Monitoring a National Power Grid With Splunk and ITSI

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Agenda

1. Introduction
2. Monitoring the National Power Grid Using Splunk
3. IoT in the OT World
4. The Road to Splunk ITSI
5. Lessons Learned

LINUS MYREFELT

Statnett Splunk Ninja

MY BETTER SELF

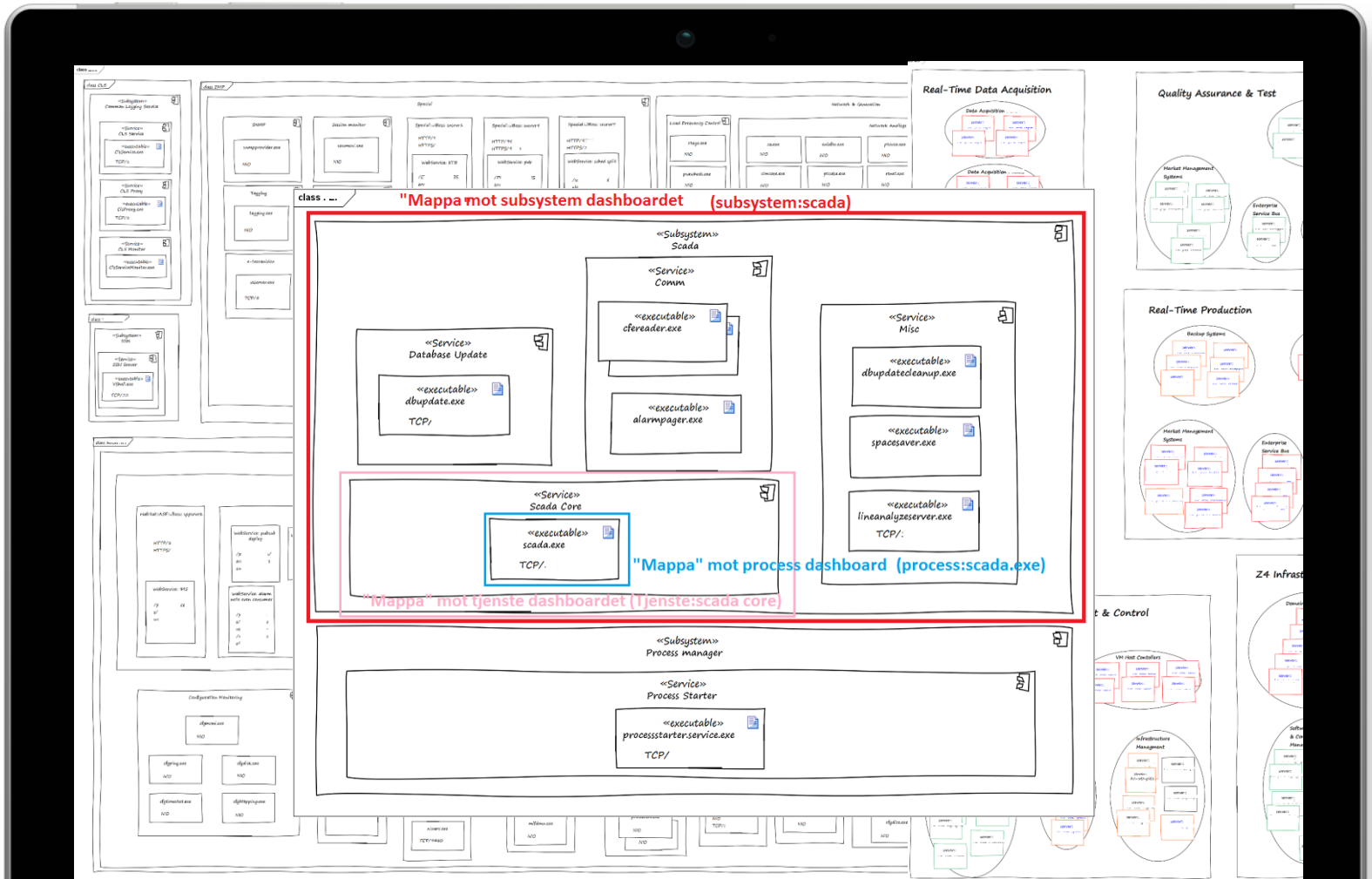
My Mini Me


Statnett

What is EMS?

- EMS
  - Also a term SCADA/EMS is used) supervises, controls, optimizes, and manages generation and transmission systems
  - EMS enables utilities to collect, store, and analyze data from hundreds of thousands of data points in national or regional power systems, perform system modeling, simulate power operation, pinpoint faults, preempt outages, and participate in energy trading markets

Input and Data Sources



- Inputs
- System diagram
- Plattform diagram
- Network / service architeture diagram
- Excel sheet with important processes / message codes / "metadata»
- Screenshots

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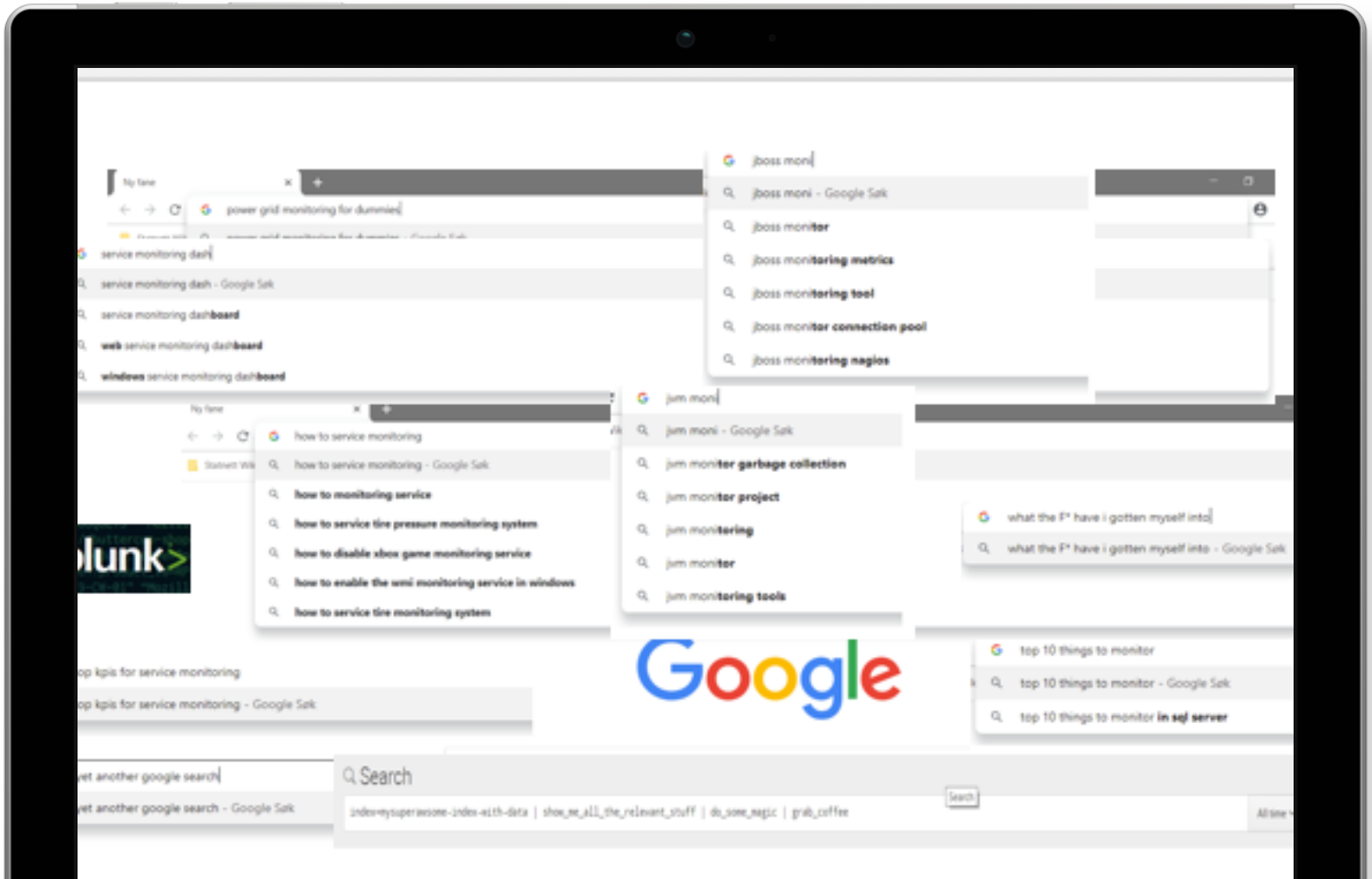
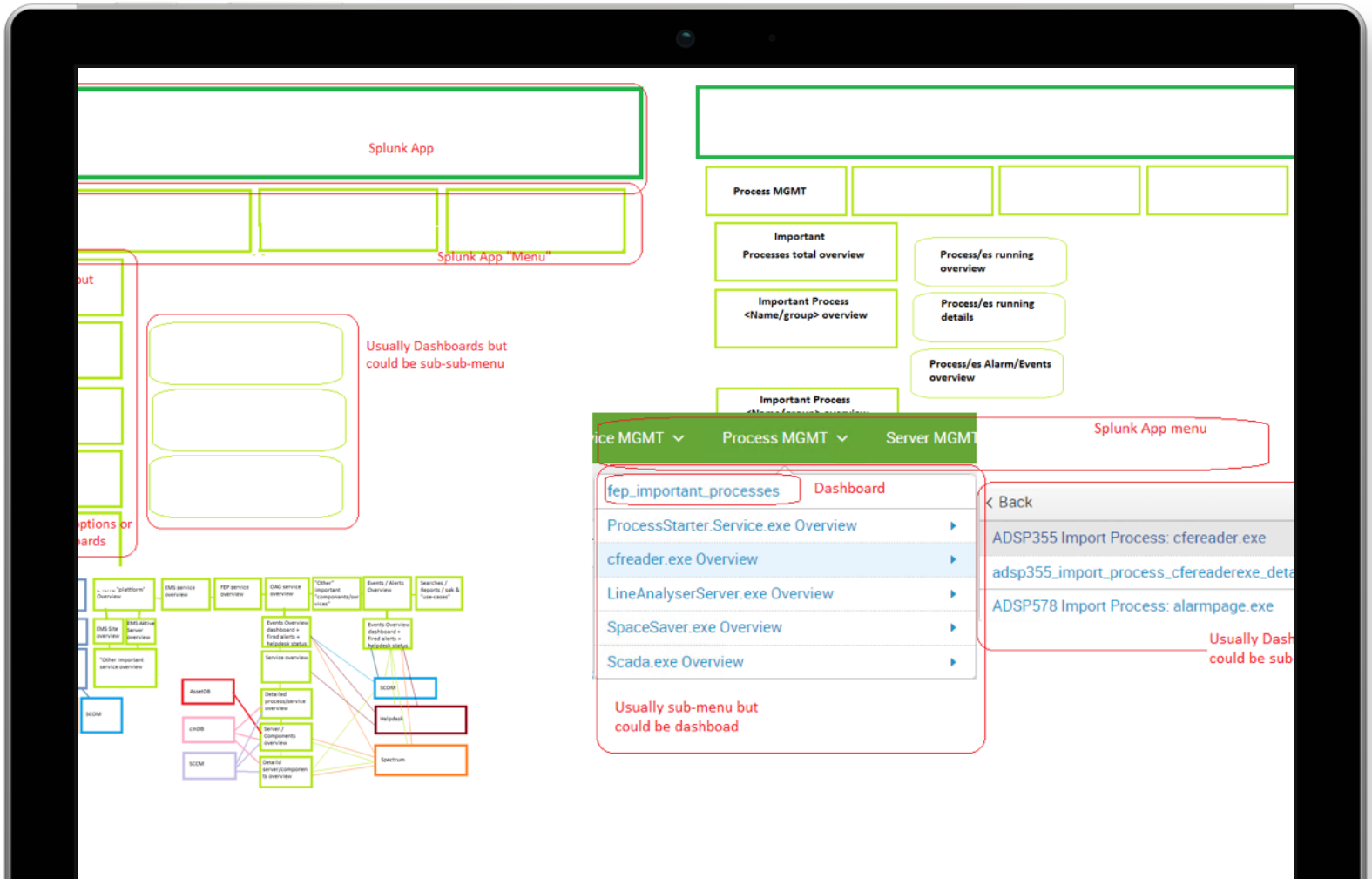
Research Phase



- Define what a service is and its various states
- Define requirement for monitoring
  - Utilization
  - Server Monitoring
  - Can we correlate this?
  - Other monitoring tools?

Developing Splunk Apps



- Create mockups before
- We created a handful of “apps” separated by role and function
- We wanted a high level subsystem view and detailed service view

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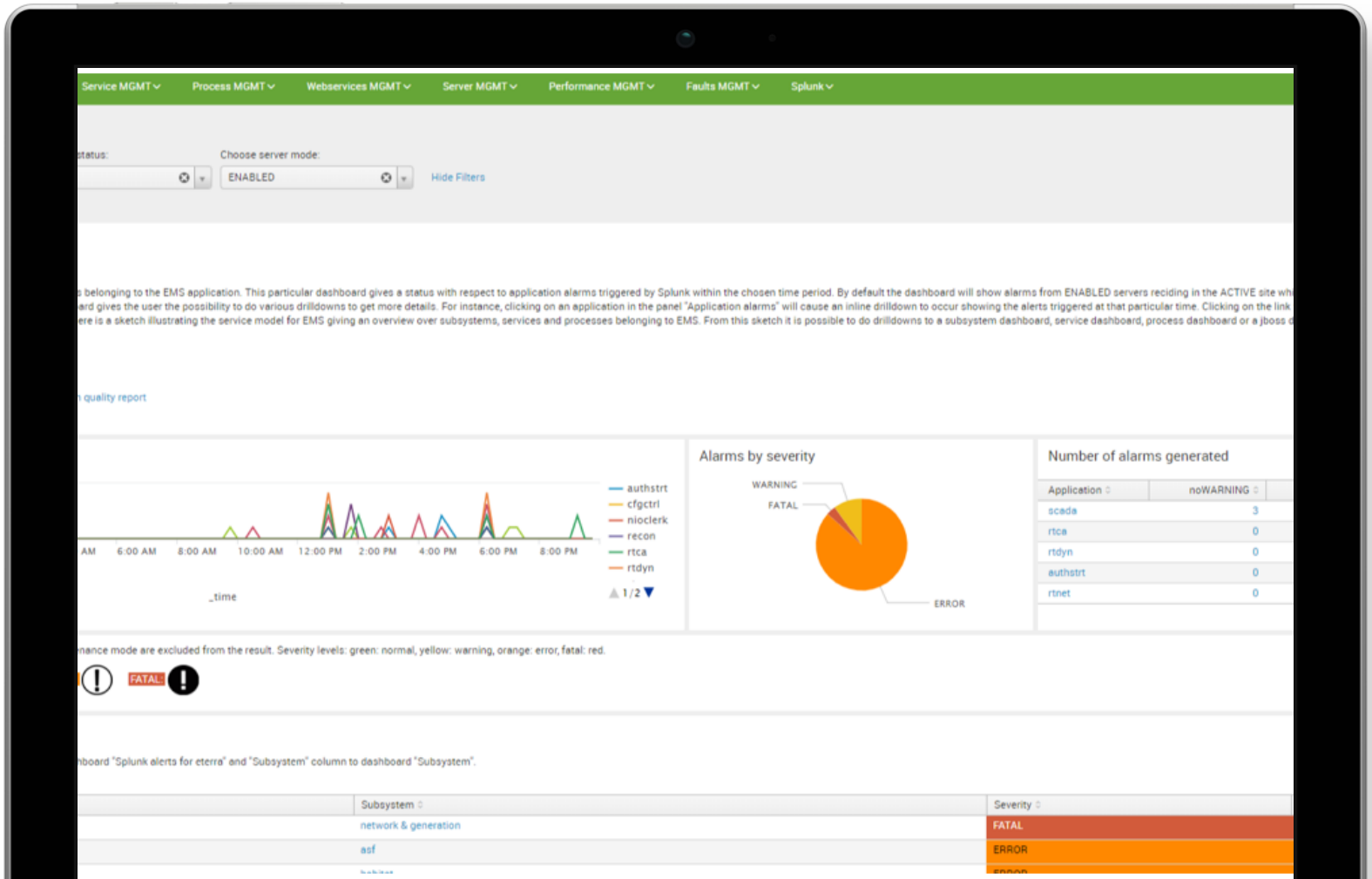
The Results



- This is the start page of each Splunk App
- Contain the most necessary information
- While also enables you to drill down into the details and alerts
- Bridges together the IT/OT environments

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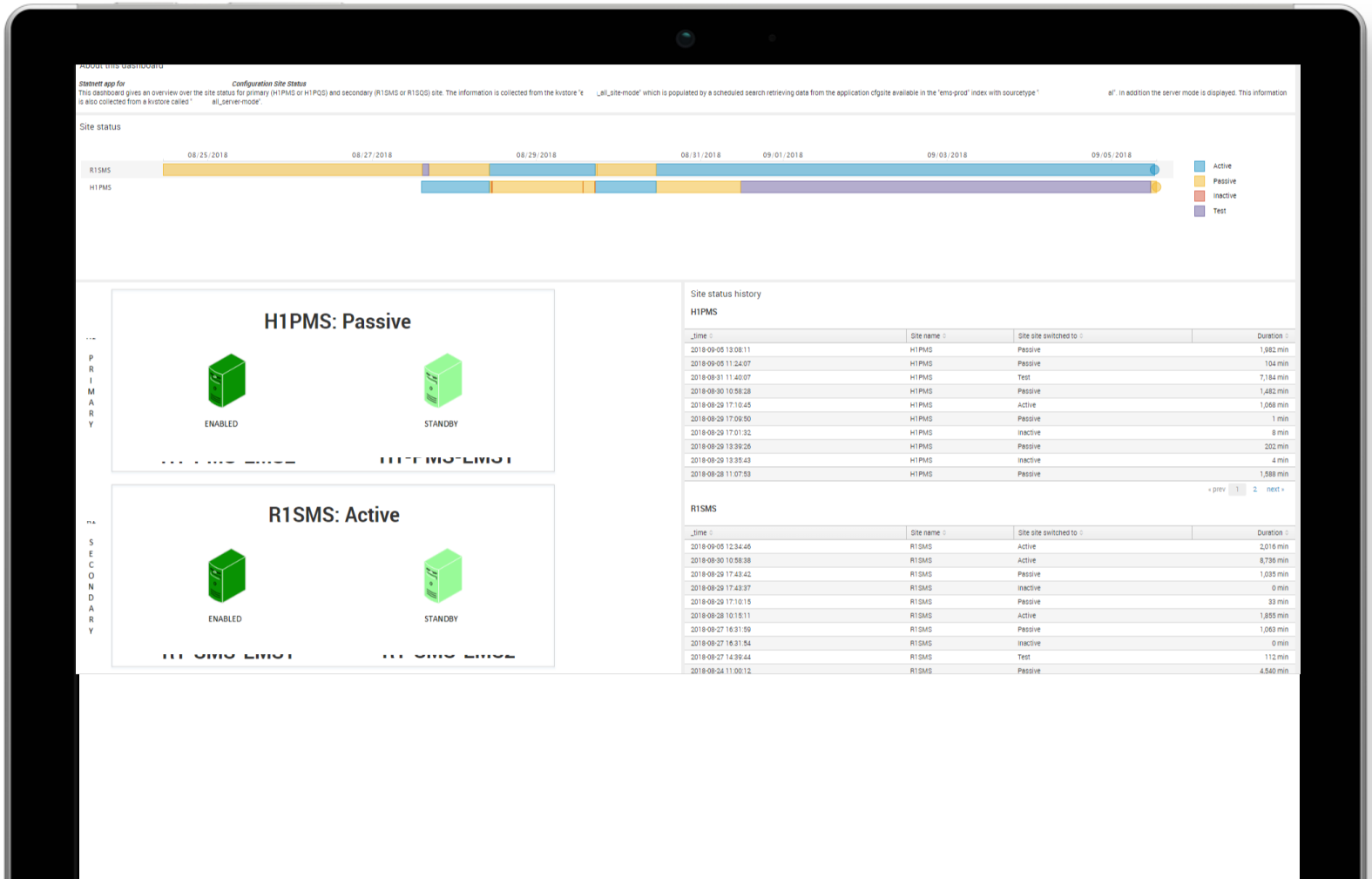
The Results



- Contain info and stats around node and site failure with the EMS
- State of system helps to dictate urgency
- Use lots of lookups and KV Collections to monitor the state

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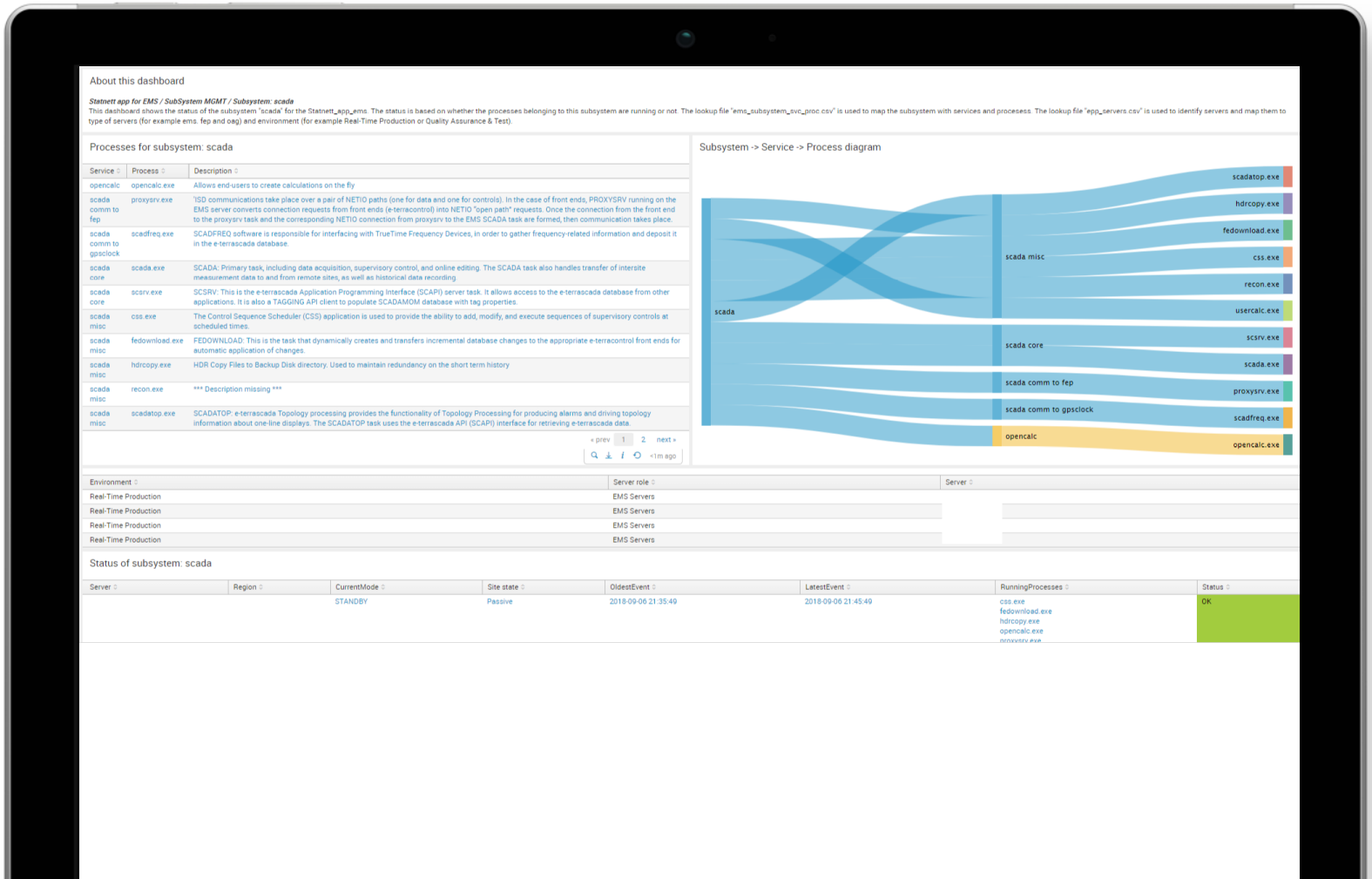
The Results



- Subservice dashboard contains description
- Higher level information is a "defined" subsystem

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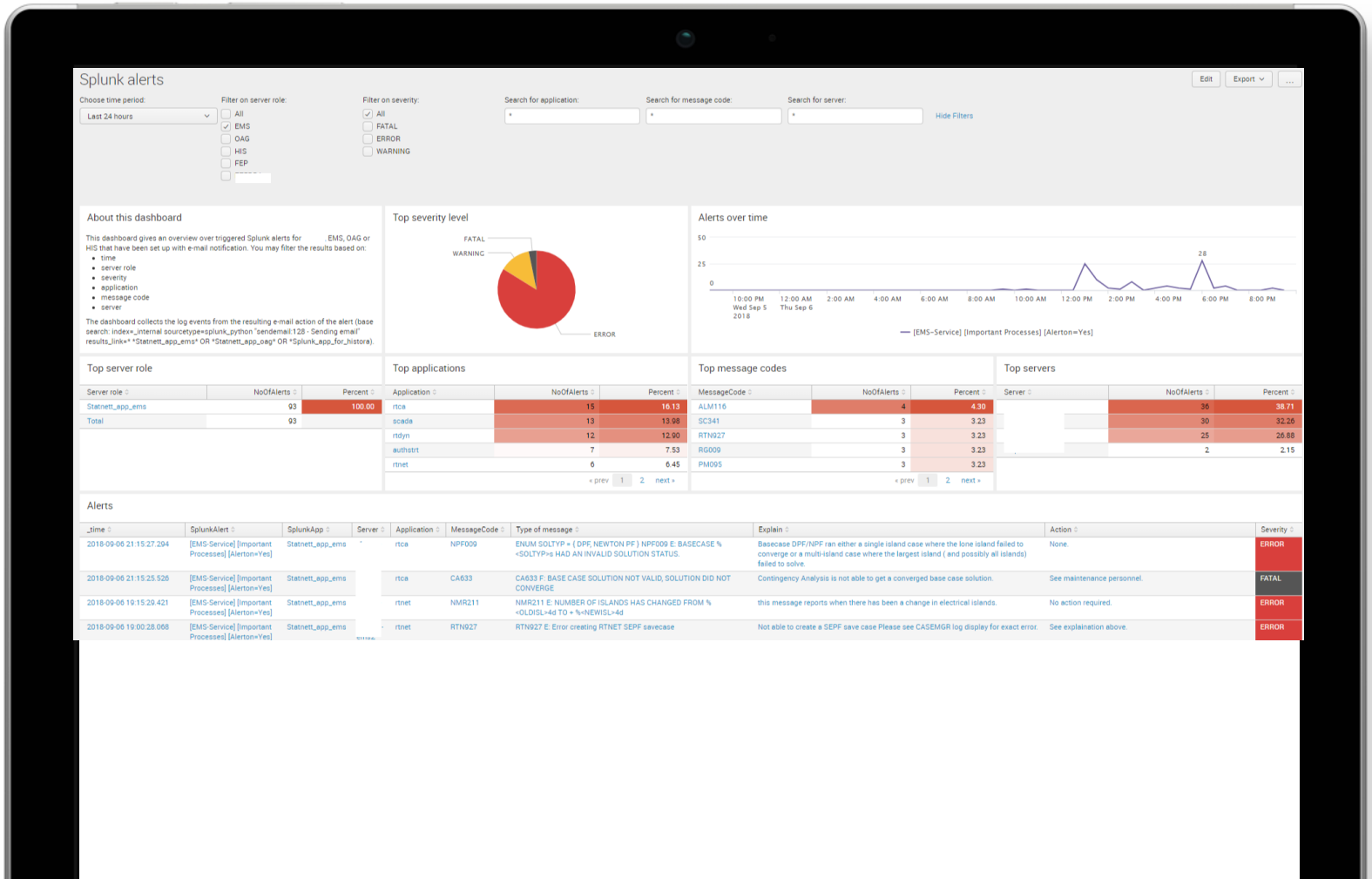
The Results



- Centralized overview of alerts generated from Splunk

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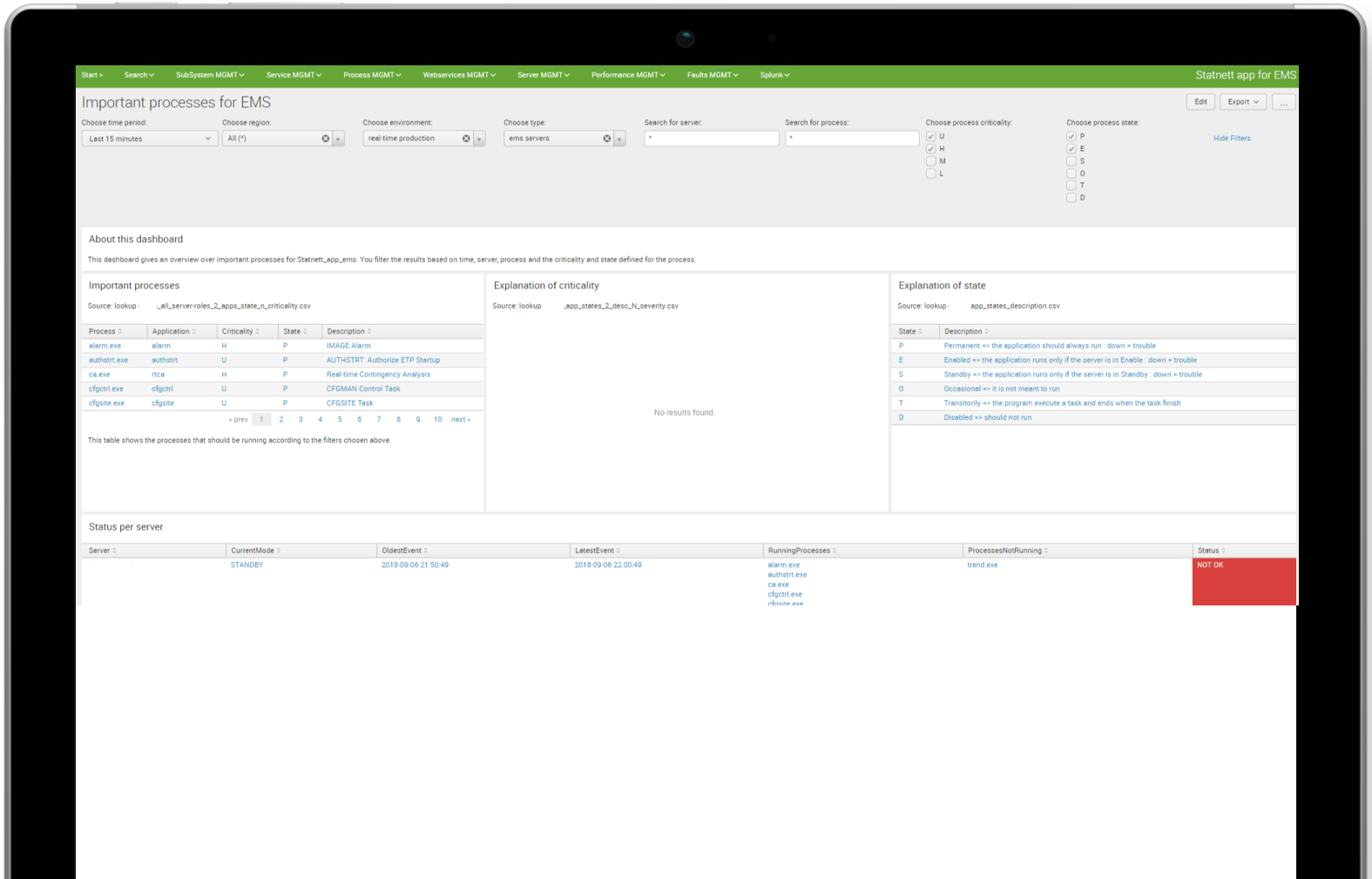
Application and Process-Focused Dashboard



- Centralized overview of Processes

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Sample Report

- Example of report generated based on collected scada data

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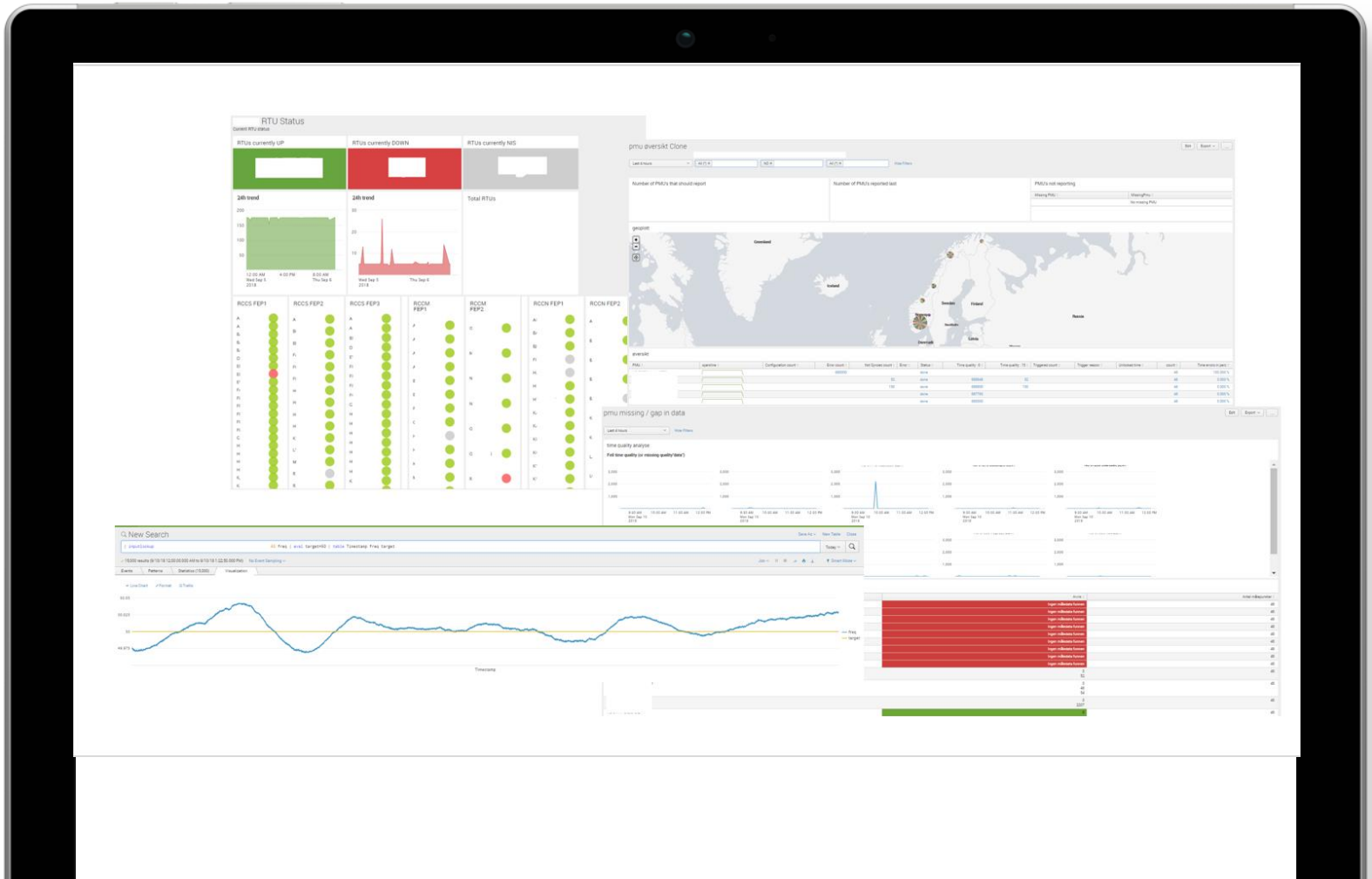
IoT in the OT World

- RTU: Remote terminal unit
  - Collects and transfers data
  - Responds to and executes commands and order the EMS
- PMU: Phasor measurement unit
  - A device which measures the electrical waves on an electricity grid using a common time source

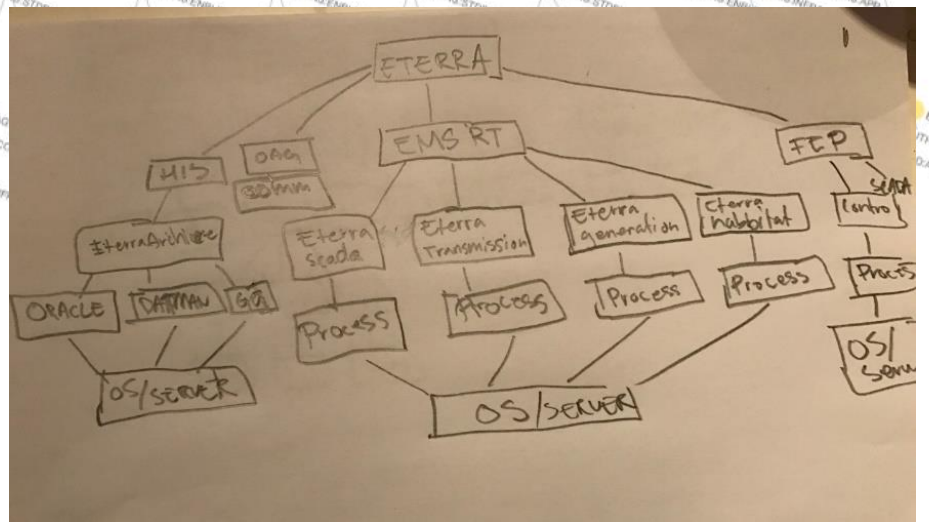
IoT Dashboard

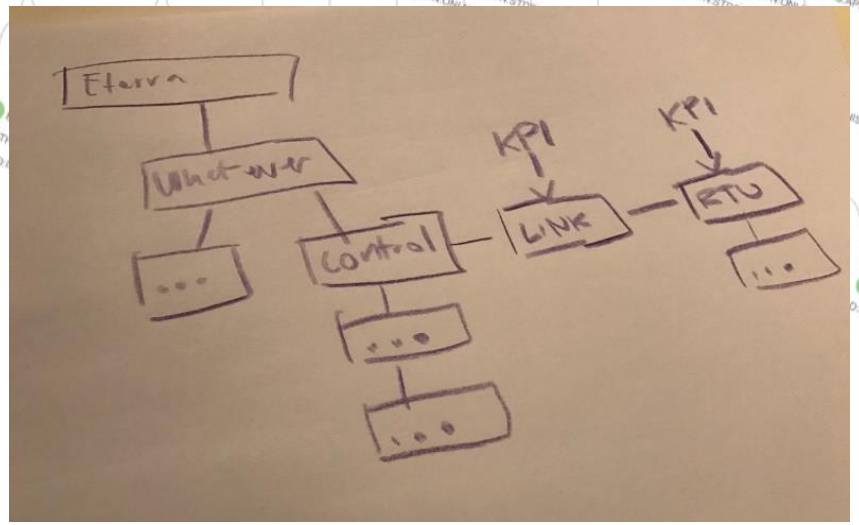


- Yey, we do IoT stuff

The Road to ITSI Enlightenment

ITSI Mock-ups





Infrastructure Glass Table Examples

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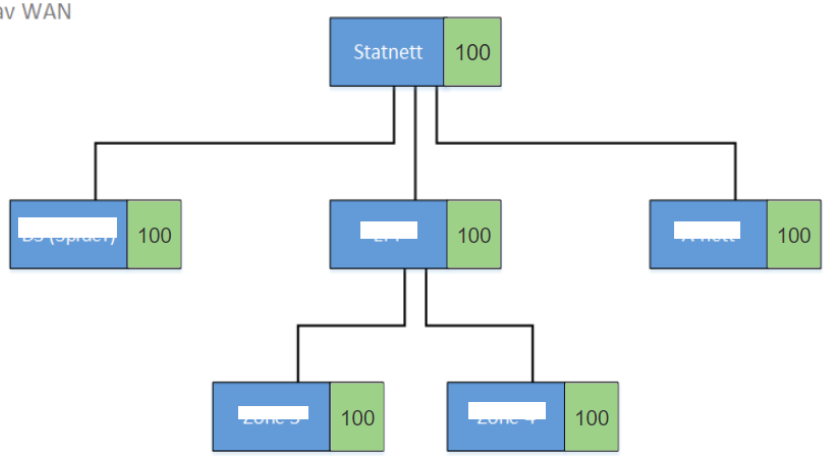
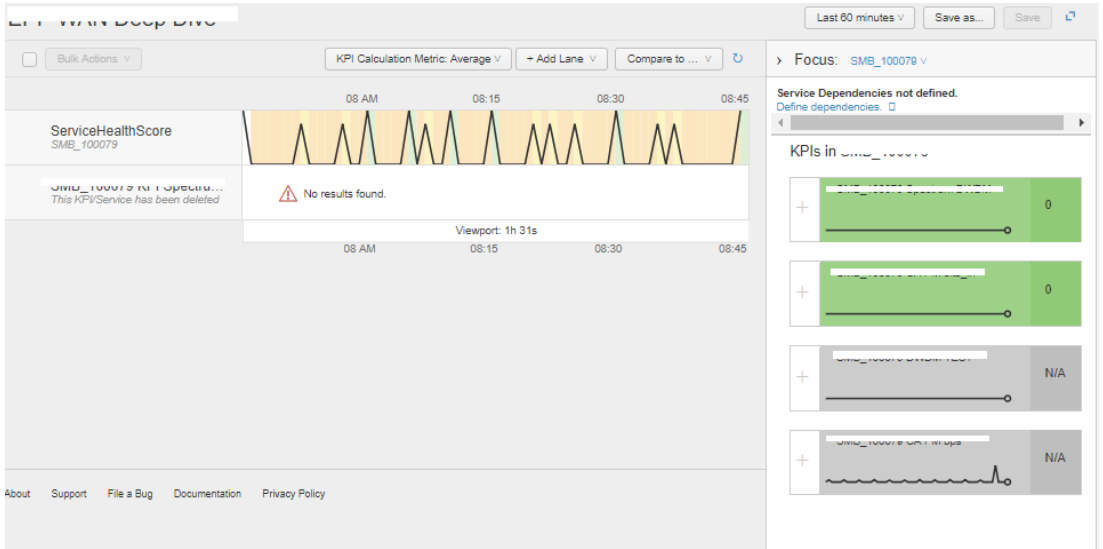
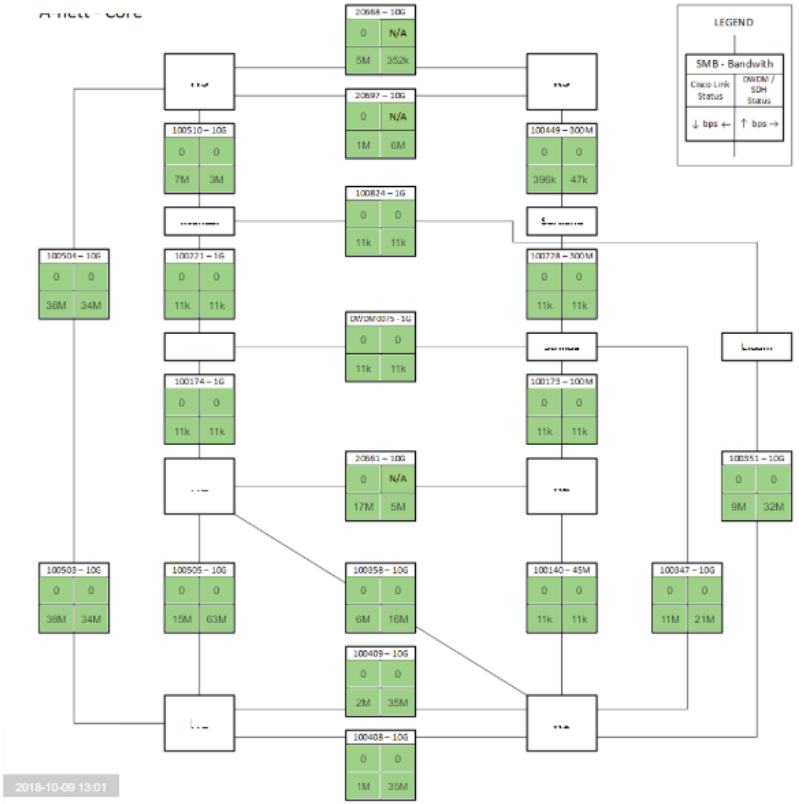
Overvåking av WAN







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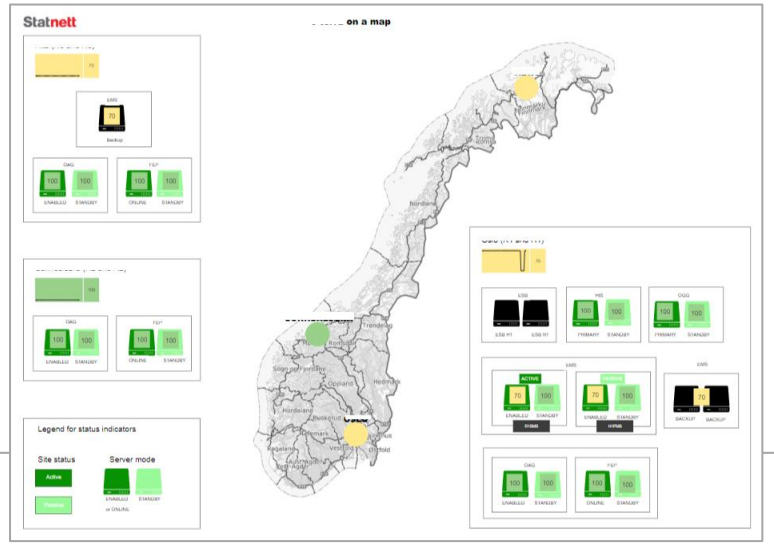
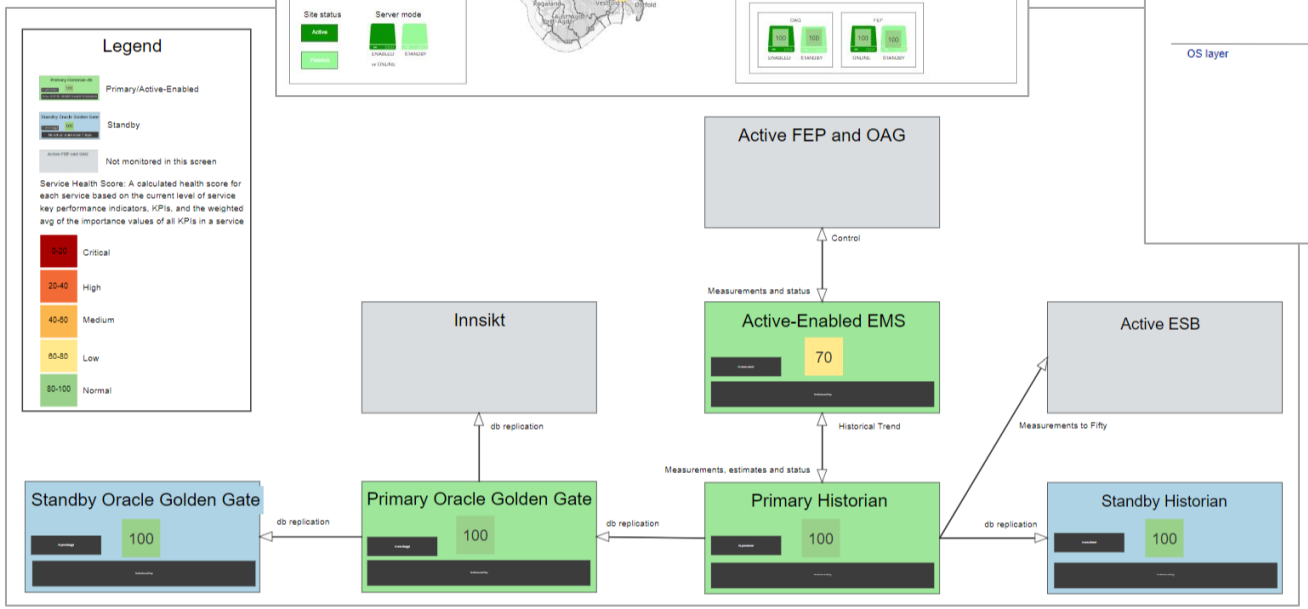
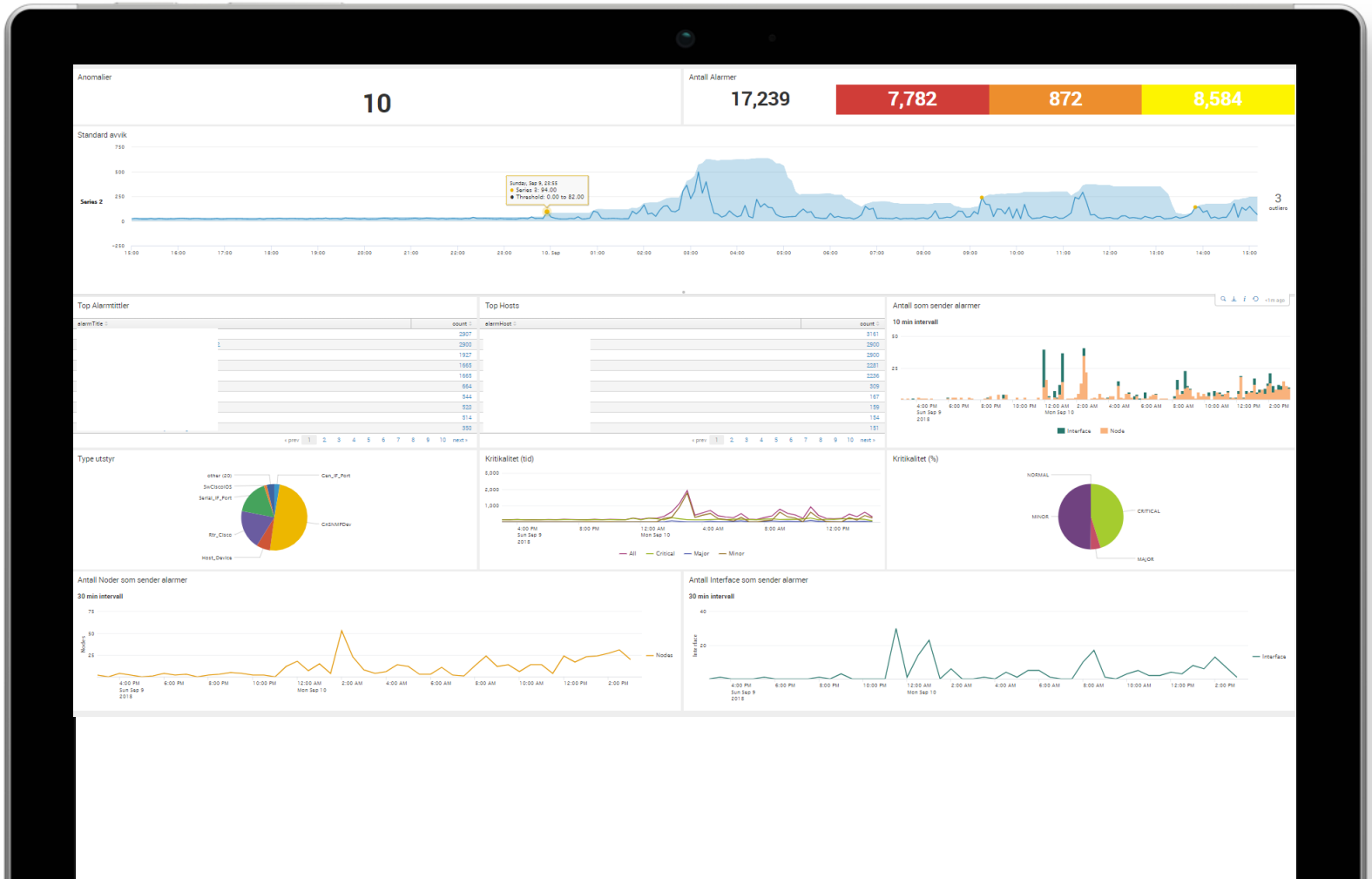
Scada Focused Glass Tables





Machine Learning and Lessons Learned



- Playing around with Machine Learning

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Lessons Learned

Thank You!

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