Enabling Digital Transformation by Connecting Legacy Devices

ENABLING IoT

CONNECTED TRANSPORT

MANUFACTURING

HEALTHCARE

ENERGY AND UTILITIES

BUILDINGS & INFRASTRUCTURE

OPEN INDUSTRY

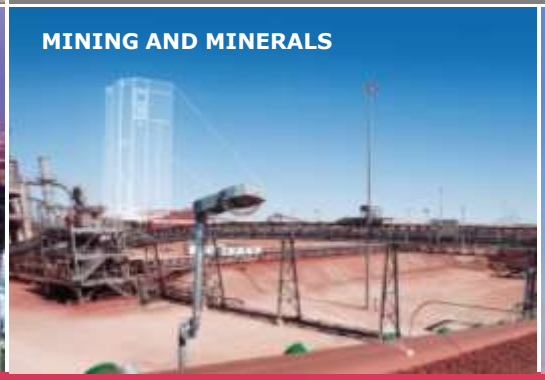
IOT SOLUTIONS WORLD CONGRESS

Enabling Digital Transformation by Connecting Legacy Devices

Jakob Jul Jensen, Danfoss Drives
Mikkel Christian Sørensen, Omnio

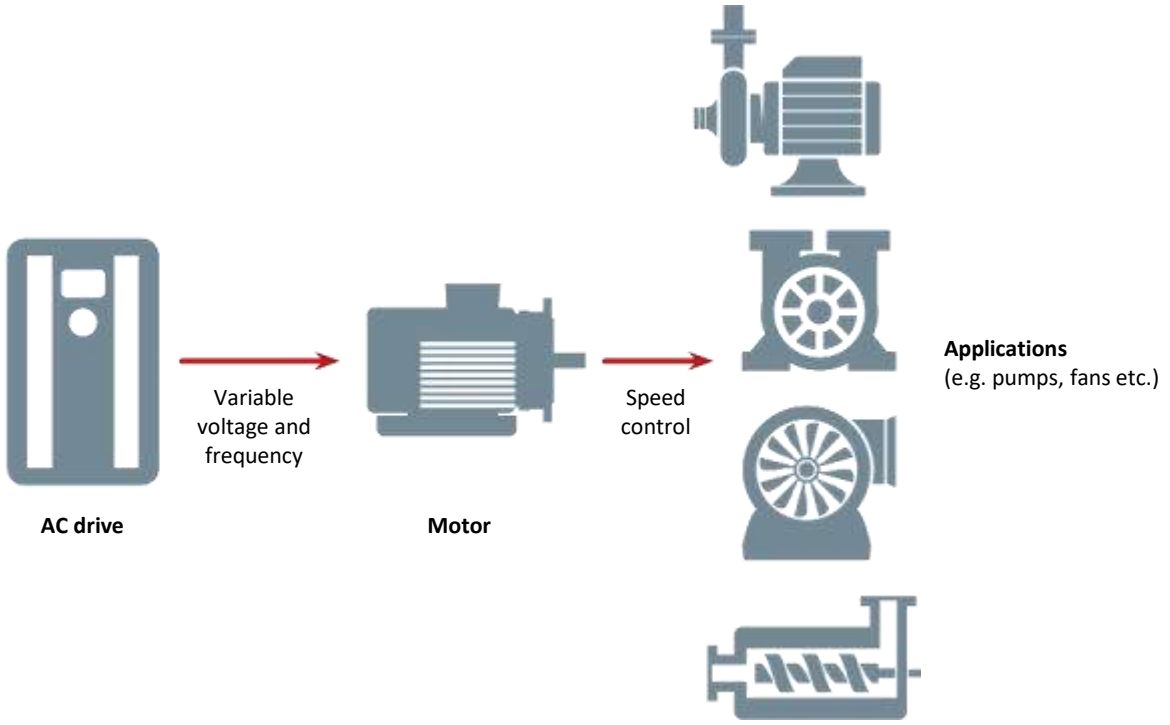

50
Years of
Drives

Drives are everywhere




AC drives have potential to save
8%
of global electricity consumption by 2040
Source: IEA World Energy Outlook 2016

What does an AC drive do?

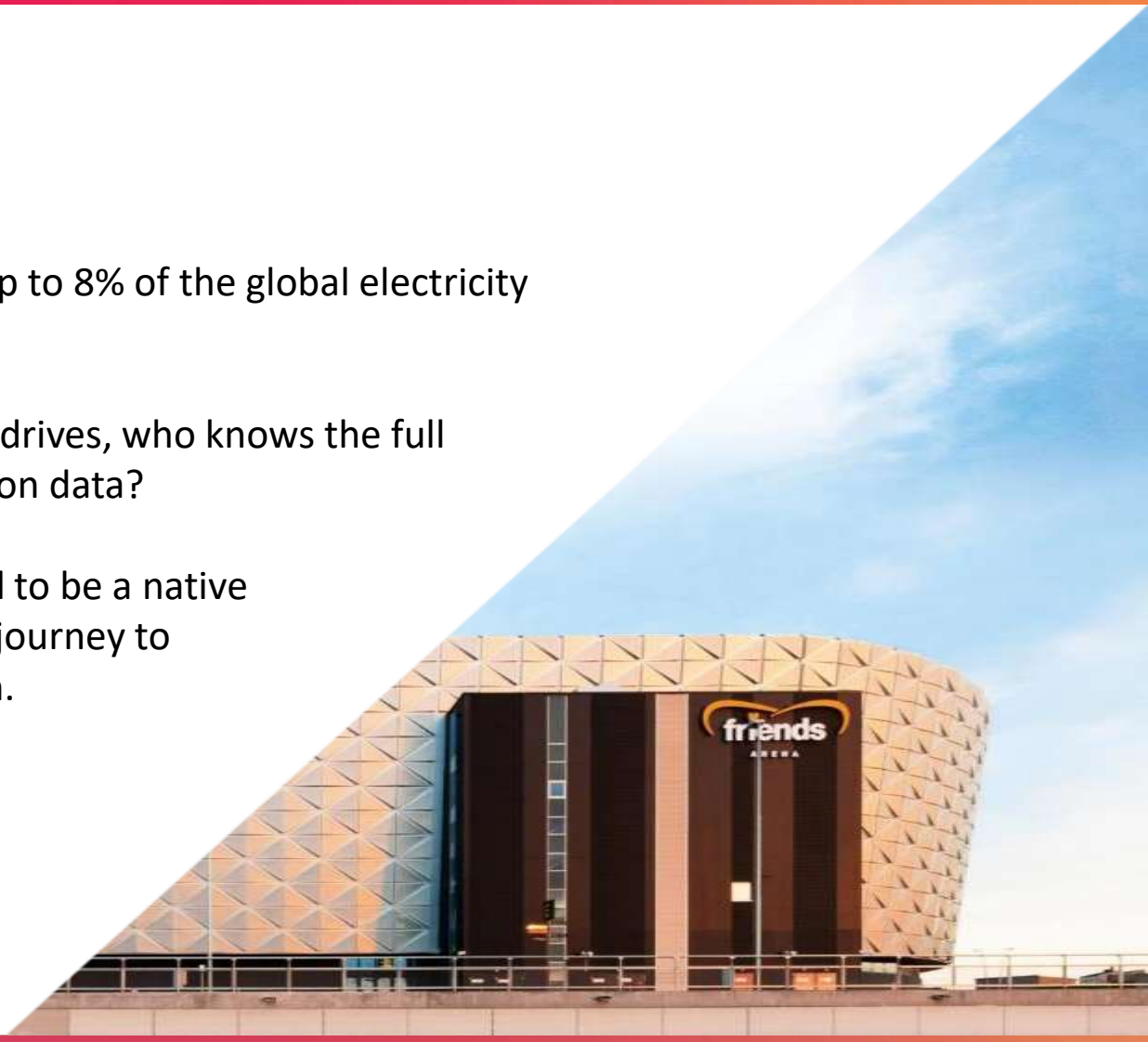


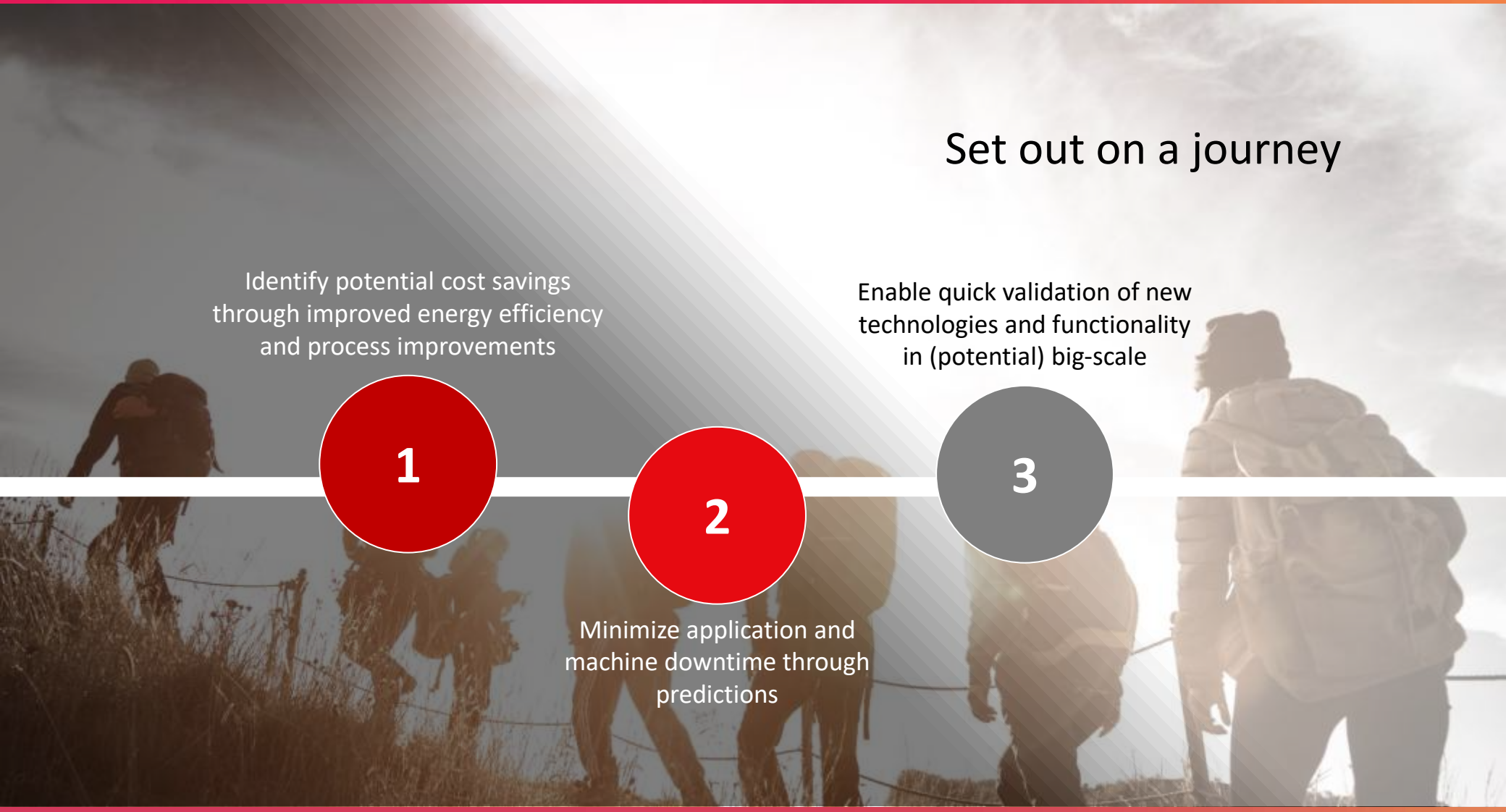
Background

Drives makes it possible to save up to 8% of the global electricity consumption by 2040.

With an install base of 20-25 mio drives, who knows the full potential when optimizing based on data?

But, the drive was never designed to be a native IoT device. Thus, we set out on a journey to unleash even more value creation.





Set out on a journey

Identify potential cost savings through improved energy efficiency and process improvements

1

2

Minimize application and machine downtime through predictions

Enable quick validation of new technologies and functionality in (potential) big-scale

3

Collaborate differently

Microsoft

accenture

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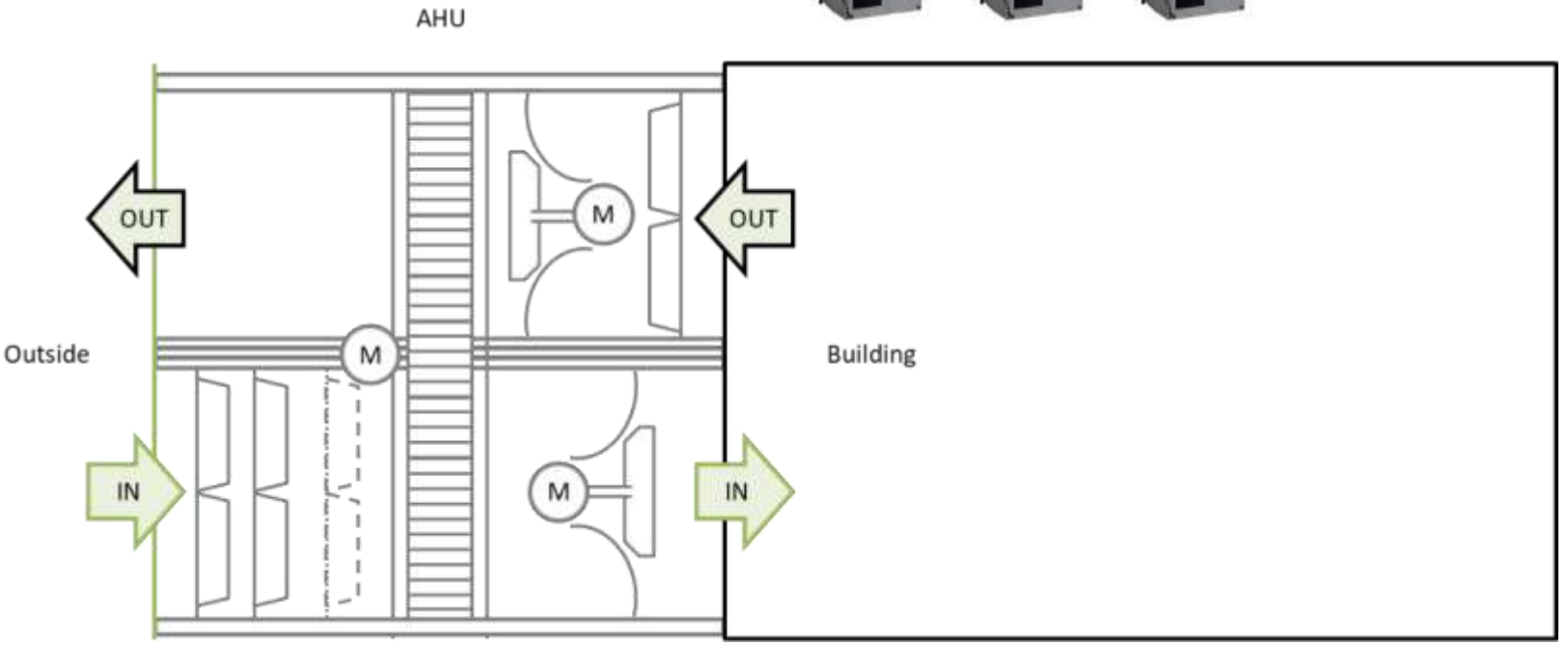
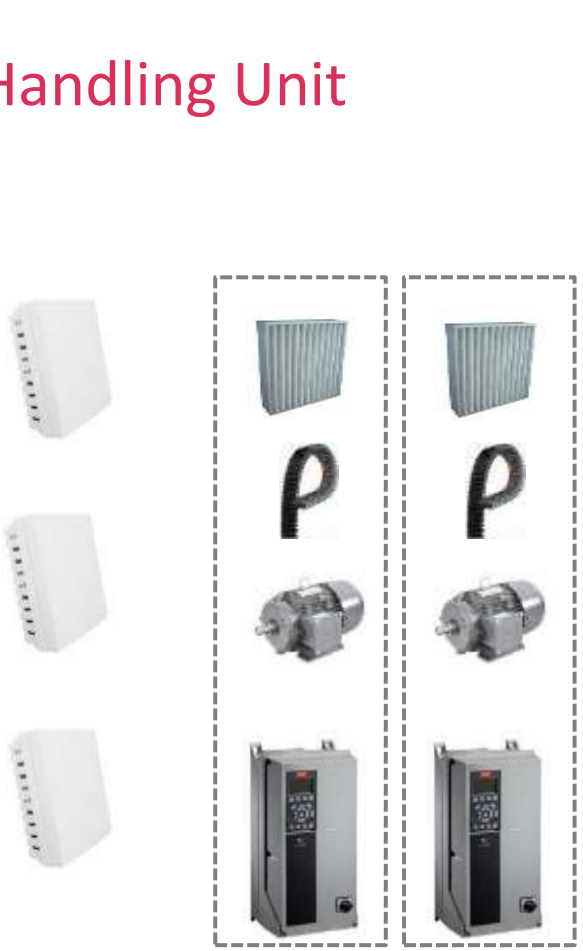
Air Handling Unit	Conveyor
30%	1 hour
Up to 20%	>100 kEUR

Air Handling Unit



Air Handling Unit



Data normalization, why and where?

Unified **data fuels industrial transformation**

Omnio unifies industrial device data so enterprises can scale IoT with ease.

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The industrial champions of tomorrow will win by leveraging data science & IoT

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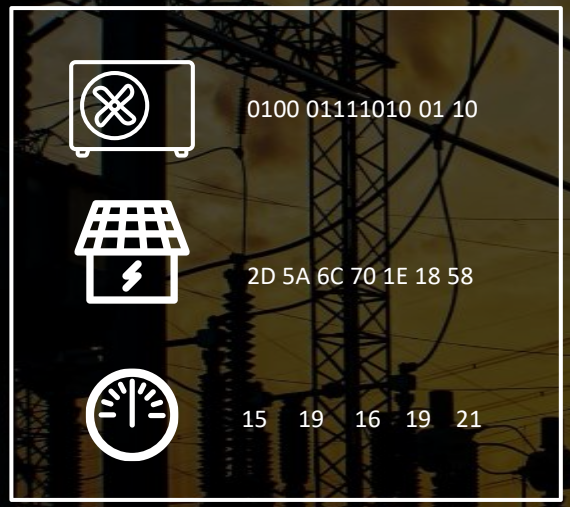
But industrial device data is messy



- Different protocols
- **Arbitrary data labelling**
- **Different scales and units**
- Unsynchronized **time-stamps**

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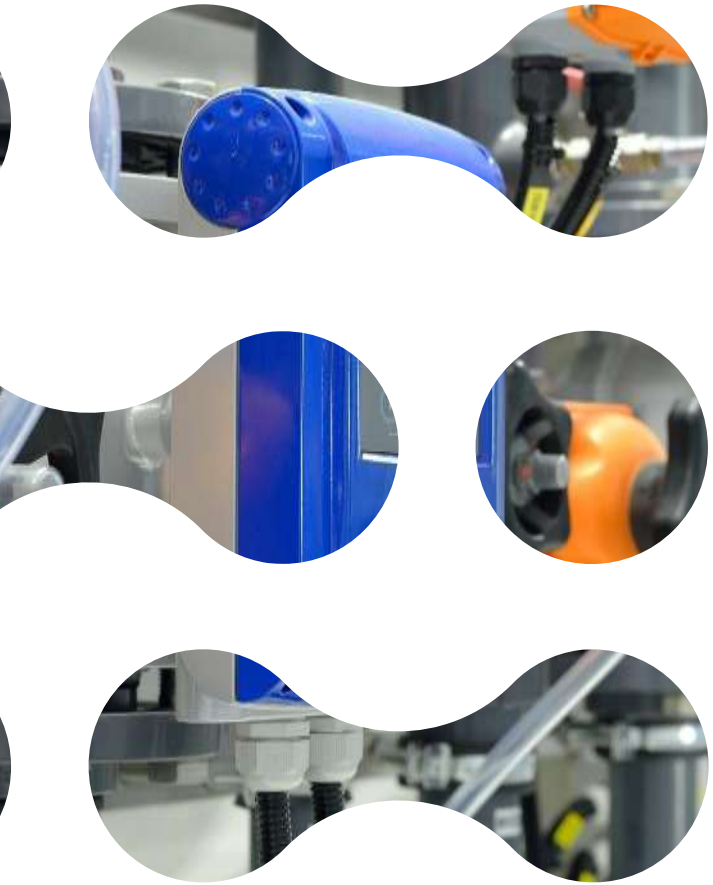
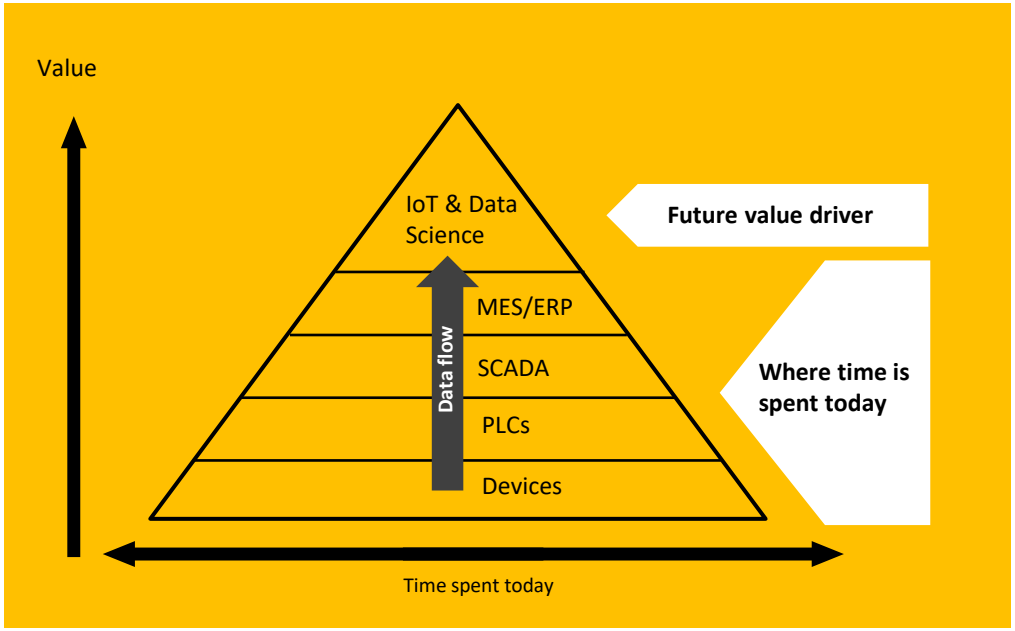


This means enterprises are stuck collecting and trying to normalize data, rather than using it.



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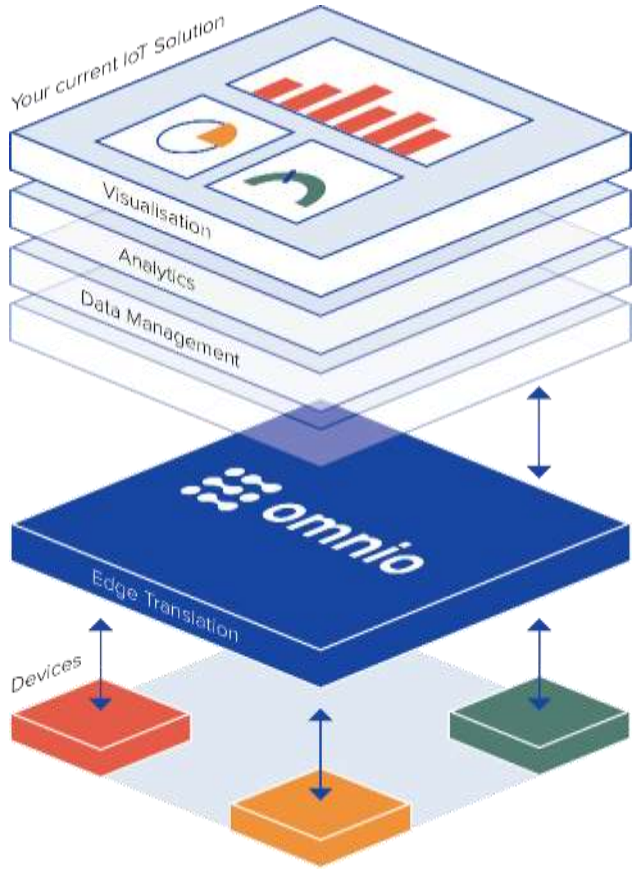
Omnio's middle-ware unifies device data into one normalized format



Any device. Any IoT solution. Unified.

An example: Operating hours

Current Labels

1768

1500

600

Unified Label

operating_hours

The result: Unified datamodel for Drives

Telemetry data

1) Operating hours
2) Running hours
3) kWh hours
4) Fan running hours
5) Reference unit
6) Power kw
7) Motor voltage
8) Frequency
9) Motor current
10) Speed
11) Torque
12) DC linked voltage
13) Heatsink temperature
14) Control card temperature
15) Analogue inputs, e.g. vibration sensors
16) Pressure sensors (4 parameters)
17) Condition-based monitoring features

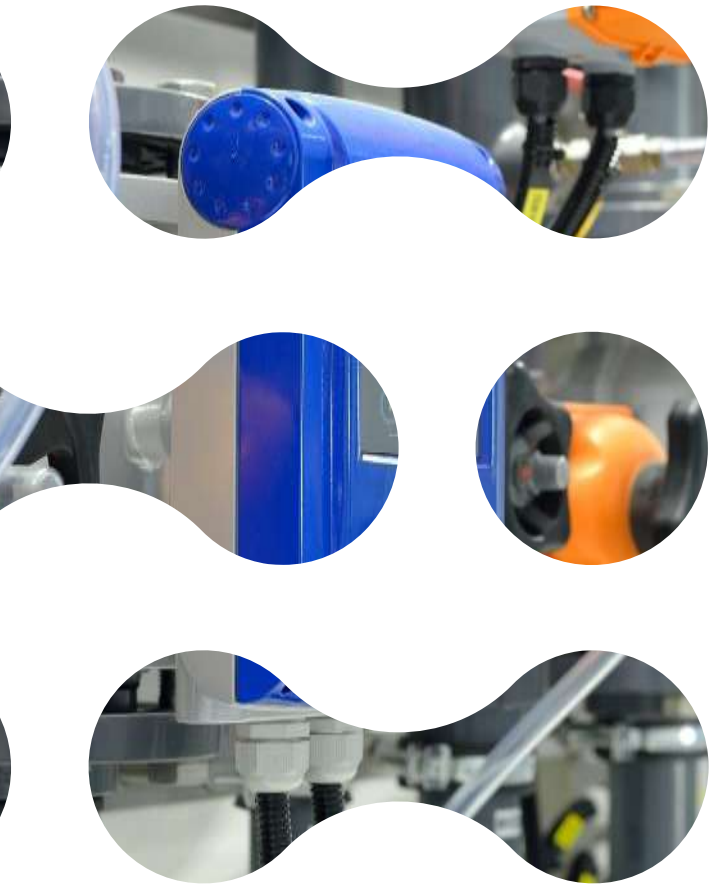
Status/alarms (binary)

1) Control word
2) Status word
3) Alarm word
4) Alarm word 2
5) Warning word
6) Warning word 2
7) Ext. Status word
8) Ext. status word 2

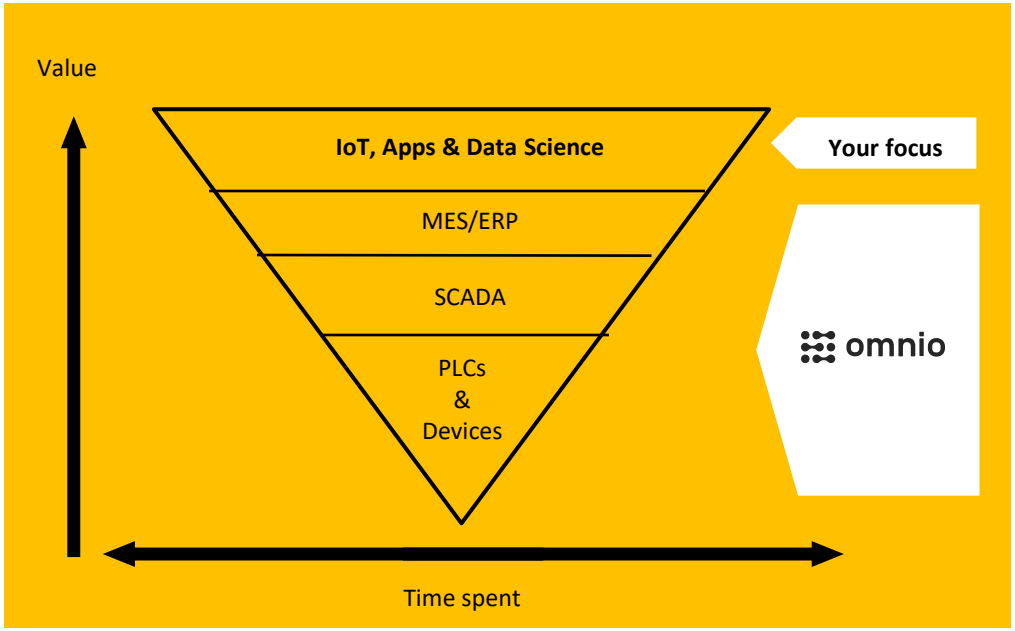
Incremental

1) Power-ups
2) Over-temps
3) Over-voltage
4) SW version
5) FC-type
6) Typecode
7) Serial No
8) Drive Order No

This model now applies to *any* drive that Danfoss wishes to connect – also the millions of competitor drives that Omnio supports



With Omnio you can move faster, scale faster – and focus on adding value, not integration



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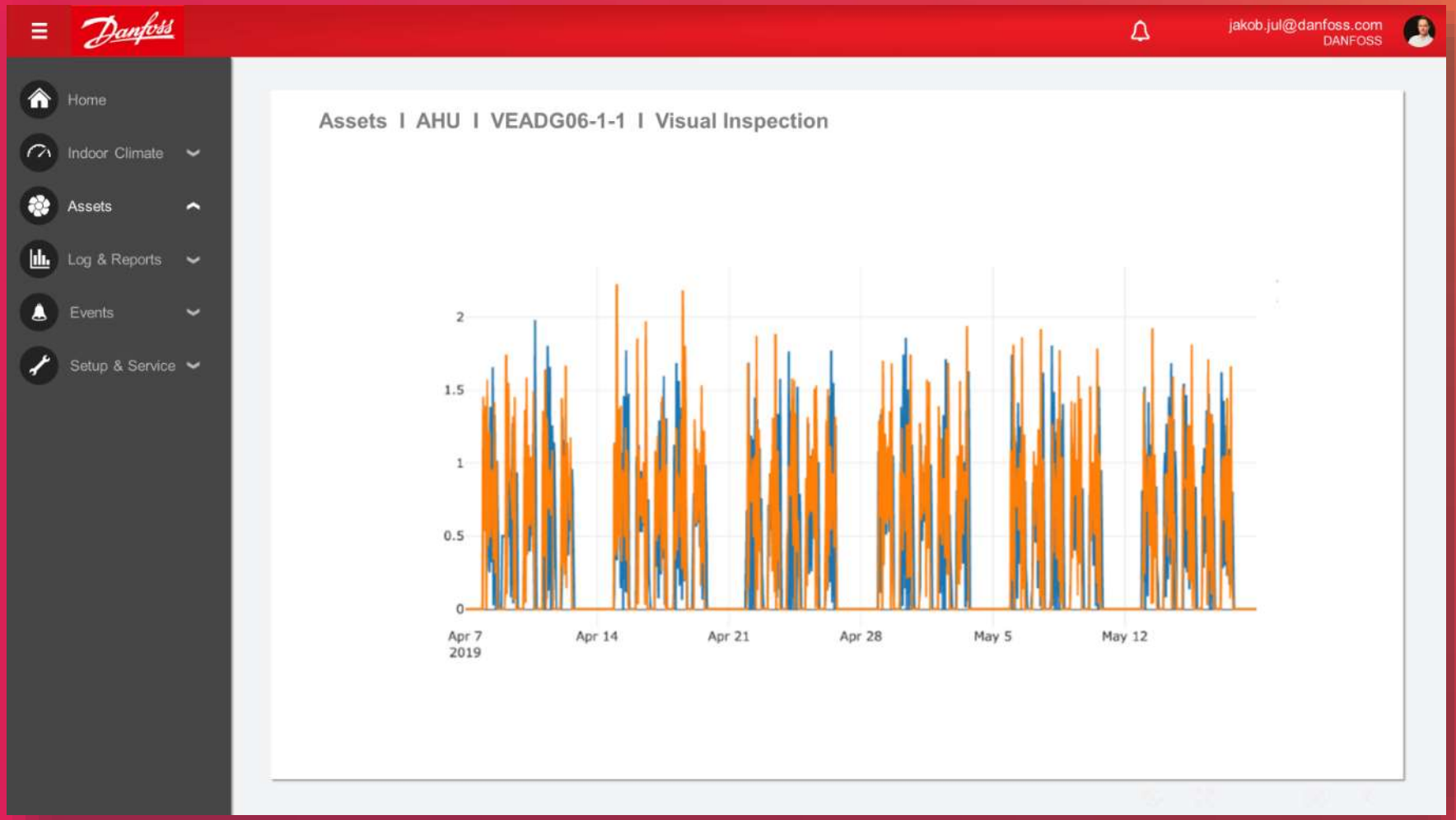
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Indoor Climate
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Assets I AHU I VEADG06-1-1 I Visual Inspection
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0.5
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Apr 28
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May 12


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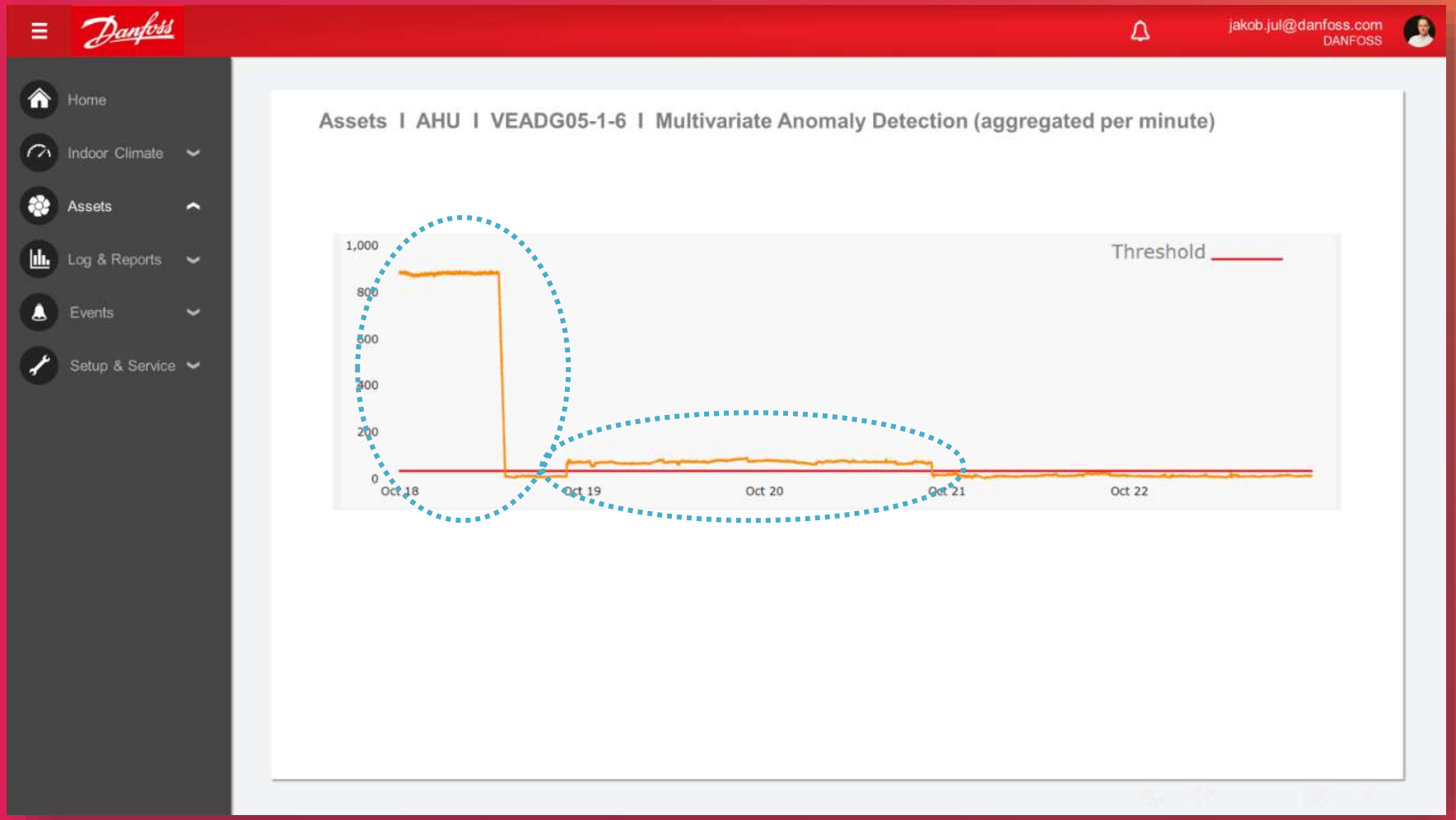
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Assets I AHU I VEADG05-1-6 I Multivariate Anomaly Detection (aggregated per minute)
Threshold
1,000
800
600
400
200
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Oct 18
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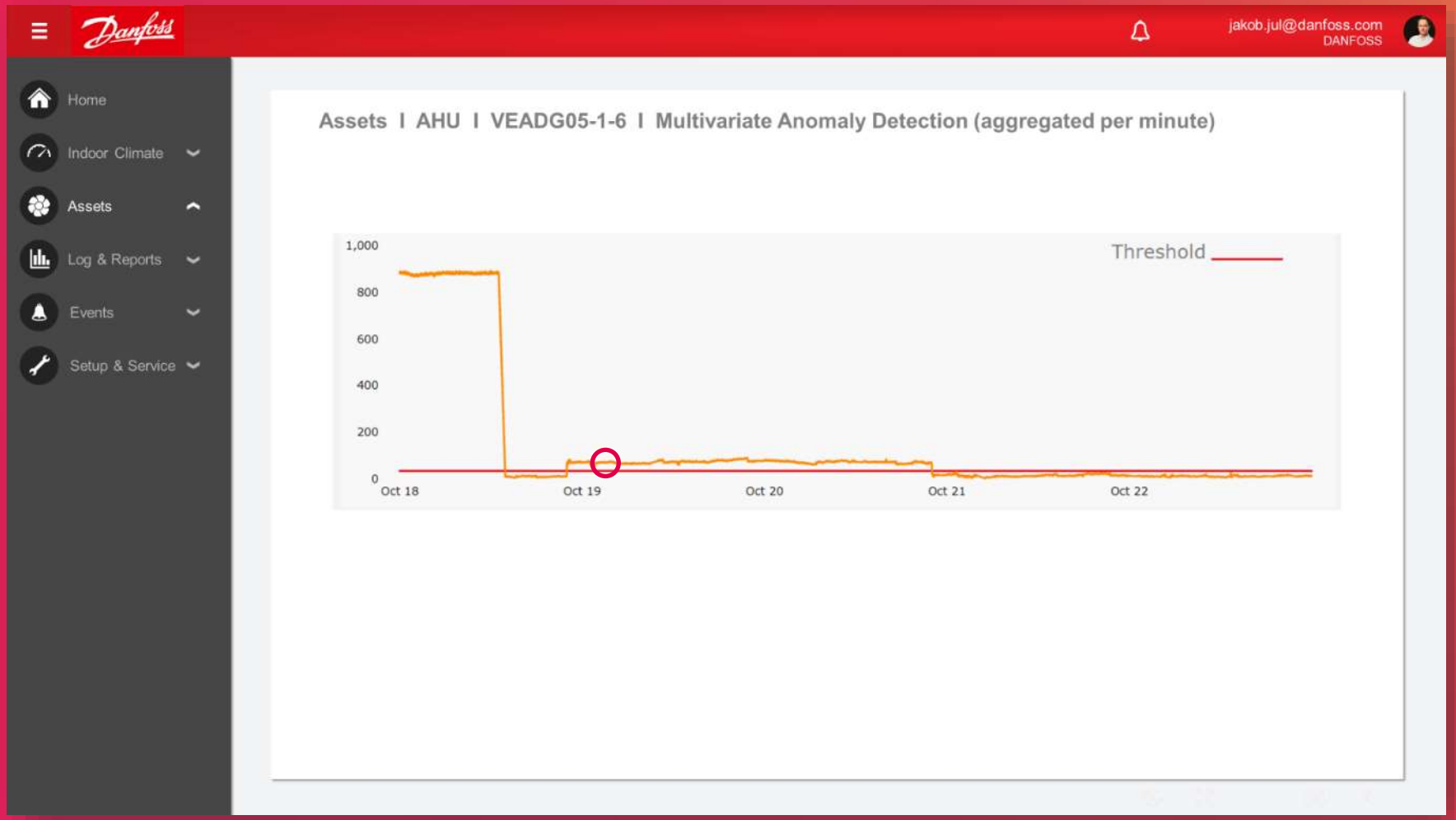
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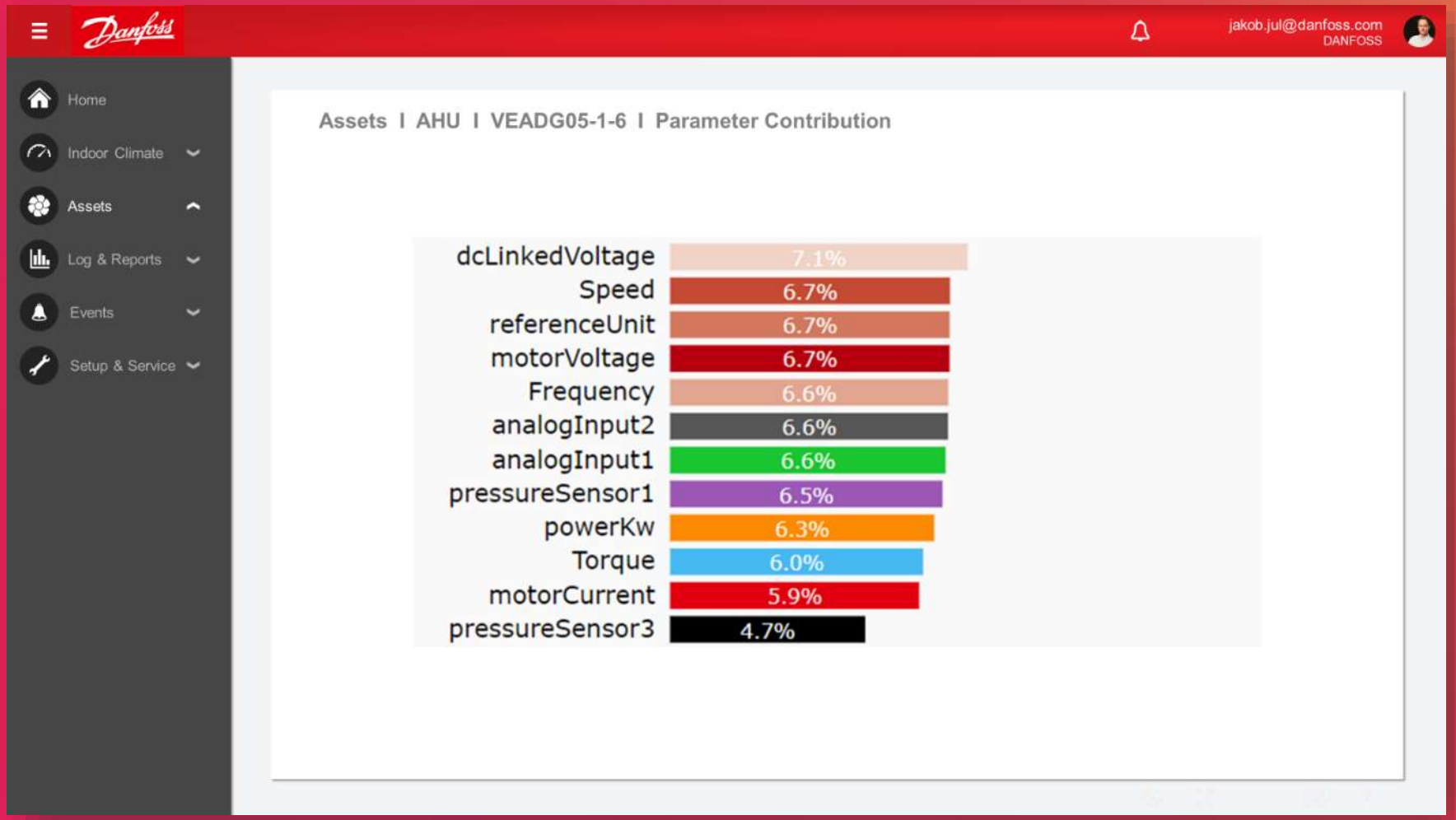
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Assets
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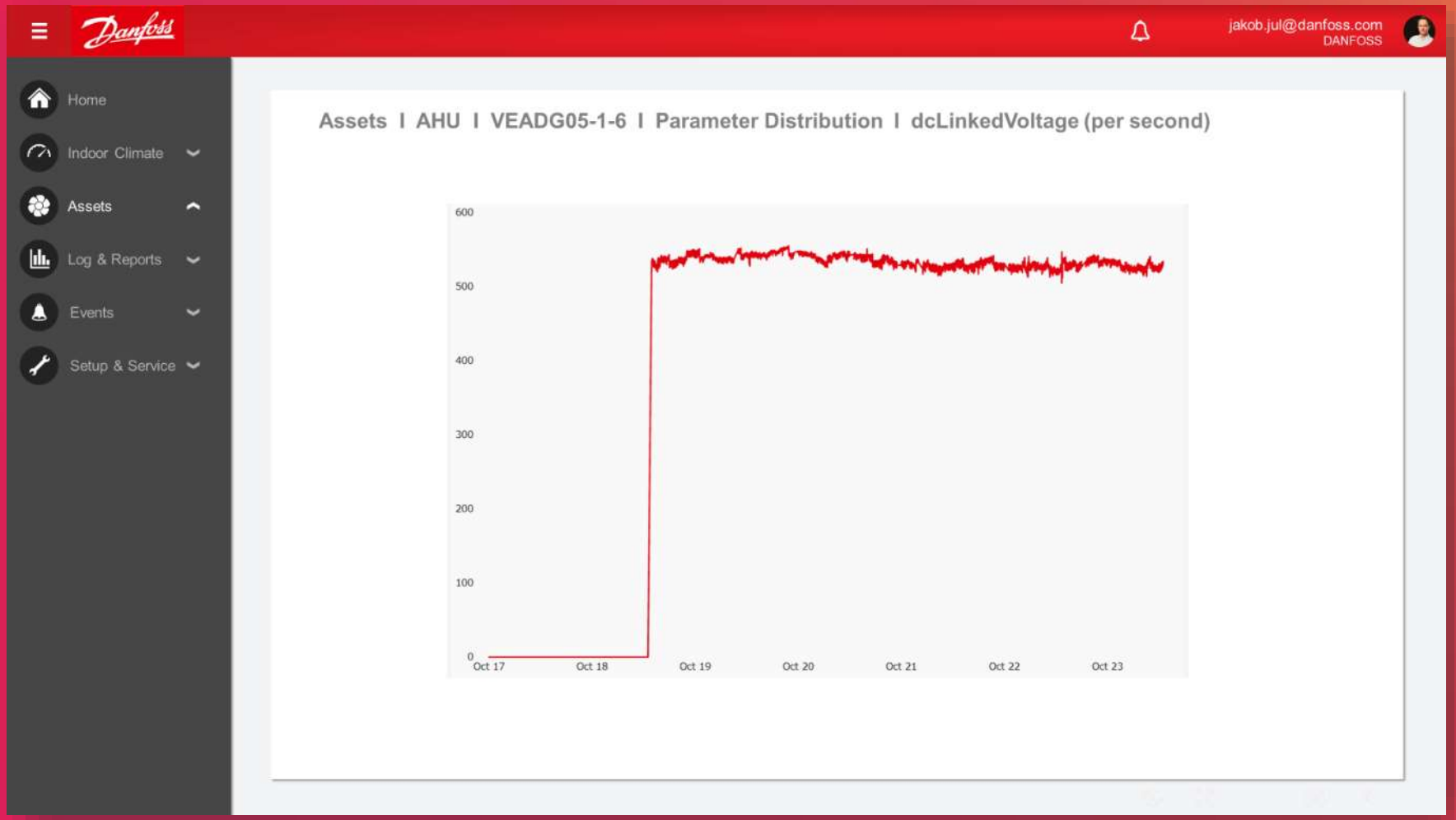
Assets I AHU I VEADG05-1-6 I Parameter Contribution
dcLinkedVoltage 7.1%
Speed 6.7%
referenceUnit 6.7%
motorVoltage 6.7%
Frequency 6.6%
analogInput2 6.6%
analogInput1 6.6%
pressureSensor1 6.5%
powerKw 6.3%
Torque 6.0%
motorCurrent 5.9%
pressureSensor3 4.7%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Indoor Climate
Assets
Log & Reports
Events
Setup & Service
Assets I AHU I VEADG05-1-6 I Parameter Distribution I dcLinkedVoltage (per second)
600
500
400
300
200
100
0
Oct 17
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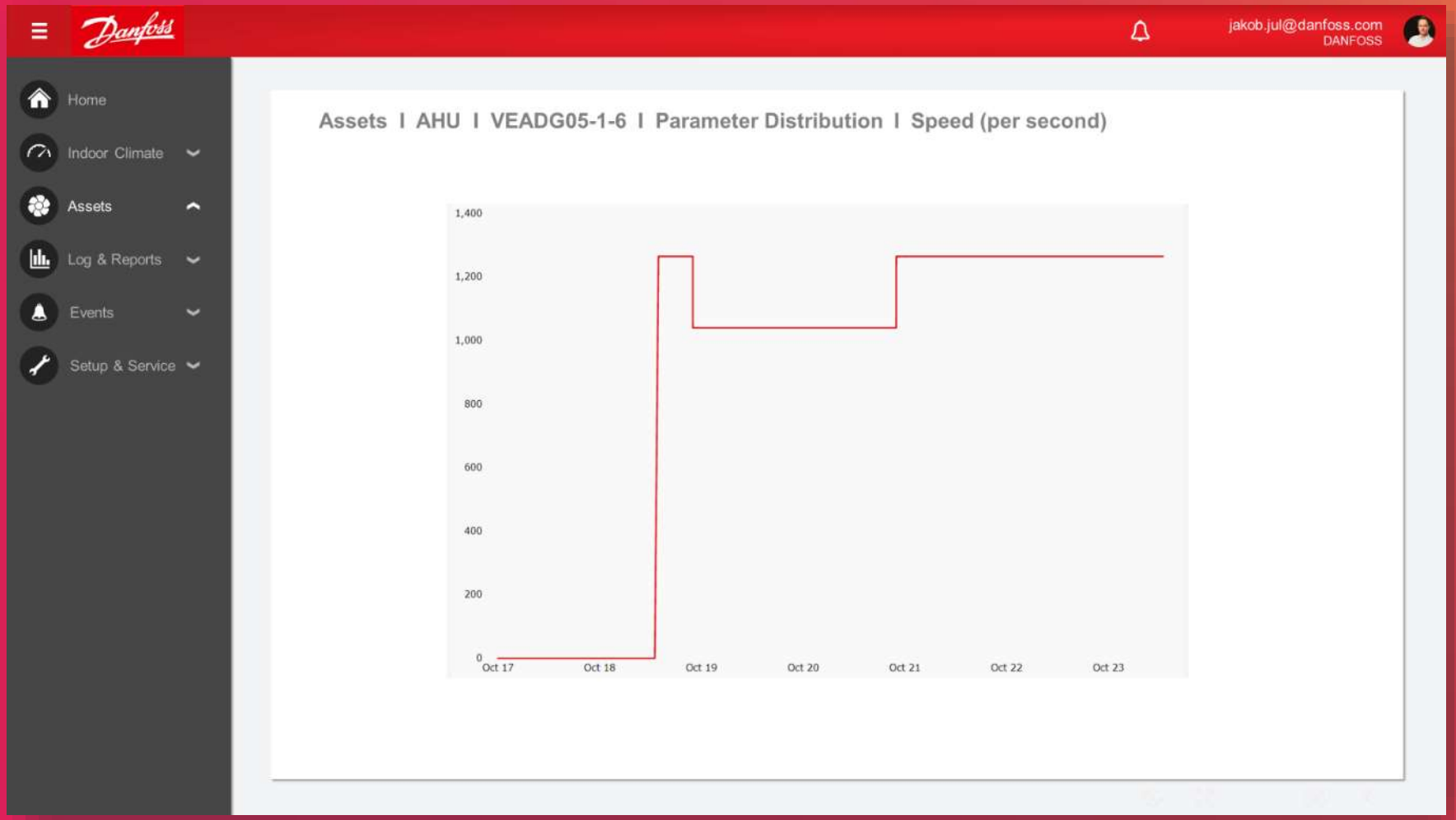
Oct 22
Oct 23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Home
Indoor Climate
Assets
Log & Reports
Events
Setup & Service
Assets I AHU I VEADG05-1-6 I Parameter Distribution I Speed (per second)
1,400
1,200
1,000
800
600
400
200
0
Oct 17
Oct 18
Oct 19
Oct 20
Oct 21
Oct 22
Oct 23

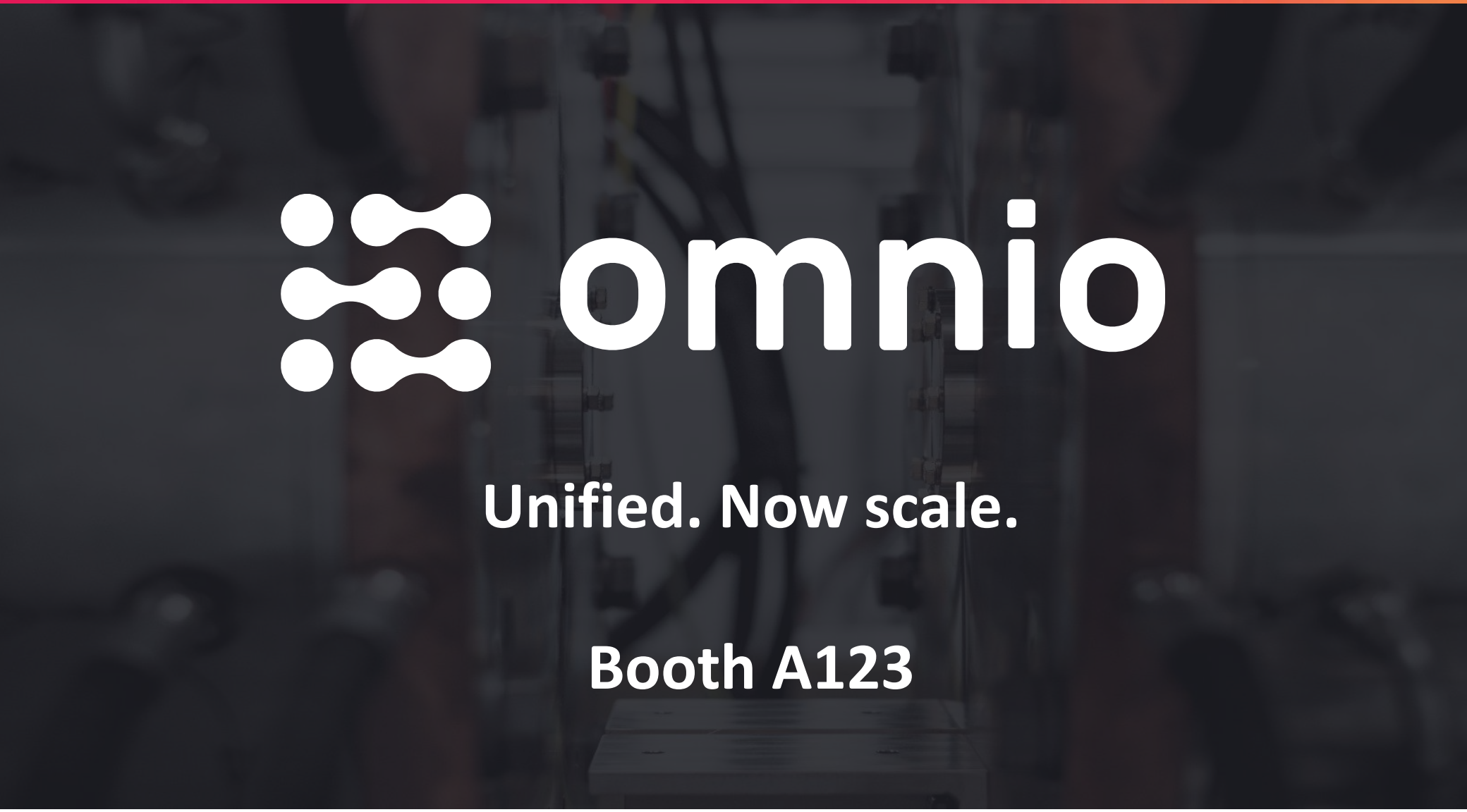
Key Learnings

Teamwork matters as different competences is required to succeed

Advanced analytics enables new value creation but **grab the low-hanging fruits**

A **unified datamodel** makes scaling easier

Creating **lasting results** requires continuous attention and investments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Unified. Now scale.
Booth A123

Q&A

DIGITALIZING INDUSTRIES

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29 - 31 October 2019

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