EMPOWER YOUR ANALYTICS WITH OPERATIONAL DATA

Recognising Abnormal

Nick Ellis,
Director of Technology & Improvement – TRONOX Australia

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About Tronox

Tronox is a vertically integrated Mining and Inorganic Chemical business. The company mines and processes Titanium ore, Zircon and other minerals, and manufactures Titanium Dioxide pigments that add brightness and durability to paints, plastics, paper, and other everyday products.

We operate on 6 continents and have around 7000 employee's.

In Australia we have Mining, Mineral Processing and Upgrading and Titanium Dioxide Facilities.

The two TiO2 plants are Major Hazard Facilities, one here in Perth in the Kwinana industrial area and the other in Bunbury in the southwest of WA.

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PI Server Asset Framework Analysis is used to compare actual equipment performance to theoretic model and relational algorithms to predict deviations from “Normal”. PI Server Event Frames and PI Vision are then used to present deviations to plant engineers for review and action.

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CHALLENGES

- How do you improve plant OEE?
- How do you minimise the impact of unplanned events?
- How do you detect abnormal?
- How do you do it early enough, accurately enough and consistently enough to make a difference?
- How do you remember to do it time passes by and people pass through?

SOLUTION

- Data analytics used to compare actual performance to theoretical models, relational algorithms or process targets.
- Visualisation tools are used to present the data to engineers.
- Documented and controlled configuration becomes the store for your process knowledge.

RESULTS

- > 500 Analyses in Continuous Operation
- 8 Theoretical Model Comparators in use.
- Gradual incorporation in standard processes.
- Model and Relational Algorithm based monitoring paves the way for even smarter monitoring.

Abnormal Is Not Normal

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1st Quartile OEE Facility

Minimise The Impact Of Unplanned Events

Early Detection of Abnormal Conditions
Ensure that Abnormal is Not Allowed to Become Normal
Abnormal Always Leads to Action to Restore Normal

What did we want?

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TRONOX's Bunbury Plant needed a way to detect abnormal plant conditions. We wanted a solution that:

- Included automated processes.
- Utilised the relative strengths of computer systems and human resources
- Used our existing data sources and analytics products – OSIsoft PI Server data historian, PI Vision and PI Server Asset Framework
- Allowed us to capture corporate knowledge
- Freed up our engineering team from trolling through trends so they could focus on improvement and innovation, and not have to "find" the problems first.
- Slapped us in the forehead when something was not right!

Defining the system

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The system is

A way to get early, accurate and consistent indications of abnormal.

A way to turn data into a source of information to prompt enquiry and action.

A link from process deviations to unplanned and/or undesirable outcomes.

A detector of small deviations that prompt preventative action.

The system is not

A duplication of DCS alarms for operators.

A duplication of DCS asset monitoring applications.

A replacement for specialised asset monitoring techniques

A replacement for operator and maintainer monitoring.

What Did We Do?

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1. Studied the early indicators of biggest loss contributors.

2. Used PI Server Asset Framework to generate event frames, and PI Vision to display alerts.

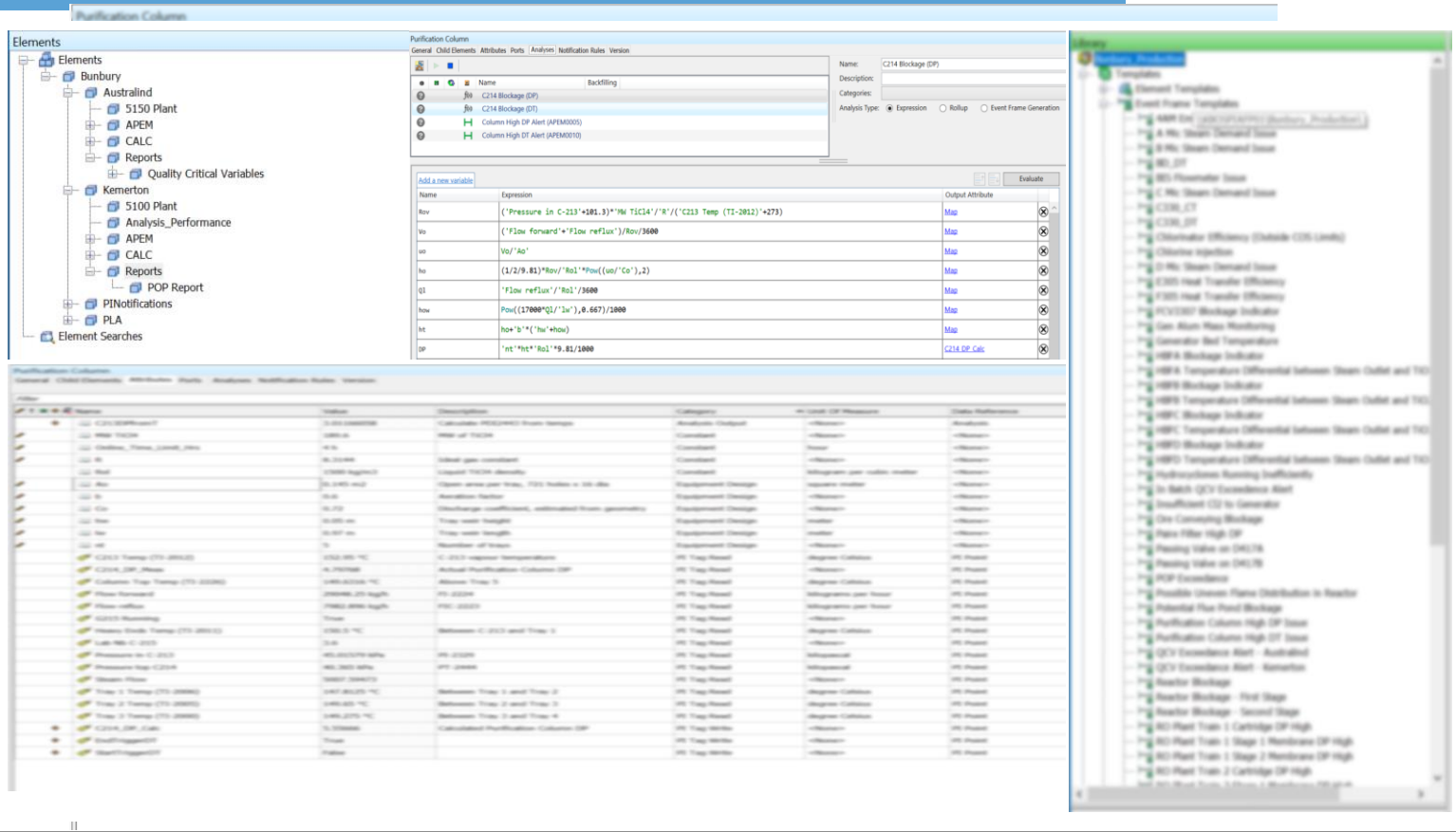
   Three kinds of alerts:

   - Automated Process and Equipment Monitors (model, relational and limit based analysis)
   - Quality Critical Variables (relational and limit based analysis)
   - Permissible Operating Parameters (limit based analysis)

3. Identified the right people who should received these alerts, to acknowledge and comment.

4. Began monitoring and tuning the alerts with a view to building them in to routine plant review processes

What Does It Look Like?



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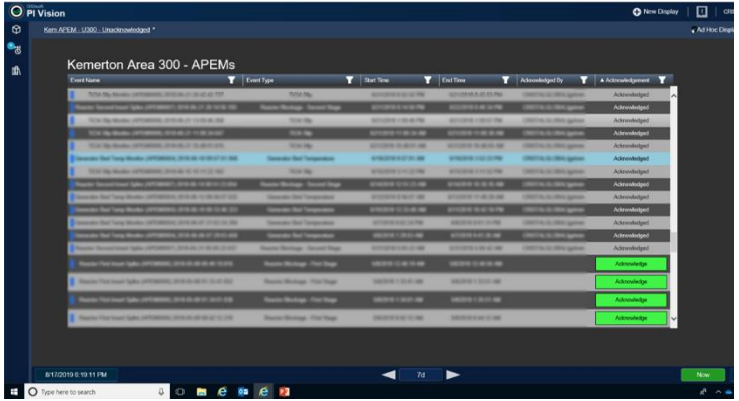

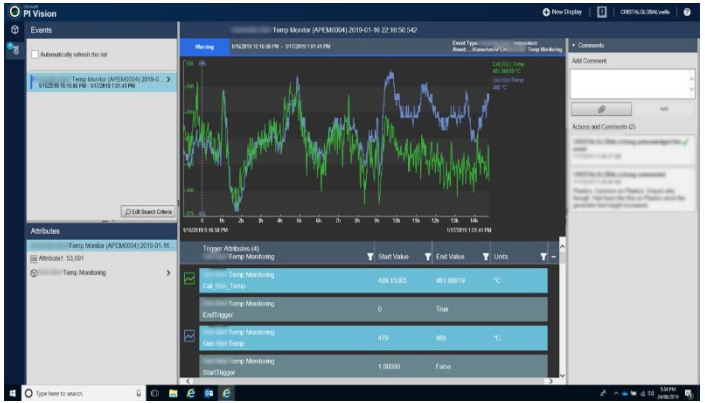

An Example – Normal v Abnormal

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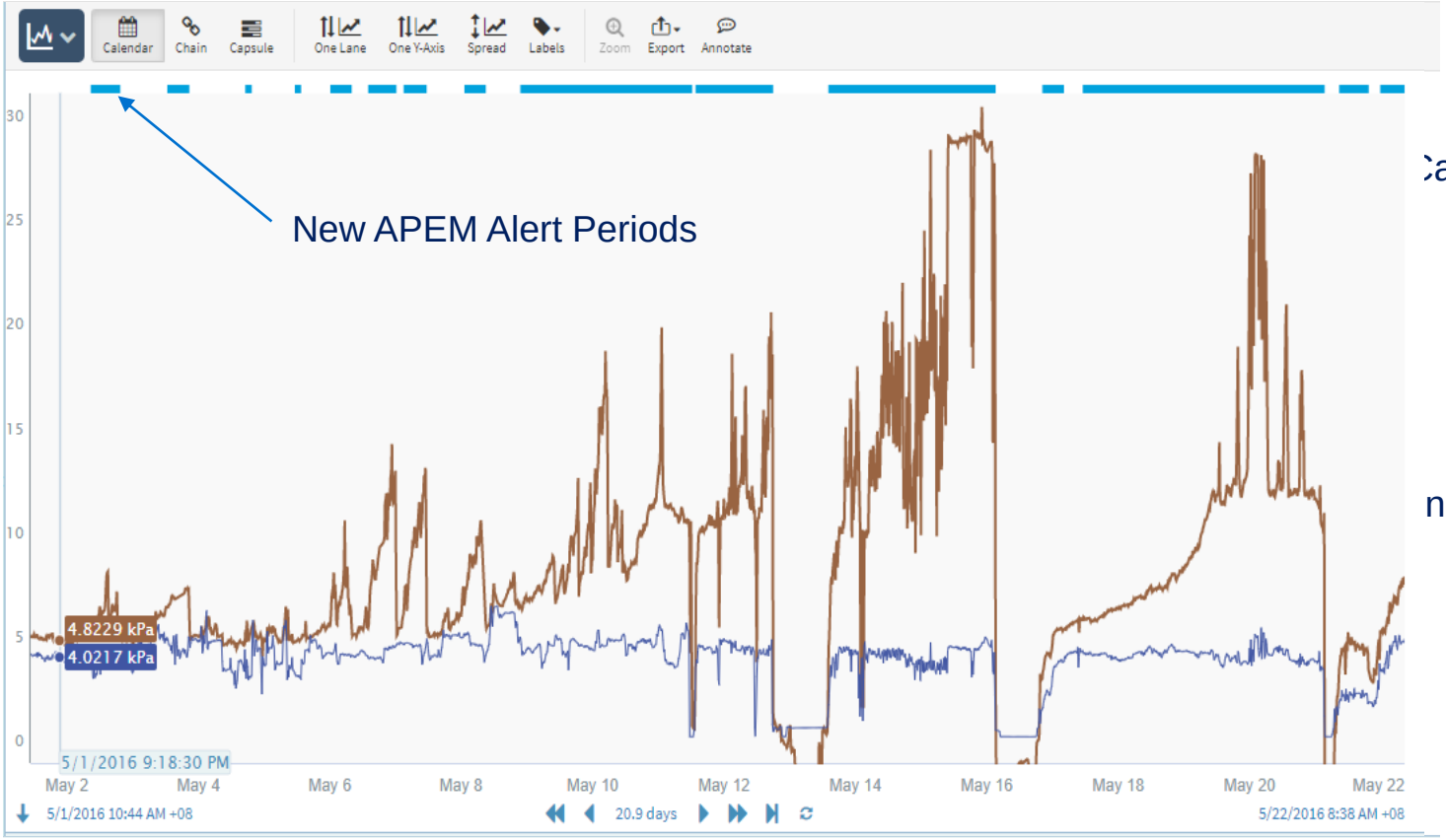

Calculated dP

nit Shutdowns

An Example – Applying APEM Method

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What Issues Did We Encounter?

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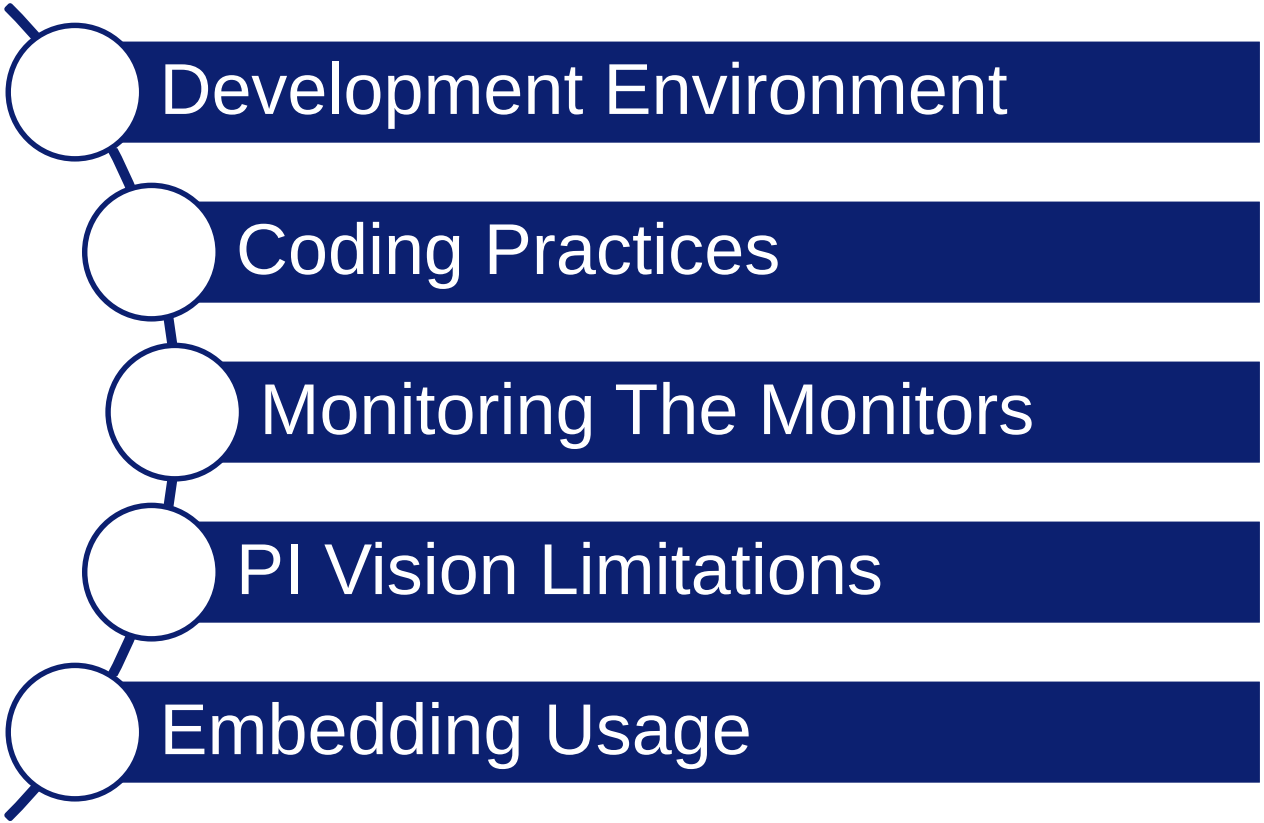

What Does The Future Hold?

Digital transformation is a key element of TRONOX Corporate strategy

- Continue to develop monitors in Bunbury
- Transfer approach to other pigment plants around the world.
- Look for opportunities in our Mining and Minerals separation operations.
- Looking at Seeq to partner with PI Server Asset Framework for Advanced Analytics and improved monitor development time.

Contact Information

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Thank You

Remember – Abnormal Is NOT Normal