



**OSI**soft®

# USERS CONFERENCE 2017

MARCH 20-23 | SAN FRANCISCO



# Users Conference 2017 San Francisco - Highlights



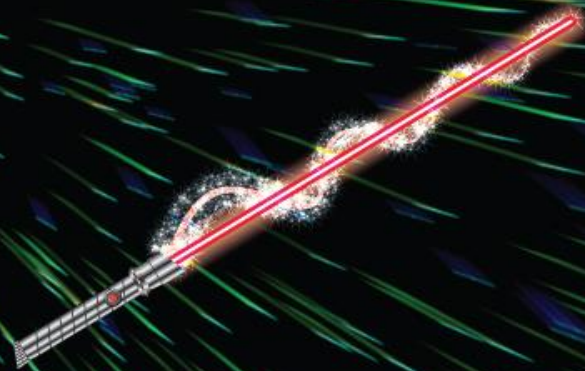


# PI Developer Community

Presented by **Ahmad Fattahi**

**Group Leader, Technology Enablement, OSIsoft**

# WELCOME TO THE GEEK SIDE





# Welcome to the Developer Track!

# Hackathon

**Barrick Gold** is data sponsor

**41 hackers, 11 teams**

Monitoring industrial mobile assets

Judging and Pitch Panel

# Developer Track

**Wednesday  
afternoon and all  
Thursday**

**10 unique hands-  
on labs**  
**11 technical  
presentations**

**Data Science**

- 1 lab and 3 presentations

**Developer Lounge**

- For PI Geeks to stop by product booths and geek it out

**Vox Pop sessions**

- Ad hoc roundtable discussions whose topics are decided by the voice of attendees

**Geek Night!**

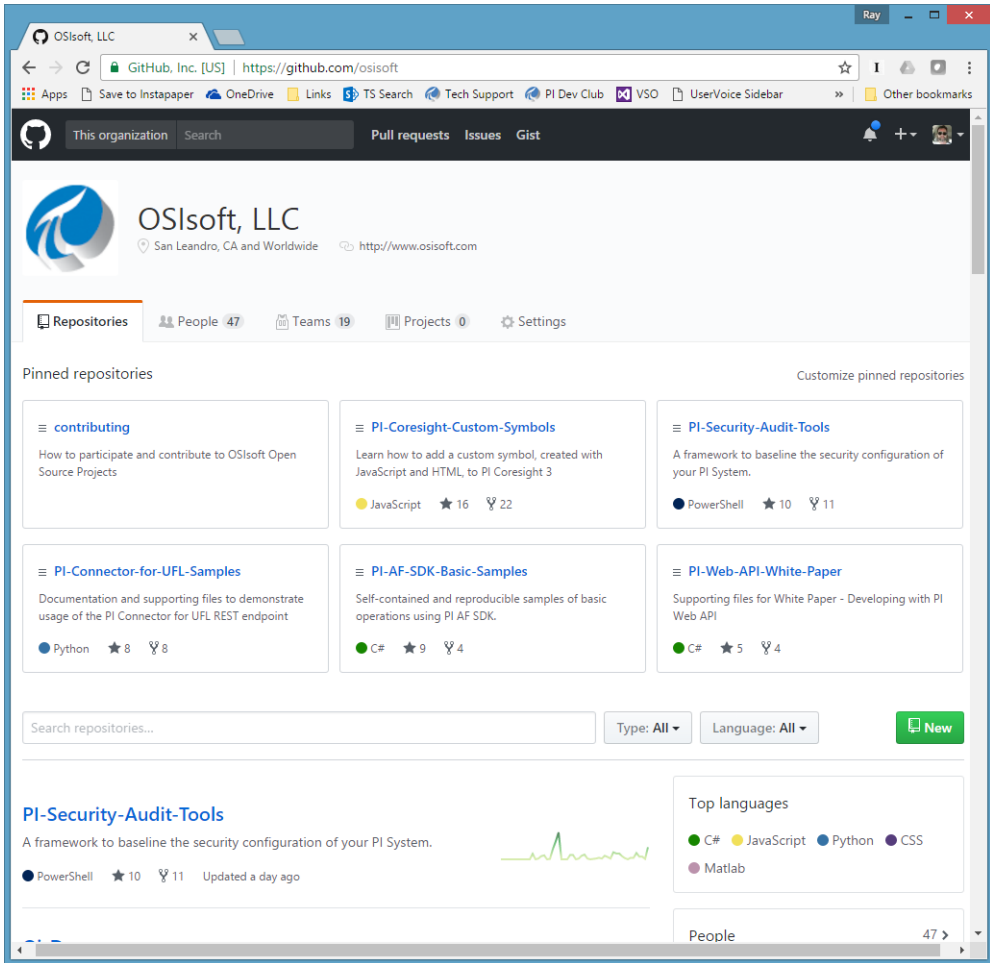
# PI Developers Club

- 2600 active members
- 6600 Subscriptions
- 955 posts last year
- 32 technical blog posts
- 12 webinars



# GitHub

- 22 repositories
- Collaboration
- White papers, UC labs
- Wish open Source? Talk to us!



# OSIssoft is on Github!

<http://github.com/osisoft>

**26 Projects and growing!**



# PI Developers Club – Looking forward

Grow the  
community of PI  
Builders

Evangelize and  
Improve  
Developer  
Technologies

Enable  
Innovation

Focus on **Data  
Science**



# Roadmap for PI Developer Technologies

Presented by **Ray Verhoeff, David Moler,  
Mike Sloves, Bodo Bachmann,  
Frank Garriel**

# Custom Applications for Your Business

- Desktop applications
- Mobile applications
- Business system integration
- Web services:
  - Much like PI Web API but built by you based on your own service designs
  - Same requirements as us:
    - Performance, scalability
    - Security
    - Large number of users

# PI Developer Technologies

## PI AF SDK

- A single high-performance .NET Framework SDK that gives you to access all PI System data

## PI Web API

- Modern REST-based web service standard, ideally suited for many platforms

## PI SQL Products

- Use SQL client applications to access PI System Data
- Integration with business systems

## PI OPC Servers

- Enables access to PI from OPC client applications
- Integration with industrial information systems

# Pricing



# PI Developer Technologies

- [Overview on the Technical Support website](#)
- [Product Roadmap](#)
  - Look for the “Developer Technologies” group
- [PI Developers Club](#)
  - Part of [PI Square](#)
- Code samples on [GitHub](#)
  - See OSIsoft’s organization at <http://www.github.com/osisoft>



# Getting ideas from you!



USERVOICE

- <https://feedback.osisoft.com/>
- Making it easier to send us suggestions
- Vote suggestions up or down
- Embedding UserVoice into our products
- *Problems should still go to Technical Support*

# At the Conference



- Presentations
- Product Expo
- Developer Lounge
- Learning Labs

# Presentation

- “How to pick the right PI Developer Technology for your Project”
  - Today, 10:15 – 11:00 am
  - Cyril Magnin II



www.wordclouds.com



# AF SDK

# AF SDK: What's new and what's coming

- Configuring Notifications
- Backfilling and Recalculating Asset Analytics
- Ongoing initiatives
  - More context
  - Performance
  - Search
  - Aggregation
- New initiatives

# Notifications and Asset Analytics






## *How can I interact with PI System Services?*

- New architecture for Notifications – much more scalable
  - Configure via AFNotificationRule
  - Triggers on Event Frames matching search criteria
  - History stored on Event Frame
  - No more AN SDK
- Asset Analytics
  - Queue backfilling, recalculation of analyses

# Attribute Traits

*How can I know what to query without user input?*

- Automatically use relationships without configuration
  - Forecast, Limits, Analysis Triggers (2016)
  - Locations (2016 R2)
  - Health (2017 R2)
- Relate asset to its location
- Evaluate limits for attribute
- Trend prediction with actual
- Calls to find attribute by trait

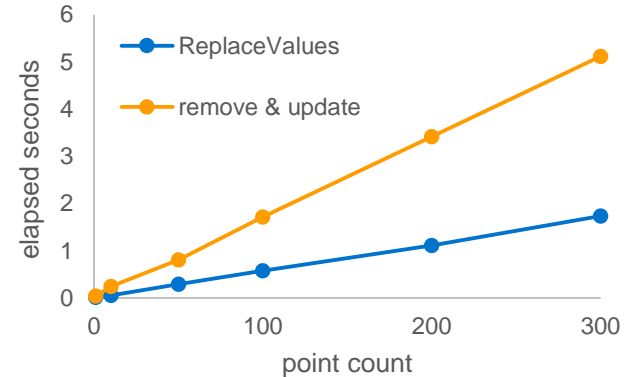
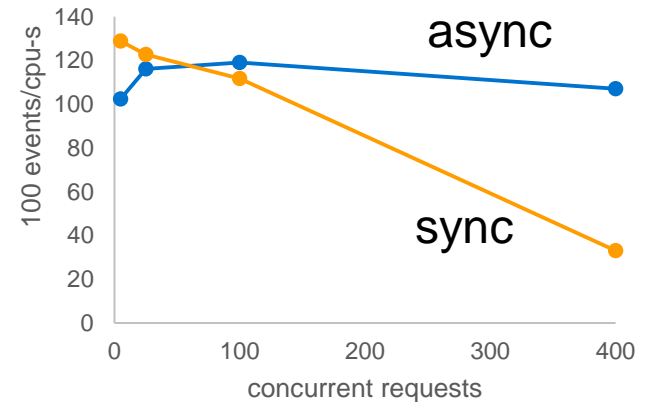
Name	Value	Trait
 Level	34.02396	
 High Level	80	Hi
 Low Level	20	Lo
 Predicted	58.4995155	Forecast
 Target	37.67728	Target



# Performance and Efficiency

*How can I get data in and out of PI System more efficiently?*

- Asynchronous data read/write calls (2016)
  - Yields thread to do other work while waiting on I/O
  - Recorded, Interpolated, Plot, Summary, Update
  - Supports AFAttribute and PIPoint
- Replace values (2016 R2)



# Search

*How can I quickly get the data I need from the PI System?*

- Filter-based searches - much more flexible (49 filters)
- Many new fields to filter on
  - “Template:‘Tank Event’ Start:>=’\*-3d’ |Level:>=45.0”
- 2016: Server cache, full load of matches, client-side matching
- Light-weight search (2017)
  - No SDK object loaded
  - Only gets requested fields
- PI Point search by value/timestamp/status (2017)
- Search for attributes (2017 R2)

```
class Dto
{
    public Guid ID;
    public DateTime StartTime;
    [AFSearch.ObjectField("Level")]
    public AFValue Level;
}
IEnumerable<Dto> matches =
    search.FindObjectFields<Dto>();
```

# Search Aggregates

## *How can I aggregate data efficiently?*

- Search aggregates (2017)
  - Summaries (min, max, count average, total, etc.)
  - Grouping (discrete)
  - Binning (continuous)
  - Can be layered, done in bulk
  - Built on light-weight search
- Server-side support for aggregates (2017 R2)

```
// outage count by week
search.Histogram(
  field: "StartTime",
  bins: beginningOfWeeks);

// average duration by reason
search.GroupedSummary(
  groupedField: "|Reason",
  summaryField: "Duration",
  summaryTypes:
    AFSummaryTypes.Average);
```

# New Initiatives for 2018

## *What's next?*

- Data quality
  - Flag stale data
  - Propagate quality information
- Event frame scale-out

## Also of interest for AF SDK developers

- **Presentations**
  - **PI Server 2017 (11:30-12:15)**
  - **Best Practices for Implementing PI AF – Customer Testimonials (3:30-4:15)**
  - **Best Practices for Building AF SDK Applications (2:15-3:00)**
- **Hands on Lab (requires pre-registration)**
  - **Building Reports from Your Event Frame Data (2:15-5:15)**



# PI Web API

# PI Web API 2017

- Releasing in April 2017
- Features
  - PI Web API Performance Improvements
  - Claims-based identity
  - Security Improvements for 2017
  - Health Status endpoint
  - Time Zone Support
  - Public PI Web API sandbox
  - Small feature additions
    - Search Event Frame by severity
    - RecordedValuesAtTimes
    - Etc. (See Release Notes because you all read them)

# PI Web API 2017 R2

- Support AF Notifications
- Client Libraries!
- Support for AFAnalysis
- Continue Performance Improvements
- Continue Security Improvements
- WebId 2.0



# PI Web API 2018

- Complete Indexed Search Relaunch!
- Even more performance improvements and scaling options
- Improved installation and administration experiences
- Much more to come....

# Presentation

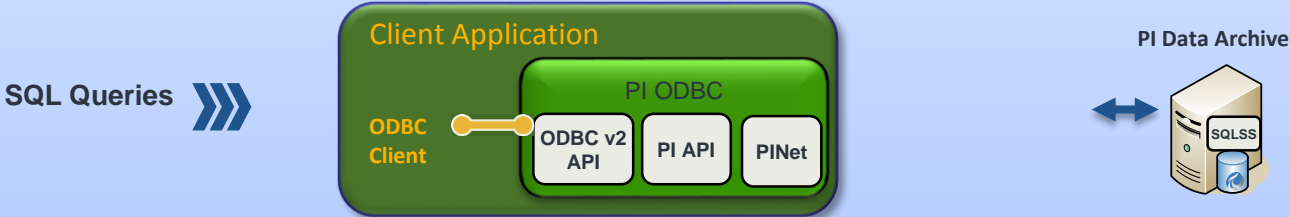
- “Build a Secure, Public-Facing PI Web API Environment”
  - Today, 3:30 – 4:15 pm
  - Cyril Magnin II



# PI SQL Family

# PI SQL Family Evolution

## PI ODBC

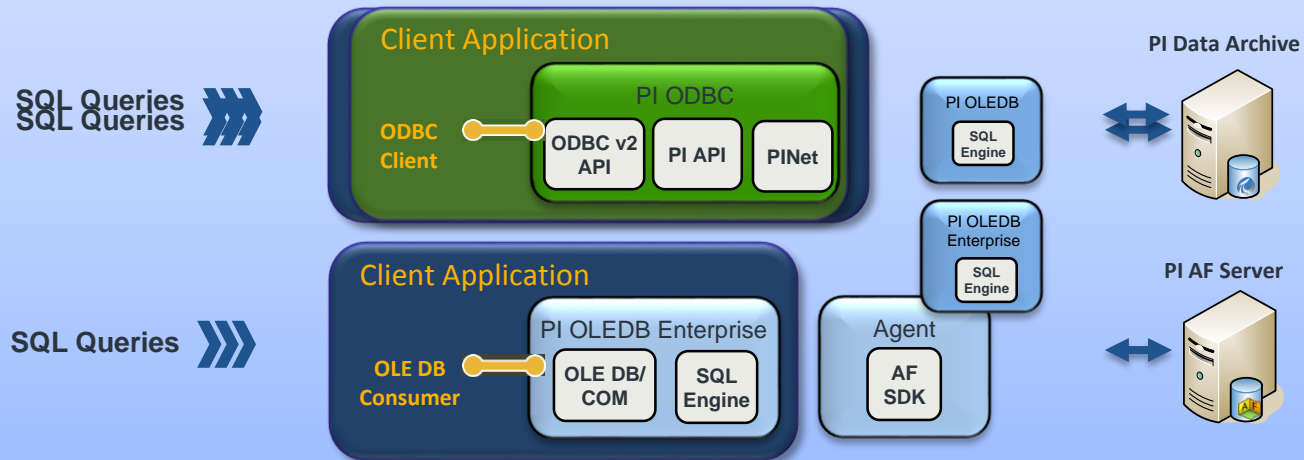


# PI SQL Family Evolution

PI ODBC

PI OLEDB Provider

PI OLEDB Enterprise



# PI SQL Family Evolution

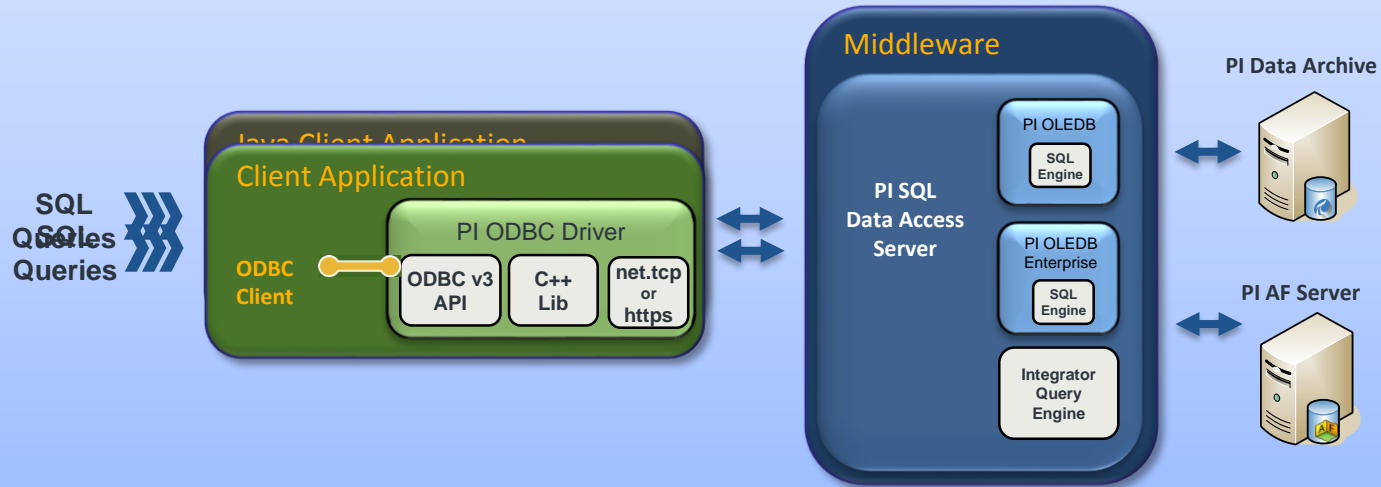
PI ODBC

PI OLEDB Provider

PI JDBC Driver

PI OLEDB Enterprise

PI ODBC Driver



# PI SQL Family Evolution – in Development

PI ODBC

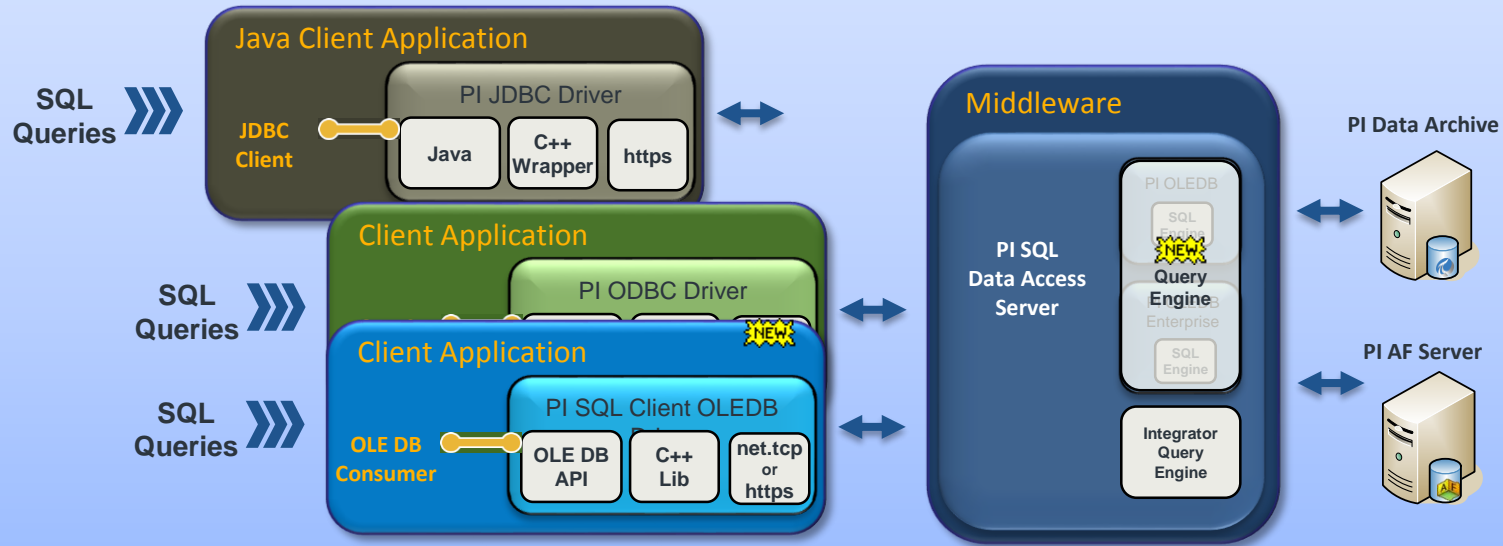
PI OLEDB Provider

PI JDBC Driver

PI OLEDB Enterprise

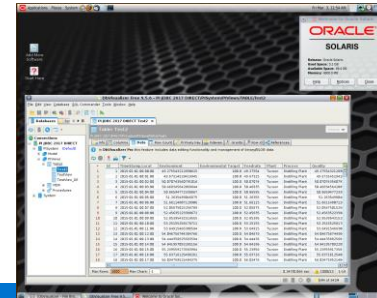
PI ODBC Driver

PI SQL Client OLEDB



# PI SQL Family Evolution – in Development

- New Query Engine
  - Redesign PI SQL access to AF
  - New simplified E-R model
  - Performance and scalability
- New OLE DB Provider
  - Leverage new architecture (query execution close to data store)
- PI JDBC
  - Pure Java version (more platforms)







# PI SDK

# PI SDK 2016

- Big Security Improvements
  - Transport Security (with PI Data Archive 3.4.395 or later)
  - Takes advantage of newer, more secure compiler
    - SafeSEH Exception Handling Protection
    - SEHOP
    - Heap Metadata Protection
    - Increased protection against buffer overrun exploits
    - Control Flow Guard
    - SDLC Checks
  - VB6 ActiveX components
    - Update to latest PI SDK to mitigate known security issues fixed by Microsoft

# PI SDK vNext

- More improvements to security
  - Use of static analysis tools to find known problems
  - Removing of deprecated calls
- Bug Fixes



# PI OPC DA/HDA Server

# PI OPC DA/HDA Server





# PI OPC HDA Server

# PI OPC HDA Server 2016

- Bug Fixes
  - 2 Memory leaks addressed
    - TimeAverage reads
    - Repeated connection / disconnection
  - OPC HDA v1.2 compliance issue – PercentGood is now time-weighted
  - Misc Bug Fixes: Null pointers, empty strings, ItemHandle release
- End of support of Module Database

# PI OPC HDA Server vNext

- Continued Maintenance, as need arises





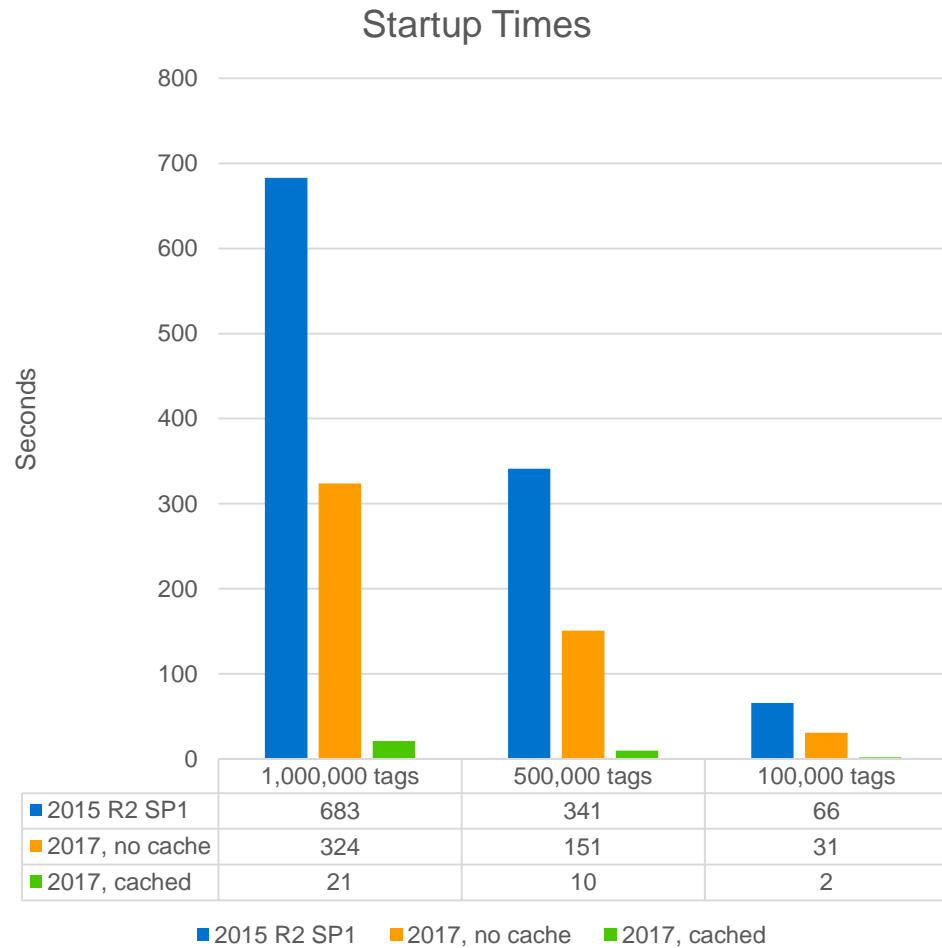
# PI OPC DA Server

# PI OPC DA Server 2015

- Uses AF SDK to access PI Data Archive
  - Eliminates server-crashing bug inherent to previous architecture / design
  - Improved security (vs. using PI SDK / PI API)
- Very long start-up time ☹️

# PI OPC DA Server 2017

- 50% faster initial startup time than 2015
- Namespace Data cached on shutdown leads to...
  - 95% faster startups!



# PI OPC DA Server vNext

- Additional optimization to initial startup times
- Research & implementation of access rights, per connected client (vs. single configured user for all of PI OPC DA Server)

# Contact Information

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Engineering Manager

**David Moler**

[dmoler@osisoft.com](mailto:dmoler@osisoft.com)

Development Lead

**Frank Garriel**

[fgarriel@osisoft.com](mailto:fgarriel@osisoft.com)

Software Developer

# Visualization Virtual Hackathon



## All-Virtual Event

- 3 weeks
- 51 participants

## Leveraged Extensibility Model

- Develop additions to the OSIsoft visualization platform

## 20 Teams

- 13 Customer and Partner
- 7 from OSIsoft

# Visualization Virtual Hackathon Participants



Lonnie A. Bowling

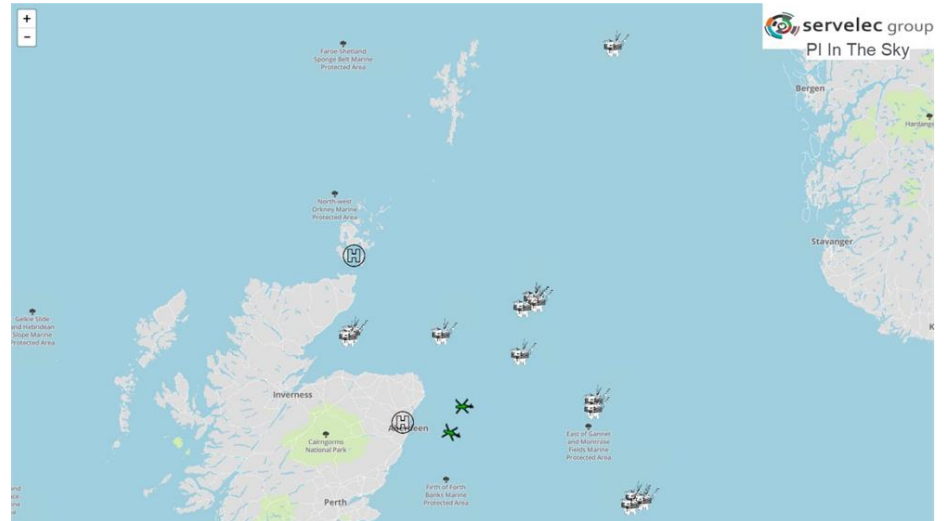


# Most Creative Use of External Data

- Servelec Controls Team 1
  - Alexander Dixon
  - Gregor Emslie
  - Michael Nelson
  - James Todd



PI In The Sky – Visualizing real time flight data



<https://pisquare.osisoft.com/people/gemslie/blog/2017/03/10/hackathon-servelec-group-team-1>

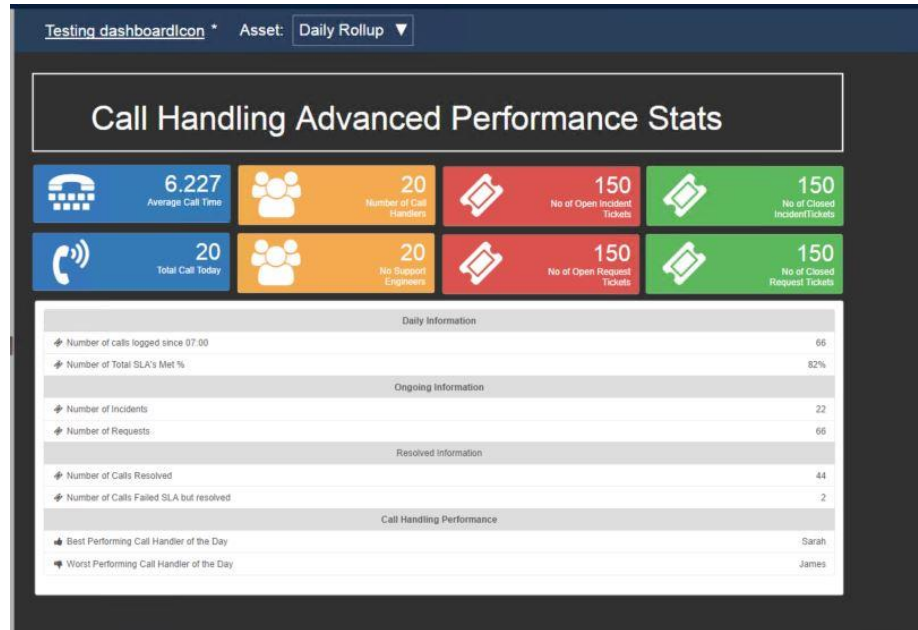


# Biggest Potential Business Impact

- Servelec Controls Team 2
  - Tim MacLaren
  - Sarah Wallace
  - Marija Markovic
  - Leslie Shields



## Dashboarding call center data



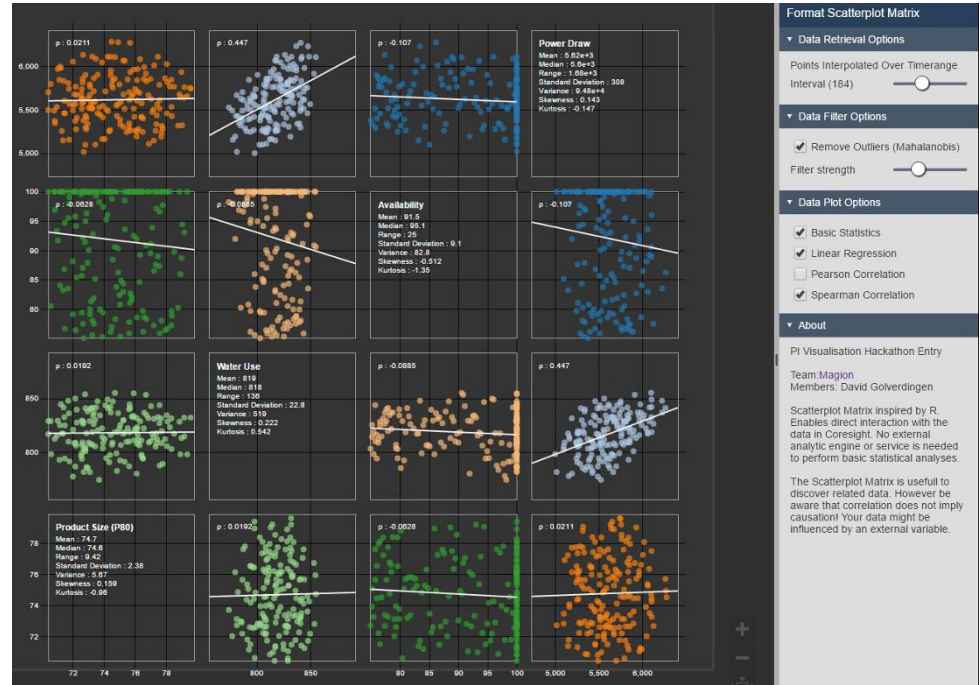
<https://pisquare.osisoft.com/people/tim.maclaren/blog/2017/03/12/hackathon-servelec-group-team-2>

# Best in Show

- Magion
  - David Golverdingen



## Scatter plot matrix



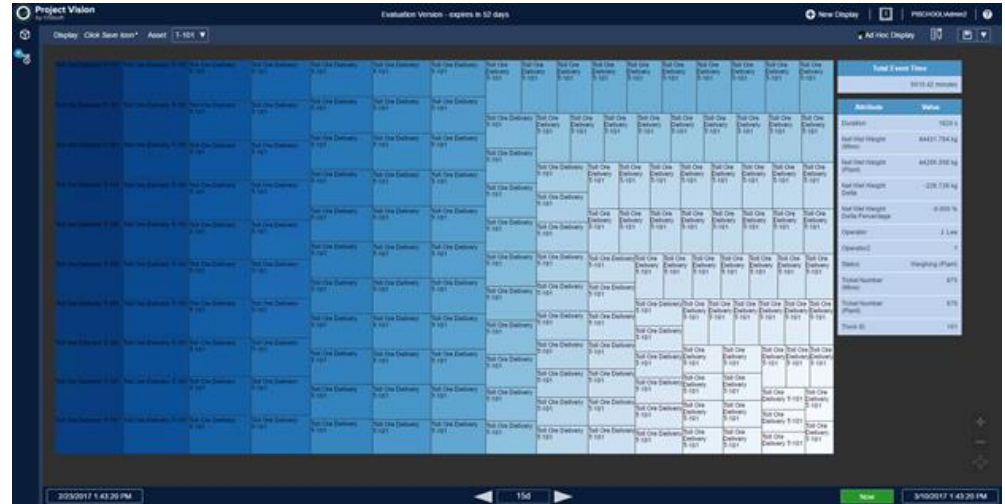
<https://pisquare.osisoft.com/people/DGolverdingen/blog/2017/03/07/pi-visualization-hackathon-magion-entry>

# Best in Show

- Exele
  - Dan Fishman
  - James Sconfitto
  - Mike Kiefer



Tree map of Event Frames



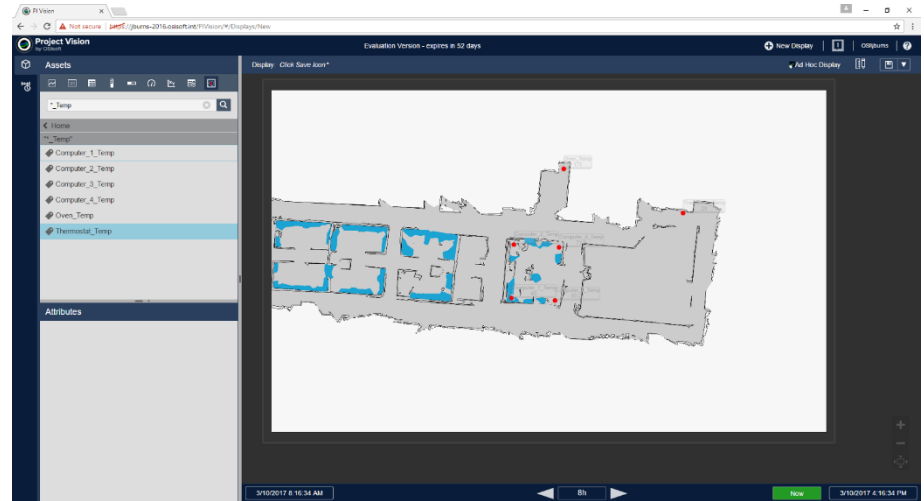
<https://pisquare.osisoft.com/people/DanFishman/blog/2017/03/12/exele-event-map-osisoft-visualization-virtual-hackathon-2017-entry>

# OSIsoft Internal Winner

- Team Doomguy
  - Johnathan Burns
  - Simon Boka
  - Phillip Little
  - Andrew Bathon



Augmented reality map with PI data



<https://pisquare.osisoft.com/people/abathon/blog/2017/03/12/project-operation-pi-tango-doom-3d>

# Users Conference Hackathon

Data sponsor: **Barrick Gold**

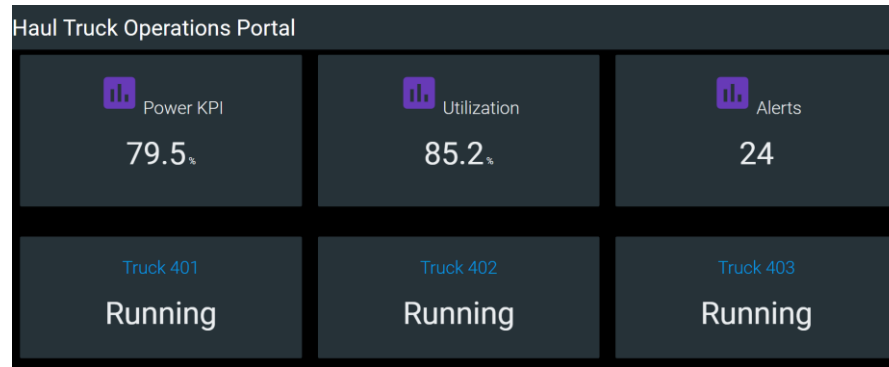
- Theme: *Asset Health Monitoring, Predictive Analytics, and Maintenance Optimization of industrial mobile assets*

41 Hackers

- 11 Teams
- 23 Hours

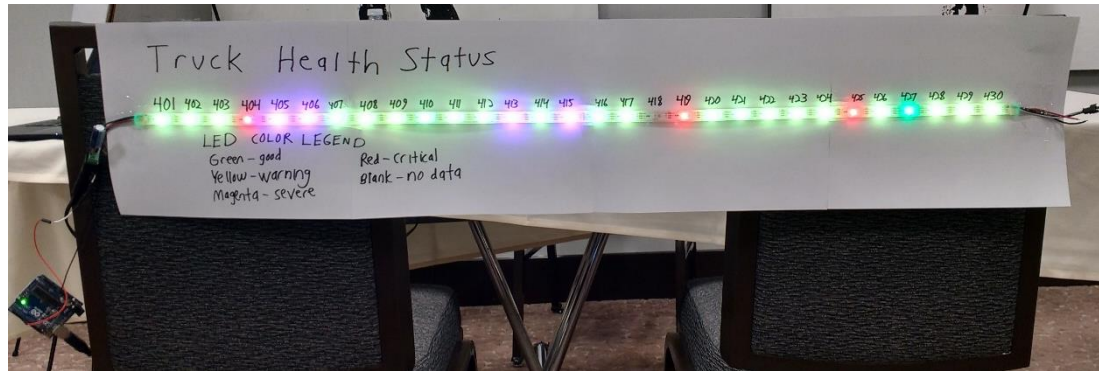
# Hackathon Winner – 3<sup>rd</sup> Place - Tied

- **PI In the Sky:** Rhys Kirk, Rob Raesemann, Yevgeni Nogin, Lonnie Bowling
- 1 year free subscription to PI DevClub
- \$200 Amazon gift card



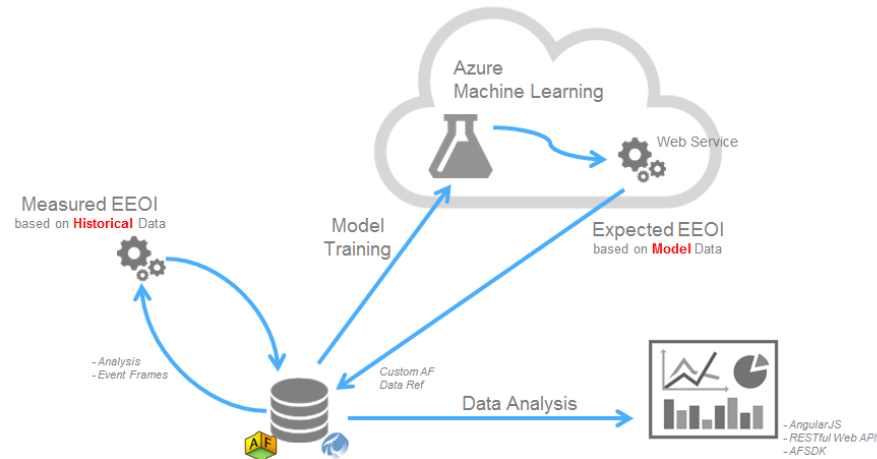
# Hackathon Winner – 3<sup>rd</sup> Place - Tied

- **Atomic 79:** Mina Andrawos, Stew Bernhardt, Seth Gregg, Dave Johnson
- 1 year free subscription to PI DevClub
- \$200 Amazon gift card



# Hackathon Winner – 2<sup>nd</sup> Place

- **Machine Learners:** Ionut Buse, Gael Cottet, Jean-Francois Beaulieu
- 1 year free subscription to PI DevClub
- 50% discount to UC
- \$300 Amazon gift card





# Hackathon Winner – 1<sup>st</sup> Place

- **Random Sample:**
  - Jacqueline Davis, James Hughes, Matthew Wallace, Jon Horton
  - 1 year free subscription to PI DevClub
  - 100% discount to UC
  - \$400 Amazon gift card



# Top OSIssoft Community Contributors

- Mike Zboray



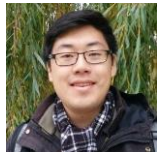
Development Lead  
Notifications

- Jason Golla



Team Leader  
PI Vision

- Gavin Chen



Escalation Engineer  
PI Server

## Honorable Mention

- **Stephen Kwan**, Product Manger
- **David Hearn**, Development Team Lead

# PI Developers Club Rising Stars 2017

- **Holger Amort**



TQS Integration Ltd  
United States



## Honorable Mention

- **Paurav Joshi**, ECG IT
- **Akash Naik**, Accenture

- **Steve Boyko**



ADM Systems Engineering  
Canada

- **Nicola Gargano**



Indra Sistemas  
Spain

- 1 year free subscription to PI DevClub
- 100% discount to UC
- \$400 Amazon gift card

# PI Developers Club All-Stars 2017

- Roger Palmen



CGI  
Netherlands

- Rhys Kirk



The Genius Group  
United Kingdom

- John Messinger



Optimate Pty Ltd  
Australia

## Honorable Mention

- **Asle Frantzen**, Amitec
- **Lonnie Bowling**, Independent



- 1 year free subscription to PI DevClub
- 100% discount to UC
- \$400 Amazon gift card



OSIsoft®

# EMEA USERS CONFERENCE

LONDON, UNITED KINGDOM • OCT 16-19, 2017

**TRANSFORM** YOUR WORLD





**OSIsoft**<sup>®</sup>  
**USERS CONFERENCE**

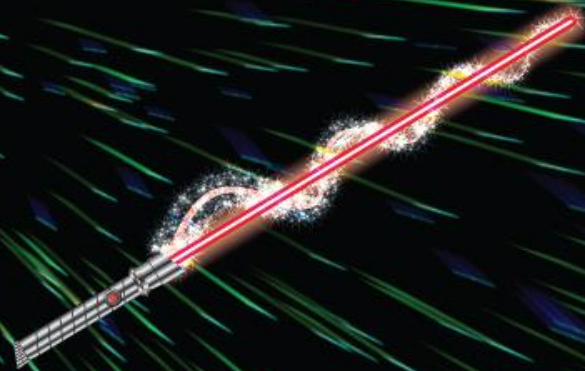
**SAVE THE DATE 2018**

**APRIL 23-26 | SAN FRANCISCO**

**HILTON UNION SQUARE | PARC 55 | HOTEL NIKKO**

# Vox Pop!

# WELCOME TO THE GEEK SIDE





감사합니다

谢谢

Danke

Merci

Gracias

**Thank You**

ありがとう

Спасибо

Obrigado