AVEVAWORLD

ACCELERATE INDUSTRIAL INTELLIGENCE

AVEVA WORLD 2026

DESIGN. BUILD. OPERATE. OPTIMIZE - AUTONOMOUS OPERATIONS WITH ANDRITZ AND AVEVA

DANIEL SCHUCK

PULP, PAPER AND FOREST | GLOBAL

ANDRITZ improves customer reliability and operational performance with Reliability Twins

Challenge

- Engineering, operations, and maintenance data are siloed
- Equipment degradation was detected too late, causing unplanned downtime
- Operators lacked confidence to run assets closer to optimal conditions
- Value from data stops at dashboards, not actions

Solution

- AVEVA PI System streamed operational data to CONNECT
- CONNECT enabled governed data sharing across the lifecycle
- AVEVA Advanced Analytics detected degradation and failure risk
- ANDRITZ Reliability Twin delivered health scores, risk levels, and actions

Results

- **Reduced unplanned downtime by 1–3 %**
- **Increased production throughput by 1–6 %**
- **Improved productivity by 5–25 %**
- **Reduced maintenance costs by 1–5 %**
- **Improved energy efficiency by 1–9 %**
- **Reduced unplanned downtime through early degradation detection**
- **Clear path from advisory analytics to autonomous operation**

AGENDA

01 Who is ANDRITZ?

02 From Design to Optimization

03 ANDRITZ and AVEVA

01

WHO IS ANDRITZ?

WORLD MARKET LEADER WITH FOUR BUSINESS AREAS

PULP & PAPER	METALS	HYDROPOWER	ENVIRONMENT & ENERGY
			
42%*	22%*	18%*	18%*
Pulp: **#1** Paper: **#3**	Forming: **#1** Processing: **#1-2**	**#1-2**	**#1-3**

* Share of total Group revenue 2024
# Global market position, estimated by ANDRITZ

MAXIMIZE INDUSTRIAL PERFORMANCE

PROCESS

MAXIMIZING PROCESS PERFORMANCE

- UP TO **6%** Production increase
- UP TO **10%** Cost reduction
- UP TO **25%** Quality losses reduction

ASSET

MAXIMIZING ASSETS PERFORMANCE AND SECURITY

- UP TO **3%** Process Availability increase
- UP TO **5%** Maintenane cost reduction

HUMAN

EMPOWERING EFFICIENCY, ENHANCING EXPERTISE AND SAFETY

- UP TO **25%** Productivity increase
- UP TO **95%** Operator actions reduction
- Safety Improvement

SUSTAINABILITY

REDUCING EMISSIONS, PRESERVING RESOURCES

- UP TO **8%** Reduction in emissions
- UP TO **7%** Reduction in water usage
- UP TO **9%** Increase energy efficiency

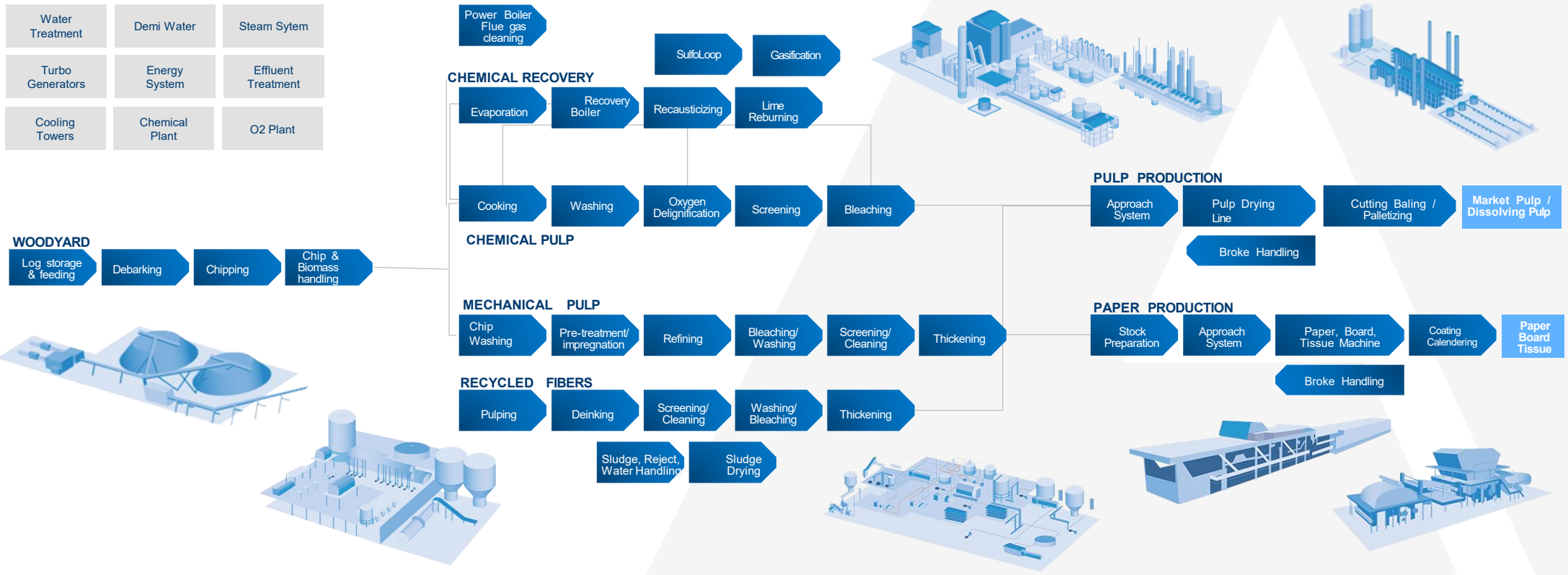
WHY DIGITALIZATION?

Maximize Industrial Performance

MEASURABLE VALUES

- **UP TO 6%** Production Increase
- **UP TO 10%** Cost Reduction
- **UP TO 25%** Quality Losses Reduction
- **UP TO 3%** Mill Availability Increase
- **UP TO 5%** Maintenance Cost Reduction
- **UP TO 25%** Productivity Increase
- **UP TO 95%** Operator Actions Reduction
- **UP TO 9%** Increase Energy efficiency
- **UP TO 8%** Reduction in Emissions
- **UP TO 7%** Reduction in Water Usage

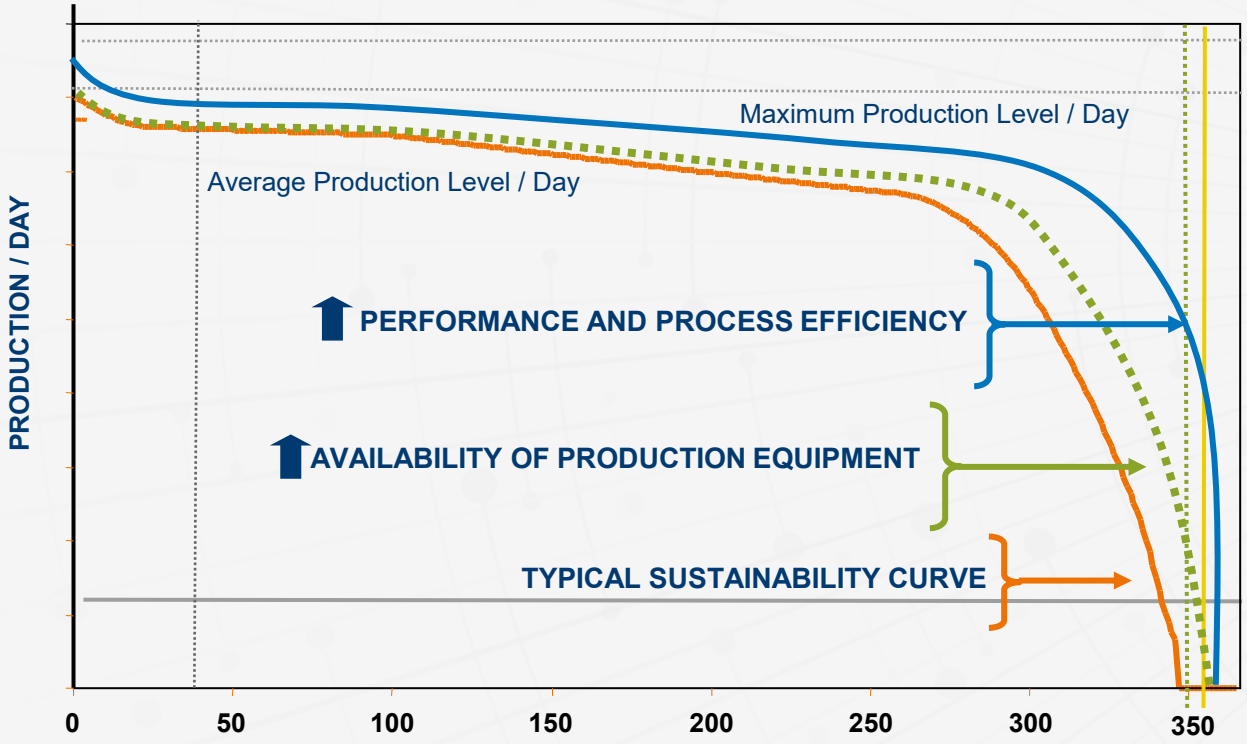
ENTIRE PLANT



FULL LIFE-CYCLE

DESIGN → BUILD → OPERATE → OPTIMIZE

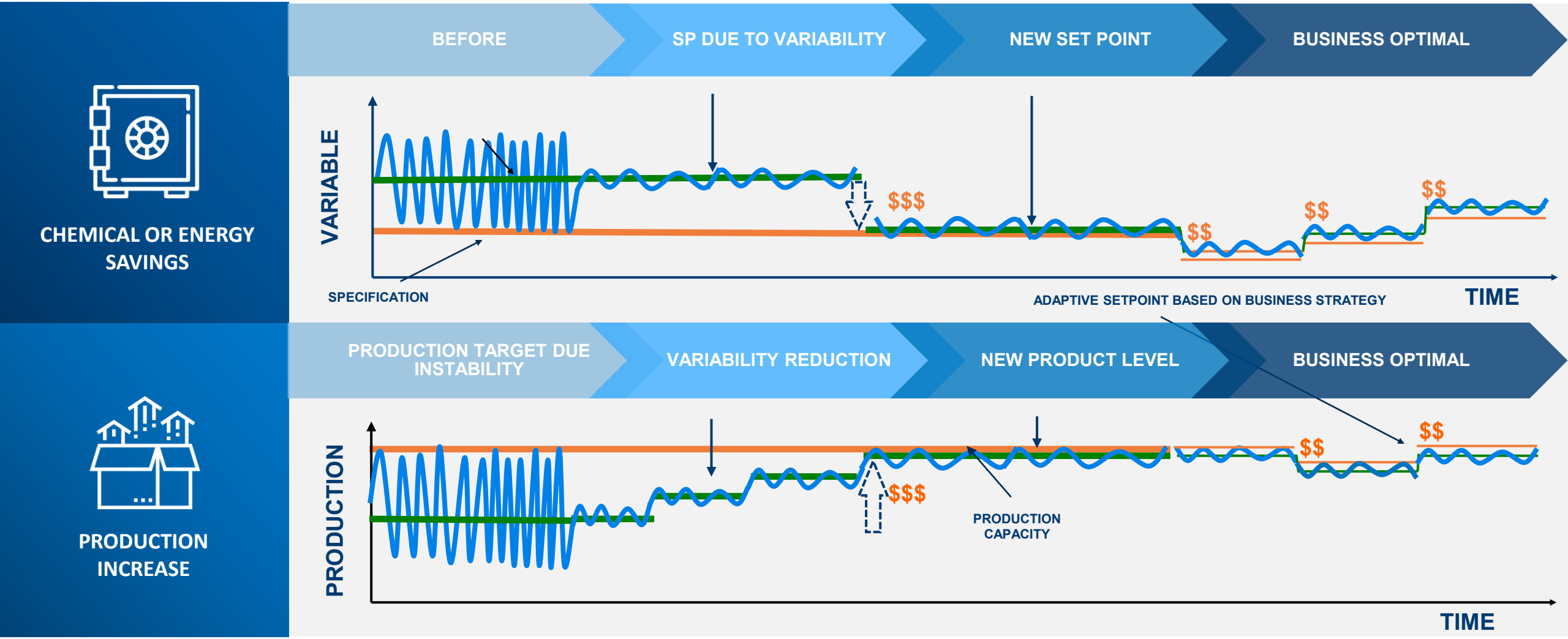
HOW TO MAXIMIZE INDUSTRIAL PERFORMANCE



KEY BENEFITS

- Increase production stability
- Reduce process variability
- Fast start-up
- Mill balance
- Operate close to safe limits
- Increase equipment reliability
- Avoid shutdown using automatic slow down system
- Equipment failure prediction
- Risk assessment

HOW TO MAXIMIZE INDUSTRIAL PERFORMANCE



ANDRITZ VISION OF THE EMPLOYEE OF THE FUTURE

Operators and maintainers transforms into analysts and optimizers

Analysis of Process and Equipment Performance

Utilizing advanced data analysis and management tools to identify inefficiencies and initiate course of actions

Problem Solving and Optimization

Operators and Maintenance will work in direct cooperation solving and optimizing inefficiencies with less support from engineering and management

Use of assisted support via AI

Application of AI Assistant tools for data processing and troubleshooting support with access to company know-how

ANDRITZ DRIVES FORWARD THE AUTONOMOUS MILL

Customers' global competition and environmental challenges forces industries to act

Dr. Joachim Schönbeck
President & CEO, Executive Board Member

"ANDRITZ's aim is to make the fully autonomous mill a reality."

HUMAN
Empowering efficiency, enhancing expertise, and safety

ASSET
Maximizing asset performance and security

PROCESS
Maximizing process performance

SUSTAINABILITY
Reducing emissions, preserving resources

"ANDRITZ can and will contribute towards society by developing technologies that enable respectful and sustainable utilization of our planet's resources."

DECISION LEVELS IN A MILL

MILL MANAGEMENT	**Budget control** Budget control, Speed, Economy, Balanced (It defines show mill balance should work), Schedule shutdown	**DAILY**
PRODUCTION MANAGER	**Mill Balance control** Start-up/Stop sequence, Speed-up/Slow-down, Recipes (35 controls)	**MINUTES TO HOURS**
OPERATOR	**Control of complex variables** Kappa, Brightness, Moisture, Dry-solids, etc. (75-100 controls)	**3 - 300 SECONDS**
	Control of simple variables and avoid interlocks Flow, Temperature, level, pressure (1000 controls + 2000+ interlocks)	**0.1 - 1 SECONDS**

JOURNEY TO AUTONOMOUS PLANT

INFORMATION	HANDS-ON	HANDS OFF	EYES OFF	MIND OFF	TOTAL AUTONOMY
LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
Zero autonomy; the operator performs all control tasks.	Operator assistance. The “ears, eyes and arms”: additional data, info and field actuators for smarter operation	Normal functions performed automatically. Area operation is optimized	Operators are notified and advised if something goes or tends to go wrong	Equipment does not need to be monitored continuously. Only rare events require human intervention.	All functions are managed automatically. The operator may have the option to control the plant.

AI Expert Agent - Digital Assistant

AI Powered

Asset Performance Management

- Risk Based Management
- Control Performance Assessment
- Alarm Management
- Condition Monitoring / Vibe
- Control Valves
- On-off Valves
- Motors
- Inspection
- Calibration Management
- Planning (Weekly, Commissioning, Shutdown, etc.)
- Root Cause & Problem Elimination
- Bypass Management
- Management of Changes

Mill-Wide Optimization

Mill Balance – Production, Cost and Energy Management

- Area-specific production control
- Area-specific quality tracking and forecast
- Area-specific cost tracking and forecast
- Autonomous operations dashboard
- Mill-wide Production Management
- Mill-wide Cost and Energy Management
- Mill-wide Quality Tracking

AI Powered

Adaptive Sequence

- Start with one click
- Stop with one click
- Recipe management
- Anomaly management

AI Powered

Digital Twin

Virtual Plant

- Engineering-Construction-Service (ECS) Platform
- Digital Plant (DIP)
- eXtended Reality (XR)

Optimizer

AI Powered

- Instrument health check
- Soft sensors (First principles / AI based)
- Setpoint optimization
- Operating limits
- KPIs
- Forecasting
- Product Tracking
- Cost Optimization

Reliability

AI Powered

- Anomaly score
- Downtime probability
- Ideal conditions
- Remaining Useful Life (RUL)

PIMS (Plant Information Management System)

- Data Analytics
- Display Studio
- Reports
- Product Tracker
- AI / Machine Learning
- Kanban
- Logbook
- Statistical Process Control
- LIMS (Laboratory)
- OEE
- Cost Management
- Energy Management
- Carbon Footprint

APC (Advanced Process Control)

- Watchdog and Safeguards
- Production Control
- Advanced Regulatory control
- Model identification and Auto-tune
- Sensor Corrections
- Grade Change

AI Powered

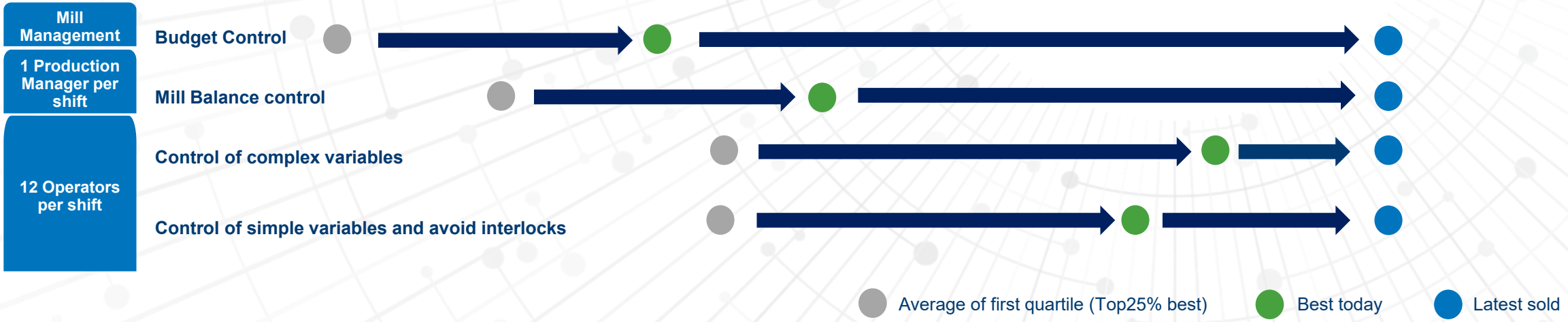
OTS (Operator Training Simulator)

Cybersecurity

AI ENABLES HIGH AUTONOMY!

LEVELS OF AUTONOMY

Level	0	1	2	3	4	5
Degree of Automation	NO AUTOMATION	OPERATOR ASSISTANCE	PARTIAL AUTOMATION	CONDITIONAL AUTOMATION	HIGH AUTOMATION	FULL AUTOMATION
Level by automotive definition (Tesla)	**Information**	**Hands On**	**Hands Off**	**Eyes Off**	**Mind Off**	**Full Autonomy**
Description	Zero autonomy; the operator performs all control tasks.	Plant is controlled by the operator, but some automation is included in the plant design.	Plant has combined automated functions, like flow and temperature control, but the operator must remain engaged with the plant and always monitor the situation.	Operator is a necessity but is not required to watch the displays continuously. The operator must be ready to always take control with notice.	The automation is capable of performing all control actions under certain conditions. The operator may have the option to control the plant.	The automation can control perform all control functions under all conditions. The operator may have the option to control the plant.



REAL RESULTS FOR CUSTOMERS

Highest autonomous pulp mill in 2024

Eldorado, Três Lagoas, Brazil

PRODUCTION RECORDS AND AUTONOMOUS OPERATION

Production records within one year (1.5 million → to 1.7 million tons/a in 2017)

+18% production increase

Holistic asset performance management enables drawing attention to the most critical assets for maintenance activities
→ Outcome: 95% overall equipment availability

Eldorado mill runs in automatic mode 97-98%

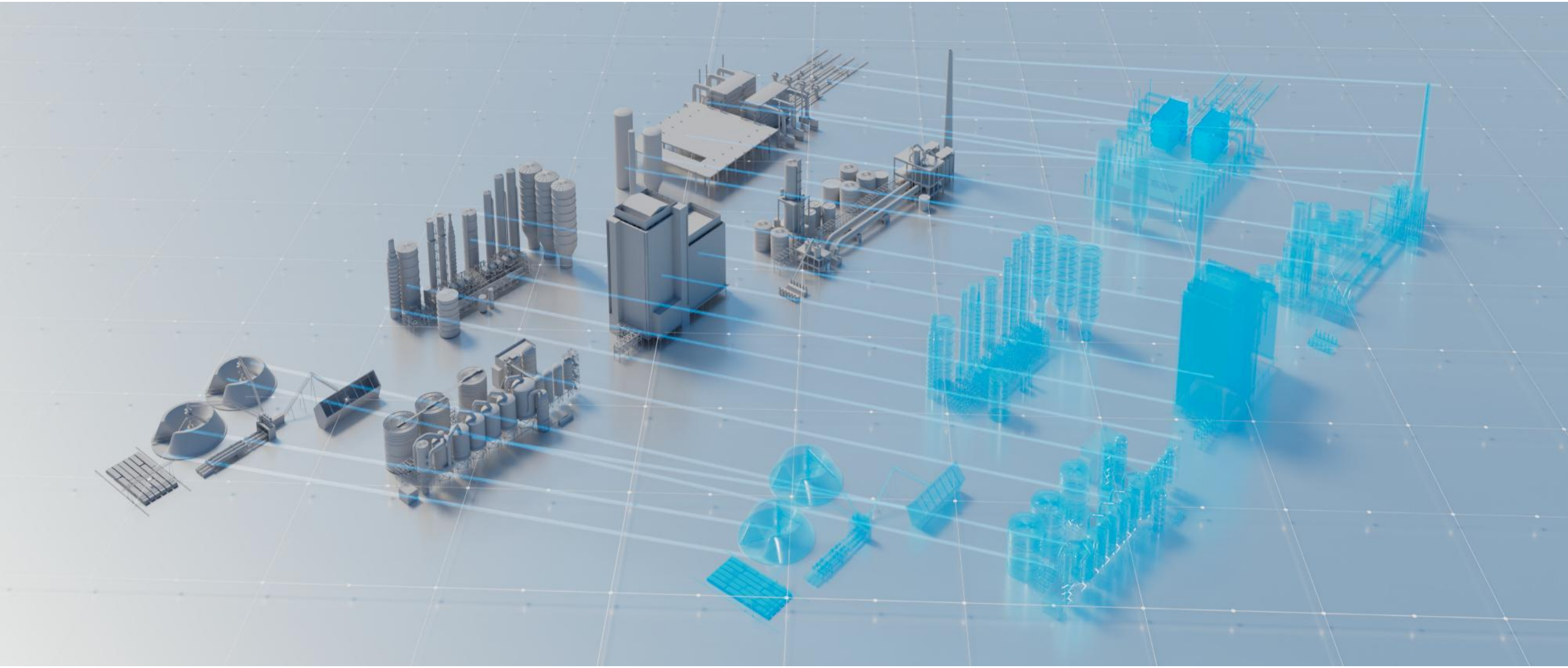
- +7 milion tons/year Production Increase
- 7% Increase Energy efficiency
- 7% Cost Reduction
- Quality Losses Reduction
- 95% Operator Actions Reduction
- Maintenance Cost Reduction
- 95% Mill Availability Increase
- From 89.2% to 95% Productivity Increase

02

FROM DESIGN TO OPTIMIZATION

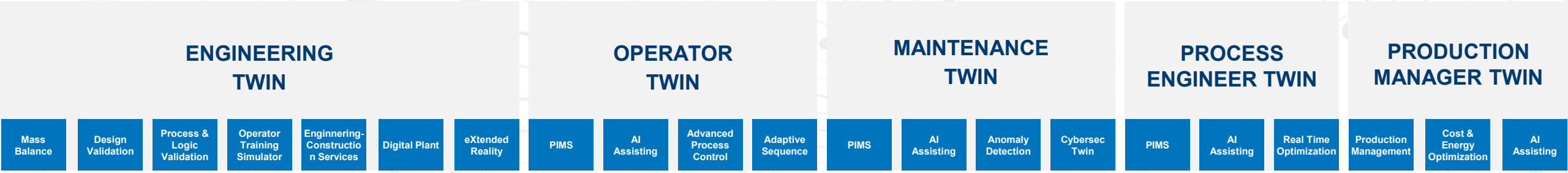
FROM VISION TO EXECUTION

A structured framework to identify high-Confidence Reliability Twin opportunities



DIGITAL TWIN IN THE LIFE-CYCLE MANAGEMENT

Context: It is a complex topic and complex to manage



Types / Formats

- First principles, Physics-based models, Simulation
- Historians (time series data)
- Visual models (3D, P&ID, laser scans, drawings, photos, images, etc.)
- ERP/CMMS data (Asset structure, components, inspection etc.)
- Documents (manuals, procedures, spreadsheets, etc.)

Sources

- PIMS
- DCS
- ERP
- CMMS
- Document Management System
- Engineering platforms
- Condition monitoring systems
- IoT platforms
- Etc.

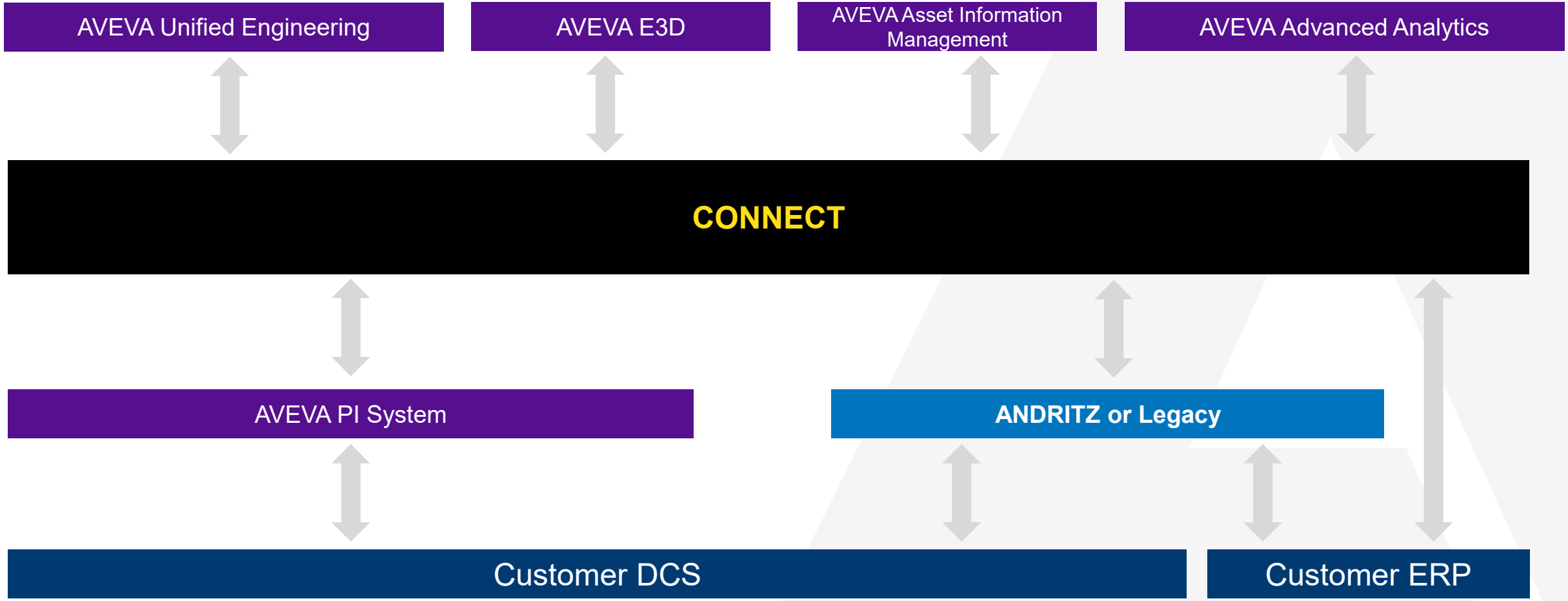
Applications

- Softsensors
- Setpoint optimization
- Operating limits
- KPIs
- Forecasting
- Product tracking
- Asset health check
- Anomaly detection
- Failure anticipation
- Etc.

Benefits

- Reduction of chemical, energy, and fuel consumption
- Increase production, working closer to limits
- Reduction of production losses
- Increase availability
- Reduce time to repair
- Etc.
- Autonomy Level 3-4

ARCHITECTURE



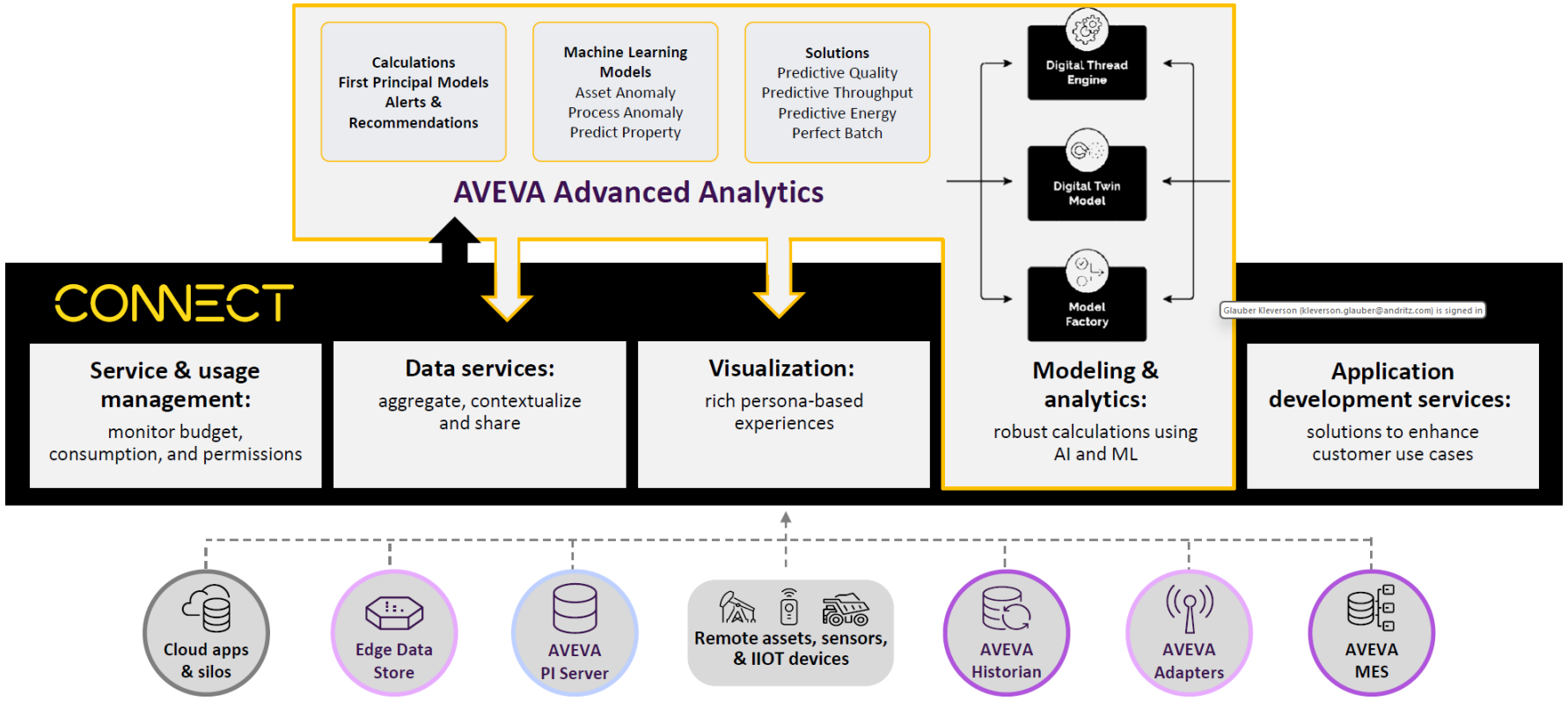
DDW RELIABILITY TWIN

AVEVA ADVANCED ANALYTICS

AI-driven optimization for industrial excellence

Connect AI with all industrial data and visualization

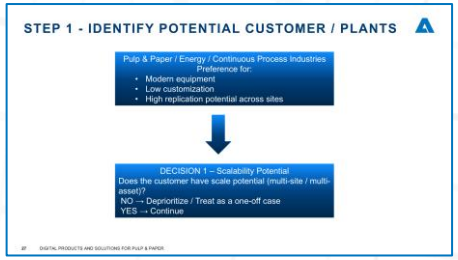
Open and neutral, providing rich data insights for your unified industrial ecosystem

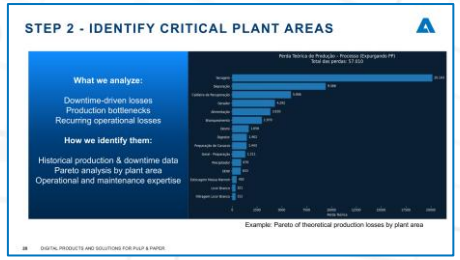


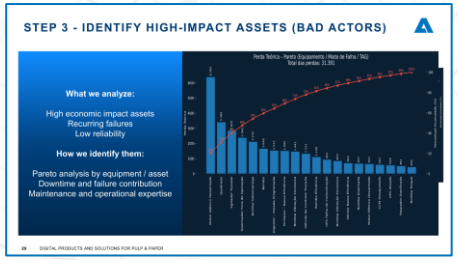
RELIABILITY TWIN

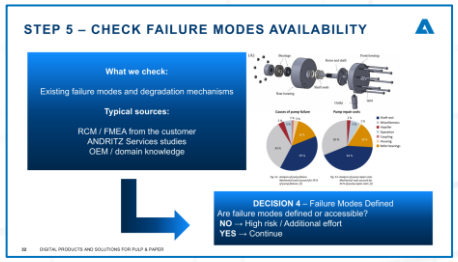
KPIs	Description	Benefits
HEALTH SCORE	Composite index (0–100) reflecting deviation from healthy baseline	• Provides an immediate, intuitive view of overall asset and process health. • Allows operators, maintenance and management to speak the same language. • Enables fast comparison across assets, lines or mills. • Acts as an early warning signal before alarms, trips or failures occur. • Creates a clear entry point for digital health monitoring adoption.
ANOMALY SCORE	Detects Degradation. Real-time anomaly intensity indicator	• Shifts ANDRITZ from reactive troubleshooting to proactive performance management. • Detects hidden degradation before alarms or trips occur. • Protects ANDRITZ equipment reputation by reducing unexpected failures. • Creates a technical basis for value-based service contracts.
FAILURE PROBABILITY	Assesses operational risk. Probability of failure within 7d / 30d horizon	• Quantifies the risk of unplanned shutdowns in customer language. • Enables ANDRITZ to prioritize actions on the most critical assets. • Supports customer decision making on when to intervene versus continue operation. • Reduces production loss risk on ANDRITZ-supplied process islands.
IDEAL CONDITIONS	Reduces stress and slow down failure progression	• Identifies operating windows that minimize mechanical and process stress. • Extends asset lifetime without additional hardware investments. • Links process operation directly to equipment health. • Strengthens ANDRITZ positioning as a process and equipment expert, not only an OEM.
RUL	Estimated remaining useful life (RUL). Enables maintenance planning at the right time	• Moves maintenance from calendar-based to condition-based. • Avoids both premature maintenance and late interventions. • Improves customer maintenance planning and spare parts readiness. • Enabler for ANDRITZ services, spares and upgrades.
RISK LEVEL	Consolidated risk classification (Low / Medium / High)	• Provides a clear and simple decision signal for operations and maintenance. • Aligns operators, maintenance, management and ANDRITZ service on priority. • Enables fast triage across assets, areas or mills. • Reduces decision latency during abnormal situations. • Supports escalation logic and service response models. • Forms a natural trigger for condition based services and SLAs.
PRESCRIPTION	Recommended maintenance or inspection actions	• Converts insights into clear actions for operations and maintenance. • Reduces mean time to repair by guiding teams to the right intervention. • Avoids unnecessary inspections by focusing only where value exists. • Improves coordination between operations, maintenance and ANDRITZ service. • Enables condition based service contracts and SLAs. • Protects availability and performance of ANDRITZ supplied equipment. • Creates a repeatable, scalable service model across assets and mills.

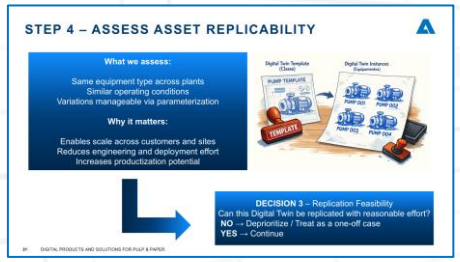
DEFINING TARGET ASSETS

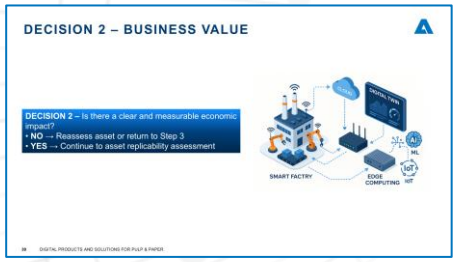


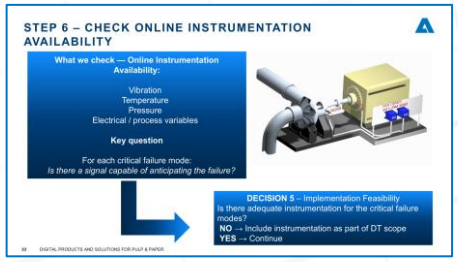


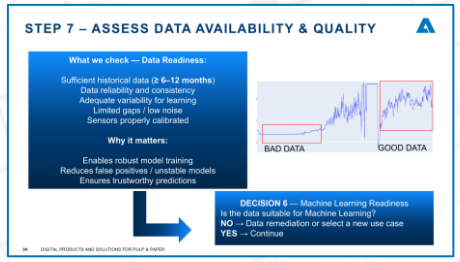


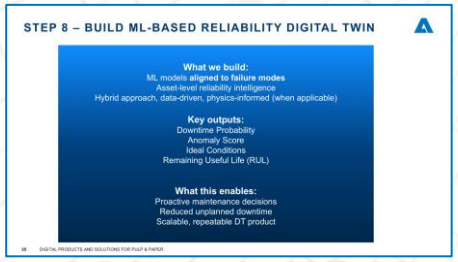


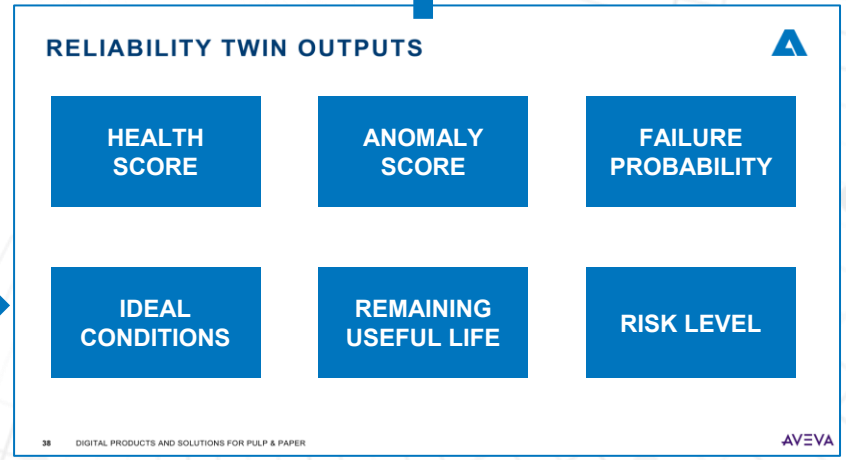








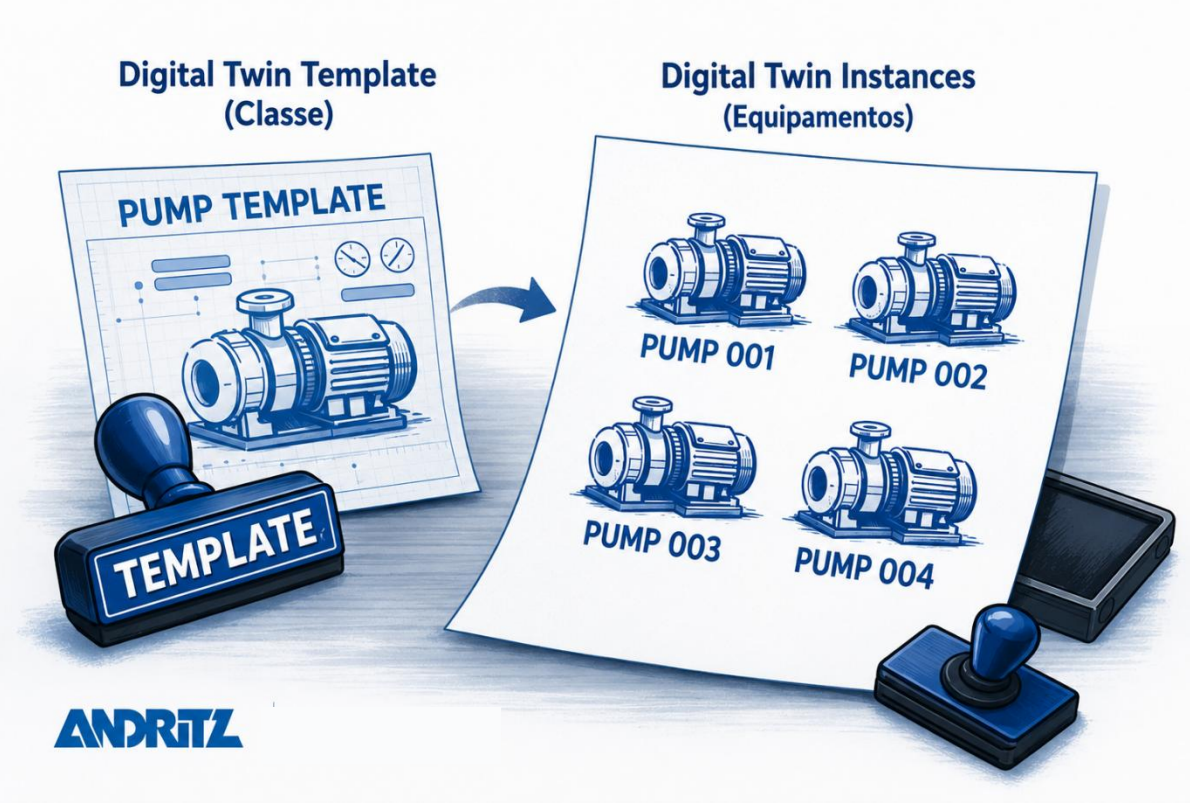




Greenfield → Based on FMEA + criticality analysis

Brownfield → Same as greenfield or based on production losses (constrained budget)

TEMPLATE VERSUS INSTANCES + REQUIRED DATA



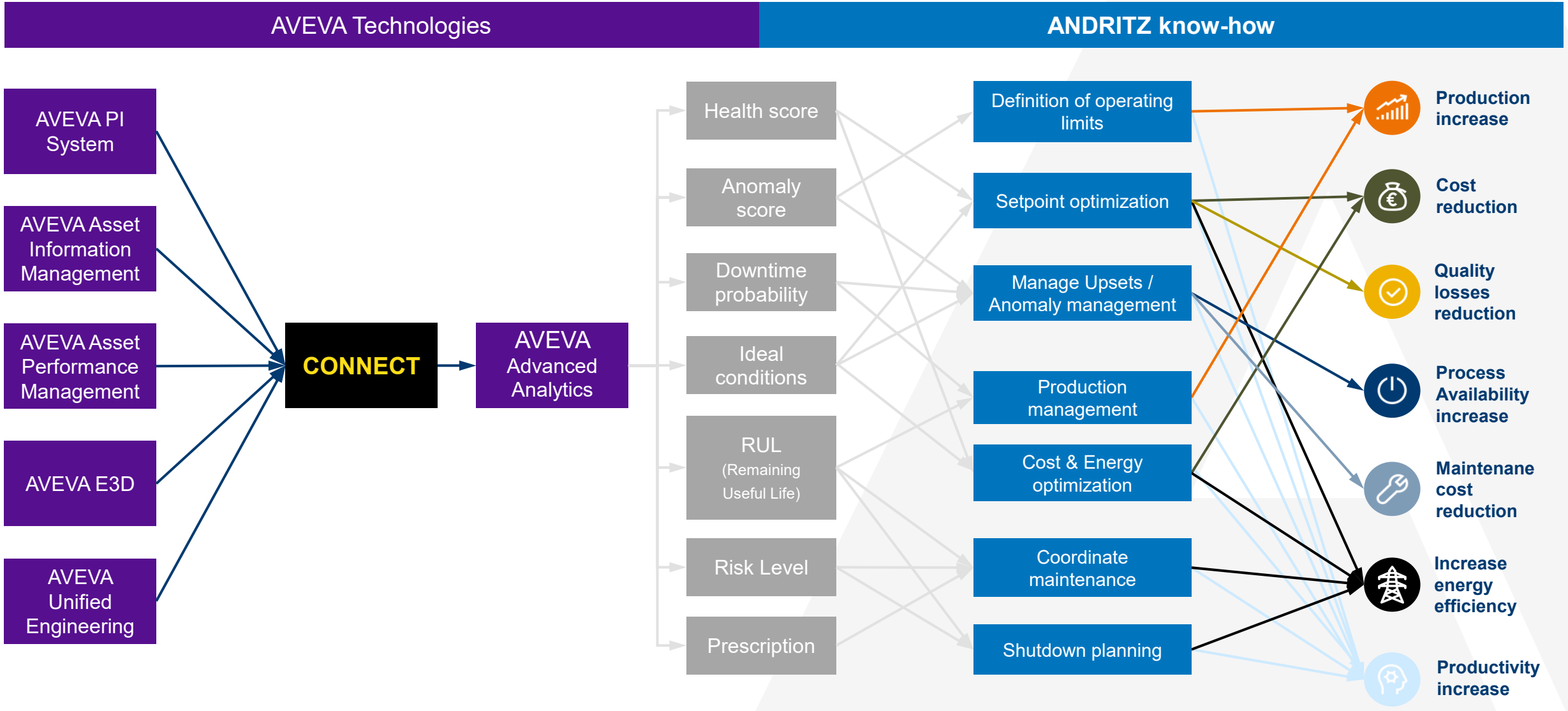
MINIMUM INSTRUMENTATION (MANDATORY)

- Radial vibration (DE/NDE): Primary indicator for bearing degradation and imbalance
- Axial vibration: Required for thrust bearing and hydraulic instability detection
- Bearing temperature: Secondary confirmation of mechanical degradation
- Motor current: Indirect load and hydraulic resistance monitoring
- Flow: Operational regime classification and cavitation detection
- Suction pressure: Critical parameter for cavitation risk assessment

RECOMMENDED ENHANCEMENTS

- Envelope vibration: Early-stage bearing defect detection
- Ultrasonic sensor: Cavitation and lubrication anomaly detection
- Torque: More accurate load monitoring
- Differential pressure: Hydraulic efficiency monitoring

FROM AVEVA PI DATA TO AUTONOMOUS DECISIONS



03

ANDRITZ AND AVEVA

PARTNERSHIP ANDRITZ + AVEVA

WHY

*Customers in the Pulp & Paper industry are constantly searching for ways for **Maximizing Industrial Performance**. ANDRITZ and AVEVA partnership is focused on creating measurable value for our customers throughout the full life-cycle (Design, Build, Operate and Optimize) and the entire value stream by combining AVEVA´s excellence and global leadership in industrial software with ANDRITZ´s global leadership and deep know-how in process, maintenance, automation, and digitalization in the Pulp & Paper industry.*

HOW

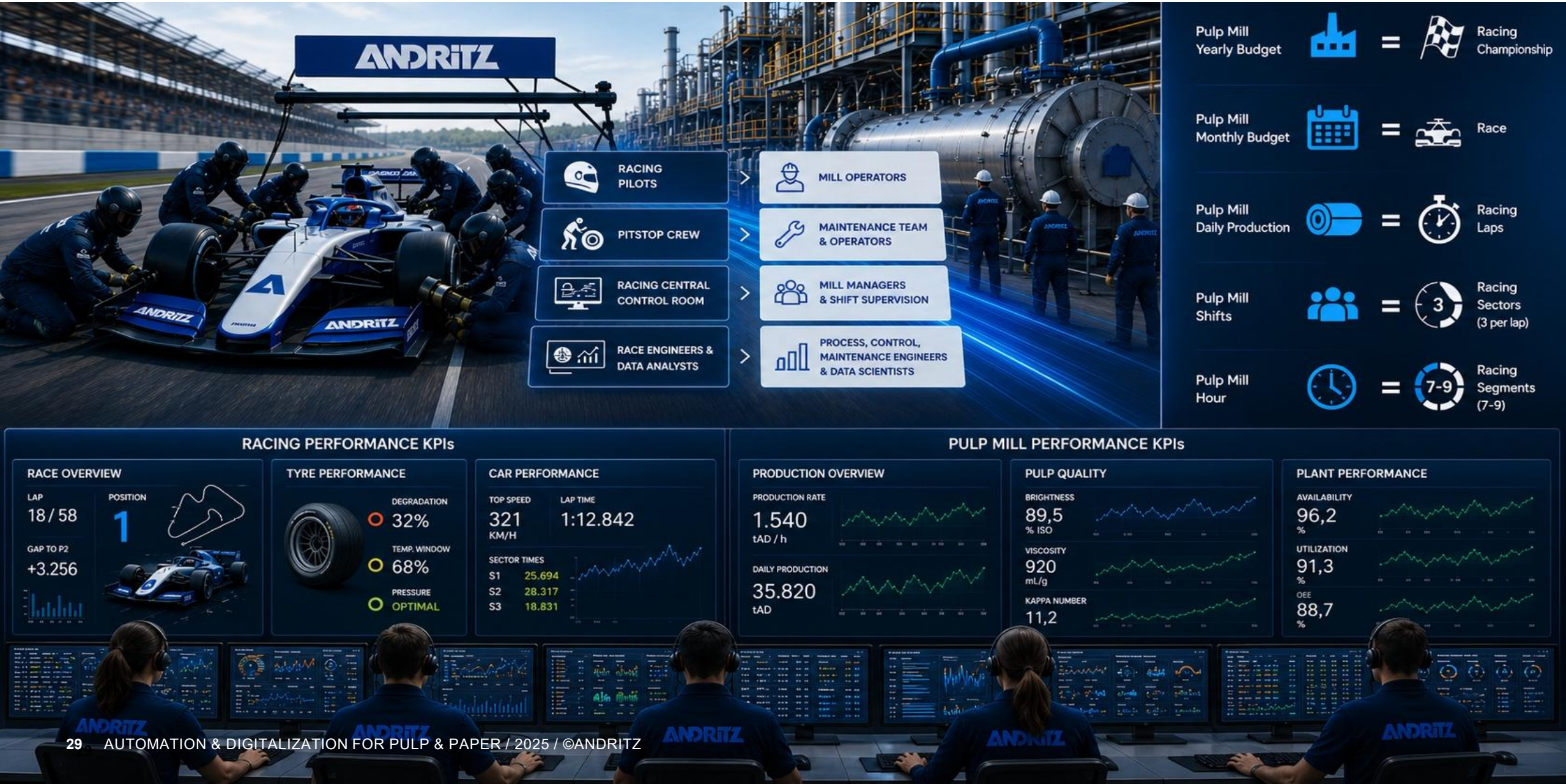
ANDRITZ

- Value-driven solutions in digitalization in the Pulp & Paper industry well recognized by customers
- E2E offering for building plants, systems, and equipment
- Deep know-how in designing, building, maintaining and optimizing Pulp & Paper process plants
- Globally-oriented and innovation-driven corporate DNA
- ANDRITZ and AVEVA products can be integrated to solutions bundles to bring the best-in-class value to our customers
- […]

AVEVA

- Comprehensive software suite covering the entire value stream and the full life cycle
- Most trusted solution for data historian and visualization
- State-of-the-art integration and predictive analytics capabilities
- Part of ANDRITZ engineering is already done in AVEVA products, which can bring seamless integration
- Proven approach for mutually benefiting partnerships
- […]

TECHNOLOGY EMPOWERS PEOPLE TO DO MORE!



TECHNOLOGY EMPOWERS PEOPLE TO DO MORE!

BENEFITS AND ROADMAP

BENEFITS

PRODUCTION
- MSR as % of capacity
- Production stability
- Production (admt/a)

COSTS
- Wood costs
- Chemical costs
- Energy costs
- Maintenance costs
- EUR per ton

QUALITY
- % inside specification
- Process variability
- Quality losses

POTENTIAL BENEFITS WITHOUT MAJOR INVESTMENTS
- Production increase: 2-7%
- Availability: 1-4%
- Chemical reduction: 3-14%
- Energy optimization: 2-7%
- Operator action reduction: >90%

ROADMAP

UNDERSTAND BUSINESS OBJECTIVES
- Process
- Asset
- Human
- Sustainability

READINESS STUDY
- Field analysis
- Data analysis
- Infrastructure
- Required investments
- Potential benefits

IMPLEMENTATION
- 3-5 Years project
- Focus on potential benefits

SUSTAIN THE RESULTS
- Keep results in the long-term

THANK YOU!

WANT TO KNOW MORE?
LET'S CONNECT:

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FOR GROWTH
THAT MATTERS.

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