

“Listen To The Wind, It Talks” – Monitoring Wind Energy Production From SCADA Systems

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.conf2016

splunk>

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Agenda

- **Intro – About us**
- Business and Control Data Flow
- The Challenge
- “The first step” - PoC
- “All-in” – Splunk to Production
- Data Challenges
- What has changed?
- What is next?



Intro

IT Engineer with high focus on Enterprise Architecture.

Victor has been working in the Renewable Energy Industry for almost 3 years. Within Infigen he is responsible for the proactive development of the Infigen application technology portfolio.

Highly involved with Data and Information control, governance and system integrations.

Victor has experience with other industries such as Music Streaming and Online Gaming.

Strong knowledge of data and enterprise architecture, strong RDBMS skills, knowledge on programming and Big Data.



NAME: Victor Sanchez

OCCUPATION:

Information and Application Architect

LIVES IN: Sydney, AUSTRALIA

BIRTH DATE: July, 1983

EDUCATION:

KTH - Royal Institute of Technology, SWEDEN

Universidad Anahuac, MEXICO

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About Us

Infigen Energy (ASX:IFN) is a developer, owner and operator of renewable energy generation in Australia.

Infigen owns **six wind farms and a solar farm** with a combined installed **capacity of 557 megawatts** operating in New South Wales, South Australia and Western Australia.

Infigen's operating assets generate enough power to meet the needs of over **250,000 homes** saving over a million tonnes of carbon dioxide emissions each year.

The Infigen logo consists of a purple-to-pink gradient square with the word "infigen" in white lowercase letters at the bottom.

     www.infigenenergy.com

Agenda

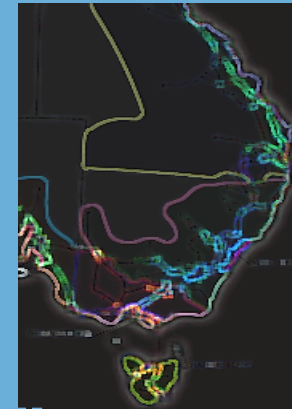
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Operational Assets And Energy Market

WIND FARM	STATE	# TURBINES	CAPACITY (MW)
ALINTA	WA	54	89.1
LAKE BONNEY 1	SA	46	80.5
LAKE BONNEY 2	SA	53	159.0
LAKE BONNEY 3	SA	13	39.0
WOODLAWN	NSW	23	48.3
CAPITAL	NSW	67	140.7
CAPITAL EAST	NSW	N/A	0.1

- As other large scale electricity generators, Infigen sell its electricity directly into the Australia Energy Market. It is from here that retailers buy electricity and provide it to consumers.
- There are three semi-scheduled windfarms in Infigen portfolio, all of them follow a generation control mechanisms from AEMO (Australia Energy Market Operator)



100% MERCHANT

CONTRACTED (power and/or LGCs)

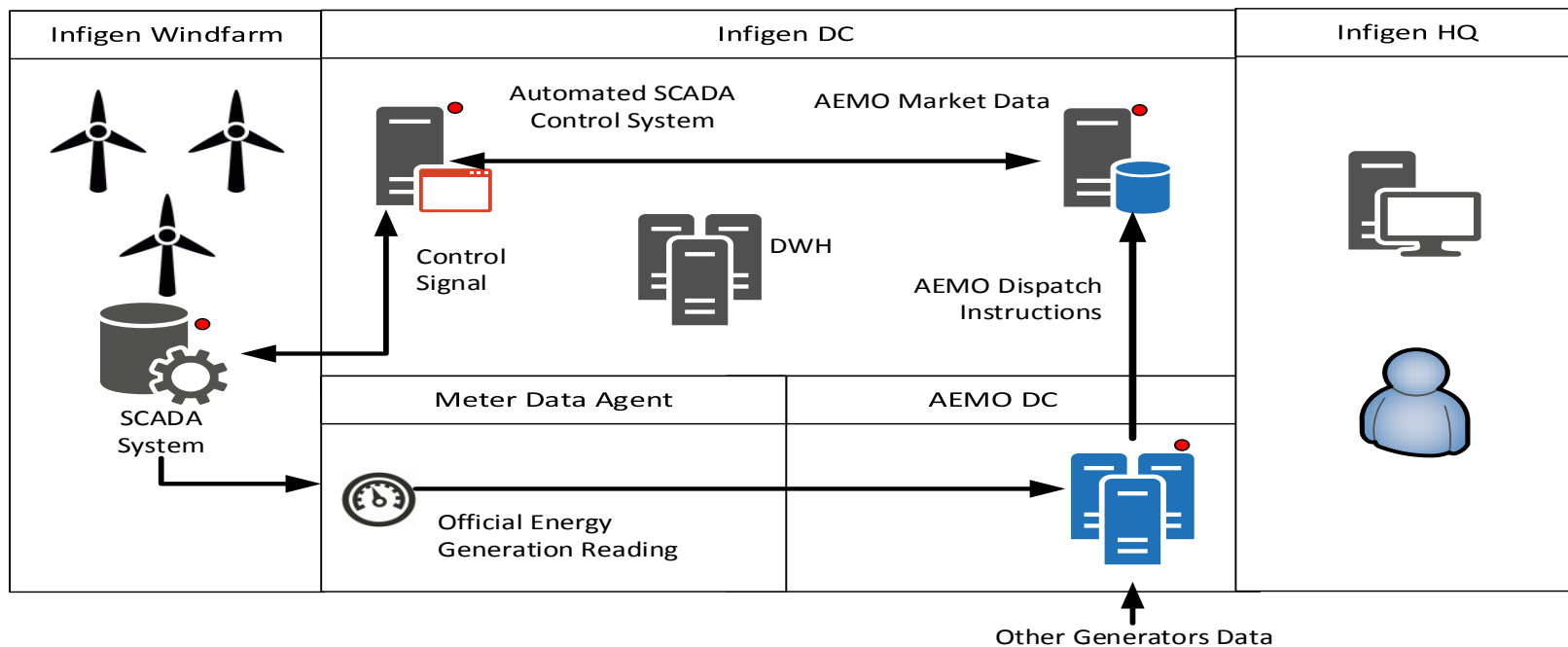
Operations Control Center - OCC



- Specialized team for 24x7 Operations
- Market analysis and electricity trading on a 5min basis.
- Monitoring and remote control of the windfarms.



Windfarm Control Data Flow



- Dispatch Instructions every 5 min. Increase, decrease or no change in production can be communicated.
 - Heartbeat signals between Automated Control and SCADA Systems every 1 min.
 - Data produced on the SCADA system could be second or sub second granularity.
- * SCADA: (Supervisory Control And Data Acquisition)



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The Challenge



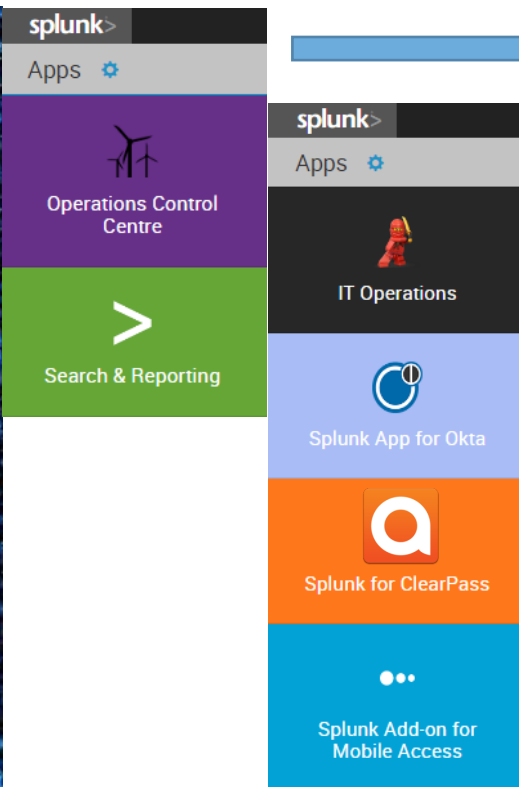
- Multi – Cloud Environment (Public – Private)
- Not unified application or infrastructure monitoring system.
- Long time to troubleshoot and correlate errors across different systems.
- Difficult to track the number of errors over time.
- Hard to access business data.

The Challenge

keep it
simple.



Infigen Splunk Use Cases



Business users have access to Infigen OCC Splunk app that grant them access to SCADA and Market Data.



IT team has access to both IT Ops and OCC Splunk apps, granting them access to unified monitoring across platforms.

Splunk Add-on for Mobile Access was installed from Splunk base. This granted mobile access for every employee across the organization.

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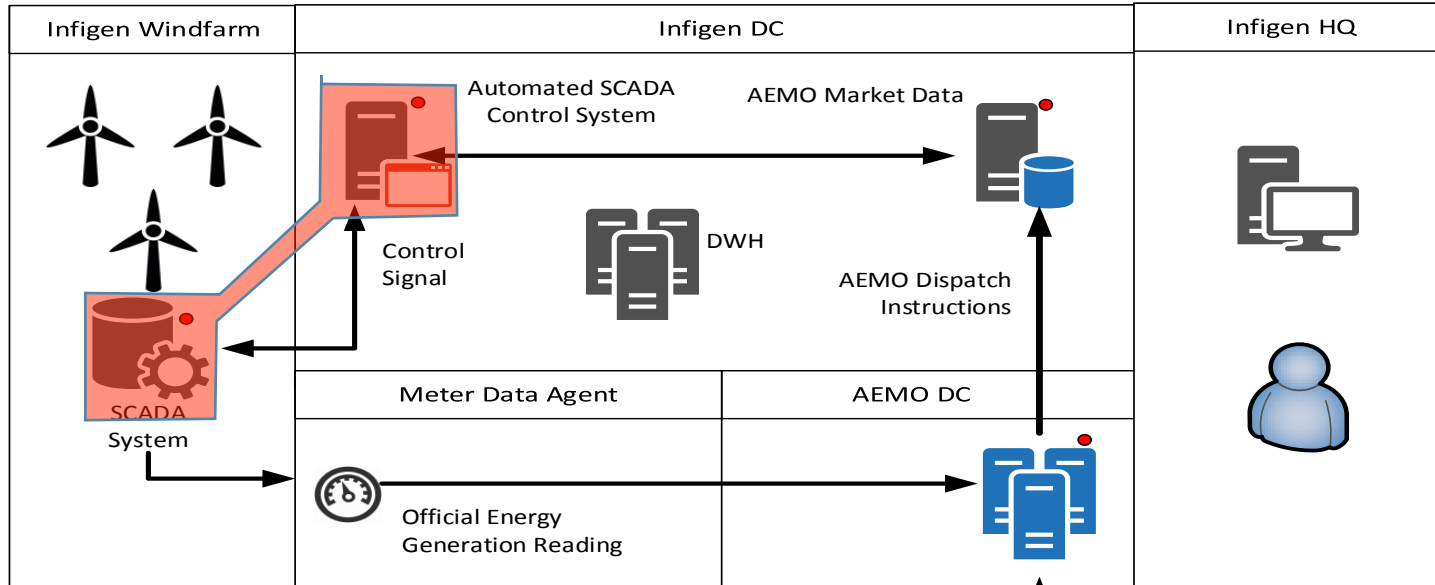


“The First Step” - Splunk Proof Of Concept

- Infigen **Automated SCADA Control System** had been crashing and was hard to troubleshoot.
- The application is a **bespoke development** for Infigen. This application routes the **dispatch control signals** from AEMO to the SCADA systems.
- The application is **business critical** for Infigen. It forms part of the **Energy Trading systems**.
- The application has multiple modules, developed in different languages such as **Python and Ruby**. Also communicates to the windfarm in multiple protocols such as **DNP3 and OPC**.



“The First Step” - Splunk Proof Of Concept



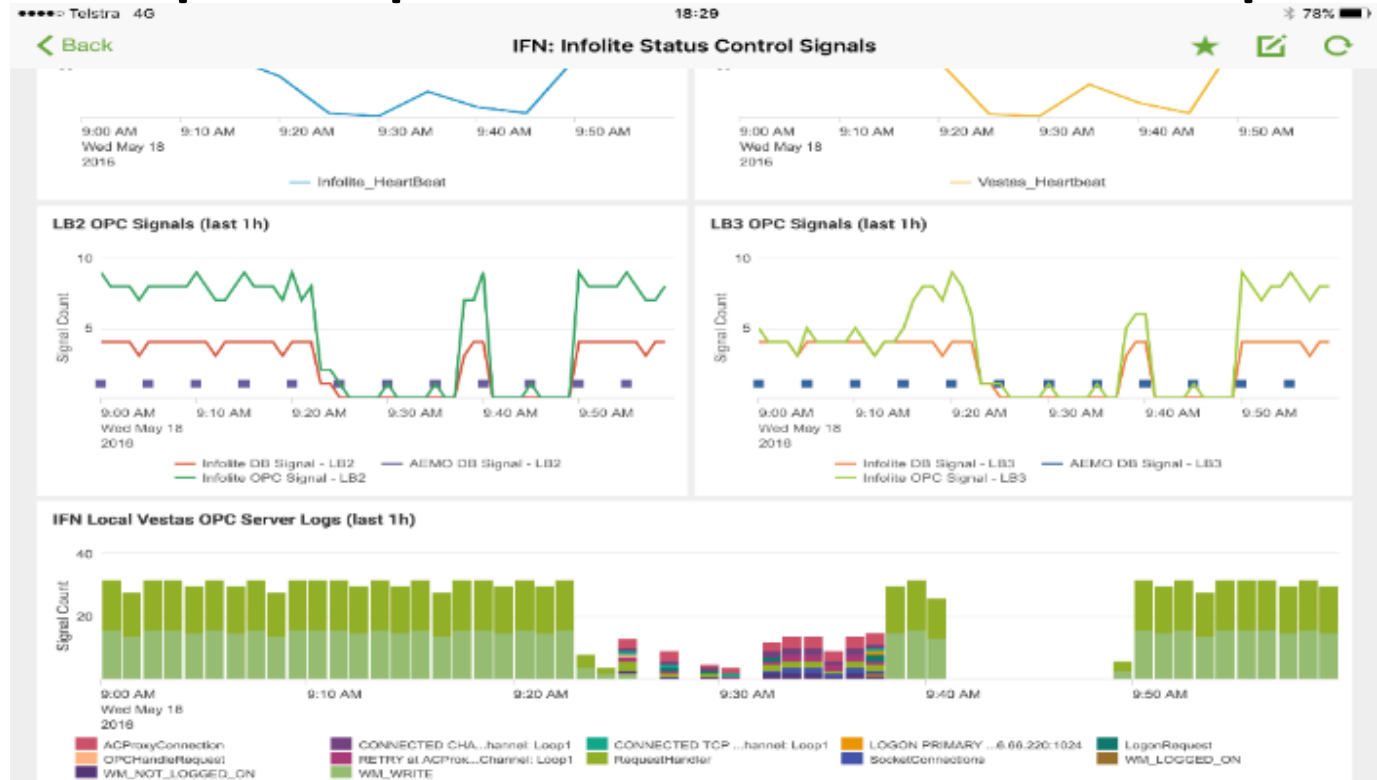
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“The First Step” - Splunk Proof Of Concept

- Splunk up and running on a Standalone Windows Machine in 1 day.
- Simplified access in one dashboard
- Integrates the status of four different system modules, including access to databases.
- Removed "data-hacks" as Splunk recognises time zones automatically.



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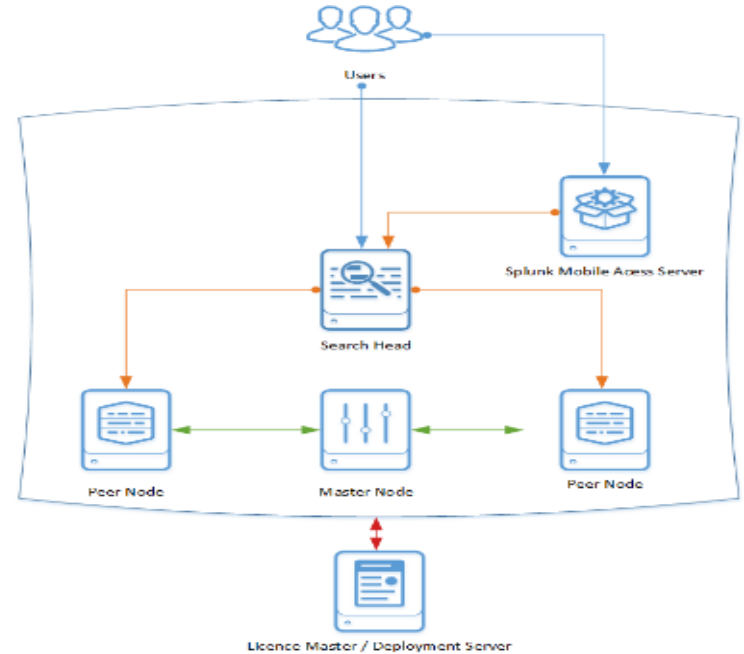
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"All In" – Splunk To Production

- Understand your data and your users
- Start small but Architect for growth
- Take advantage of Splunk distributed setup

Be all
in or get
all out.
There is
no halfway.



"All In" – Splunk To Production



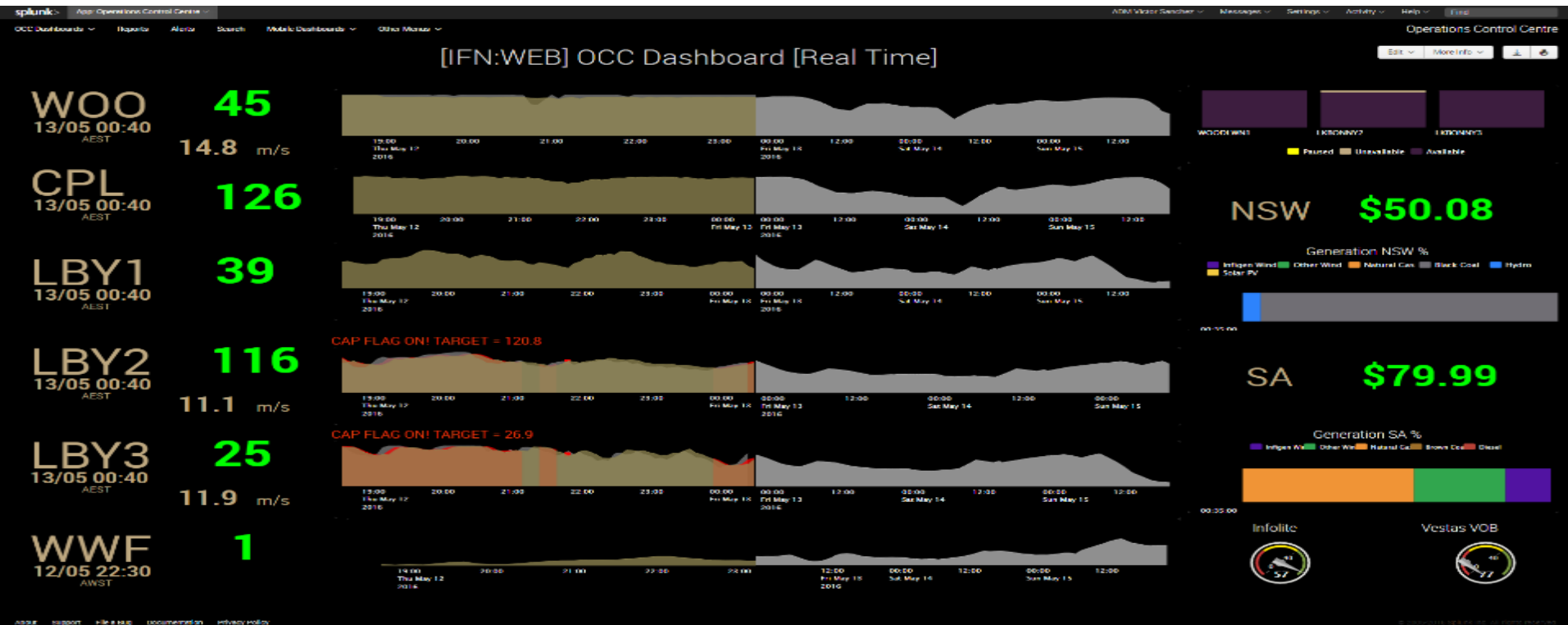
- **19** Splunk Real-Time searches
- **~140k** events are modelled and presented in the OCC Dashboard.
- **8** different data sources (RDBMS, App Logs, SCADA)

Solution Highlights

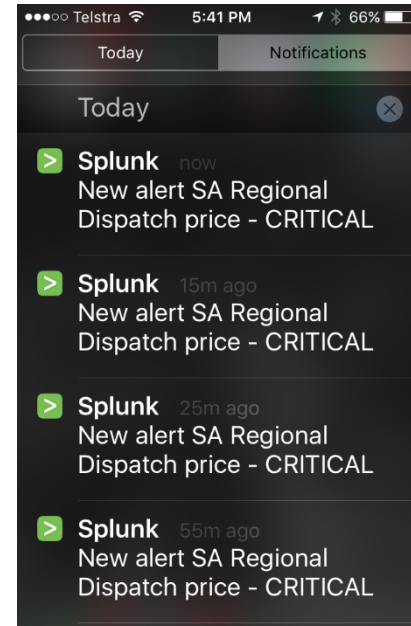
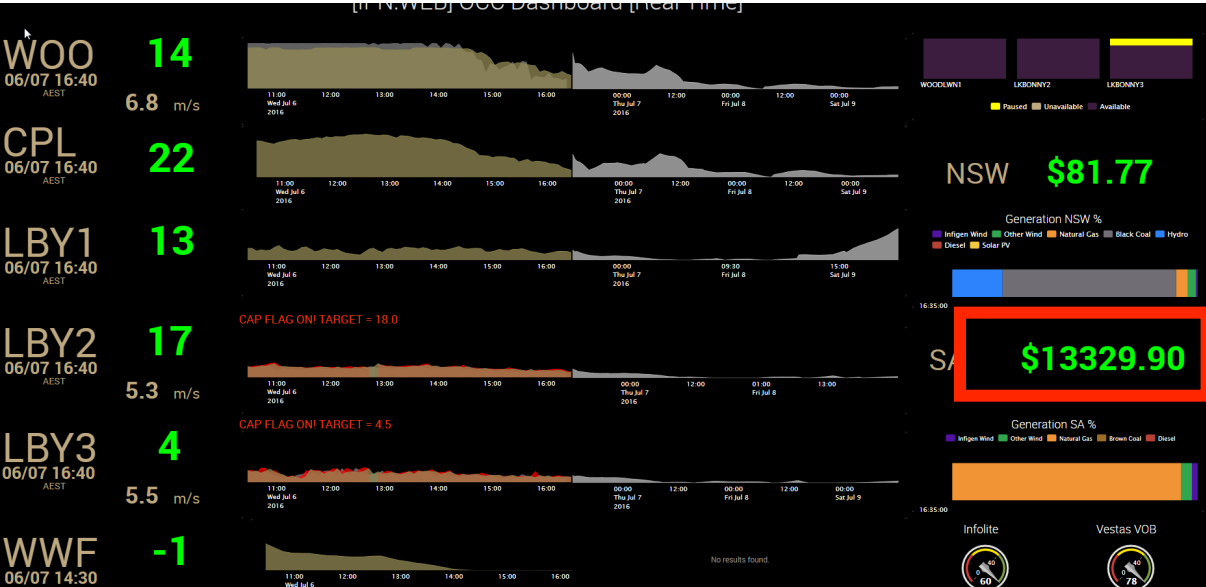
- Real time and Historical version of Dashboards.
- Dashboards are fully operational in their mobile versions.
- Alerts are pushed via Email and Splunk Mobile App.



"All In" – Splunk To Production



"All In" – Splunk To Production



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Data Challenges

18/05/2016 09:25:43.000 2016-05-18 09:25:43,065 [3840] INFO name: 'LB2_3.LB3.Dispatch_MW_FB' value: 'None' quality: 'Bad' time: '05/17/16 23:25:03'

Event Actions ▾

Type	Field	Value	Actions
Selected	<input checked="" type="checkbox"/> host ▾	VSTLPRWOSINFO01	▾
	<input checked="" type="checkbox"/> infolite_opc_tagname ▾	LB2_3.LB3.Dispatch_MW_FB	▾
	<input checked="" type="checkbox"/> infolite_opc_tagquality ▾	Bad	▾
	<input checked="" type="checkbox"/> infolite_opc_tagtime ▾	05/17/16 23:25:03	▾

- Time Zones, each Windfarm has a different one.
- Forecast Data, render the future. Data received ~5 min in advance but mapping instructions and data in the future.
- Semi-structured Data (field extractions)



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What Has Changed?

- Mobility, data available on the go.
- Step forward on democratizing access to the information across the company.
- Better monitoring and alert consolidation across business and IT operational data.
- Simplified part of the Business Continuity Plan (BCP)

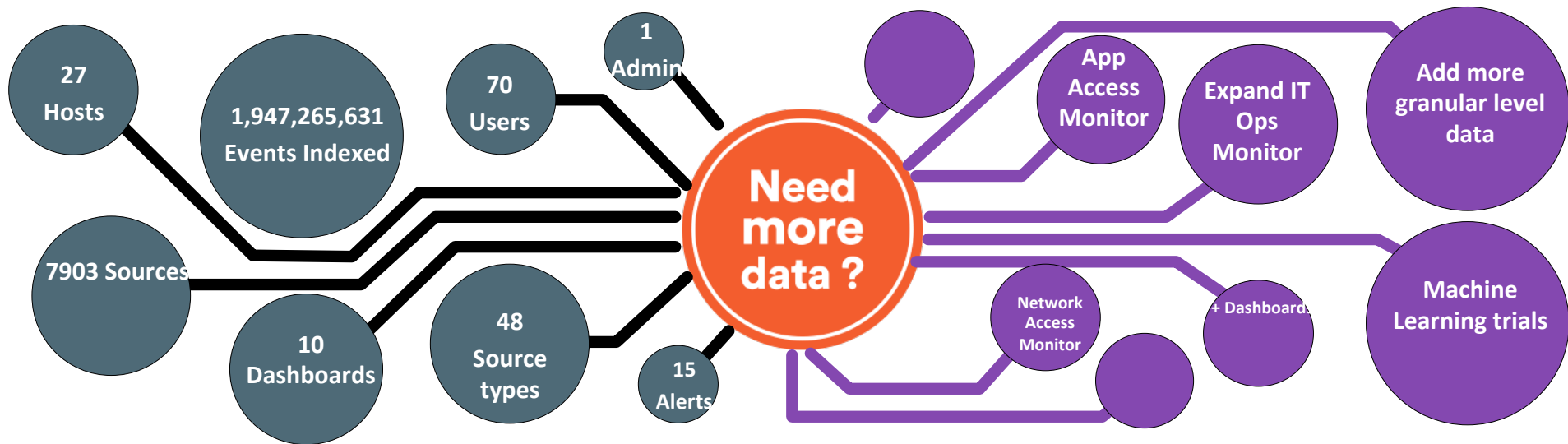


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What Is Next?



Lessons Learned!

- Watch out for dashboard customizations
- Verify Splunk Apps compatibilities before upgrades
- Take time to design your data model, do not just simply ingest data.
- Training and testing is key



Q&A



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THANK YOU

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