



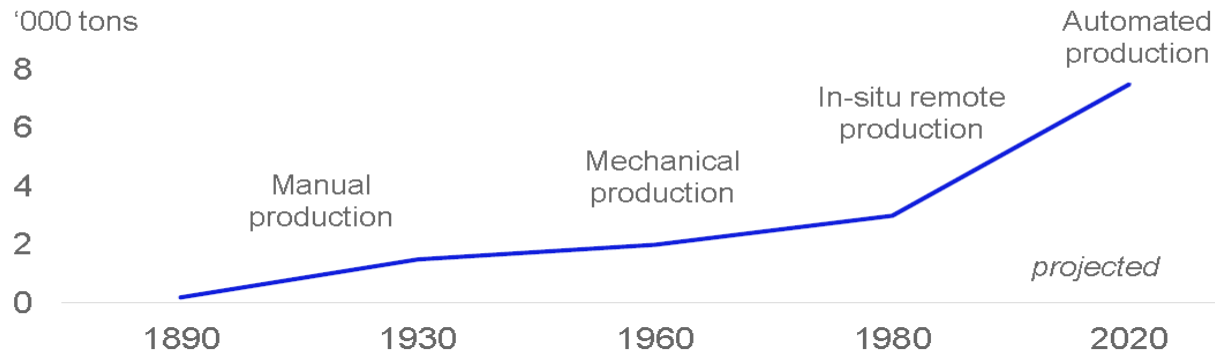
Eduardo Gallestey, Business Unit Process Industries - June 9, 2015

Next level mining Enabling technologies and applications – Part 1

The mining industry today

The main challenge is productivity improvement

Productivity in tons / person / year



Four key mining industry requirements

- Productivity
- Safety
- Environment sustainability
- Reliability

Mechanization

- Standardization of processes
- Mechanization means dramatic shifts in production capabilities
- Operation of equipment still requires human interaction

Automation

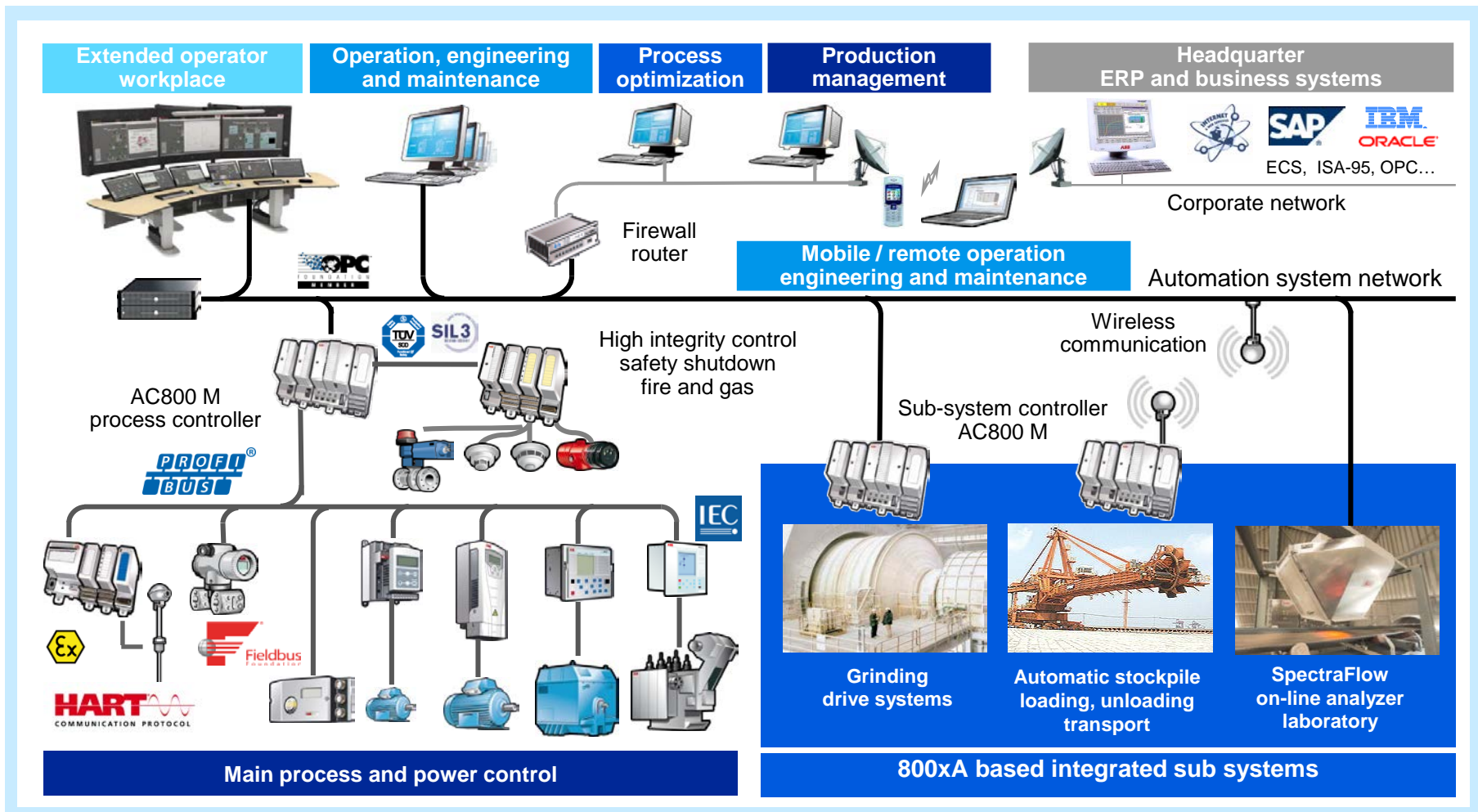
- Integrated modeling and planning for higher quality yield
- Greater visibility into parts of the value chain
- More detailed information coming from equipment and plant to enable remote mining

Optimization

- More responsive demand and supply
- Higher level of automation driven by labor shortages and remote mining locations
- Limiting bottlenecks by adopting more continuous processes
- High levels of visibility across the value chain and between operations

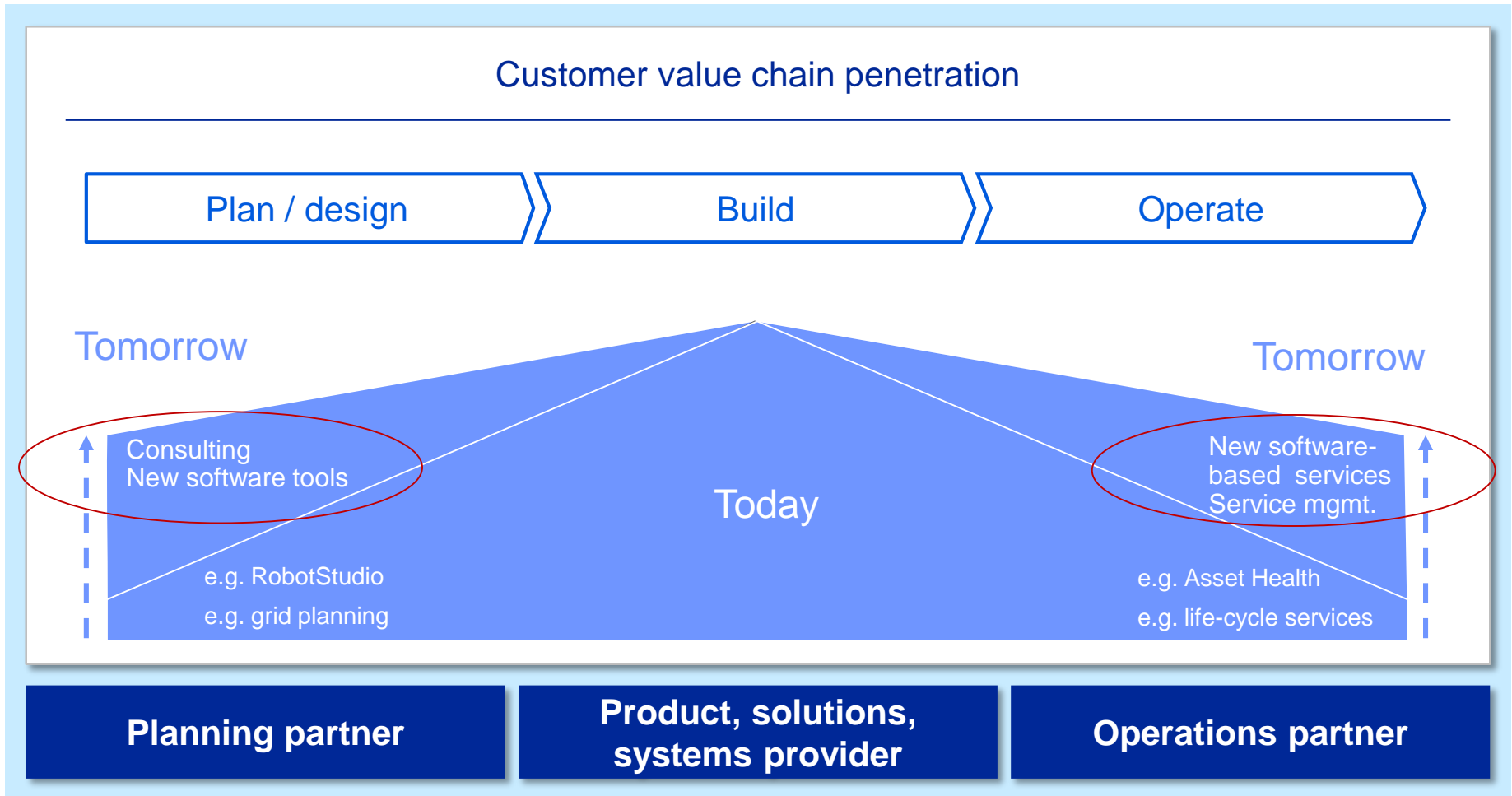
ABB in Mining today

Fostering a one-system approach



Next level mining

Expanding customer value proposition beyond the simple system provider approach



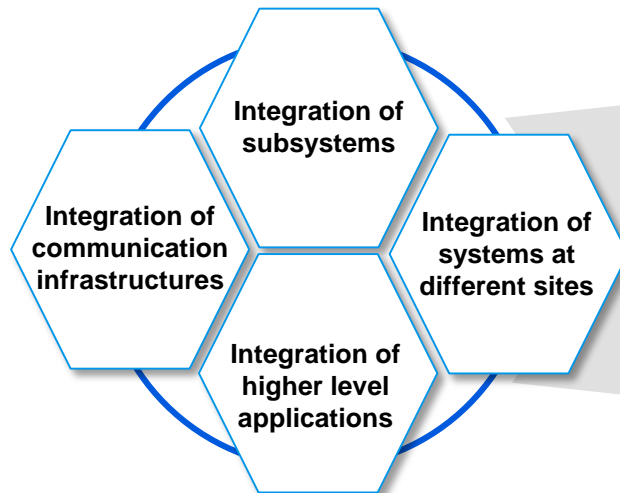
Next Level mining

Through power and automation integration

Integration of equipment, systems and people...

...enabled by technology...

...to get one common view



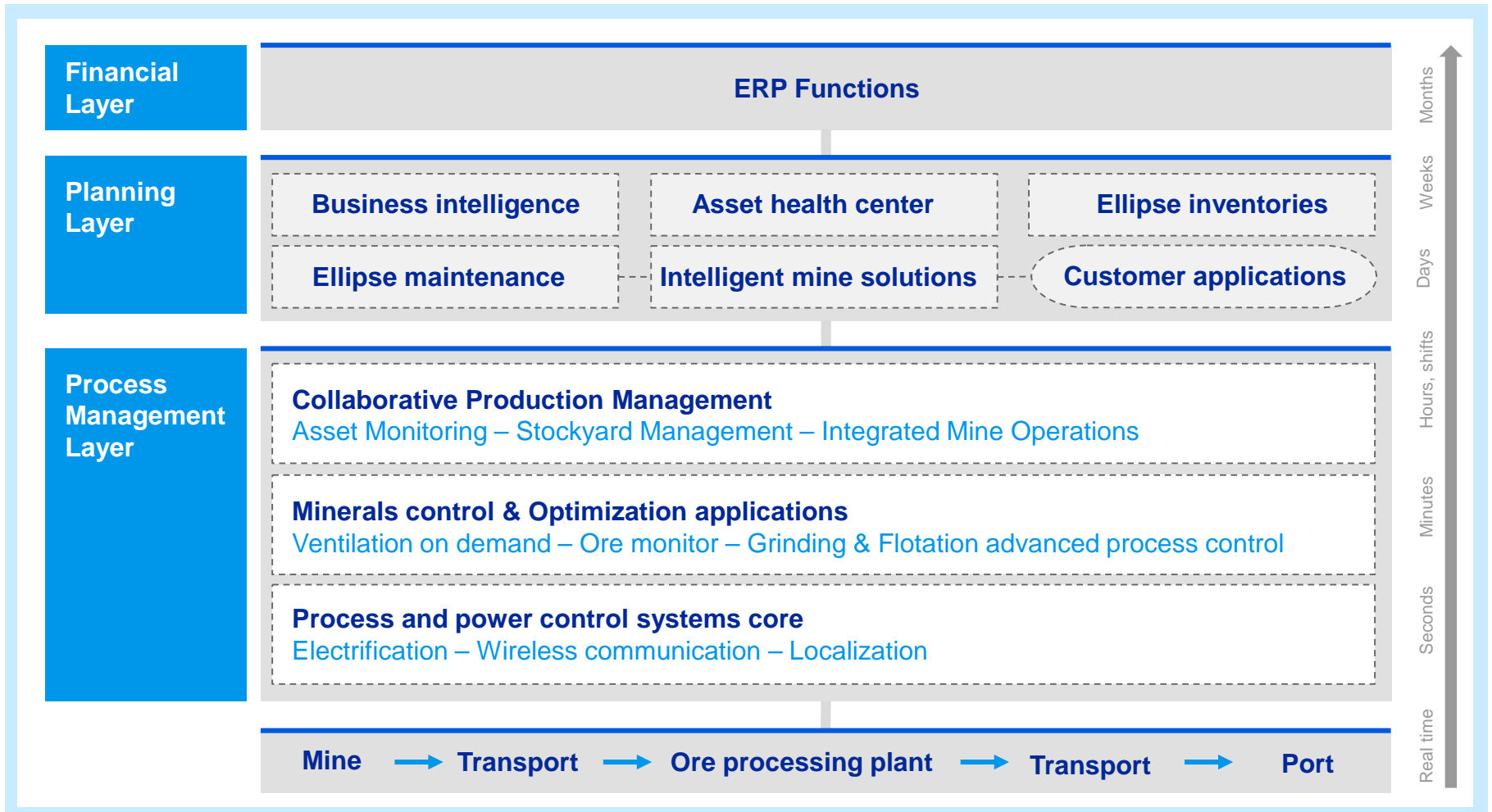
Aspect Objects™

- Object centric information access
- One Click to all information
- Direct navigation from any aspect to the next
- Information filtering based on job role/function
- Real-time decisions and action

- An infrastructure that can represent all the assets
- Embed all applications and systems
- Share information without barriers
- Bring teams together and get the best from all teams
- Empower people to perform their best

ABB in Mining solution suite

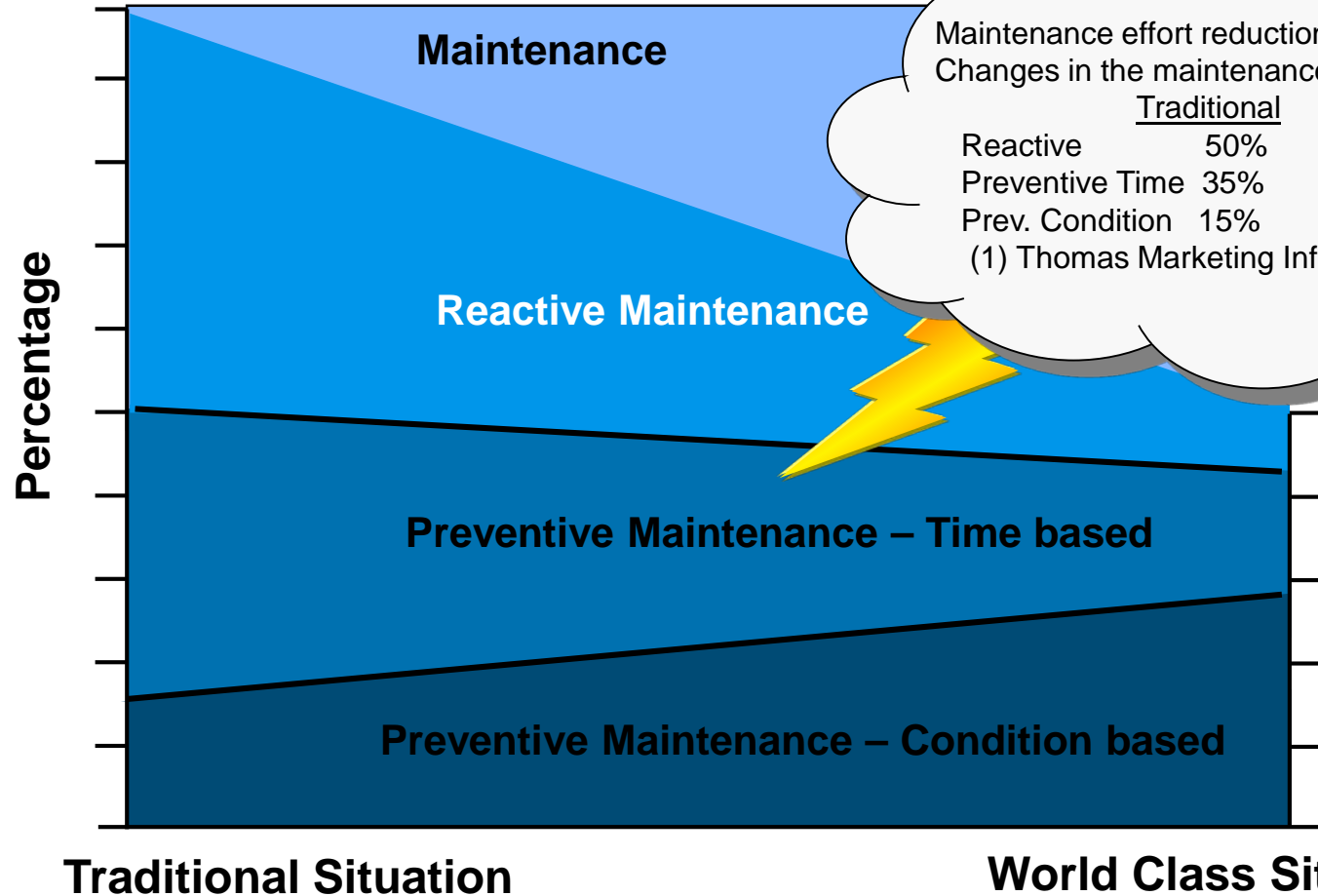
A holistic approach to the entire mine operation



Collaborative Production Management

Collaborative Production Management

Asset optimization, unleashing value towards new maintenance strategies



Collaborative Production Management

Asset Monitors, providing awareness on asset condition in real time

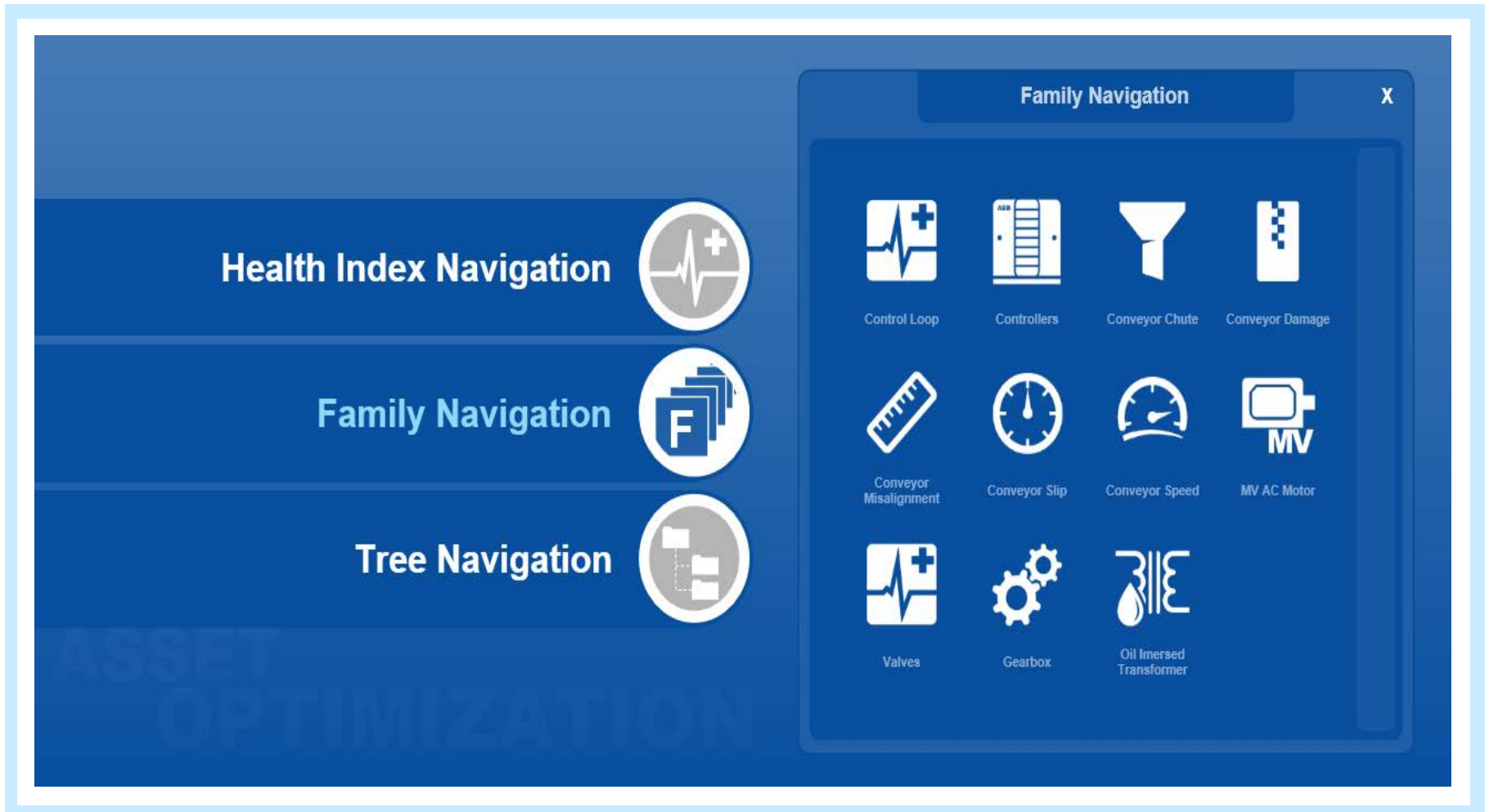
The screenshot displays the 'USWIC-ARGE System // Plant Explorer Workplace' interface. On the left, a tree view shows the control structure with 'Area 20' expanded to show 'Motor 1, Runtime Asset Monitor'. The main window shows a table of 'Aspects of Motor 1' with columns for 'Modified', 'Desc...', 'Inherited', and 'Category name'. Below this, the 'Motor 1 - Runtime Asset Monitor Asset Monitor' window is active, showing 'Asset Monitor Status: good'. A table below lists conditions with columns for 'Severity', 'Condition', 'Sub Condition', 'Description', 'Timestamp', 'Quality Status', and 'Fault Report'. A tooltip is visible over the 'Condition' column, showing 'Condition Details: Runtime Limit Reached', 'Asset Monitor Status', and 'Fault Report Submitter'.

Severity	Condition	Sub Condition	Description	Timestamp	Quality Status	Fault Report
500	Runtime Limit Reached	Yes	RunningTime > 600 hrs.	10/12/2006 3:51:20 PM	good	Available

- Asset Monitor is a software component that monitors and promptly reports one or more conditions of an asset
- Asset Monitors can receive data from multiple OPC data sources including 3rd party
- Asset Optimization (AO) is fully integrated into System 800xA

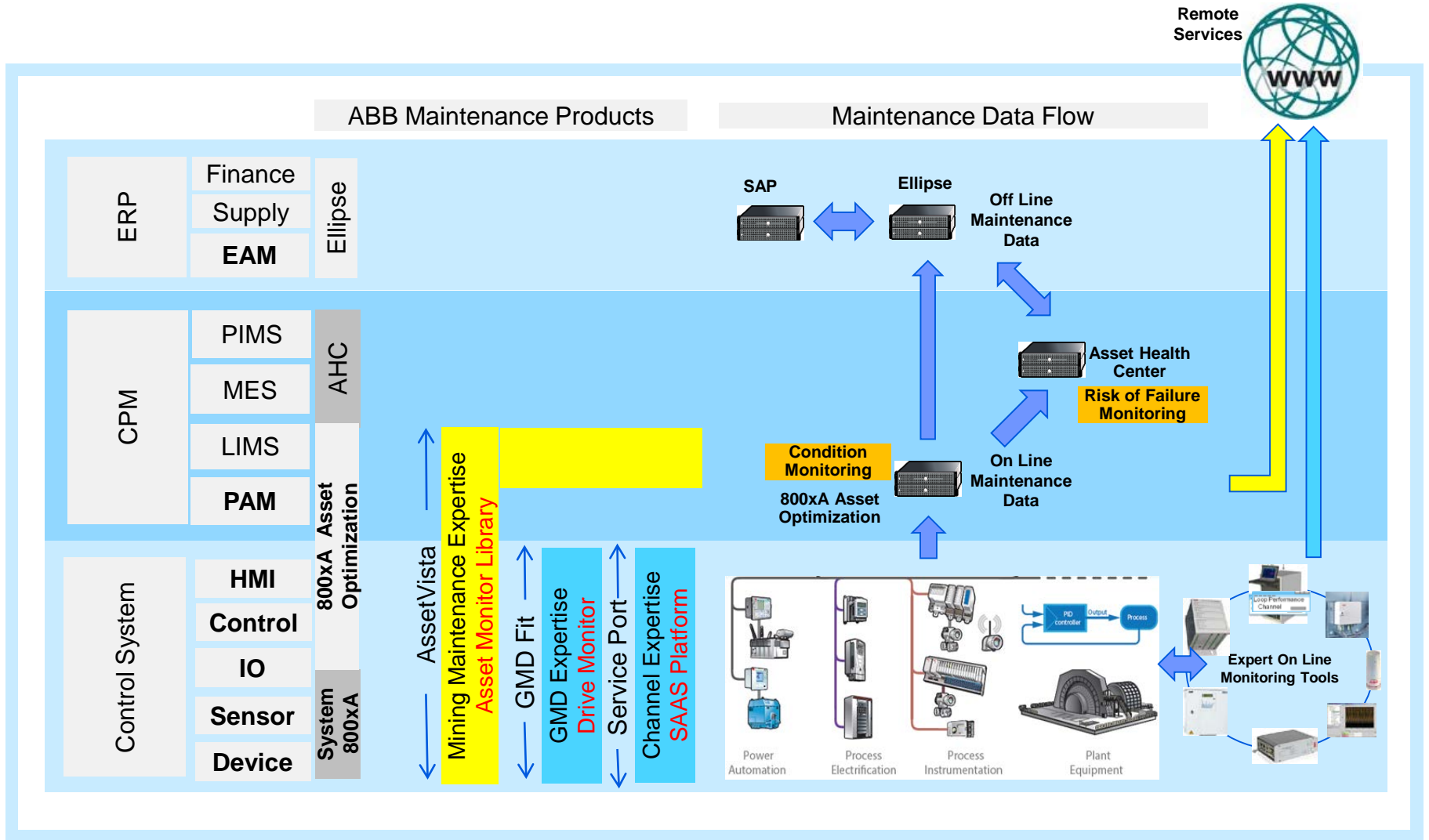
Collaborative Production Management

AssetVista dashboard, providing awareness on asset condition in real time



Collaborative Product Management

Asset monitors generate value at enterprise level



Collaborative Product Management

Asset Health Center: enterprise wide solution

Asset Details [Transformer: Miller (M) | TRANSFORMER | XFM 23444]

Asset ID: GLD1829588 Utility: EEC Manufacture Date: Jan 01, 1983
 Voltage Class: 765 KV Station: Miller (M) Age: 30 Years
 Manufacturer: American Elm

General Dissolved Gases Duval Triangles GIC Compare to Family Message Log

Message Log [Transformer: Miller (M) | TRANSFORMER | XFM 23444] [11 Records]

Message Type	Algorithm Run Date	Algorithm	Message
Action	06/04/2013 7:56 PM	MTMP Expert System	IMPORTANT: Combustible gases may be associated with serious issues inside the transformer. All precautions must be taken while investigating sensor output and taking manual oil samples - including de-energizing the transformer.
Action	06/04/2013 7:56 PM	MTMP Expert System	Several dissolved combustible gases have reached high or critical levels. Recommend minimizing load on this unit until issues can be addressed.
Predictive	06/04/2013 7:56 PM	MTMP Expert System	Hydrogen shows a rate of increase of 5.2 ppm/yr based on the latest 24 hours of data. At this rate, IEEE "condition 3" level may soon be reached (less than 5 days).
Alert	06/04/2013 7:56 PM	MTMP Expert System	Latest offline samples of Acetylene show an IEEE "condition 4" level. Level is 577ppm.
Alert	06/04/2013 7:56 PM	MTMP Expert System	Levels of Ethane (243 ppm) are increasing above the serious IEEE condition 4 level.
Alert	06/04/2013 7:56 PM	MTMP Expert System	Latest offline samples of Ethane show an IEEE "condition 4" level. Level is 243ppm.
Warning	06/04/2013 7:56 PM	MTMP Expert System	Latest offline samples of Acetylene show an IEEE "condition 3" level. Level is 25ppm.
Warning	06/04/2013 7:56 PM	MTMP Expert System	Latest offline samples of Methane show an IEEE "condition 3" level. Level is 518ppm.
Informational	06/04/2013 7:56 PM	MTMP Expert System	Latest offline samples of Hydrogen show an IEEE "condition 2" level. Level is 107ppm.
Informational	06/04/2013 7:56 PM	MTMP Expert System	MTMP Analysis: The updated Total Risk of Failure is 3.82
Informational	05/30/2013 12:28 AM	MTMP Expert System	MTMP Analysis: The updated Total Risk of Failure is 5.30

Navigation Asset Monitor [EEC | All - All - 1]

Ventyx AN ABB COMPANY

Dashboard Asset Monitor Current User AHC

Dashboard Reports Options

Voltage Class	Avg. ROF (-3Q)	Avg. ROF (-2Q)	Avg. ROF (-1Q)	Avg. ROF (current)	ROF (current)	High ROF (units)	Med. ROF (units)	Low ROF (units)	Total (units)	Spares (units)
Extra High Voltage	23.05	23.04	25.78	25.05	30	5	21	34	74	4
High Voltage	15.73	0	0	0	0	0	4	4	0	0
Medium Voltage	25.78	0	0	0	0	1	2	4	0	0
Low Voltage										

by Org Importance over ROF

by Equipment Type by Voltage Class by Age (years)

Asset Details [Transformer: Miller (M) | TRANSFORMER | XFM 23444]

Asset ID: GLD1829588 Utility: EEC Manufacture Date: Jan 01, 1983
 Voltage Class: 765 KV Station: Miller (M) Age: 30 Years
 Manufacturer: American Elm

General Dissolved Gases Duval Triangles GIC Compare to Family Message Log

ROF (Risk of Failure): 3.82

Message Summary (counts):
 Last Updated: Jun 04, 2013
 Alerts: 3 Warnings: 2 Informational: 2 Predictive: 1 Actions: 2

Message	AI	W	I	P	Ac	Details
High/increasing combustible gas level(s) detected	3	2	1	0	0	
Oil quality issue(s) detected	0	0	0	0	0	
Significant combustible gas trend(s) detected	0	0	0	1	0	
Unit status update available	0	0	1	0	0	

Importance over ROF

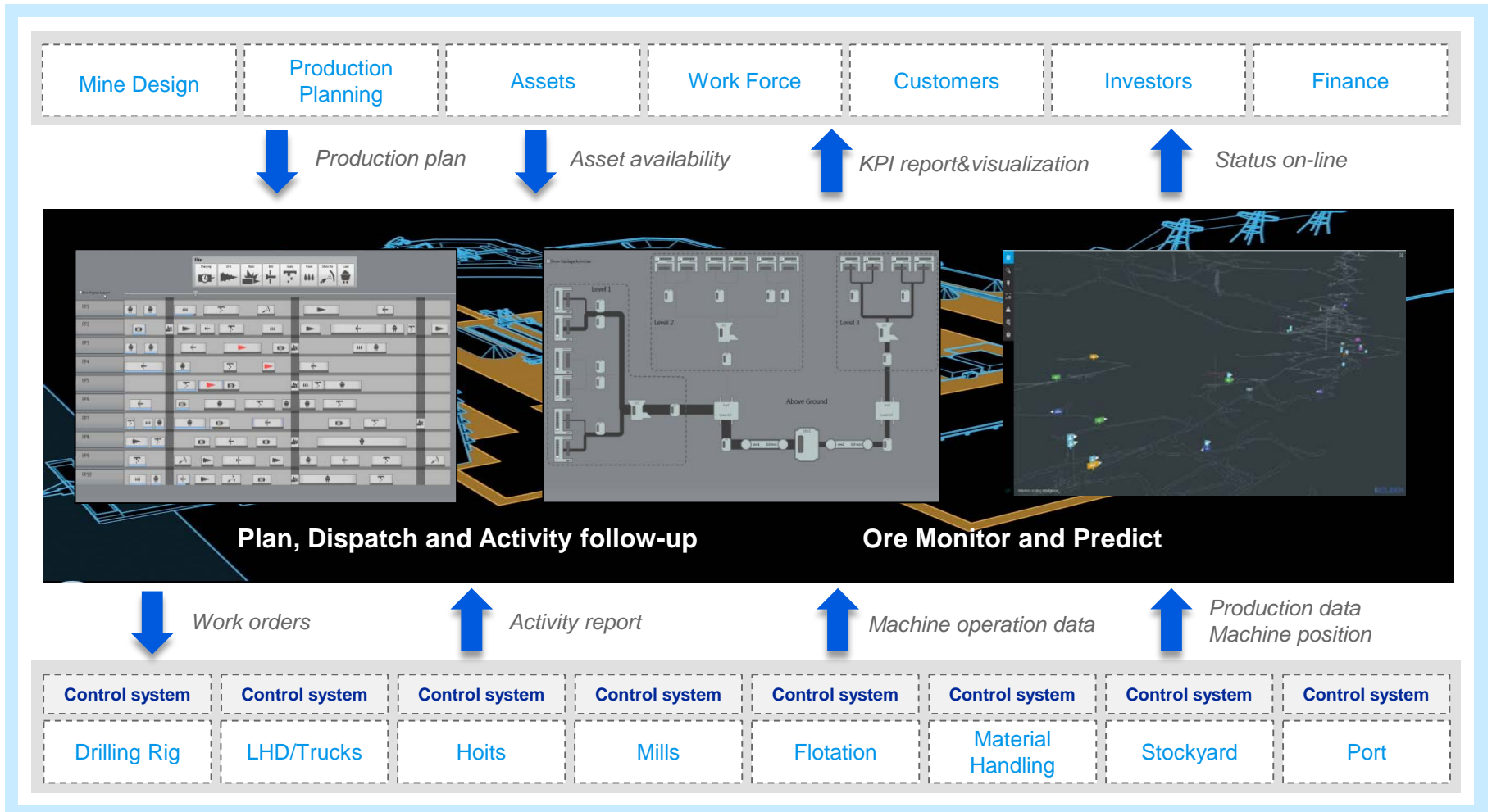
Sensor(s): Calisto1

Page: 1 of 1

Minerals control & optimization applications

Minerals control and optimization applications

Ultimate link between control and enterprise levels



Minerals control and optimization applications

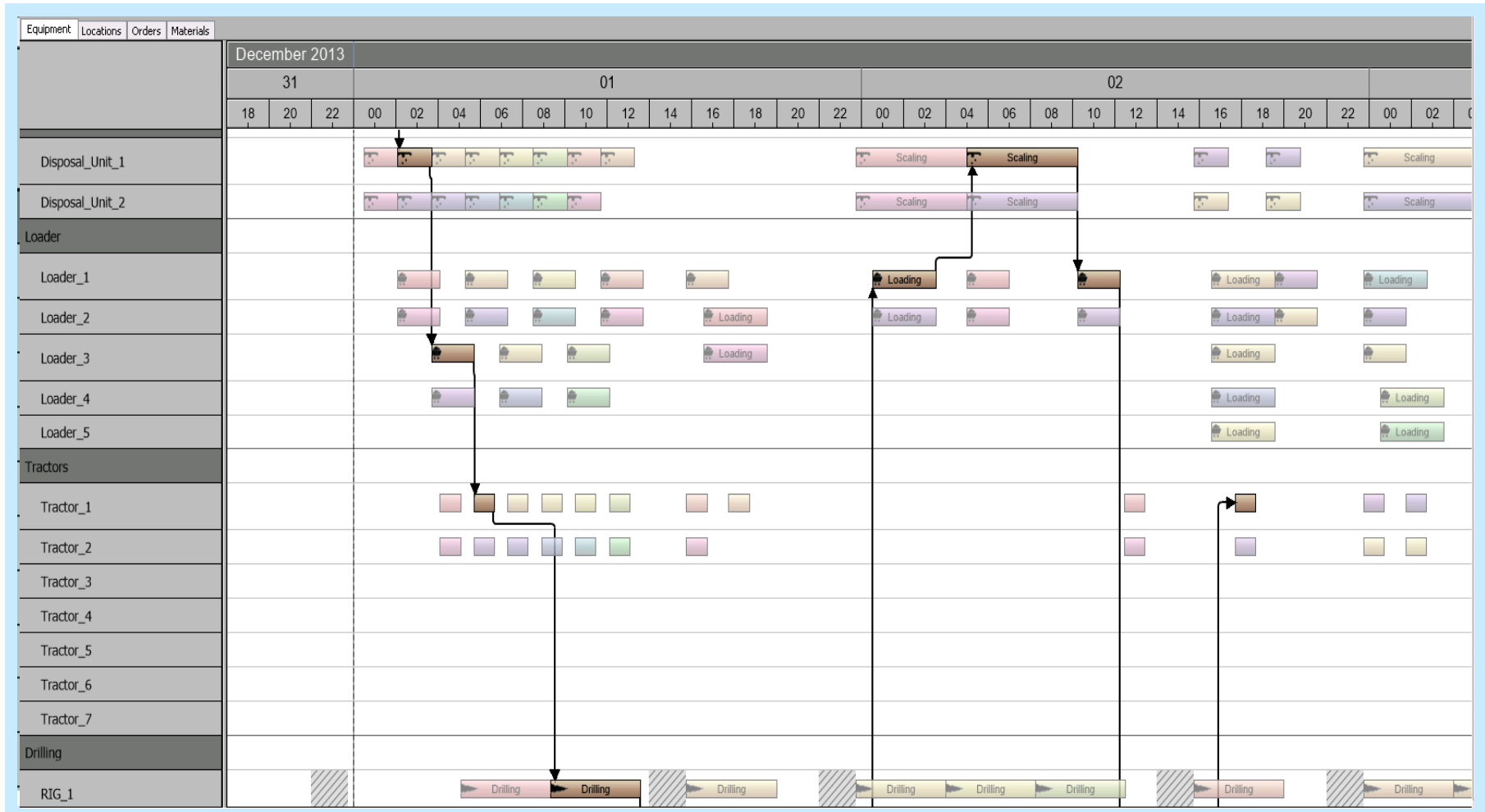
Production scheduling and dispatch

- Software package where mine operators dispatch and track operations in real time, increasing operational transparency and enabling decisions for best operations in real time.
- Functionalities
 - Visibility of all resources across the mine
 - Plan continuously updated, based on truly existent resources.
 - Optimal response to disturbances in real time
 - ISA 95 based data store holds mine's past present and planned activities
 - Scheduling engine supporting optimal decision making, including constraint checking mechanisms to enforce resource availability



Minerals control and optimization applications

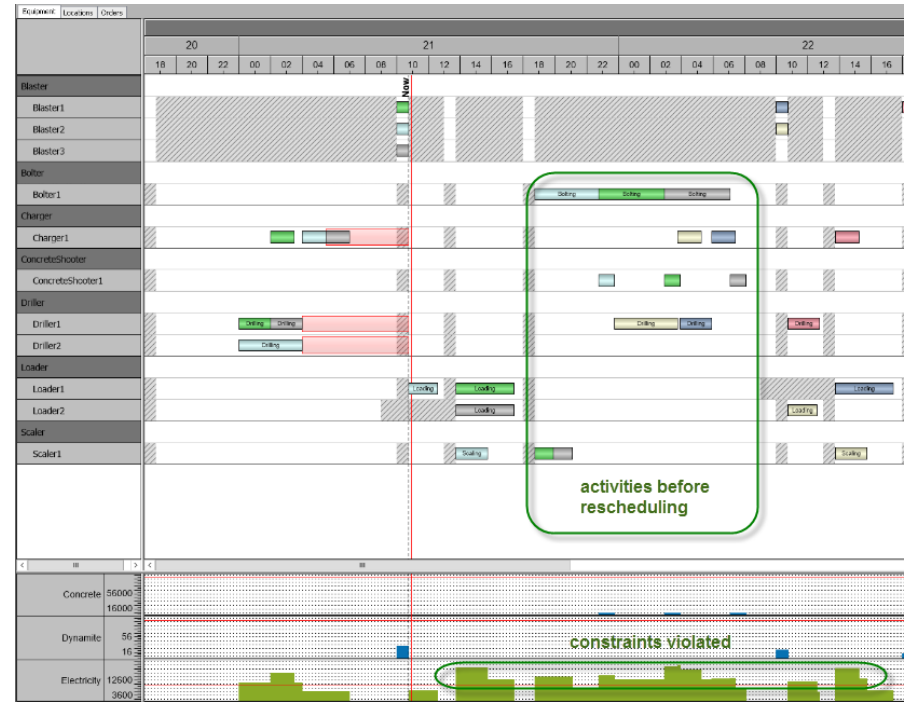
A cockpit to provide full visibility & enable optimization



Minerals control and optimization applications

Integrated energy and water management

- Predict accurate energy demand schedules to lower purchase costs and avoid penalties
- Manage complexity from varying energy price and power availability by allocating energy consumption to off-peak hours and energy production to peak hours
- Same framework can be used to manage of other limiting factors such as water and fuels

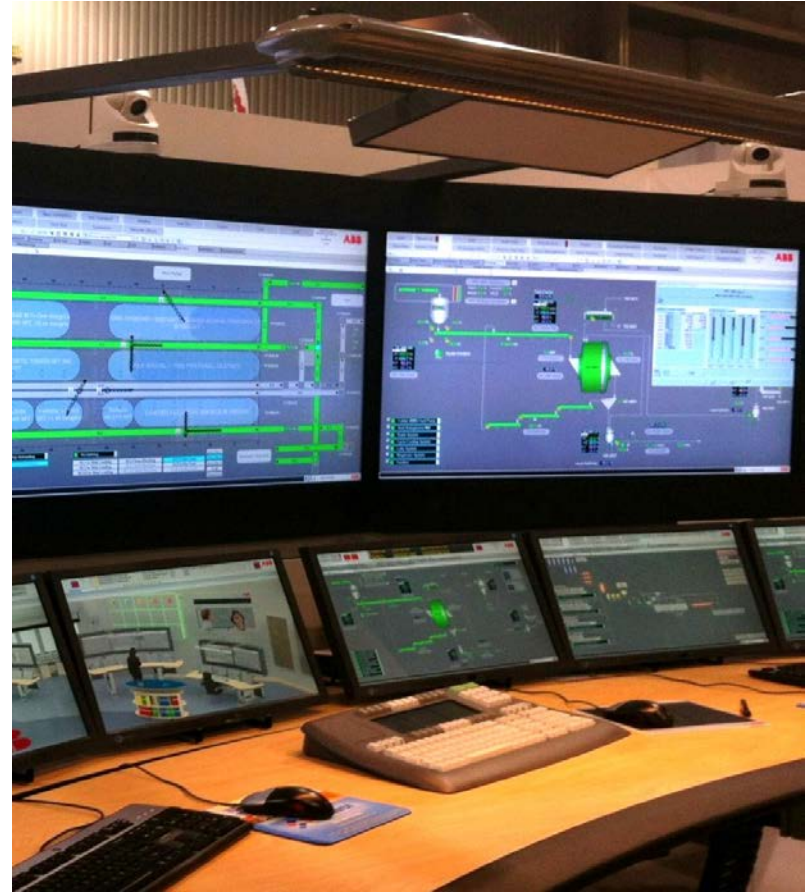


Select resources to enable production schedule at minimum cost

Securing the future of mining

ABB's vision for mining companies is now closer

- ABB portfolio provides visibility and optimization across the value chain
- ABB products and systems will drive fundamental change in the way a mining enterprise works, creating dramatic increases in
 - Process productivity
 - Predictability of operations
 - Asset reliability
 - Energy efficiency
 - Health, safety
 - Protection of the environment



Power and productivity
for a better world™

