

# PREDIKTIVT UNDERHÅLL

Ides Community Conference 2017

Hooks Herrgård den 17 maj 2017

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# EXPECT A BETTER TOMORROW



## SPECIALISTENHET INOM SIGMA SOM LEVERERAR SYSTEMLÖSNINGAR INOM ASSET MANAGEMENT OCH UNDERHÅLL

ASSET CARE – KUNDTEAM FÖR PROJEKT, SUPPORT OCH VIDAREUTVECKLING

### ASSET MAINTENANCE

Underhållssystem  
(CMMS/EAM)  
Baserat på IBM Maximo  
eller API PRO

### ASSET PREDICT

Prediktivt underhåll  
(PdM)  
Baserat på Microsoft,  
Ericsson m.fl.

### ASSET MOBILE

Mobila arbetssätt  
(HTML5)  
Rollbaserat för alla  
enheter, on- och off-line

### ASSET LIFECYCLE

Asset Management  
(ISO 55000)  
Assessment  
Anläggningsdok.

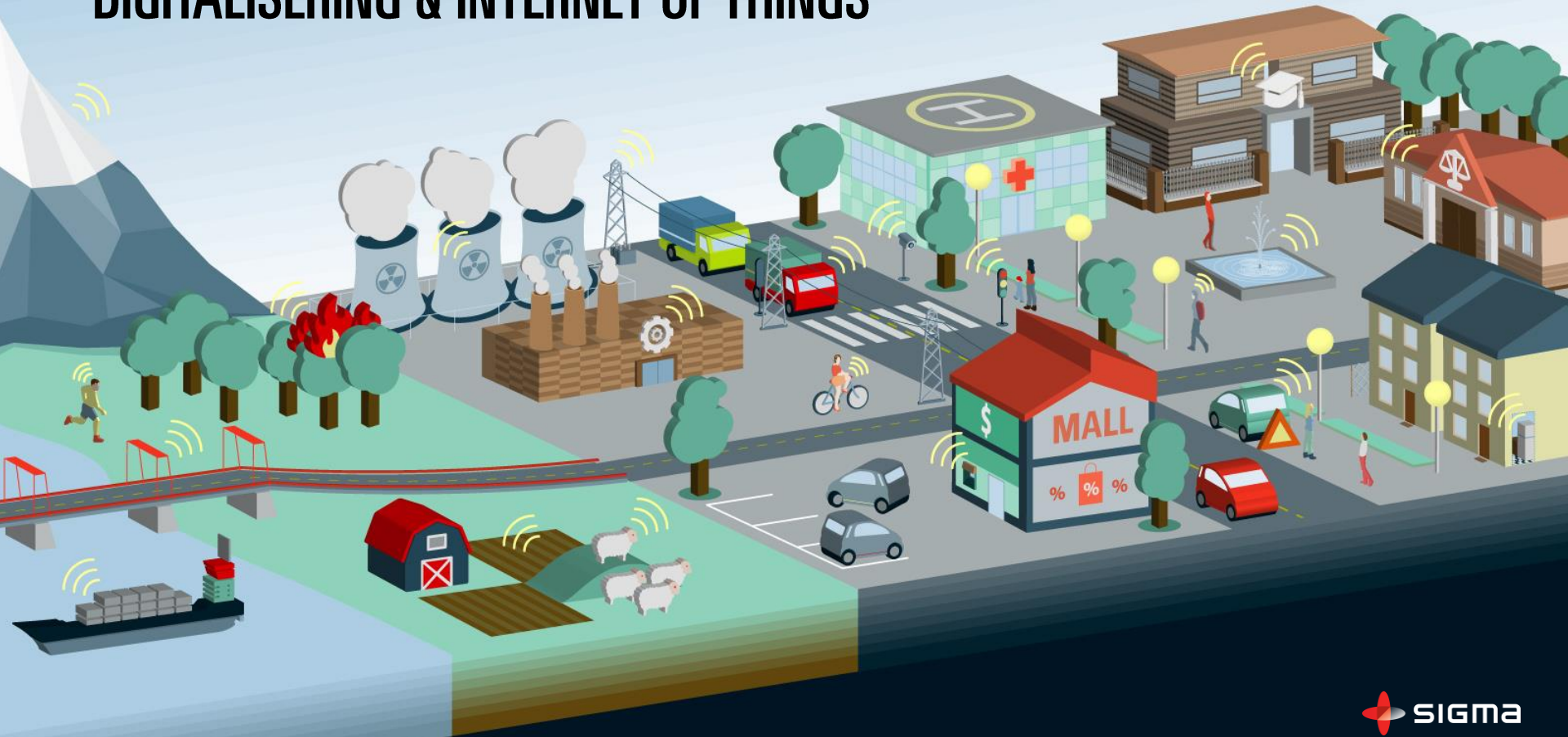




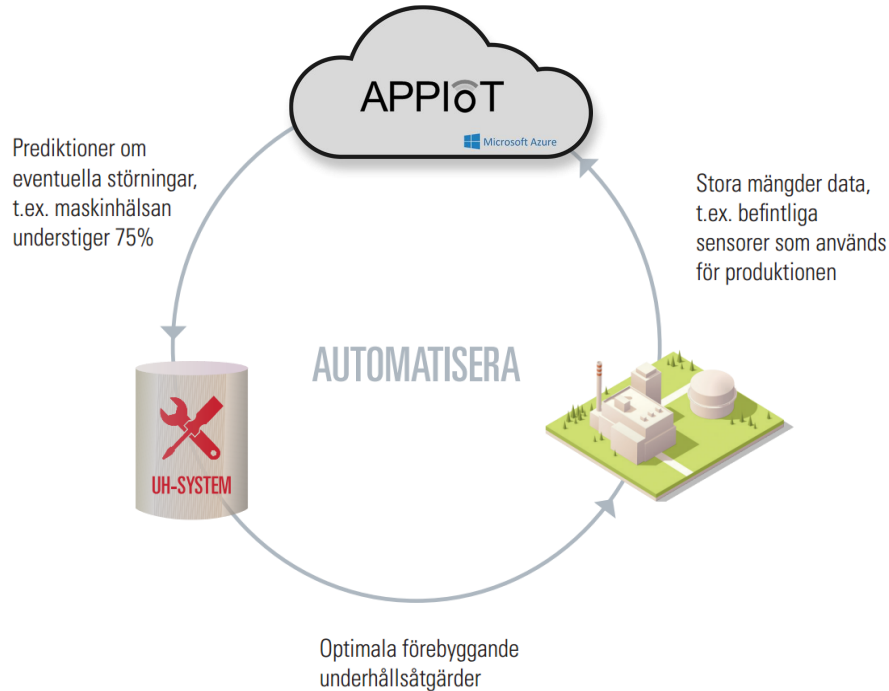
© TimoElliott.com

*"Henry, it's for you -  
apparently your heart is  
about to fail..."*

# DIGITALISERING & INTERNET OF THINGS



# ASSET PREDICT



## RÄTT ÅTGÄRD I RÄTT TID

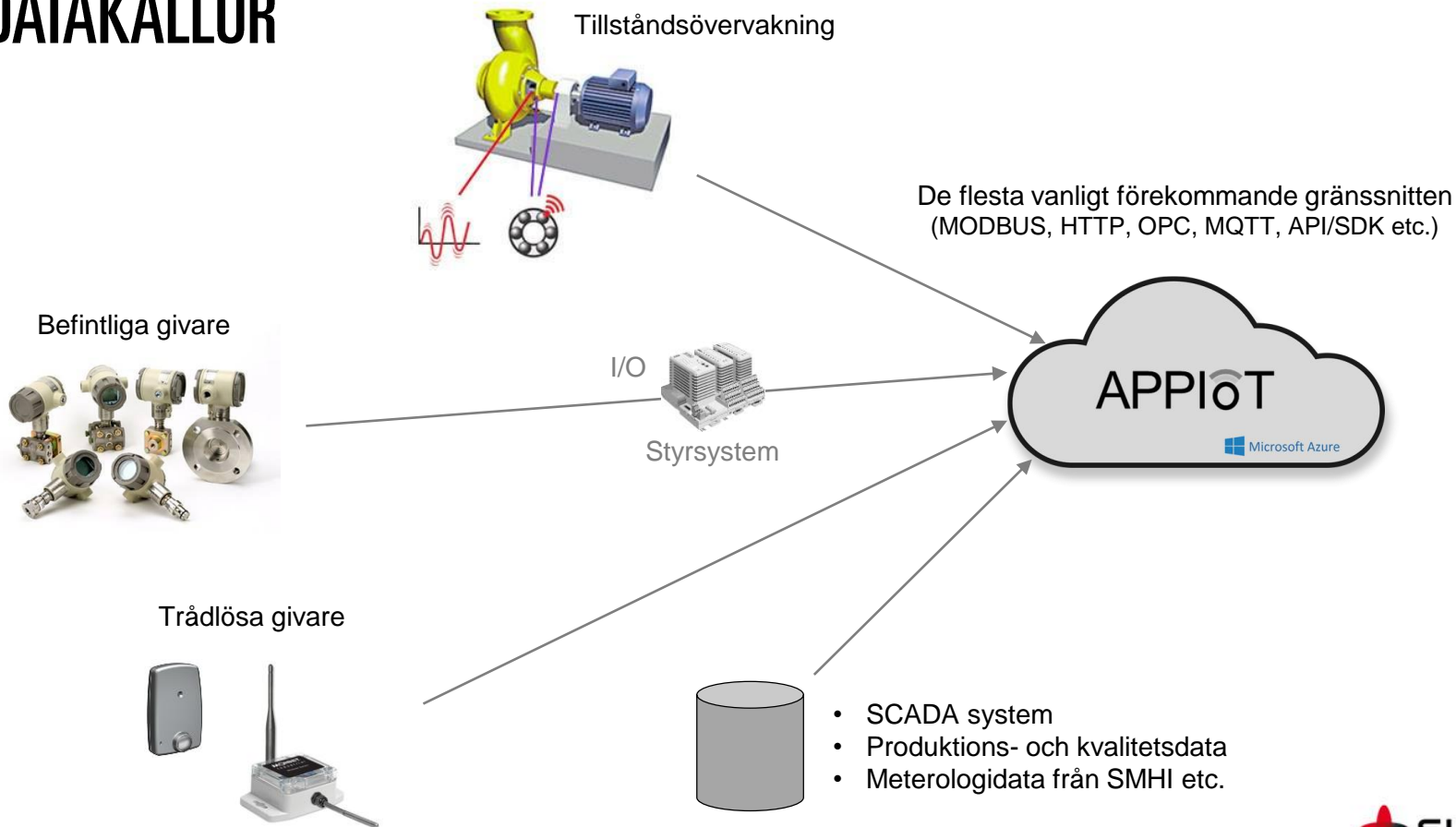


Fånga upp eventuella störningar innan ett haveri eller försämrad kvalitet, vilket ger ökad tillgänglighet och ökat TAK/OEE

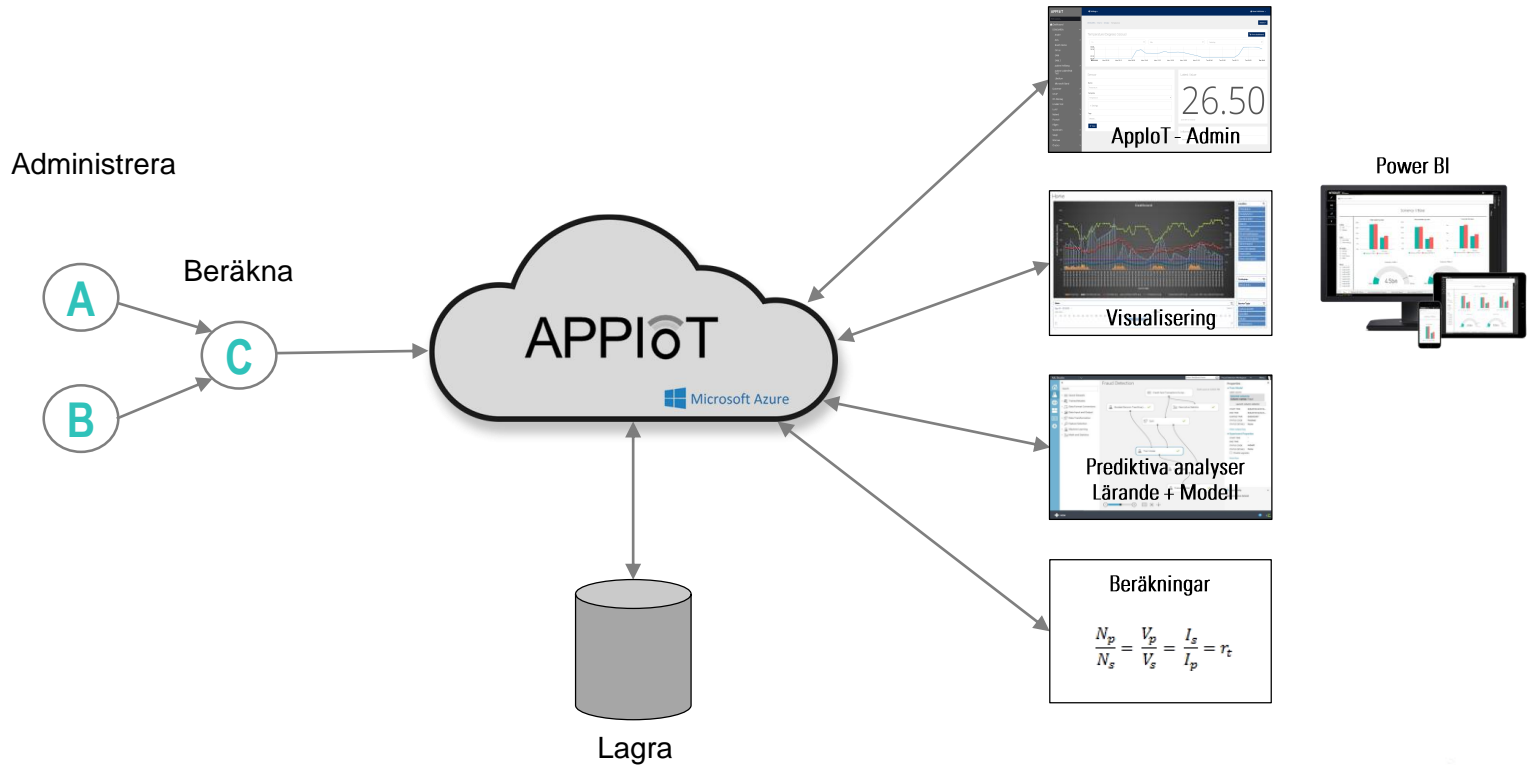


Skjuta på olika underhållsåtgärder med bibehållen driftsäkerhet, vilket ger lägre underhållskostnader

# 1. DATAKÄLLOR



# 2. HANTERING OCH ANALYS AV DATA – HISTORIK & REALTID





Filter Locations...

Dashboard

DEMOAREA

Andre

Axis

Booth Demo

Cirrus

EAM

EAM 2

Joakim Hellberg

Joakim Uddenfeldt  
Test

Libelium

Microsoft Band

Epicenter

IoTaP

ISS Norway

Lindab Test

Lund

Malmö

Poznań

Pågen

Stockholm

Växjö

Warsaw

Örebro

DEMOAREA / EAM 2 / Climate / Temperature

Actions

## Temperature (Degrees Celsius)

Pin to dashboard

1 h

Max

Yesterday



## Sensor

## Name

Temperature

## Template

Temperature

&gt; Settings

## Tags

Choose...

Save

## Latest Value

26.50

2016-09-13 13:53:50

## Information

Internal Id

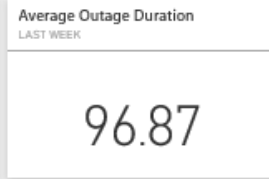
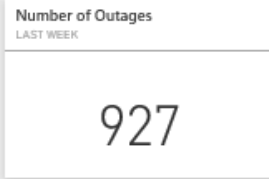
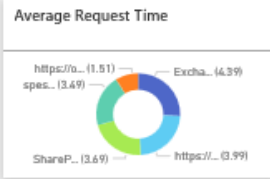
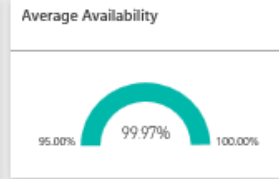
4e5e702b-bb45-405a-ad02-eb1e7f66d6c3

- My Workspace
- Search by name
- Dashboards
  - Office365Mon
- Reports
  - Office365Mon
- Datasets
  - Office365Mon

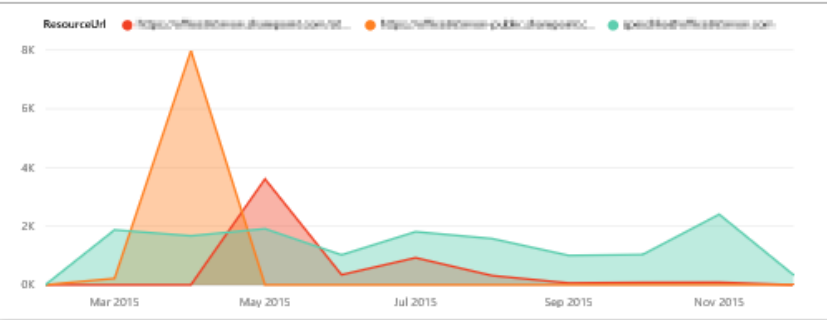
OFFICE365MON

Ask a question about the data on this dashboard

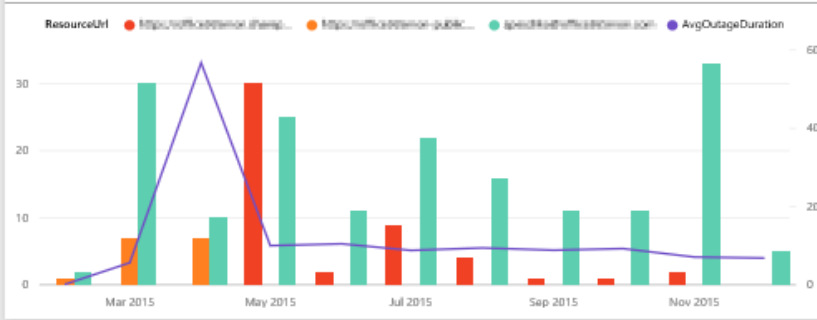
[How to ask](#)



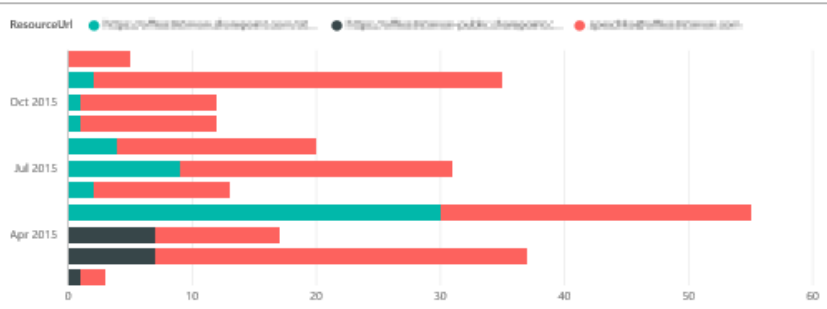
Total Outage Seconds



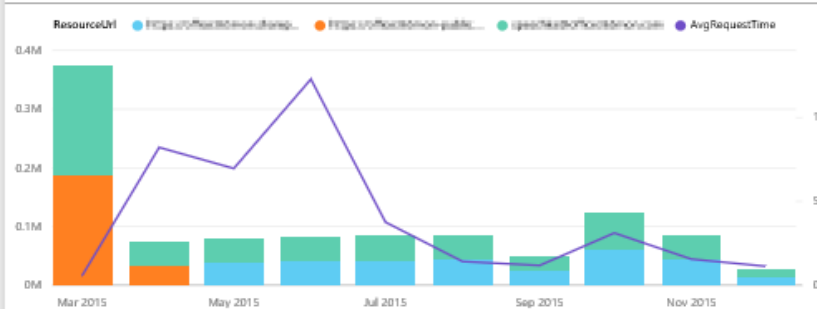
Number of Outages and Average Outage Duration



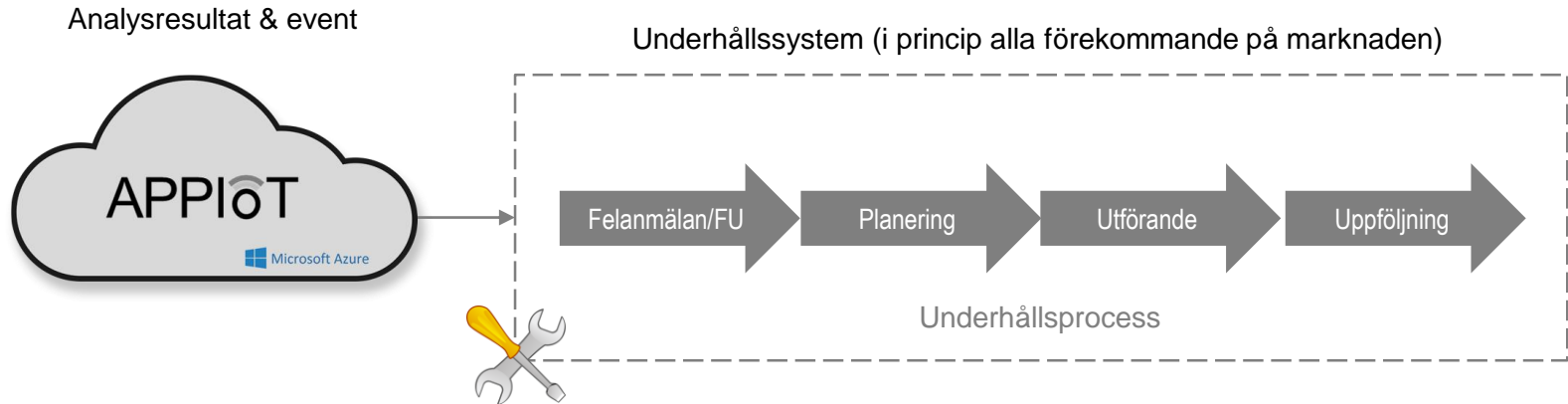
Number of Outages



Average Request Time and Number of Requests



# 3. AUTOMATISERA – RÄTT ÅTGÄRD I RÄTT TID



# ASSET PREDICT

## EXEMPEL PÅ KUNDER



ÖJ Snabbtåg Signalfel  
ÖJ Regional Inställt  
ÖJ Regional  
ÖJ Regional



Webb



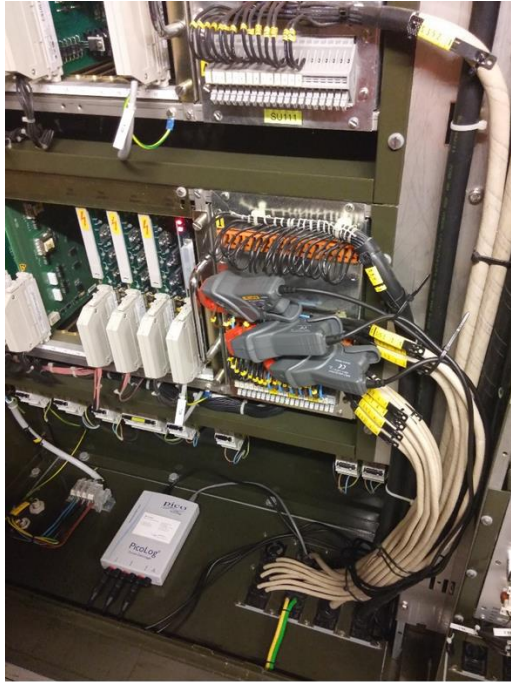
1. Val av sensorer
2. Visualisera
3. Analysera
4. Automatisera

Spårväxel 12

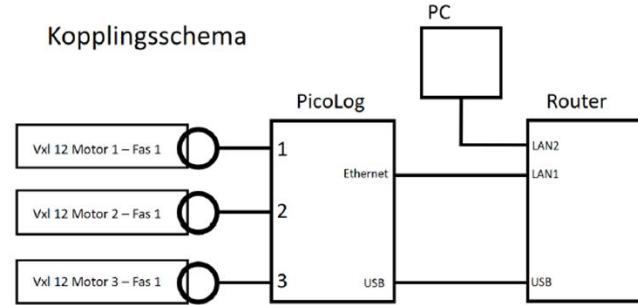
Spårväxel driv x 3

Totalt ca 40 trådlösa sensorer:

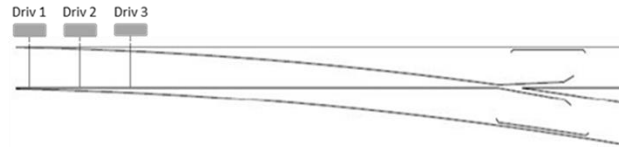
- Strömmätning i ställverk x 3
- Spårväxel driv x 3 (vibration, temp, position)
- Avstånd mellan tungor och stödräl 3 positioner
- Klimat x 5 (temp, fukt och ljus)
- Rälstemperatur x 5



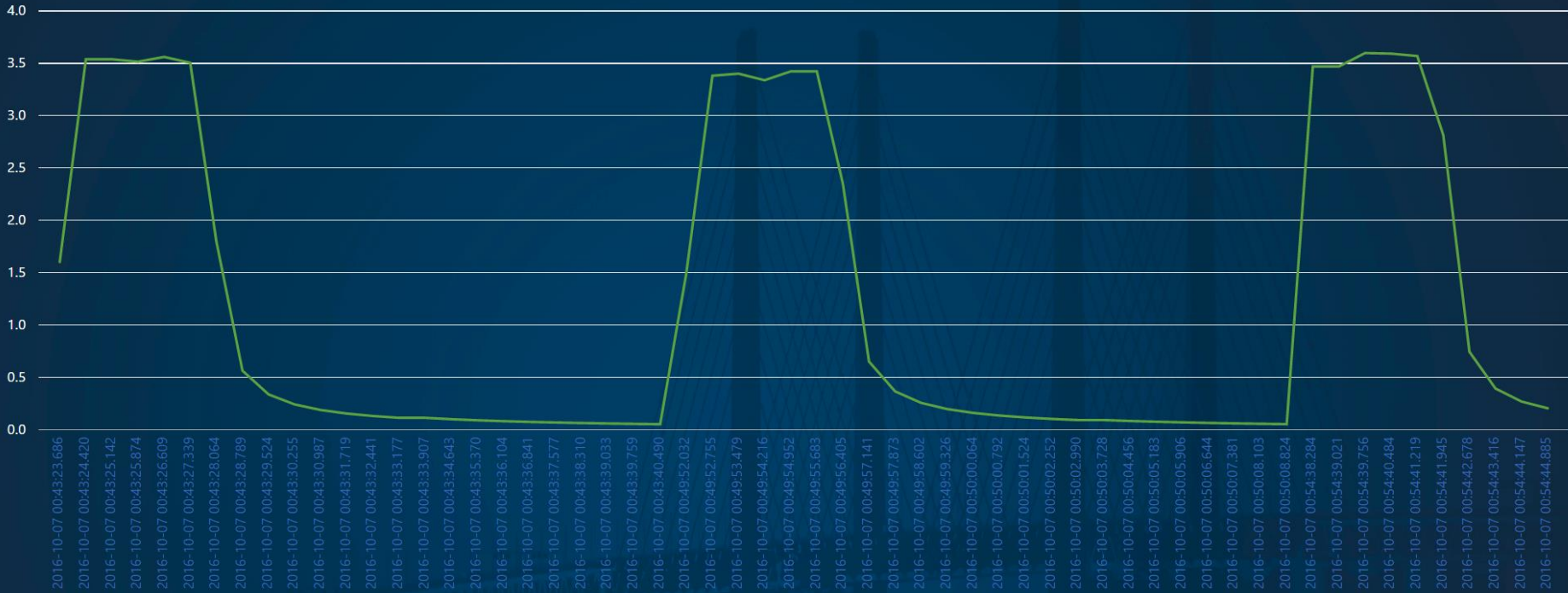
## Kopplingschema



*Ett exempel:  
Strömmätning*



# Motor 1



## Predictive Health

98%

Y Q M W **D**

day

Oct 5 2016 - Oct 23 2016

2016  
Q4  
Oct  
W40

W41

W42

5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23



ØRESUNDSBRON®



## TRAINING

Engine 1

Filename: D:/engine1TrainingData.xlsx

Network trained

Engine 2

Filename: [Select file...]

Train Network 2

Engine 3

Filename: [Select file...]

Train Network 3

## EVALUATE

KASTRUP

COPENHAGEN

Start date

Stop date



den 1 november 2016

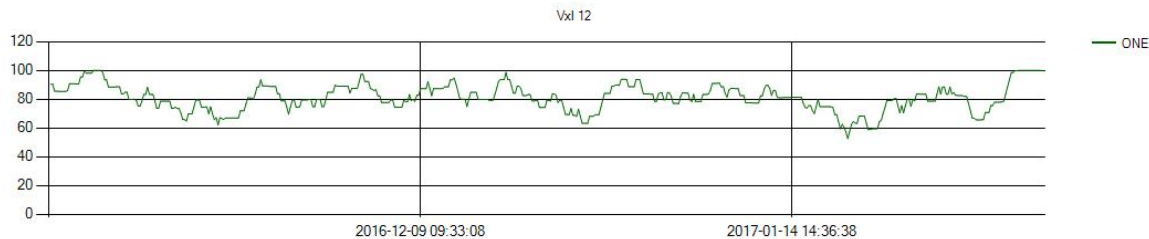


den 9 februari 2017



Moving average count:

20



## Switches during period

Switching	Machine Health
2016-11-03 01:21:09	0.998016914445743
2016-11-03 02:31:25	0.998016897582018
2016-11-03 02:58:58	0.00249563714089038
2016-11-03 04:28:32	0.997649332761534
2016-11-03 04:51:24	0.997861652833854
2016-11-03 05:06:33	0.998018061268893
2016-11-03 06:45:57	0.997857074086537
2016-11-03 07:19:13	0.997963504962788
2016-11-03 08:43:28	0.00249563714089038
2016-11-03 09:15:11	0.9974754379769
2016-11-03 09:45:05	0.997898911522998
2016-11-03 10:55:10	0.967782896100604
2016-11-03 11:46:55	0.98196899102151

ASSET PREDICT



### TRAINING

Engine 1	Filename: D:/LearnThree.xlsx	Network trained
Engine 2	Filename: D:/LearnTwo.xlsx	Network trained
Engine 3	Filename: D:/LearnThree.xlsx	Network trained

### EVALUATE

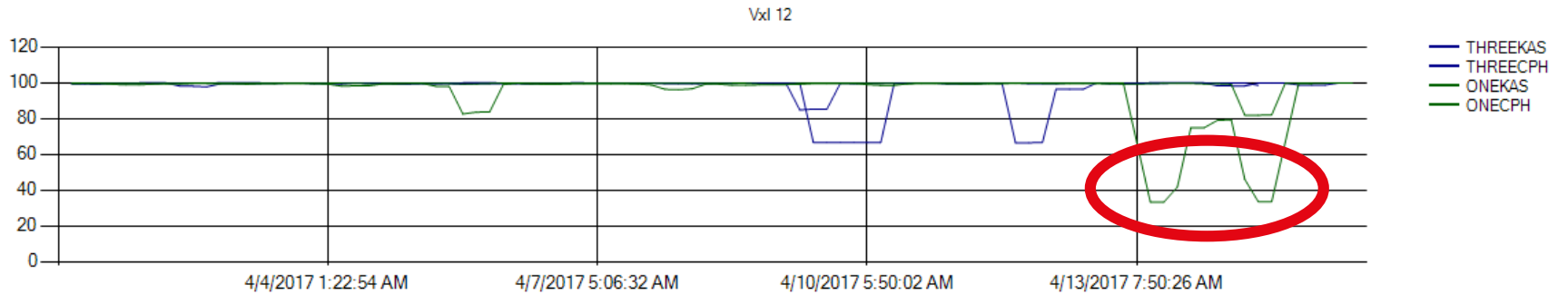
KASTRUP  COPENHAGEN

Start date: Saturday, April 1, 2017

Stop date: Tuesday, April 18, 2017

Moving average count:

Clear Graph



## Admin gränssnitt:

- Data & sensorer
- Kurvor & analys
- Events



Webb

APPIOT

Microsoft Azure

Maximo

## Med automatik:

- Initiera FU baserat på drifttid & slagtimmar
- Skapa felanmälan om hög vibration

## Visualisera data:

- Grafisk översikt i realtid
- Historik inkl. kurvor
- AO-historik från Maximo

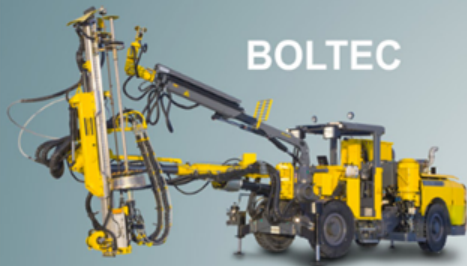
OPC

OPC

Slagtimmar  
Dieseltimmar

**SPM**  
condition monitoring solutions

Atlas  
Copco  
CERTIQ



# BOLTEC

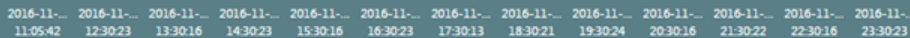
Predictive health:

98%

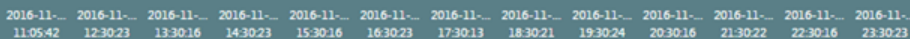
Selection:

- Alla
- Igår

Operation hours:



Drill hours:



Engine



Outputshaft



BOLIDEN



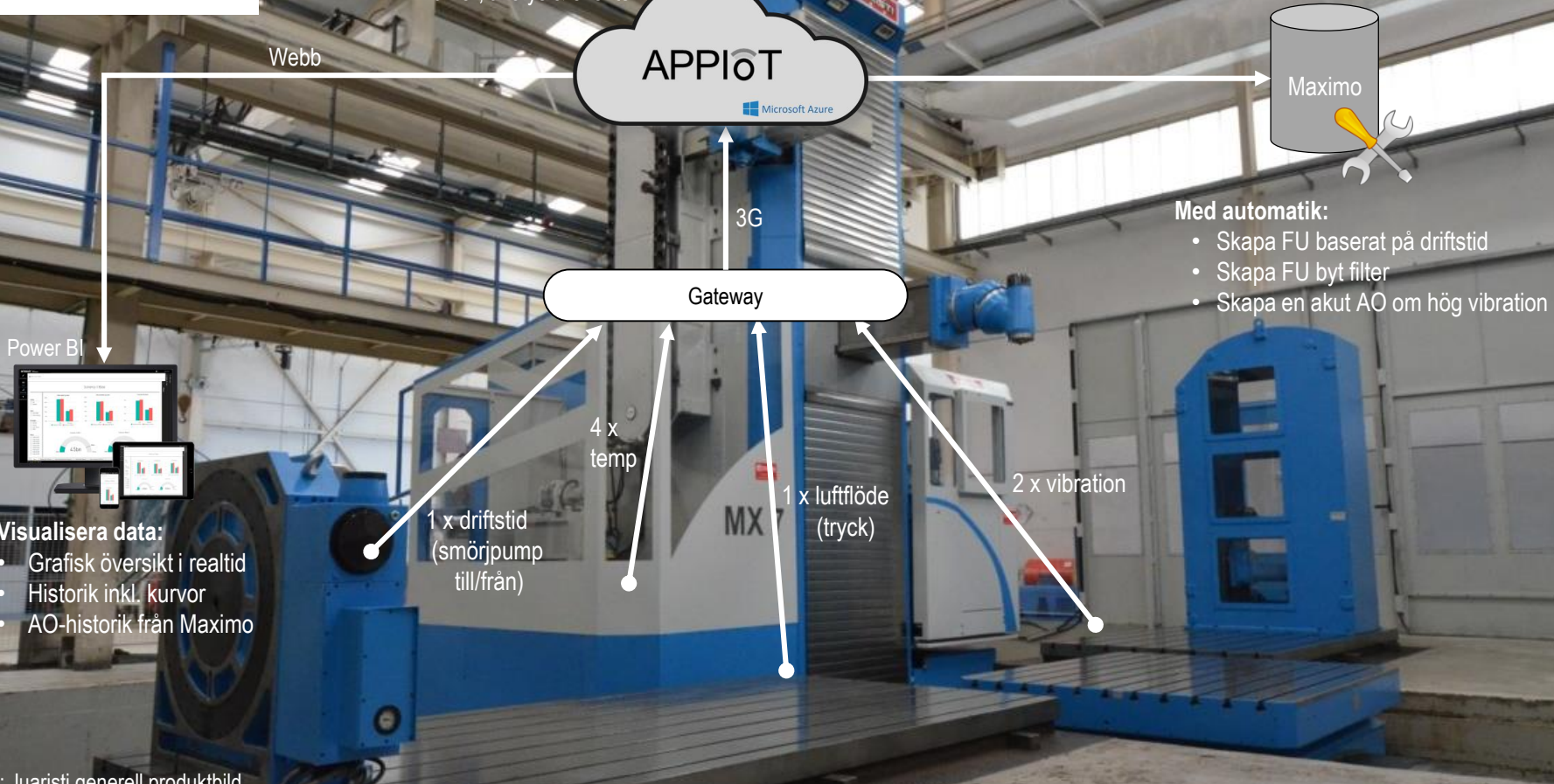
Inputshaft





## Admin gränssnitt:

- Sensorer
- Kurvor, analys & events



Webb

APPIoT

Microsoft Azure

Maximo

3G

Gateway

Power BI

4 x temp

1 x luftflöde (tryck)

2 x vibration

1 x driftstid (smörjpump till/från)

## Med automatik:

- Skapa FU baserat på driftstid
- Skapa FU byt filter
- Skapa en akut AO om hög vibration

## Visualisera data:

- Grafisk översikt i realtid
- Historik inkl. kurvor
- AO-historik från Maximo



SR to Maximo last sent:  
2016-05-03

Expected next filter change:  
2017-May

Predictive Health:  
**98%**

Operation hours:  
**4.85**

Operation hours until next maint:  
**5842**

**ON**  
OFF



11/30/2016 11:51:...  
Temp 1



11/30/2016 11:49:...  
Temp 2 - Oil pump



11/30/2016 11:55:54 PM  
Temp 3 - Elec. cabinett



11/30/2016 10:58:22 PM  
Airflow - Elec. cabinett



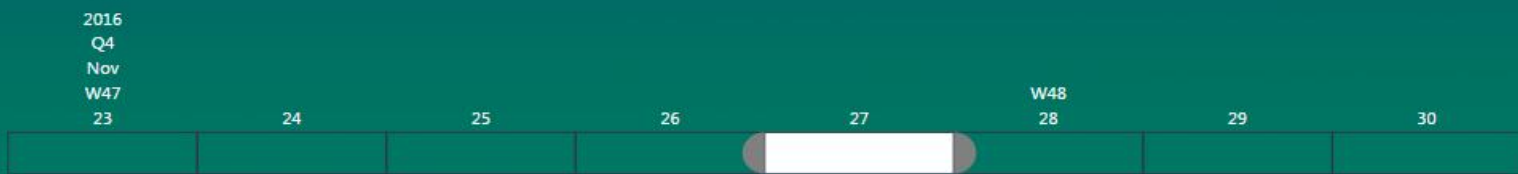
(Blank)  
Vibration Max



(Blank)  
Vibration Avg

Y Q M W **P**

Nov 27 2016 - Nov 27 2016



START  
SMALL

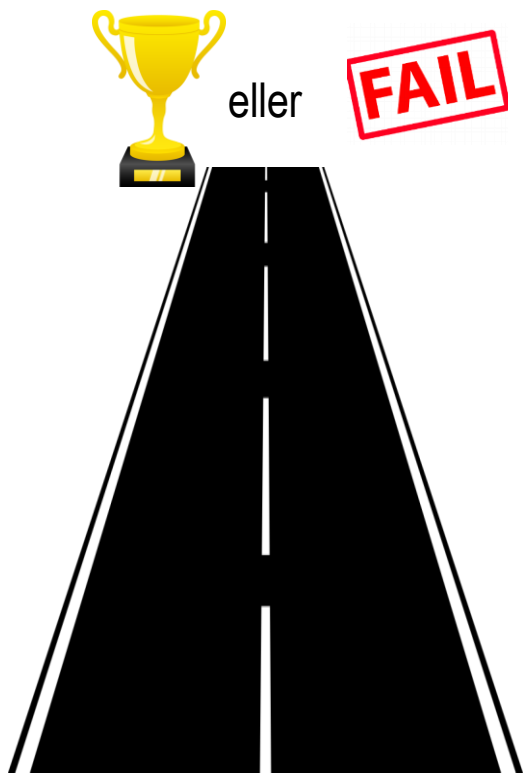


THINK BIG

# OMRÅDEN SOM KAN VARA EN BRA FÖRSTA PILOT

- Effektivare underhåll
- Problem med teknisk otillgänglighet
- ”Livrem och hängslen” för kritiska utrustningar

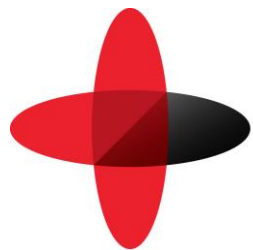
Vad de flesta  
människor tänker



Vad framgångsrika människor vet



Ref: Nicklas Ingeström, CDO på Stena AB



**SIGMA**

Expect a better tomorrow

**Hans Hellström**

Försäljningsansvarig, Asset by Sigma

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