OSIsoft.

REGIONAL SEMINAR 2012

APAC

The Power of Data

MALAYSIA

PI System Calculations

Operate, Maintain and Improve

Presented by **Wilson Lim,** Customer Support Engineer

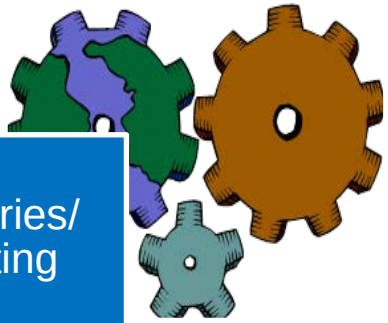
Why Calculate?

Operate

Maintain

Improve

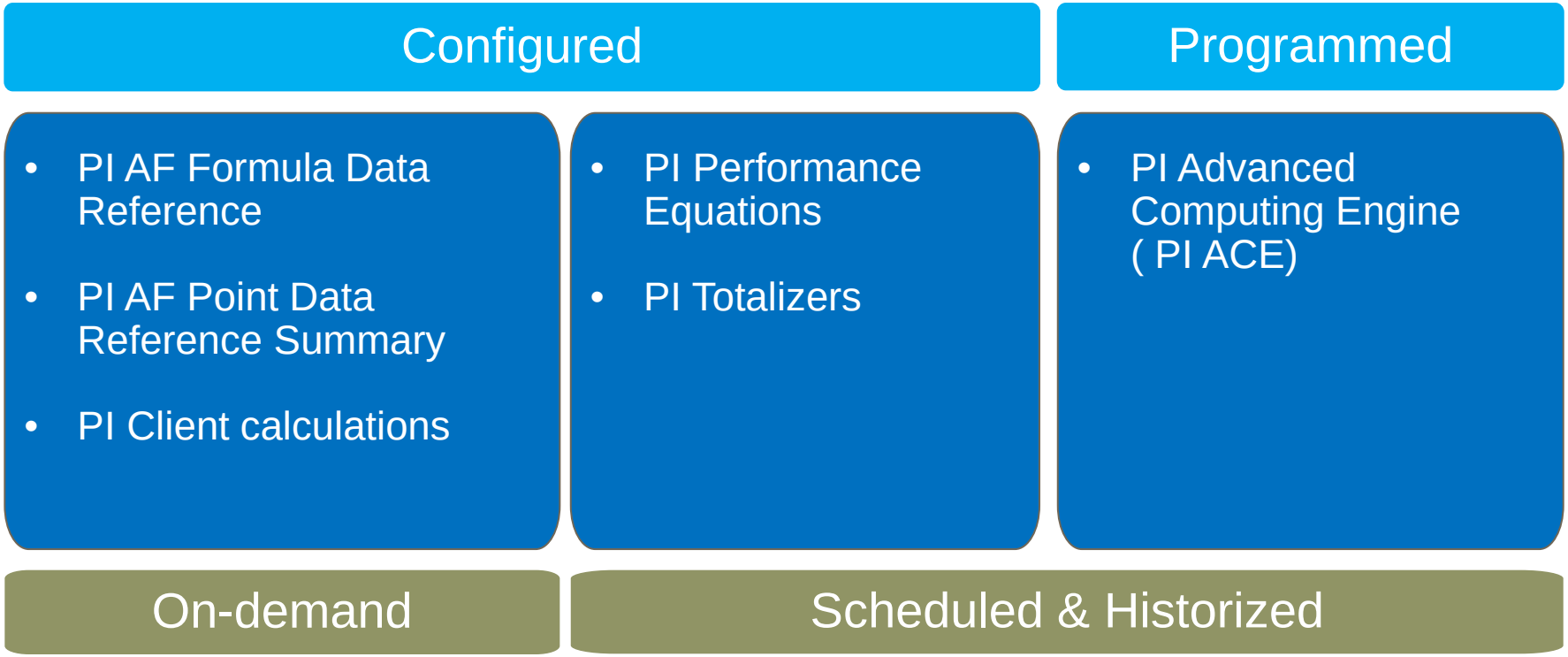
Summaries/ Reporting

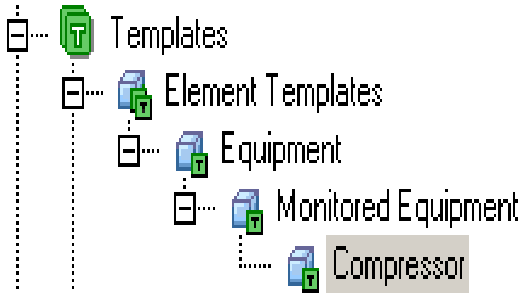


Performance

Data filtering

PI System Calculations





PI AF native

PI AF can help

PI Tag based

Compressor

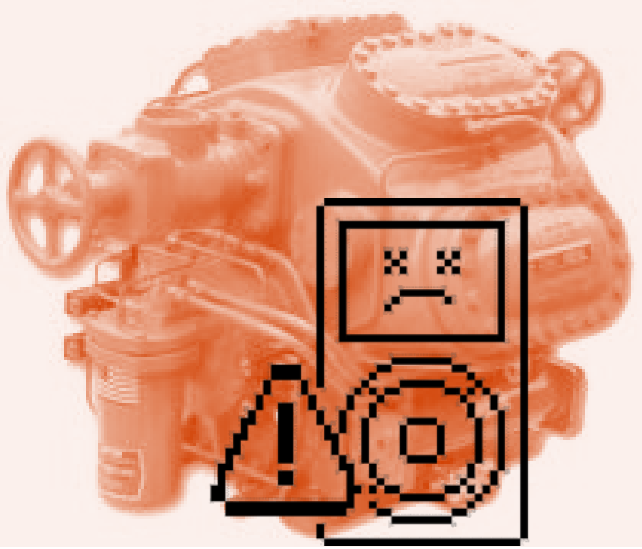
General | Attribute Templates | Ports

Filter

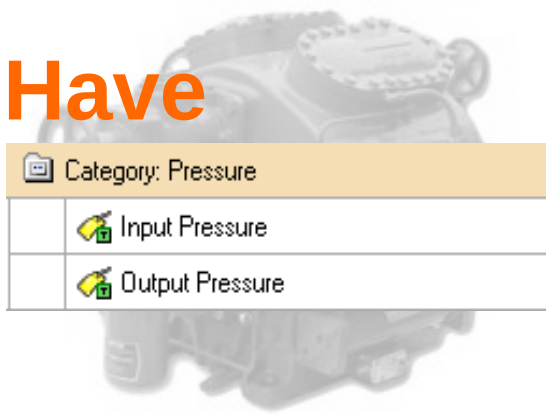
Name	Default Value
Template: Equipment	
Installation Date	0
Manufacturer	0
Model	0
Template: Monitored Equipment	
Status	0
Template: Compressor	
Casing Temperature	0 °C
Input Pressure	0 kPa
Oil Temperature	0 °C
Output Pressure	0 kPa
Power Draw	0 kW
Rating	0 hp
Speed	0 rpm

A Problem with Compressors…

“Seems like these things have heat issues when they run slow for too long”



Can I smooth out some of the data?



Have

Category: Pressure
Input Pressure
Output Pressure

+

Need

Category: Calculation
Input Pressure 5m Average
Output Pressure 5m Average

“The raw pressure numbers are too noisy.”

Data smoothing and averaging

Demo 

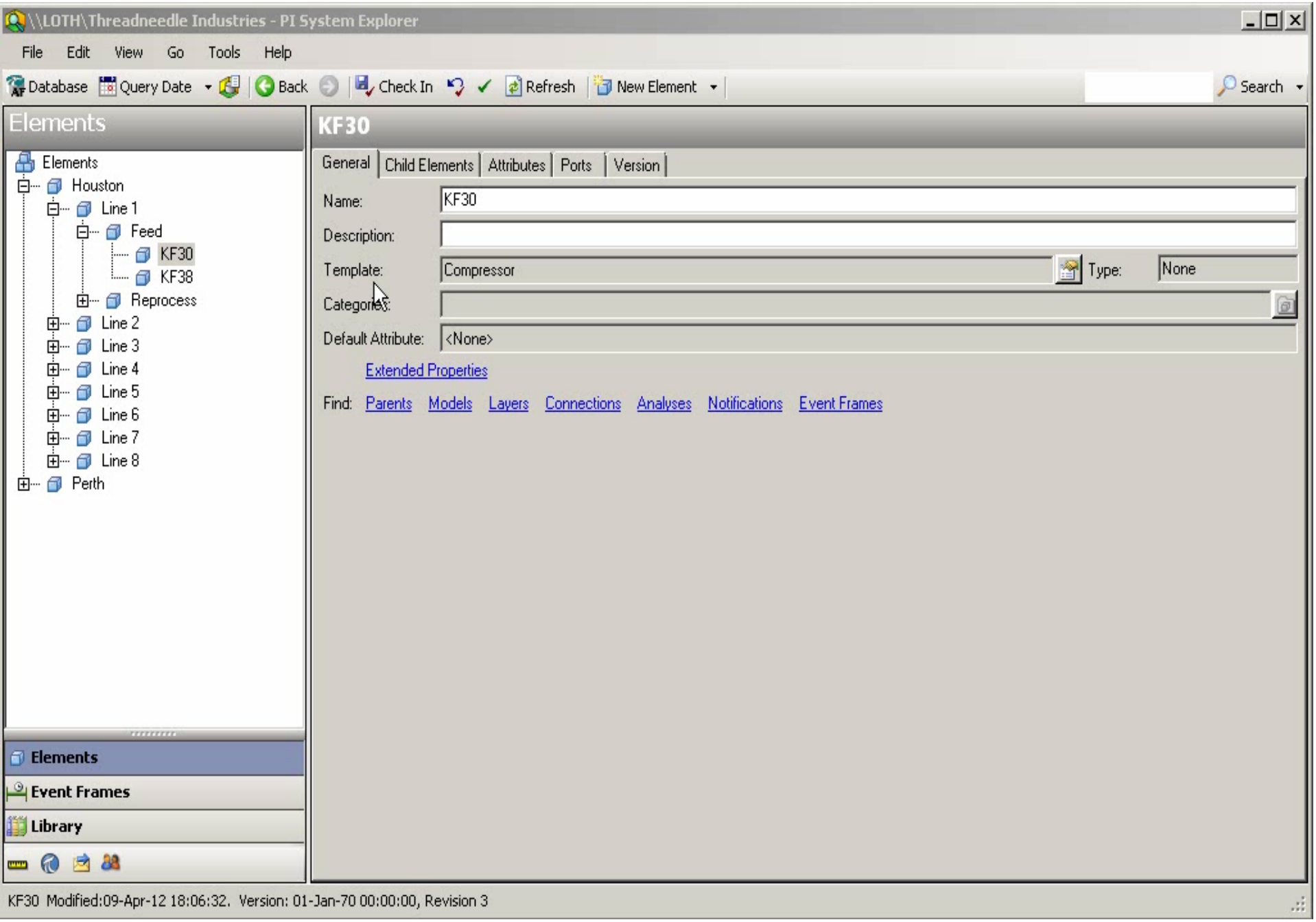
PI Point statistics

+ On-demand. No recalculation needed
+ Leverages PI AF Templates for easy rollout
- Not for long time ranges or dense datasets

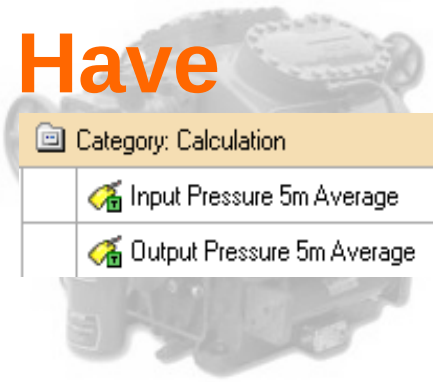
PI Totalizer tags

+ Efficient
+ Can be templatized and built by PI AF
- Tricky to configure, no recalculation

PI Performance Equation tags



How Hard are the Units Working?



Have

Category: Calculation
Input Pressure 5m Average
Output Pressure 5m Average

+

Need

Category: Calculation
Differential Pressure 5m Average

"What's the true pressure *across* each compressor?"

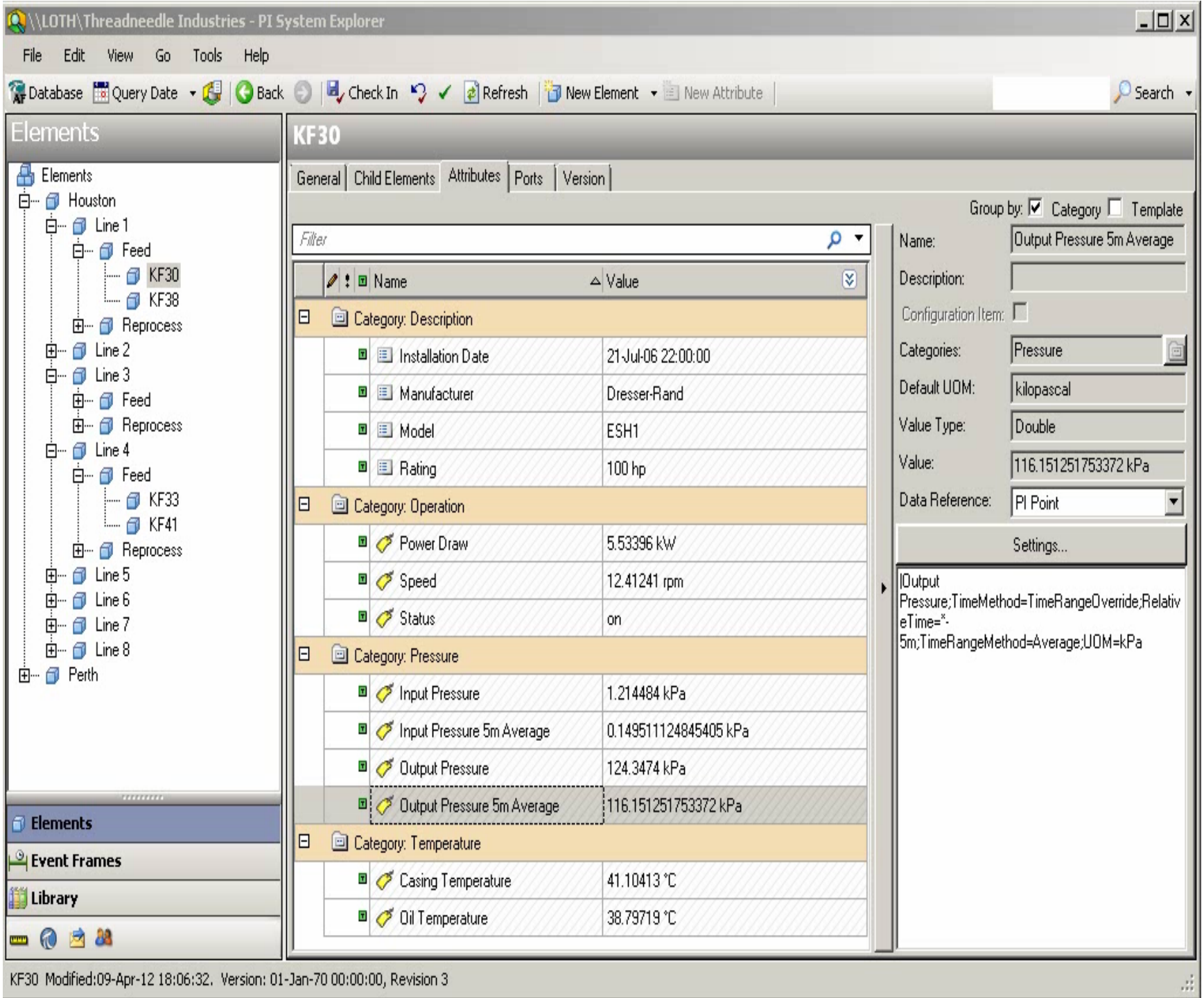
Simple Formula Calculations

PI AF Formulas

+ On-demand. No recalculation needed
+ Supports Units of Measure
+ Leverages PI AF Templates for easy rollout
- Not for use with strings, only numbers

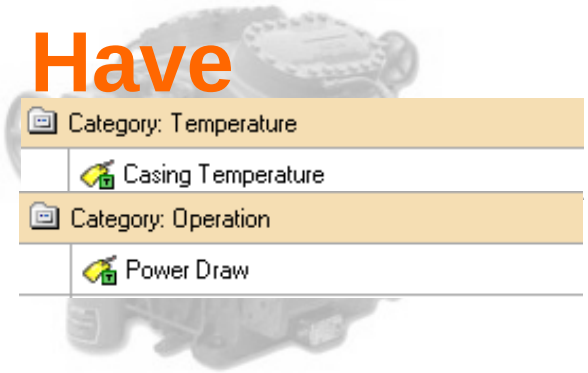
PI Performance Equation tags

+ 100+ function library
+ Universal PI PE syntax
+ Can be templatized and built by PI AF
- PI Data Archive tag inputs only


\\LOTH\Threadneedle Industries - PI System Explorer
File Edit View Go Tools Help
Database Query Date Back Check In Refresh New Element New Attribute Search
Elements
Elements
Houston
Line 1
Feed
KF30
KF38
Reprocess
Line 2
Line 3
Feed
Reprocess
Line 4
Feed
KF33
KF41
Reprocess
Line 5
Line 6
Line 7
Line 8
Perth
Elements
Event Frames
Library
KF30
General Child Elements Attributes Ports Version
Group by: Category Template
Filter
Name Value
Category: Description
Installation Date 21-Jul-06 22:00:00
Manufacturer Dresser-Rand
Model ESH1
Rating 100 hp
Category: Operation
Power Draw 5.53396 kW
Speed 12.41241 rpm
Status on
Category: Pressure
Input Pressure 1.214484 kPa
Input Pressure 5m Average 0.149511124845405 kPa
Output Pressure 124.3474 kPa
Output Pressure 5m Average 116.151251753372 kPa
Category: Temperature
Casing Temperature 41.10413 °C
Oil Temperature 38.79719 °C
Name: Output Pressure 5m Average
Description:
Configuration Item:
Categories: Pressure
Default UOM: kilopascal
Value Type: Double
Value: 116.151251753372 kPa
Data Reference: PI Point
Settings...
|Output Pressure;TimeMethod=TimeRangeOverride;RelativeTime=*-5m;TimeRangeMethod=Average;UOM=kPa
KF30 Modified:09-Apr-12 18:06:32. Version: 01-Jan-70 00:00:00, Revision 3

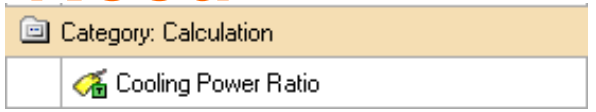
Are the Units Cooling to Spec?

Have



+

Need



"What is the hourly temperature average per total power draw that hour?"

Conditional/Filtered Statistics

PI Performance Equation tags

+ 100+ function library
+ Universal PI PE syntax
+ Can be templatized and built by PI AF
- PI Data Archive tag inputs only

PI Totalizer tags

+ Efficient
+ Uses universal PI PE syntax for filters/conditions
+ Can be templatized and built by PI AF
- Tricky to configure, no recalculation

PI Advanced Computing Engine

(stay tuned)

PI Performance Equation Syntax

Cooling to Power Ratio

TagAvg(‘CaseTemp’ , ’*-1h’ , ’*’) /
(TagTot(‘PowerDraw’ , ’*-1h’ , ’*’) * 24)

Daily run hours when power > 20A

TimeGE(‘ PowerDraw’ , ‘*-24h’ , ’*’ , 20) / 3600

PI Performance Equation Syntax

Hourly power draw, compensating for bad data

```
IF
    PctGood( ‘PowerDraw’ , ’*-1h’ , ’*’ ) > 50
THEN
    TagTot( ‘PowerDraw’ , ’*-1h’ , ’*’ ) * 24
ELSE
    NoOutput()
```

Compare performance between assets

Have

Category: Temperature

Oil Temperature

\+

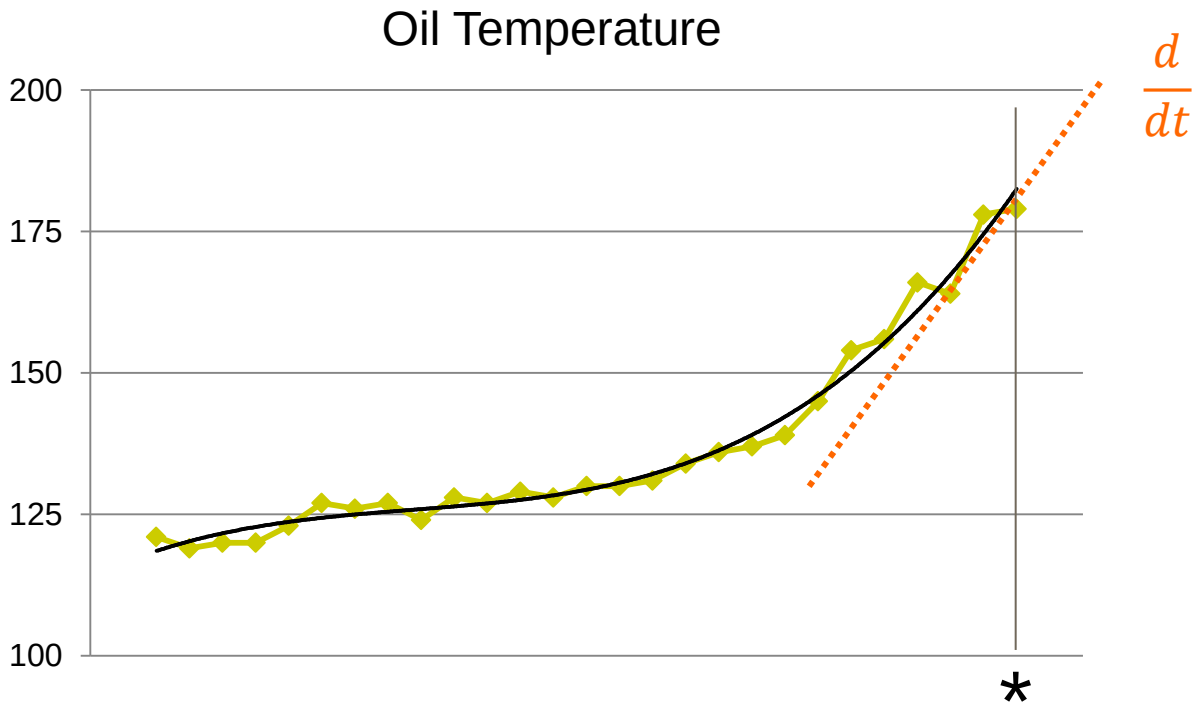
Need

Category: Calculation

Oil Temperature Rate of Change

"How fast is this thing heating up?"

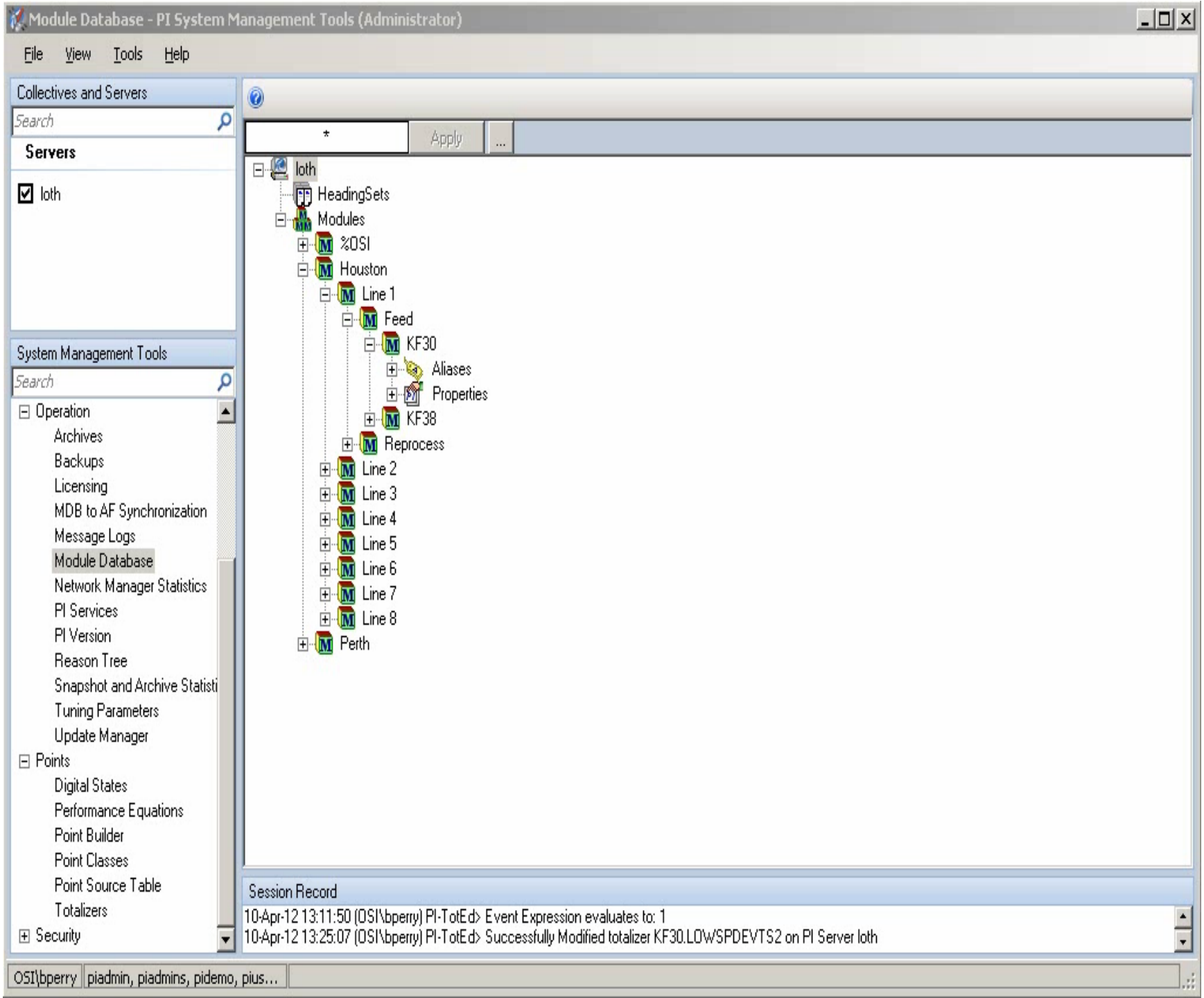
Calculating rate of change



Complex calculations

PI Advanced Computing Engine

+ Power of .NET with ease of a wizard
+ Write for one asset, apply to many assets
+ Manual and automatic recalculation
· Indirect support for PI AF via AF Link
- Requires Visual Studio license


Module Database - PI System Management Tools (Administrator)
File
View
Tools
Help
Collectives and Servers
Search
Servers
loth
System Management Tools
Search
Operation
Archives
Backups
Licensing
MDB to AF Synchronization
Message Logs
Module Database
Network Manager Statistics
PI Services
PI Version
Reason Tree
Snapshot and Archive Statisti
Tuning Parameters
Update Manager
Points
Digital States
Performance Equations
Point Builder
Point Classes
Point Source Table
Totalizers
Security
*
Apply
...
loth
HeadingSets
Modules
%OSI
Houston
Line 1
Feed
KF30
Aliases
Properties
KF38
Reprocess
Line 2
Line 3
Line 4
Line 5
Line 6
Line 7
Line 8
Perth
Session Record
10-Apr-12 13:11:50 (OSI\bperry) PI-TotEd> Event Expression evaluates to: 1
10-Apr-12 13:25:07 (OSI\bperry) PI-TotEd> Successfully Modified totalizer KF30.LOWSPDEVTS2 on PI Server loth
OSI\bperry
piadmin, piadmins, pidemo, pius...

General Guidelines

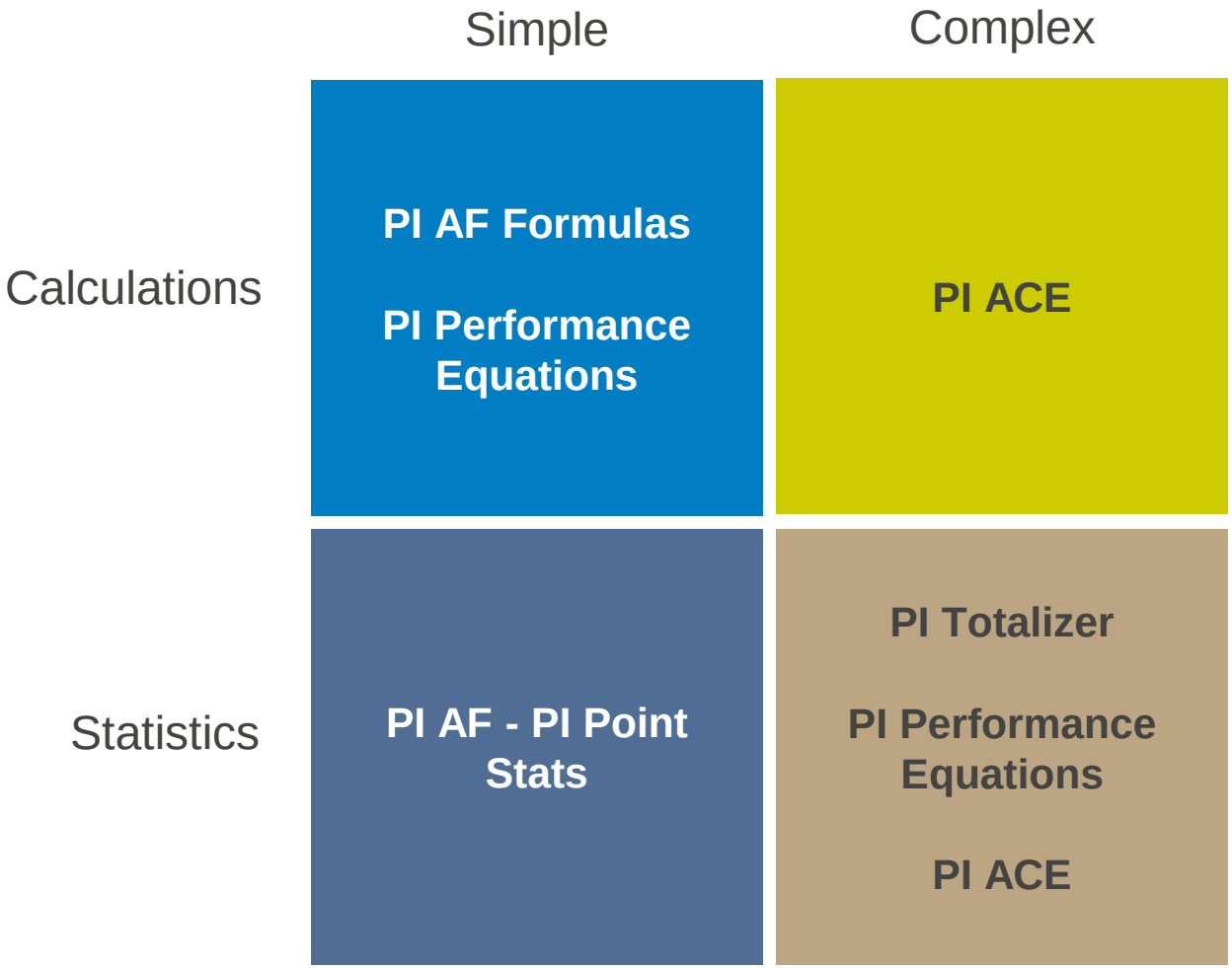
PI AF Formulas and PI AF - PI Point summaries
- Simple on demand calculations
- Small time range and data value summarization

PI Performance equations
- Simple scheduled calculations – 2 or 3 nested IF/THEN levels

PI Totalizers
- Efficient scheduled summarizations

PI Advanced Computing Engine
- Flexible programming environment for scheduled calculations

General Guidelines - Summary



With power comes responsibility

- Have I considered the performance impact?
  - ✓ Solution choice, calculation frequency, amount of input data
- Have I selected the right calculation solution?
  - ✓ Simplicity, performance and manageability
  - ✓ PI Point Statistics data too dense? → PI Performance Equation or PI Totalizer
  - ✓ PI Performance Equations too complex/numerous? → PI ACE
- If you aren't sure, ask!
  - ✓ OSIsoft Technical Support
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  - ✓ Center of Excellence for Enterprise Agreement customers

Wilson Lim

wlim@osisoft.com

Customer Support Engineer

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