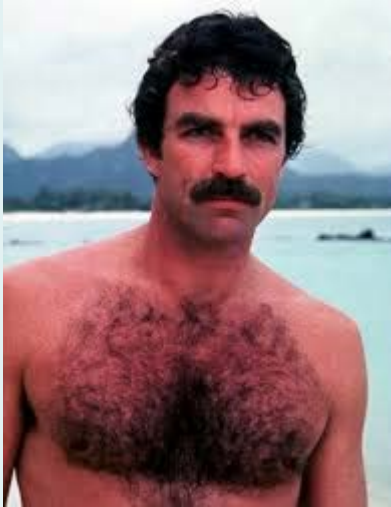


Haystack in Practice – Application in the Real World



A review of different data-driven operational opportunities

Richard Harrison – Chief Technology Officer





CCTV and access



PIR sensors



Sound sensors



CO monitoring



Lighting systems



Vertical transport



Sprinkler systems



Smoke detection



Water treatment



Fire matrix reviews



Compliance updates



Meter data



Irrigation systems



Computer apps



Sensor fusion



BT and Wi-Fi



Occupancy sensors



Pump sets performance



HVAC performance



EWIS performance



Fire system interfacing



Data driven maintenance



Bin sensors



JIT dispatching



Dynamic route mgt



lpWAN



Compactors and balers



GIT monitoring



Reporting integrations



Vibration analysis



Parking systems



Business intelligence



People counting



A Review of Different Data-driven opportunities

Fire Systems, Vertical Transport and Vibration Analysis

- Operational objectives
- Integration Methods
- Tagging & Analytics
- Example Outputs



Fire Systems

The issue

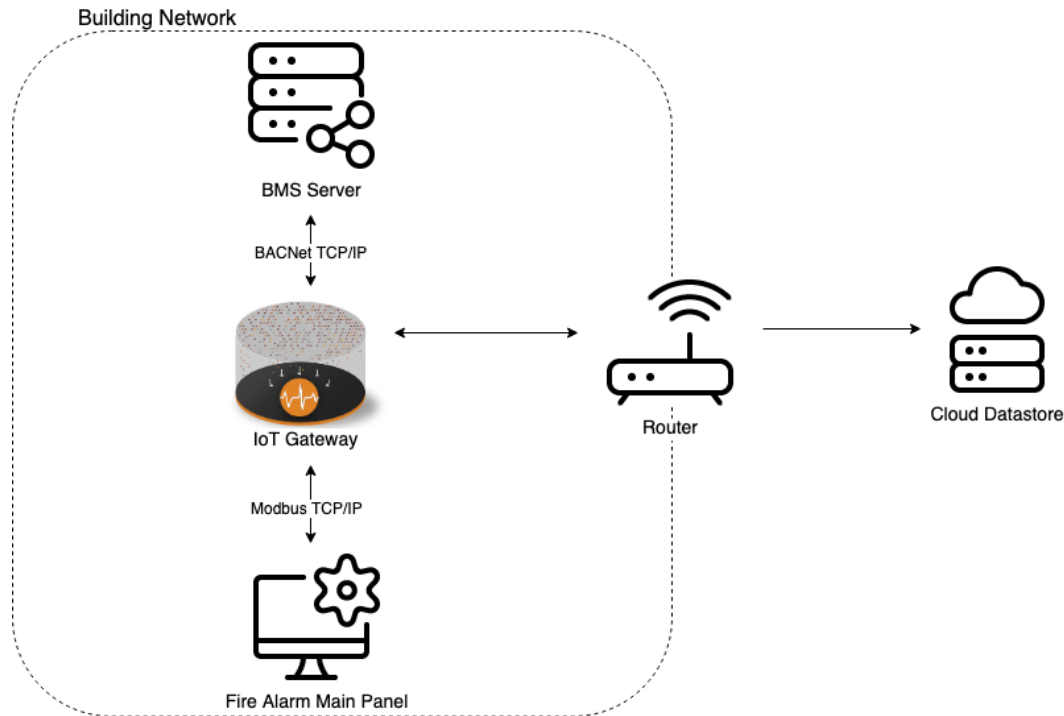
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Opportunities

- Enhance fire and life safety compliance
- Maintenance and testing regime transparency
- Detailed system Alarm, Isolation and Fault trend analysis
- Detailed reporting outside of onsite logbook management process



Example Architecture



Data Points

- Alarms
- Pre-Alarms
- Isolations
- Faults
- IO devices
- Testing status

Tagging Elements

- Loop
- Zone
- Matrix components

Example 1 - Daily Reporting

Fire Panel Report 2019-05-09



Isolation per loop 2019-05-09

Loop Nr	Sensors Isolated	% Sensors Isolated
1	15	12.7 %
2	16	14 %
3	3	2.8 %
4	2	2.3 %
6	2	1.9 %
7	1	1.2 %
8	2	4.9 %
10	43	40.6 %
15	1	1 %
18	14	16.7 %
19	2	3.3 %
20	1	1.1 %
21	3	4.1 %
22	1	1.4 %
24	3	2.6 %

Example 2 - Fire Matrix Assessment

Fire Matrix Report 2018-05-14



Fire Matrix Failed

Sensor	Equipment	Start	Result	Required	Duration	Inspect
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	AHU5-5	14/May/18 3:37PM	FAILED	RUN	17 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	AHU5-10	14/May/18 3:35PM	FAILED	RUN	1 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	AHU5-11	14/May/18 3:35PM	FAILED	RUN	1 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	KEF-5-05	14/May/18 3:35PM	FAILED	STOP	2 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	RAFMyer5-01	14/May/18 3:35PM	FAILED	STOP	1 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	RAFMyer5-02	14/May/18 3:35PM	FAILED	STOP	18 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	SPF-5-01	14/May/18 3:35PM	FAILED	RUN	18 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	SPF-5-02	14/May/18 3:35PM	FAILED	RUN	18 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	SPF-5-03	14/May/18 3:35PM	FAILED	RUN	18 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	SPF-5-04	14/May/18 3:35PM	FAILED	RUN	18 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	SPF-6-01	14/May/18 3:35PM	FAILED	RUN	18 min	inspect data
24-83-25-L-5 BLOSSUM PLACE WAGNER-XP95 APID	SPF-6-02	14/May/18 3:35PM	FAILED	RUN	18 min	inspect data



Vertical Transport



The issue

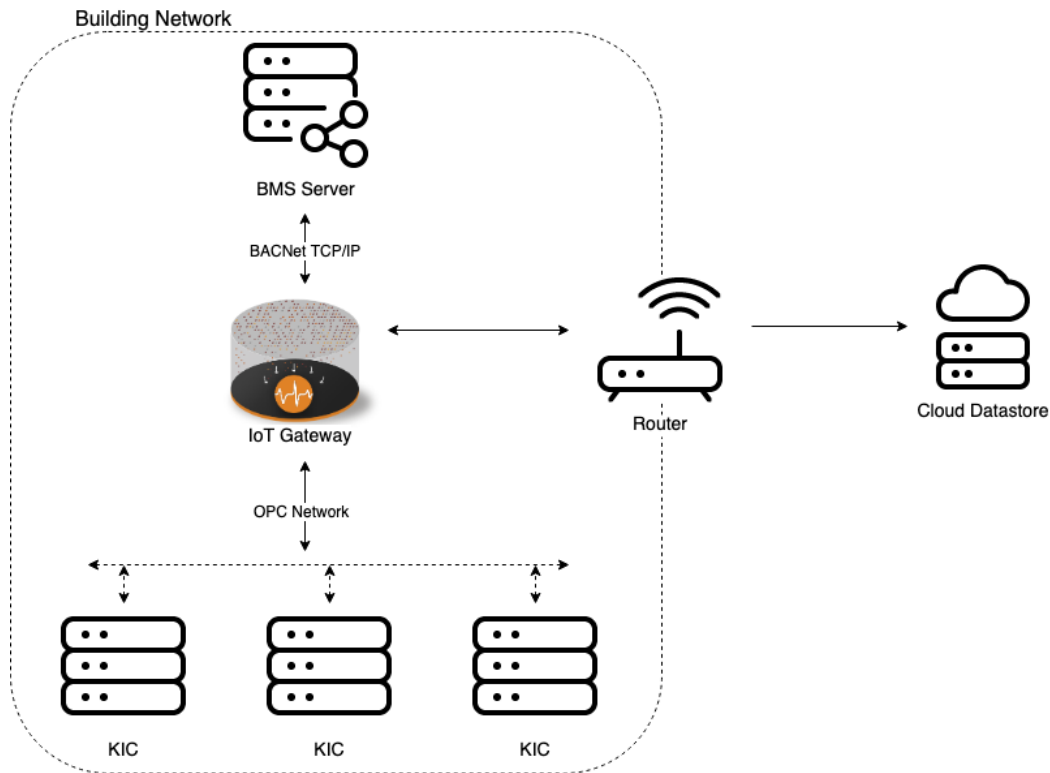


Opportunities

- Delivering performance transparency
- Improving reliability and availability
- Targeted responses to breakdowns and complaints
- Minimising repetitive breakdowns
- Maximising labour efficiency
- Lifecycle analysis capability
- Combining mixed OEM plant types
- Interface with CMMS and Asset Management platforms



Example Architecture



Data Points

- Alarms
- VT speed and weights
- All button activities
- Drive system detail
- Door operations
- On/Off Status

Tagging Elements

- Lift Group Type i.e. High, Medium, Low Rise
- Maximum Safe Working Load
- Lift Type i.e. Hydraulic, Rope

Example 1 - Daily Reporting

Riverside Centre VT DLP Report for Apr-2019



Lift DLP Stats

Operating hours : 7:00-18:00

Lift Bank outages this month : Goods Lift: 2 (0.6h)

Lift Afterhours shutdowns : Lift1 21 (1.3h), Lift2 20 (1.8h), Lift3 21 (3.6h), Lift20(R) 256 (98h)

Lift Group	Lift Name	Daytime availability %	Probable Entrapments	Alarm Dialer Compliance	Failures	Failures Dur	Starts	Floors Travelled	Average Waiting Time
CparkLifts123	Lift1	100 %	0		2	0 h	5 424	7 005	
CparkLifts123	Lift2	100 %	0		1	0 h	11 494	13 520	
CparkLifts123	Lift3	100 %	0		1	0 h	18 639	21 617	
Lowrise	Lift4(C)	100 %	0		7	0 h	4 021	22 513	
Lowrise	Lift5(D)	100 %	0		0		11 288	66 007	
Lowrise	Lift6(A)	99.6 %	0	✓	7	1.3 h	6 962	40 237	
Lowrise	Lift7(B)	100 %	0	✓	0		2 936	15 489	
MidRise	Lift08(F)	98.9 %	0		1	0 h	19 063	215 612	

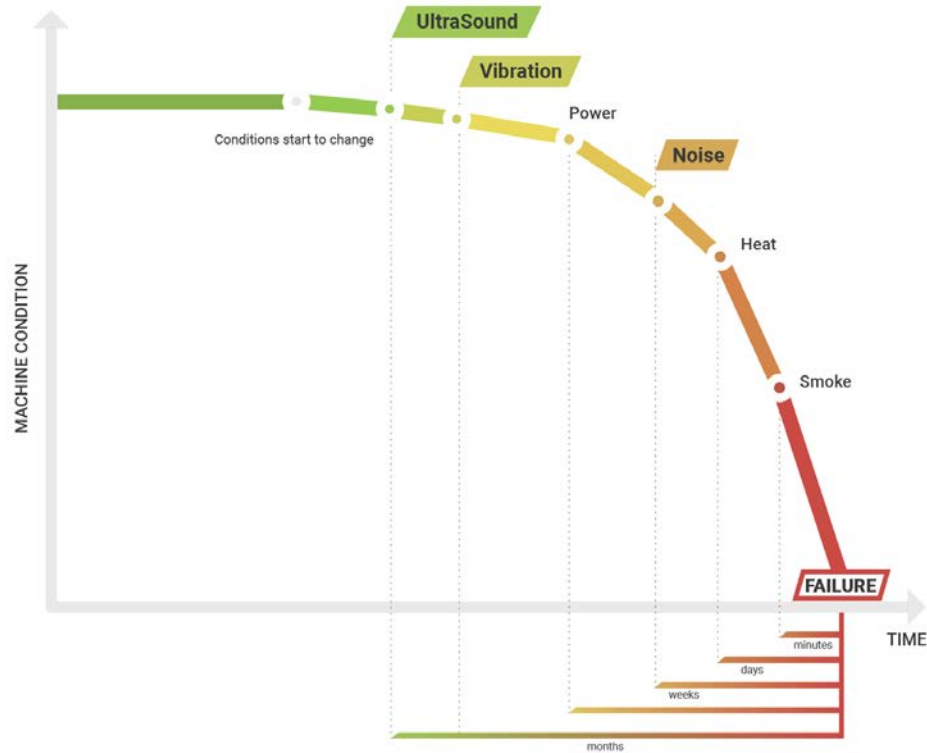
Example 2 - Traffic Counting



Vibration Analysis



The issue

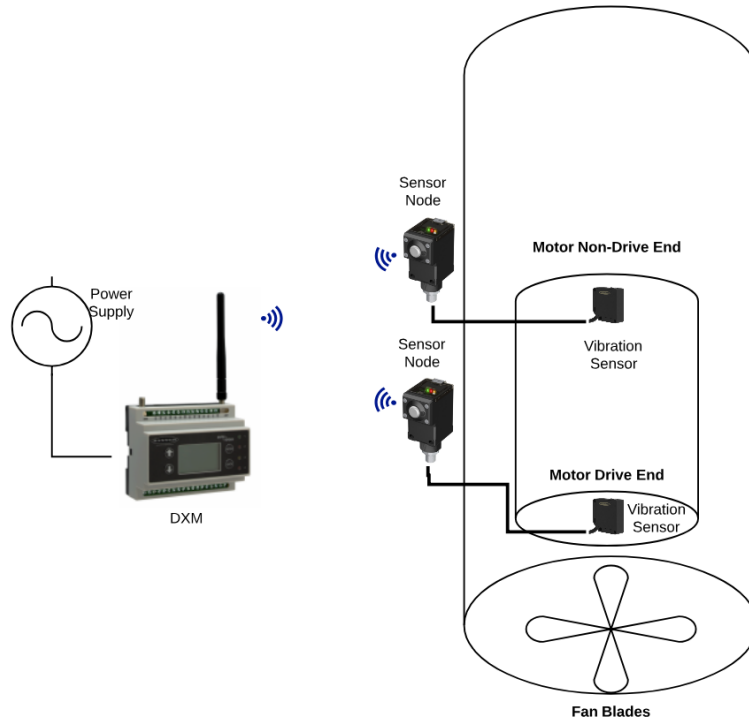


Opportunities

- Maximise & control equipment uptime
- Increase visibility of equipment performance
- Reduce maintenance costs through data driven maintenance
- Interface with CMMS and Asset Management platforms



Example Architecture



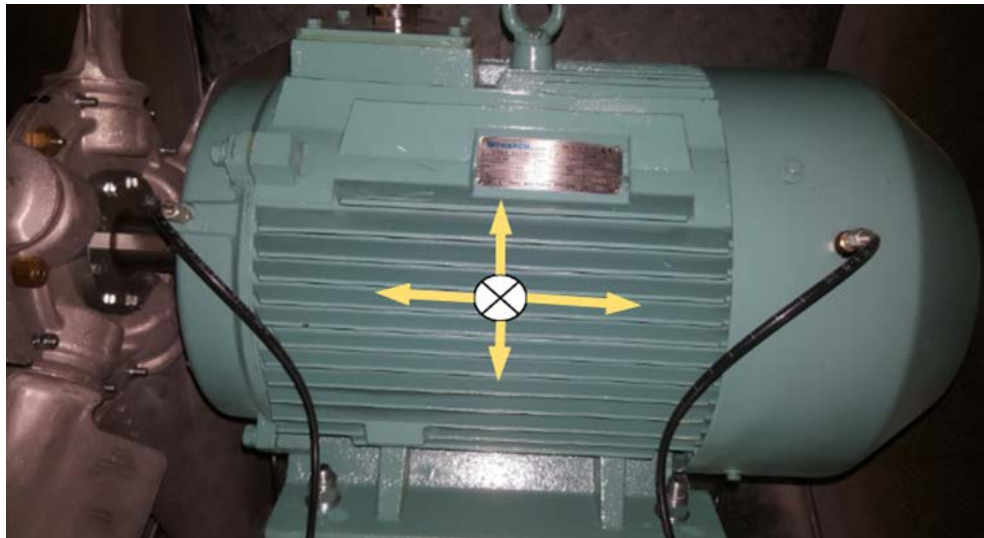
Data Points

- X-Axis - Speed | Velocity | Amplitude(g)
- X-Axis - Frequency
- Y-Axis - Speed | Velocity | Amplitude(g)
- Y-Axis - Frequency
- Z-Axis - Speed | Velocity | Amplitude(g)
- Z-Axis - Frequency

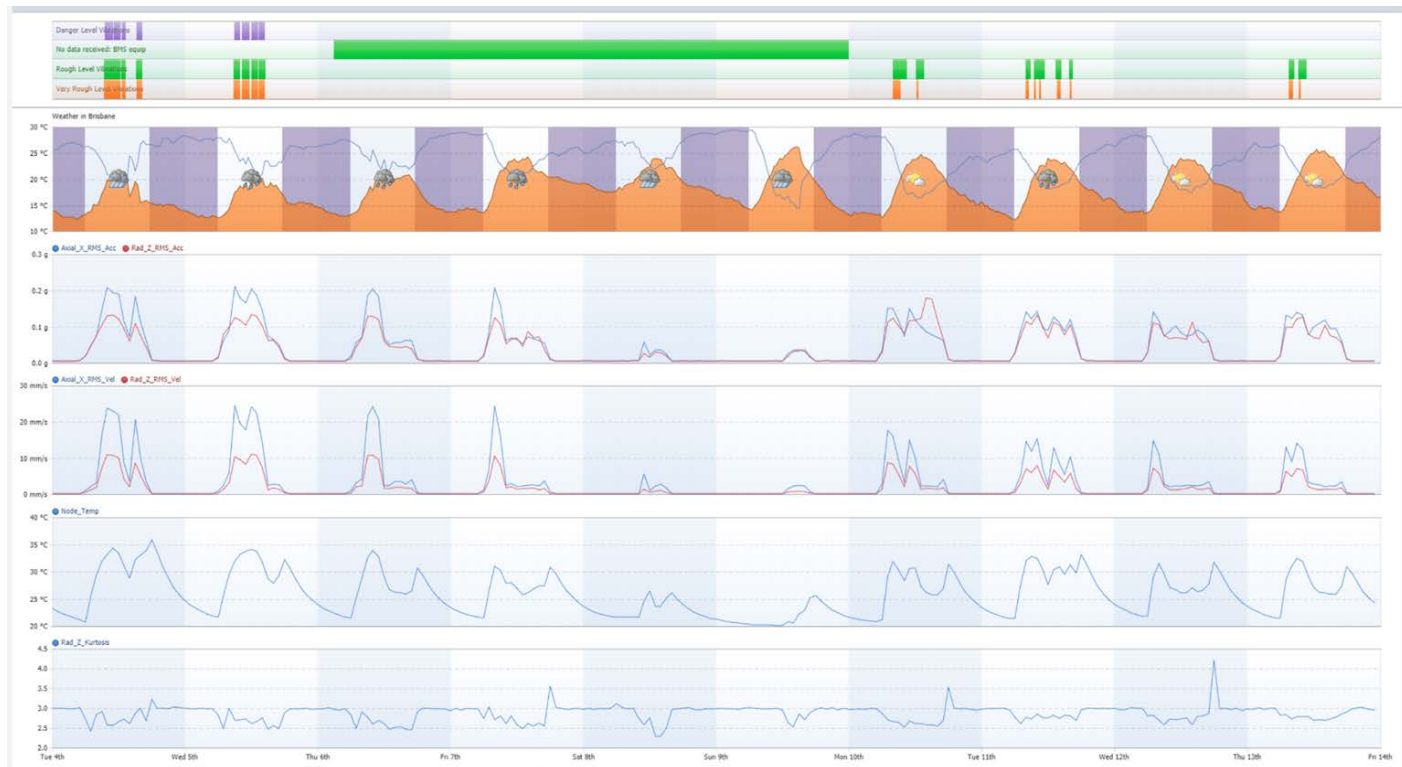
Tagging Elements

- Accelerometer type i.e. piezoelectric, piezoresistive and capacitive MEMS.
- VA measurement type i.e. Impact, RMS, VMS
- Sensor Axis type i.e. 2 axis, 3 axis

Example 1 - Install examples



Example 2 - Issue Example



Summary

- Analytics helps us move maintenance from checklists to data-driven operations
- Having visibility of our data helps us uncover issues we didn't even know existed
- Non-HVAC systems are an area of great opportunity, and there is a lot of low-hanging fruit
- It's an exciting time to work in this space!



Thank you

