



# Machen Sie mehr aus Ihren Daten!

## Azure IoT Suite

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P-TSP - Microsoft  
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## Fakten:

- Seit 1999
- Spezialist für Data-Warehouse, Big-Data- & Data-Analytics-Lösungen
- 73 Mitarbeiter
- Top kununu-Bewertungen 4,4
- 70.000 Beratertage Erfahrung
- 700 Einzelprojekte

Microsoft  
Partner  


Gold Data Analytics  
Gold Data Platform  
Gold Cloud Platform



## Auszeichnungen:

- Microsoft Gold Kompetenz Data Analytics
- Microsoft Gold Kompetenz Data Platform
- Microsoft Silber Kompetenz Cloud Platform
- Microsoft Frontline Partner of the Year (2012)
- Zertifizierung nach Hichert/IBCS

# Unser Portfolio



## Data Analytics Platform

BI und Big Data werden in Unternehmen oftmals als getrennte Themen betrachtet. Jedoch ist es in vielerlei Hinsicht sinnvoller, die beiden Welten zu vereinen. Mit der ORAYLIS Data Analytics Platform bauen wir für Sie eine flexible DWH-Architektur auf, die genau auf Ihre Anforderungen zugeschnitten ist und in alle Richtungen erweitert werden kann.



## Data Driven Innovation

Stetig wachsende Datenbestände bieten das Potenzial für innovative Produkte und Dienstleistungen. Im ORAYLIS Business Innovation Labs erforschen wir gemeinsam Ihre Daten nach Erkenntnissen, die eine digitale Transformation Ihres Geschäfts sowie Vorteile gegenüber dem Wettbewerb ermöglichen.

## Unsere Kunden

APCOA  
PARKING

Atlas Copco

AVENTICS<sup>®</sup>

BAUR

BAYER Bayer

brands4friends

C&A

CHRIST

„DekaBank

DFS Deutsche Flugsicherung

DORN  
BRACHT

ECOLAB<sup>®</sup>

EP:  
ElectronicPartner

E-PLUS GRUPPE  
|||||||

elringklinger

TEWE  
TEL

FAH  
Hochschule Aachen

GEA

GRUNDFOS

Hesse Lignal  
LACKE & BEIZEN

HiPP

Hoist Finance

HPA  
Hamburg Port Authority

is  
media  
marketing

KARSTADT

KRONES

MALZERS  
BACKSTUBE

Microsoft

mod<sup>®</sup> Finance & Accounting  
Für den Mittelstand.

nobilis<sup>®</sup>

OBI<sup>®</sup>

PENNY.

POLIZEI  
BERLIN

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SCHEIDT & BACHMANN SB

Telefonica

Thüringer  
Kultusministerium

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unitymedia

usg people

Verlagsgruppe  
Handelsblatt

VIESSMANN

vodafone

Volkswagen

VORWERK

WIKAL

wilo

IoT

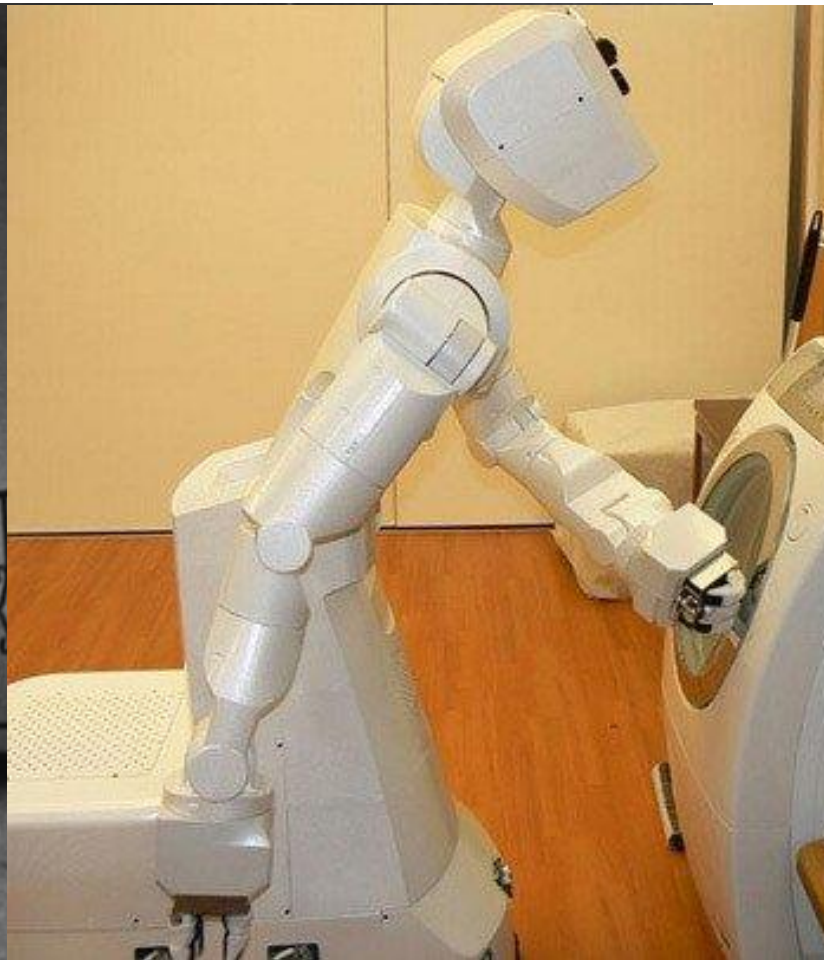
„Every industry is now a software industry where they are building these systems of intelligence... provide SaaS services that go along with your products.“ - Nadella



Dream for decades... will it ever come true?



Dream for decades... will it ever come true?



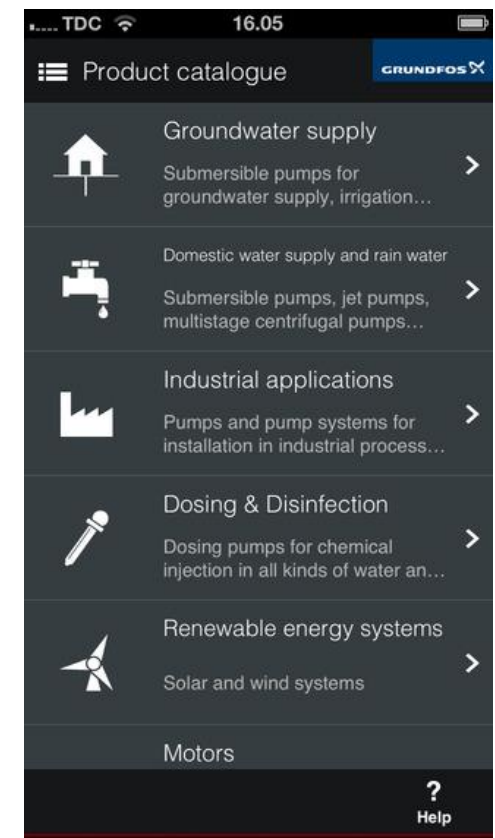
Kevin Kelly, founder of Wired Magazine: Singularity is the point at which "all the change in the last million years will be superseded by the change in the next five minutes."



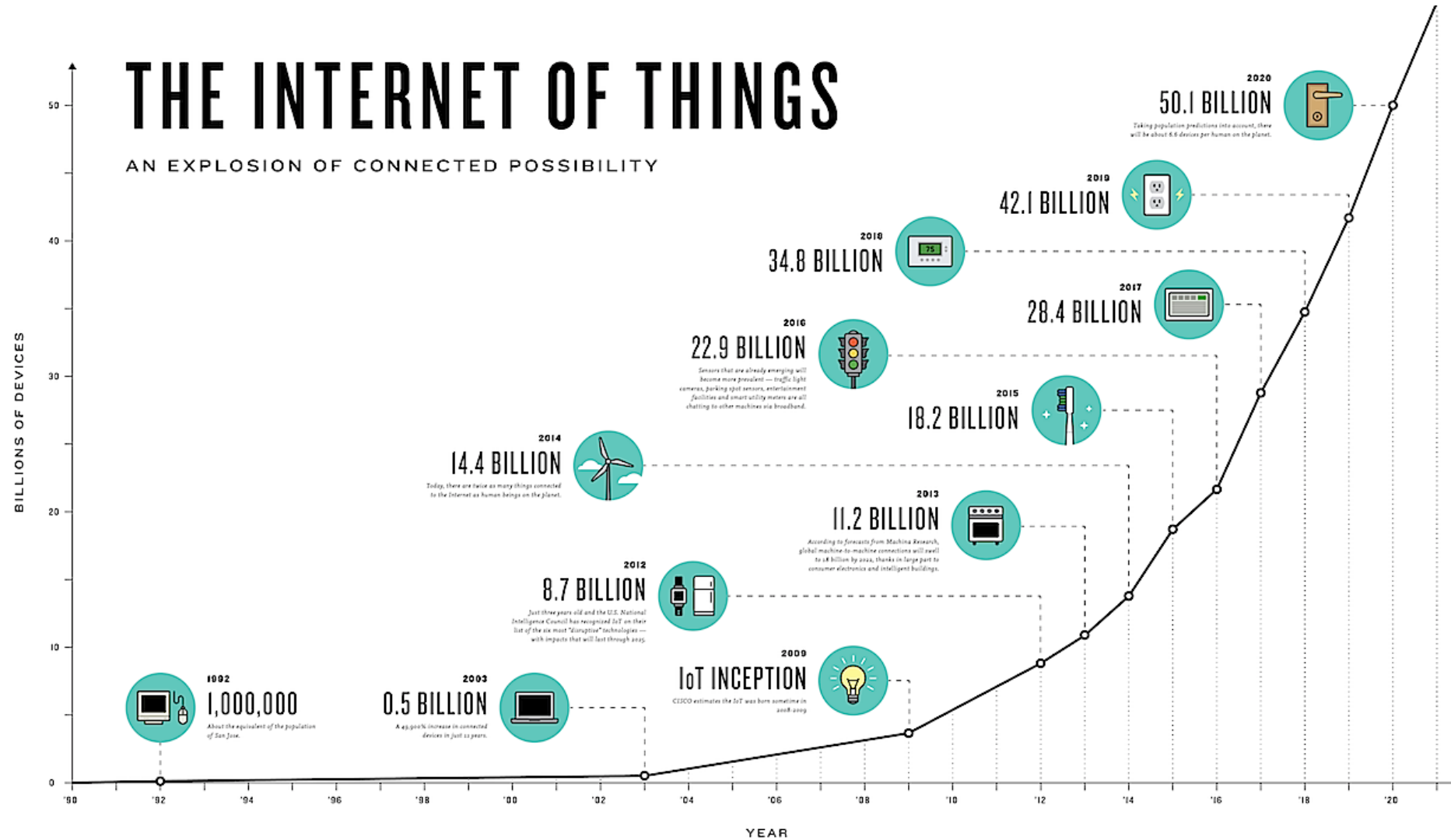
# Competing over Analytics has become more important than Competing over Products



# Competing over Analytics has become more important than Competing over Products

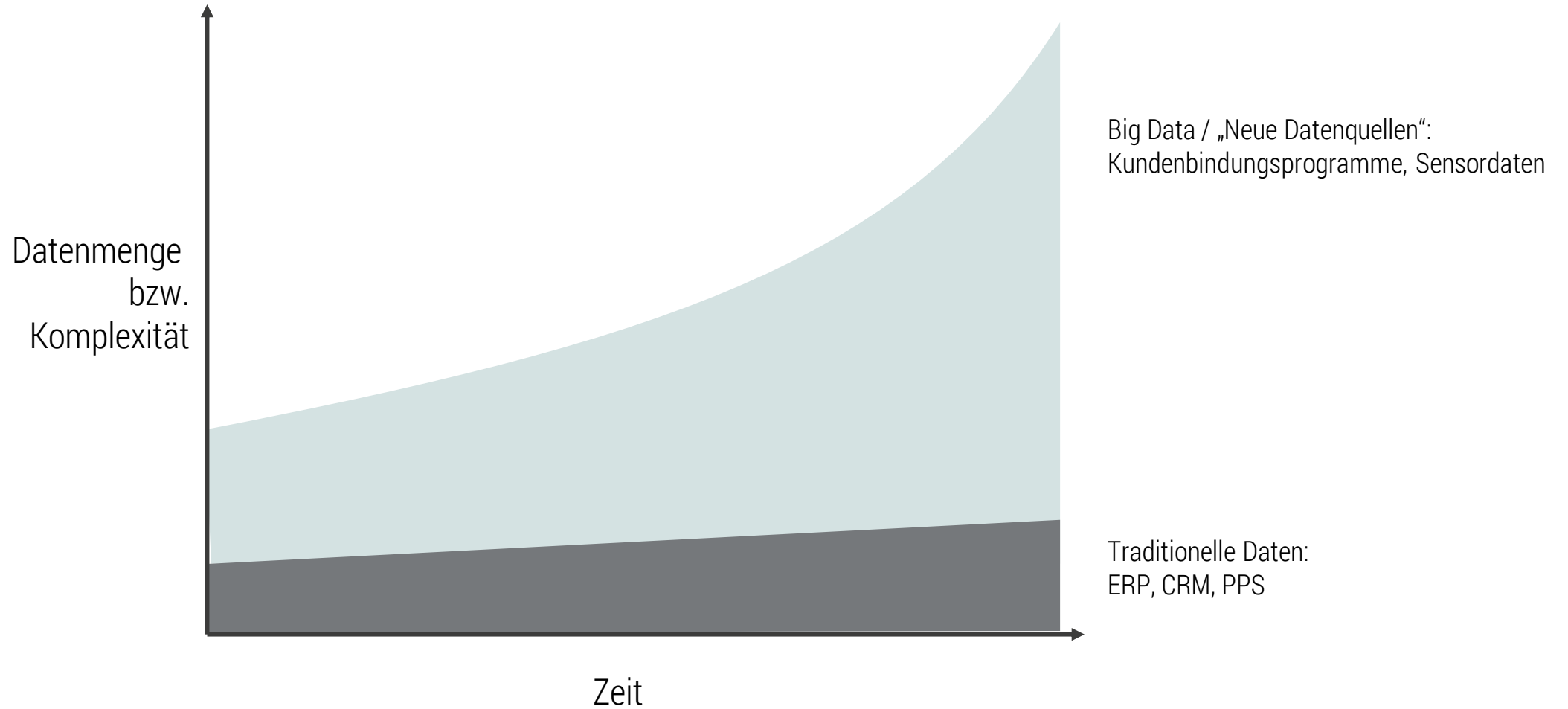


# Internet of Things Prognose

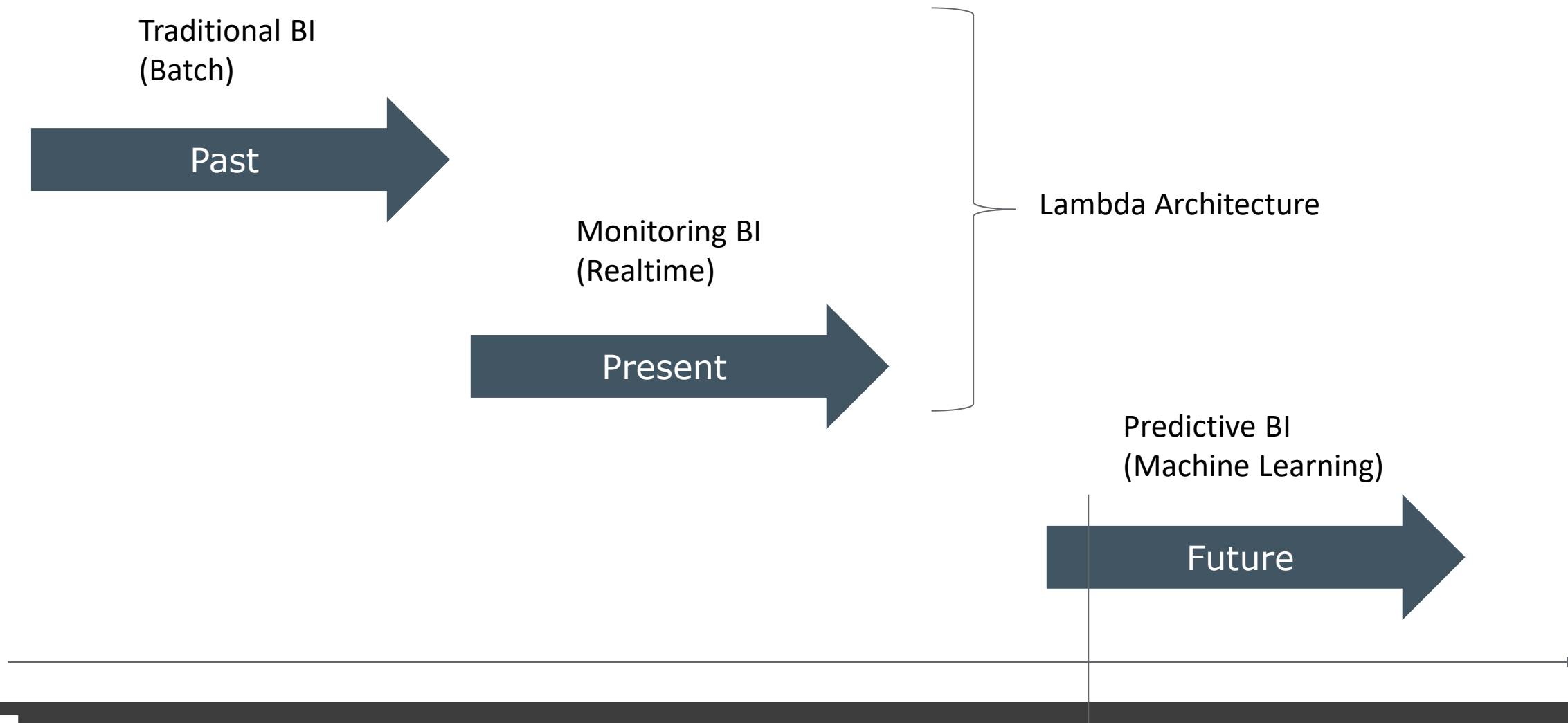


(Bild: theconnectivist)

## Traditionelle Daten vs. Big Data



# From the Realtime Enterprise to the Predictive Enterprise

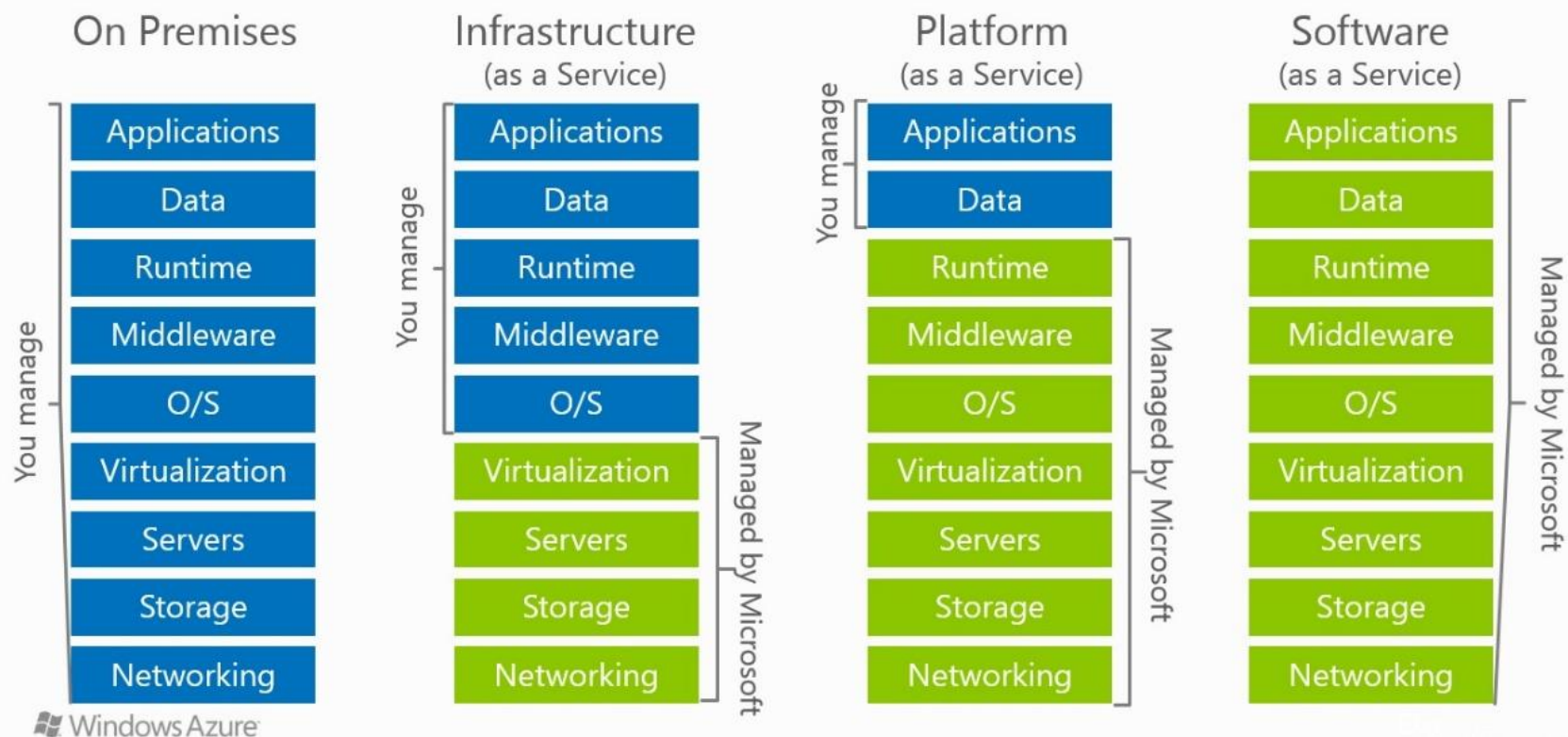


## IoT Suite

Cloud != Cloud



## Cloud Models



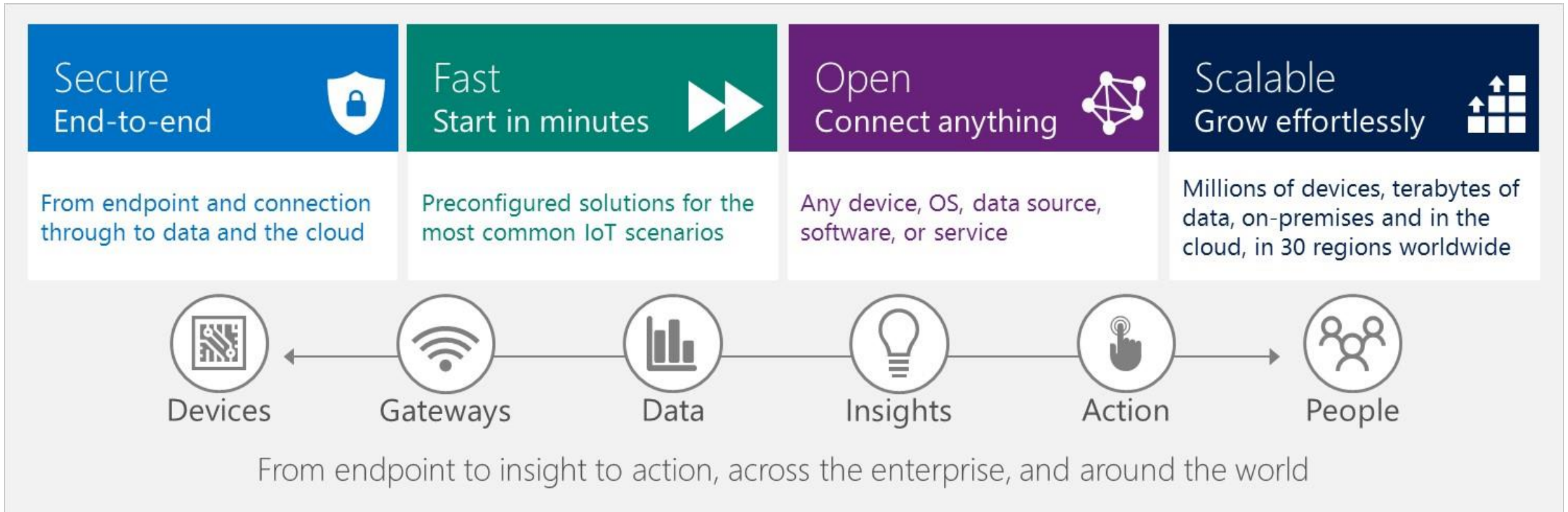
# Democratization of Technology – Now it's just about the Business Idea

Democratization disrupts this exclusivity with products that are often less expensive, integrate more easily in the corporate datacenter and, importantly, are accessible to mainstream information workers and developers using the skills they already have.



# IoT Suite = Solution Accelerator

It's not a service. It's a solution accelerator.



Magic Quadrant Leader, Business Intelligence and Analytics Platforms\*



## Built on the industry's leading cloud



# Microsoft Azure Portal

The screenshot displays the Microsoft Azure Portal interface for configuring an HDInsight cluster. The top navigation bar shows the breadcrumb path: Microsoft Azure > New > Internet of Things > HDInsight > Basics > Cluster configuration. The left sidebar contains the 'New' section with a search bar and a list of categories: Compute, Networking, Storage, Web + Mobile, Databases, Data + Analytics, AI + Cognitive Services, Internet of Things (selected), Enterprise Integration, Security + Identity, Developer tools, Monitoring + Management, Add-ons, Containers, and Blockchain. Below these are 'RECENT' items: HDInsight, Data Factory, and SQL Database. The main content area is divided into three panes. The first pane, 'Internet of Things', lists featured apps including IoT Hub, Event Hubs, Time Series Insights (preview), Stream Analytics job, Machine Learning Workspace, Machine Learning Web Service, Notification Hub, HDInsight, and DataStax Enterprise. The second pane, 'HDInsight by Microsoft', shows a three-step process: 1. Basics (Configure basic settings), 2. Storage (Set storage settings), and 3. Summary (Confirm configurations). A note states: 'This cluster may take up to 20 minutes to create.' The third pane, 'Basics', contains the following configuration fields: Cluster name (Enter new cluster name), Subscription (ORAYLIS PRESALES - DEV), Cluster type (dropdown menu with options: Hadoop, HBase, Storm, Spark (selected), R Server, Interactive Hive (Preview), Kafka (Preview)), Cluster login username (admin), Cluster login password, Secure Shell (SSH) username (sshuser), Use same password as cluster login (checked), Resource group (Create new / Use existing), and Location (West Europe). A 'Next' button is at the bottom of this pane. The fourth pane, 'Cluster configuration', shows a 'Cluster type' dropdown menu with the same options as the 'Basics' pane. A 'Select' button is at the bottom of this pane. The right sidebar shows 'All dashboards' with a 'TYPE' dropdown (Shared dashboards), a 'Subscriptions' section (All 15 selected - Don't see a subscription? Switch directories), and a list of dashboards including 'Reifenhäuser' and 'BD-Dashboard'.

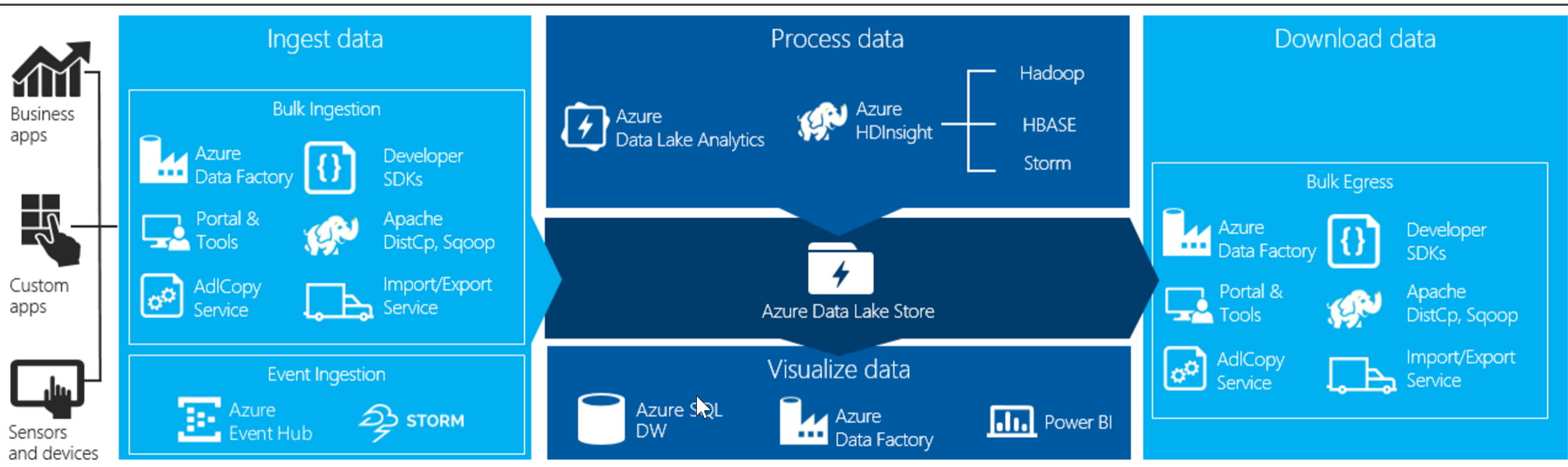
# Microsoft Azure IoT Services

| Devices                                                                           | Device Connectivity                                                                                       | Storage                                                                                                    | Analytics                                                                                            | Presentation & Action                                                                                  |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|  |  Event Hubs              |  SQL Database            |  Machine Learning |  App Service        |
|  |  IoT Hubs                |  Table/Blob Storage      |  Stream Analytics |  Power BI           |
|  |  Service Bus             |  DocumentDB              |  HDInsight        |  Notification Hubs  |
|                                                                                   |  External Data Sources |  External Data Sources |  Data Factory   |  Mobile Services  |
|                                                                                   |                                                                                                           |                                                                                                            |                                                                                                      |  BizTalk Services |

Data Lake

Data Lake Analytics

# Microsoft Azure Data Lake



# IoT Suite: Vorkonfigurierte Lösungen

Microsoft Azure IoT Suite



Jens Kröhnert  
ORAYLIS GMBH



## Lösungstypen



### Remoteüberwachung

Verbinden und überwachen Sie Ihre Geräte, um ungenutzte Daten zu analysieren und Geschäftsergebnisse durch die Automatisierung von Prozessen zu verbessern.

Auswählen



### Verbundene Factory

Beschleunigen Sie Ihren Weg zu Industrie 4.0 – verbinden, überwachen und steuern Sie Industriegeräte über die OPC UA, um Einblicke zu erhalten und so die Produktivität und Rentabilität des Betriebs zu fördern.

Auswählen



### Vorbeugende Wartung

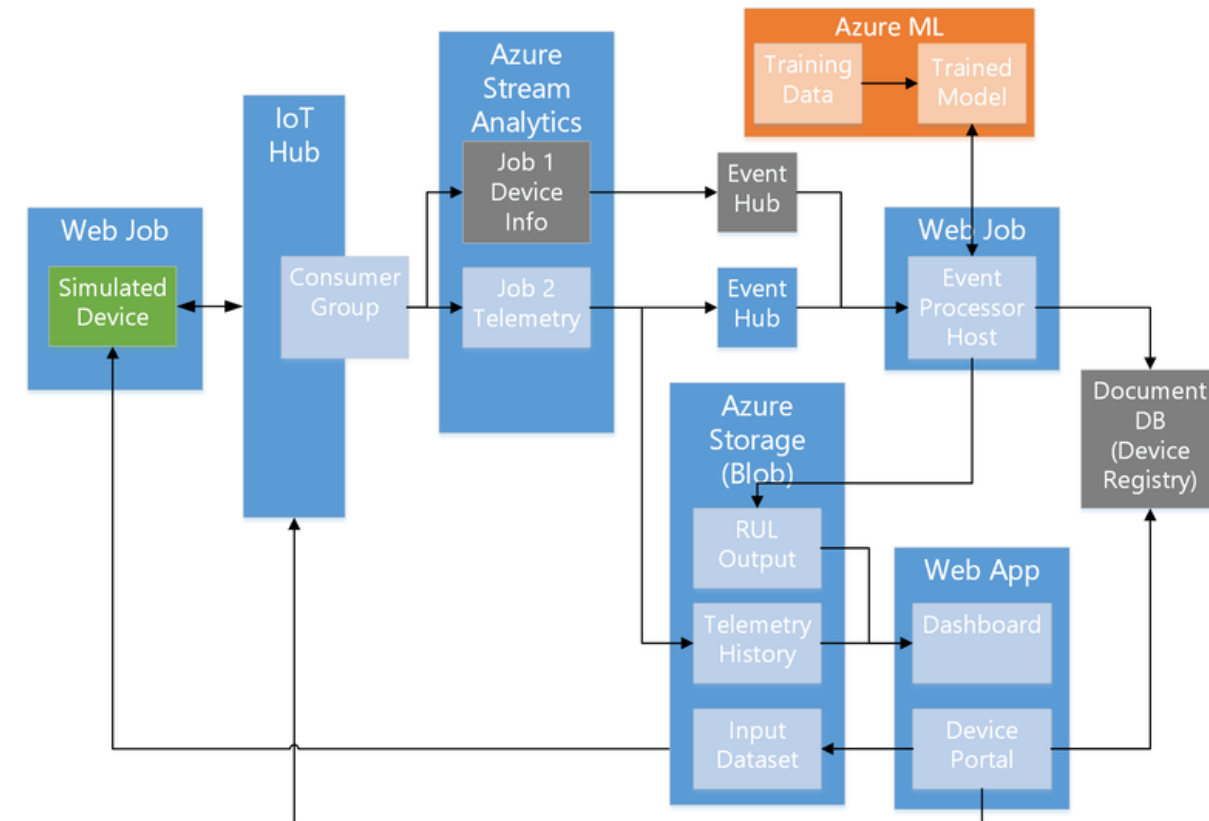
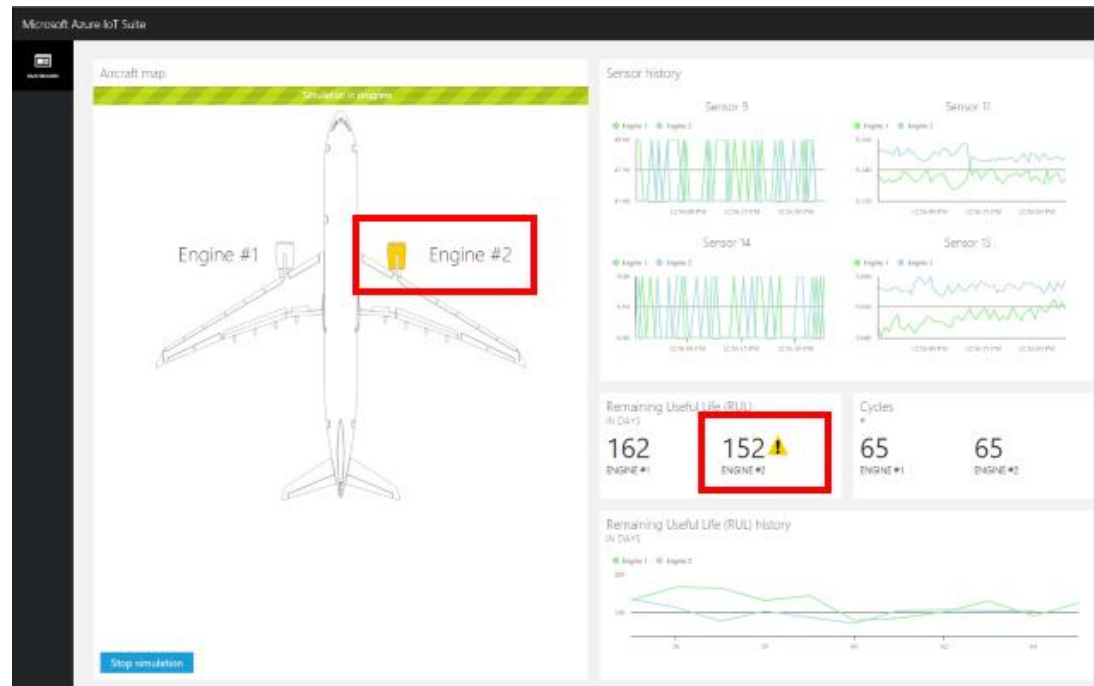
Sehen Sie Wartungsbedarf voraus, und vermeiden Sie ungeplante Ausfallzeiten durch das Verbinden und Überwachen Ihrer Geräte für die vorbeugende Wartung.

Auswählen

# IoT Suite: Vorkonfigurierte Lösung vs. Manuelle Architektur

## Vorkonfigurierte Lösung: Predictive Maintenance

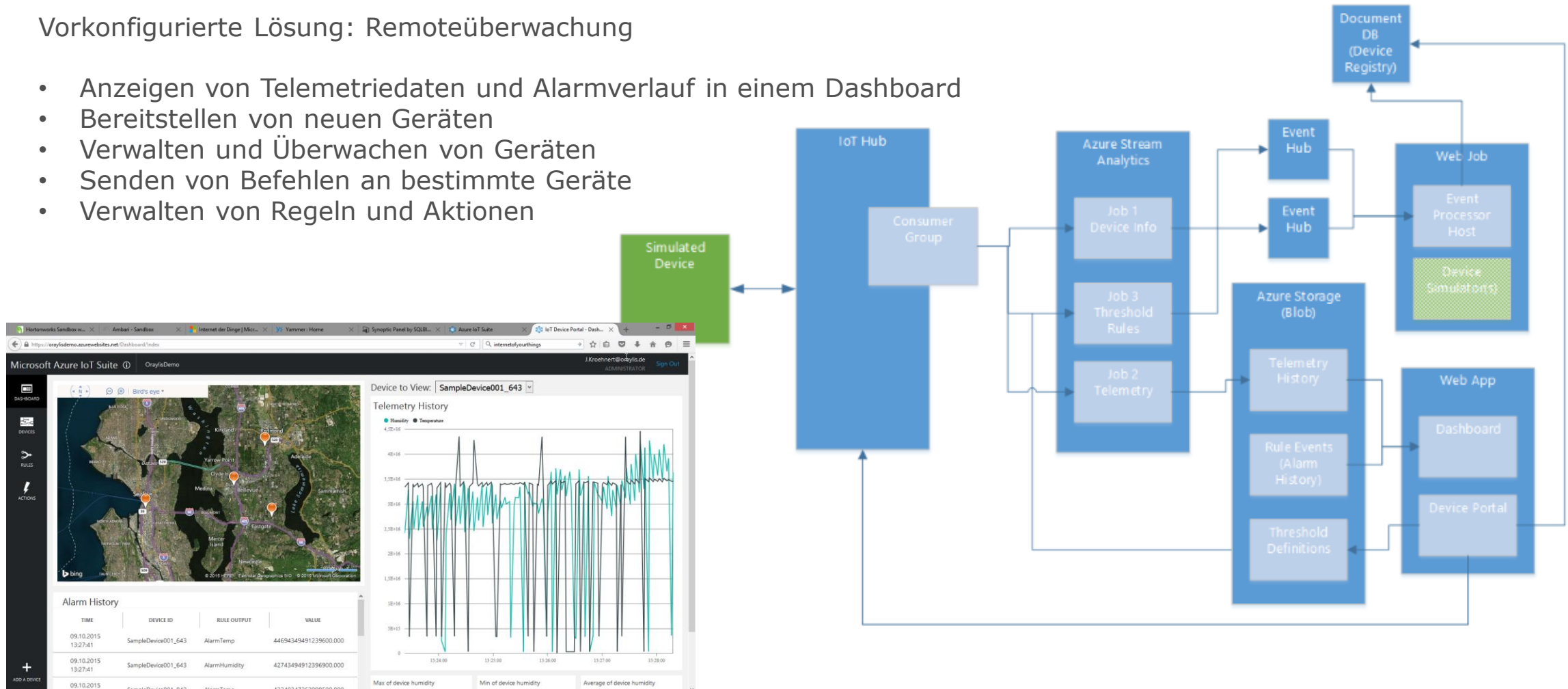
- Ausgabedaten von Stream Analytics-Aufträgen in der Blob Storage-Einheit
- Restlebensdauer und Zyklusanzahl pro Flugzeugtriebwerk



# IoT Suite: Vorkonfigurierte Lösung vs. Manuelle Architektur

## Vorkonfigurierte Lösung: Remoteüberwachung

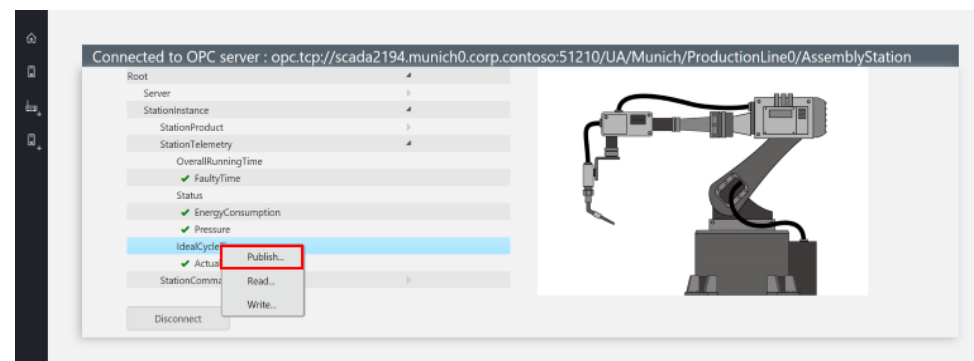
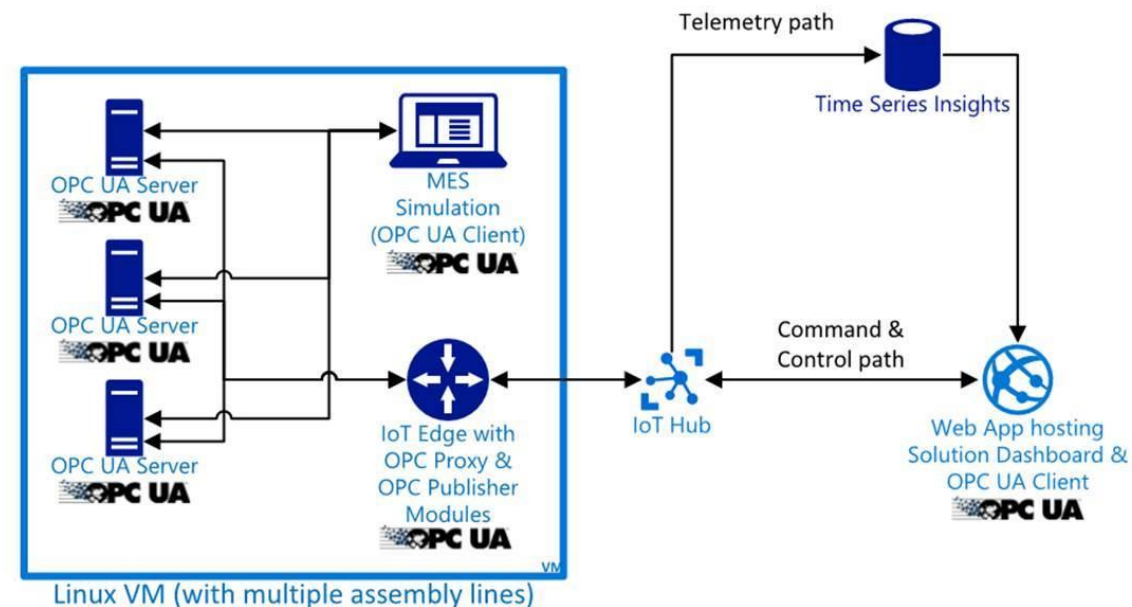
- Anzeigen von Telemetriedaten und Alarmverlauf in einem Dashboard
- Bereitstellen von neuen Geräten
- Verwalten und Überwachen von Geräten
- Senden von Befehlen an bestimmte Geräte
- Verwalten von Regeln und Aktionen



# IoT Suite: Vorkonfigurierte Lösung vs. Manuelle Architektur

## Vorkonfigurierte Lösung: Connected Factory

- Verbinden von OPC UA Servern über Azure IoT Gateway
- Einfache Auswahl von OPC Messpunkten zur Übernahme
- Direkte feingranulare Analyse in Azure Time Series Insights
- OPC Calls zur Remote Steuerung
- Konfigurierbares Portal



## Lambda Schritt 1: Realtime – Hot Path



## Mitmach-Demo mit Ihrem Smartphone

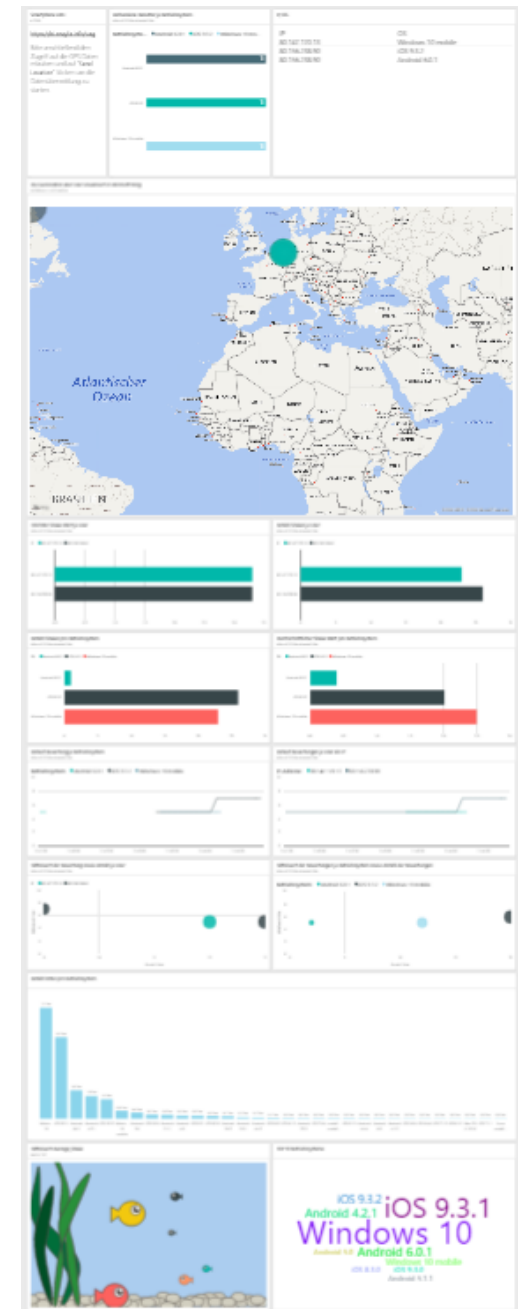
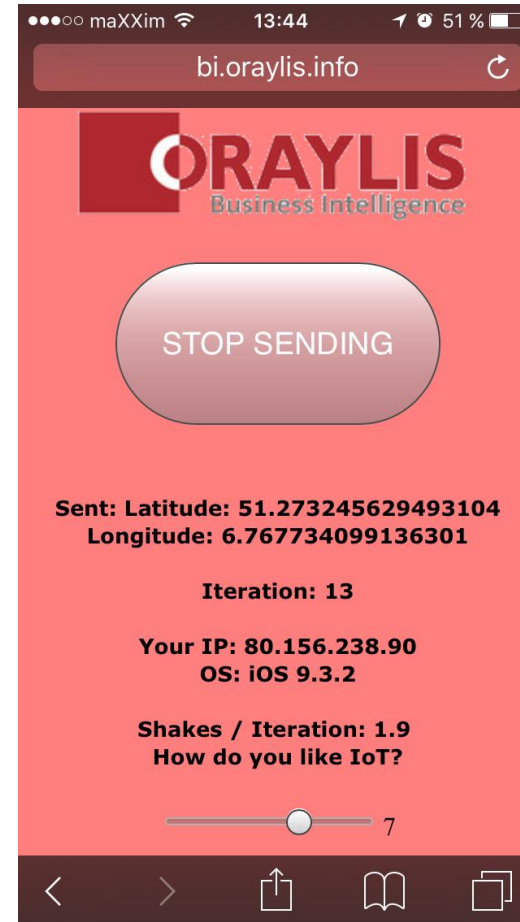
<https://bi.oraylis.info/usg>

Im Browser ihres Smartphones eingeben

Geokoordinaten auf Anfrage erlauben

START SENDING drücken

Alle 10 Sekunden wird dann gesendet (Iterationen)



# Field-Gateway Architektur

## Betriebssystemplattformen

Die Azure IoT-Bibliotheken wurden auf dem Erfolg

### Linux-/UNIX-Betriebssystemplattformen

Debian Linux  
Fedora Linux  
Raspbian Linux  
Ubuntu Linux  
Yocto Linux

### Windows-Betriebssystemplattformen

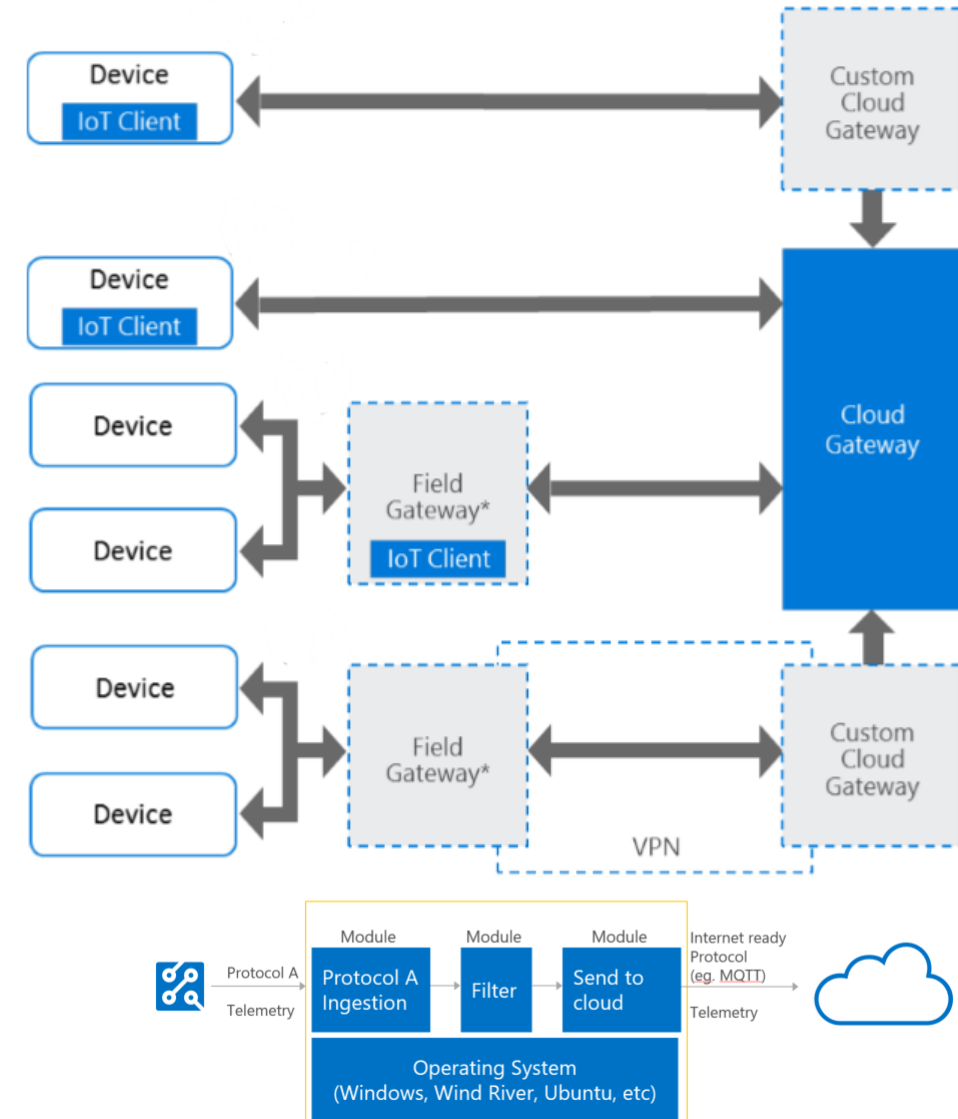
Windows Desktop  
Windows IoT Core  
Windows Server

### Andere Plattformen

mbed  
TI-RTOS

|                                 |                                  |                     |
|---------------------------------|----------------------------------|---------------------|
| NEXCOM NISE 50C                 | Windows 10 IoT Core              | C#                  |
| Pacific Control Systems G2021ES | Ubuntu                           | C                   |
| PANASONIC Toughpad FZ + F1      | Windows 10 IoT Mobile Enterprise | C#                  |
| Raspberry Pi 2                  | Raspbian                         | C, JavaScript, Java |
| Raspberry Pi 2                  | Windows 10 IoT Core              | C, JavaScript, C#   |
| Samsung ARTIK                   | Fedora                           | C                   |
| SOTEC CloudPlug                 | YOCTO                            | C                   |
| TI CC3200                       | TI-RTOS 2.x                      | C                   |
| Toradex Apalis iMX6             | Linux Angstrom(Yocto)            | JavaScript, Java    |

|                  | Version |
|------------------|---------|
| Windows Desktop  | 10      |
| Windows IoT Core | 10      |
| Windows Server   | 2012 R2 |
|                  | Version |
| mbed             | 2.0     |
| TI-RTOS          | 2.x     |



# IoT Device Katalog

Azure Certified for IoT-Gerätecatalog – Vorschau

Partnerdashboard

## Finden Sie Ihr IoT-Gerät

Certified IoT devices and starter kits tailored to your needs

Tell us what you are looking for

Become a Partner

Weitere Informationen

Microsoft Azure Certified

- ▶ Microsoft Azure IoT Starter Kit
- ▶ Branche
- ▶ Gerätetyp
- ▶ Getestete kompatible Sensoren
- ▶ Getestete integrierte Sensoren
- ▶ Betriebssystem
- ▶ Konnektivität
- ▶ Secure Hardware
- ▶ E/A-Hardwareschnittstellen
- ▶ Chiphersteller
- ▶ Programmiersprachen
- ▶ Industrial Protocols
- ▶ Industriezertifizierung
- ▶ Cloudprotokoll
- ▶ Geografische Verfügbarkeit

|                                                                                                                                              |                                                                                                                                                                              |                                                                                                                                                                          |                                                                                                                                                        |                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Azure IoT Starter Kit</p> <p>EMW3166</p>  <p>MAXCHIP</p> | <p>Azure IoT Starter Kit</p> <p>IoT Wi-Fi node based on STM32 NUCLEOL476RG</p>  <p>ST</p> | <p>Azure IoT Starter Kit</p> <p>Amplified-FATBOX-G3</p>  <p>AMPLIFIED ENGINEERING</p> | <p>Azure IoT Starter Kit</p> <p>M5Stack lot kit</p>  <p>M5STACK</p> | <p>Azure IoT Starter Kit</p> <p>PMC-5231</p>  <p>ICP DAS</p> |
| <p>Azure IoT Starter Kit</p> <p>CPS 200</p>               | <p>Azure IoT Starter Kit</p> <p>WISE-5231</p>  <p>ICP DAS</p>                           | <p>Azure IoT Starter Kit</p> <p>Sparkfun-ThingDev</p>  <p>sparkfun</p>              | <p>Azure IoT Starter Kit</p> <p>Raspberry-Pi3</p>                 | <p>Azure IoT Starter Kit</p> <p>Intel NUC</p>              |

# Oraylis Referenzprojekt IoT

- Spezialist für innovative Lösungen für Mess- und Regeltechnik im Bereich Wasseranalyse
- 70 Jahre Erfahrung in der Herstellung von Instrumenten, Sensoren und Systemen “Made in Germany”



# Oraylis Referenzprojekt IoT

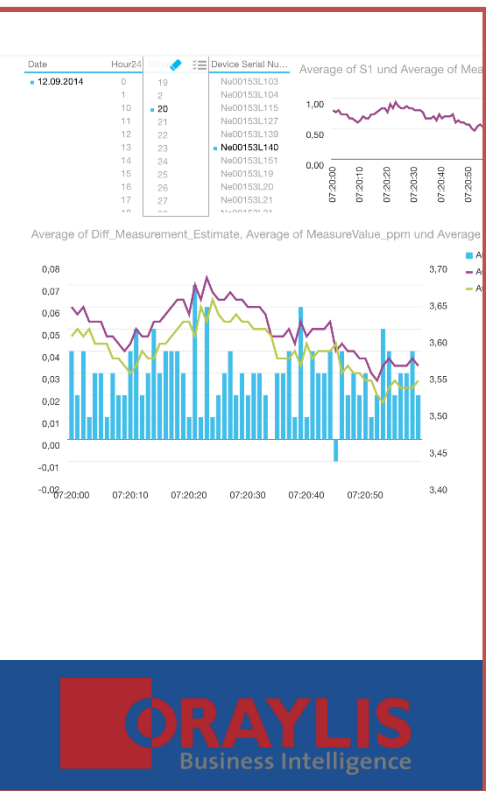
- ✓ Realtime Monitoring
- ✓ Predictive Alarming
- ✓ Predictive Maintenance

Instruments

Sensors

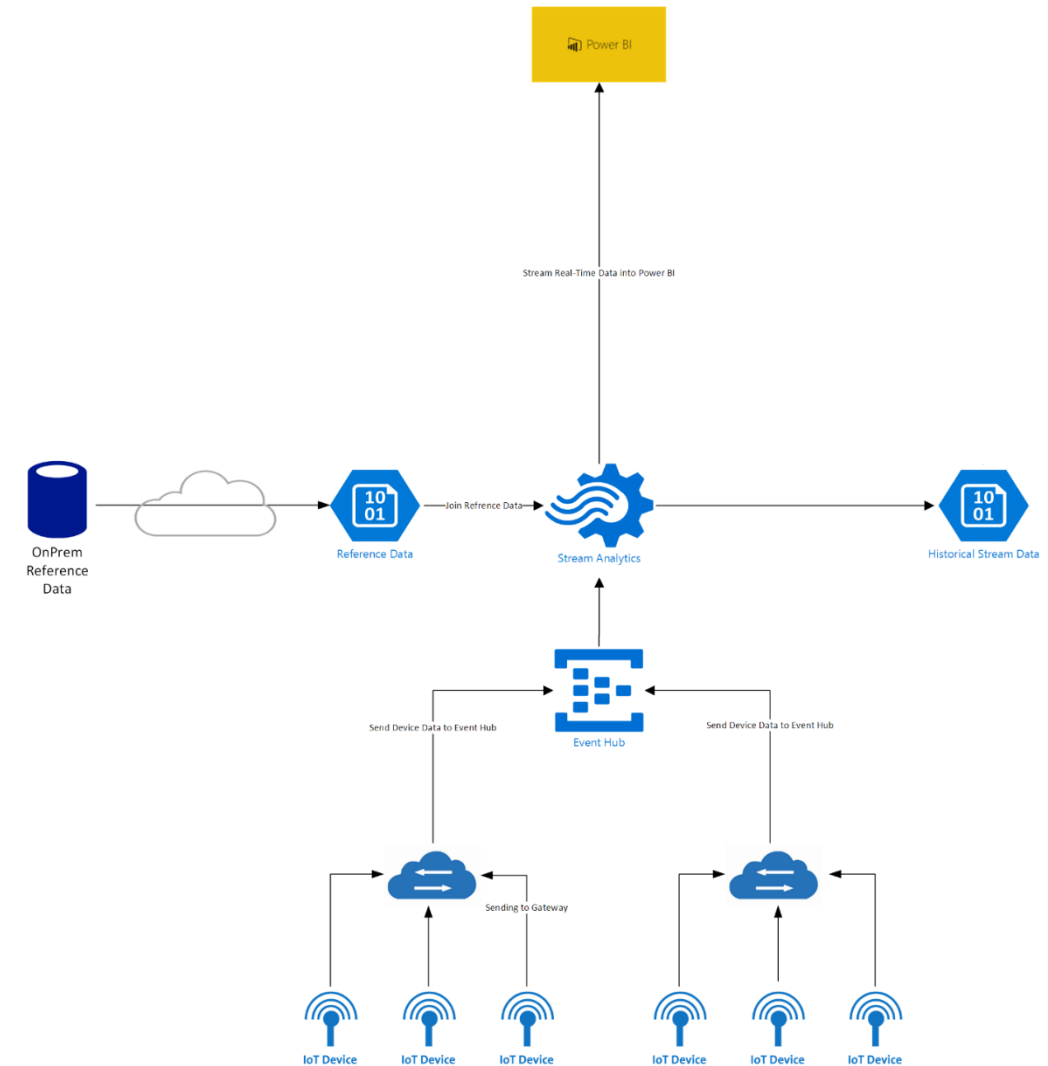
Systems

Services



# Architektur Step 1 Realtime

- Event Hub
  - Output Consumer Group
- Stream Analytics
  - Input Event Hub Consumer Group
  - Input Reference Data
  - „Complex Event Processing“ (SQL)
  - Output Power BI
  - Output Blob Storage
- Power BI
  - Real Time Dataset
- Data Factory
  - Gateway to OnPrem SQL Server
  - Orchestrate Reference Data Pull



# Azure Event Hub

The screenshot displays the Microsoft Azure portal interface for the resource group 'IoTchallenge0abromberg'. The left sidebar shows the 'All resources' view with a list of subscriptions and services. The main content area is divided into two sections: 'Essentials' and 'Metrics'.

**Essentials Section:**

- Resource group:** IoTchallenge0abromberg
- Status:** Active
- Location:** West Europe
- Subscription name:** ORAYLIS PRESALES - DEV
- Subscription ID:** dbe0024e-603d-45e4-8660-dba3fc0886ea
- Connection Strings:** [Connection Strings](#)
- Throughput Units:** 1

**Metrics Section:**

The metrics section shows a line graph for 'Throughput Units' over time. The graph has a y-axis from 0 to 4 and an x-axis with dates from 18 to 12. The line shows a peak of 4 units on 18, a dip to 2 on 19, a peak of 4 on 20, and a rise to 4 on 12.

**Summary Metrics:**

| INCOMING MESSAGES | INCOMING SEND REQUES. | INTERNAL SERVER ERRORS | OUTGOING MESSAGES |
|-------------------|-----------------------|------------------------|-------------------|
| 0                 | 54                    | 0                      | 54                |

**Table of Event Hubs:**

| NAME         | STATUS | MESSAGE RETENTION | PARTITION COUNT |
|--------------|--------|-------------------|-----------------|
| iotchallenge | Active | 1                 | 2               |

# Azure Event Hub Konfiguration

Microsoft Azure All resources > IoTchallenge0abromberg > iotchallenge - Properties

Search resources

J.Kroehnert@oraylis.de ORAYLIS GMBH

iotchallenge - Properties  
Event Hub - PREVIEW

Save changes Discard changes

Event Hub state  
Active Disabled

Partition Count  
2

Message Retention  
1

Archive  
On Off

Time window (minutes)  
5

Size window (MB)  
300

Container  
Nothing selected

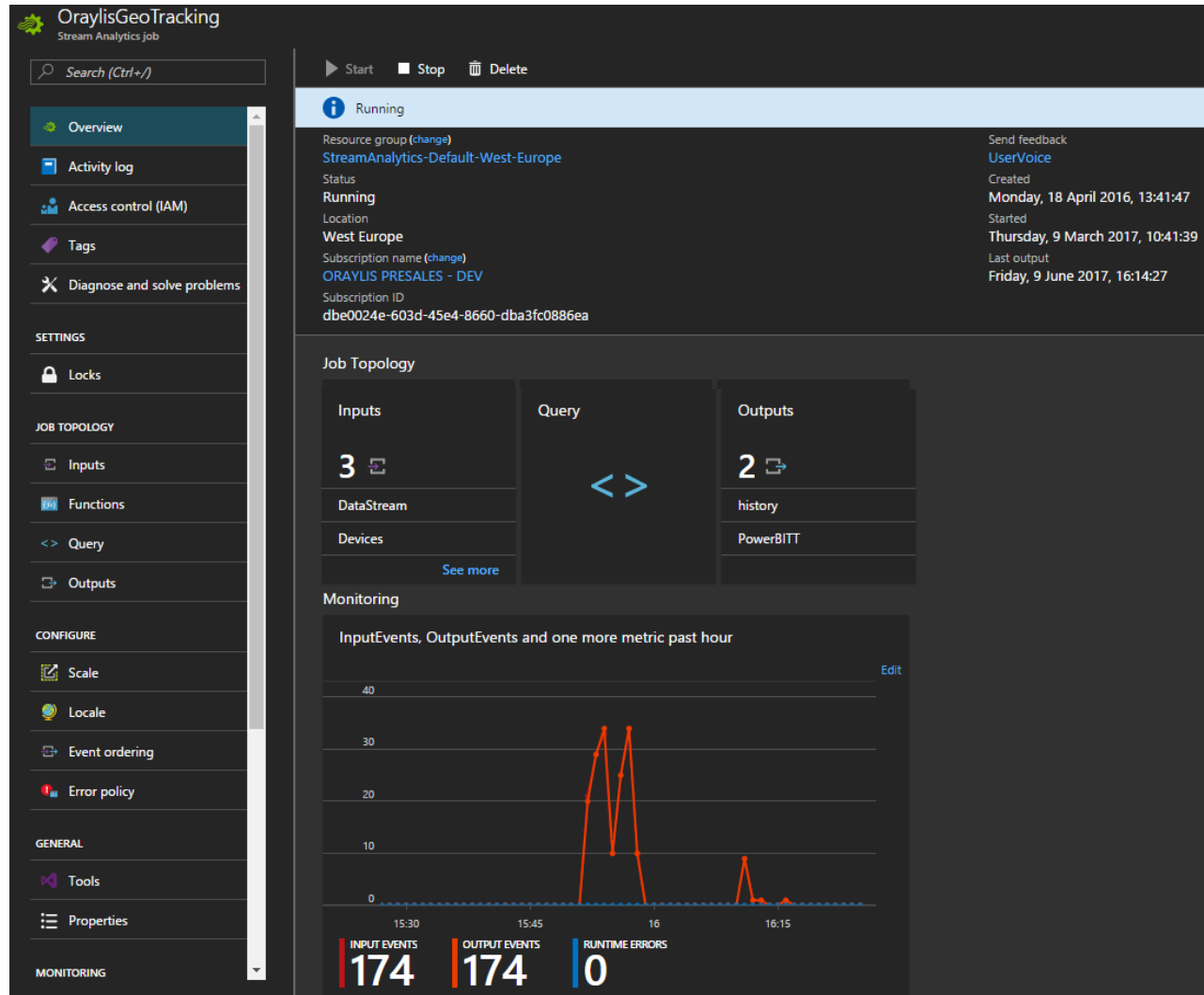
Storage Account

Sample Archive file name formats  
{Namespace}/{EventHub}/{PartitionId}/{Year}/{Month}/{Day}/{Hour}/{Minute}/{Second}

Archive file name format  
{Namespace}/{EventHub}/{PartitionId}/{Year}/{Month}/{Day}/{Hour}/{Minute}/{Second}

E.g. IoTchallenge0abromberg/iotchallenge/0/2017/5/9/14/25/12

# Stream Analytics Inputs mit Referenzdaten



Inputs  
BasicSample

+ Add

| NAME       | SOURCE TYPE | SOURCE       |     |
|------------|-------------|--------------|-----|
| DataStream | Stream      | Event hub    | ... |
| Devices    | Reference   | Blob storage | ... |
| Locations  | Reference   | Blob storage | ... |

# Stream Analytics Abfrage mit SQL

Microsoft Azure BasicSample > BasicSample

Search resources

J.Kroehnert@oraylis.de ORAYLIS GMBH

BasicSample Query

Save Discard Test

Inputs (3)

- DataStream
- Devices
- Locations

Outputs (2)

- history
- PowerBITT

Need help with your query? Check out some of the most common Stream Analytics query patterns [here](#).

```
1 with step1 as
2 (
3 Select
4 t0.Time,T0.DeviceID,T0.Temperature,'ppm' = case when t0.Alarm=1 OR t0.Alarm=2 OR t0.Alarm=3 then 0.00 else t0.ppm end,t0.Alarm,T1.Name,T1.City,T1.Product,t2.state,t2.contact,t2.fon,t2.mob
5 ,'Status' = Case when t02.Deviceid is null then 'Offline' else 'Online' end
6 ,'AlarmDesc' = Case when t1.Deviceid is null AND t0.Alarm = 0 then 'New Device Connected' when t0.Alarm = 1 then 'No Water' when t0.Alarm = 2 then 'Cleaning' when t0.Alarm = 3 then 'Calibr
7 ,'AlarmVal' = case when t0.Alarm > 0 then 100 else -1 end
8 ,100 as 'Offline'
9 ,120 as 'Max Temp', 80 as 'Min Temp', 103 as 'Target Temp', 2.0 as 'Min ppm', 3.0 as 'Max ppm', 2.55 as 'Target ppm',cast(Datepart(Hour,t0.Time)as nvarchar(max)) as Hour,cast(Datepart(Minu
10 FROM
11 DataStream T0 TimeStamp by Time --DataStream from Eventhub
12 left JOIN DataStream T02 TIMESTAMP BY Time ON T0.Deviceid = T02.deviceid AND DateDiff(second, T0, T02) BETWEEN 1 AND 30 /* Self join to check if there was a measure 30 seconds ago */
13 left join Devices T1 on T0.deviceid = T1.deviceid --ReferenceData
14 left Join Locations T2 on T1.City = t2.City --ReferenceData
15 where T02.DeviceID is null
16 Union
17 SELECT
18 t0.Time,T0.DeviceID,T0.Temperature,'ppm' = case when t0.Alarm=1 OR t0.Alarm=2 OR t0.Alarm=3 then 0.00 else t0.ppm end,t0.Alarm,T1.Name,T1.City,T1.Product,t2.state,t2.contact,t2.fon,t2.mo
19 ,'Online' as 'Status'
20 ,'AlarmDesc' = Case when t1.Deviceid is null AND t0.Alarm = 0 then 'New Device Connected' when t0.Alarm = 1 then 'No Water' when t0.Alarm = 2 then 'Cleaning' when t0.Alarm = 3 then 'Calibr
21 ,'AlarmVal' = case when t0.Alarm > 0 then 100 else -1 end
22 ,-1 as 'Offline'
23 ,120 as 'Max Temp', 80 as 'Min Temp', 103 as 'Target Temp', 2.0 as 'Min ppm', 3.0 as 'Max ppm', 2.55 as 'Target ppm',cast(Datepart(Hour,t0.Time)as nvarchar(max)) as Hour,cast(Datepart(Minu
24 FROM
25 DataStream T0 TimeStamp by Time --DataStream from Eventhub
26 left join Devices T1 on T0.deviceid = T1.deviceid --ReferenceData
27 left Join Locations T2 on T1.City = t2.City --ReferenceData
28 )
29
30 Select * into PowerBITT from step1
31 --Select * into PowerBI00jk from step1
32 Select * into history from step1
33 --select Time,DeviceID,Name,City,AlarmVal,AlarmDesc into errorhub from step1 where AlarmVal > 0
```

# Stream Analytics Best Practices

- Pivotisieren durch Tumbling Window

```
1 with pivotdata as (  
2  Select System.Timestamp AS timecreated,T0.location,T0.organization,T0.displayname,  
3  0.00 as AVG_Temperature,  
4  0.00 as AVG_Humidity,  
5  0.00 as AVG_Pressure,  
6  0.00 as AVG_Altitude,  
7  SUM(CASE T0.measurename WHEN 'Temperature' THEN T0.value ELSE 0.00 END) 'Temperature',  
8  SUM(CASE T0.measurename WHEN 'Humidity' THEN T0.value ELSE 0.00 END) 'Humidity',  
9  SUM(CASE T0.measurename WHEN 'Pressure' THEN T0.value ELSE 0.00 END) 'Pressure',  
10 SUM(CASE T0.measurename WHEN 'Altitude' THEN T0.value ELSE 0.00 END) 'Altitude'  
11 FROM EHoraweatherstation T0 TIMESTAMP BY timecreated  
12 Group by T0.location,T0.organization,T0.displayname,TumblingWindow(second, 2)  
13 ),  
14 avg_values as  
15 (  
16 Select System.Timestamp AS timecreated,location,organization,displayname,
```

# Stream Analytics Best Practices

- Join des Stromes mit sich selbst: Änderungen verfolgen

Sie benötigen Hilfe bei Ihrer Abfrage? Einige der gängigsten Stream Analytics-Abfragemuster finden Sie [hier](#).

```
1 with step1 as
2 (
3 Select
4   t0.Time, T0.DeviceID, T0.Temperature, 'ppm' = case when t0.Alarm=1 OR t0.Alarm=2 OR t0.Alarm=3 then 0.00 else t0.ppm end, t0.A
5   , 'Status' = Case when t02.Deviceid is null then 'Offline' else 'Online' end
6   , 'AlarmDesc' = Case when t1.Deviceid is null AND t0.Alarm = 0 then 'New Device Connected' when t0.Alarm = 1 then 'No Water'
7   , 'AlarmVal' = case when t0.Alarm > 0 then 100 else -1 end
8   , 100 as 'Offline'
9   , 120 as 'Max Temp', 80 as 'Min Temp', 103 as 'Target Temp', 2.0 as 'Min ppm', 3.0 as 'Max ppm', 2.55 as 'Target ppm', cast(D
10 FROM
11   DataStream T0 Timestamp by Time --DataStream from Eventhub
12   left JOIN DataStream T02 TIMESTAMP BY Time ON T0.deviceid = T02.deviceid AND DateDiff(second, T0, T02) BETWEEN 1 AND 30 ,
13   left join Devices T1 on T0.deviceid = T1.deviceid --ReferenceData
14   left Join Locations T2 on T1.City = t2.City --ReferenceData
15 where T02.DeviceID is null
16 Union
17 SELECT
```

# Stream Analytics Best Practices

- Last-Funktion: z.B. Werte fortschreiben (auch bei Abbruch des Stroms)

Sie benötigen Hilfe bei Ihrer Abfrage? Einige der gängigsten Stream Analytics-Abfragemuster finden Sie [hier](#).

```
1 Select Timestamp ,serial,  
2 last(value) OVER (PARTITION BY serial LIMIT DURATION(hour, 24) WHEN description = 'temp_vts_r_hk2') as'temp_vts_r_hk2',  
3 last(value) OVER (PARTITION BY serial LIMIT DURATION(hour, 24) WHEN description = 'system_konfiguration_drbhp') as 'system_konfiguration_drbhp'  
4 From Eventhub  
5 |
```

# Stream Analytics Abfragen für Outputs

Microsoft Azure BasicSample > BasicSample

Search resources

J.Kroehnert@oraylis.de ORAYLIS GMBH

BasicSample Query

Save Discard Test

Inputs (3)

- DataStream
- Devices
- Locations

Outputs (2)

- history
- PowerBITT

Need help with your query? Check out some of the most common Stream Analytics query patterns [here](#).

```
1 with step1 as
2 (
3   Select
4     t0.Time,T0.DeviceID,T0.Temperature,'ppm' = case when t0.Alarm=1 OR t0.Alarm=2 OR t0.Alarm=3 then 0.00 else t0.ppm end,t0.Alarm,T1.Name,T1.City,T1.Product,t2.state,t2.contact,t2.fon,t2.mob
5     ,'Status' = Case when t02.Deviceid is null then 'Offline' else 'Online' end
6     ,'AlarmDesc' = Case when t1.Deviceid is null AND t0.Alarm = 0 then 'New Device Connected' when t0.Alarm = 1 then 'No Water' when t0.Alarm = 2 then 'Cleaning' when t0.Alarm = 3 then 'Calibr
7     ,'AlarmVal' = case when t0.Alarm > 0 then 100 else -1 end
8     ,100 as 'Offline'
9     ,120 as 'Max Temp', 80 as 'Min Temp', 103 as 'Target Temp', 2.0 as 'Min ppm', 3.0 as 'Max ppm', 2.55 as 'Target ppm',cast(Datepart(Hour,t0.Time)as nvarchar(max)) as Hour,cast(Datepart(Minu
10  FROM
11    DataStream T0 TimeStamp by Time --DataStream from Eventhub
12    left JOIN DataStream T02 TIMESTAMP BY Time ON T0.deviceid = T02.deviceid AND DateDiff(second, T0, T02) BETWEEN 1 AND 30 /* Self join to check if there was a measure 30 seconds ago */
13    left join Devices T1 on T0.deviceid = T1.deviceid --ReferenceData
14    left Join Locations T2 on T1.City = t2.City --ReferenceData
15  where T02.DeviceID is null
16  Union
17  SELECT
18    t0.Time,T0.DeviceID,T0.Temperature,'ppm' = case when t0.Alarm=1 OR t0.Alarm=2 OR t0.Alarm=3 then 0.00 else t0.ppm end,t0.Alarm,T1.Name,T1.City,T1.Product,t2.state,t2.contact,t2.fon,t2.mo
19    ,'Online' as 'Status'
20    ,'AlarmDesc' = Case when t1.Deviceid is null AND t0.Alarm = 0 then 'New Device Connected' when t0.Alarm = 1 then 'No Water' when t0.Alarm = 2 then 'Cleaning' when t0.Alarm = 3 then 'Calibr
21    ,'AlarmVal' = case when t0.Alarm > 0 then 100 else -1 end
22    ,-1 as 'Offline'
23    ,120 as 'Max Temp', 80 as 'Min Temp', 103 as 'Target Temp', 2.0 as 'Min ppm', 3.0 as 'Max ppm', 2.55 as 'Target ppm',cast(Datepart(Hour,t0.Time)as nvarchar(max)) as Hour,cast(Datepart(Minu
24  FROM
25    DataStream T0 TimeStamp by Time --DataStream from Eventhub
26    left join Devices T1 on T0.deviceid = T1.deviceid --ReferenceData
27    left Join Locations T2 on T1.City = t2.City --ReferenceData
28  )
29
30  Select * into PowerBITT from step1
31  --Select * into PowerBI00jk from step1
32  Select * into history from step1
33  --select Time,DeviceID,Name,City,AlarmVal,AlarmDesc into errorhub from step1 where AlarmVal > 0
```

# Stream Analytics Output für Power BI

Microsoft Azure BasicSample > Outputs > Output details

### Outputs

BasicSample

+ Add

| NAME      | SINK         |     |
|-----------|--------------|-----|
| history   | Blob storage | ... |
| PowerBITT | Power BI     | ... |

### Output details

PowerBITT

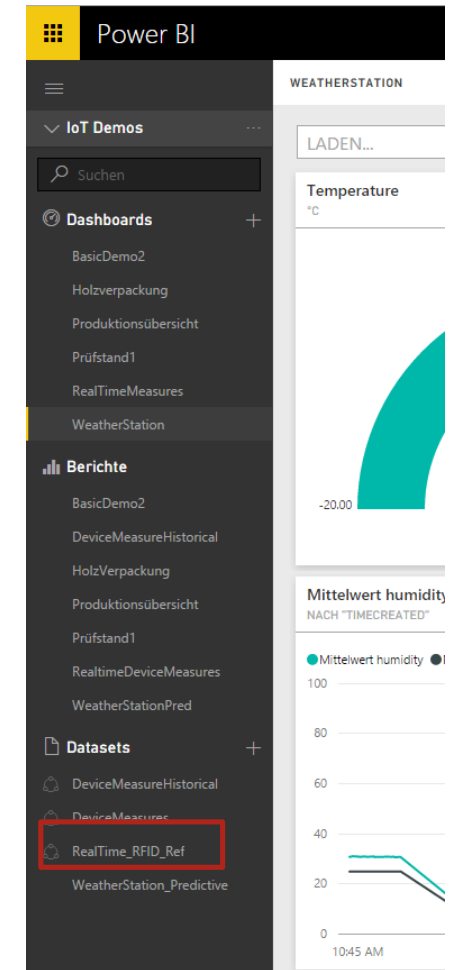
⚙ Test 🗑 Delete

Group Workspace  
My Workspace ▼

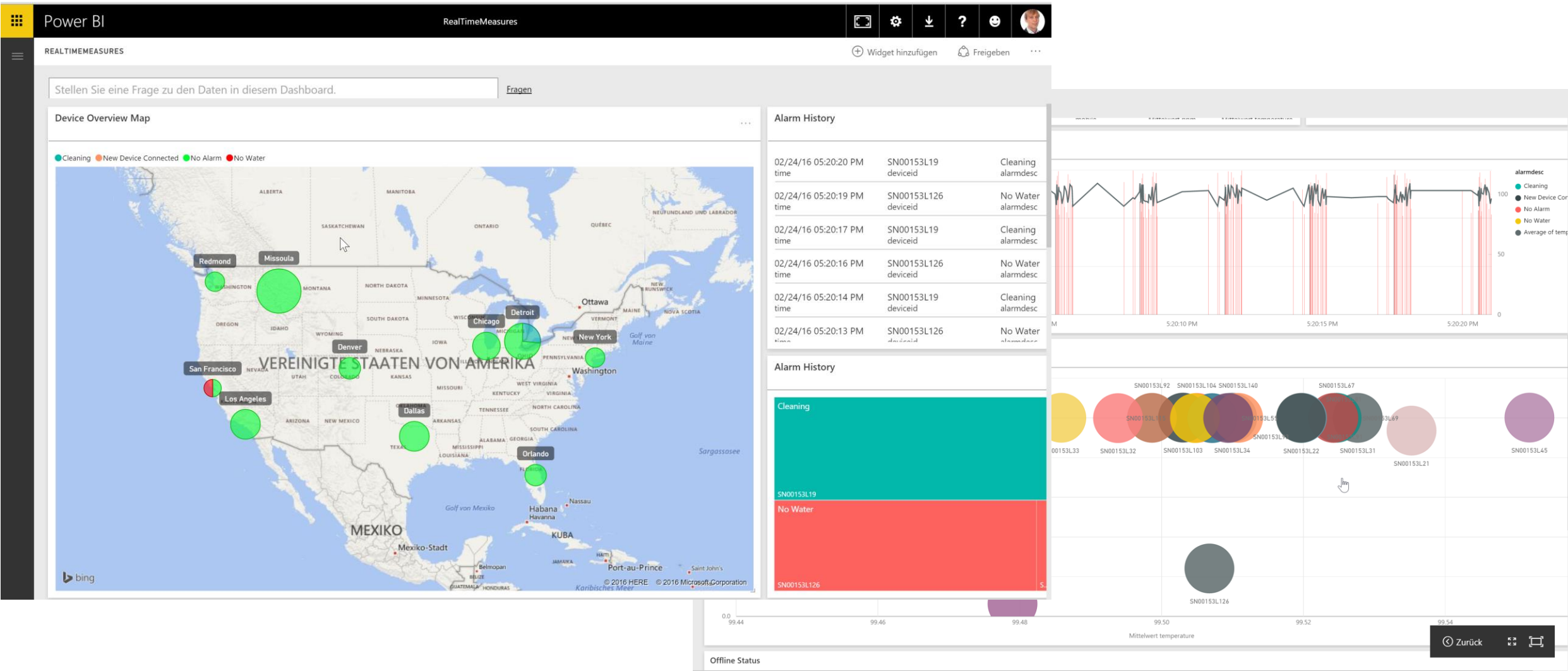
\* Dataset Name  
**DeviceMeasures**

⚠ If the dataset or table already exists in your Microsoft Power BI subscription, it will be overwritten.

\* Table Name  
DeviceMeasures



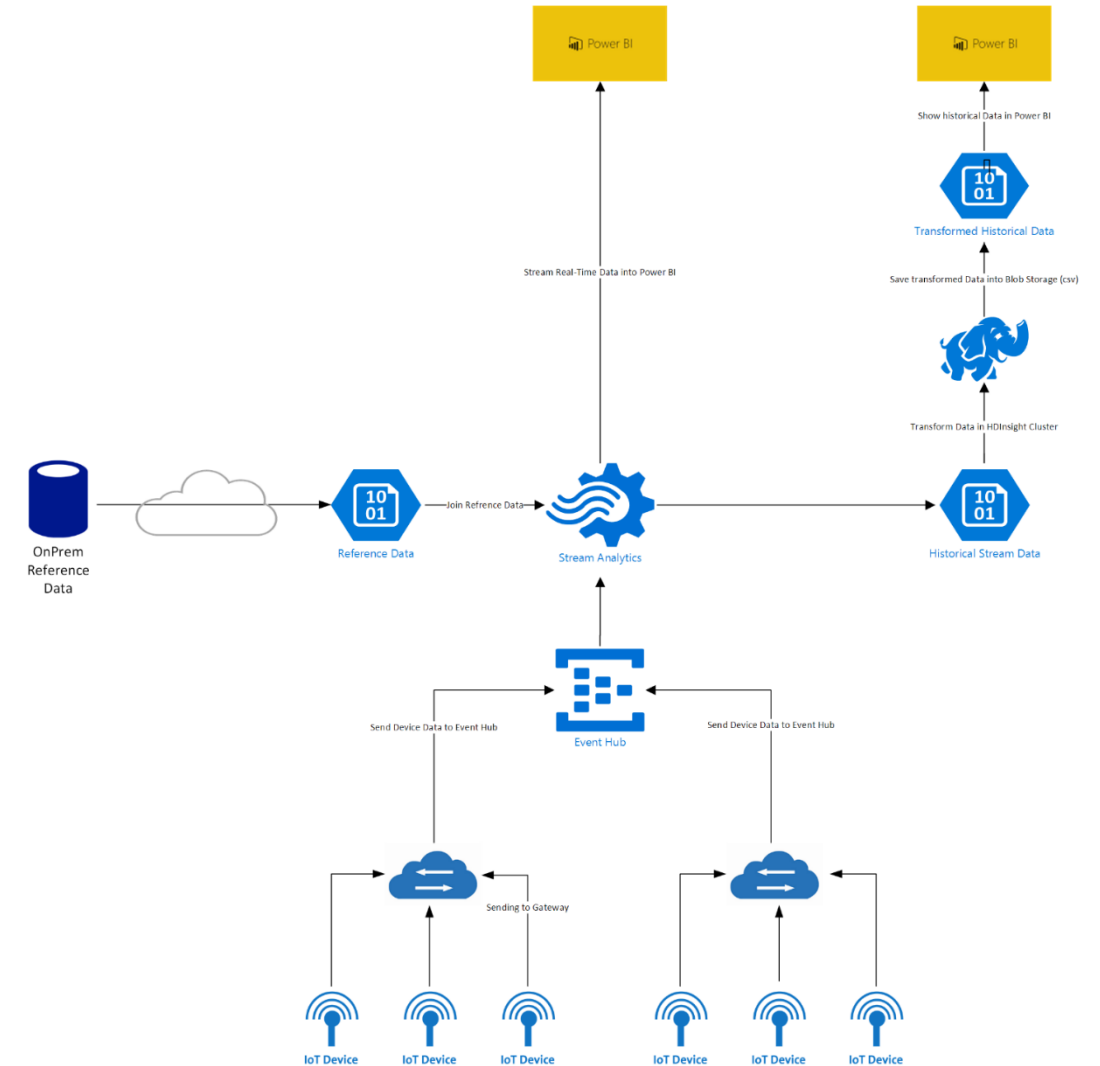
# Visualisierung mit Power BI



## Lambda Schritt 2: Batch – Cold Path

## Architektur Step 2 Batch

- HDInsight
  - Nightly Batch
  - Input Blob Storage (JSON)
  - Output Blob Storage (csv)
- Power BI
  - Batch Dataset over Power Query Blob Storage
- Data Factory
  - Orchestrate nightly HDInsight OnDemand Hive Execution



# HDInsight (Microsoft Brand of Hortonworks Data Platform) – Hadoop as a Service

Microsoft Azure New > Internet of Things > HDInsight > Basics > Cluster configuration

HDInsight by Microsoft

Quick create Custom (size, settings, apps)

- 1 Basics Configure basic settings
- 2 Storage Set storage settings
- 3 Summary Confirm configurations

This cluster may take up to 20 minutes to create.

Basics

\* Cluster name skdfjlskjfls ✓

\* Subscription ORAYLIS PRESALES - DEV .azurehdinsight.net

\* Cluster type Configure required settings

\* Cluster login username admin

\* Cluster login password

Secure Shell (SSH) username sshuser

☒ Use same password as cluster login

\* Resource group Create new Use existing

\* Location West Europe

Cluster configuration

Learn about HDInsight and cluster versions. [Learn more](#)

Cluster configuration

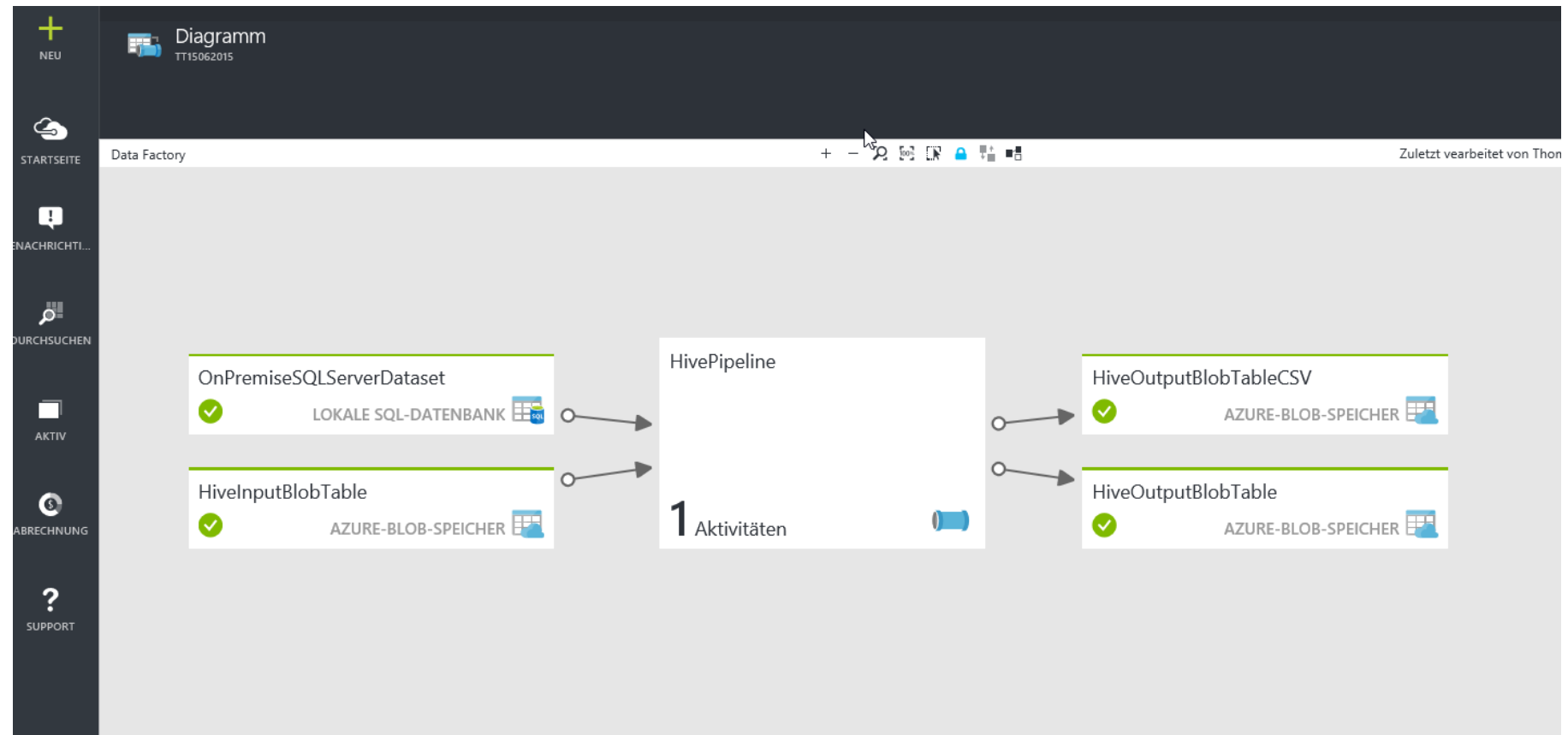
\* Cluster type Hadoop HBase Storm Spark R Server Interactive Hive (Preview) Kafka (Preview)

\* Operating system Linux Windows

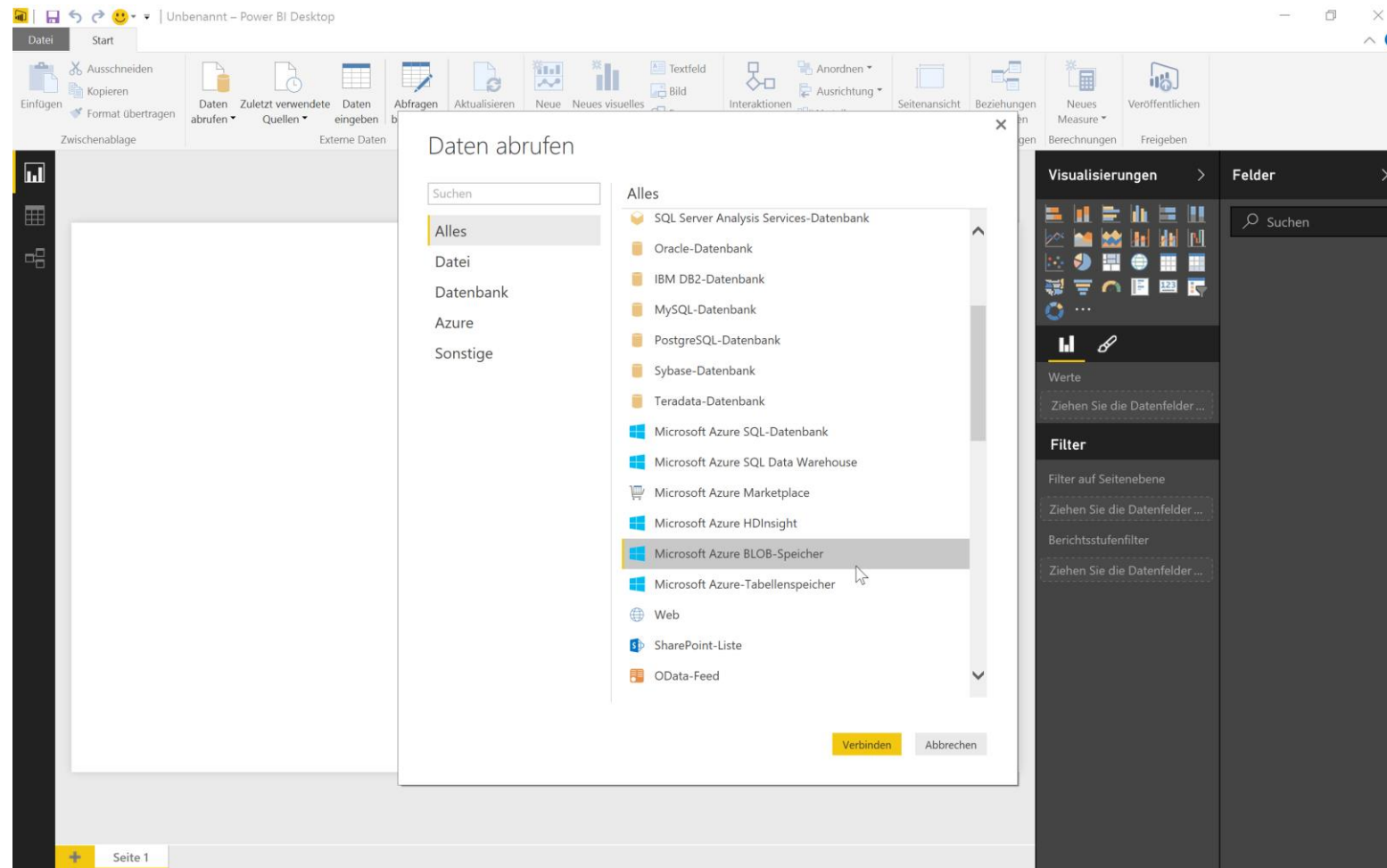
\* Version



# HDInsight on Demand – Azure Data Factory



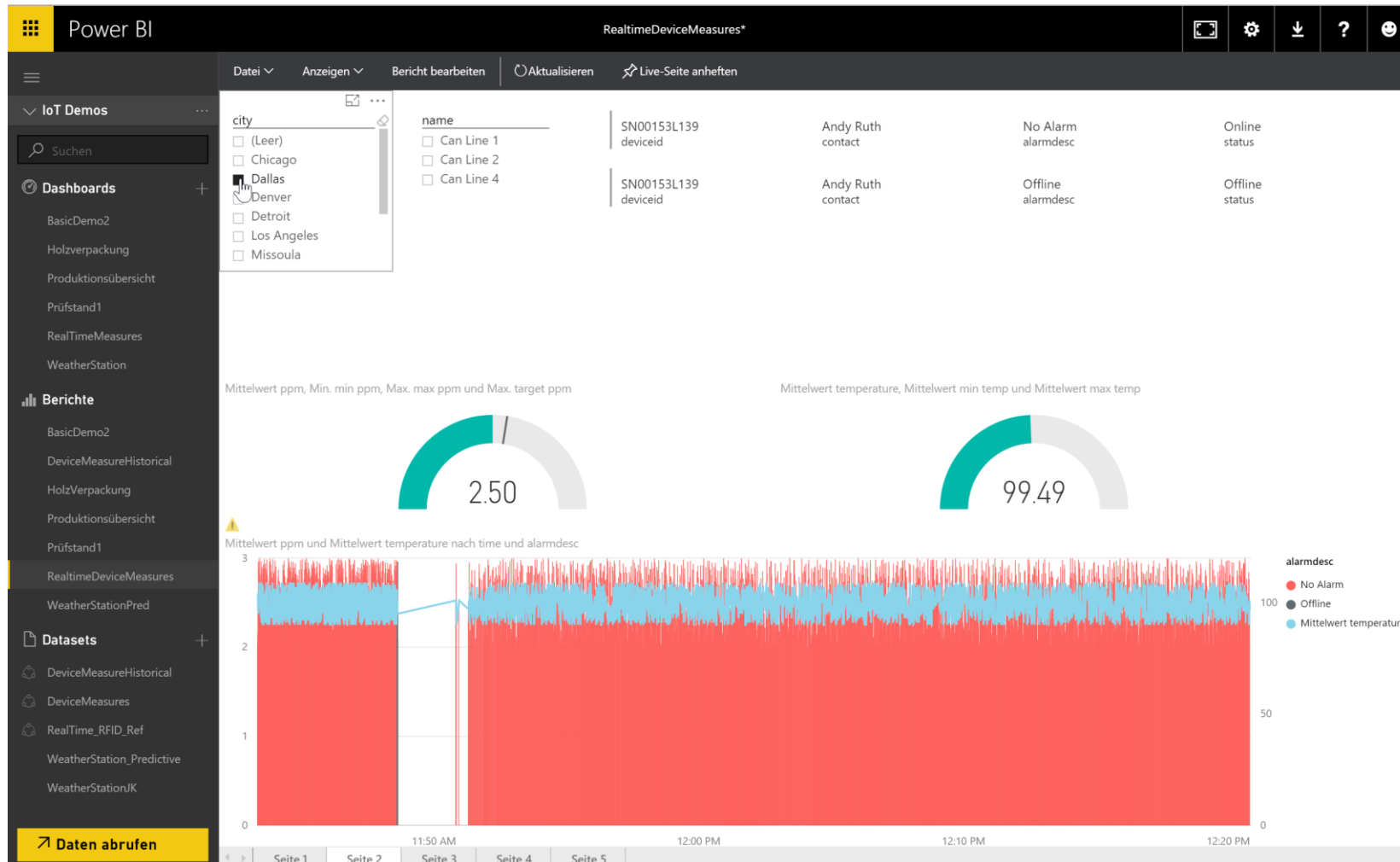
# Batch Load to Serving Layer (Power BI)



# Batch Load to Serving Layer (Power BI)

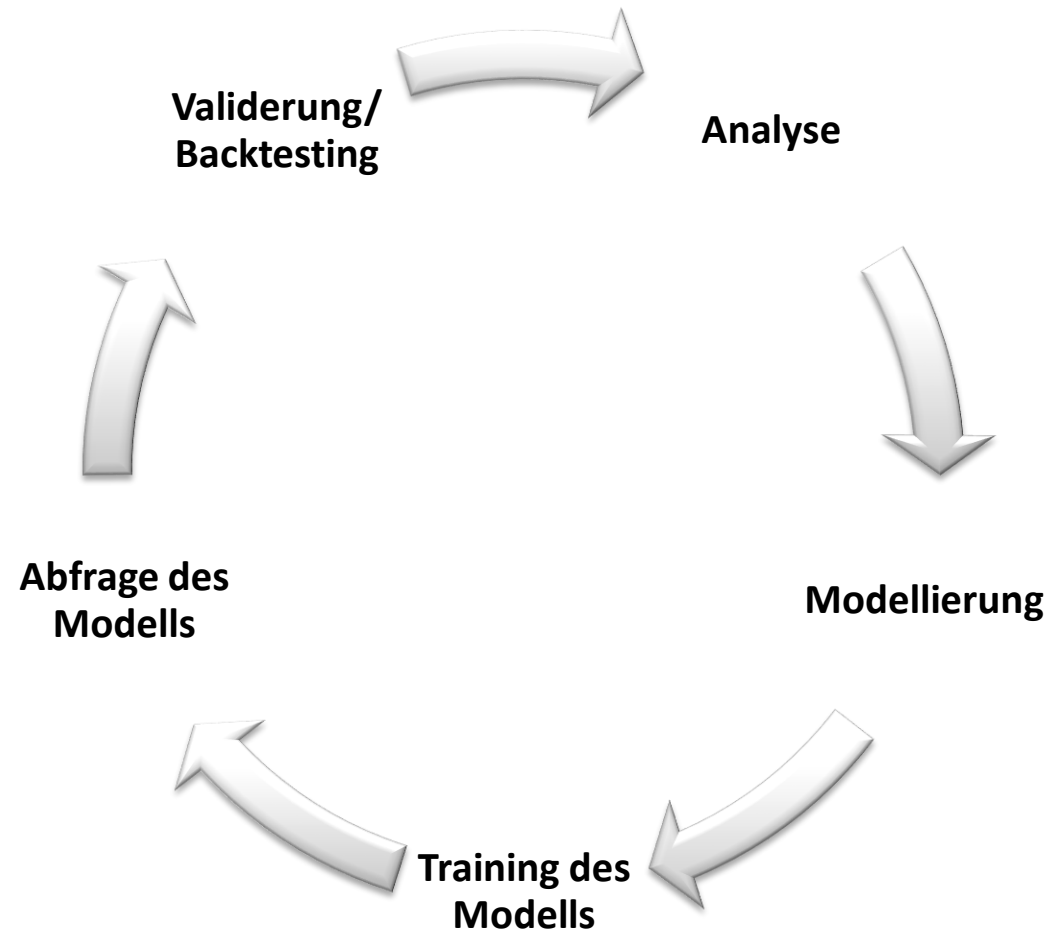
The screenshot displays the Microsoft Power BI Desktop application. On the left, the 'Daten' (Data) pane lists several datasets, with 'IoTShowCase2015\_Historical' selected. The main workspace shows a card for this dataset. The card's title is 'IoTShowCase2015\_Historical'. Below the title, it states: 'Letzte erfolgreiche Aktualisierung: Sun Nov 08 2015 11:45:40 GMT+0100 (Mittleuropäische Zeit)' and 'Der Aktualisierungszeitplan ist nicht aktiviert.' (The refresh schedule is not activated). At the bottom of the card, there is a row of action buttons: 'DURCHSUCHEN', 'UMBENENNEN', 'ENTFERNEN', 'ZEITPLANAKTUALI...', 'JETZT AKTUALISIE...', and 'SCHNELLEINBLICKE'. The 'ZEITPLANAKTUALI...' button is highlighted with a mouse cursor, and a tooltip 'ZEITPLANAKTUALISIERUNG' is visible. The top of the interface shows the 'Power BI' logo and a ribbon with tabs for 'Datei', 'Anzeigen', 'Leseansicht', 'Textfeld', 'Formen', and 'Visuelle Interaktionen'. The bottom status bar shows 'Seite 1' and a plus sign.

# Historie und abgeleitete Kennzahlen in Power BI



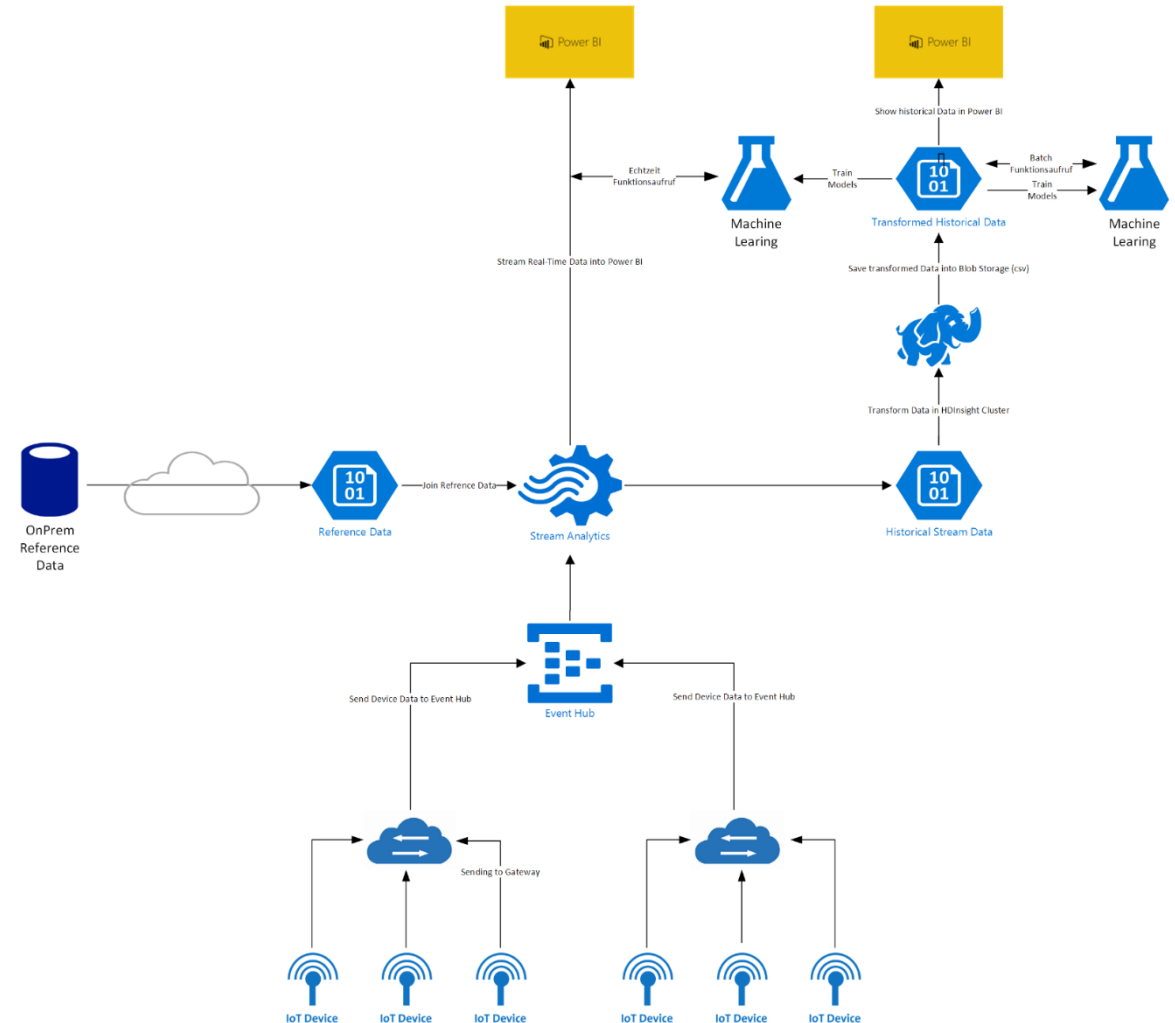
## Lambda Schritt 3: Predictive / Artificial Intelligence (AI)

# Data Mining Prozess

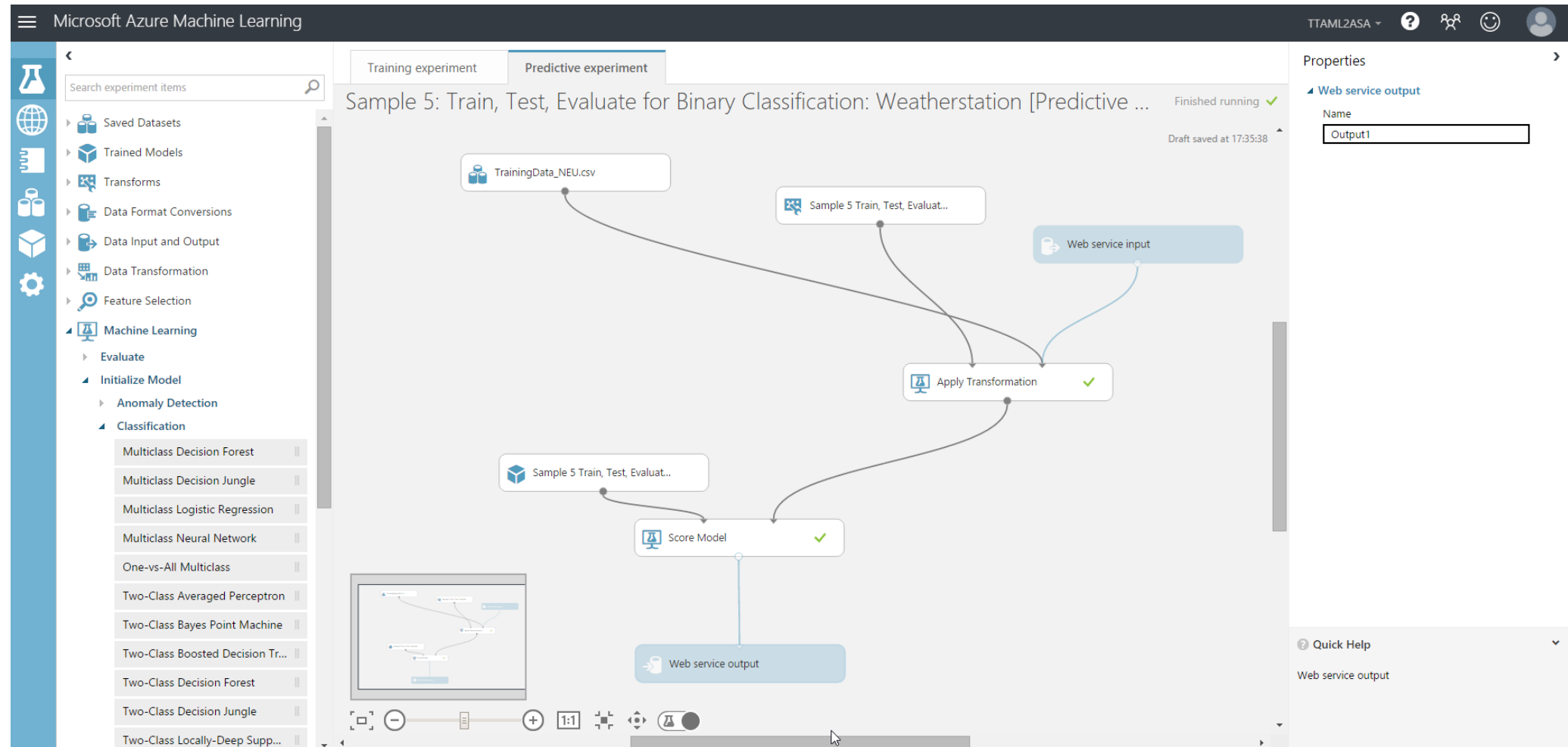


## Architektur Step 3 Predictive

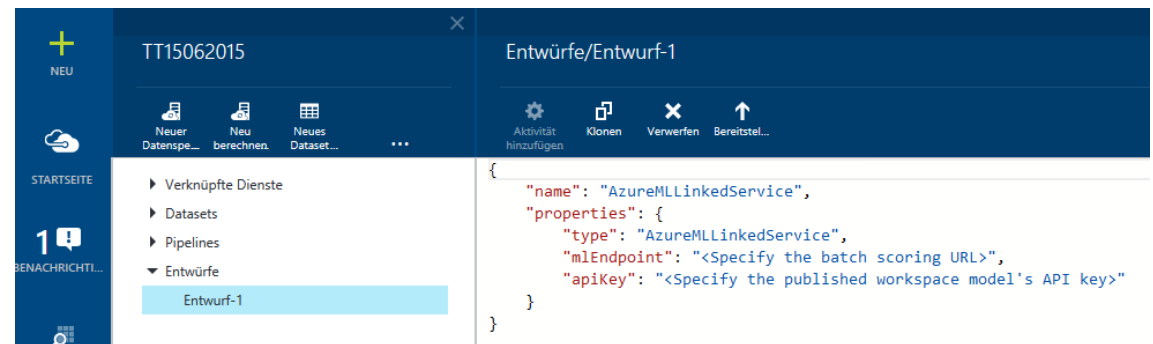
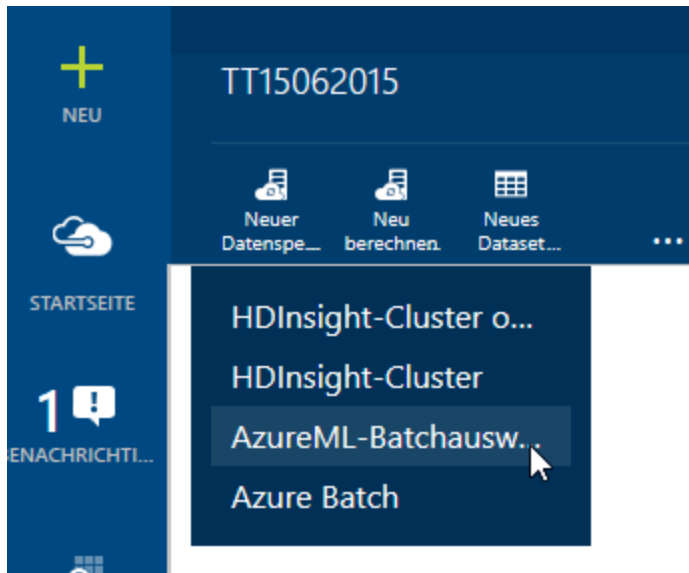
- HDInsight
  - Nightly Batch
  - Input Blob Storage (JSON)
  - Output Blob Storage TrainingsData
- Azure ML
  - Train Model Predictive Alarming
  - Train Model Predictive Maintenance
- Stream Analytics
  - FunctionCall Real-Time Model Predictive Alarming
- Data Factory
  - Batch Get Reference Data from OnPrem SQL DB
  - Batch FunctionCall Predictive Maintenance



# Azure ML (Machine Learning)



# ML Batch Funktionsaufruf in Data Factory



# ML Funktionsaufruf in Stream Analytics

Microsoft Azure All resources > OraylisWeatherStation - Functions

ORAYLIS GmbH

+ Add Columns Refresh

Subscriptions: 1 of 15 selected – Don't see a subscription? Switch directories

Filter by name...

83 items

NAME

- media0services0ab
- olapdata
- STORAGE ACCOUNT (CLASSIC)
- azuremltest
- oraiotdemos
- STREAM ANALYTICS JOB
- BasicSample
- IoTchallenge0abro...
- OraylisGeoTracking
- OraylisWeatherStat...

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

SETTINGS

Locks

JOB TOPOLOGY

Inputs

Functions

Query

Outputs

CONFIGURE

Functions can't be edited while a job is running. You can stop the job to add or edit functions.

| NAME | PARAMETERS | OUTPUT TYPE | FUNCTION TYPE |
|------|------------|-------------|---------------|
| pred | 12         | record      | Azure ML      |

## Funktionssignatur

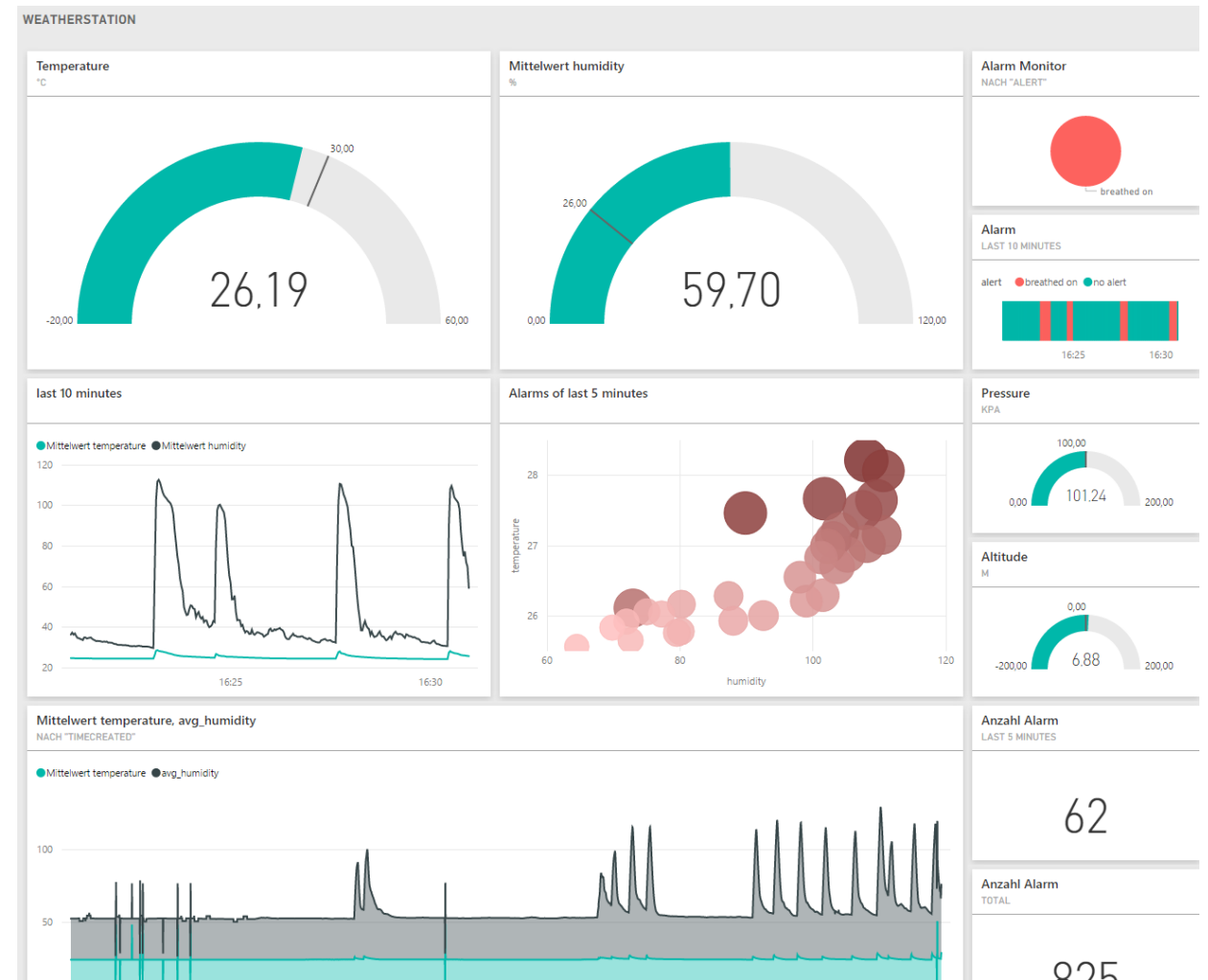
`pred(temperature FLOAT, avg_temperature FLOAT, ratio_temperature FLOAT, humidity FLOAT, avg_humidity FLOAT, ratio_humidity FLOAT, pressure FLOAT, avg_pressure FLOAT, ratio_pressure FLOAT, altitude FLOAT, avg_altitude FLOAT, ratio_altitude FLOAT) RETURNS RECORD`

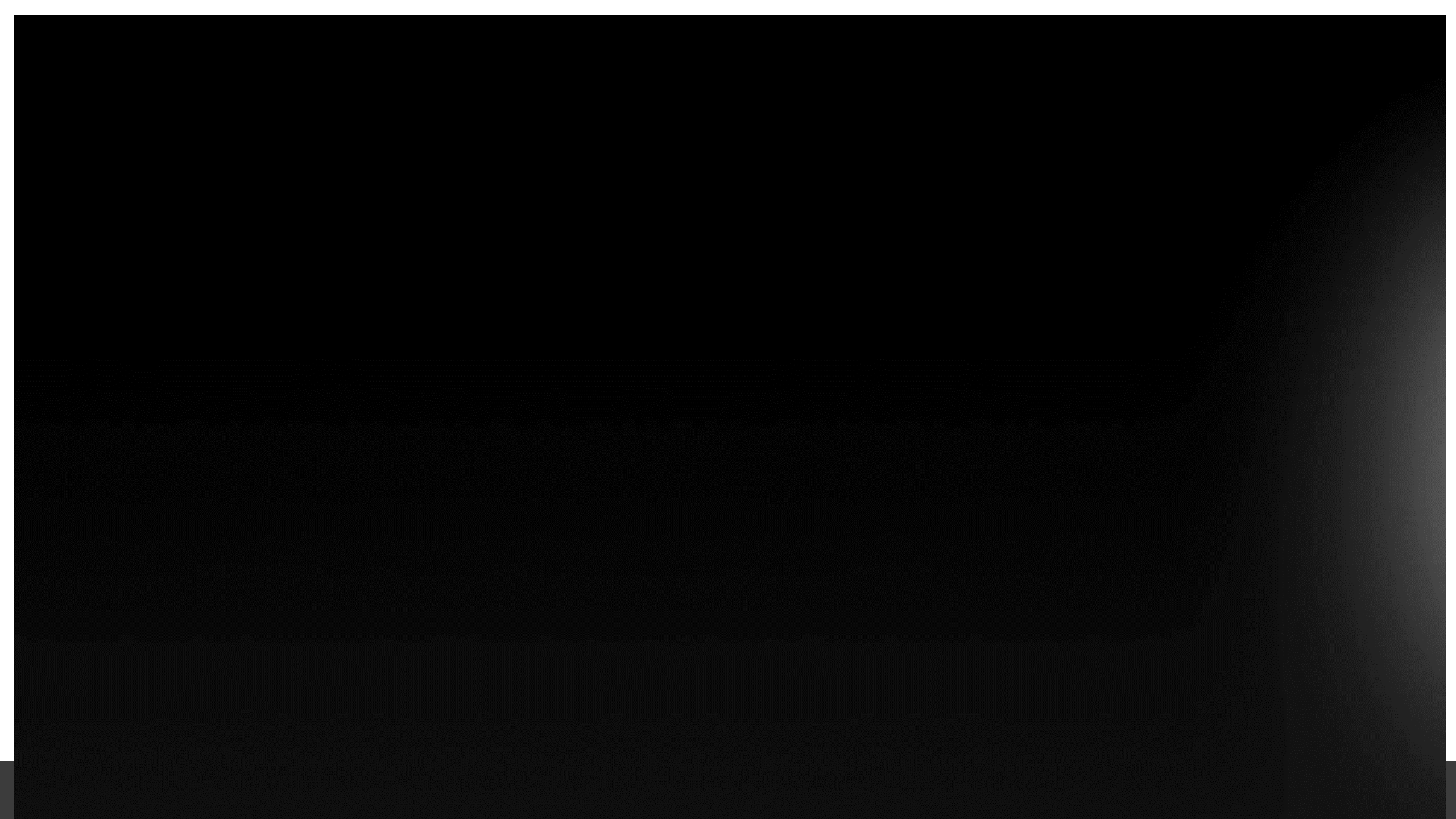
## ML Funktionsaufruf Best Practice

```
53 result_prediction as
54 (
55 Select System.Timestamp AS timecreated,location,organization,displayname,
56 temperature,avg_temperature,ratio_temperature,humidity,avg_humidity,ratio_humidity,pressure,avg_pressure,ratio_pressure,altitude,avg_altitude,ratio_altitude,
57 pred(temperature,avg_temperature,ratio_temperature,humidity,avg_humidity,ratio_humidity,pressure,avg_pressure,ratio_pressure,altitude,avg_altitude,ratio_altitude) as r
58 from result
59 )

63 Select timecreated,location,organization,displayname,temperature,avg_temperature,ratio_temperature,humidity,avg_humidity,ratio_humidity,pressure,avg_pressure,ratio_pressure,altitude,avg_altitude,
64 r.[Scored Labels],r.[Scored Probabilities],'Alert' = case r.[Scored Labels] when 'H' then 'breathed on' else 'no alert' end into PowerBITTPred
65 from result_prediction T0
```

# Demo Predictive Alert

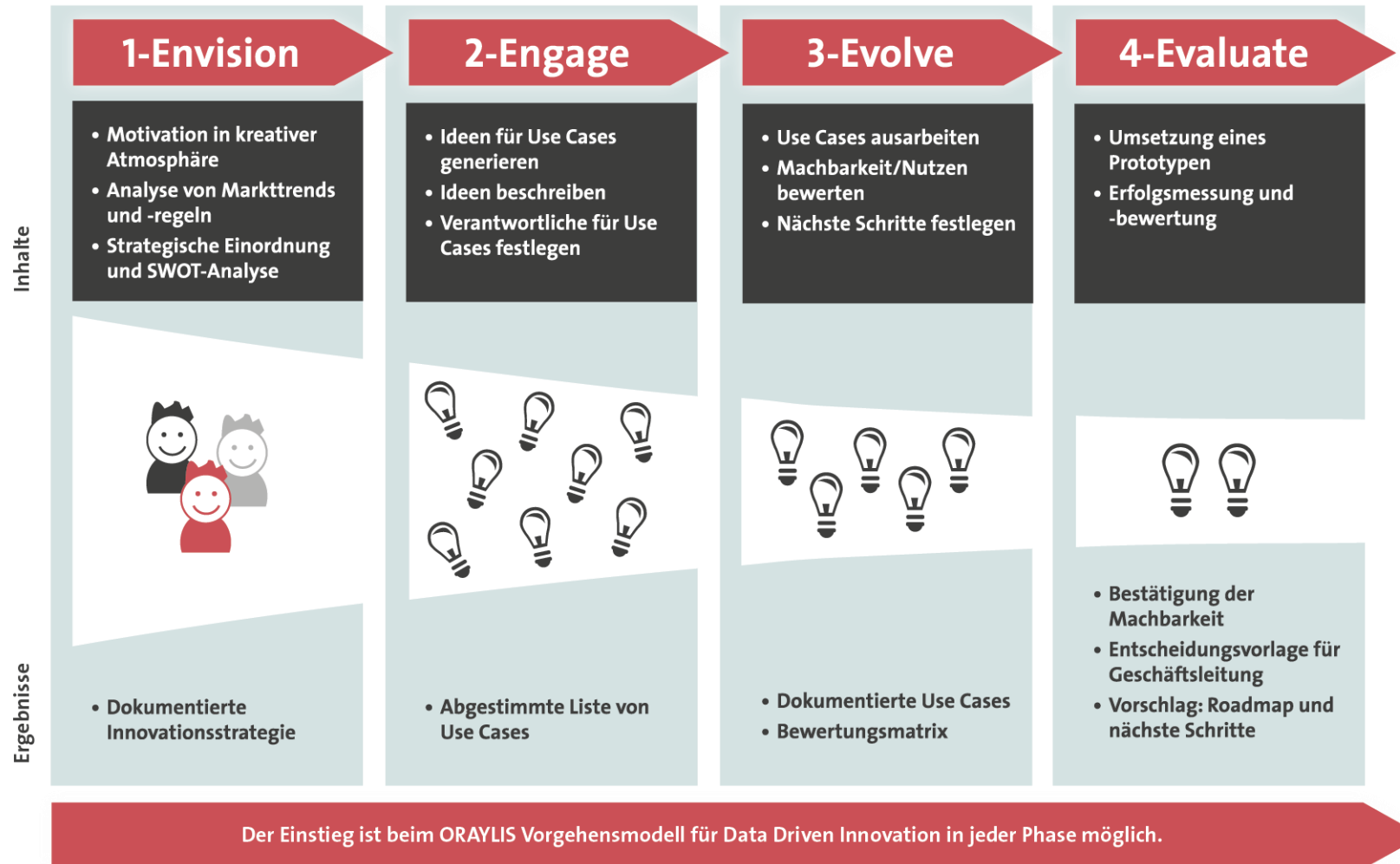




## Kunden Situation: Wie innovieren?



# Data Driven Innovation is a manageable process



# Kunde Anlagenbauer: Strategie Papier (Think Big)



**1. Operation Center**  
A future-proof human machine interface

3



**3. Diagnostic Center**  
Operational excellence through speedy fault analysis



**5. Cloud analytics**  
Optimized production through Big Data



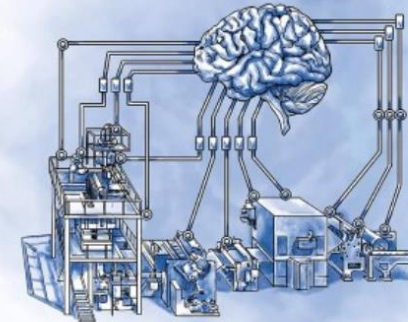
**2. Performance Cockpit**  
All key figures at a glance

4



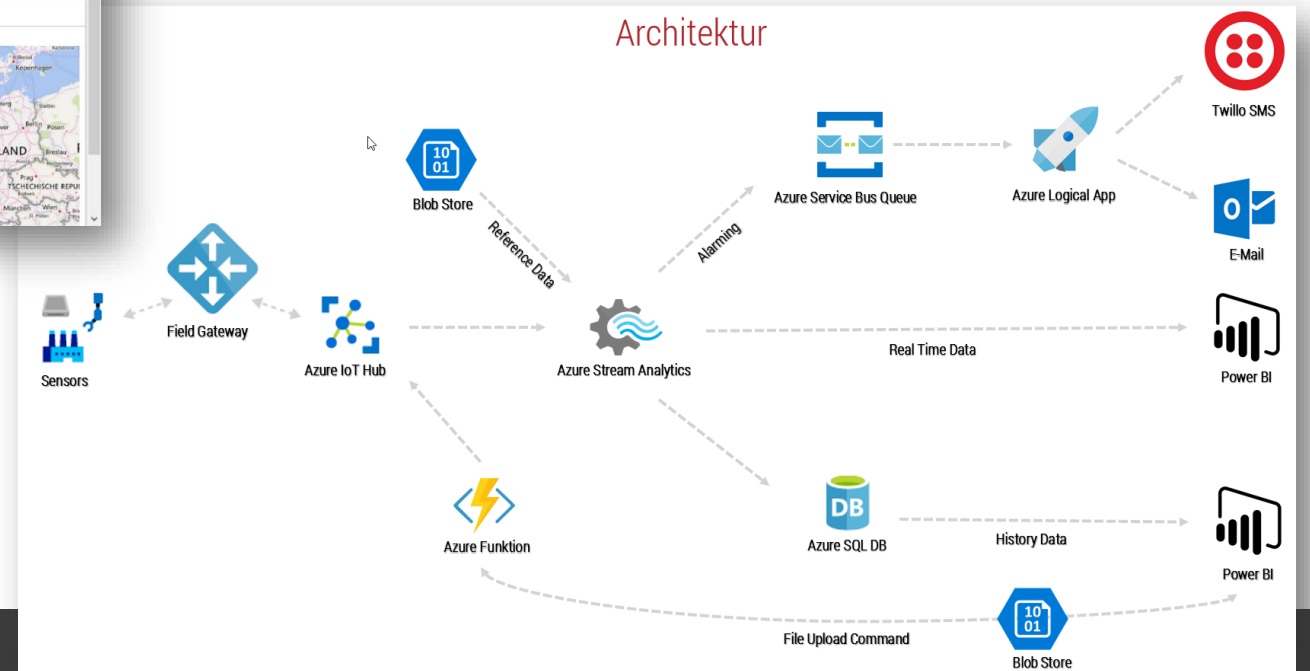
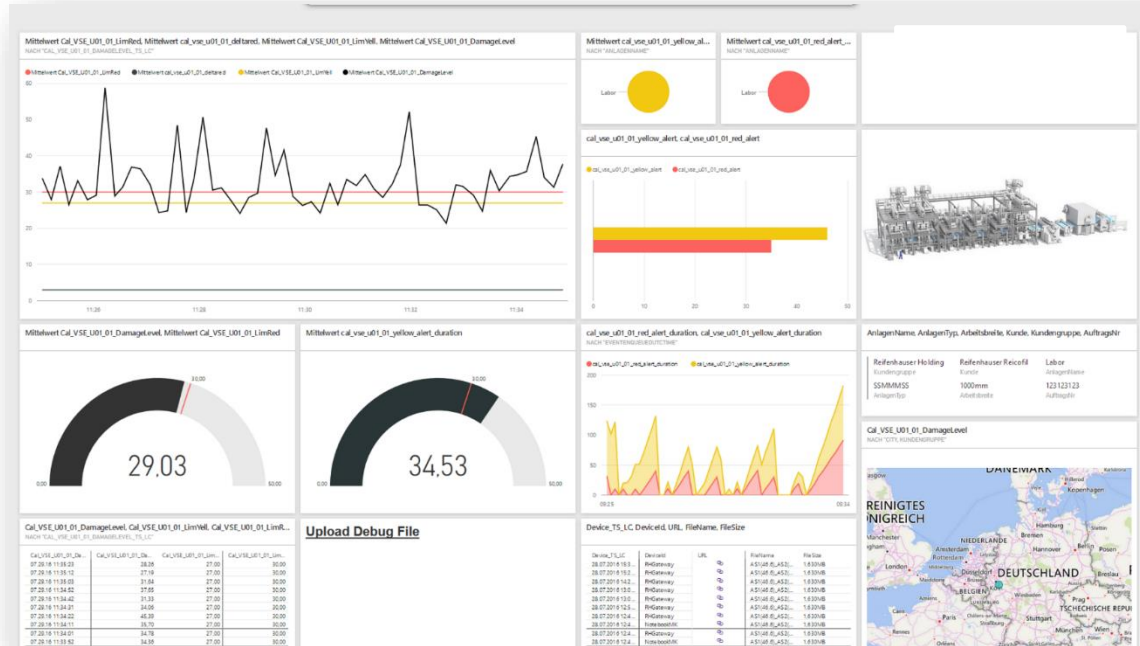
**4. Enterprise integration**  
Networked information exchange

6



**6. Intelligent production**  
Self-optimizing systems

# 1. InnovationLab Ergebnis für Kunde Anlagenbauer: (Start Small)





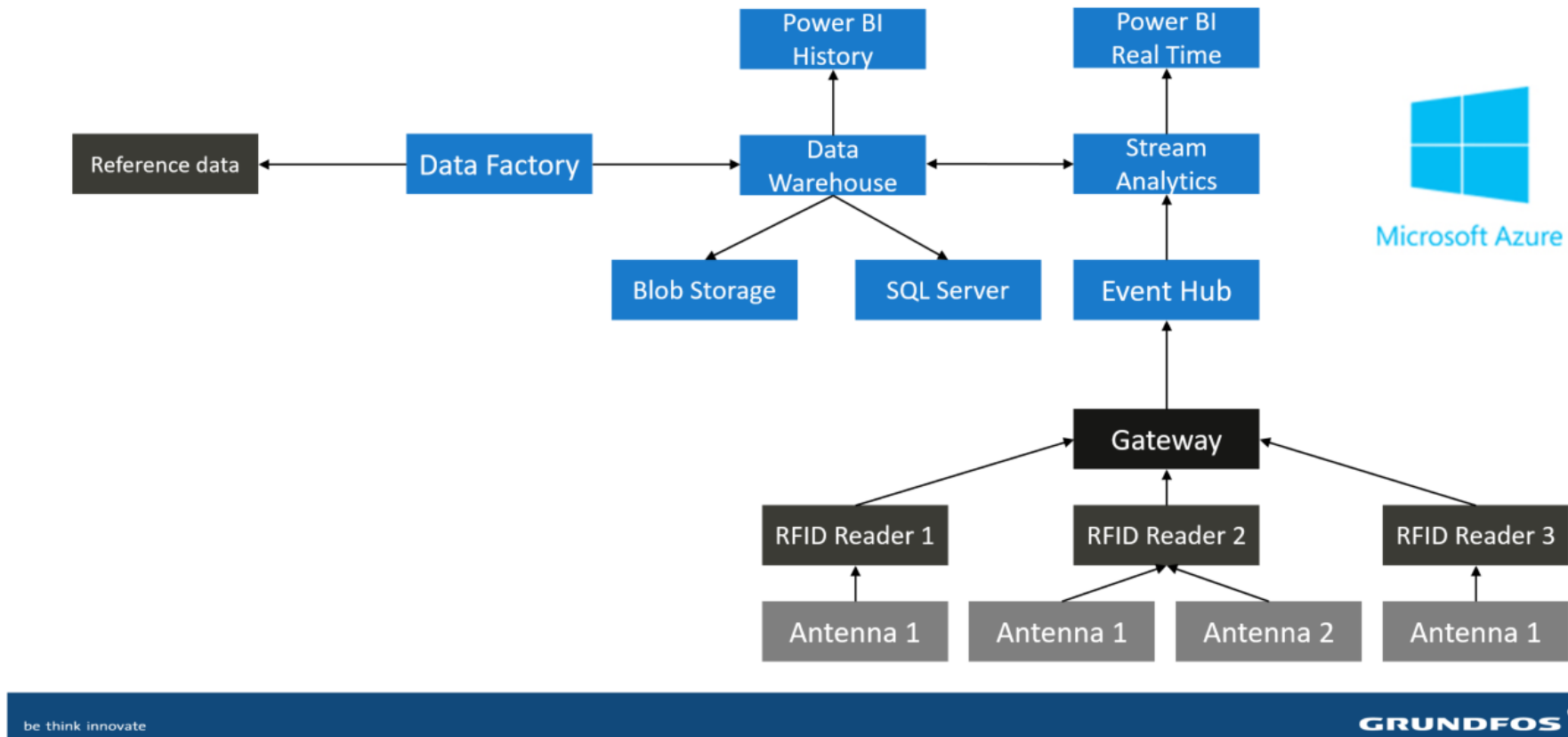
- DWH and Microsoft BI
- Consolidation of DWH and Big Data as one team since summer 2016
- Big Data Use Cases
  - Material used list in SAP with Hadoop
  - Hybrid Hadoop: OnPrem Hortonworks & Azure Managed Service HDInsight
  - Sensor data analytics
  - Predictive Alarming / Maintenance -> IoT scenario
  - AtScale (BI) on Hadoop



- Big IoT Cases in Danmark
- Use Case „Optimizing the production line of a customer individual product“
  - Control & monitoring manufacturing line
  - Realtime Dashboard for workers
  - Proactive status information for customer
- RFID technology

# Grundfos optimizes Assembly of Pumps with RFID and Azure IoT Suite

## Digitalization

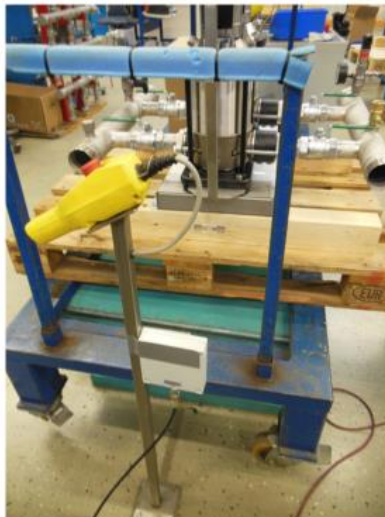


# Grundfos optimizes Assembly of Pumps with RFID and Azure IoT Suite

## Starting small, winning big

### Innovation Lab

- Test idea in real environment



# Grundfos optimizes Assembly of Pumps with RFID and Azure IoT Suite

## Starting small, winning big

Installation Phase  
- Digitalize Workplaces



be think innovate

GRUNDFOS

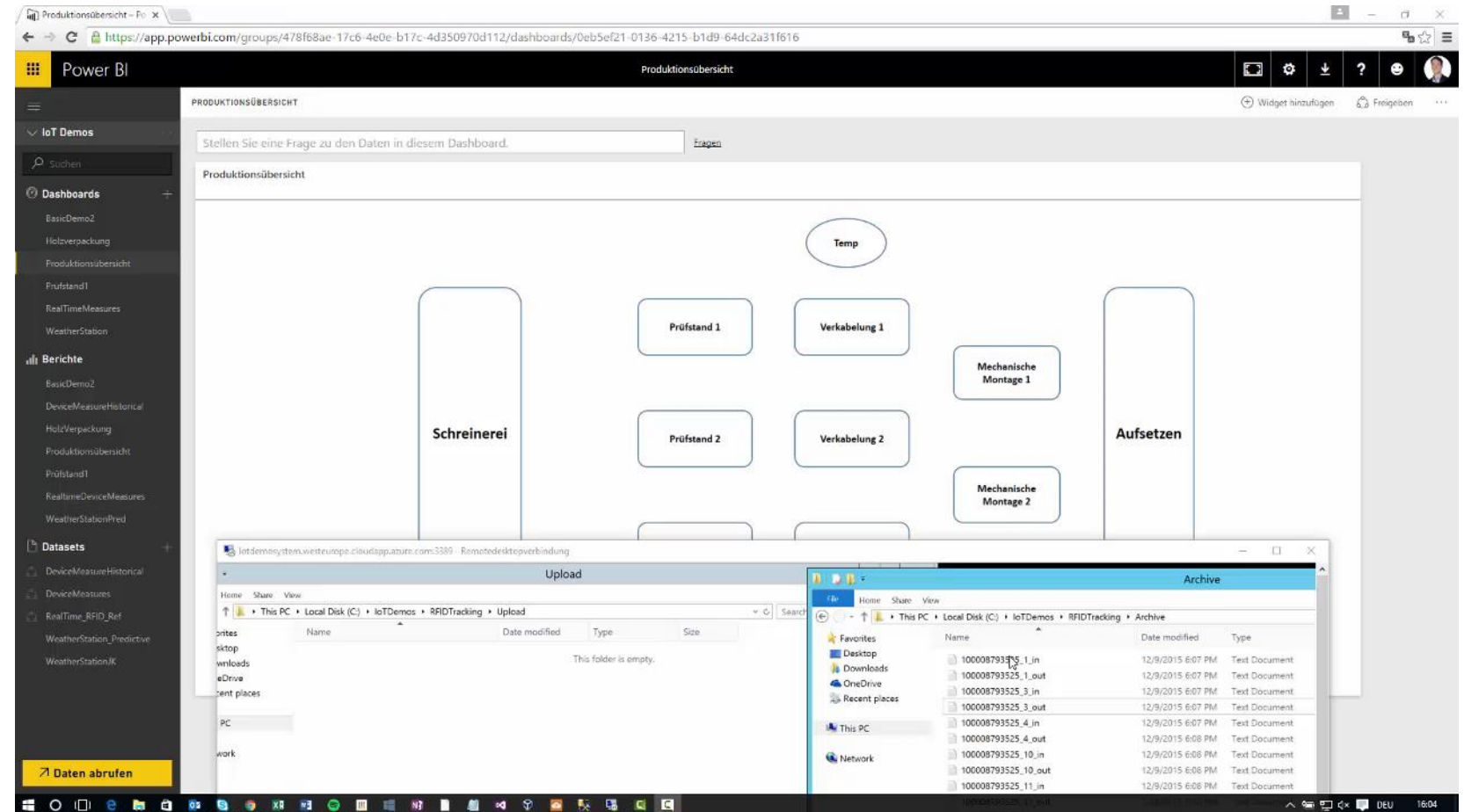
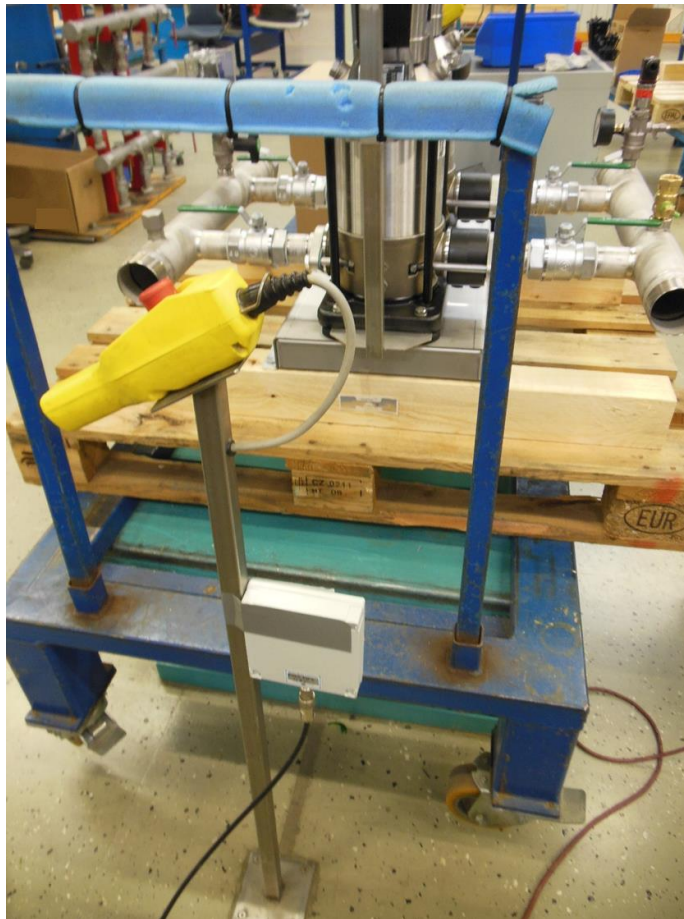
# Grundfos optimizes Assembly of Pumps with RFID and Azure IoT Suite

## Starting small, winning big

- Process 



# Grundfos solution (after 1st Innovation Lab)



# Grundfos optimizes Assembly of Pumps with RFID and Azure IoT Suite

## Starting small, winning big

Understand and Learn

- Improve setup and understand data



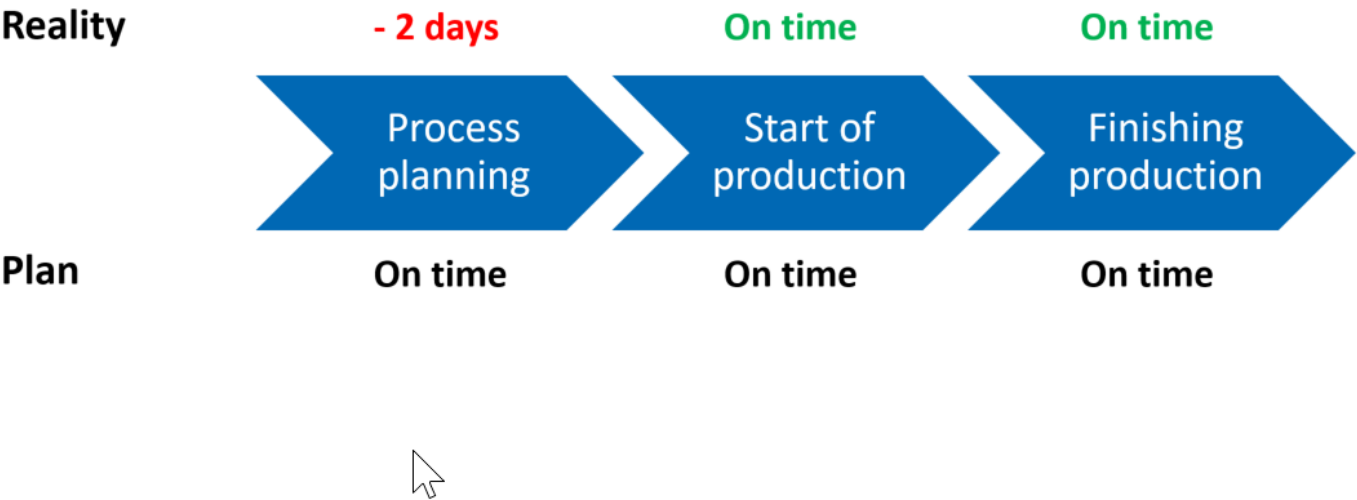
be think innovate

GRUNDFOS

# Grundfos optimizes Assembly of Pumps with RFID and Azure IoT Suite



## Current State order flow



# Innovieren – Think Big, Start Small (Fail Fast)

- **Think Big**
- **Start Small**
- **Discover Visual**
- **Scale Fast**



Go try

Microsoft Azure kostenlos testen:

<http://azure.microsoft.com/de-de/pricing/free-trial/>

AzureML:

<http://azure.microsoft.com/en-us/services/machine-learning/>

Azure Preisrechner:

<https://azure.microsoft.com/de-de/pricing/calculator/>

ORAYLIS Blog: Jens Kröhnert: Data Scientist & Predictive BI

<http://blog.oraylis.de/2014/11/innovation-lab-data-scientist-predictive-bi/>

Download Power BI Designer (kostenlos):

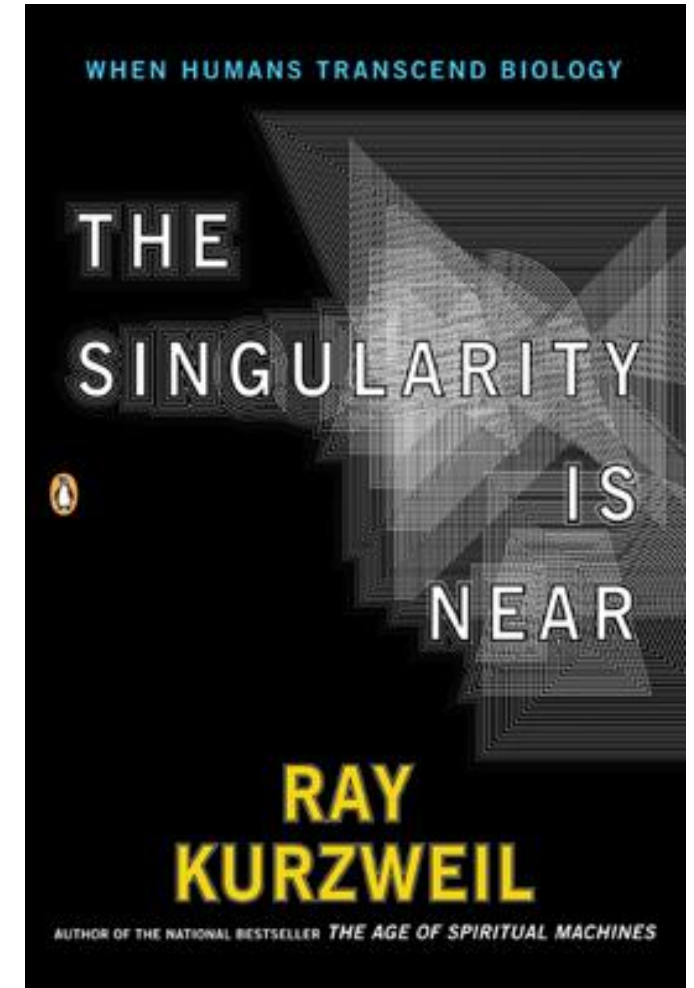
<https://www.powerbi.com/dashboards/downloads/>

ORAYLIS TV: Jens Kröhnert: Power BI Serie

<https://www.youtube.com/user/oraylisbi>

„Mit Lambda zum intelligenten Unternehmen“ – Jens Kröhnert im BI-Spectrum 2016/02

<https://goo.gl/vgLvA6>





# ORAYLIS Guide

- Reichhaltiges Angebot
  - Workshops
  - Campus Trainings
  - Innovation Labs
- Webseite: <https://www.oraylis.de/guide>
- Kontakt:  
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Inside Sales  
[c.laatsch@oraylis.de](mailto:c.laatsch@oraylis.de)  
Tel.: +49 211 179456-123

