



Downtimes



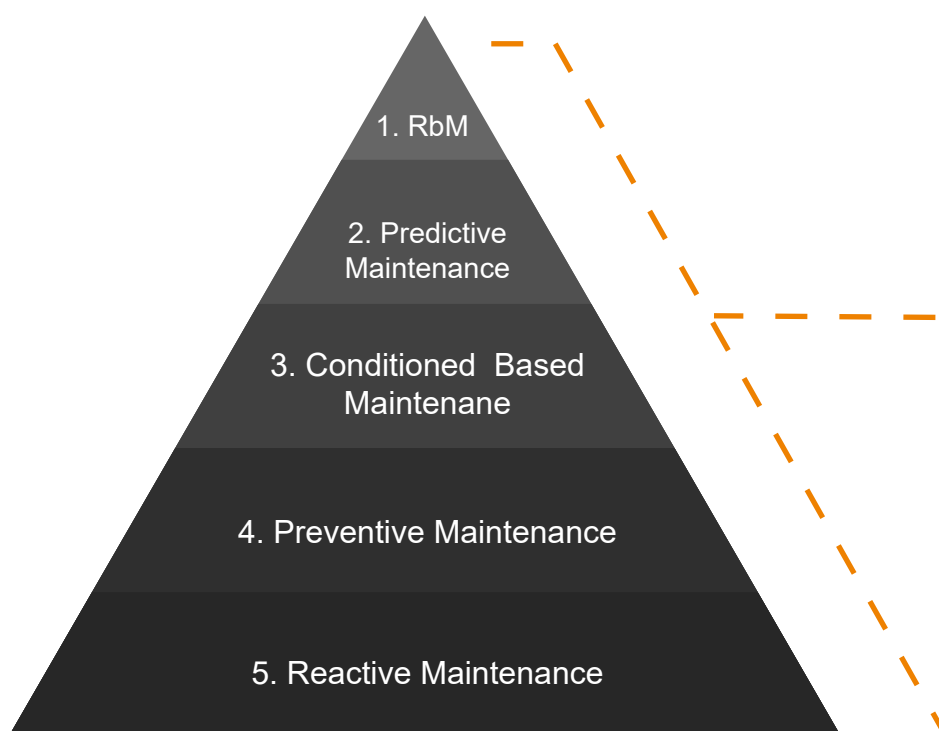


Downtimes

It's based on the best maintenance practices to monitor your Key Performance Indicators (KPI) in real time through event management, unscheduled stops and equipment monitoring.

Downtimes has been developed taking into account the best maintenance practices, which aim to monitor the performance of assets, optimize their production to achieve and improve the objectives of reliability, safety and performance of their industrial equipment.

This management is based on the level of maturity of an organization within the context of industrial maintenance 4.0, which can be understood in the following figure:



From this perspective Downtimes adapts to each organization and allows it to face the current reality and prepare to climb the pyramid in the context of industrial maintenance.



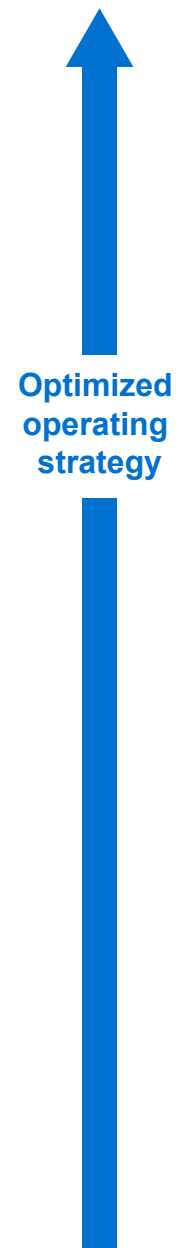
1. Risk-Based Maintenance (RbM): Focused on equipment that is more sensitive to risk, it first collects asset data, then evaluates the likely failures to occur and their possible consequences, classifies them, creates inspection plans over time and; Finally, repeat the cycle. This maintenance mainly benefits the reliability and safety of the equipment.

2. Predictive Maintenance (PdM): Try to anticipate incidents through the monitoring of active equipment using complex algorithms; Moving away from the idea of performing maintenance based on equipment specifications, this allows identifying the best time to perform maintenance based on their active status.

3. Condition-Based Maintenance (CBM): In which the current status of the equipment is monitored through sensors that indicate signs of decreased performance or the next breakdown. The advantage is that it does not stop operation, as it is possible to during your exercise, thus also minimizing unscheduled downtime due to failures.

4. Preventive Maintenance: In this case, the machine is intervened thanks to a record of past inspections or a list of faults, which allows it to anticipate errors, giving the equipment a longer useful life and improving its productivity. In addition, this ensures the correct execution of operations to reduce costs by preventing instead of waiting for malfunctions to occur.

5. Reactive Maintenance: Also called breakdown maintenance, it consists of repairing a piece of equipment when it has a fault and can continue its usual course, there is no planning for its execution and it is low-cost in the short term. It represents the most basic of the types of maintenance; but at the same time, their presence is mandatory, since some teams cannot be completely predicted.

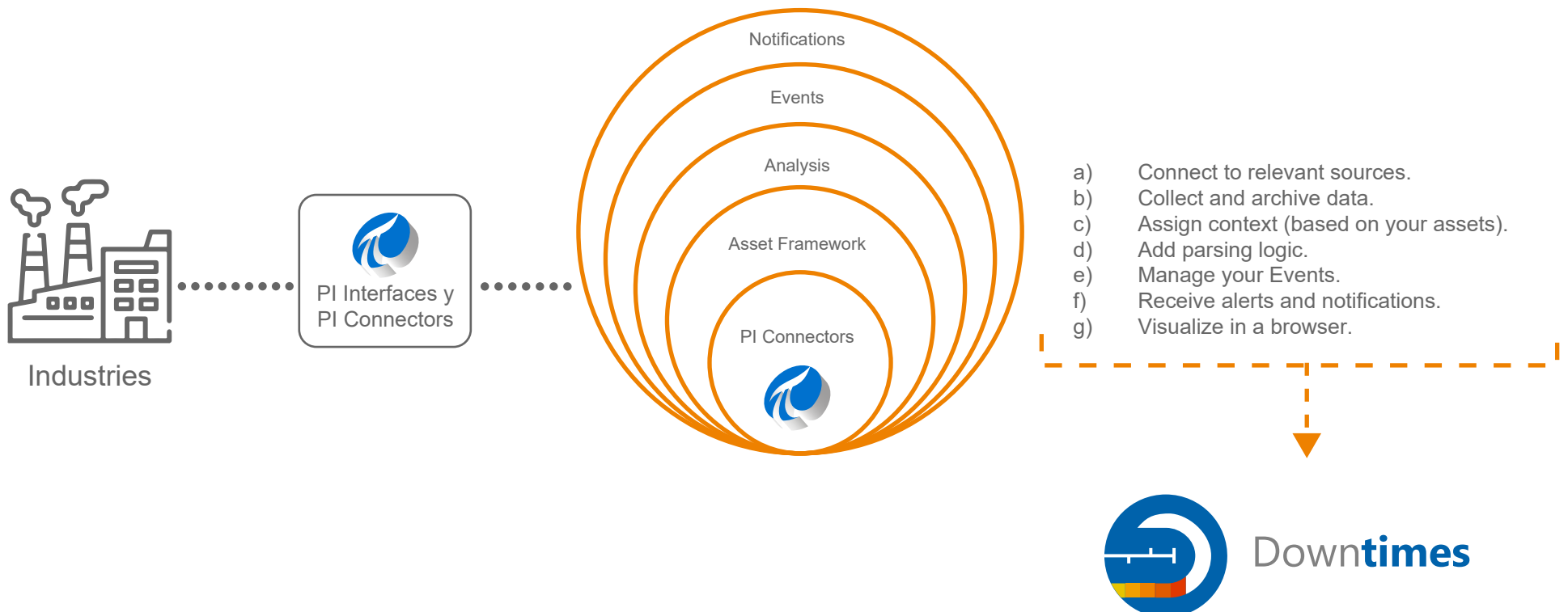


Downtimes provides information on the use of assets, which allows time-based maintenance to be carried out, as well as real-time monitoring of the conditions of critical assets, in order to opt for condition-based maintenance (CBM).

In addition, our solution can automatically generate key maintenance indicators, to display your KPIs in a friendly way, such as: Physical and mechanical availability, utilization, Mean Time to Repair (MTTR), Mean Time Between Failures (MTBF), Overall Equipment Effectiveness (OEE), Top ten of teams and Top ten of faults, as part of the management of events and stops of the teams.



PI System is used for data collection, history, search, analysis, delivery and visualization. PI Server is the core product of the PI System and includes PI Data Archive, PI Asset Framework (AF), and other products for collecting and processing data. Downtimes works here to help with different types of maintenance for anomaly detection and root cause analysis.





Management Indicators

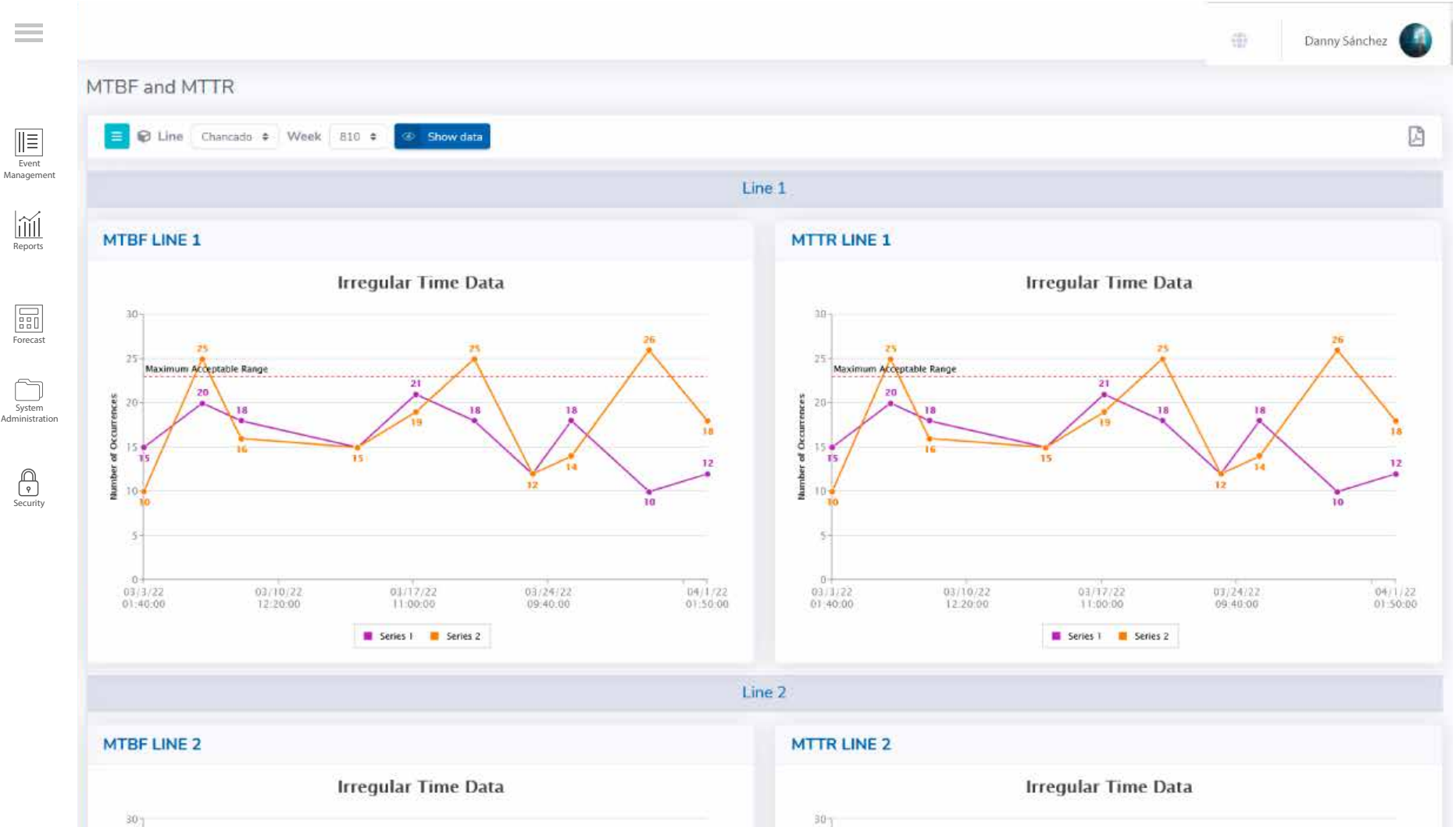
1. General Maintenance Dashboard

Report designed in a holistic way, to obtain an overview of the performance of the organization, at the level of areas, lines or teams. Thus achieving the calculation of the main Maintenance indicators in the Week to Day (WTD), Month to Day (MTD) and Year to Day (YTD) periods.



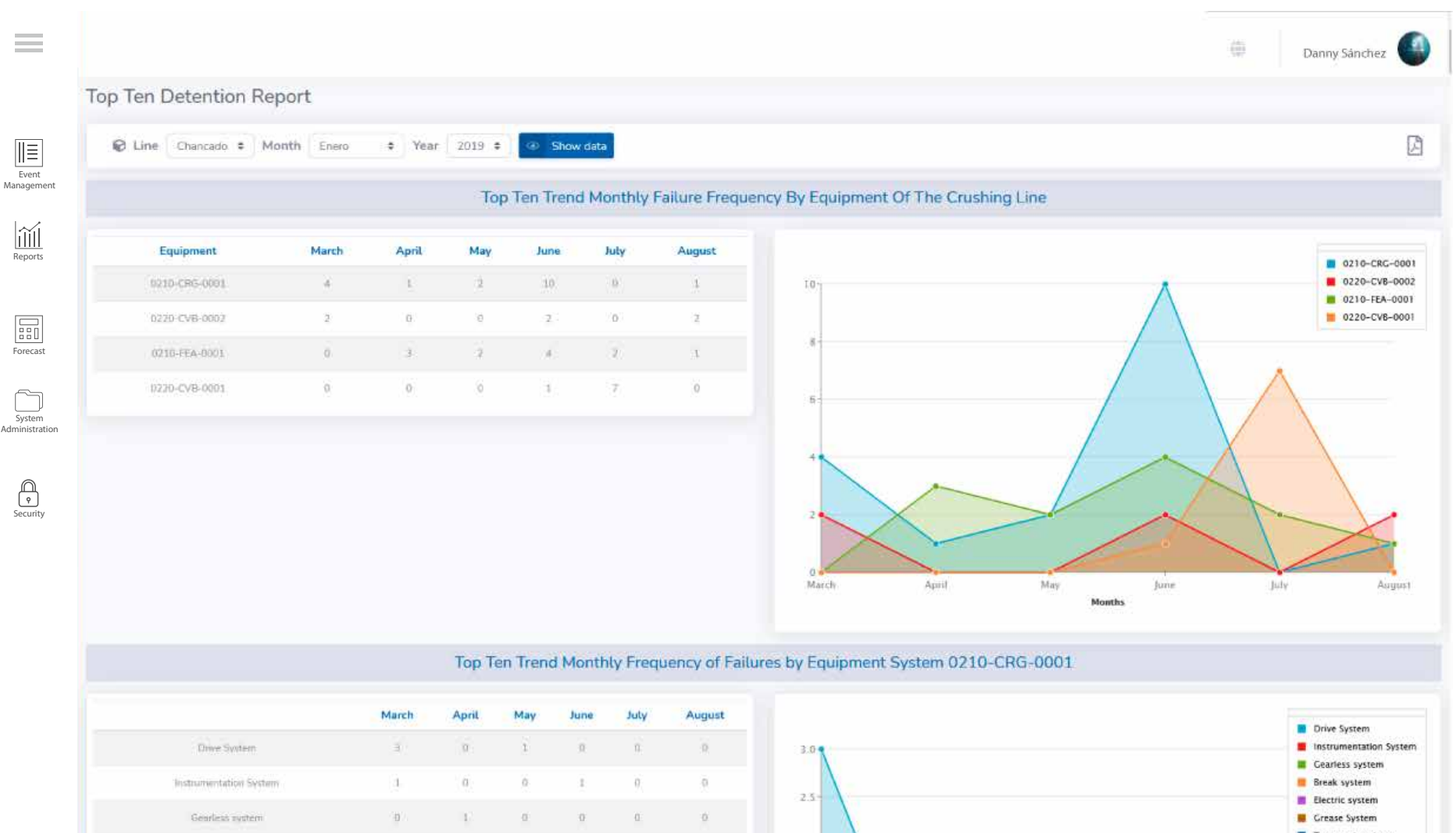
2. MTBF & MTTR

Report designed to quickly and accurately calculate and display the estimation of average times, such as the expected time of good operation that a certain piece of equipment or line (MTBF) can experience, there is the expected time for the repair of a piece of equipment, specifically when the type of repair corresponds to corrective maintenance (MTTR).



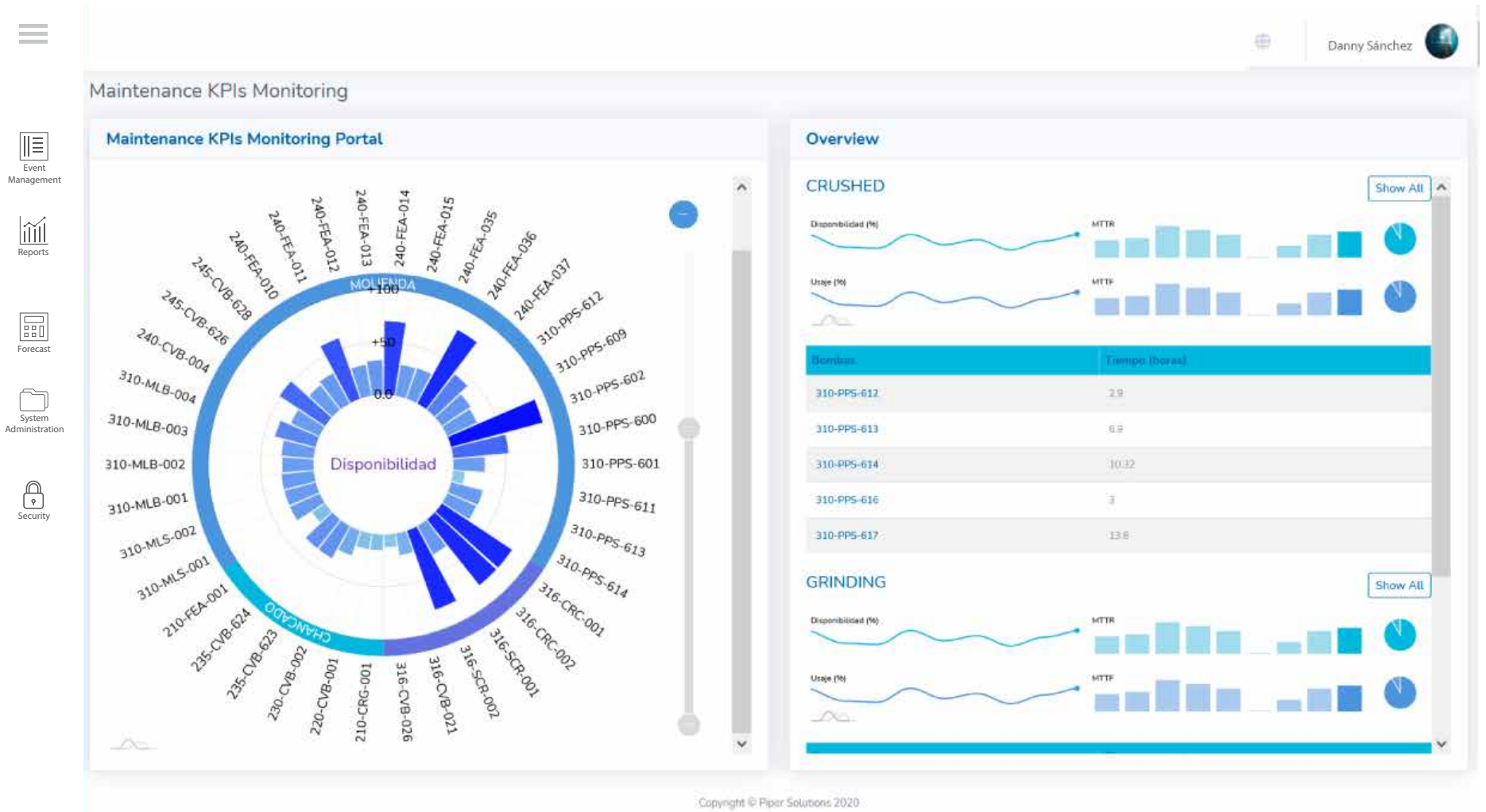
3. Top Ten Detention report

Report that allows prioritizing and visualizing the relationship of the equipment with the main failure modes responsible, this in a sequential manner according to the systems of an equipment, its components and the failure modes that may occur.



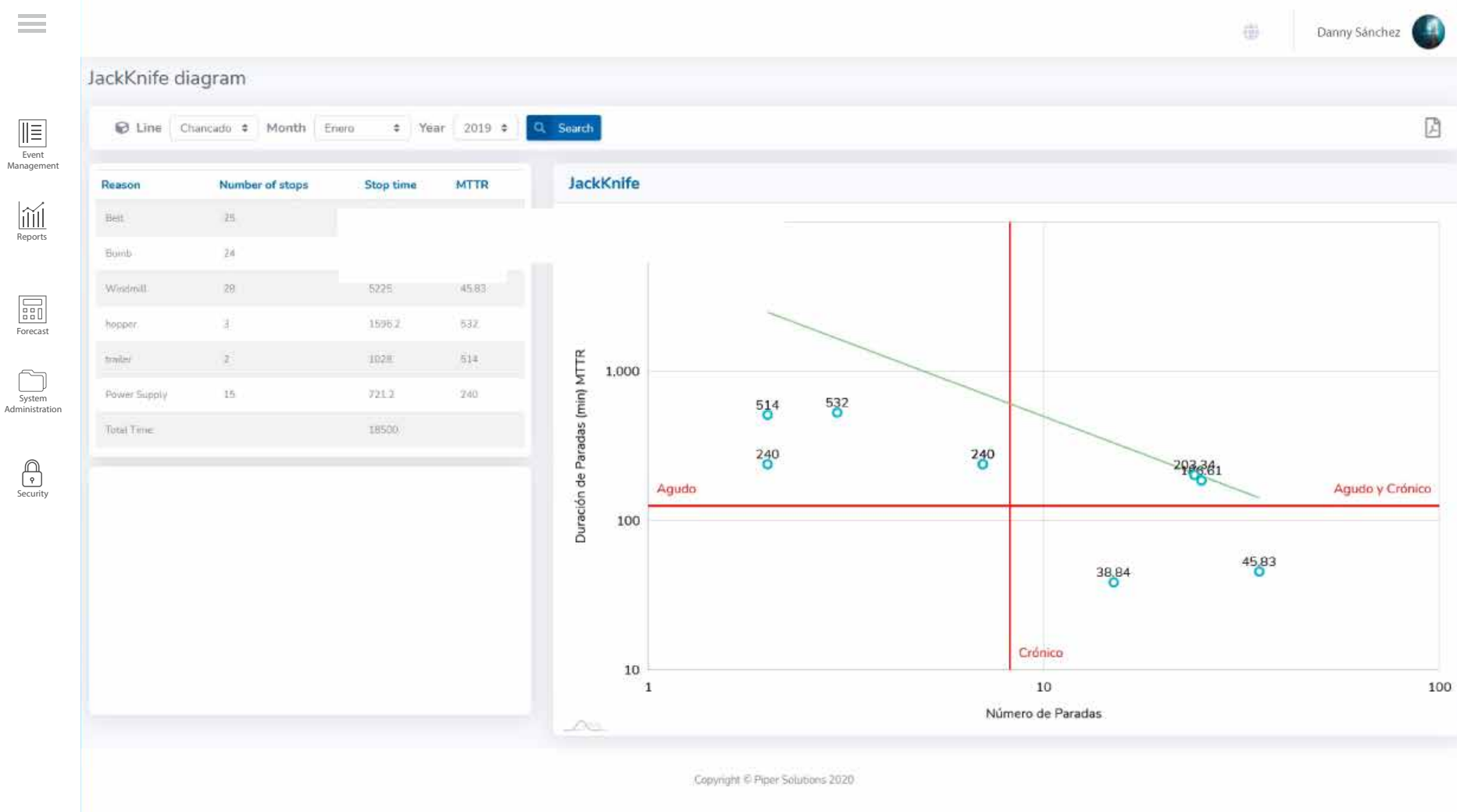
4. Monitoring of Maintenance KPIs

Report designed to quickly and accurately deliver the main maintenance and reliability performance indicators.



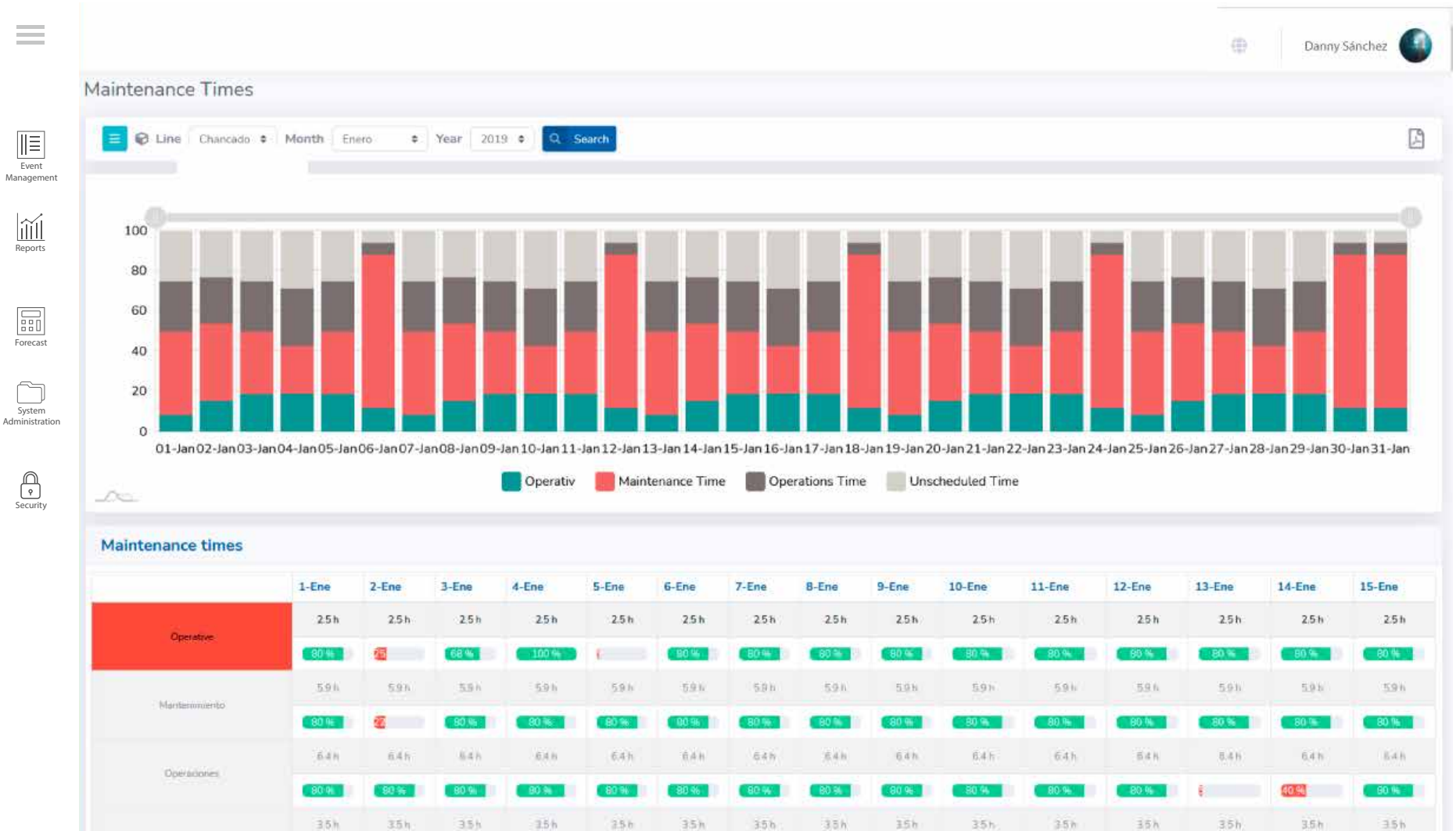
5. Jack-Knife Diagram

Report designed based on the Jack Knife analysis, it allows us to calculate and visualize a comparative-relative analysis of the frequency of occurrence of failures against their repair times, then to be able to graph them in four quadrants according to their criticality: acute, chronic, under control and acute-chronic.



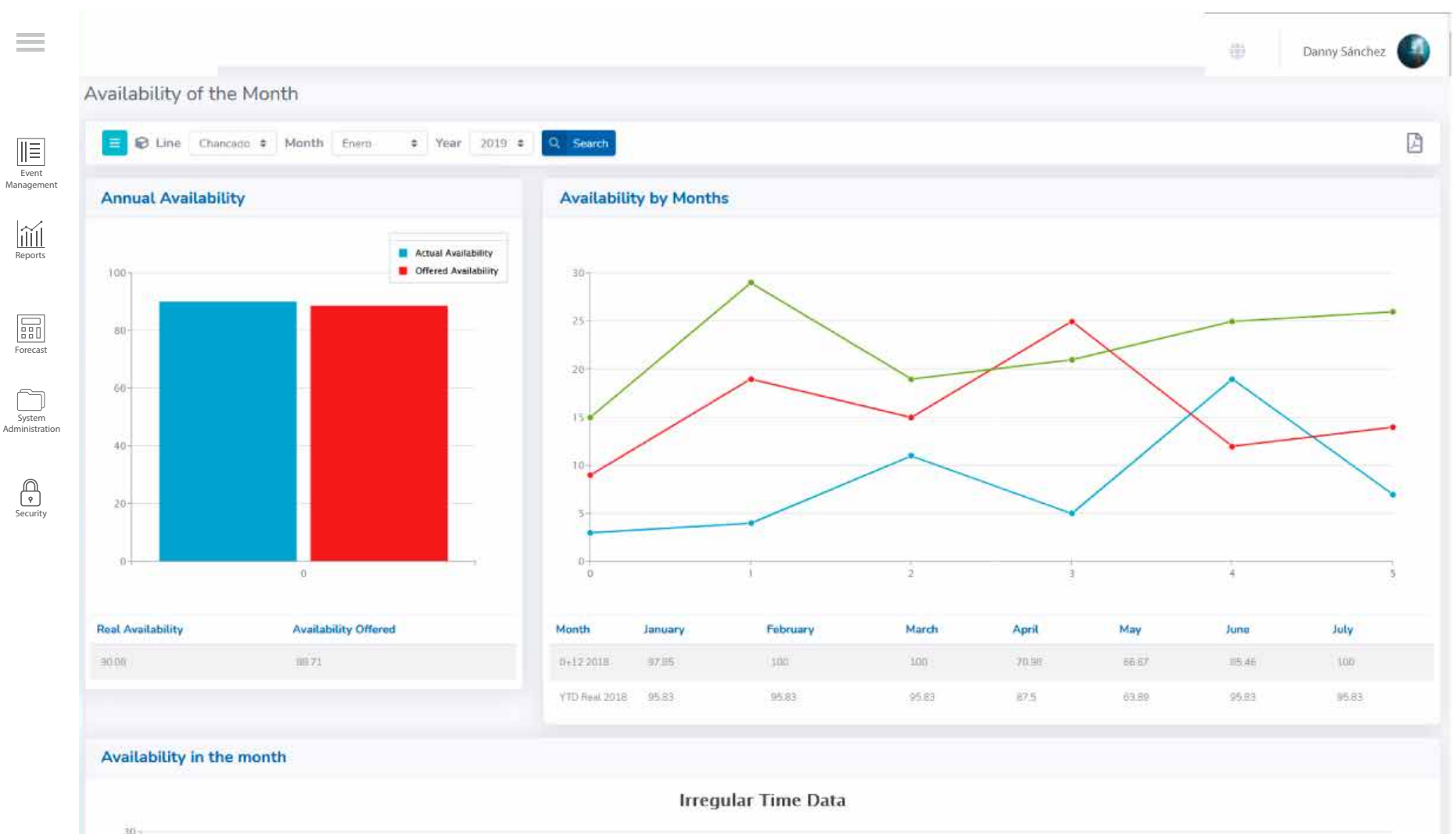
6. Maintenance Times

Report that allows a detailed comparison of the different areas or assignments (times of maintenance, operations, operations or others), previously registered, that intervene in a period of time.



7. Monthly Availability

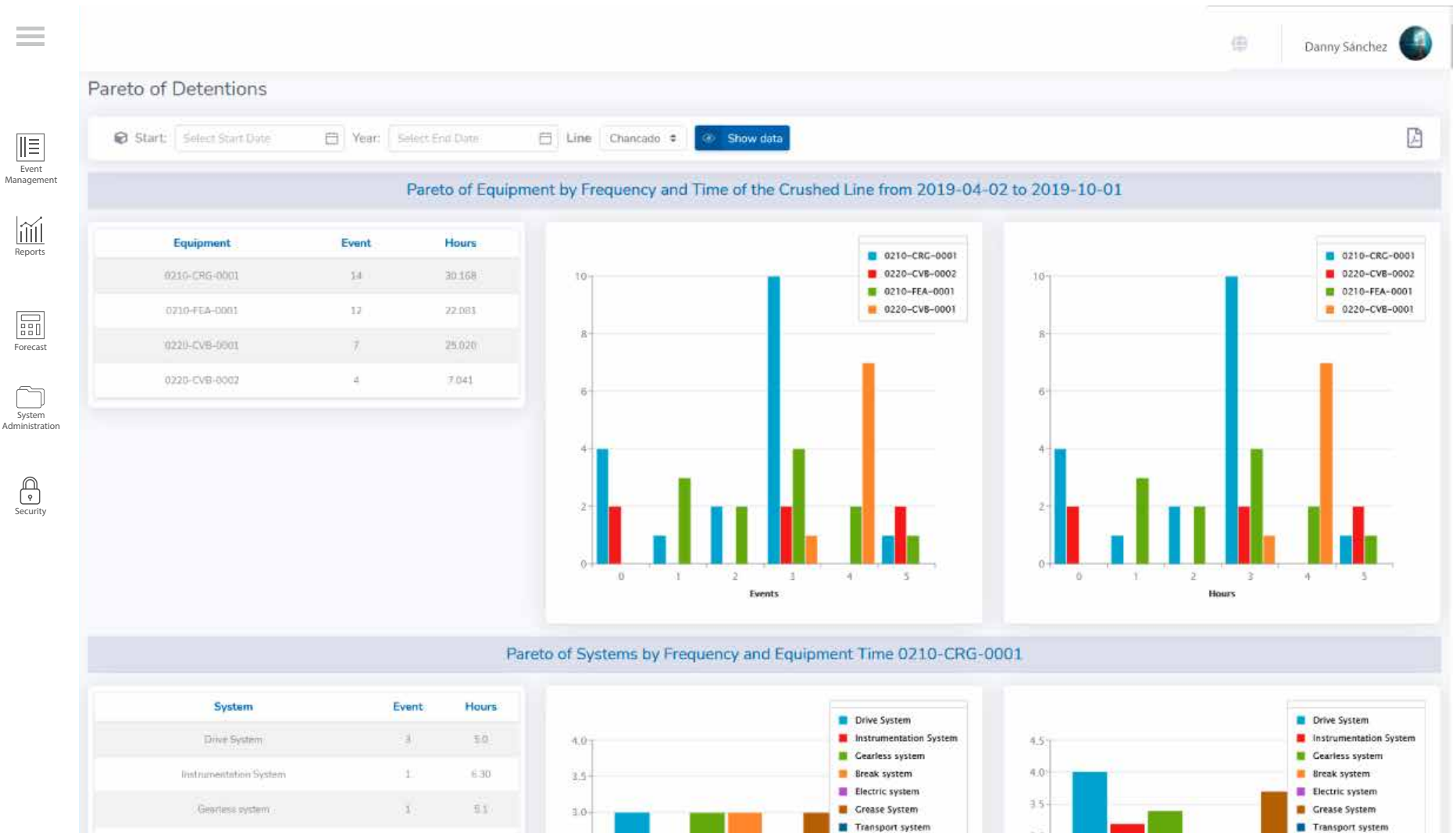
Report designed to obtain and compare the time that an area, line or equipment was physically available to work in a given period of time, in this case monthly.



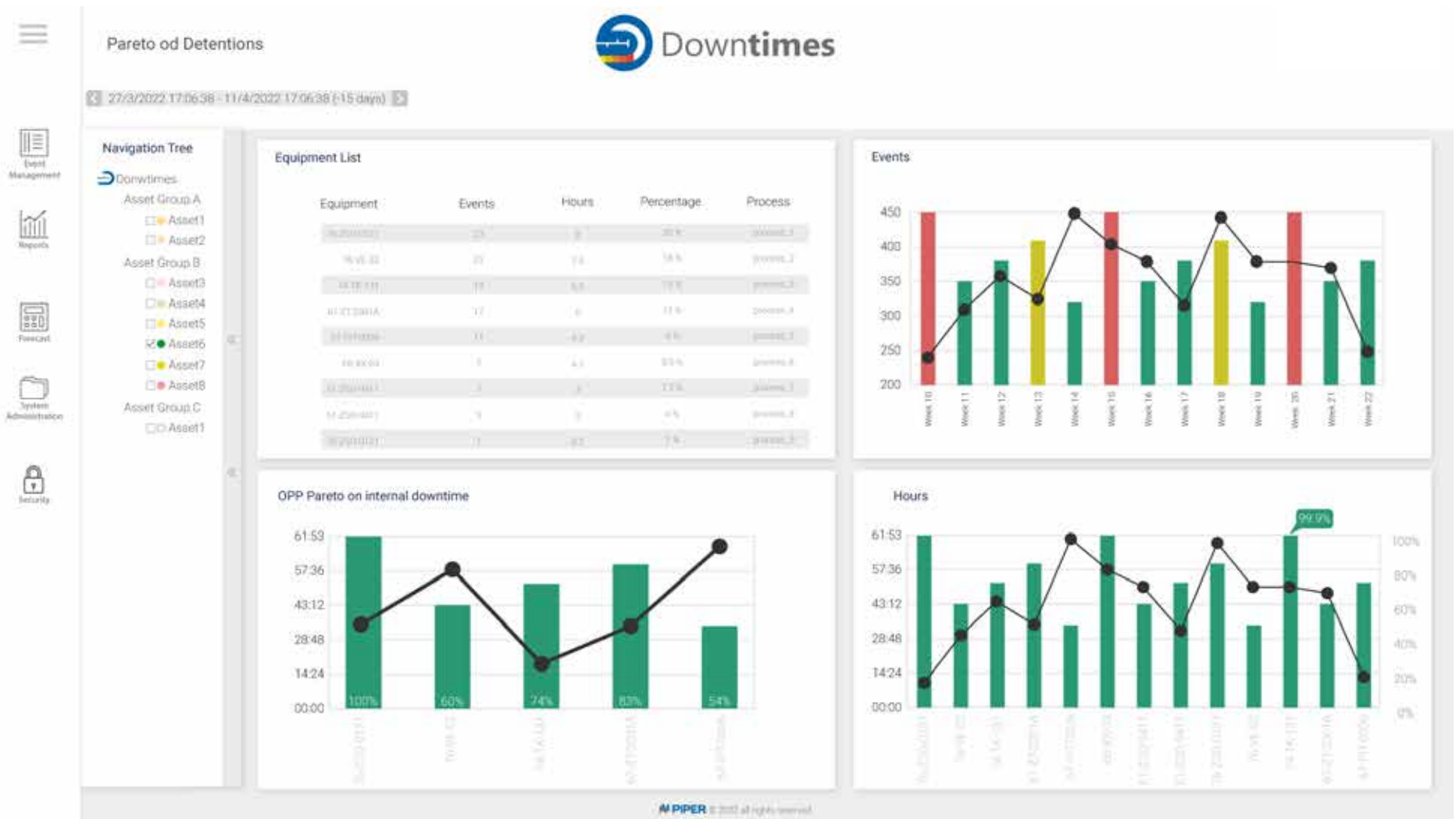
8. Pareto of Detentions

Report designed to visualize in detail the evolution of the availability of the plant or organization, and compare it with the estimate previously entered (Budget – forecast).

Dashboard 1



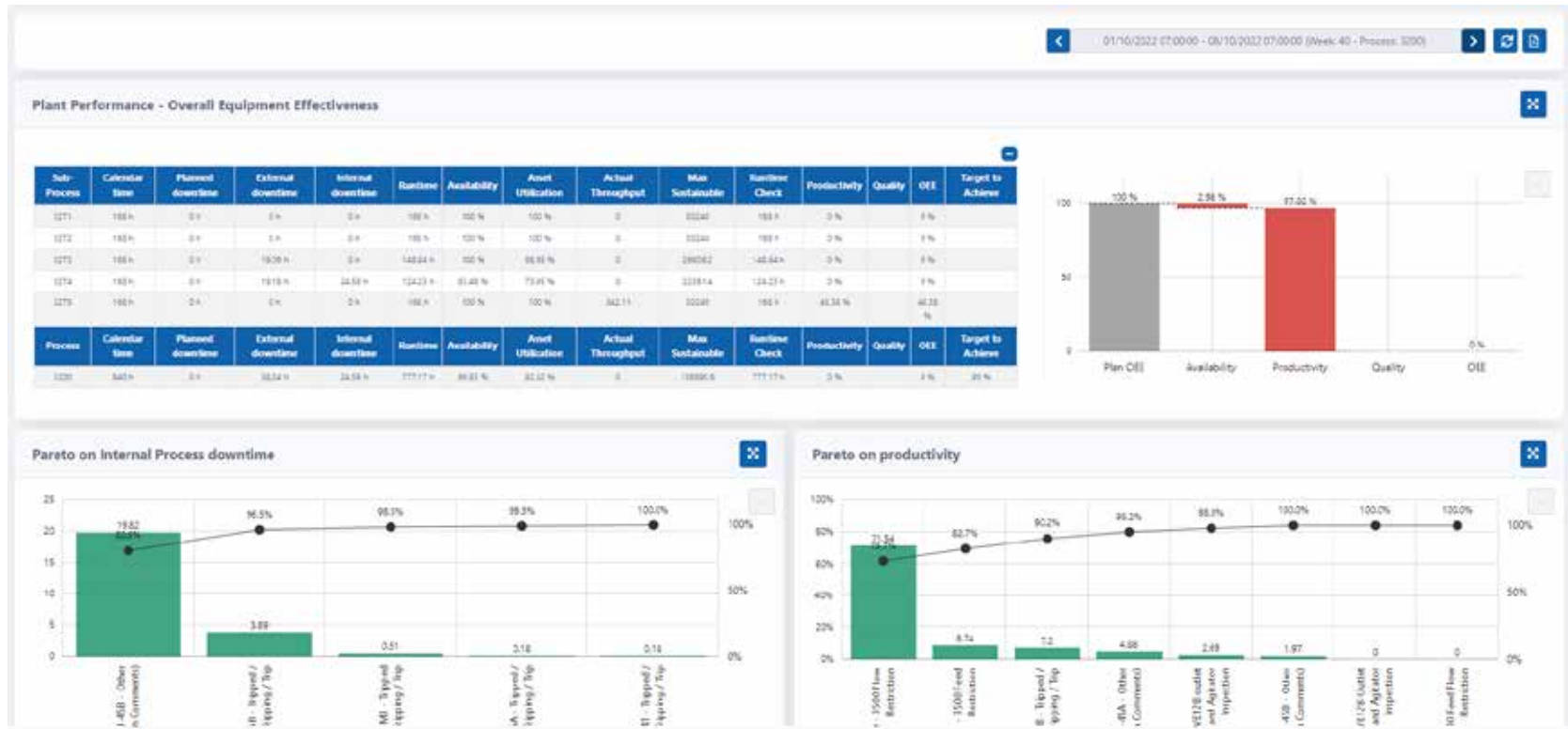
Dashboard 2



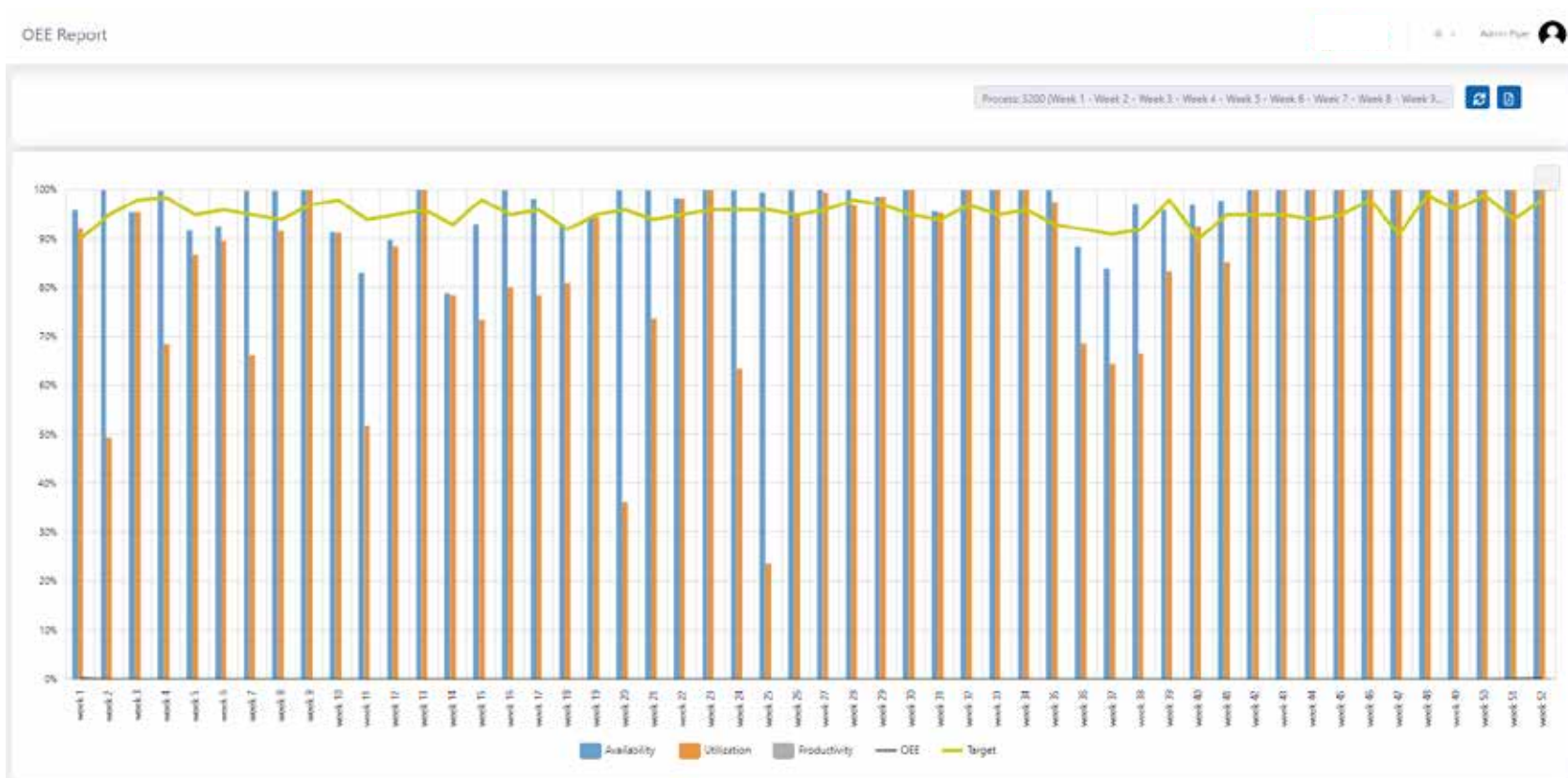
9. Overall Equipment Effectiveness

The OEE module (Overall Equipment Efficiency or General Equipment Efficiency) allows us to visualize the percentage ratio to measure the productive efficiency of equipment, processes and areas of the industry. The advantage of calculating the OEE is that it allows us to measure all the fundamental parameters in industrial production: availability, efficiency and quality.

Dashboard 1



Dashboard 2



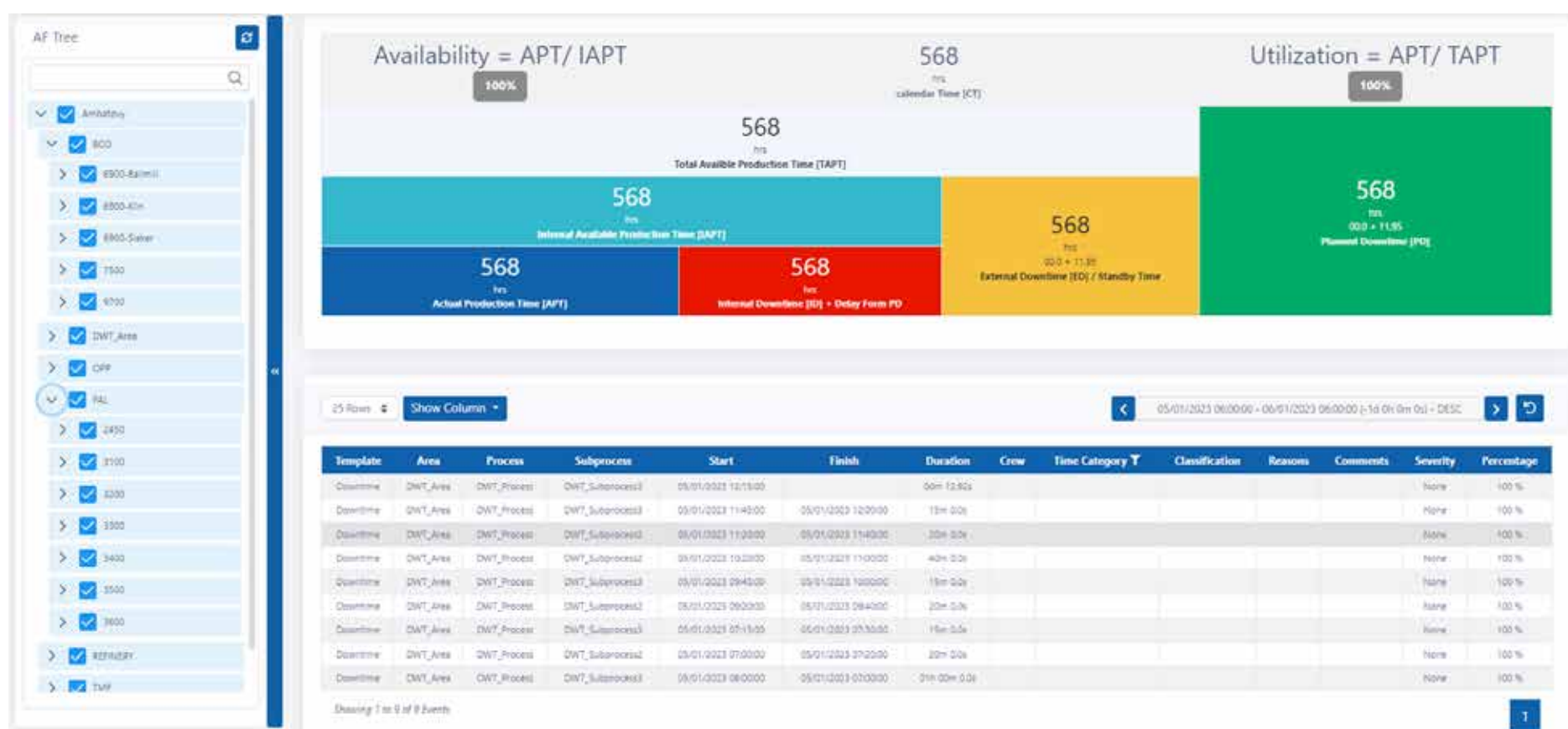


Events

Event Management:

Downtimes allows you to reduce the time used by operators to register events due to Detentions and increase the accuracy of data entered through specific codes (equipment codes, processes, areas, faults, classifications, subclassifications and more).

We managed to systematically improve the productivity of the specialists, and the reliability of the data, in addition to increasing the precision of times, less time dedicated to data management and more time in the analysis and optimization of the process.



Budget and Forecast

Allows the registration of maintenance schedules, budget and forecast information in order to visualize in real time the comparisons and/or deviations between what is planned vs. what is real.

Monthly Availability (Year: 2023 - Process: 3200 - KPI: Availability)

Year: 2023 KPI: Availability Process: 3200

Week	Start date	End date	Week	Budget	Week	Target
Week 1	01/01/2023 09:00:00	08/01/2023 09:00:00	Week 1	95	Week 1	95
Week 2	08/01/2023 09:00:00	14/01/2023 09:00:00	Week 2	95	Week 2	95
Week 3	14/01/2023 09:00:00	21/01/2023 09:00:00	Week 3	90	Week 3	90
Week 4	21/01/2023 09:00:00	28/01/2023 09:00:00	Week 4	90	Week 4	90
Week 5	28/01/2023 09:00:00	04/02/2023 09:00:00	Week 5	90	Week 5	90
Week 6	04/02/2023 09:00:00	11/02/2023 09:00:00	Week 6	95	Week 6	95
Week 7	11/02/2023 09:00:00	18/02/2023 09:00:00	Week 7	85	Week 7	85
Week 8	18/02/2023 09:00:00	25/02/2023 09:00:00	Week 8	85	Week 8	85
Week 9	25/02/2023 09:00:00	04/03/2023 09:00:00	Week 9	90	Week 9	90
Week 10	04/03/2023 09:00:00	11/03/2023 09:00:00	Week 10	95	Week 10	95
Week 11	11/03/2023 09:00:00	18/03/2023 09:00:00	Week 11	95	Week 11	95
Week 12	18/03/2023 09:00:00	25/03/2023 09:00:00	Week 12	95	Week 12	95
Week 13	25/03/2023 09:00:00	01/04/2023 09:00:00	Week 13	95	Week 13	95
Week 14	01/04/2023 09:00:00	08/04/2023 09:00:00	Week 14	95	Week 14	95
Week 15	08/04/2023 09:00:00	15/04/2023 09:00:00	Week 15	95	Week 15	95
Week 16	15/04/2023 09:00:00	22/04/2023 09:00:00	Week 16	90	Week 16	90
Week 17	22/04/2023 09:00:00	29/04/2023 09:00:00	Week 17	90	Week 17	90
Week 18	29/04/2023 09:00:00	06/05/2023 09:00:00	Week 18	90	Week 18	90
Week 19	06/05/2023 09:00:00	13/05/2023 09:00:00	Week 19	90	Week 19	90
Week 20	13/05/2023 09:00:00	20/05/2023 09:00:00	Week 20	90	Week 20	90
Week 21	20/05/2023 09:00:00	27/05/2023 09:00:00	Week 21	90	Week 21	90
Week 22	27/05/2023 09:00:00	03/06/2023 09:00:00	Week 22	96	Week 22	96
Week 23	03/06/2023 09:00:00	10/06/2023 09:00:00	Week 23	96	Week 23	96
Week 24	10/06/2023 09:00:00	17/06/2023 09:00:00	Week 24	96	Week 24	96
Week 25	17/06/2023 09:00:00	24/06/2023 09:00:00	Week 25	96	Week 25	96

Maintenance Schedule

Ambatovy

Admin Admin

Maintenance Schedule

Maintenance Schedule Turns

Maintenance Schedule 2022

2022 Edit Delete

#	Month	Week	Started Date	Ended Date
1	JANUARY	Week 1	01/01/2022 07:00:00	08/01/2022 09:02:03
2	JANUARY	Week 2	08/01/2022 09:02:03	20/01/2022 09:07:03
3	JANUARY	Week 3	20/01/2022 09:07:03	27/01/2022 09:07:03
4	JANUARY	Week 4	27/01/2022 09:07:03	03/02/2022 09:07:03
5	FEBRUARY	Week 5	03/02/2022 09:07:03	10/02/2022 09:10:03
6	FEBRUARY	Week 6	10/02/2022 09:10:03	17/02/2022 09:10:03
7	FEBRUARY	Week 7	17/02/2022 09:10:03	24/02/2022 09:10:03
8	FEBRUARY	Week 8	24/02/2022 09:10:03	03/03/2022 09:10:03
9	MARCH	Week 9	03/03/2022 09:10:03	10/03/2022 09:10:03



Monitoring

Summary of Conditions:

Here the condition of the variables belonging to the equipment is detailed, these conditions may vary according to the type of equipment.

- Event Management
- Reports
- Forecast
- System Administration
- Security

Dashboard showing monitoring data for four areas: **Activos del Area Chancado**, **Activos de Molienda**, **Activos de Pebbles**, and **Activos de Flotacion**. Each area includes a radar chart and a list of equipment with their status (Critical, Alert, Normal, Bad Date).

Legend: ■ Critico ■ Alerta ■ Normal ■ Bad Date

Activos del Area Chancado (Total: 3 Critical, 1 Alert, 5 Normal, 0 Bad Date)

- + Área : 210 (2 Normal, 1 Alert, 0 Critical, 0 Bad Date)
210-CRG-001
- + Área : 220 (2 Normal, 1 Alert, 0 Critical, 0 Bad Date)
220-CVB-001
- + Área : 310 (2 Normal, 1 Alert, 0 Critical, 0 Bad Date)
310-PPS-622 310-PPS-625

Activos de Molienda (Total: 6 Critical, 2 Alert, 6 Normal, 0 Bad Date)

- + Área : 240 (1 Normal, 0 Alert, 0 Critical, 0 Bad Date)
240-CVB-005
- + Área : 245 (0 Normal, 1 Alert, 0 Critical, 0 Bad Date)
245-CVB-628
- + Área : 310 (5 Normal, 0 Alert, 0 Critical, 0 Bad Date)
310-MLB-001 310-MLS-001
310-MLS-002 310-MLS-005
310-PPS-612 310-PPS-620

Activos de Pebbles (Total: 2 Critical, 7 Alert, 8 Normal, 0 Bad Date)

- + Área : 210 (5 Normal, 2 Alert, 0 Critical, 0 Bad Date)
210-CRG-022 210-CRG-023
210-CRG-005 210-CRG-024
- + Área : 310 (3 Normal, 0 Alert, 0 Critical, 0 Bad Date)
310-PPS-627 310-PPS-630

Activos de Flotacion (Total: 8 Critical, 3 Alert, 6 Normal, 0 Bad Date)

- + Área : 310 (0 Normal, 1 Alert, 0 Critical, 0 Bad Date)
310-PPS-623
- + Área : 320 (0 Normal, 4 Alert, 0 Critical, 0 Bad Date)
320-CPB-001 320-CPB-002
320-CPB-003 320-CPB-005

Condition Detai

Visualize in real time the conditions of the asset variables: operating variables, oils, vibrations and wear. The user has the facility to edit the limits of each variable.

The dashboard displays the following data:

TK3	TK2	TK1
Condición: <input type="radio"/> Bad Data	Condición: <input type="radio"/> Bad Data	Condición: <input type="radio"/> Bad Data
Valor: 1132.62	Valor: 11595.25	Valor: 19648.00
Variable: 6205.33	Variable: 28159.00	Variable: 13335.00
Comentario: 26490.00	Comentario: 166.00	Comentario: 12035.00

Lin. Descarga	Lin. Alimentación
Desgaste 9: 19648.00	Desgaste 9: 11595.25
Desgaste 8: 79.00	Desgaste 8: 166.00
Desgaste 7: 26490.00	Desgaste 7: 13335.00
Desgaste 6: 28159.00	Desgaste 6: 19648.00
Desgaste 5: 11595.25	Desgaste 5: 79.00
Desgaste 4: 6205.33	Desgaste 4: 12035.00
Desgaste 3: 166.00	Desgaste 3: 26490.00
Desgaste 21: 13335.00	Desgaste 21: 28159.00
Desgaste 20: 19648.00	Desgaste 20: 11595.25
Desgaste 2: 79.00	Desgaste 2: 6205.33
Desgaste 19: 12035.00	Desgaste 19: 166.00
Desgaste 18: 26490.00	Desgaste 18: 12035.00
Desgaste 17: 11595.25	Desgaste 17: 26490.00
Desgaste 16: 6205.33	Desgaste 16: 28159.00

PPZ 5	PPZ 3	PPZ 1
Motor	Motor	Motor
Vibración 2HV: 166.00	Vibración 2HV: 6205.33	Vibración 2HV: 11595.25
Vibración 2HEE3: 13335.00	Vibración 2HEE3: 166.00	Vibración 2HEE3: 6205.33
Vibración 1VEE3: 19648.00	Vibración 1VEE3: 13335.00	Vibración 1VEE3: 166.00
Vibración 1HV: 79.00	Vibración 1HV: 19648.00	Vibración 1HV: 13335.00
Bomba	Bomba	Bomba
Vibración 4HV: 6205.33	Vibración 4HV: 26490.00	Vibración 4HV: 19648.00
Vibración 3HV: 166.00	Vibración 3HV: 28159.00	Vibración 3HV: 79.00
Vibración 3HEE3: 13335.00	Vibración 3HEE3: 11595.25	Vibración 3HEE3: 12035.00

Condition Detail - Create Event

The 'Create event' form includes the following fields:

- Temp. Trunnion Bearing** (Selected Asset)
- Start:** 14/02/2022 10:22:34
- Finish:** 14/02/2022 11:22:34
- Detail:** Select detail (dropdown)
- Information:** Select information (dropdown)
- Failure:** Select failure (dropdown)
- Solution:** Select solution (dropdown)
- Comments:** Write a comment... (text area)

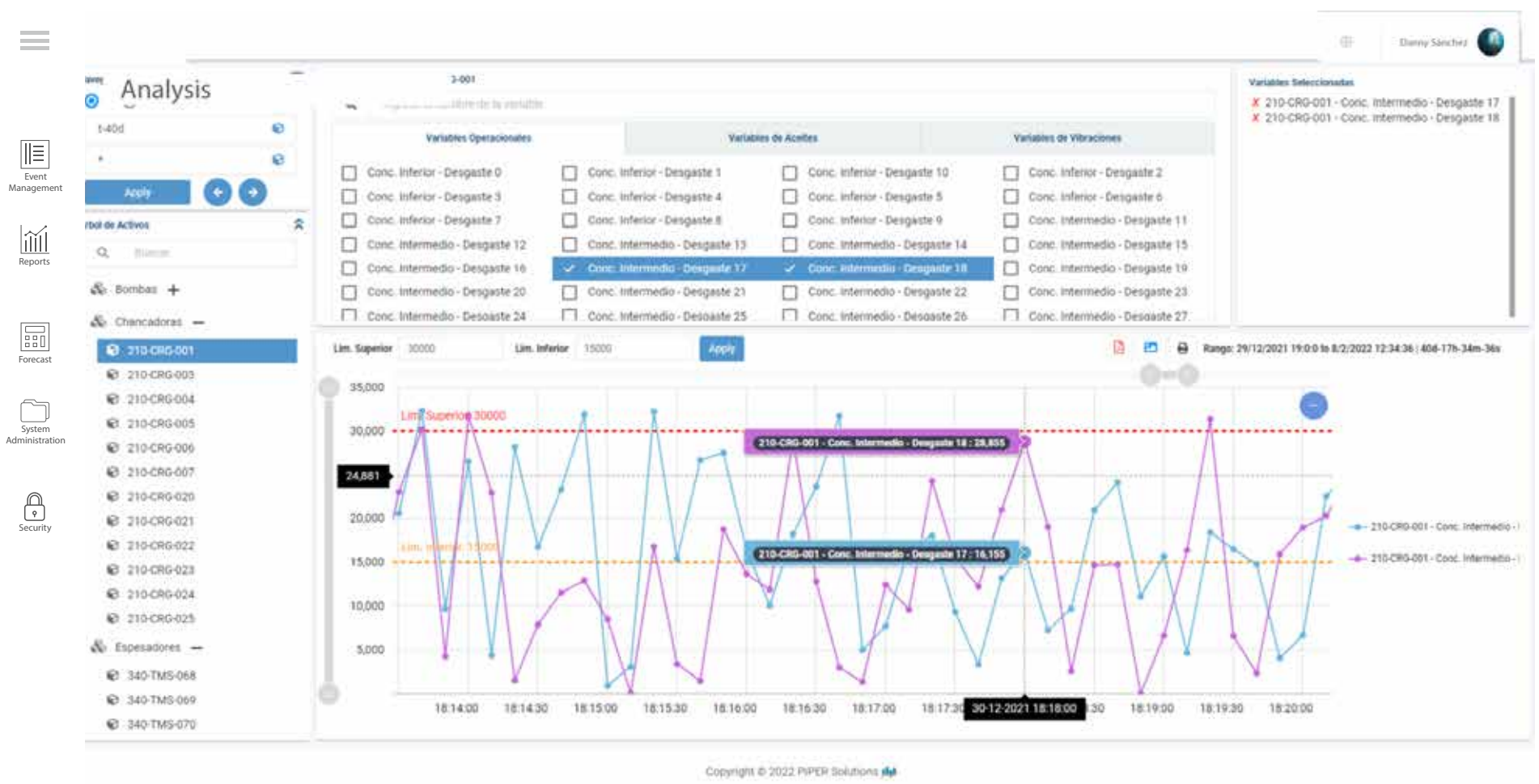
Buttons: **Save** (blue), **Close** (red), **Back** (grey)



Analysis

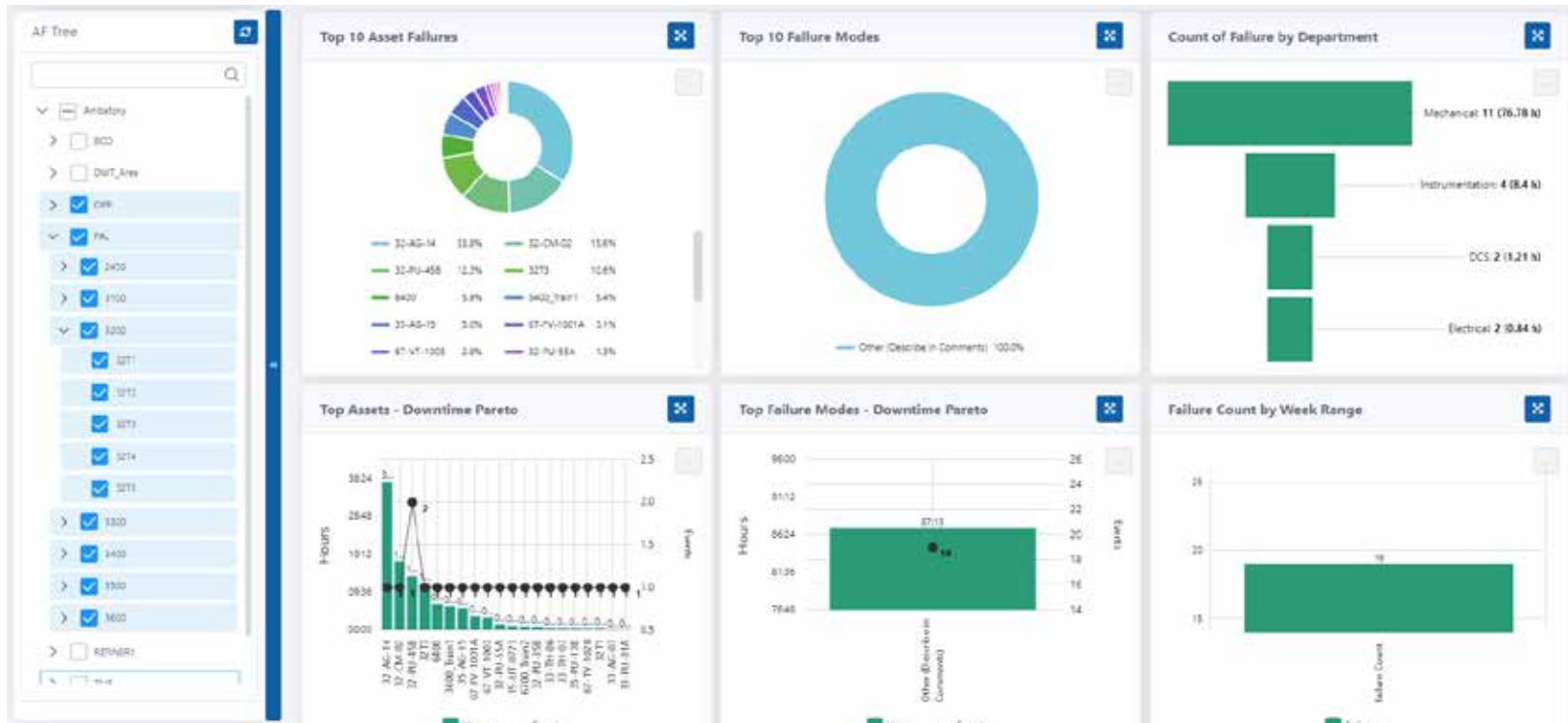
Trends:

Module that allows navigation between plant assets and their corresponding variables. The objective of this module is to carry out an analysis of the behavior of the component of a piece of equipment by means of a trend graph and to be able to compare it with other signals. The module allows cross-checking data with different pieces of equipment and being able to establish limits and appreciate the deviations of the signals. quickly and dynamically.



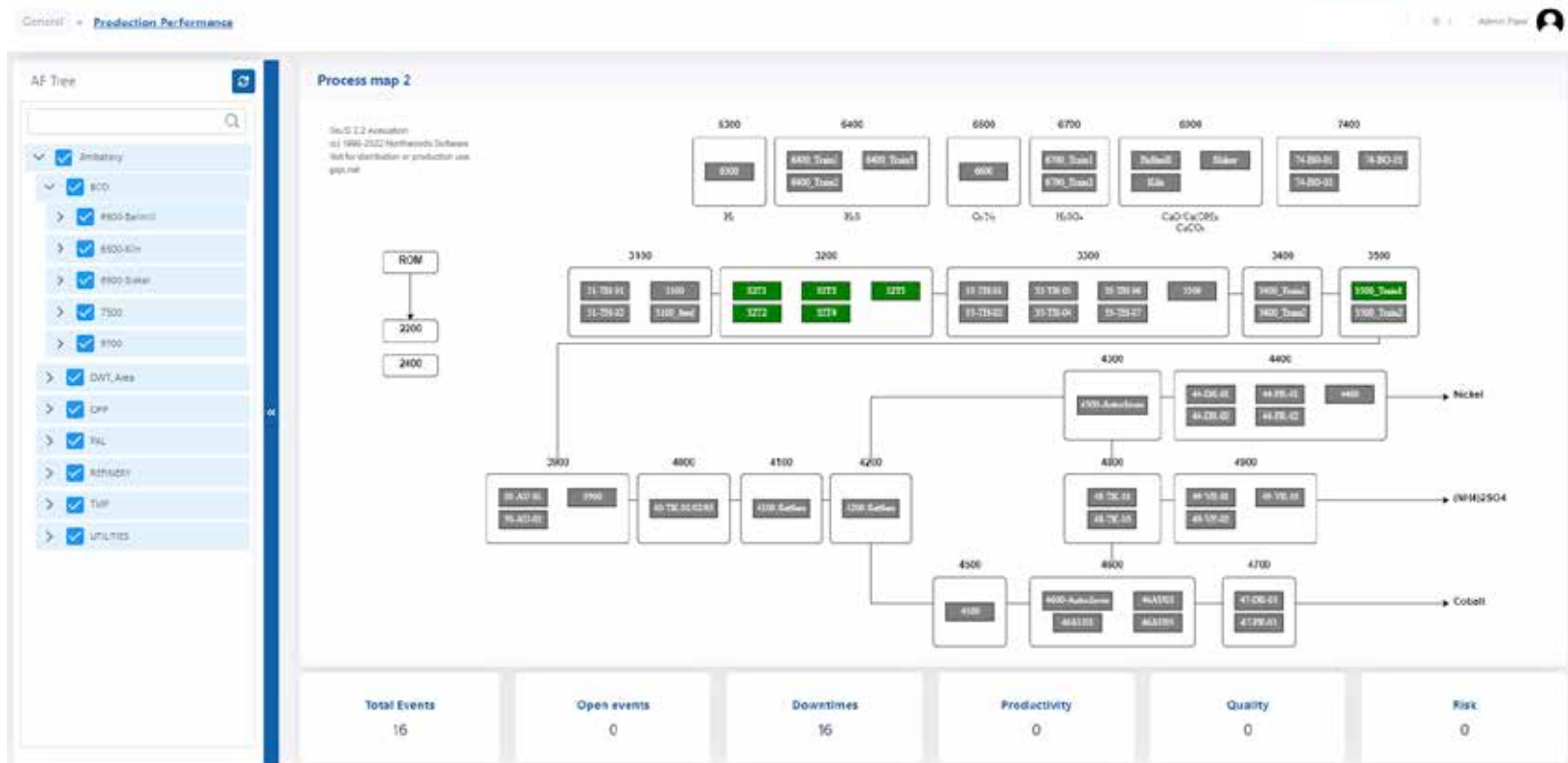
Plant Performance Monitoring:

It allows to monitor your industrial plant in real time, visualize the number of detentions, the workflow and the status of critical assets.



Overall Plant Analysis:

This module allows us to interact with the information entered, at the level of being able to make different combinations and generate specific analyses, either by process area or equipment, as well as being able to separate them by departments, work areas, and even types of failure; all this in dynamic time periods.





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