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DIGITALLY OPTIMIZED ASSETS IMPROVE SAFETY, INCREASE RELIABILITY AND OPTIMIZE COST PERFORMANCE

Global
Asset Care

AGENDA

About Global Asset Care

Project & Program Management

- Program Management / PMO
- Roadmap
- Project development
- Project Execution / Deployment
- Sustainment

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Digital Projects Experience

- Asset Information Management
- Connected Worker
- Asset Performance Management
  - Asset Strategy
  - Predictive Maintenance
  - Mechanical Integrity

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Asset Performance Management

- Business Process Simplification & Standarization.
- Technology selection
- Integration with SAP/ Maximo and Operation Technologies
- Data Management
- People
- Change Management
- Adoption

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Digital Transformation

- Program / portfolio Management
- Gap Assessment
- Requirement Assessment
- Digitalization Roadmap
- Benefits Models
- Sustainmet

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Mechanical Integrity Program

- Pressure Equipment Integrity Program
- Thickness Monitoring
- RBI Programs
- Migrate Mechanical Intigrity programs into any APM application.

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Reliability Improvement

- Gap Assessment, Gap Closure Plan
- Develop reliability process, standards, guidelines
- Asset Criticality Assessment
- Asset Strategy Development
- Asset Strategy Implementation
- Predictive Maintenance Model Development
- Library: Asset Strategy, Maintenance Procedures and Maintenance Check Sheet

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Global Asset Care (GAC) is an independent "**Maintenance, Reliability, Asset Performance Management (APM)and System Integration**" consulting company based in Calgary, Alberta, Canada. We bring firsthand expertise gained through working at operating company.

SECTION – I

DIGITAL TRANSFORMATIONS
OPERATIONS, MAINTENANCE & RELIABILITY

DIGITAL TRANSFORMATION

Digital transformation is a process in which companies implement technologies across their businesses to drive fundamental changes.

Benefits
- Elevating our assets & people (creating an engaging, productive workforce)
- Improving business agility
- Creating efficiencies, improvements, and capabilities that were never imaginable or possible before.
- Unlocking of new value for employees, customers and shareholders.
- Creating data driven values

Capabilities required

Today, most of employees working in the operation, maintenance and engineering/reliability lack the digital capabilities that are needed to make effective decisions to fully optimize asset performance.

A consistent approach is required to make data driven decisions by:
- building personnel competencies,
- applying all standards & business processes,
- providing access to right technology/tools and
- accurate data on-time

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PLANT OF THE FUTURE

Asset Information Management

Helps employees understand their assets with efficient access to all technical data required to operate and maintain assets. Real-time accessibility to accurate, comprehensive asset information powers decision-making across the enterprise.

Asset Performance Management

Focus on optimizing operational assets essential to the operation. It comprises a set of methods, processes, tools and technologies that aim at reducing unplanned repair work, increasing asset availability, minimizing maintenance costs and reducing the risk of failure for critical assets

Advanced Capabilities

- Incorporating advanced analytics models and data to identify and discover new ways of providing business value and solving problems
- Advanced inspection technologies enhance safety, accuracy of inspection
- Incorporating Advanced Process Control (APC) to optimize production yield.

Connected Worker

Field workers will have the digital tools required to access the information they need, where they need it, and the ability to share information from the field with others in any places in real time.

Connected Worker initiatives promote live data capture, support real time decisions in the field, and improves collaboration & learning from anywhere.

Production Optimization

- Improved data sharing and transparency between sites for more informed production decisions
- Integrated maintenance and production planning drives proactive inventory optimization of equipment

Enabling Technologies Programs

- Shared infrastructure (including cloud infrastructure)
- Cybersecurity strategies.
- OT Connectivity

Net-Zero Emissions

Enhance Net-Zero Emissions journey through digitalization advanced technologies.

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DIGITALLY OPTIMIZED OPERATIONS, MAINTENANCE & RELIABILITY

The 'Digitally Optimized Operations, Maintenance & Reliability program can enable employees to improve personal and process safety, increase reliability and optimize cost performance of our assets.

By transforming the workforce with new competencies, and introducing new (business) processes, technology / tools, the program can provide people with the reliable data that they need. With that, most value of the existing assets in terms of cost, reliability, and production can be achieved.

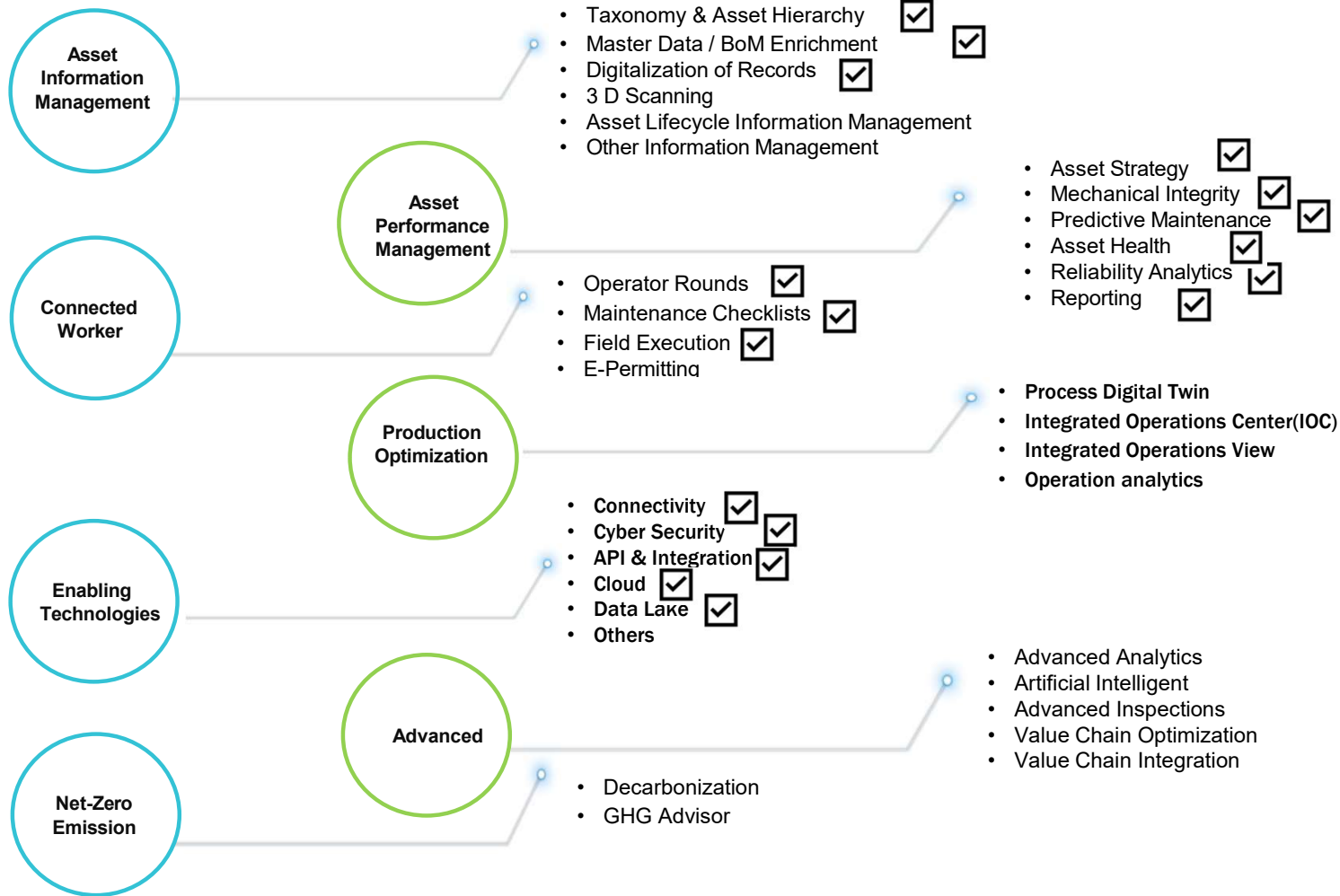# DIGITAL TRANSFORMATION FOCUS ON PROCESS, TECHNOLOGY, DATA & PEOPLE

The success of the digital program depends on how an organization adopts Process, Technology, Data and engages their People.

Key Changes to address

- **Business Process**
  - Simplify & standardize 'one business process' for all users.
  - Use standardized libraries (e.g., maintenance, inspection strategy libraries)
  - Standardize stewarding & benchmarking

- **Technology**
  - Right technology/ tool
  - 'One tool' for all users. Also, focus on 'out-of-box (no customization)' solution.
  - Integrate with ERP application (e.g., SAP) where it makes sense
  - Mobile capabilities enablement (e.g., Cell Phone & iPad, other tablets).

- **Data**
  - Cleanse data before migration. Only good quality data that are used for data-driven decisions.

- **People**
  - A comprehensive change management plan to transform the workforce to meet the needs of the future

DIGITAL TRANSFORMATIONS PRIORITY PROJECTS

Asset Information Management

- Taxonomy & Asset Hierarchy ☑
- Master Data / BoM Enrichment ☑
- Digitalization of Records ☑
- 3 D Scanning
- Asset Lifecycle Information Management
- Other Information Management

Asset Performance Management

- Asset Strategy ☑
- Mechanical Integrity ☑ ☑
- Predictive Maintenance ☑
- Asset Health ☑
- Reliability Analytics ☑
- Reporting ☑

Connected Worker

- Operator Rounds ☑
- Maintenance Checklists ☑
- Field Execution ☑
- E-Permitting

Production Optimization

- **Process Digital Twin**
- **Integrated Operations Center(IOC)**
- **Integrated Operations View**
- **Operation analytics**

Enabling Technologies

- **Connectivity** ☑
- **Cyber Security** ☑
- **API & Integration** ☑
- **Cloud** ☑
- **Data Lake** ☑
- **Others**

Advanced

- Advanced Analytics
- Artificial Intelligent
- Advanced Inspections
- Value Chain Optimization
- Value Chain Integration

Net-Zero Emission

- Decarbonization
- GHG Advisor

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ASSET INFORMATION MANAGEMENT

The asset information digitalization journey seeks to **standardize and modernize how we manage and access 'asset information'** content across the enterprise. The focus is on empowering our people to drive greater value from our asset information by providing simplified processes, tools, and technology to allow them to make decisions faster.

Benefits of Asset Information Management

- Enable trust in asset information and engineering records through a single source of truth
- Empower our people in their interactions with asset information to optimize performance and manage risks
- Build foundation of asset information that can be used to enable data-driven decision-making and digital tools (e.g. 3D models and digital field solutions)
- Enable additional efficiency and optimization of performance through standardized tools, access, capabilities and user-experience

ASSET INFORMATION MANAGEMENT

☑ **Taxonomy & Asset Hierarchy- ISO 14224**

Adopting ISO 14224 as the standard for asset hierarchy is foundational for accurate maintenance planning, faster failure root cause analysis, and improved cost tracking. Effectiveness of Asset Strategy Library and Reliability Analytics depends on it.

☑ **Master Data / BoM Enrichment**

Enrichment will improve the quality, accuracy, and completeness of maintenance & reliability (Asset Performance)

☑ **Digitalization of Records**

Converting paper-bound maintenance and inspection data, history into digital records and collecting on-going history/ data in digital format enhance digital capabilities such as reliability analytics, reliability improvement.

3 D Scanning

Allow users to view facility areas without needing to be physically present. This facilities work job planning identifying hazards, corrosion points, training etc.

Asset Lifecycle Information management (ALIM)

Establish singular suite of solutions for record management and source of truth for records / documents

Asset Class Library (ACL)

Establish digital source of truth for asset information (documents and data) rules and requirements for turnover

Asset Data Warehouse-Asset Information Viewer

Establish system to extract, transform, and view data from documents and tools

Engineering Design Tool (EDT)

Establish digital tools for creation of asset information data (i.e. 3D model, instrument, electrical, and mechanical data sheets)

Piping Material Specification Management (PMSM)

Establish singular system and source of truth for managing piping and valve specification and components database

CONNECTED WORKER

Connected Worker enable field workers with digital tools that they require to access the information they need, where they need it, and the ability to share information from the field with others in real-time.

Operator Rounds & Maintenance Check Sheets

Digitally capture operator rounds and maintenance check sheet data to unlock the potential value of information captured by making it accessible to stakeholders

Digital Permitting

Deliver a digital solution for Operational Control of Work activities that improve current risk and hazard management, while also optimizing and engaging our resources and sustaining compliance.

Digital Field Execution / Operations

Access to other elements of work in the field. Digital work package, Asset Manager, Dynamic Scheduling

Expert Assist and Virtual Trainer

Collaboration, communication and troubleshooting tools, such as video libraries and and knowledge hubs

Benefits

- Enhanced safety

- Increased efficiency and productivity of work executed in the field

- Increase communication

- Improve work planning, scheduling, execution, history capturing

- Real-time access to data and information

- Improve analytics capabilities

- Greater employee engagement and collaboration across locations and disciplines

- All these contribute to profitability

PRODUCTION OPTIMIZATION

The **Production Optimization** utilizes digital capabilities and analytics that maximize production performance. **The focus is** providing operations employees a digital process model of a physical asset.

Process Digital Twin

Real-time virtual process representation of a unit. Advanced process monitoring, process fault detection and real-time optimization.

Value Chain Optimization

To optimize scheduling and economics to maximize profitability at each site.

Improve scheduling and commercial optimization through a harmonized Linear Programming tool

Value Chain Integration

To improve the interaction between on-site planning and corporate value chain optimization teams to improve margin and maximize profitability

Operations Analytics

To leverage analytics to improve the planning and economic optimization across each unit to improve margin capture and throughput
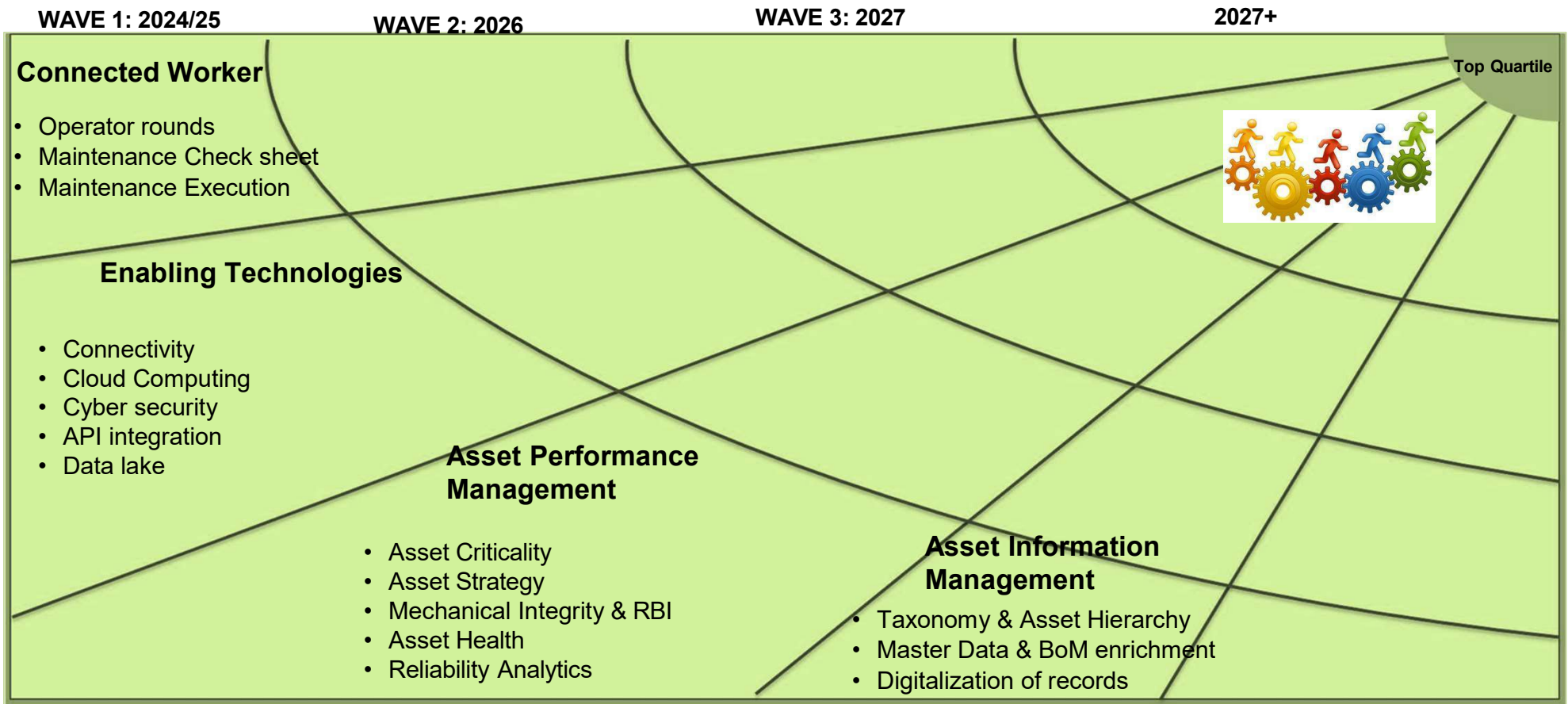
Process Engineer Integrated View

Provide a single dashboard location from which all Process Engineering models, trends and unit performance monitoring tools can be accessed.

Integrated Command Center-IOC

Centralized decision making across assets, business processes, time horizons and geographies

DIGITAL PROJECT ROADMAP

SECTION – II

ASSET PERFORMANCE MANAGEMENT (APM)

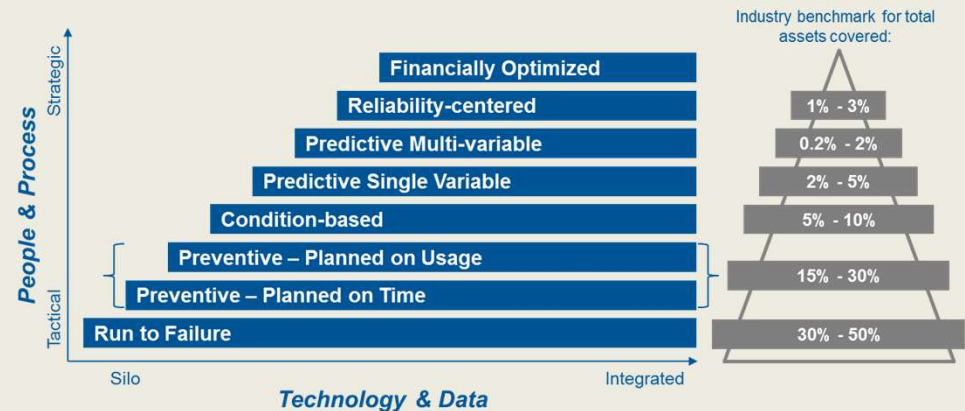# ASSET PERFORMANCE MANAGEMENT- MAINTENANCE & RELIABILITY

Asset Performance Management (APM) seeks to strengthen reliability culture across the enterprise. The focus is on empowering people to drive greater value from their interactions with assets by providing processes, tools, and technology. The goal is to improve asset reliability, minimize downtime, and decrease maintenance costs.

Asset Performance aims to dive best in class maintenance performance through improving reliability & availability of our assets.

- **Increase safety**: proactive maintenance identifies and address potential hazards
- **Increase asset reliability** across the enterprise
- **Increase availability**: Decrease down time and unplanned outages
- **Optimize maintenance costs and loss of value**
- **Increase lifespan** of assets.
- Strengthen reliability culture and capability throughout the enterprise

By focusing on...
- **Business process:** standardize & simplify business process
- **Technology:** right technology and fully configured to business process.
- **Data & visualization** : Enable decision-making through real-time asset data, consistent reporting and reliability analytics.
- **People**: consistent training/ coaching to APM methodologies

ASSET PERFORMANCE MANAGEMENT- MAINTENANCE & RELIABILITY

☑ **Asset Strategy**

Develop asset strategy to improve reliability and availability of our assets using APM application. Enabling standardized asset strategy program to foster cultural change from reactive to proactive maintenance. This will reduce the maintenance budget, progressing our journey to First Quartile Maintenance organization.

☑ **Mechanical Integrity**

Develop comprehensive mechanical integrity solution to reduce risk, lower inspection costs, and ensure regulatory compliance relative to their fixed assets. Integrating with asset strategy and ERP /EAM applications further enhance work execution.

☑ **Predictive Maintenance**

Develop predictive modeling using Big Data, Machine Learning & Advanced Analytics to predict failures to avoid catastrophic losses on mission critical assets (roughly 0.2 to 2% of all assets). This provides sufficient time to analyze & diagnose accurately and determine the best course of actions.

☑ **Asset Health**

Asset Health provides a unified comprehensive view of an asset featuring drill-down views of performance data, alerts, performance KPIs and more. Asset health equips a reliability practitioner necessary info to make a data driven decision.

☑ **M&R Reporting**

Provide a single source of truth that visualizes the maintenance status of the plant to support decision making to achieve proactive maintenance and risk mitigation.

☑ **Reliability Analytics**

Provides a comprehensive set of analytical tools to help better understand causes of asset failure patterns and the true cost of failure.

Understanding the historical costs, failure frequencies, and trends of production assets in a critical component of any asset performance management program.

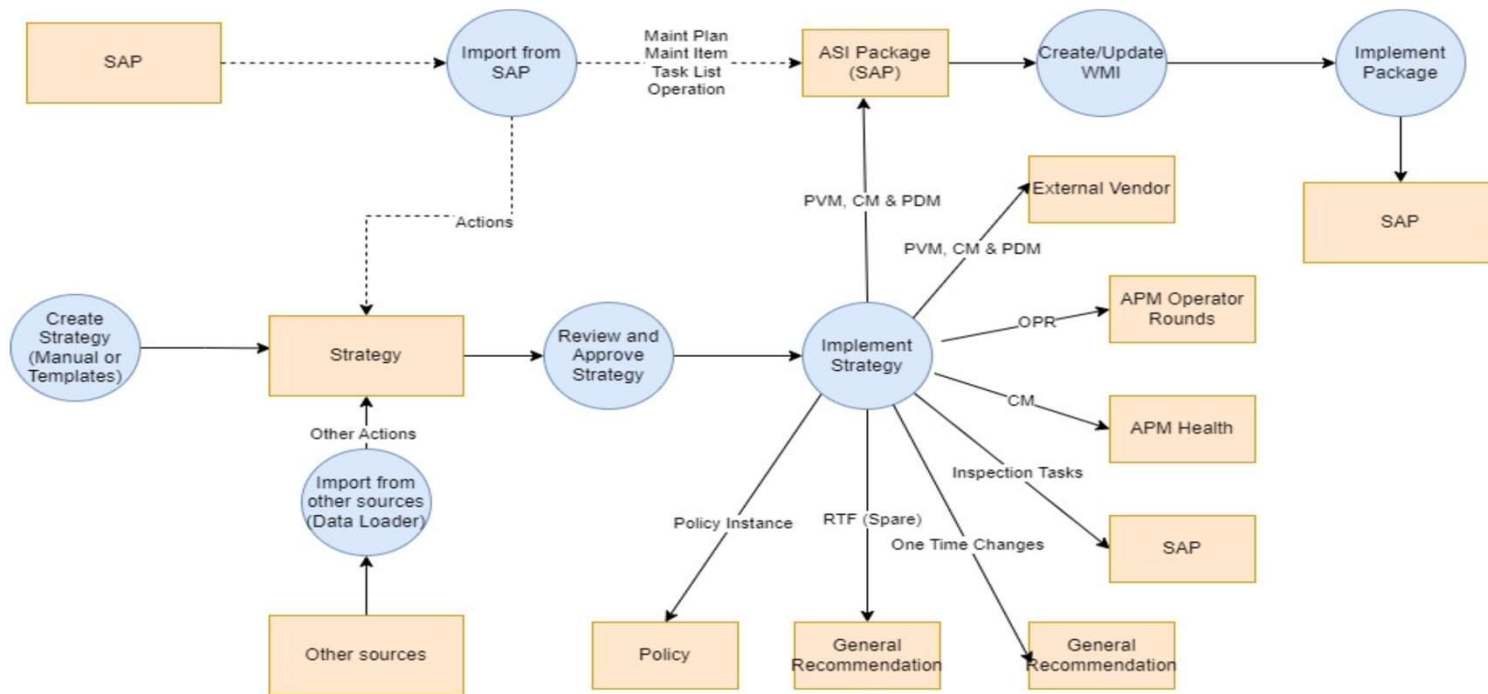# SECTION – III

INNOVATION IN APM
IMPLEMENTATION & OPTIMIZATION

Reliability Lifecycle

PLAN

1. Whats eating our lunch (Assess)
- Work History
- Prod Losses
- Consequences
- Visualization
- Prioritization

6. Business Risks Update
- Asset Overall Health
- Dynamic Risks
- Dashboards

2. Failure Elimination
- Failure Events
- Data Quality
- Rel Analytics

DO

ACT

Path to Operational Excellence ** (Asset Reliability Improvement)

5. Asset Strategy Changes
- Update/Implement Strategy Monitor Collect data

3. P-F Curve
- P-F Curve(FM)
- Intervals to act
- Spares Analysis

CHECK

4. Recommend

Collect all Reliability Recommendations:
- Definitions
- Master data
- Transactional data
- CM/PM data (DL/DW)
- Metrics/KPI's

- Optimize Strategy
- PM Optimize
- RCA

** Aligned to Industry Standards

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Strategy Implementation Workflow

Q & A

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