Efficient Asset Management of a Large and Distributed DG Solar Portfolio

Presented by **Steve Hanawalt**

POWER FACTORS DRIVE

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Agenda

- Power Factors Overview
- The Problem we are Trying to Solve
  - High Volume
  - High Velocity
  - High Geographic Dispersion
  - Low Cost
- The Solution
  - IT
  - Automation
  - Event Management
- Applications and Use Case / How the PI System was Applied
- Challenges
- Conclusion

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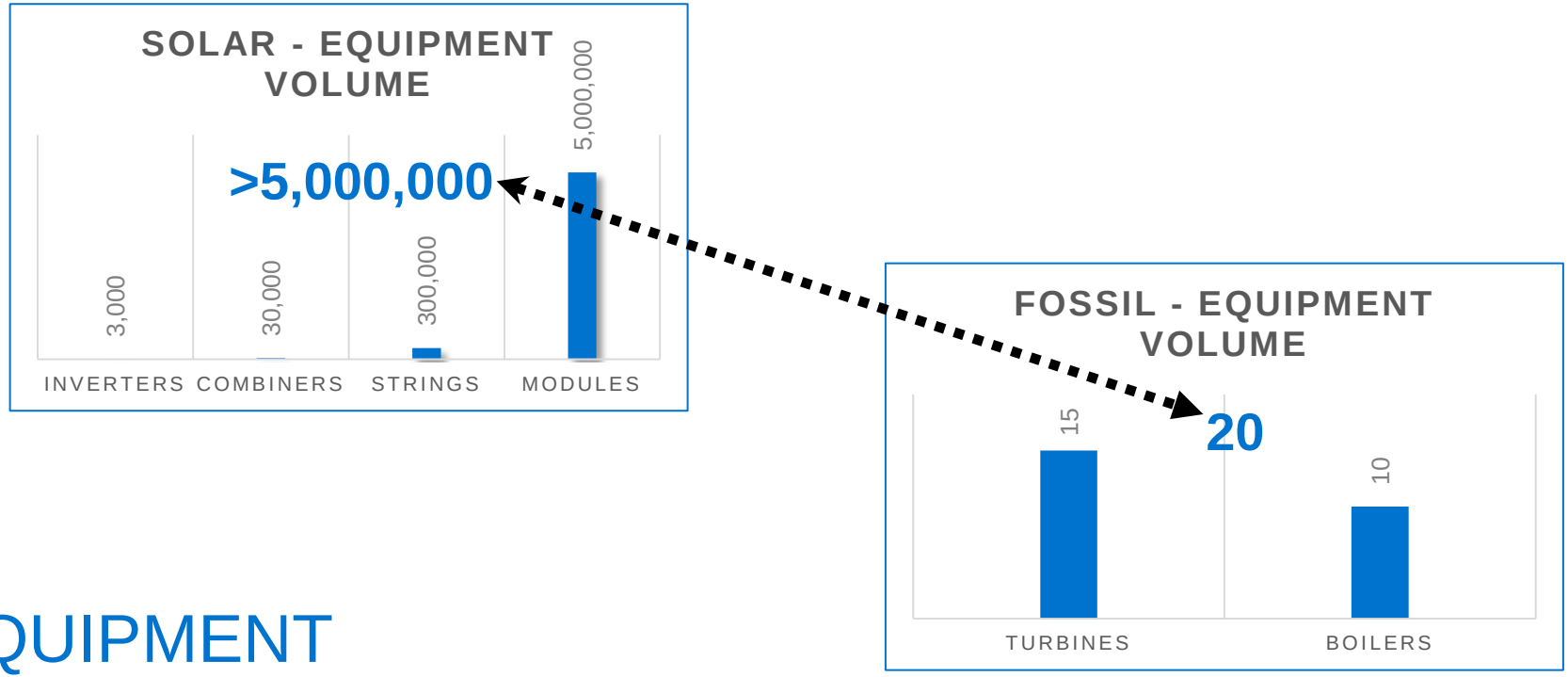
Fossil and Solar Asset Classes – Volume



EQUIPMENT

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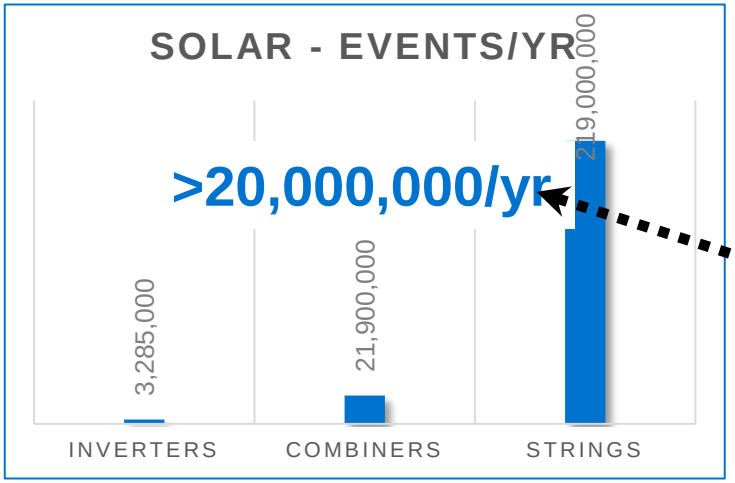
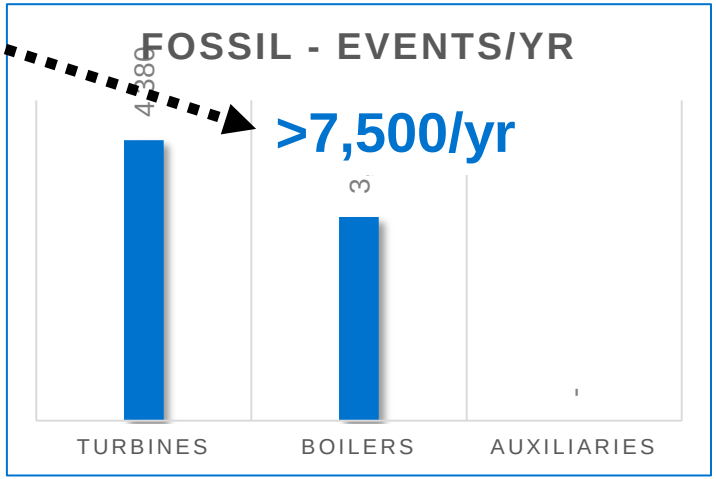
Fossil and Solar Asset Classes - Volume





EVENTS

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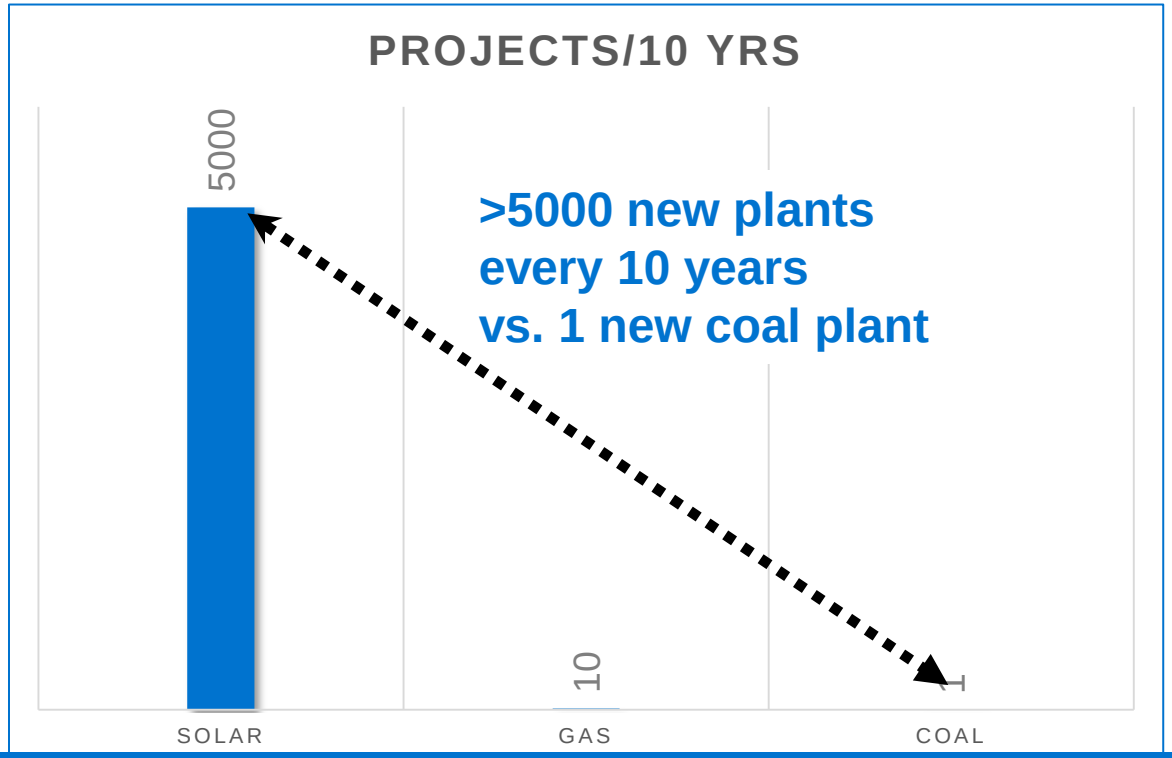
Fossil and Solar Asset Classes - Velocity



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Geographic Dispersion

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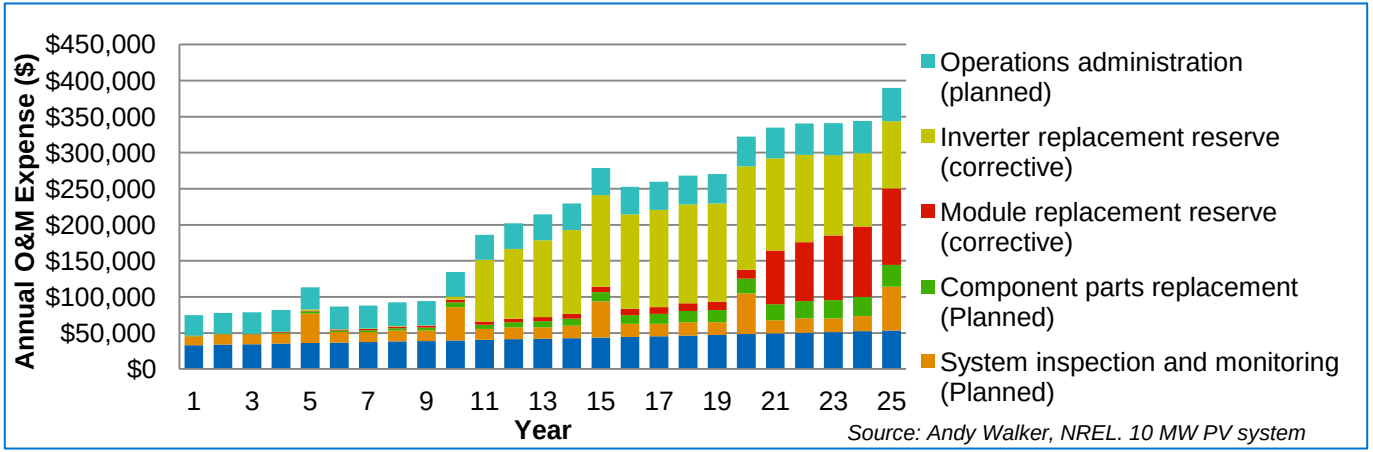
Low Cost O&M

- Developers have sold a myth--“solar power system don’t require any maintenance…”



Annual O&M costs range

1st year: $7.00/kW

By year 25: $39.00/kW

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Summary

- Traditional O&M approaches don't work
- Problem needs to be solved with a high degree of:
  - Technology
  - Centralization
  - Automation

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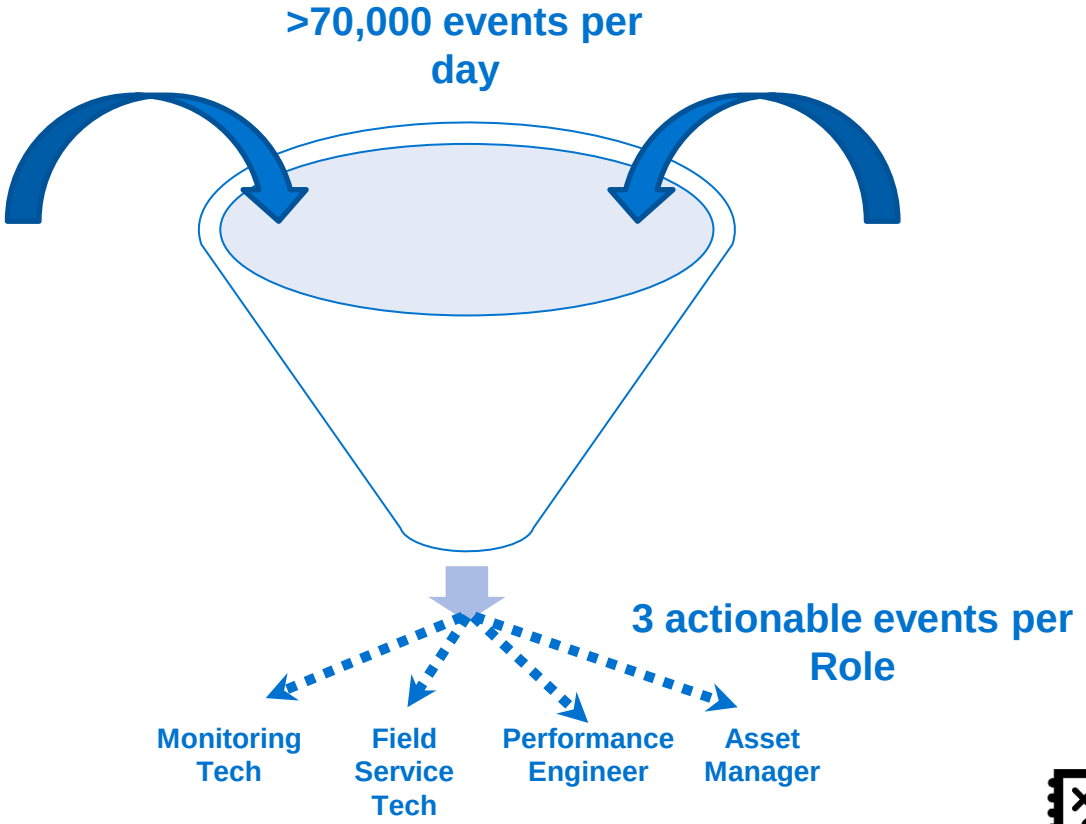
Event Management

Reduce 70,000 events to 12 role-based actions per day



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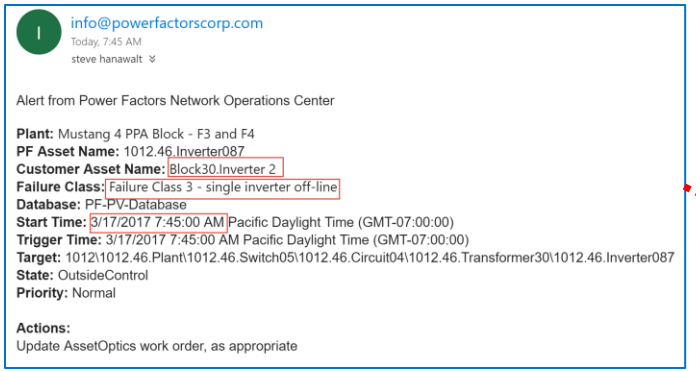
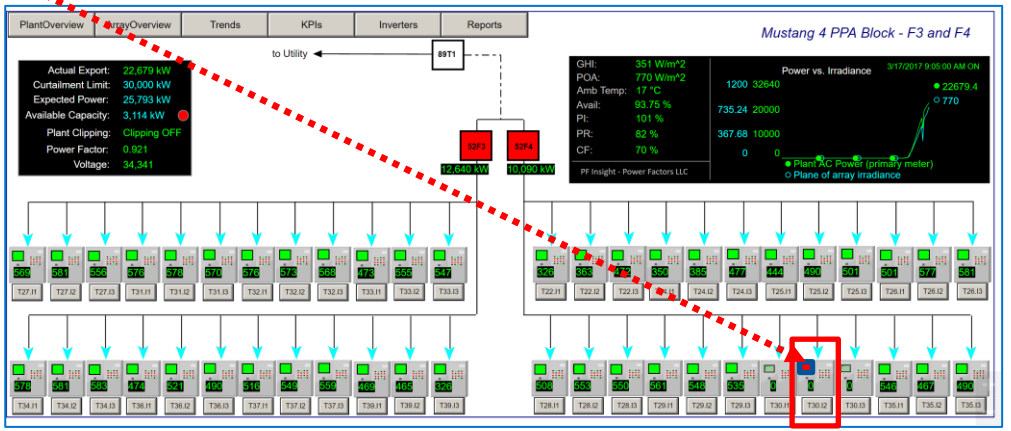
Day-in-the-Life: Monitoring Technician - Respond



Event detection and notification

Technician acknowledges
Event
and verifies its accuracy

Verification



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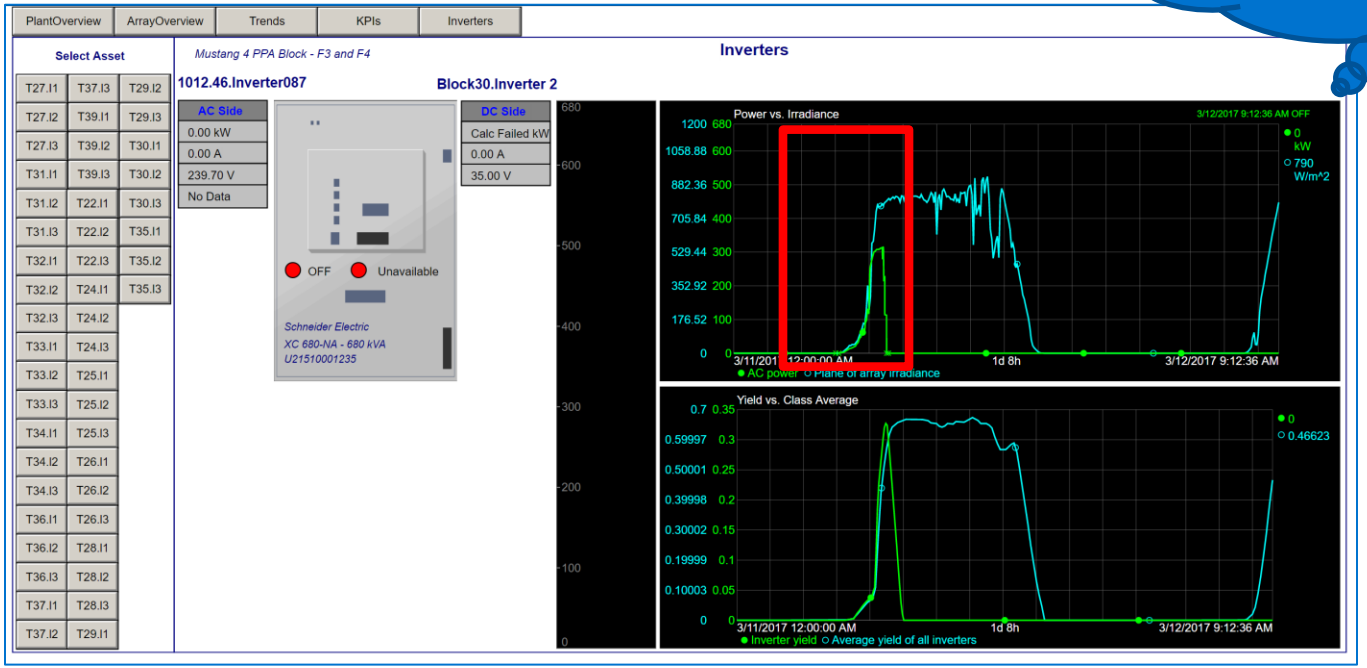
Day-in-the-Life: Monitoring Technician - Diagnose

Technician diagnoses Event
to
determine Cause and Action



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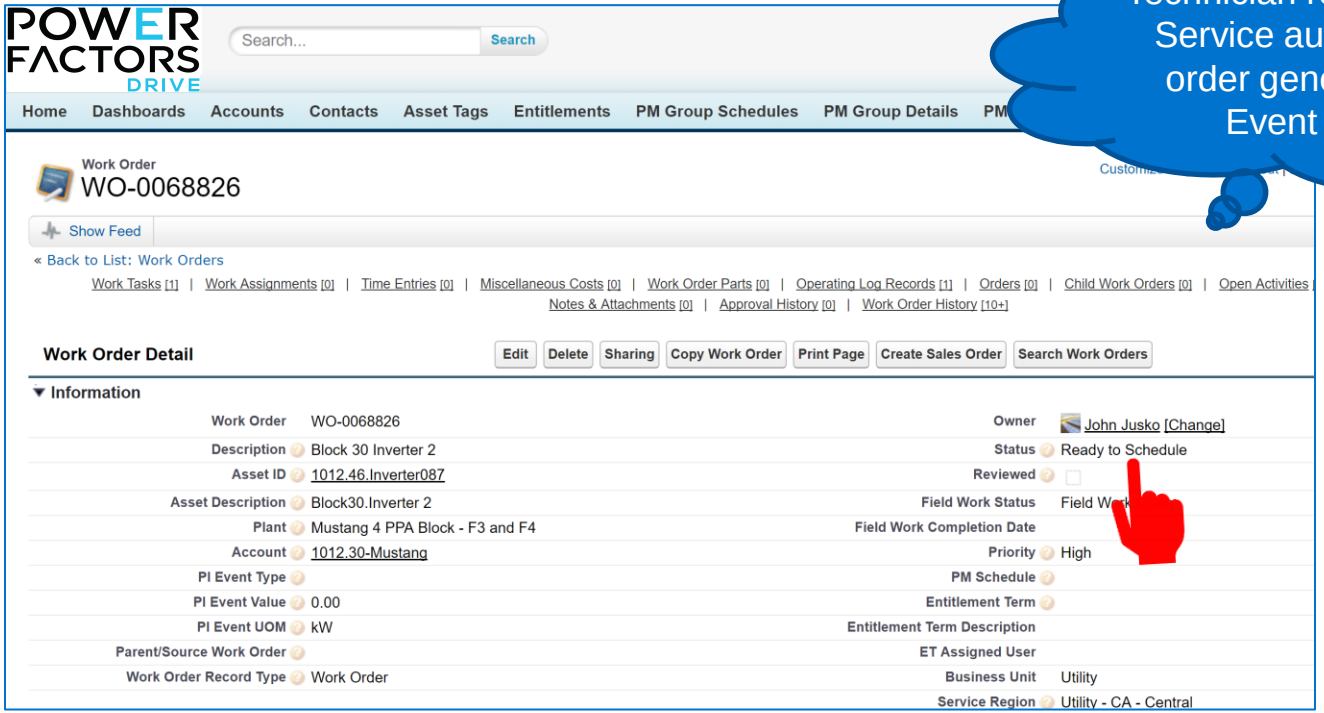
Day-in-the-Life: Monitoring Technician - Restore



Technician releases to Field Service automated work order generated by the Event Manager

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Day-in-the-Life: Asset Manager – Commercial Compliance

NOTIFICATION: Past Due 3/17/2017 for [redacted]

N

noreply@salesforce.com on behalf of Power Factors Support

Today, 4:00 AM

rbooth@maxgenservices.com

AO

Commercial compliance past due Event. Click link and complete compliance task

NOTIFICATION: Past Due 3/17/2017

Plant #	Plant Name	Subject	Reference Information	Status	Due Date	Link to Term	Completion Variance (Days)	Special Instructions (Truncated)
1012.27	RE Barren Ridge 1 LLC	1012.27.Plant-Exhibit B - Basic Services Reporting-O&M Agreement-2.6(a)(vii) Maintenance Data and Records - Weekly Plant Performance	2.6(a)(vii) Maintenance Data and Records/ Exhibit B.38	Not Started	2/28/17	004393	-17	2.6(a) Operator shall prepare and maintain, in electronic format, the following reports relating to
1012.27	RE Barren Ridge 1 LLC	1012.27.Plant-Re-Vegetation and Landscaping Plan Preventive Maintenance: Plant	Land Lease 6.10 - Maintenance, Repair, Operations/ Exhibit B.58	Not Started	2/28/17	004464	-17	Operator shall perform all obligations of Owner (as ? Lessee?) set forth in the following provisions
1012.32	RE Garland A LLC	1012.32.Plant-Re-Vegetation and Landscaping Plan - Signal Energy Additional Services: Plant	Re-Vegetation & Landscaping Plan 7.2 - Monitoring/ Exhibit B.45	Not Started	2/28/17	012345	-17	Operator shall perform all operations and maintenance requirements of and perform the Servi

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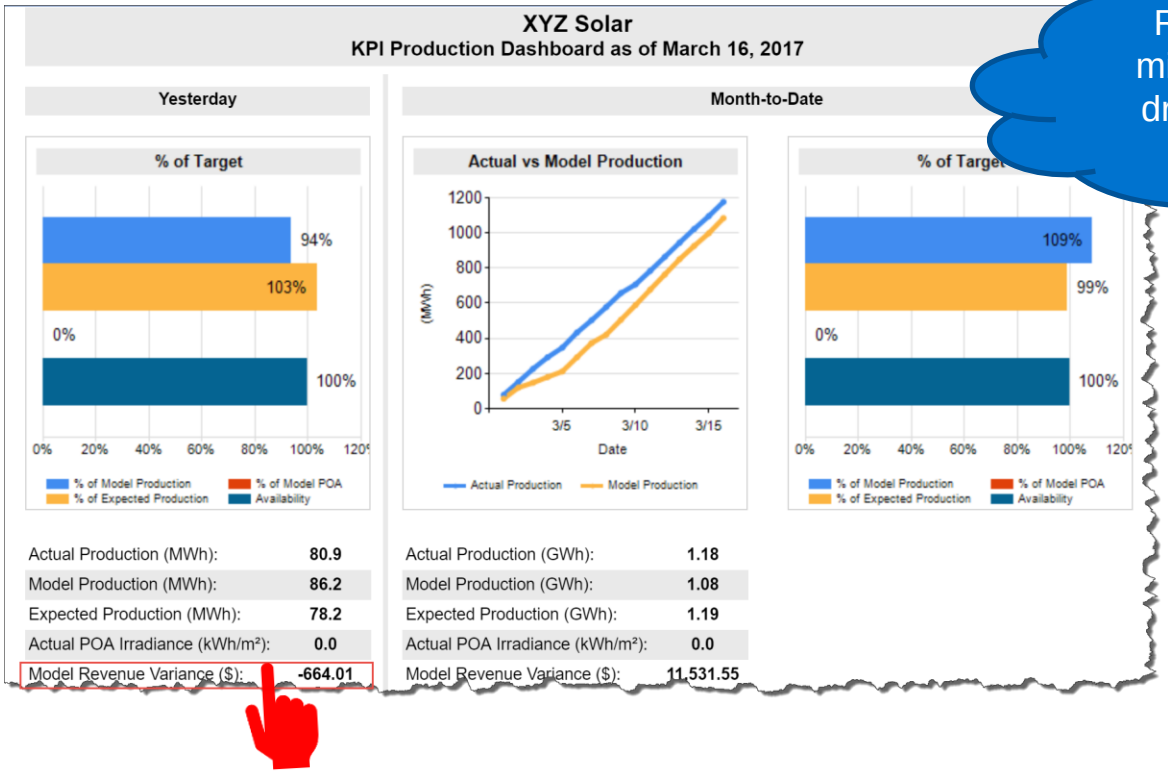
Day-in-the-Life: Asset Manager – Revenue Target



Revenue target Event missed. Click target and drill-down to production variance

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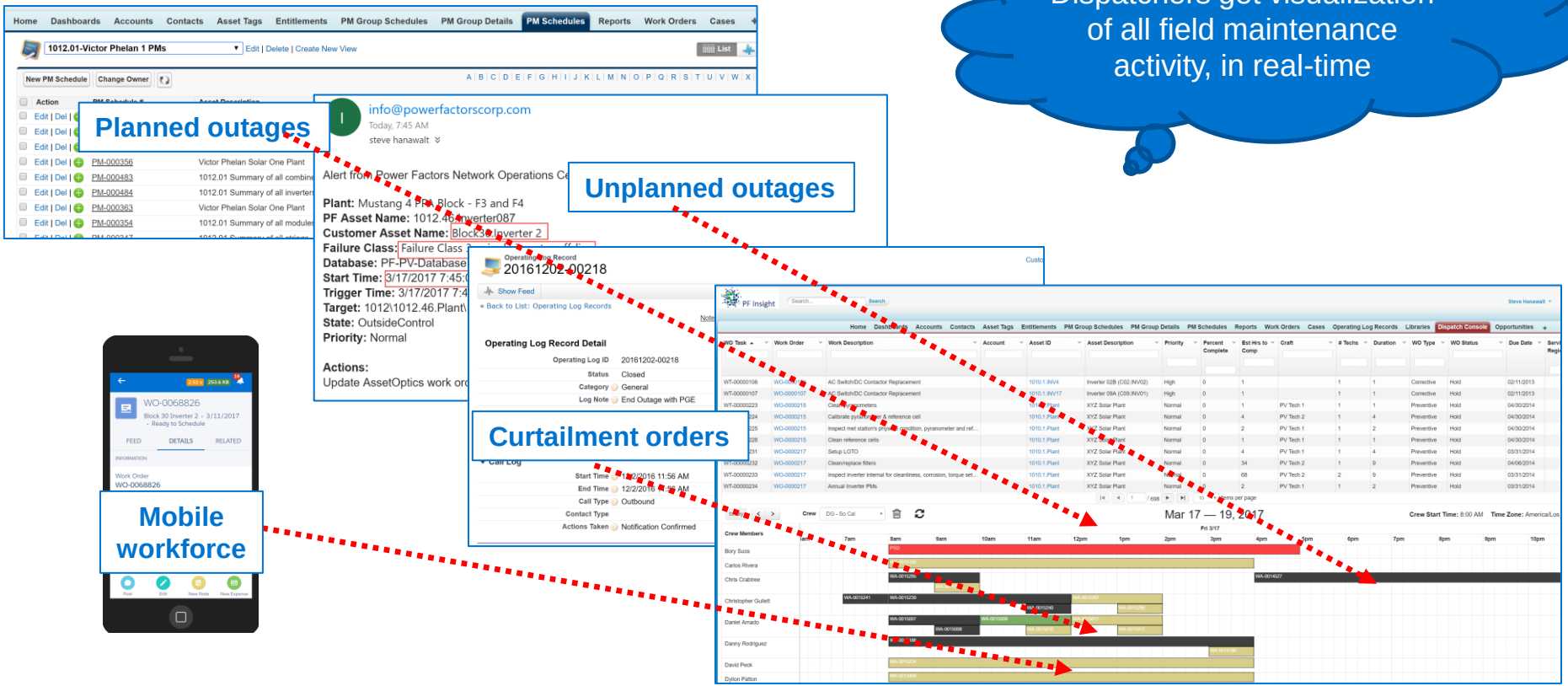
Day-in-the-Life: Planner & Scheduler

Dispatchers get visualization of all field maintenance activity, in real-time



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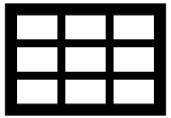
Challenges

- Data Curation

- Event Management

- Scalability



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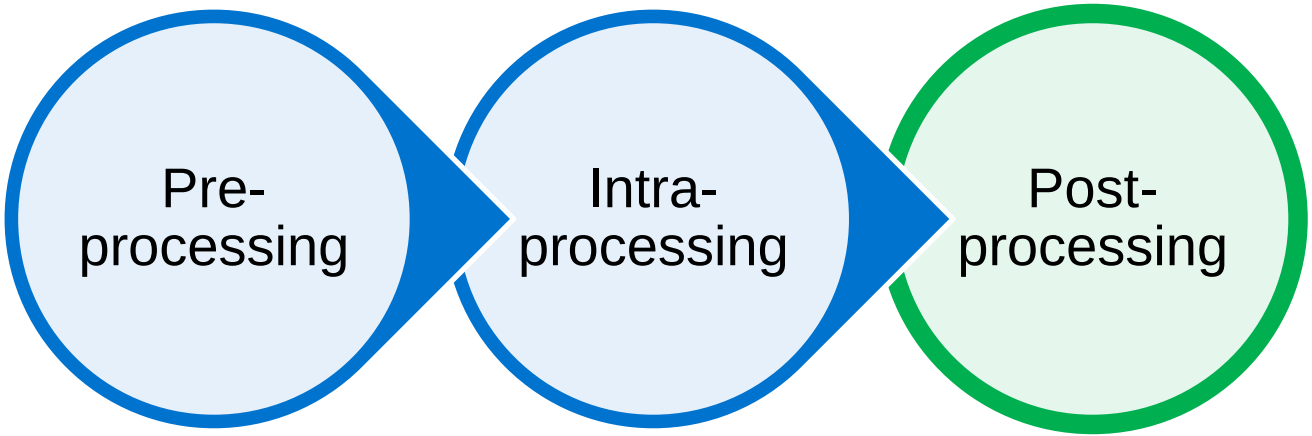
Data Curation

Data curation is the management of **data** throughout its lifecycle, from creation and initial storage to the time when it is archived for posterity or becomes obsolete and is deleted. The main purpose of **data curation** is to ensure that **data** is reliably retrievable for future use



AF Analytics

Reporting

SQL

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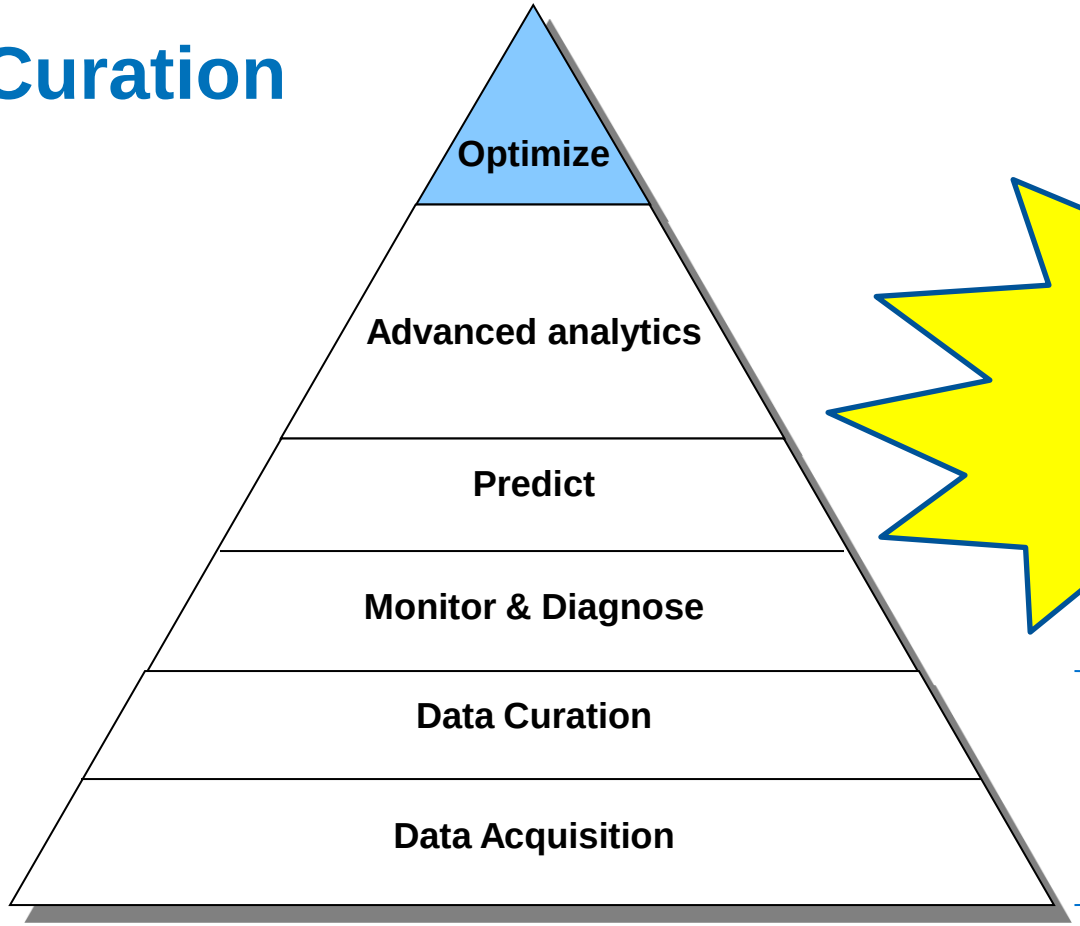
Data Curation



Data can become the problem, not the solution

If you don't get these two right, all of the advanced analytics will be essentially useless

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Event Management

Q - What do we do with 70,000 events per day?

A – Ignore 69,988 of them

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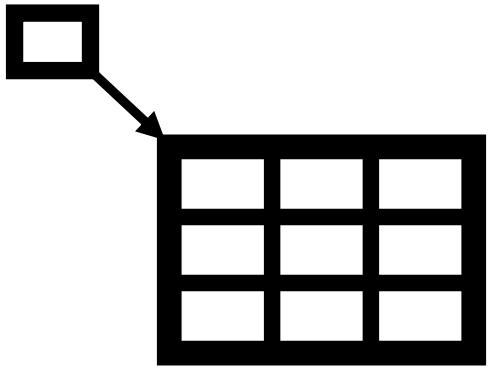
Scalability

- How can we make this scale?
  - Role-based
  - User-configurable
  - Onboarding utilities
    - Auto asset structure creation (Elements/attributes)
    - Templatized
      - Elements
      - Analytics
    - Element relative
  - Offboarding utilities
    - Active/Inactive
    - Auto renew



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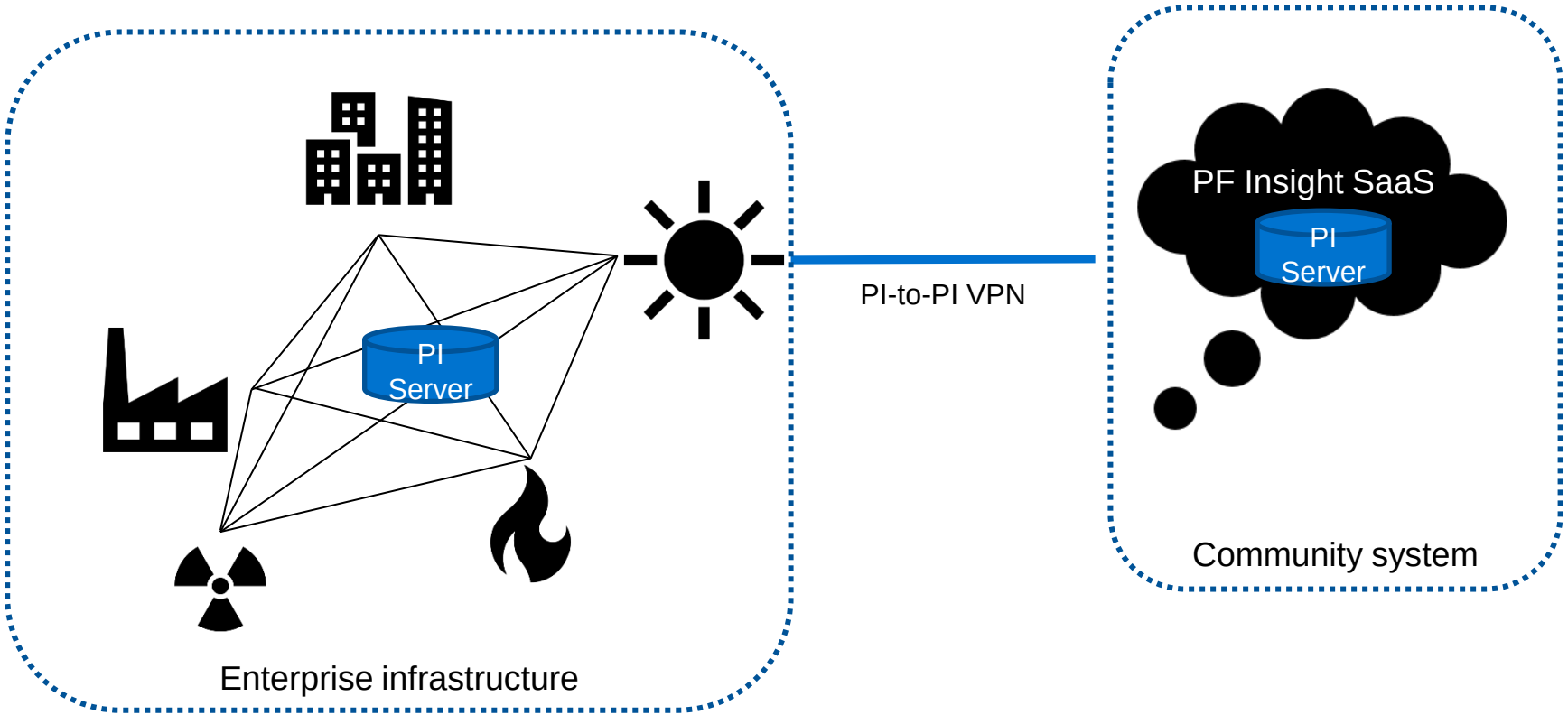
Extending Value Creation Beyond the Enterprise Knowledge Base



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OSIsoft Product and Services Used

- AF Builder
- AF SDK
- Center of Excellence (CoE)
- Connected Services
- Enterprise Program Manager (EPM)
- Field Service Engineers
- PI Cloud Connect™
- PI Connectors
- PI Coresight™
- PI DataLink®
- PI OLEDB Enterprise
- PI Web Services™
- PI Interfaces
- PI ProcessBook®
- PI Server™
- Asset Framework (AF)
- Event Frames
- High Availability (HA)
- Notifications
- Performance Equations (PE)
- System Management Tools (SMT)
- Totalizers
- PI Smart Connectors™
- PI System®
- PI System Connections
- PI System Explorer™
- PI System Field Service
- PI System Tools
- PI Tag™
- PI to PI Interface™
- PI Web API
- PI WebParts™
- Software Reliance Program (SRP)
- Technical Support

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Summary

COMPANY and GOAL

1) SaaS Portfolio Performance Management Solution
2) Cost-effective toolset for renewable power owners & operators for managing their portfolio of assets

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CHALLENGE

Equipping solar owners/operators with a performance management tool that is scalable, robust and fits into their budget

- High volume operational data set
- High project velocity
- Low O&M budget

SOLUTION

Fully integrated cloud-based performance, reporting & asset management tool that

- Real-time PI event detection & notification
- Curated reporting
- Automated work orders
- Contract compliance

RESULTS

2-5% improvement in project cash flows

Dramatic reduction in fixed cost structure

- Higher operational efficiencies
- Lower labor cost-of-production
- Reduced levelized cost of energy

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감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado

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