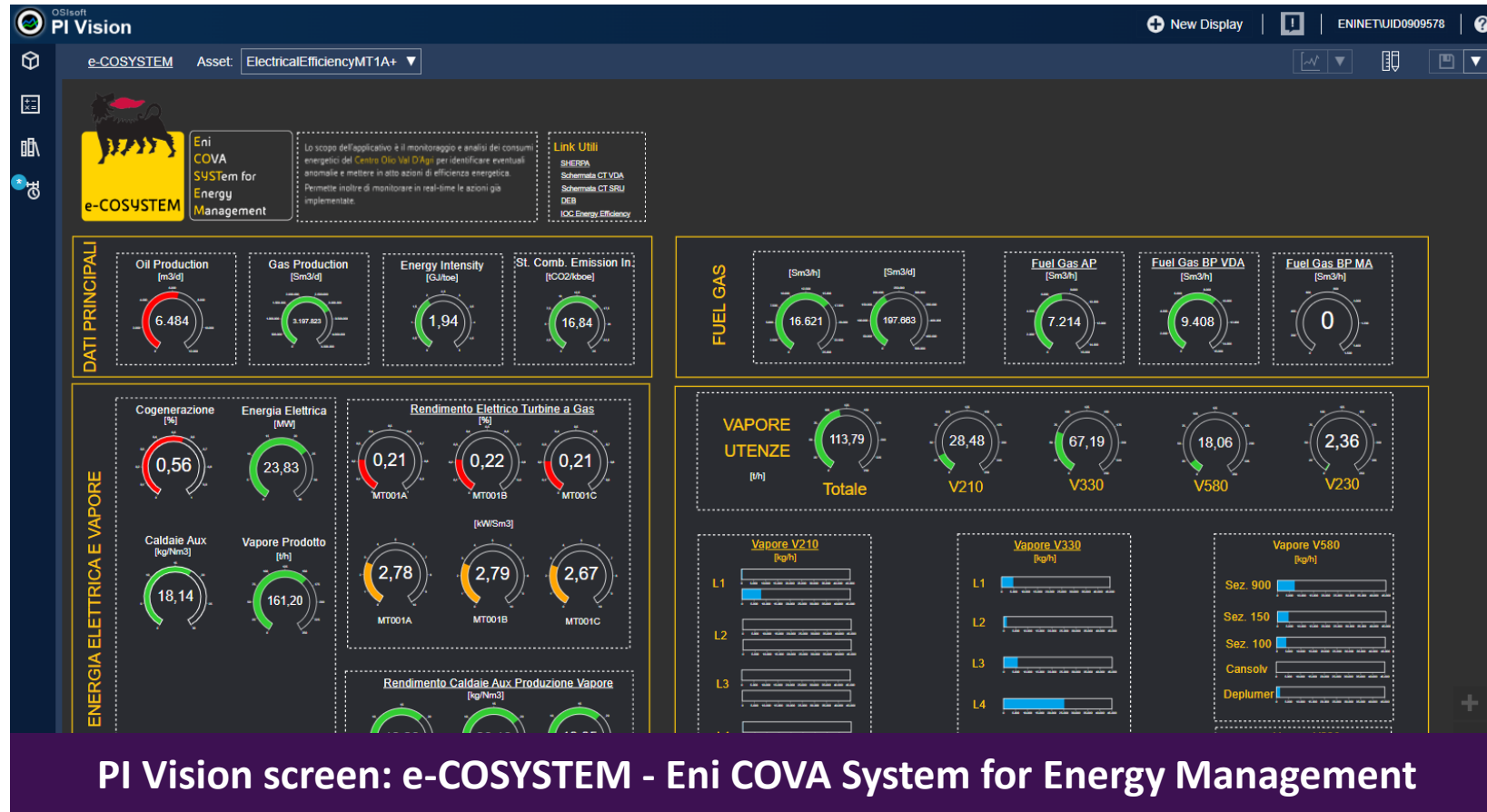
 Multiple benefits of energy efficiency



# Data Democracy Energy Management



## Real Time Energy Management System



User friendly,  
custom created  
dashboard.

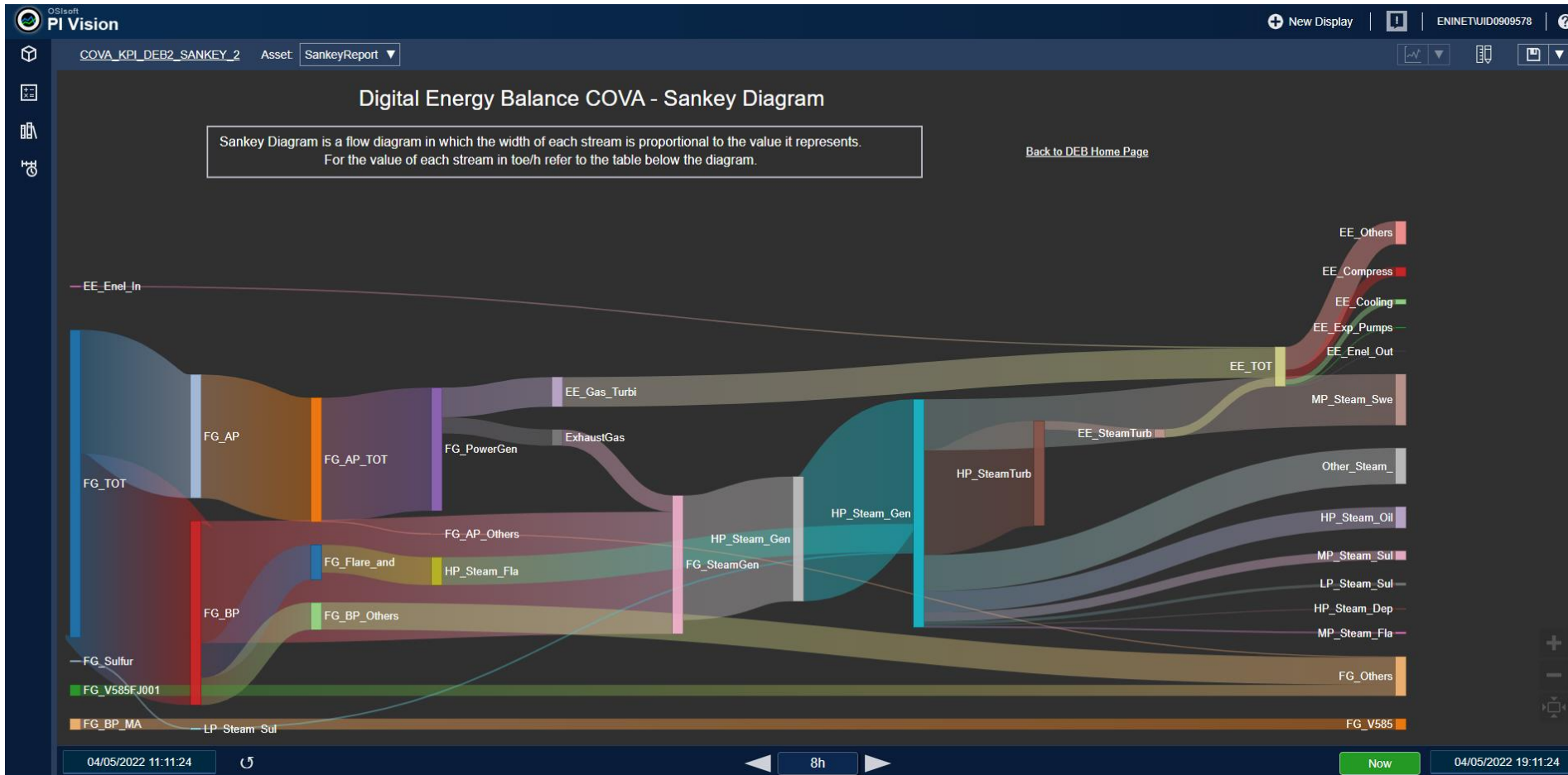
From  
aggregated data  
and KPI to raw  
value



# Data Democracy Energy Management



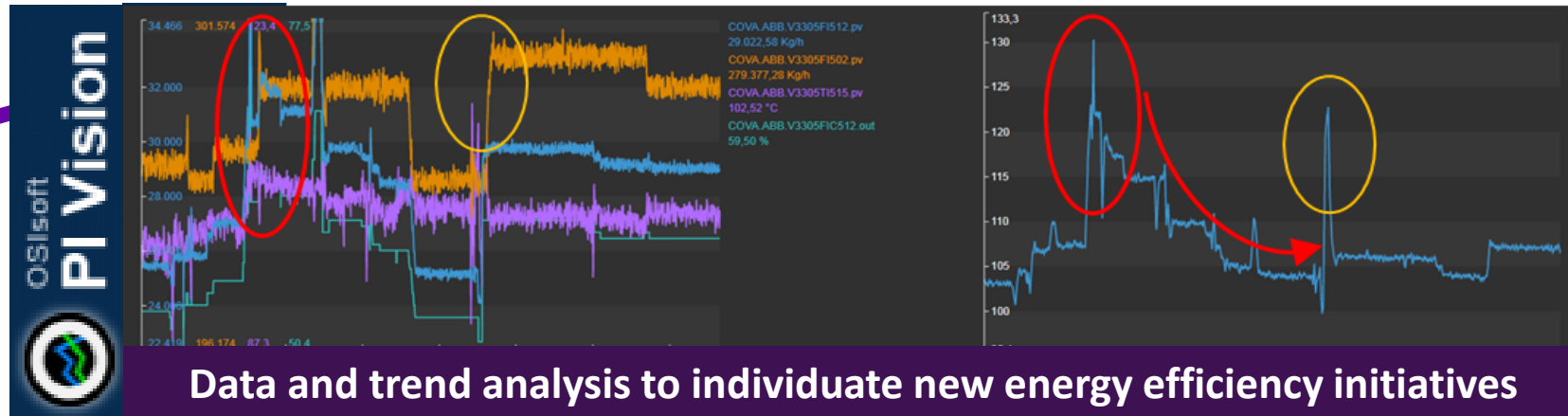
## Interactive and Real Time Digital Energy Balance – PI Vision Sankey Diagram



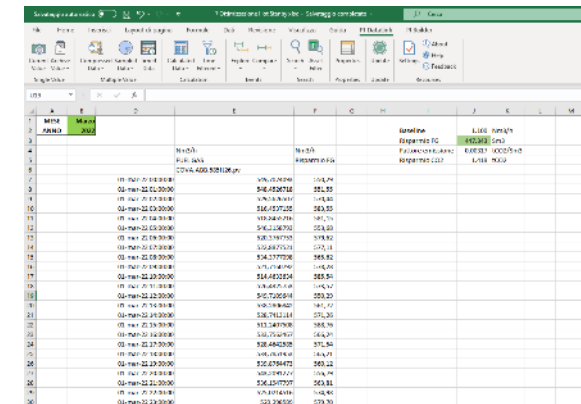
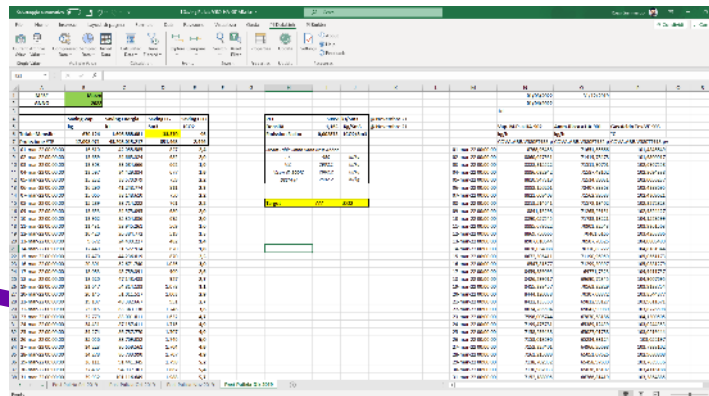
# Data Democracy Energy Management



## Energy Saving Reporting



Real time insight & PI Data Link are essential to monitor energy savings during certification process



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# DATA DEMOCRACY - Conclusion



Enables next generation **decision making process**



**Know-how impact** maximized



Creates a **collaborative environment**

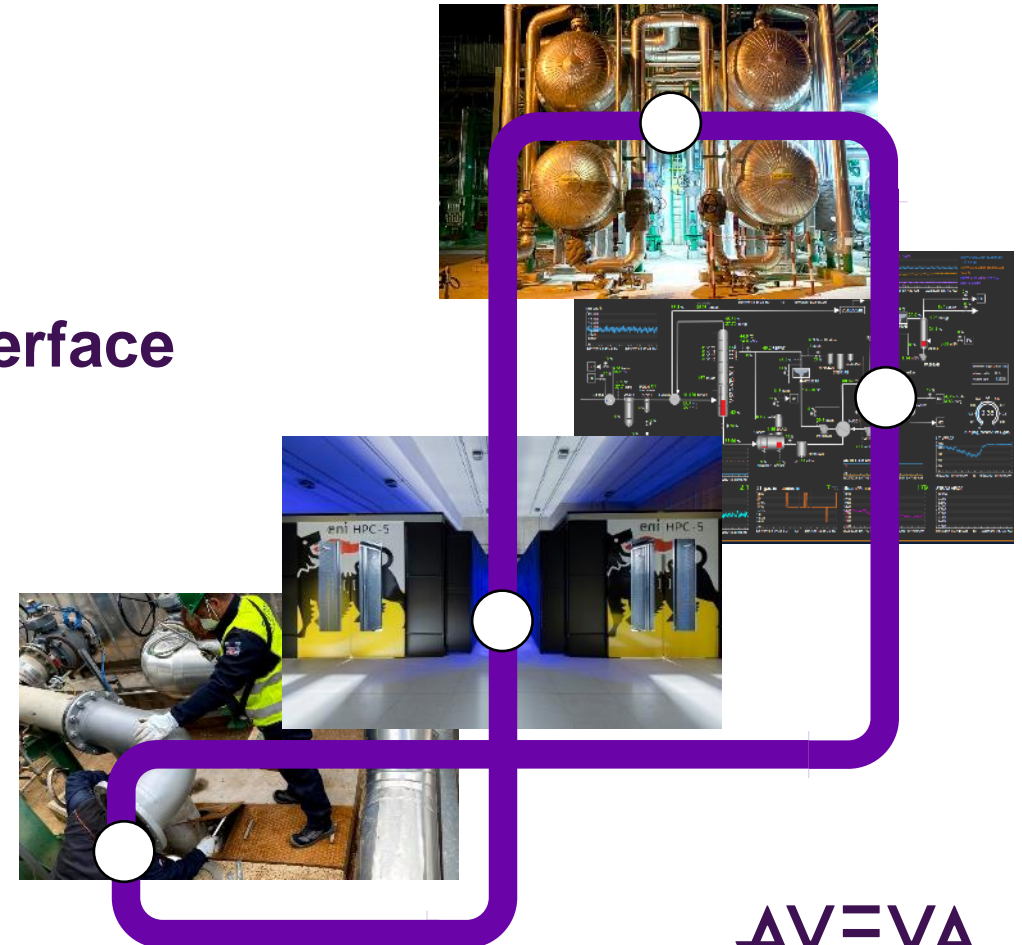


Directs data flows to a **unique lean interface**



Major results in terms of:

- Emission events
- Flaring time
- Unplanned upsets
- Energy Management
- Energy Efficiency
- GHG emission reporting







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# Cadei Luca

## Plant Manager

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“Man has no Body distinct from his Soul for that call'd  
Body is a portion of Soul discern'd by the five Senses,  
the chief inlets of Soul in this age  
Energy is the only life and is from the Body and Reason  
is the bound or outward circumference of Energy.  
**Energy is Eternal Delight.”**


William Blake – The Marriage of Heaven and Hell

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