



Instrumentation and Predictive maintenance in Mining

INTERNATIONAL
CENTER OF
EXCELLENCE

Definition

Smart Asset refers to an asset that exploits digital capacities and infrastructure for enabling data driven decision making processes.

- Seamlessly communicates with third party applications.
- Allows for interoperability.
- Adjust their performances with respect to other assets
- Inform their own performances and health status.

Objective Function Optimization

Adapted from : C.B.H. Nel and J.L. Jooste, *A technologically-driven asset management approach to managing physical assets - a literature review and research agenda for 'smart' asset management*. S. Afr. J. Ind. Eng. vol.27 n.4 Pretoria Dec. 2016. ISSN 2224-7890.

Emerson Plantweb Digital Ecosystem

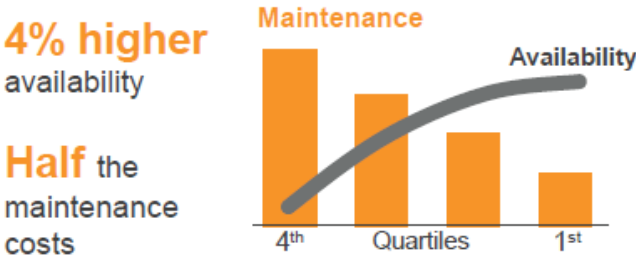


Emerson Enterprise Advisor Suite

Health Advisor (Actual v.s. Baseline)



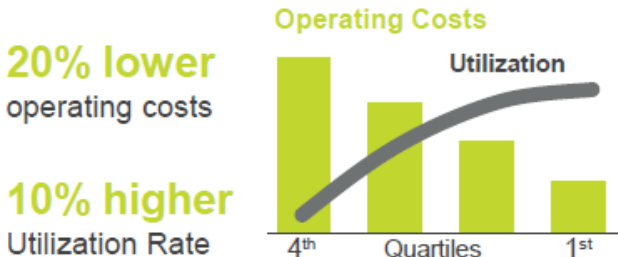
Reliability



Performance (Actual v.s. Nominal)



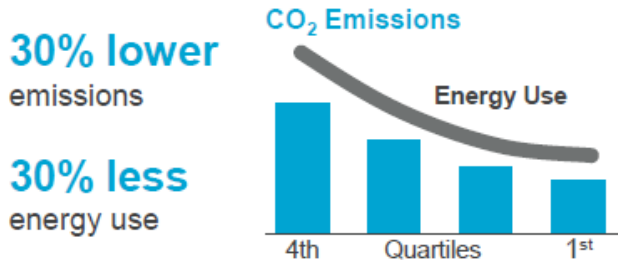
Production



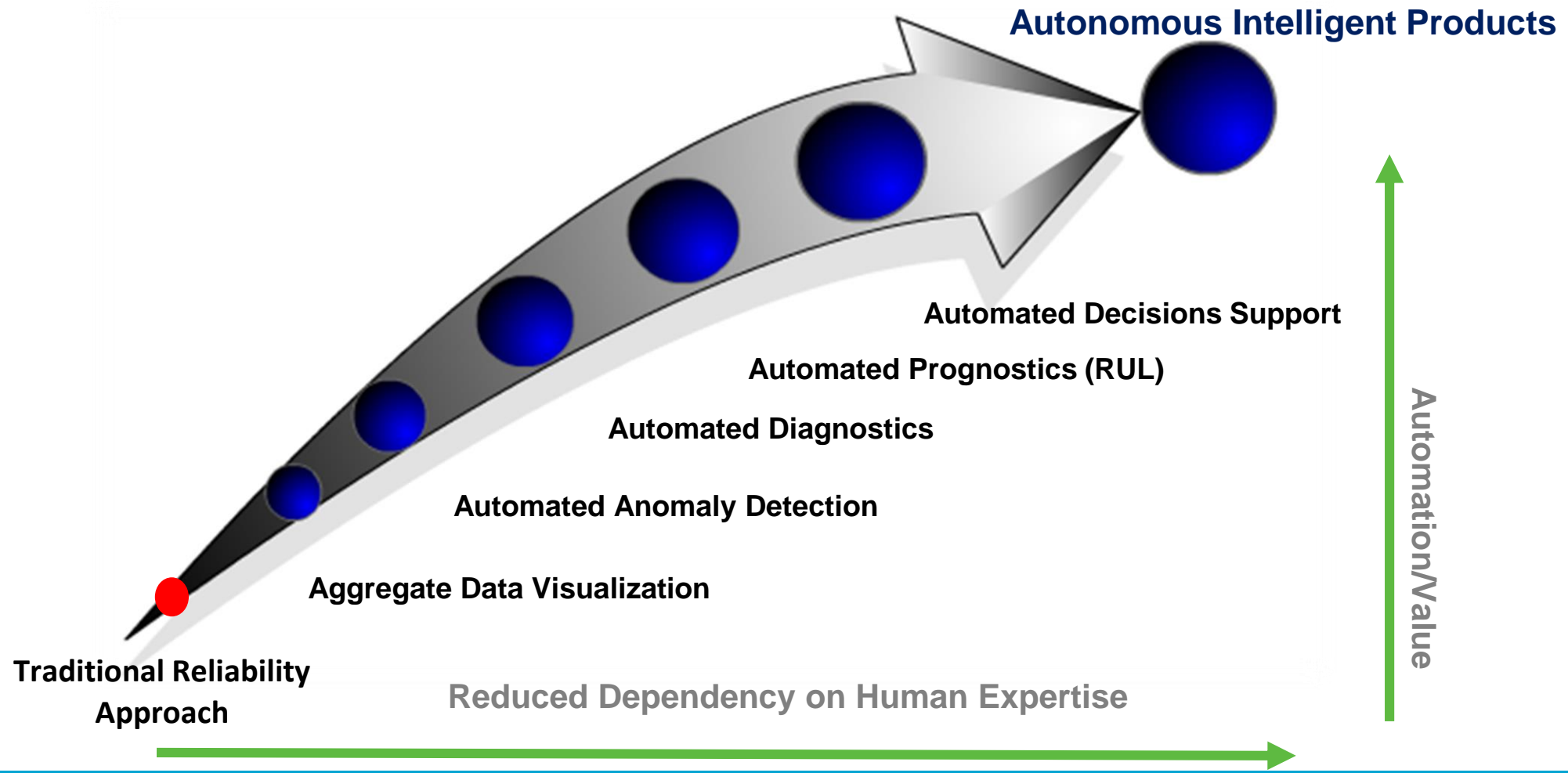
Energy (Actual v.s. Target)



Emissions



Product evolution – based on API 691

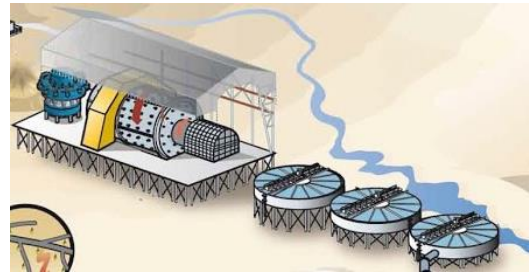
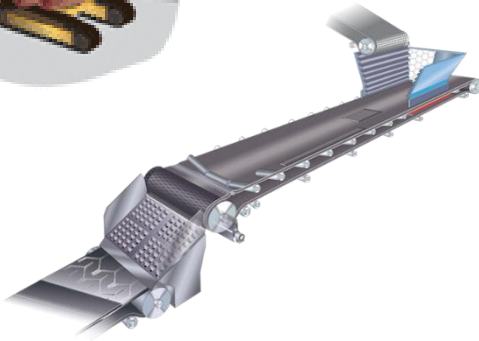


- **Big Data processing along the mining business value chain**
- **Continuous knowledge creation - Adaptive algorithms, Machine Learning**

Emerson Plantweb™ Health Advisor: Mining Equipment

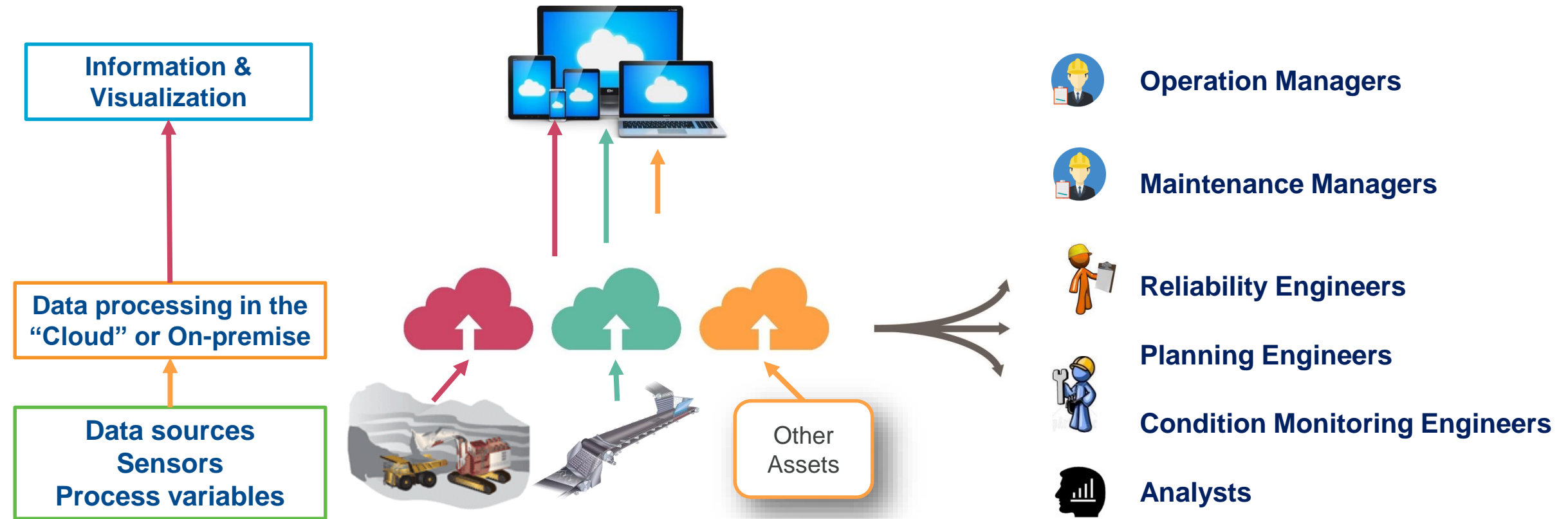
Digital platform and Artificial Intelligence for Mining Assets Reliability Management

On line information to ensure Operational Continuity along the value chain
Move Toward Zero Unplanned Downtime



- **Big Data processing along the mining business value chain**
- **Continuous knowledge creation - Adaptive algorithms, Machine Learning**

Emerson Plantweb™ Health Advisor: Mining Equipment



Open Platform and Artificial Intelligence

- ✓ **Condition based Maintenance**
 - ➔ Critical Assets Maintenance for Operational Continuity
- ✓ **Intelligent Predictive Reliability**
 - ➔ Automated early fault Detection & Identification
- ✓ **Advanced data Analytics/Collaborative Intelligence**
 - ➔ Early fault detection algorithms, Continuous learning reliability

Application

English

User Name

Password

Logout

EMERSON

Health Advisor for Mining

PLANTWEB
advisor



English

PierreUser:Functional User

Logout

EMERSON

Health Advisor for Mining

PLANTWEB
advisor

DASHBOARD

REPORTS

KPIS

HELP

Shovel01

Time Frame

6h

24h

1w

1m

1y

Calendar

EMERSON

> Shovels

PL03

PL07

Shovel01

Shovel01

Systems status

4

1

1

Healthy

Warning

Critical

Health Index

0.00

Fail

0

100

| System | Severity level | Vibration analysis | Temperature analysis | Oil analysis |
|----------|----------------|--------------------|----------------------|--------------|
| Crowd | Critical | Healthy | Critical | Critical |
| Holst | Warning | Healthy | Healthy | Warning |
| Propel01 | Healthy | Healthy | Healthy | Healthy |
| Propel02 | Healthy | Healthy | Healthy | Healthy |
| Swing01 | Healthy | Healthy | Healthy | Healthy |
| Swing02 | Healthy | Healthy | Healthy | Healthy |

English

PierreUser:Functional User

Logout

EMERSON

Health Advisor for Mining

PLANTWEB
advisor

DASHBOARD

REPORTS

KPIS

HELP

EMERSON

Time Frame

6h

24h

1w

1m

1y

Calendar

EMERSON

Asset status

15

7

4

3

Healthy

Warning

Critical

Out of service

Health Index

75.00

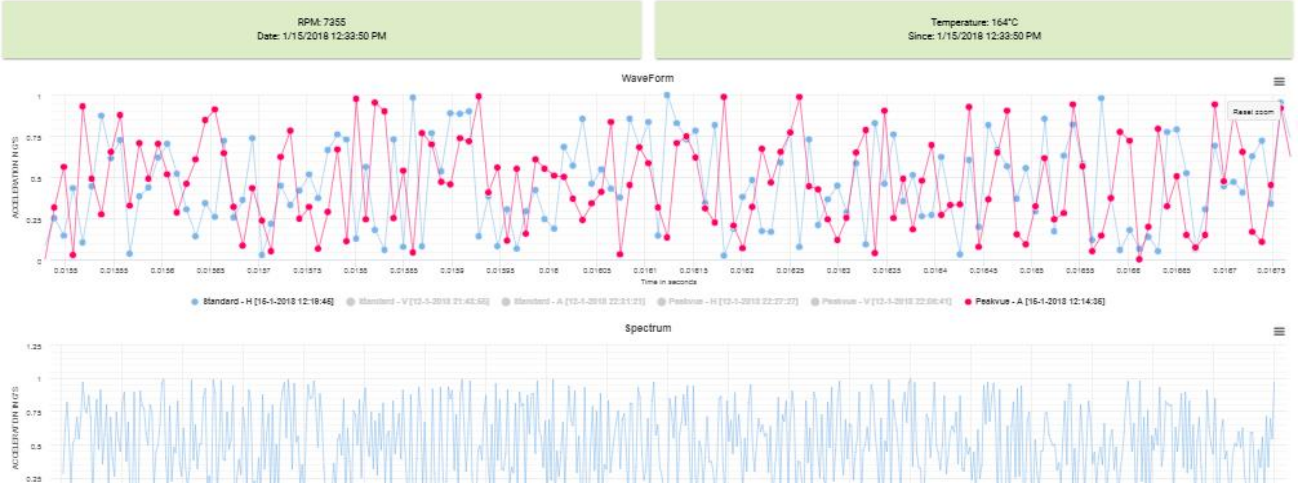
Warning

0

100

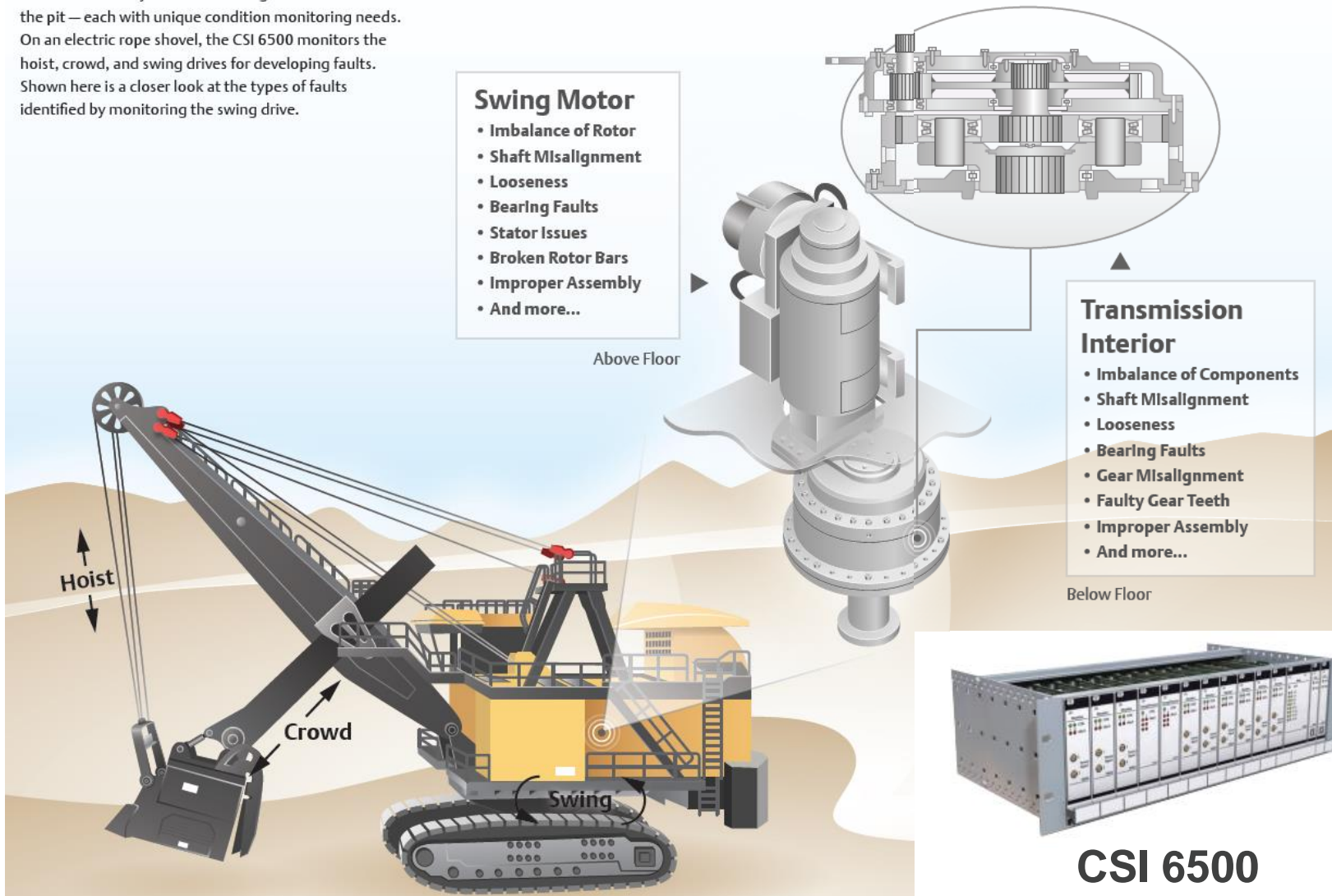
| Plant | Area | Unit | Asset | Type | Health | Alert |
|-------|------|-----------|------------|-----------|--------|-------|
| EMR | Mine | Shovels | Shovel01 | Shovels | 100% | |
| EMR | Mine | Drills | Drill01 | Drills | 80% | |
| EMR | Mine | Shovels | PL03 | Shovels | - | |
| EMR | Mine | Shovels | PL07 | Shovels | - | |
| EMR | Mine | Conveyors | Conveyor01 | Conveyors | - | |

MEASUREMENT POINT 6



Example: Shovels

There are a variety of mobile mining assets available in the pit — each with unique condition monitoring needs. On an electric rope shovel, the CSI 6500 monitors the hoist, crowd, and swing drives for developing faults. Shown here is a closer look at the types of faults identified by monitoring the swing drive.



CSI 6500 for continuous Monitoring

- Crowd System
- Hoist System
- Swing Systems



AMS MHM

- Data Collection (Vibration)
- Data Analysis



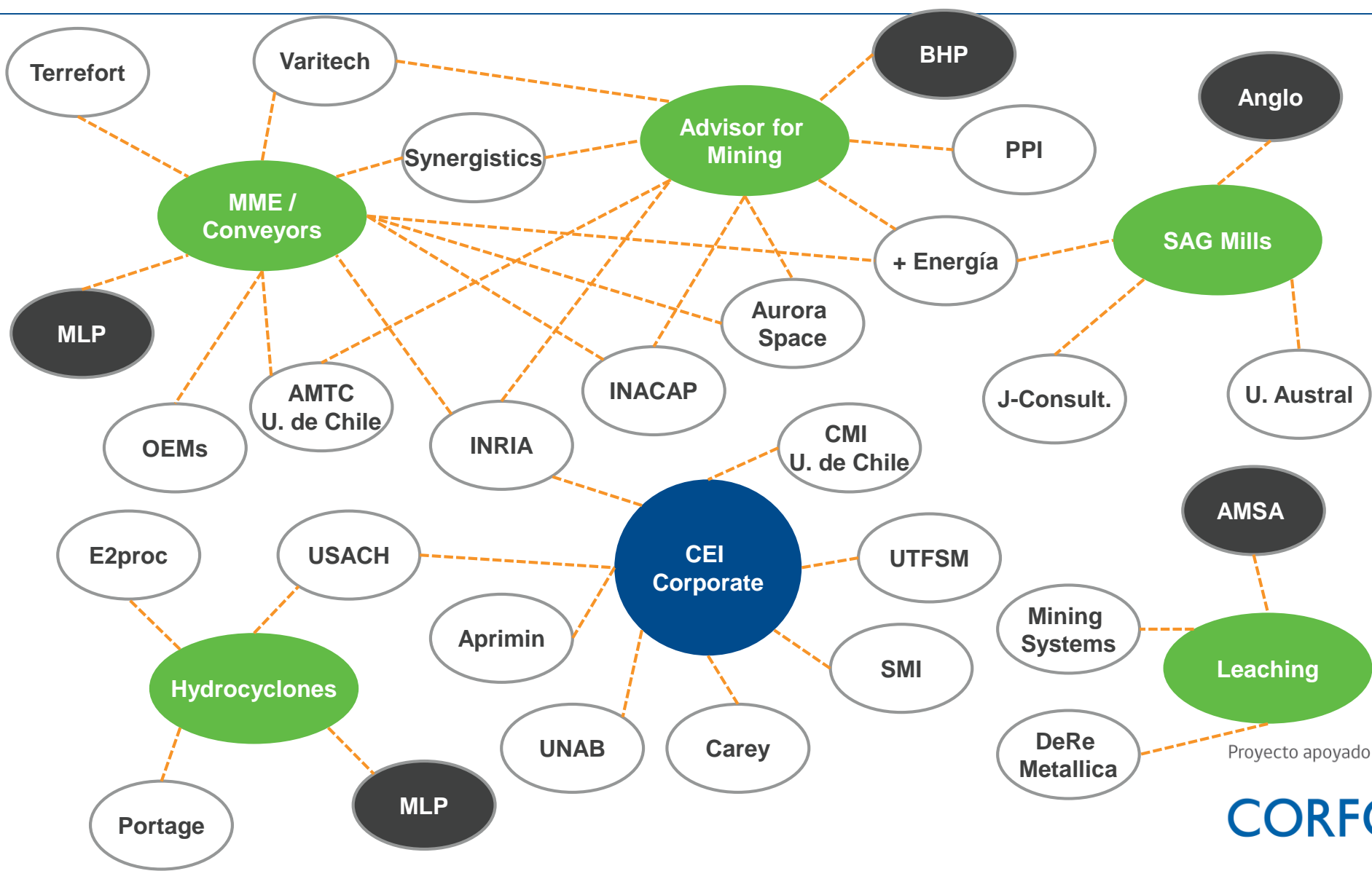
Advisor Mining

- Advanced Predictive Analytics
- Integrated Reliability Information



CSI 6500

Local Ecosystem



Proyecto apoyado por
CORFO

