

AVEVA PI WORLD 2022 - AMSTERDAM

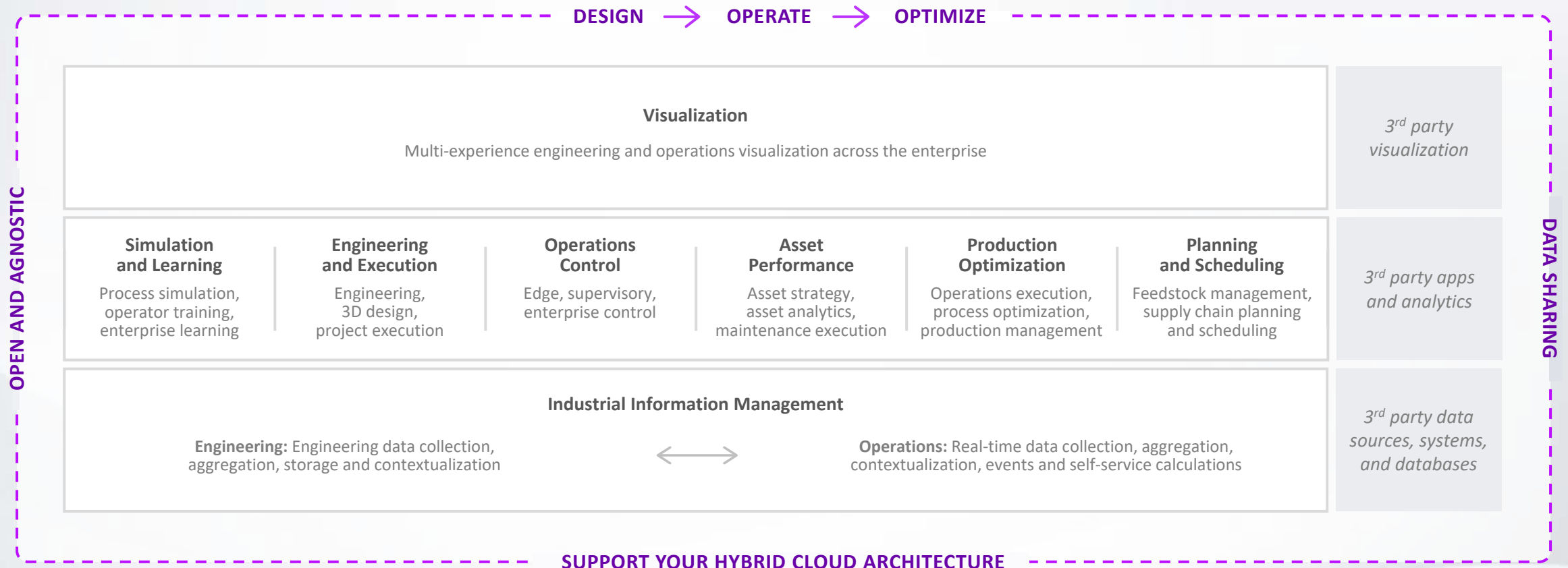
AVEVA Asset Strategy Optimization

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AVEVA

Delivering a complete digital thread, purpose-built for industry

Accelerate time to value with flexible, scalable, and trusted industrial hybrid SaaS solutions





What are we showing you today?

1. A brief introduction to our Asset Strategy Optimization solution capabilities
2. Three real business cases our customers are deploying with our solution, including business value
3. How does ASO work together with PI and other APM solutions

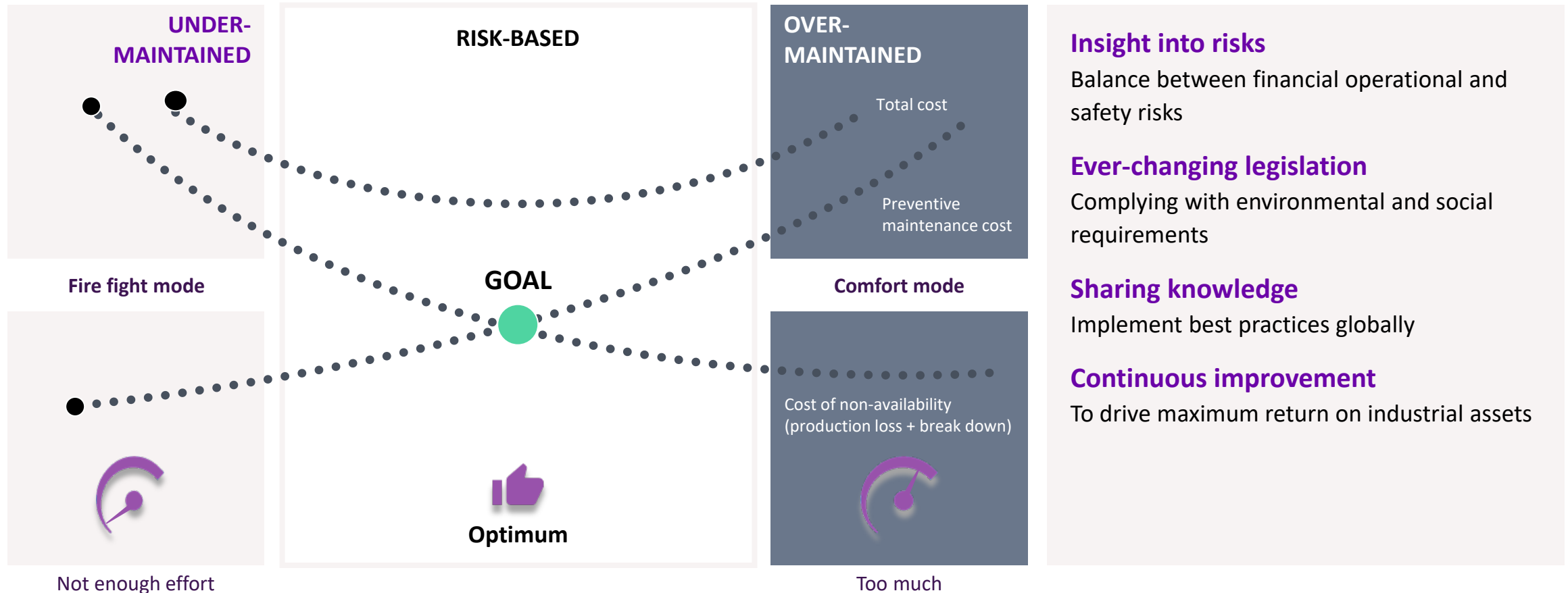


Brief Introduction to Asset Strategy Optimization



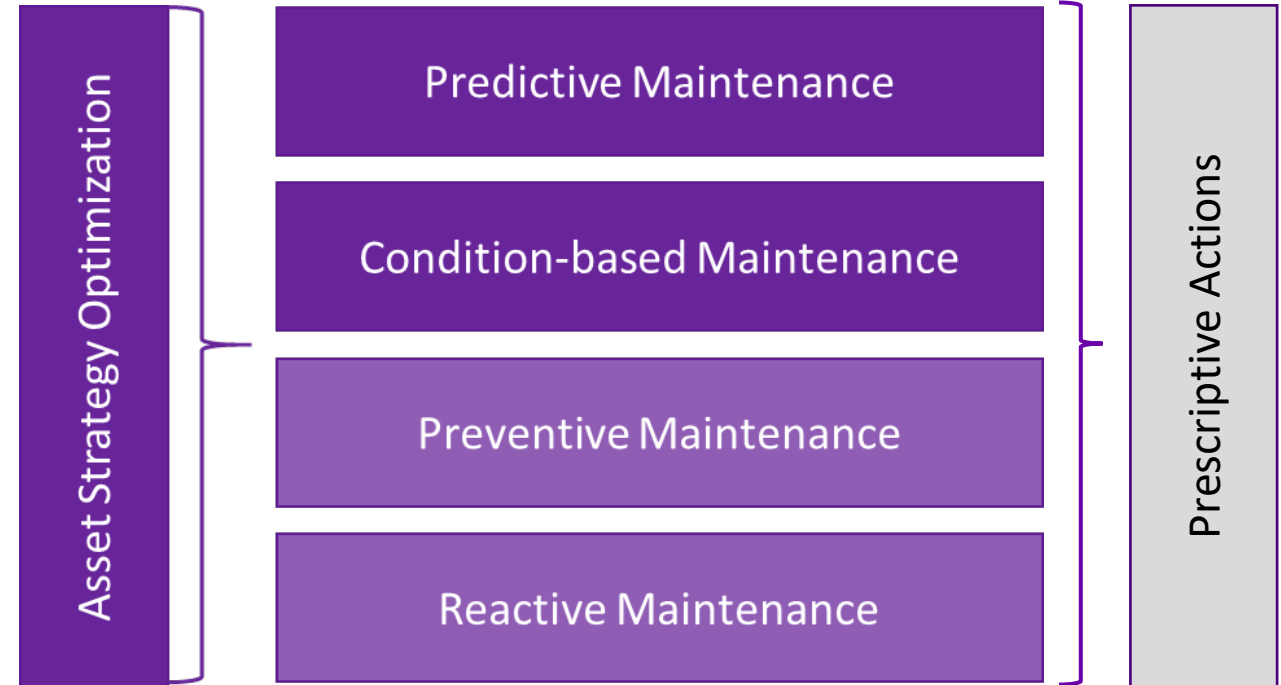
The Benefit of Optimized Asset Strategies

The importance of a risk-based approach



Asset Strategy

- Asset Strategy is a **mix** of different maintenance types
 - Reactive
 - Preventive
 - Condition based / Predictive
 - Predictive
- For all equipment
- Based on dynamic business objectives
- Prescriptive actions for all strategies



Asset Strategy Optimization

Optimize strategy

- Higher plant output
- Improved HSE performance

Eliminate unnecessary maintenance

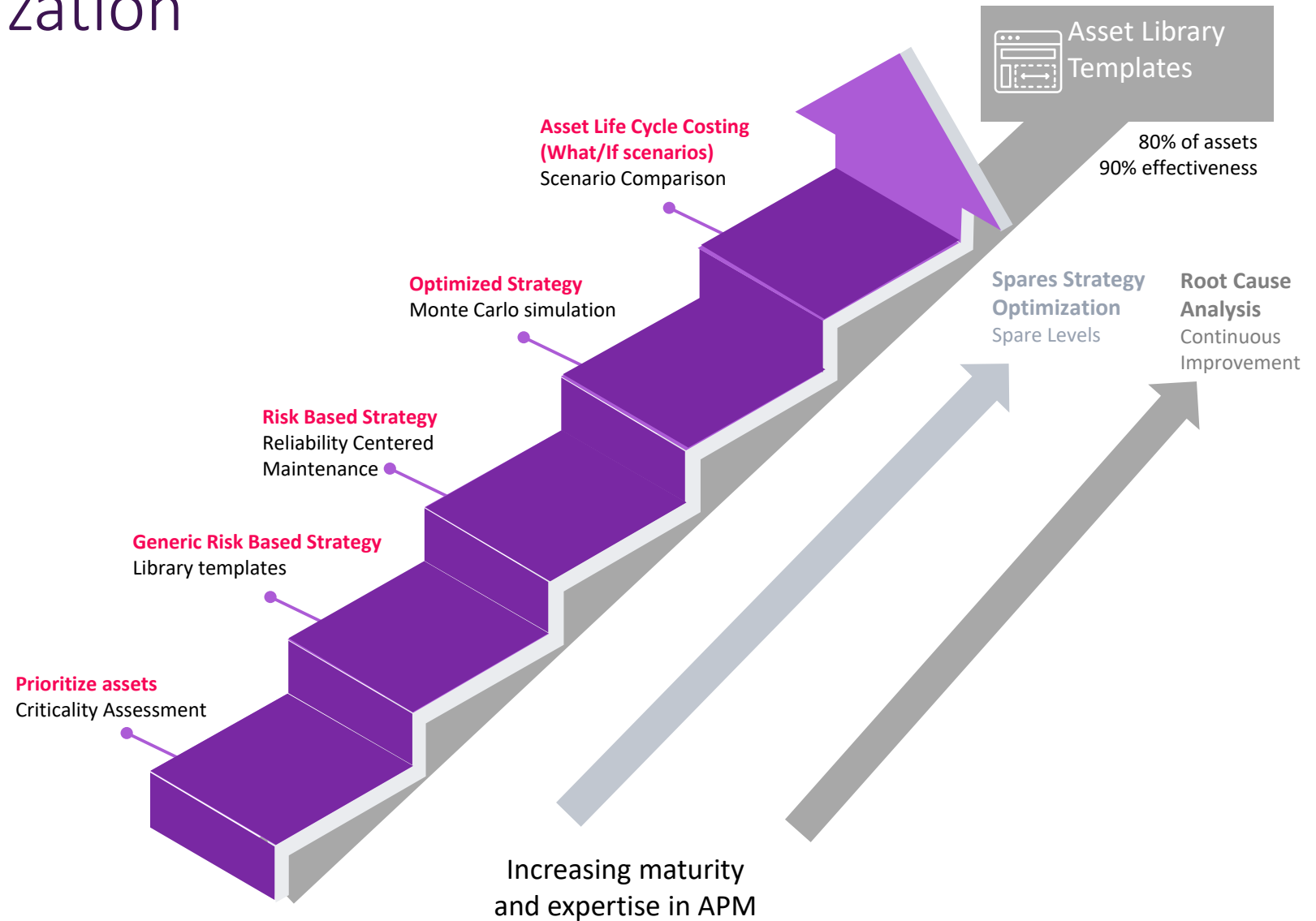
- Less scheduled downtime
- Less maintenance cost

Optimize over asset life cycle

- Lowest life cycle cost
- Increased ROA (Return On Assets)

Standardize data structure and improve data quality

- Improved compliance
- Rapid fleet deployment

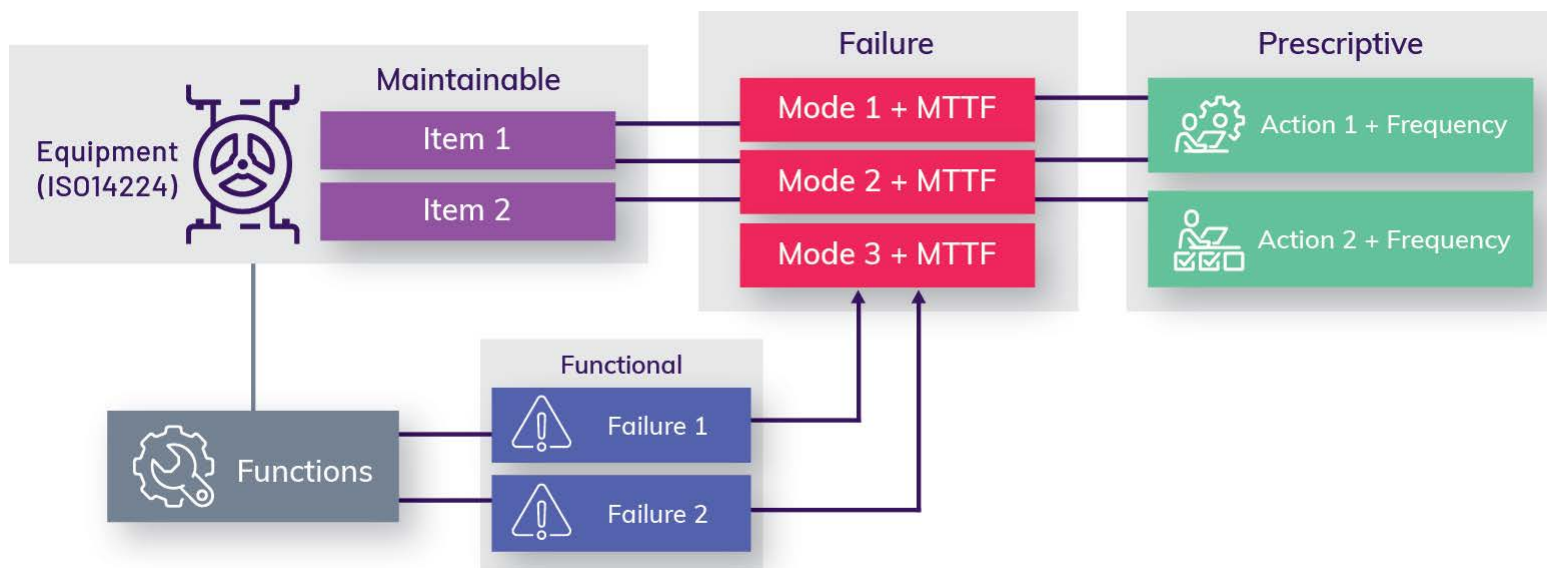


Deployment Acceleration

AVEVA Asset Strategy Library

By adding data and asset templates to the solution strategy deployment can be done up to 90% faster.

The AVEVA Asset Library contains RCM-based equipment failure data and preventive maintenance for the top 100 most commonly found asset types in asset-intensive industries:



- 1,000 components
- 1,500 failure causes with failure conditions
- 2,000 preventative tasks
- 5,000 prescriptive tasks

20 years and 22,000 man-hours of experience



Three Business Cases for Asset Strategy



1. Asset Output Increase

Business Challenge

Increase production output with 50% in short time

Solution

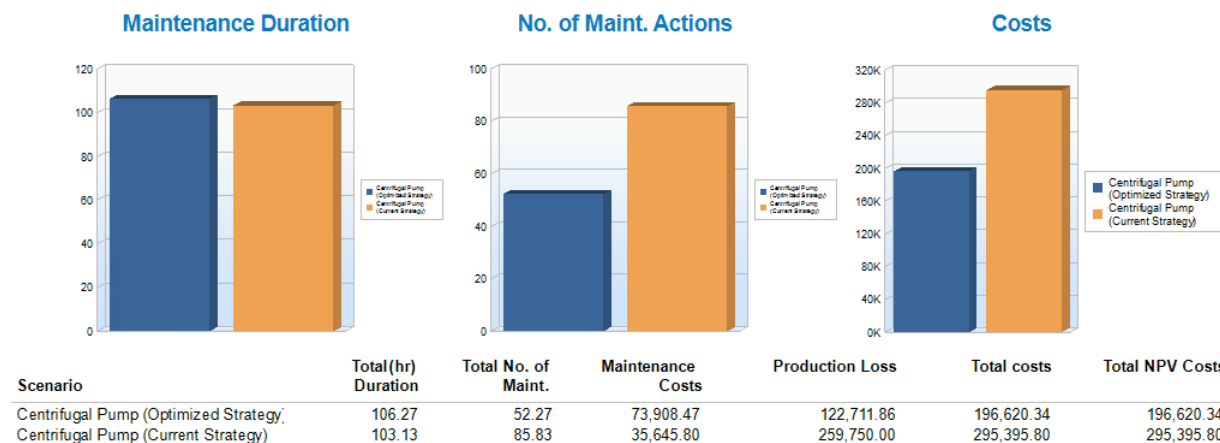
Analyze production bottlenecks in plant, change strategies for increased output

Results

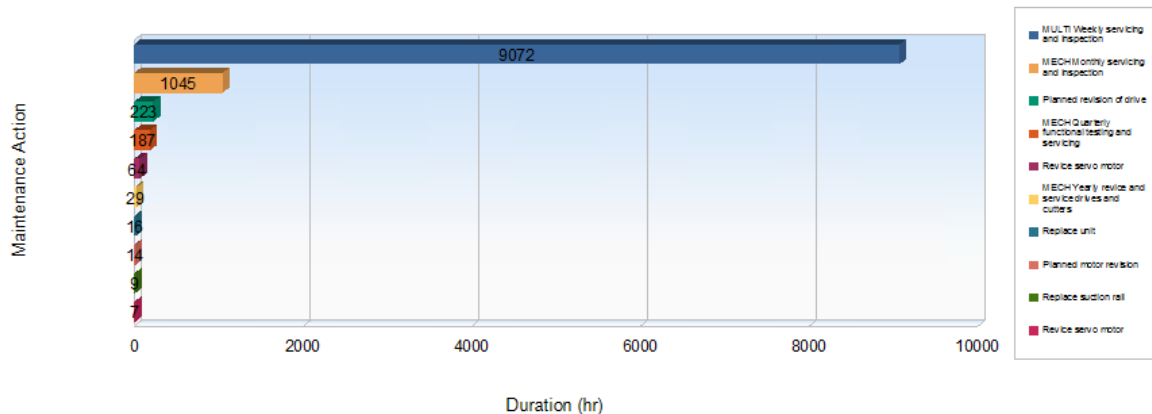
50+ strategies changed to eliminate bottlenecks



Totals
Object Name: B0242001 - J-9002A CENTRIFUGAL PUMP



Downtime Top 10 Report
Object Name: Line 1



2. Asset Life Cycle Cost Reduction

Business Challenge

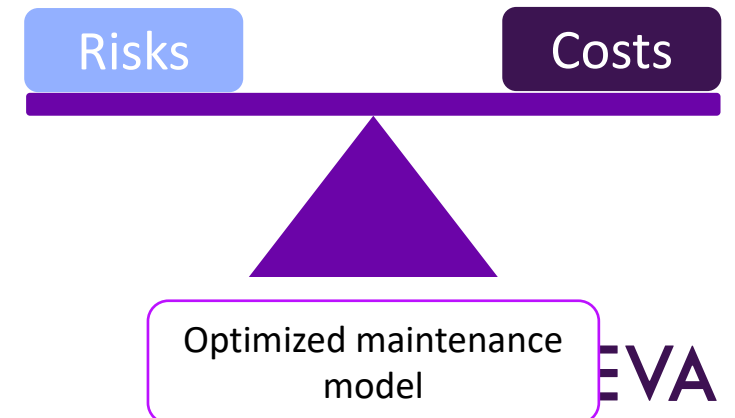
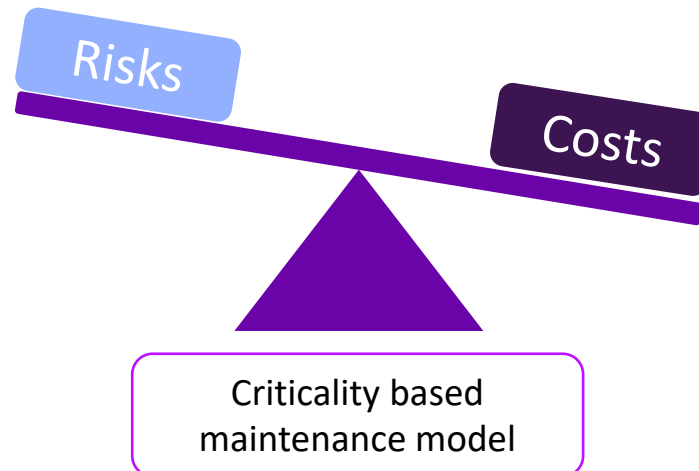
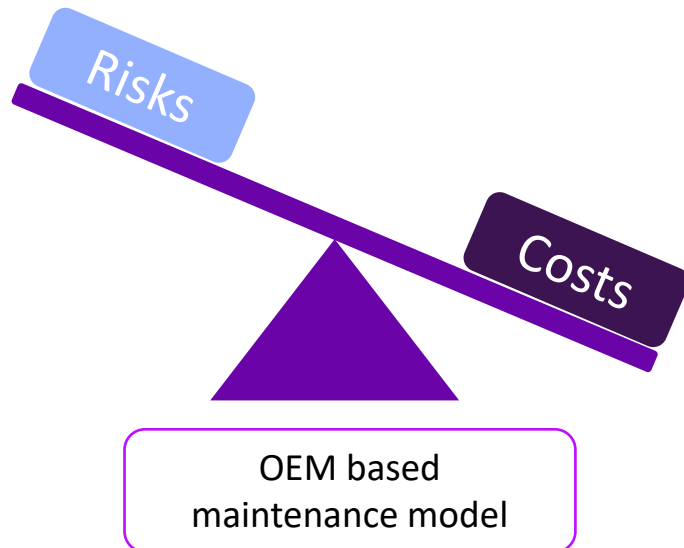
Decrease maintenance cost, move into renewables

Solution

Analyse largest cost contributors, add renewables asset types library

Results

Focus on reducing OEM based asset strategies



3. ASO combined with Condition Monitoring

Business Challenge

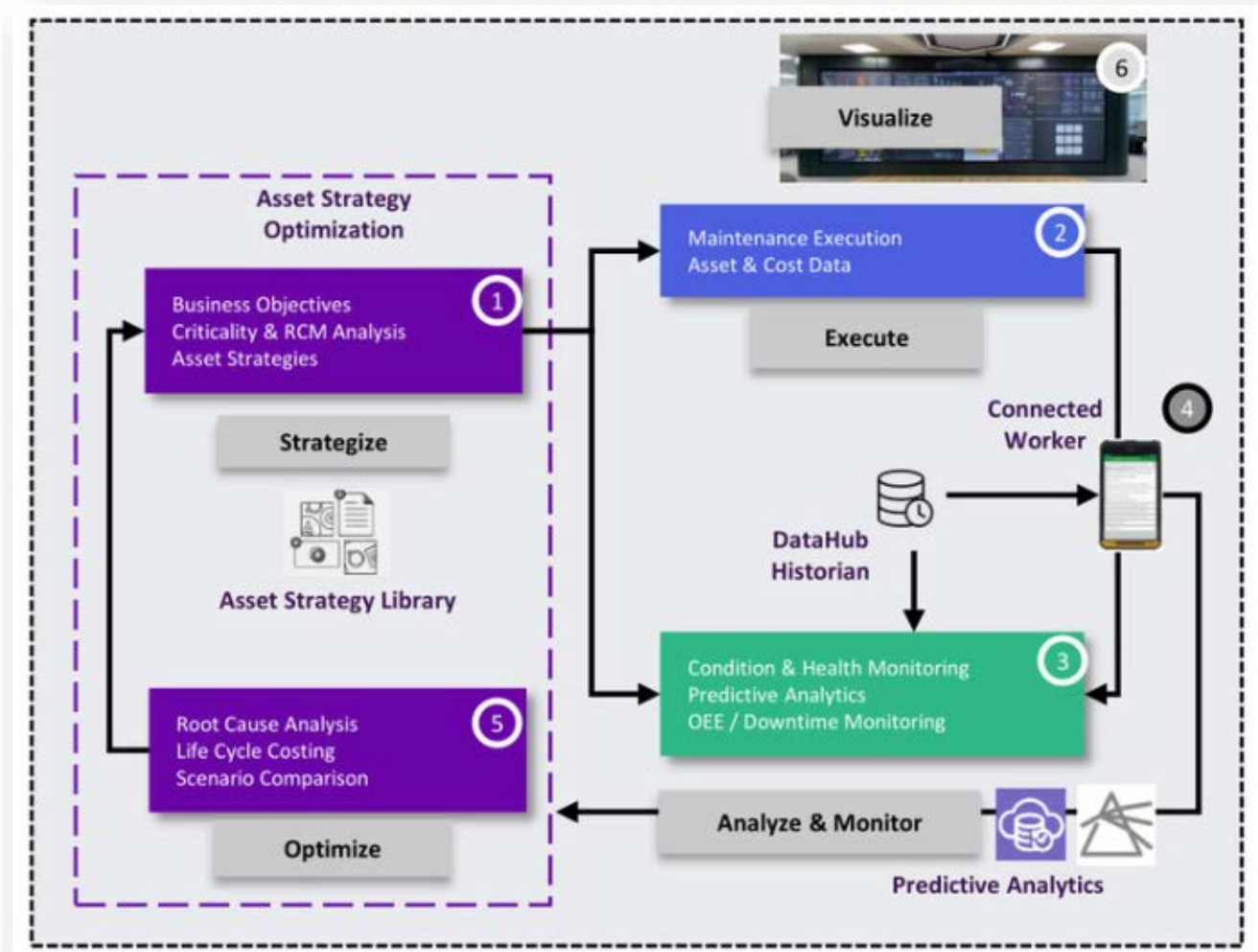
Find opportunities to decrease cost and risk by expanding Condition Monitoring

Solution

Analyse critical equipment, identify Failure Modes for monitoring and add prescriptive actions

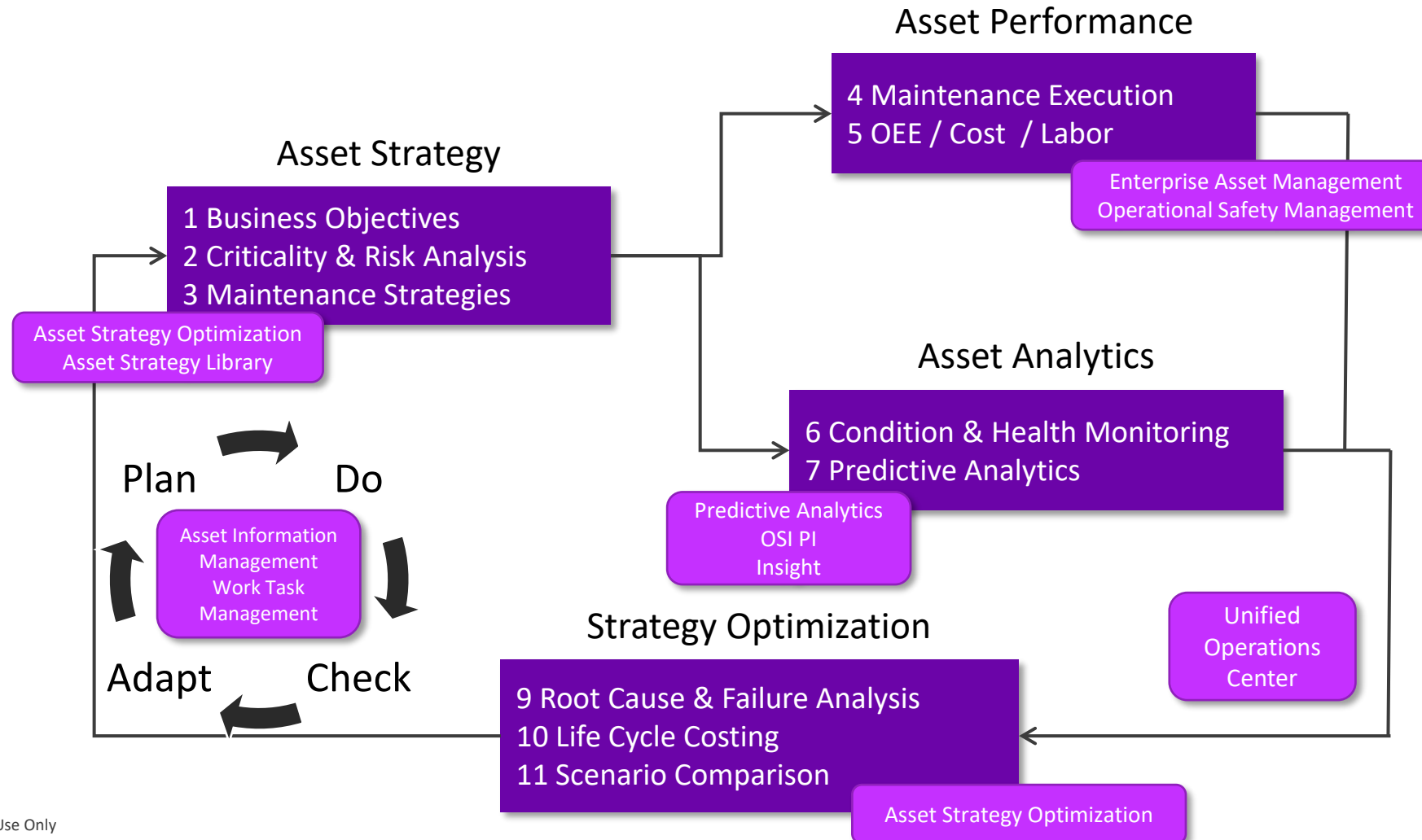
Results

50+ strategies changed to eliminate bottlenecks



How does Asset Strategy fit into APM?

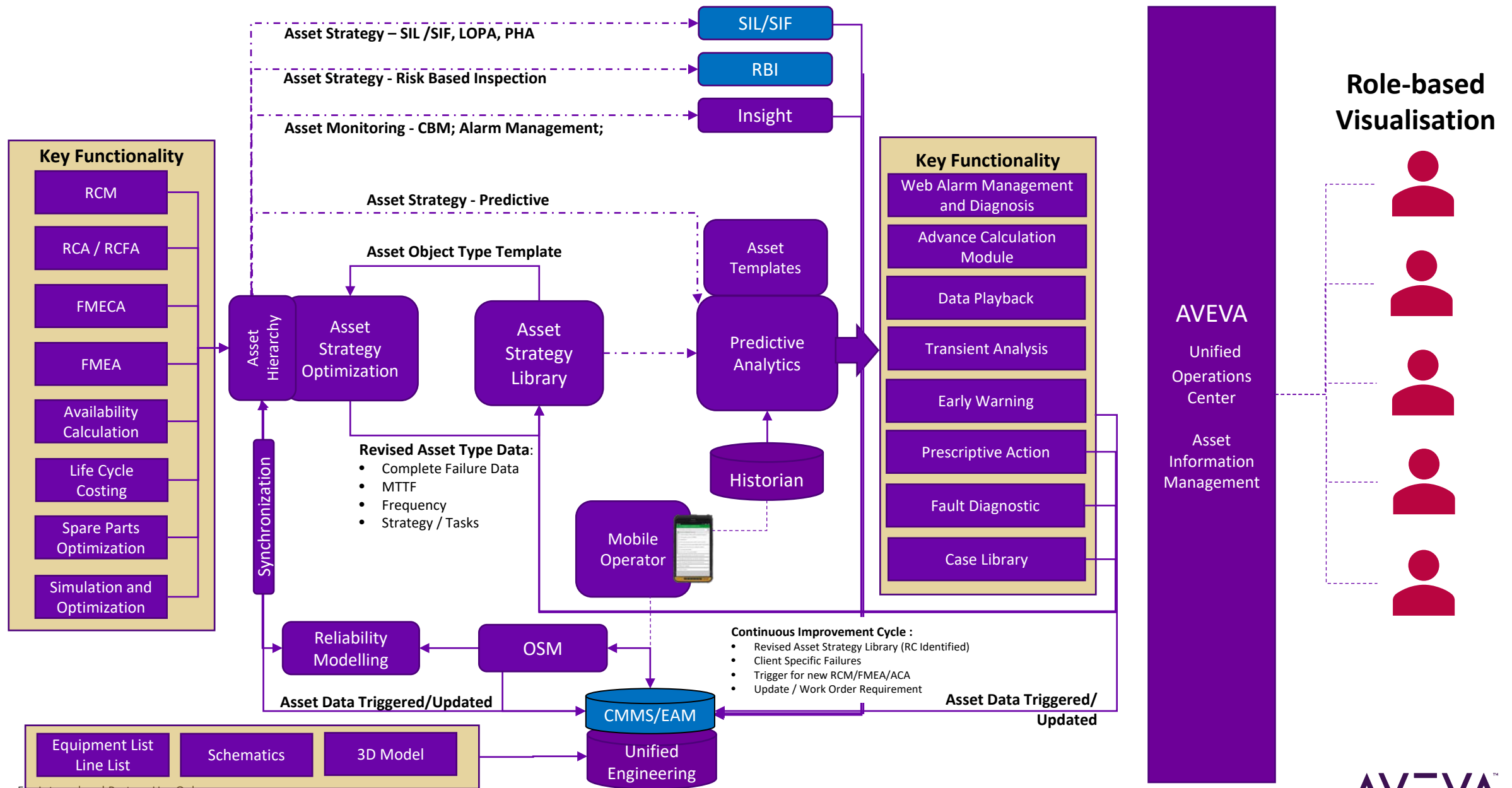
How AVEVA Asset Strategy Optimization fits in the APM Work Process



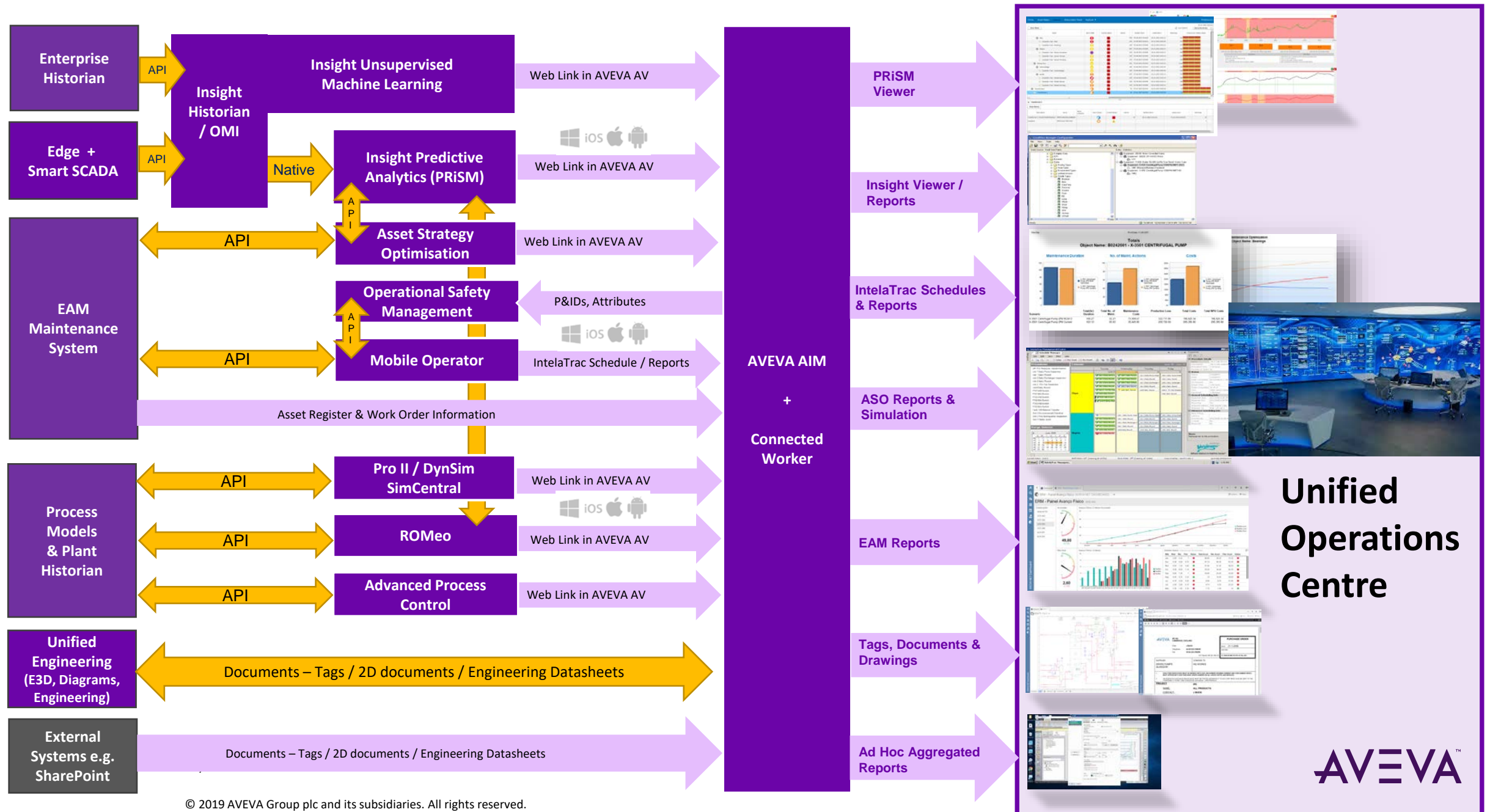
Back up slides



Bringing it Together – Continuous Improvement Closed Loop



Solution Map Operations & Maintenance



AVEVA Asset Library

Content


- 4 Content Packages
 - Asset Library (general)
 - Asset Library – O&G
 - Asset Library – Power
 - Asset Library – MMM
- Current content supports prescriptive actions in CM Alerts
 - ISO14224 Equipment breakdown (Type, Subunit, Maintainable Item)
 - Failure modes
 - Prescriptive actions (889)

| Asset Classes | Asset Types | Faultdiagnostics | Prescriptive Actions |
|---------------|-------------|------------------|----------------------|
| 14 | 75 | 553 | 889 |

| | | Content Packages | | | |
|---------------------|--|------------------|---------------------|-----------------------|---------------------|
| Asset Class | Asset Type | Asset Library | Asset Library - O&G | Asset Library - Power | Asset library - MMM |
| Blowers and Fans | Blower | x | x | x | x |
| Compressors | Compressors - Centrifugal | x | x | x | x |
| Compressors | Compressors - Reciprocating | | x | | |
| Compressors | Compressors - Screw | | x | | |
| Electric generators | Electric generators | | | x | |
| Electric generators | Electric generators - Gas-turbine driven | | | x | |
| Electric Motors | Electric Motors - Alternating Current | x | x | x | x |
| Gas Turbines | Gas Turbines - Aero-derivative | | | x | |
| Gas Turbines | Gas Turbines - Industrial | | | x | |
| Heaters and boiler | Heaters and boilers - HC-fired Boiler | | x | | |
| Heaters and boiler | Heaters and boilers - Indirect HC-fired Heater | | x | | |
| Heat exchangers | Heat exchangers - Air Cooled | | x | | |
| Heat exchangers | Heat exchangers - Plate Fin | | x | | |
| Heat exchangers | Heat exchangers - Rotary | | x | | |
| Heat exchangers | Heat exchangers - Shell and Tube | | x | | |
| Mills | Mills - Tube Ball Mill | | | | x |
| Mills | Mills - Vertical Spindle | | | | x |
| Steam Turbines | Steam Turbines - Multi-stage | | x | | |
| Pressure vessels | Pressure vessels - De-aerator | | x | | |

4.1 Detailed results

 Preventive maintenance

 Corrective maintenance

Average # actions per year

| Strategy | Supplier based | Criticality | Optimized |
|------------------------|----------------|-------------|------------|
| Inspection | 43 | 45 | 46 |
| Work out of inspection | 7 | 9 | 10 |
| Corrective | 40 | 39 | 39 |
| Preventive replacement | 12 | 7 | 7 |
| Total | 102 | 100 | 102 |

Average costs per year (€)

| Strategy | Supplier based | Criticality | Optimized |
|------------------------|----------------|----------------|----------------|
| Inspection | 16.257 | 9.363 | 9.768 |
| Work out of inspection | 32.331 | 48.618 | 45.662 |
| Corrective | 48.670 | 42.690 | 42.622 |
| Preventive replacement | 8.785 | 7.686 | 7.687 |
| Total | 116.042 | 108.357 | 105.738 |

| Strategy | Total Downtime (hr) | Average Duration (hr) | No. of Maint. Actions | Average No. of Maintenance Actions | Total Unavailability (%) |
|----------|---------------------|-----------------------|-----------------------|------------------------------------|------------------------------|
| FBM | 4,196.82 | 167.87 | 566.68 | 22.67 | 1,916 |
| | 4,196.82 | 167.87 | 566.68 | 22.67 | 1,916 = 98.08 % Availability |

Supplier based maintenance

| Strategy | Total Downtime (hr) | Average Duration (hr) | No. of Maint. Actions | Average No. of Maintenance Actions | Total Unavailability (%) |
|----------|---------------------|-----------------------|-----------------------|------------------------------------|------------------------------|
| FBM | 3,095.90 | 123.84 | 518.90 | 20.76 | 1,414 |
| | 3,095.90 | 123.84 | 518.90 | 20.76 | 1,414 = 98.59 % Availability |

Optimized maintenance for availability

Applying Life Cycle Costing

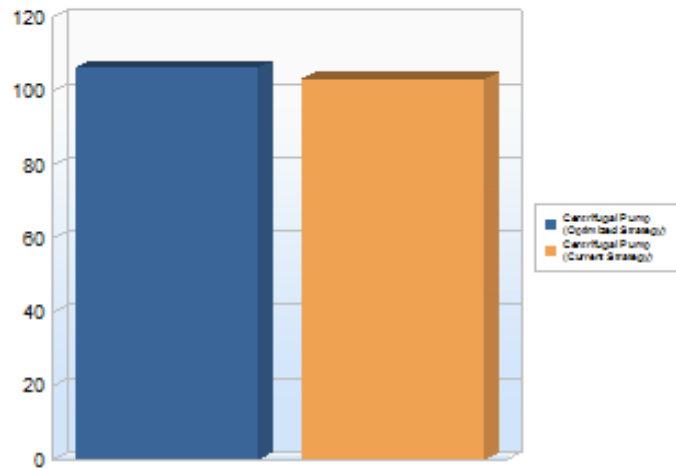
AVEVA

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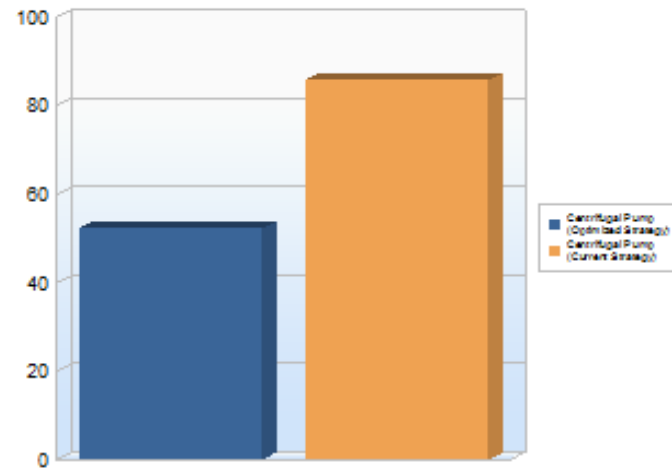
Totals

Object Name: B0242001 - J-9002A CENTRIFUGAL PUMP

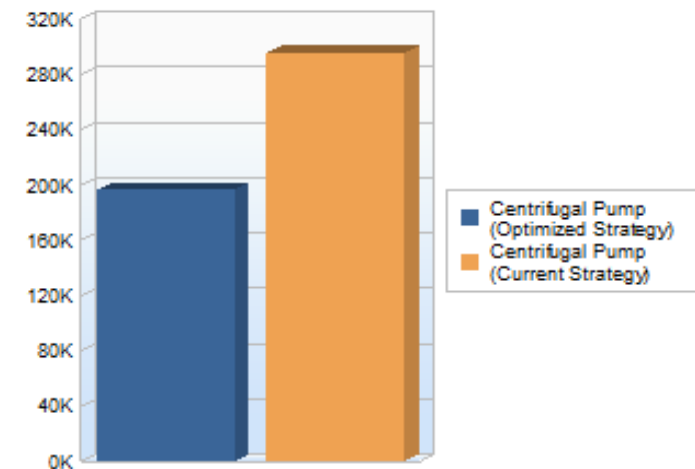
Maintenance Duration



No. of Maint. Actions



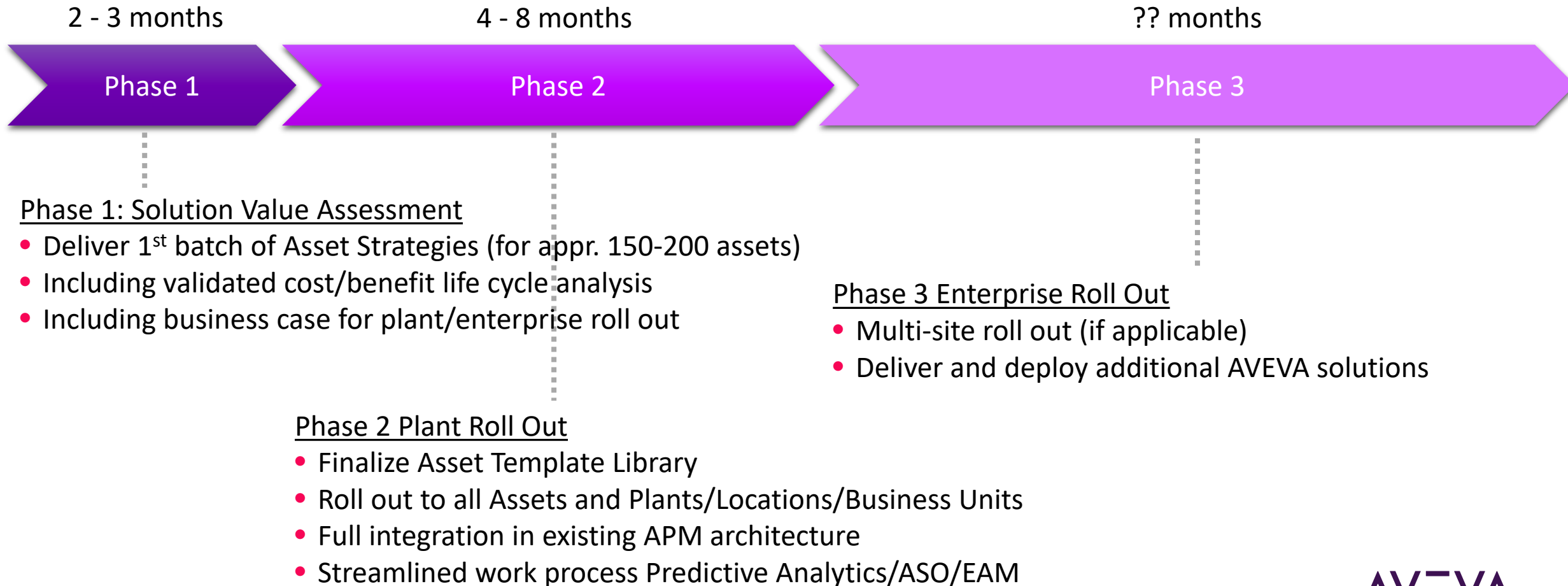
Costs



| Scenario | Total (hr) Duration | Total No. of Maint. | Maintenance Costs | Production Loss | Total costs | Total NPV Costs |
|---------------------------------------|---------------------|---------------------|-------------------|-----------------|-------------|-----------------|
| Centrifugal Pump (Optimized Strategy) | 106.27 | 52.27 | 73,908.47 | 122,711.86 | 196,620.34 | 196,620.34 |
| Centrifugal Pump (Current Strategy) | 103.13 | 85.83 | 35,645.80 | 259,750.00 | 295,395.80 | 295,395.80 |

Best practice approach to deliver value

Fully supported roadmap, maximum flexibility



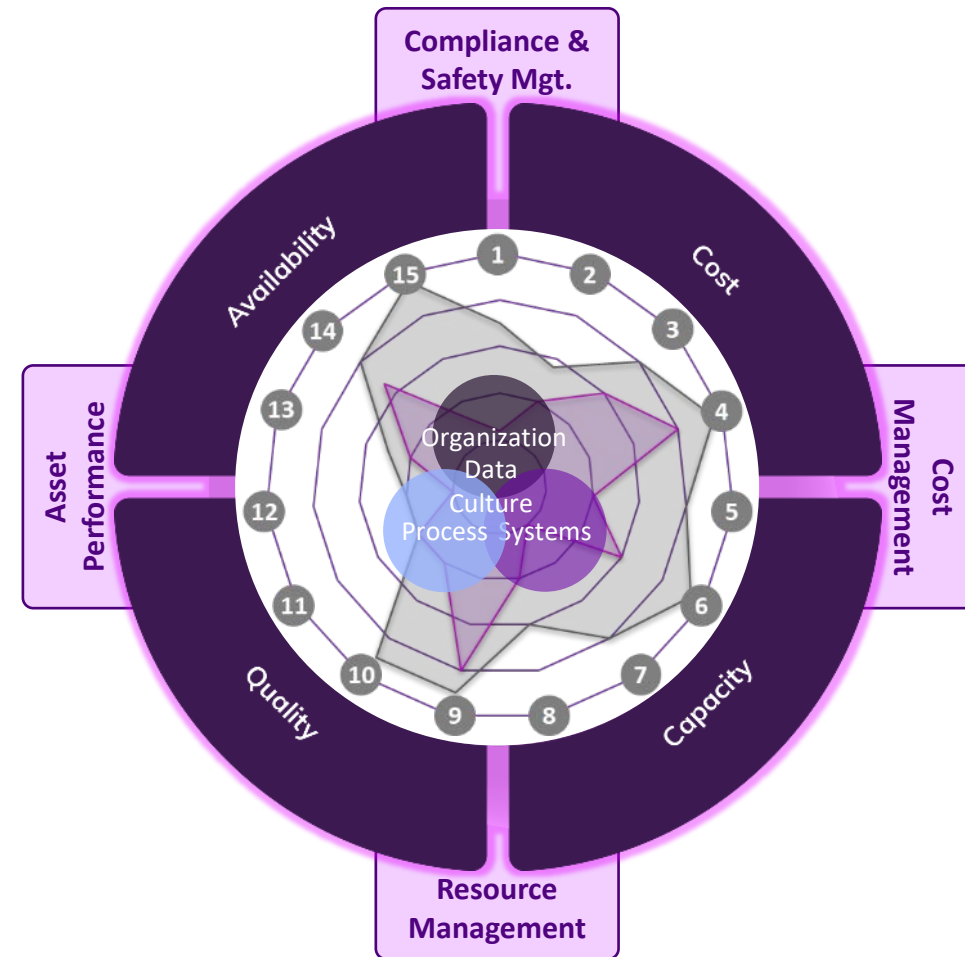


Maintenance &
Operations

The APM Framework

How to achieve APM excellence

1. Business Objectives Realization
2. Resource Strategies
3. Asset Compliance & Scenario Planning
4. Budget & Cost Control
5. Work intake & Prioritization
6. Scheduling & Work Preparation
7. Work Execution
8. Work close-out & Reporting
9. Work Evaluation
10. Asset Integrity, Data- & Systems handling
11. Asset Portfolio Management
12. Reliability Engineering
13. Predictive Analytics
14. Asset Engineering, MOC & Early Management
15. Sustainability & Energy Management

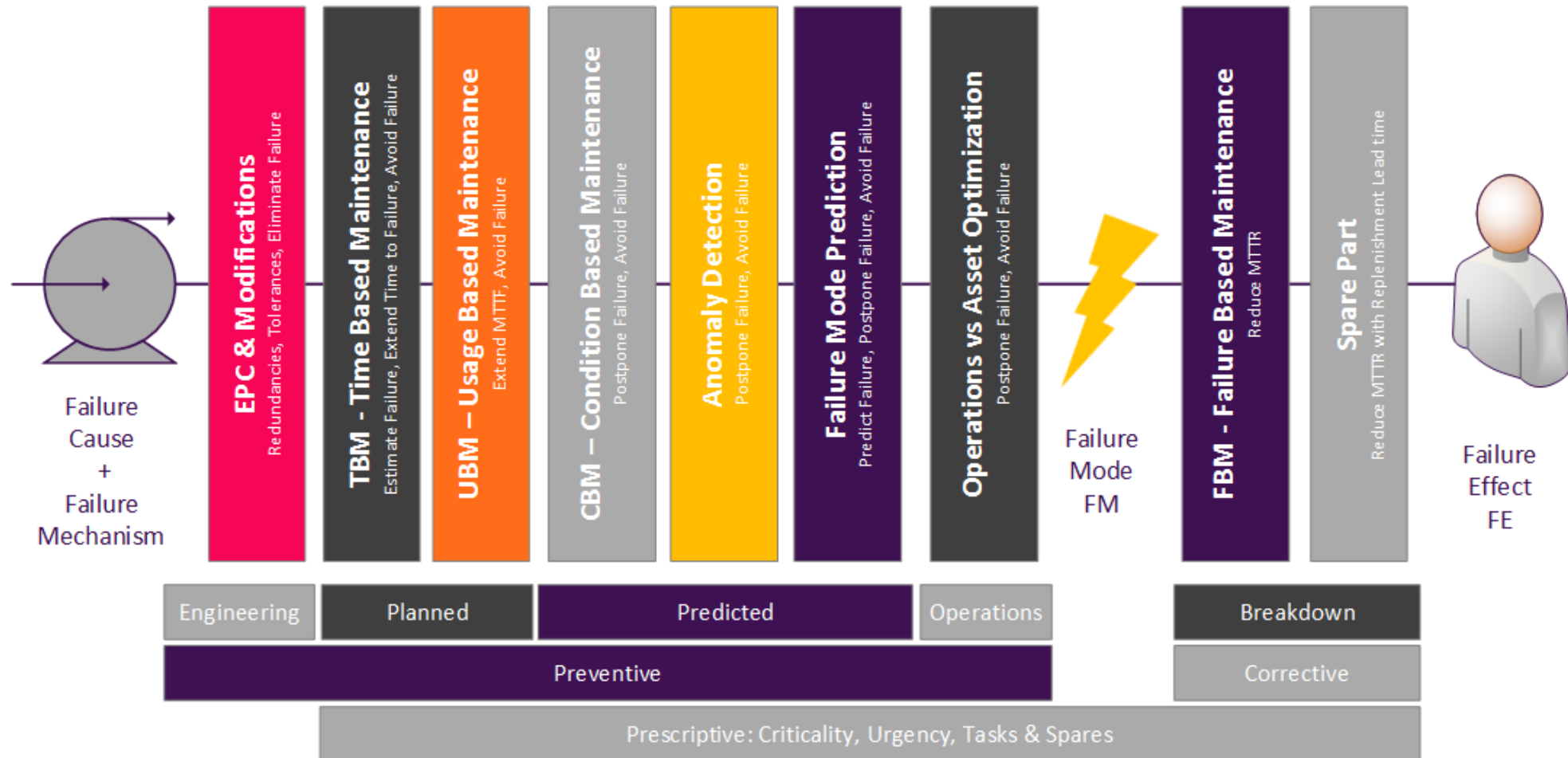



Basic Asset Condition


AVEVA

Asset Strategy Optimization

Preventive vs Corrective Strategies that mitigate Failures to an acceptable level



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ABOUT AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries.

The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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Accelerating digital transformation of the industrial world with complementary product offerings

