



BOILER SYSTEM MONITORING AND CONTROL

**WESTERN REGION BOILER ASSOCIATION CONFERENCE
PASCO, WASHINGTON
MARCH 2015**

Norris N. Johnston

AGENDA

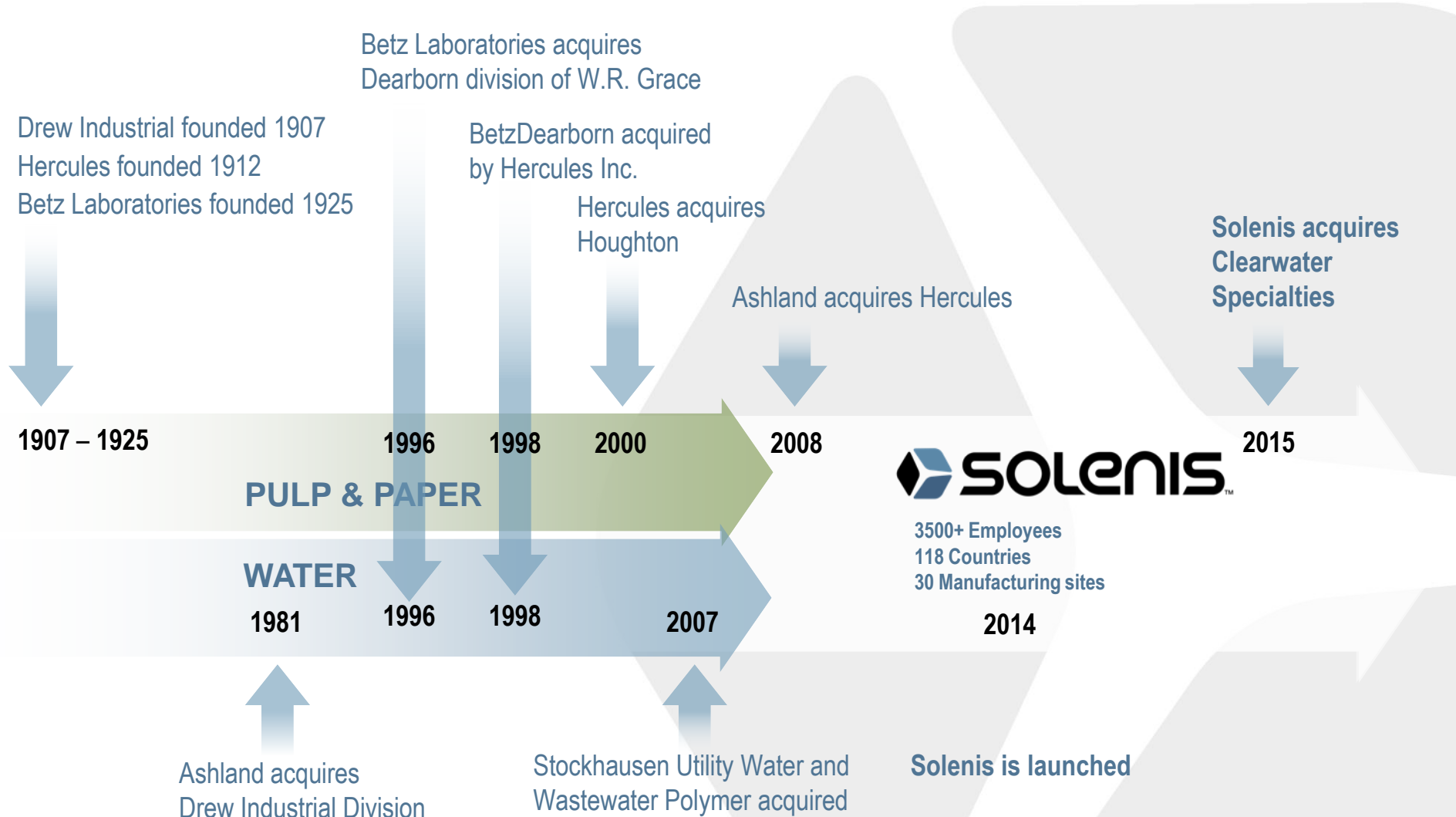
- **Who is Solenis and who is Norris Johnston?**
- **Why Boiler System Treatment, Monitoring, and Control**
- **Evolution of Treatment, Monitoring, and Control**
- **Monitoring and Control: Where, What, How**
- **Decision Making and Data Management**
- **Summary**

INTRODUCTION

WHO IS SOLENIS? WHO IS NORRIS JOHNSTON?

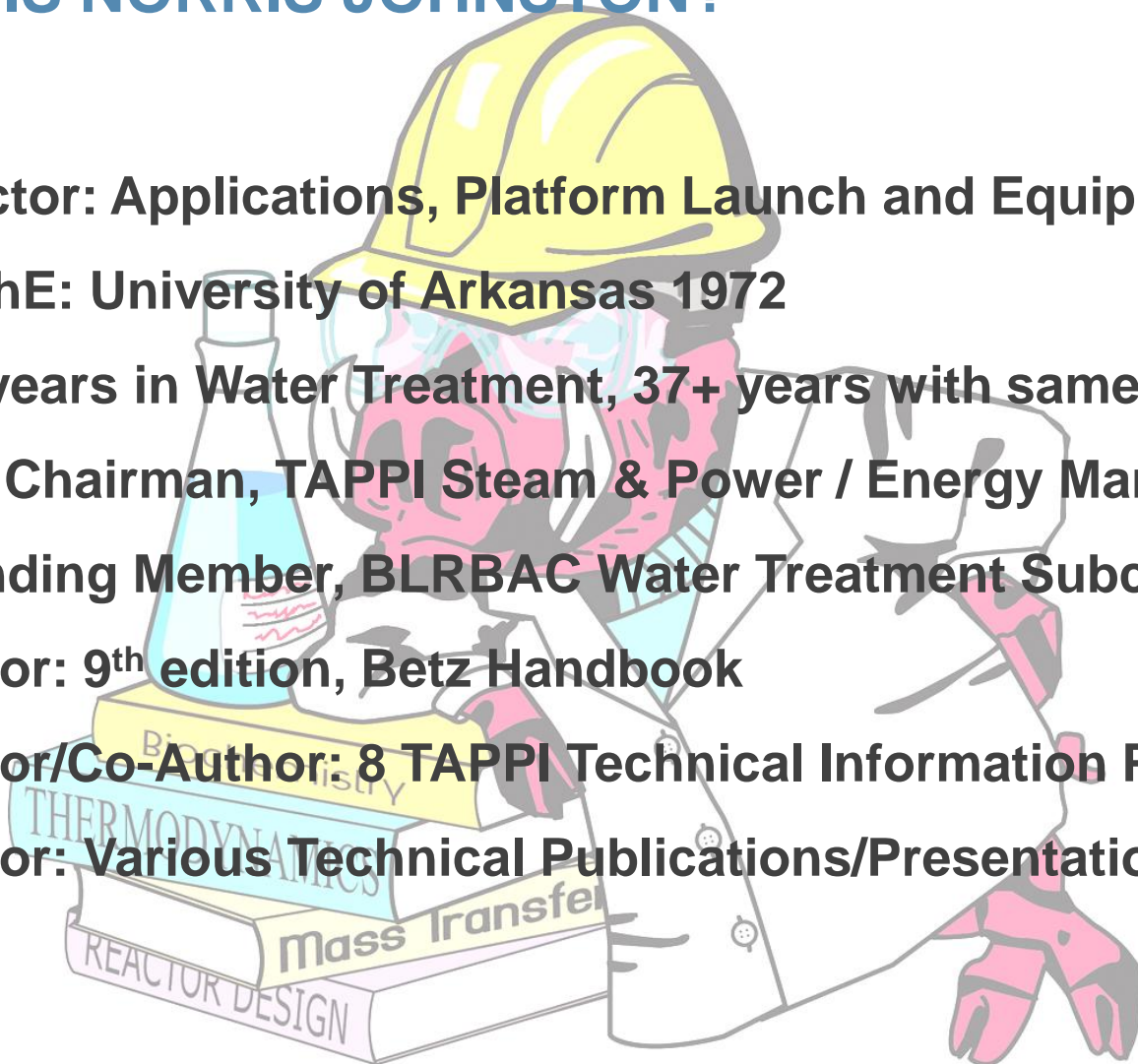
WHO IS SOLENIS?

A HISTORY OF TRUSTED PARTNERS



WHO IS NORRIS JOHNSTON?

- **Director: Applications, Platform Launch and Equipment**
- **BSChE: University of Arkansas 1972**
- **42+ years in Water Treatment, 37+ years with same company**
- **Past Chairman, TAPPI Steam & Power / Energy Management**
- **Founding Member, BLRBAC Water Treatment Subcommittee**
- **Author: 9th edition, Betz Handbook**
- **Author/Co-Author: 8 TAPPI Technical Information Papers**
- **Author: Various Technical Publications/Presentations**



BOILER WATER TREATMENT, MONITORING, CONTROL: WHY?

CRITICAL SUCCESS METRICS

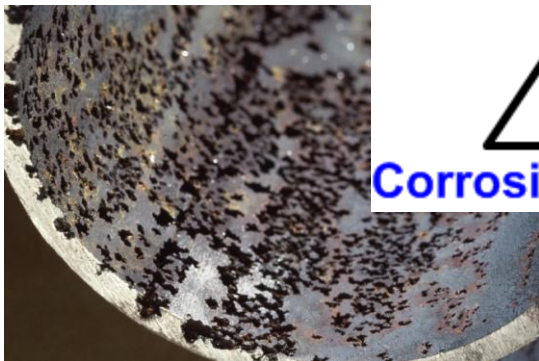
- **Compliance**
- **Sustainability**
- **Resources**
- **System Assurance**



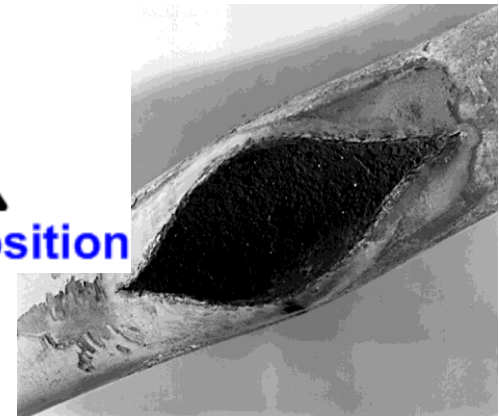
WHY BOILER WATER TREATMENT?



Carryover



Corrosion



Deposition

WHY MONITORING AND CONTROL?

Good Chemistry is Not Enough

- Trust
- Comfort
- Confirmation

Action is Required

- Key Operating Indicators
- Key Performance Indicators
- Measure/React/Measure/React/.....

“Assure, Verify, Protect”

STG Pitting - Carryover



Stress Assisted Corrosion



Long Term Overheat

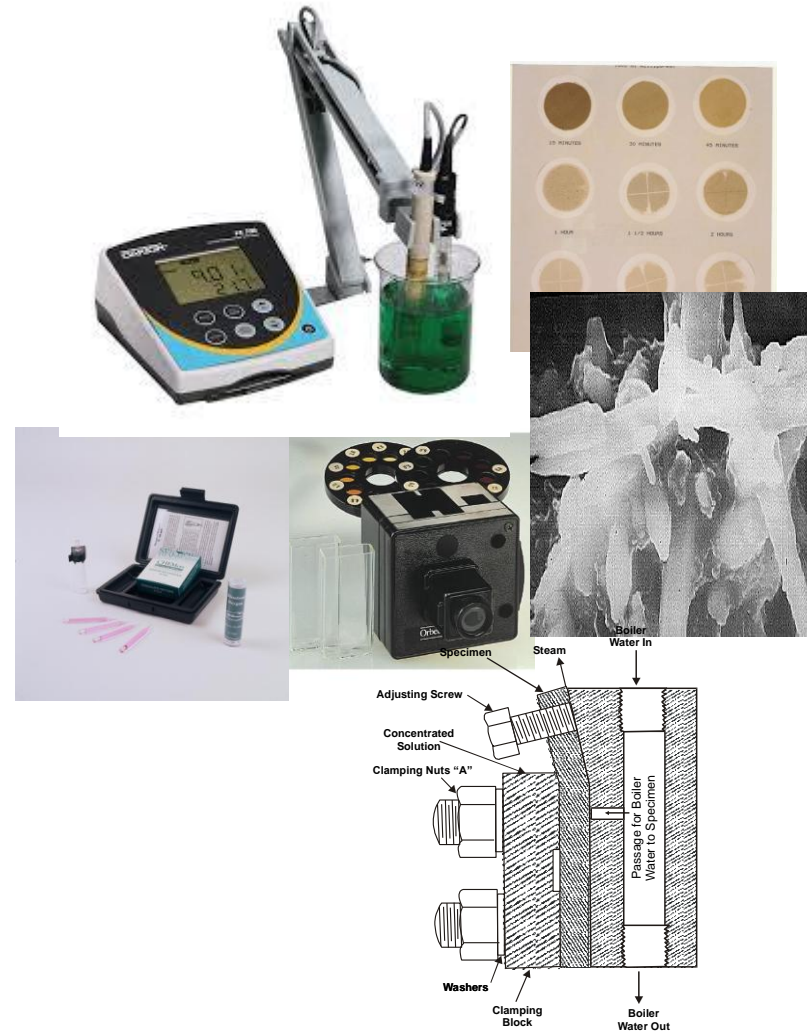


EVOLUTION OF TREATMENT, MONITORING, CONTROL

EVOLUTION OF TREATMENT, MONITORING, CONTROL

WHERE WE STARTED

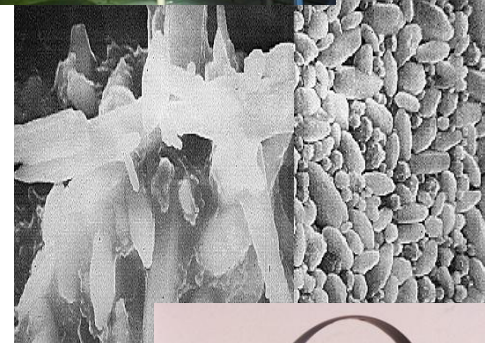
- **Basic Treatment**
 - Phosphate
 - Chelant
 - Sulfite
- **Crude Manual Tests**
 - Soap Test
 - Color Comparator – pH +
 - Grab samples
- **Elementary Control Methods**
 - Gross adjustments
 - Shot feed
 - Reactive



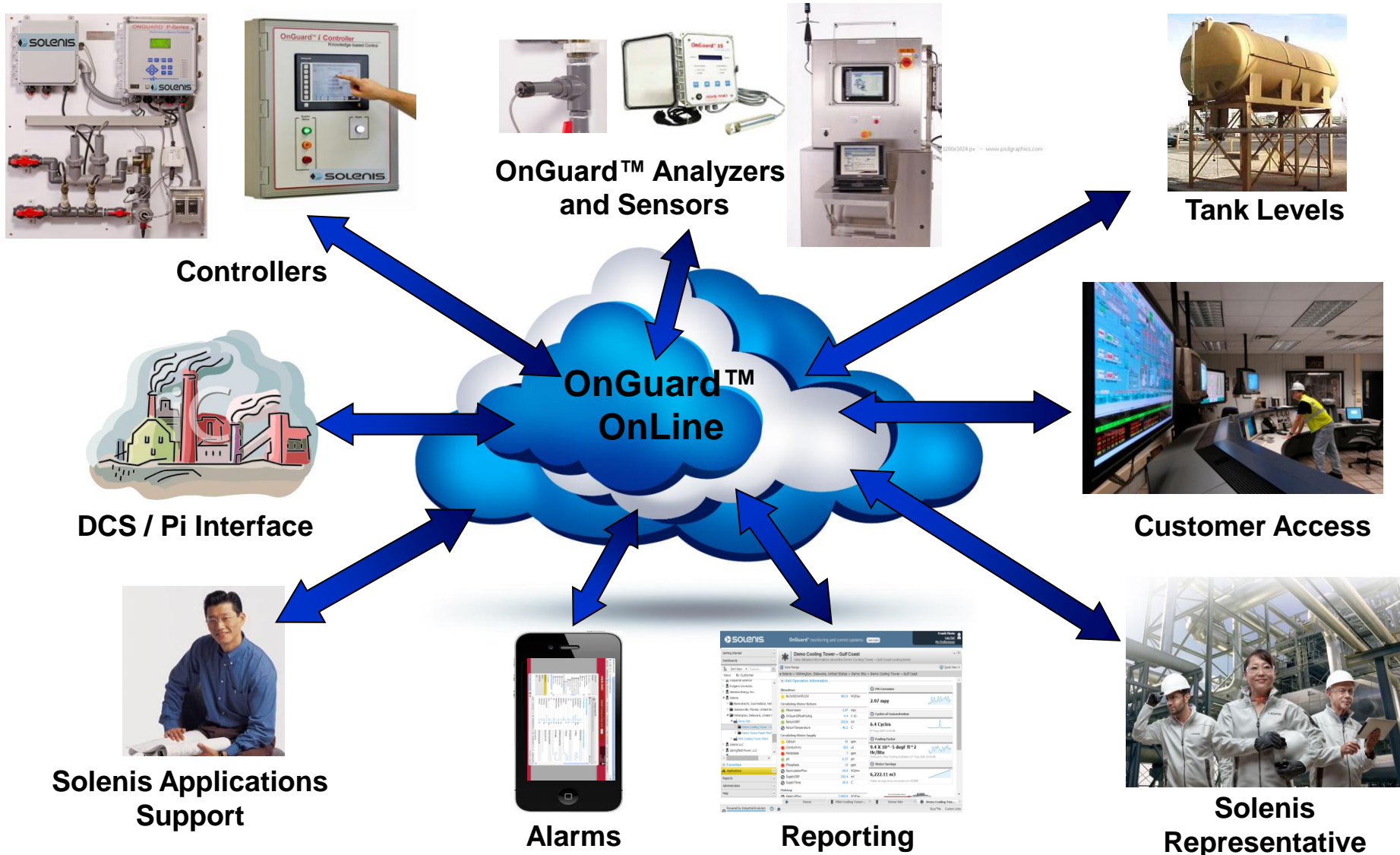
EVOLUTION OF TREATMENT, MONITORING, CONTROL

WHERE WE ARE HEADED

- **Advanced Treatment**
 - High Purity Boiler Feedwater
 - AVT, AP, Phosphate
 - Dispersants
 - Volatile Scavengers and Passivators
- **Advanced Analytical Techniques**
 - Continuous automated analysis
 - Precision titration methods
 - Ultra low detection limits in the field
- **Advanced Control Methods**
 - Smart Pumps
 - PLC and DCS systems
 - Artificial Intelligence



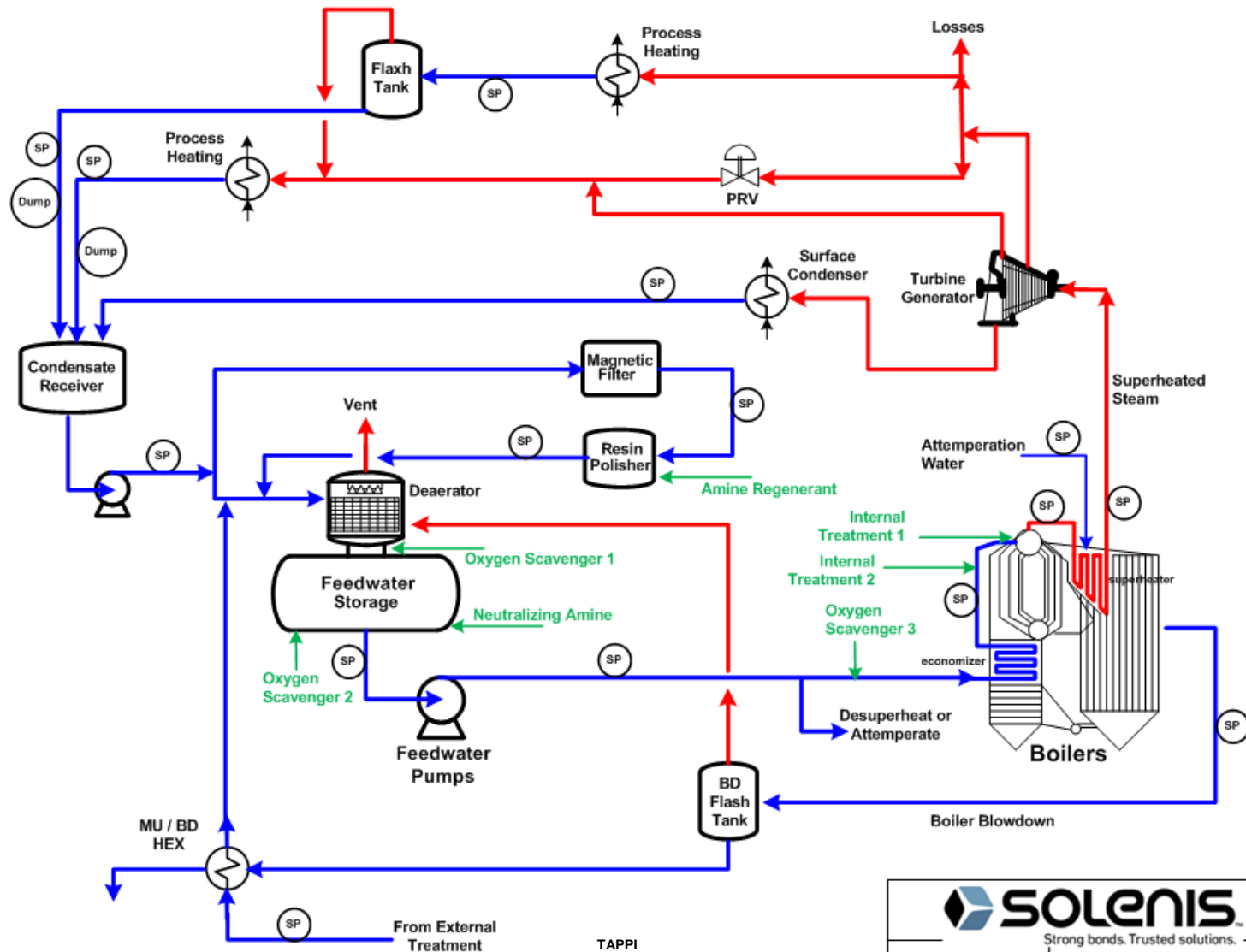
ONGUARD™ ONLINE PLATFORM ARCHITECTURE



Performance, Reliability, Cost Efficiency

MONITORING AND CONTROL
WHERE? WHAT? HOW?

MONITORING: WHERE? Boiler System Monitoring



TAPPI
TIP 0416-03
TIP 0416-14

MONITORING: WHAT?

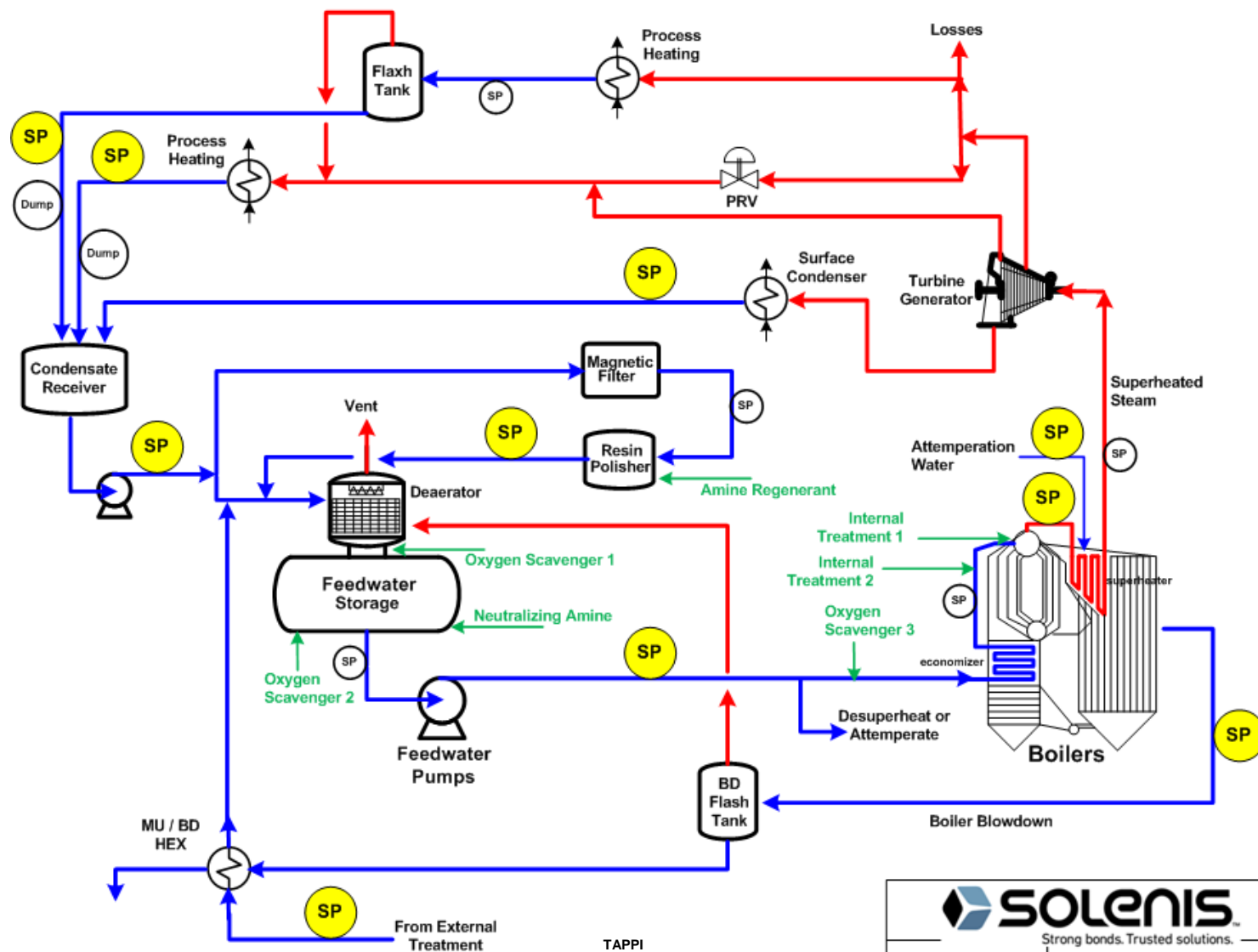
Key Operating Indicators (KOI)

- **Specific ions or water characteristics**
- **Specific flows**

Key Performance Indicators (KPI)

- **Corrosion**
- **Deposition**
- **Carryover**

MONITORING: HOW? Boiler System Monitoring



TAPPI
TIP 0416-03
TIP 0416-14

Strong bonds. Trusted solutions.	
Norris N. Johnston August 2000	Boiler System Monitoring

WHAT NOW?

DECISION MAKING AND DATA MANAGEMENT

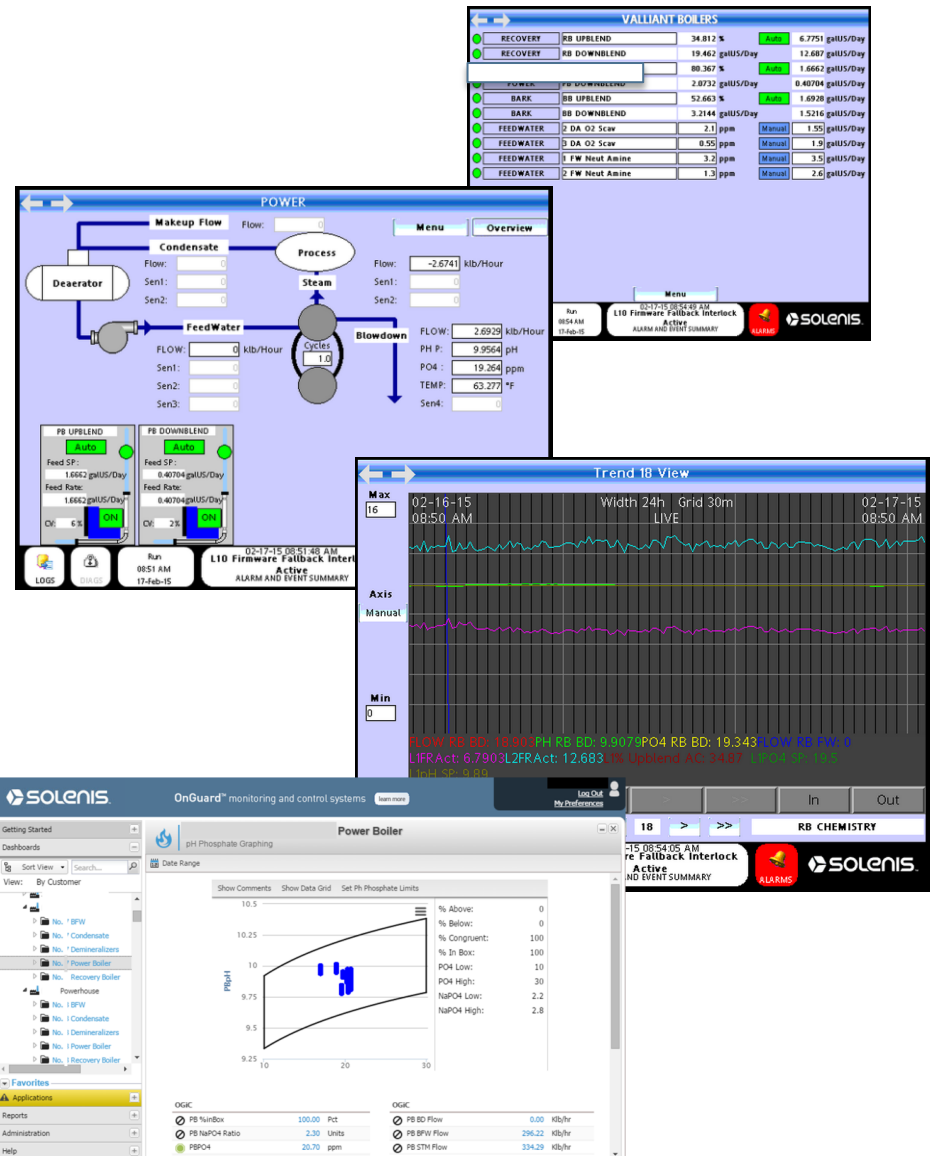
DECISION MAKING

Monitoring Results

- Grab Test Data
- Continuous Test Data

Control Results

- Process Variable Data
- Event Data
- Trends



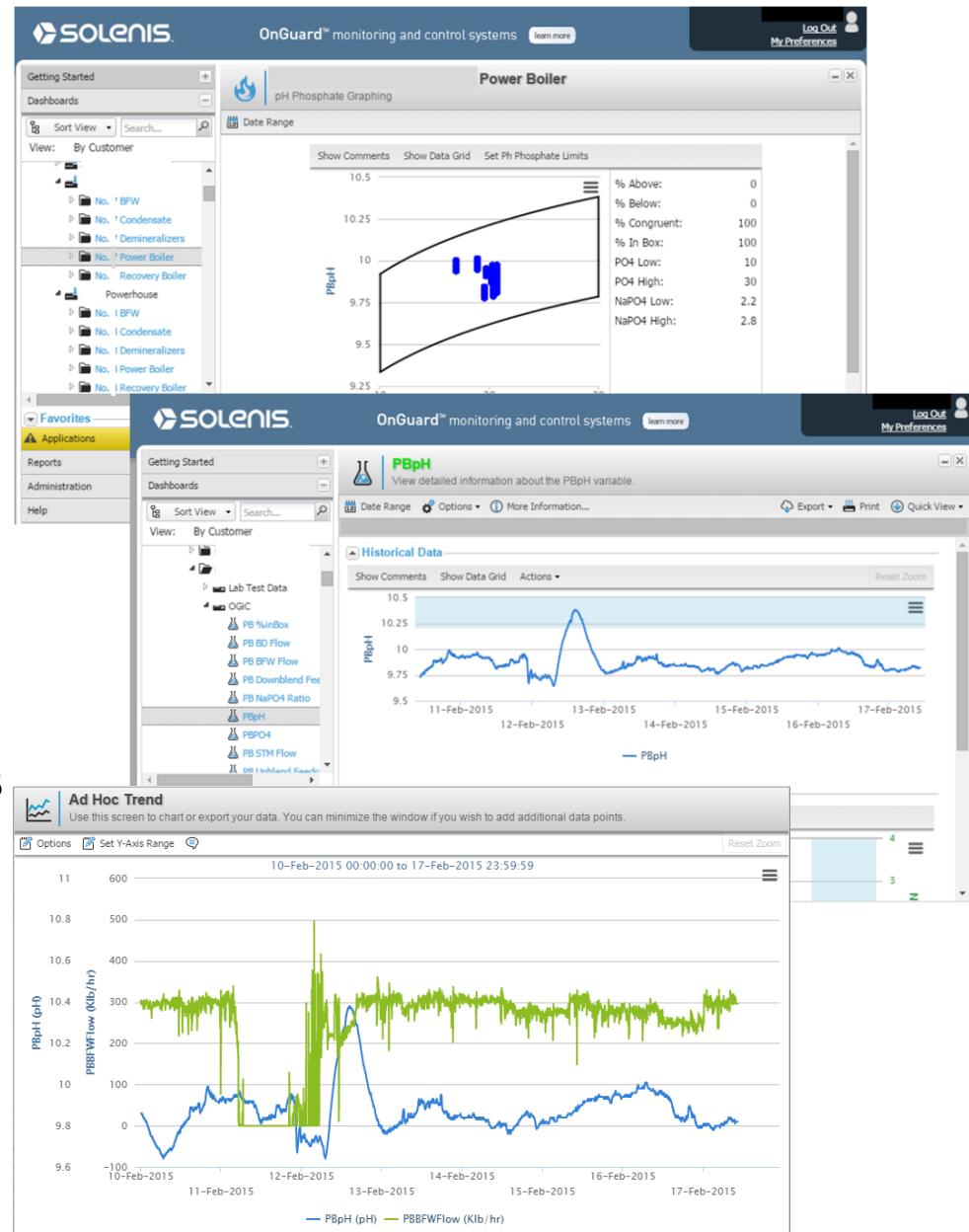
DATA MANAGEMENT

Real Time

- KOI and/or KPI tracking
- Trending

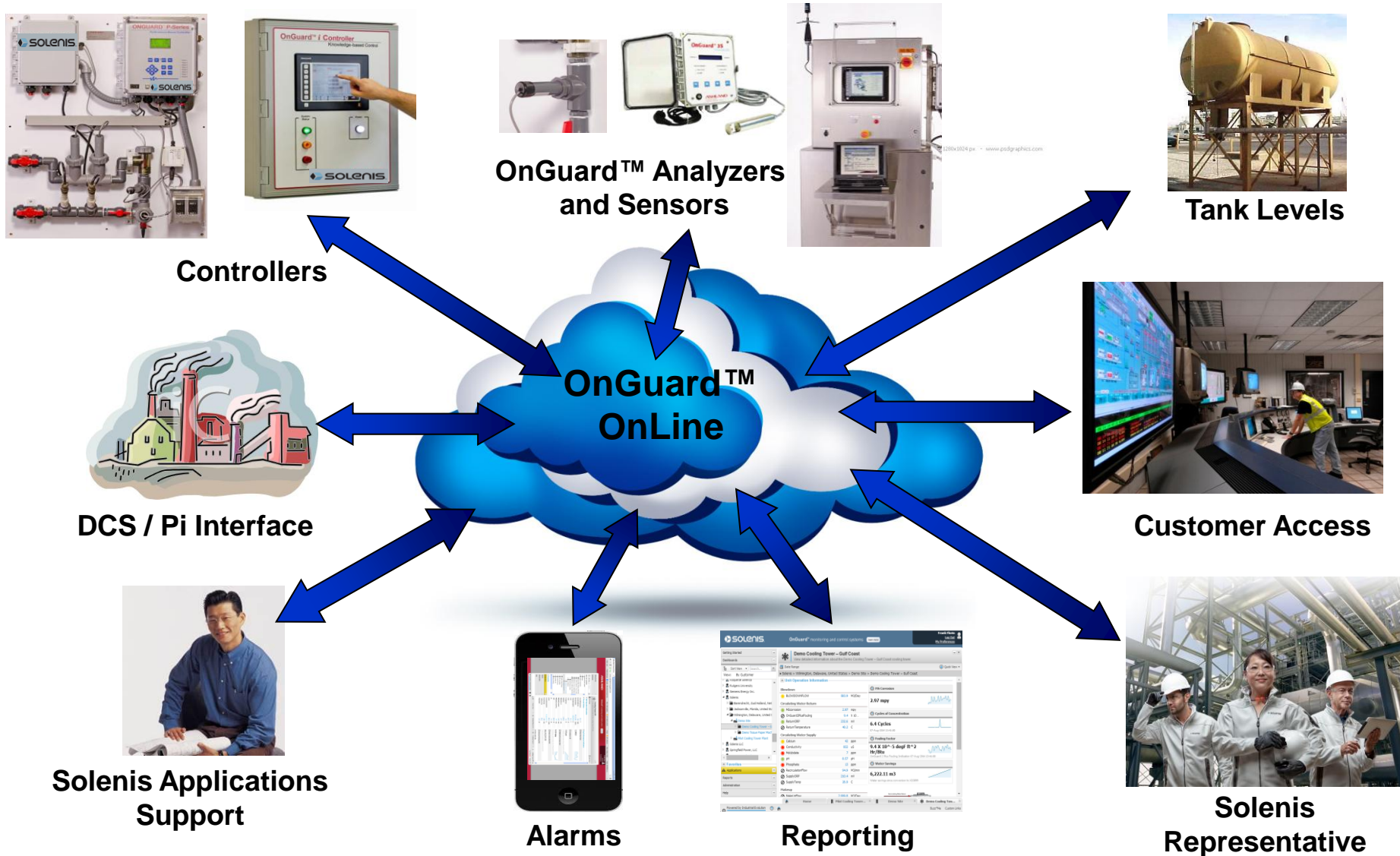
Historian

- KOI / KPI history
- Trend history
- Manual entry trends
- Continuous variable trends



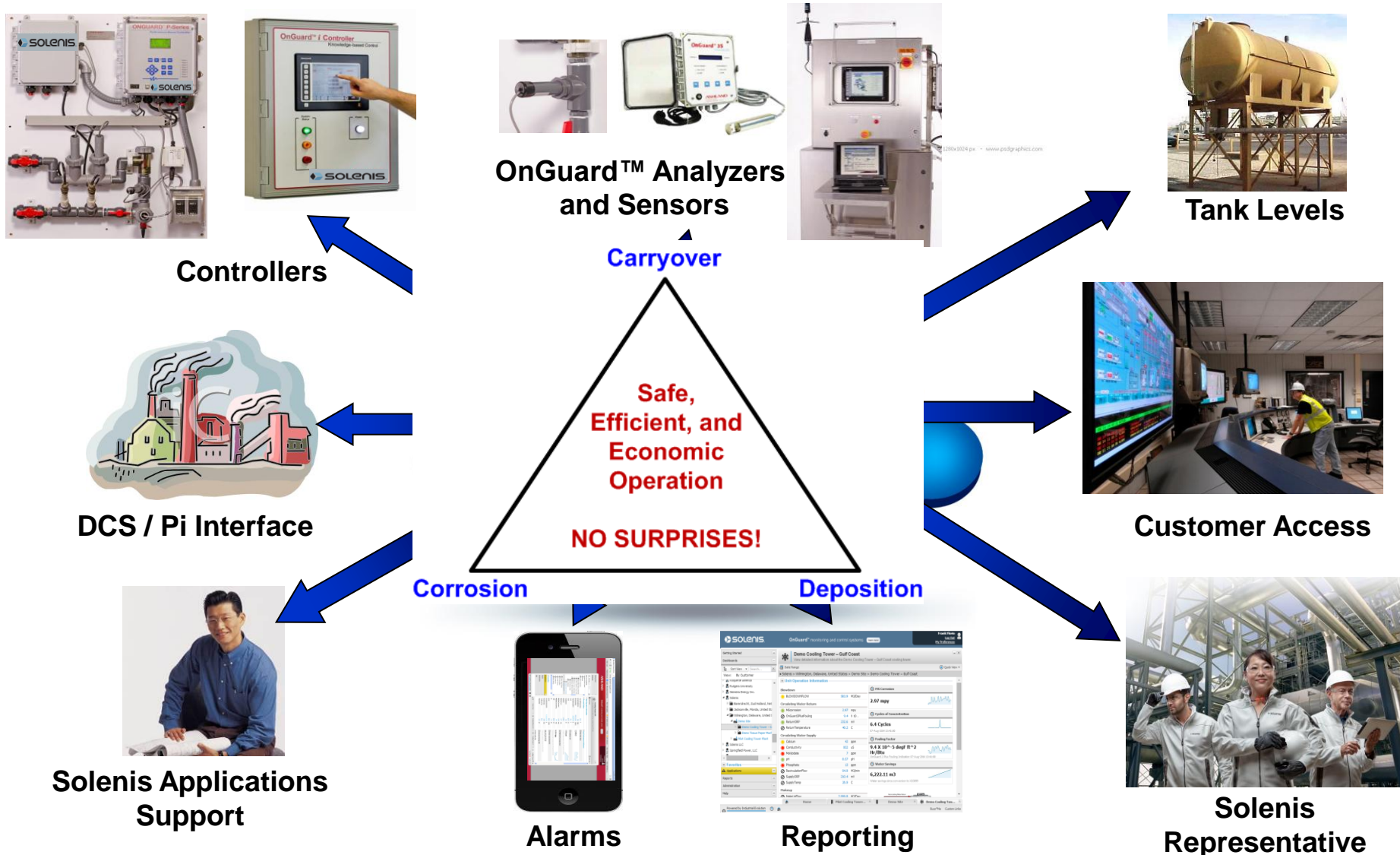
SUMMARY

ONGUARD™ ONLINE PLATFORM ARCHITECTURE



Performance, Reliability, Cost Efficiency

ONGUARD™ ONLINE PLATFORM ARCHITECTURE



Performance, Reliability, Cost Efficiency