



# IoT and Azure

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Platform Services

Security & Management

- Portal
- Active Directory
- Multi-Factor Authentication
- Automation
- Key Vault
- Store / Marketplace
- VM Image Gallery & VM Depot

Compute

- Cloud Services
- Service Fabric
- Batch
- Remote App

Web and Mobile

- Web Apps
- API Apps
- API Management
- Mobile Apps
- Logic Apps
- Notification Hubs

Developer Services

- Visual Studio
- Azure SDK
- Team Project
- Application Insights

Hybrid Operations

- Azure AD Connect Health
- AD Privileged Identity Management
- Backup
- Operational Insights
- Import/Export
- Site Recovery
- StorSimple

Integration

- Storage Queues
- Biztalk Services
- Hybrid Connections
- Service Bus

Analytics & IoT

- HDInsight
- Machine Learning
- Data Factory
- IoT and Event Hubs
- Stream Analytics
- Mobile Engagement

Data

- SQL Database
- SQL Data Warehouse
- Redis Cache
- Search
- DocumentDB
- Tables

Media & CDN

- Media Services
- Content Delivery Network (CDN)

Infrastructure Services

Compute

- Virtual Machines
- Containers

Storage

- BLOB Storage
- Azure Files
- Premium Storage

Networking

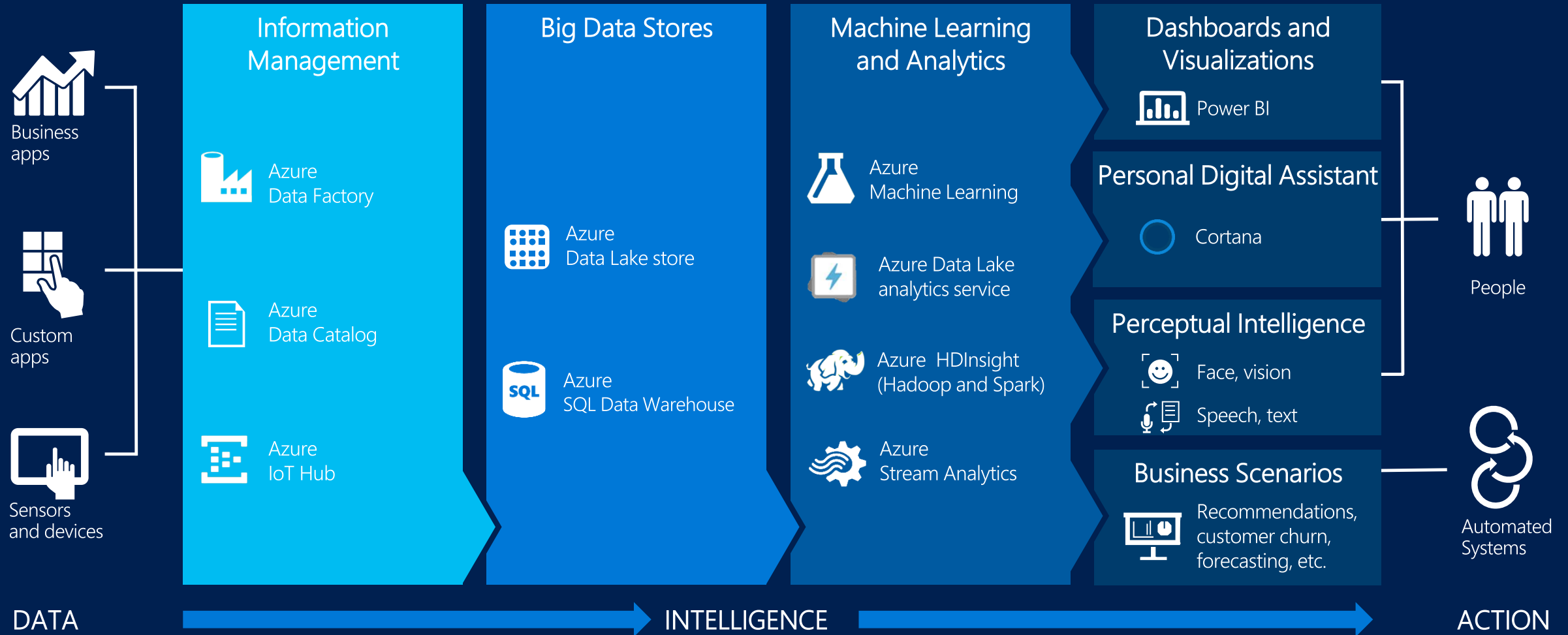
- Virtual Network
- Load Balancer
- DNS
- Express Route
- Traffic Manager
- VPN Gateway
- Application Gateway

Datacenter Infrastructure (24 Regions, 19 Online)



# Analytics and IoT

## Transform data into intelligent action



# Azure IoT Suite Scenarios

## Solution types



### Predictive maintenance

Anticipate maintenance needs and avoid unscheduled downtime by connecting and monitoring your devices for predictive maintenance.



### Remote monitoring

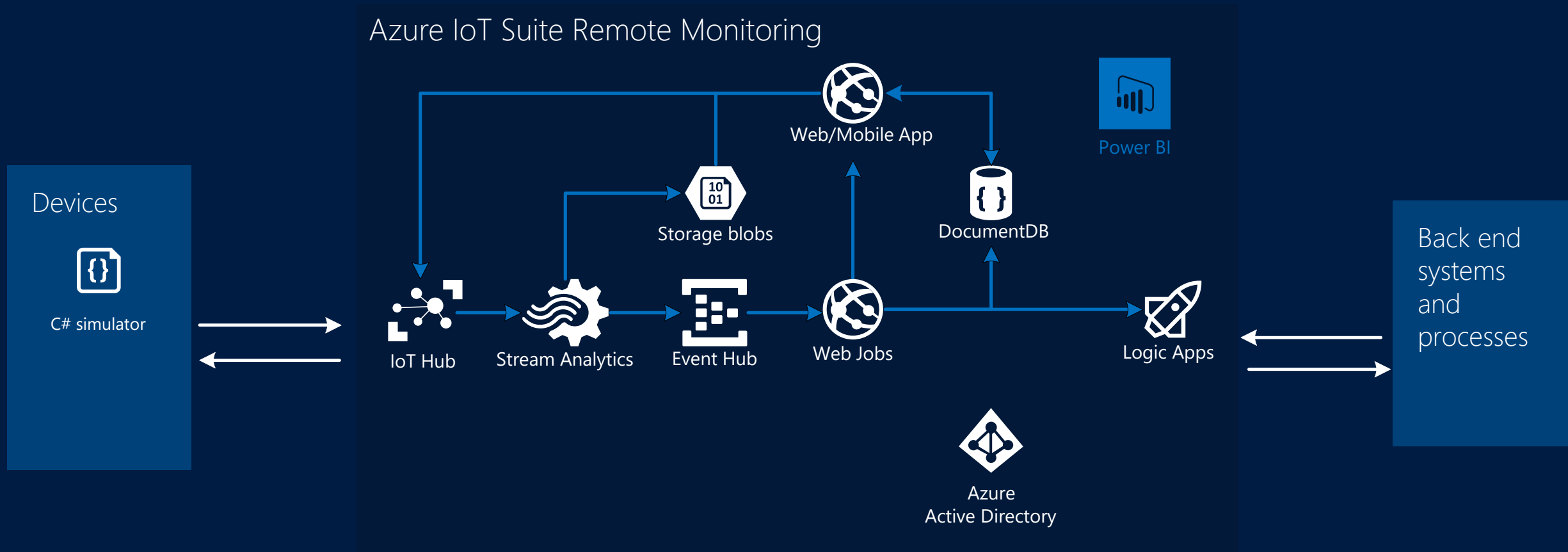
Connect and monitor your devices to analyze untapped data and improve business outcomes by automating processes.

<http://www.microsoftazureiotsuite.com/demos/predictivemaintenance>

<http://www.microsoftazureiotsuite.com/demos/remotemonitoring>

<https://www.AzureIoTsuite.com/>

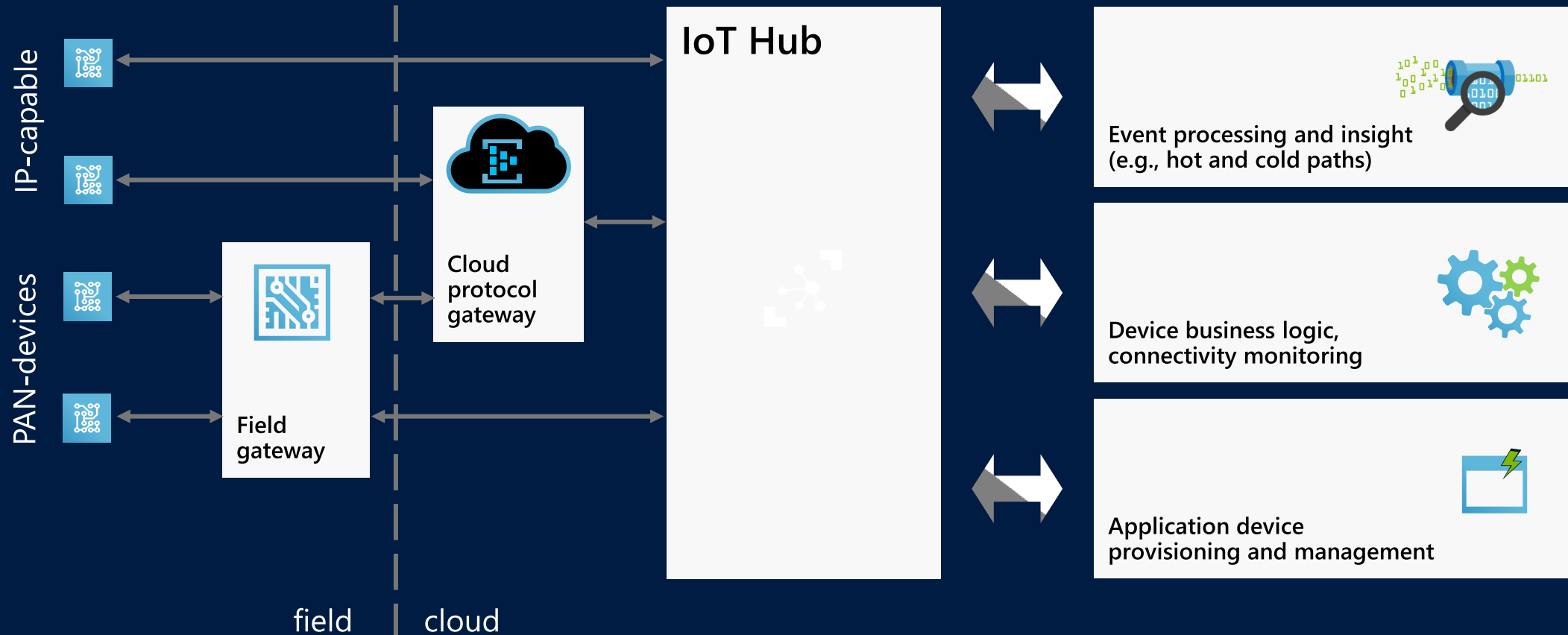
# What you get with remote monitoring preconfigured solution



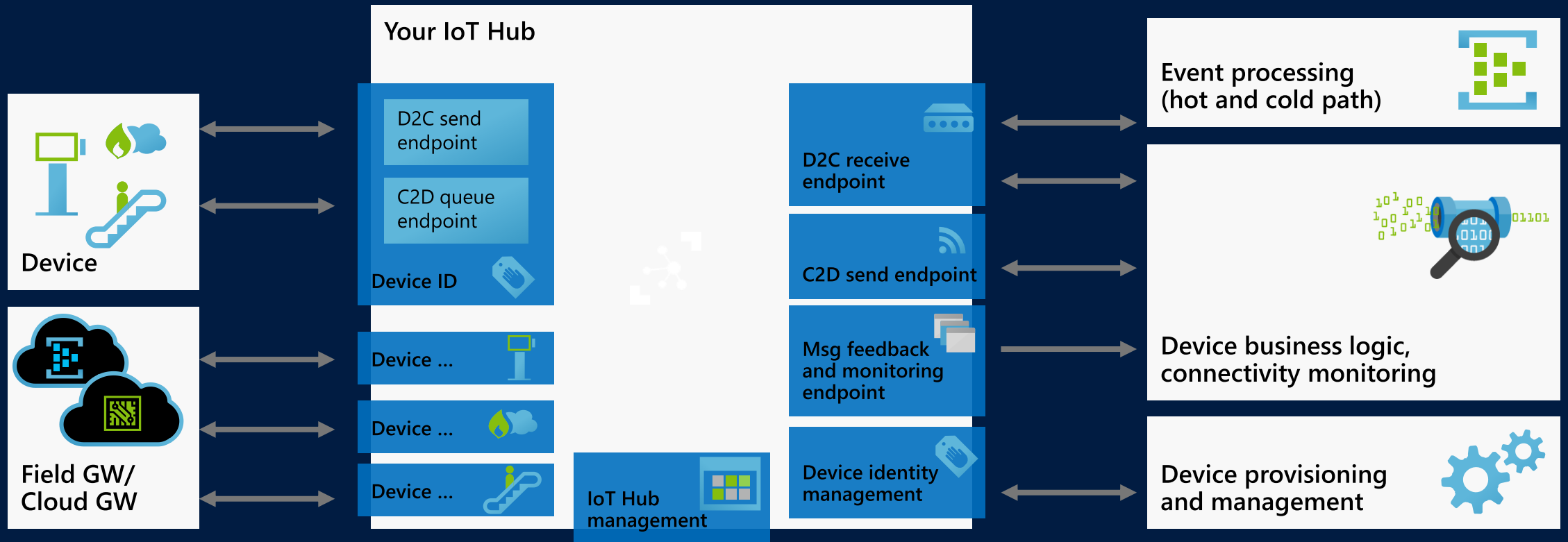
Connect & Control  
Azure IoT Hub



# Connect your devices to Azure



# IoT Hub endpoints





# Azure IoT Hub

## Designed for IoT

Connect up to 10 million devices

## Service assisted communications

Secure bi-directional communication

Command and control

## Cloud-scale messaging

Device-to-cloud and Cloud-to-device

Durable messages (at least once semantics)

## Cloud-facing telemetry ingestion

Delivery receipts, expired messages

Device communication errors

## Per-device authentication

Individual device identities and credentials

## Connection multiplexing

Single device-cloud connection for all communications (C2D, D2C)

## Multi-protocol support

Natively supports AMQP, HTTP

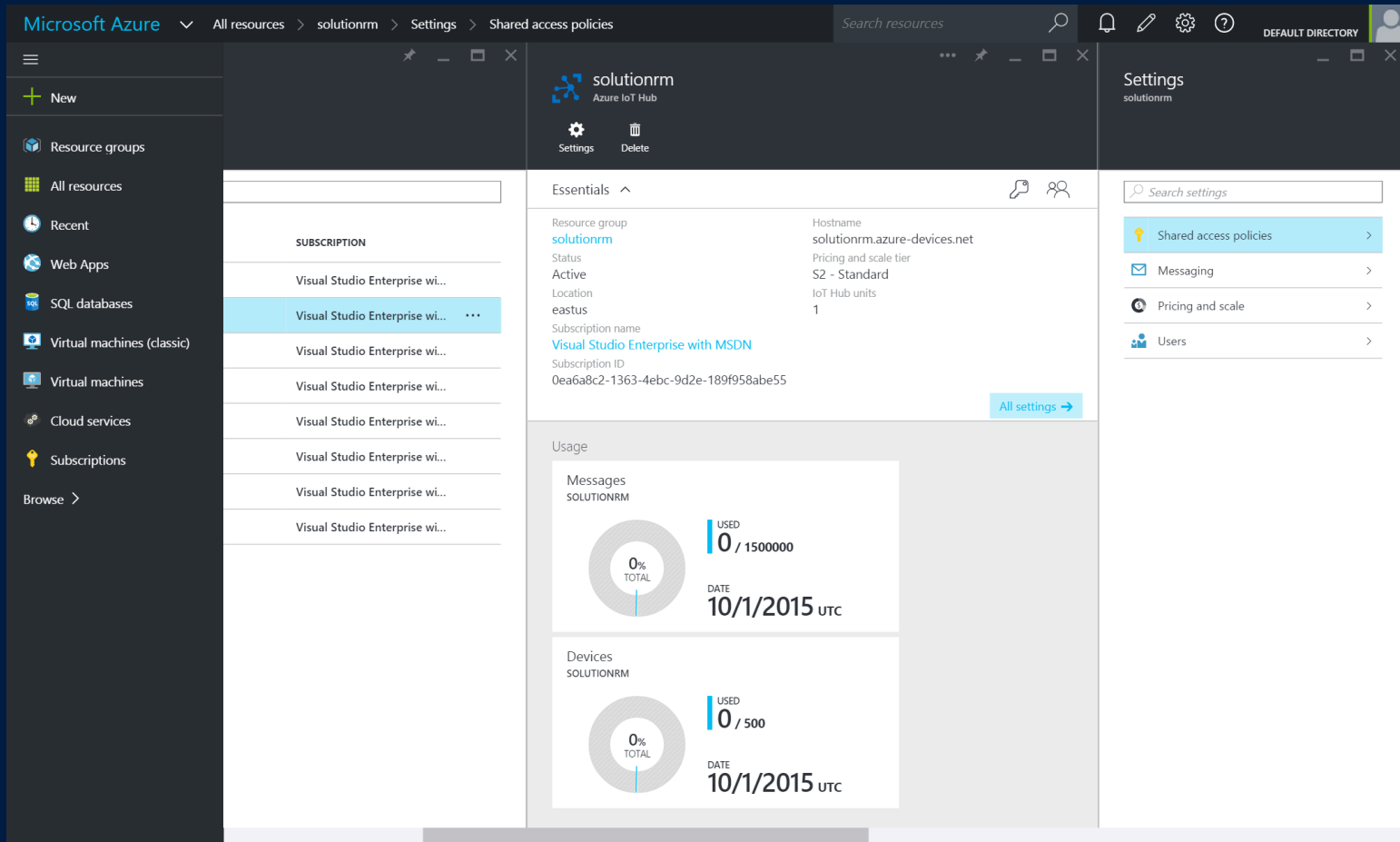
Designed for extensibility to custom protocols

## Multi-platform

Device SDKs available for multiple platforms (e.g. RTOS, Linux, Windows)

Multi-platform Service SDK.

# Manage IoT Hub in Azure portal



# Simple navigation

## Management of devices, volume and scaling made easy through the IoT Hub settings in the Azure Management Portal

Event Processing  
Azure Stream  
Analytics



# Real time event processing

## Uncover real time insights

Perform real time analytics across multiple streams

## Rapid Deployment

Use simple SQL syntax, auto distributed for scale

## Mission critical reliability

Fully managed, low latency, high throughput

## Create real time alerts

Flag alerts and alarms for attention

## High volume

Analyze millions of data points per second

## Highly scalable

Enterprise grade, predictable solution.

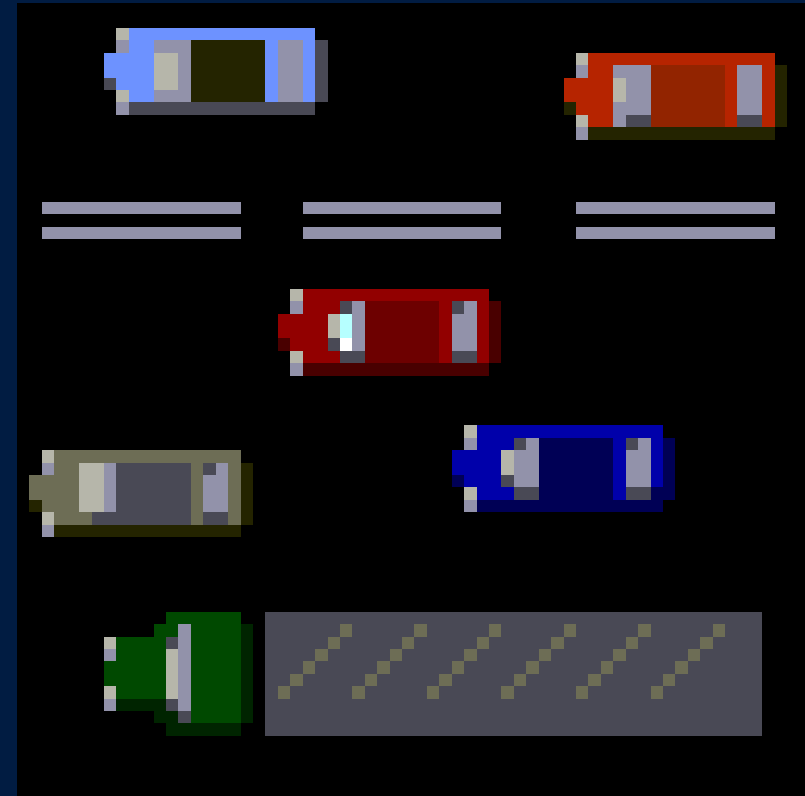


# Working with Streaming Data

## Data at Rest

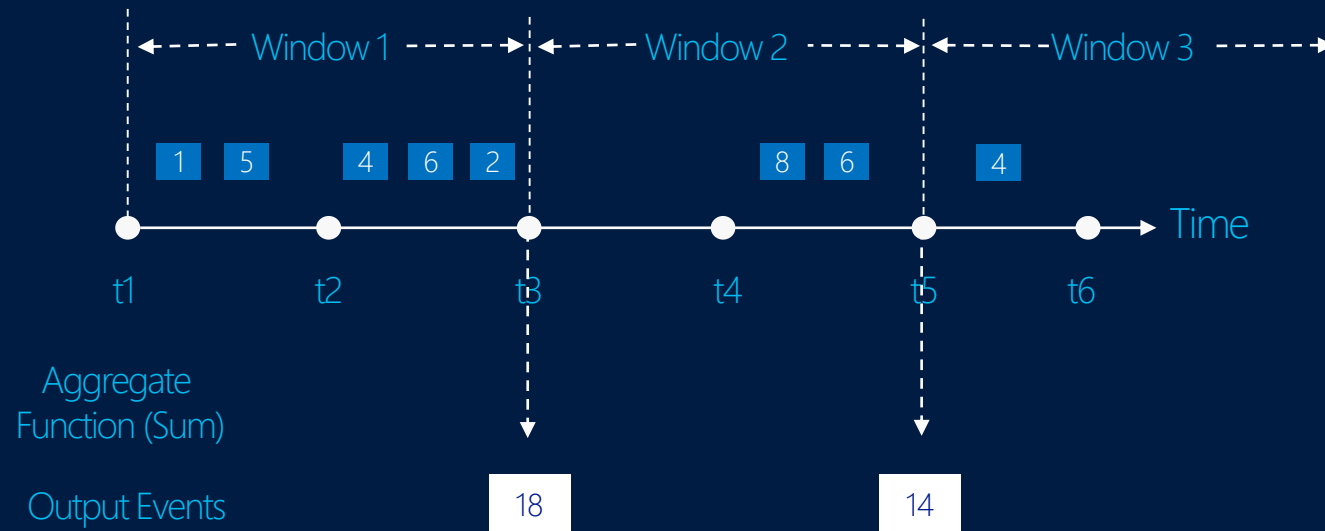


## Data in Motion



# Windowing Concepts

- Windows can be **tumbling**, **hopping**, or **sliding**
- Windows are fixed length
- Must be used in a **GROUP BY** clause



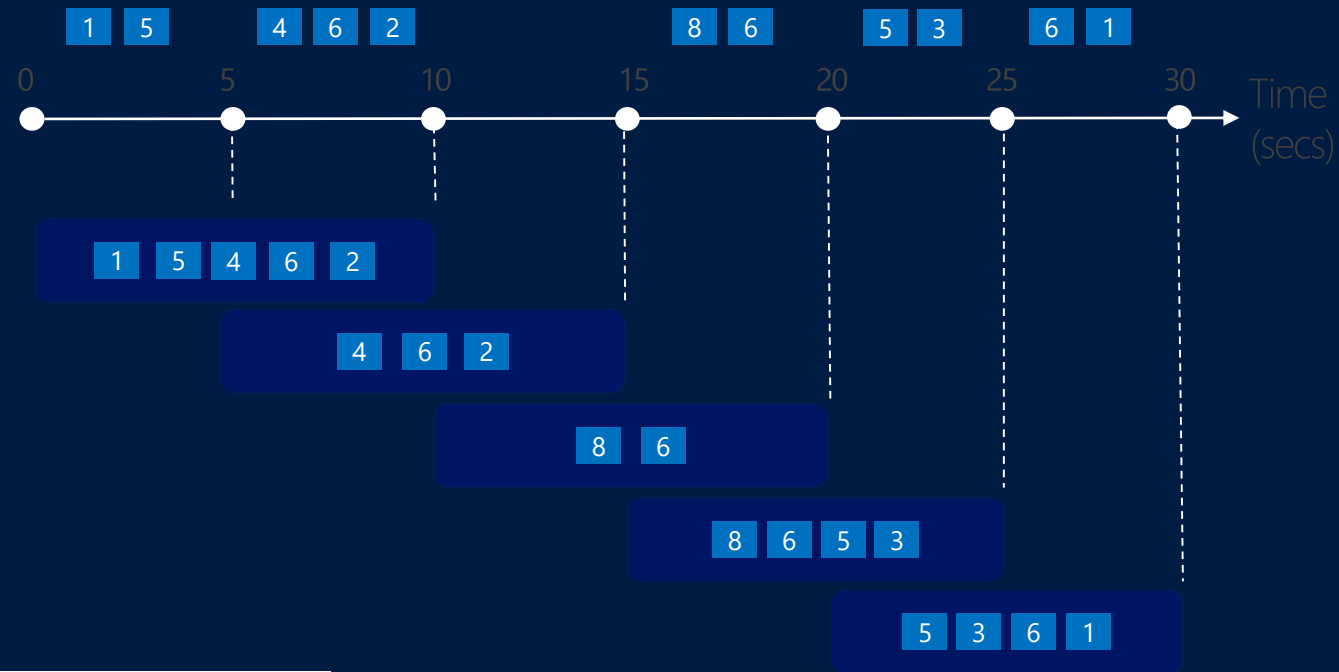
- Output event will have the timestamp of the end of the window

# Hopping Windows

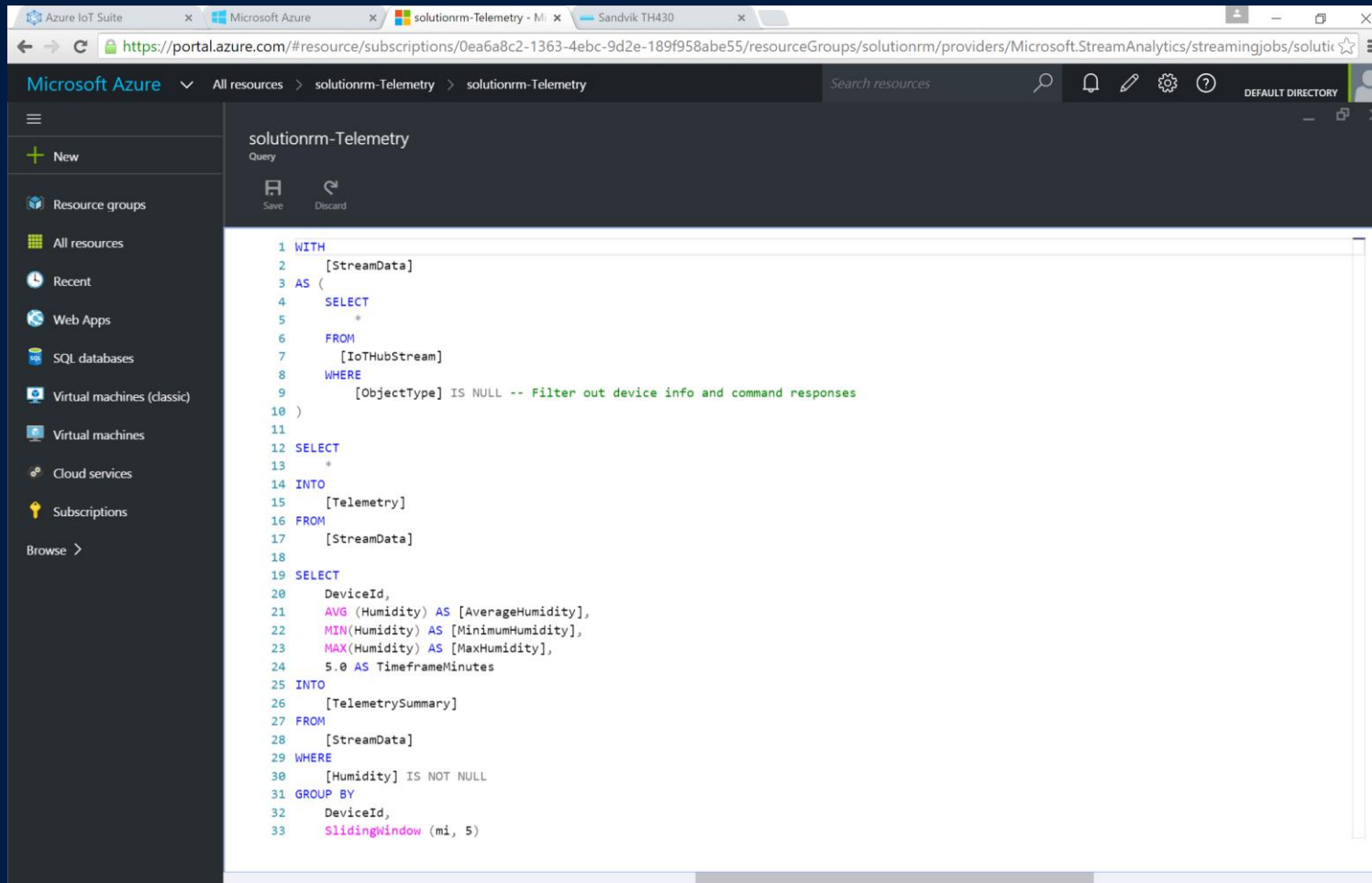
*"Every 5 seconds give me the count of tweets over the last 10 seconds"*

```
SELECT Topic, Count(*) AS TotalTweets
FROM TwitterStream
TIMESTAMP BY CreatedAt
GROUP BY Topic, HoppingWindow(second, 10, 5)
```

A 10-second Hopping Window with a 5-second "Hop"



# Add or edit jobs using simple ASA interface



Rule based interface

Simple implementation and rule development using ASA UI.

Multi-channel

Analyze multiple channels of information simultaneously, in real time.



# Data Visualization Power BI



# Data visualization with PowerBI

## Highly accessible analytics

Cloud based dashboard and analytics tool,

## 360° view of business KPI's

Customize dashboards to address concerns and performance metrics.

## Cross platform support

View data via web platform, on any device

## Pre-built dashboards

Utilize standard dashboards for rapid deployment, based on popular solution demands.

## Real time capabilities

Ingest, analyze and display data as it happens

## Secure access

Secure, live communication with data source

## Query data







Intuitive, natural language query tool

## Integrated systems







Integrate with other business systems and enrich device data with intelligence from other business systems, eg: CRM, ERP

# Power BI Overview

## Data sources

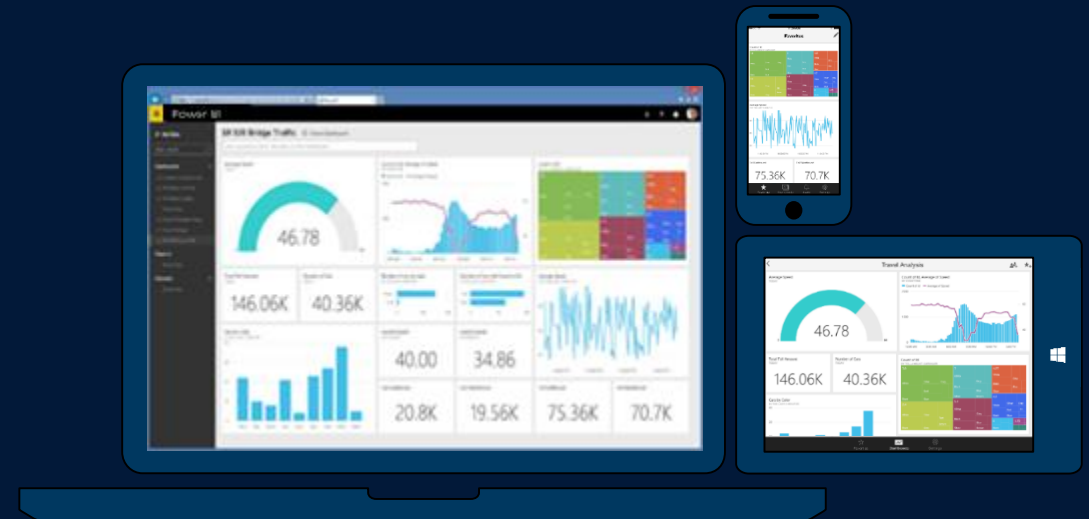
-  SaaS solutions  
*e.g. Marketo, Salesforce, GitHub, Google analytics*
-  On-premises data  
*e.g. Analysis Services*
-  Organizational content packs  
*Corporate data sources or external data services*
-  Azure services  
*Azure SQL, Stream Analytics...*
-  Excel files  
*Workbook data / data models*
-  Power BI Desktop files  
*Data from files, databases, Azure, and other sources*

## Power BI service

-  Content packs
-  Live dashboards
-  Visualizations
-  Reports
-  Datasets
-  Data refresh

 Natural language query

 Sharing & collaboration



# Data visualization with PowerBI

Rich visuals

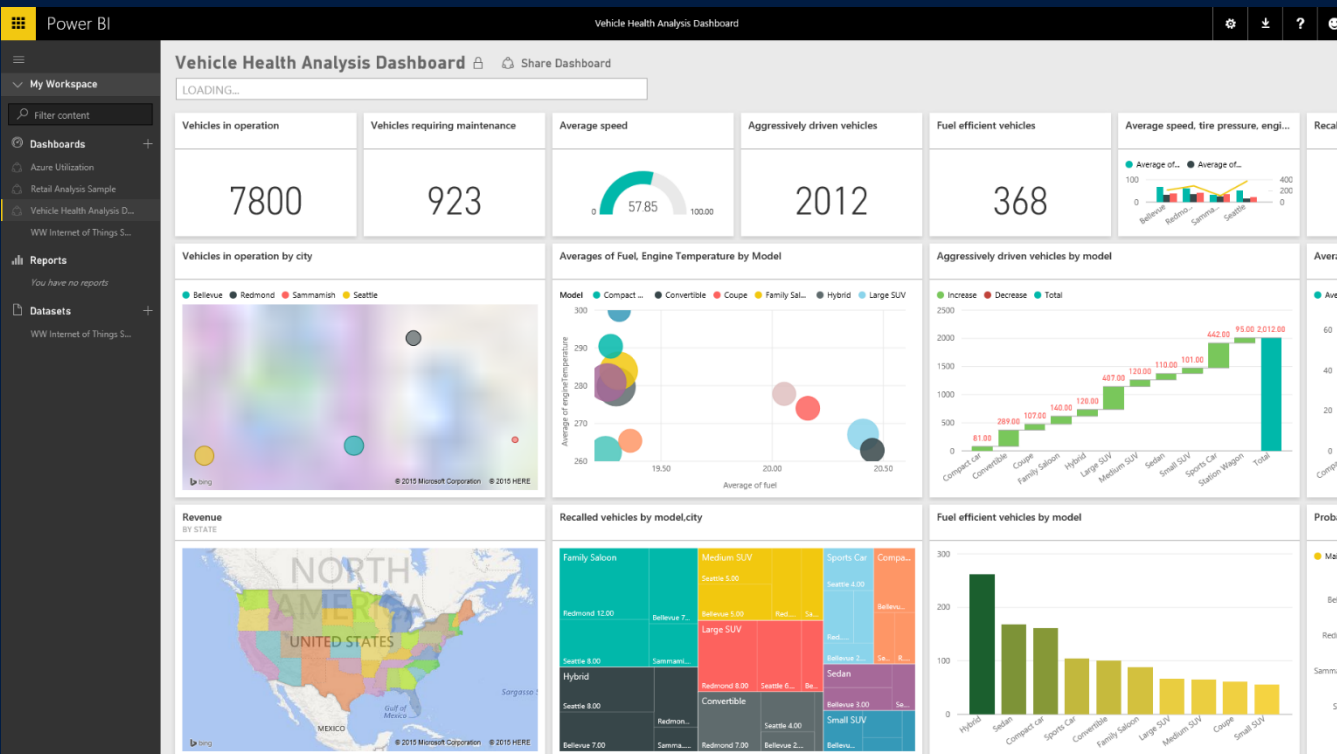
Standard and custom graphing options

Custom dashboards

Build heat maps and visually track data

External data

Integrate external data feeds to add value to device data, or pull in external information such as weather or market information.





# Demo – Band on the Run

<https://github.com/bandontherun>



