

ORACLE®

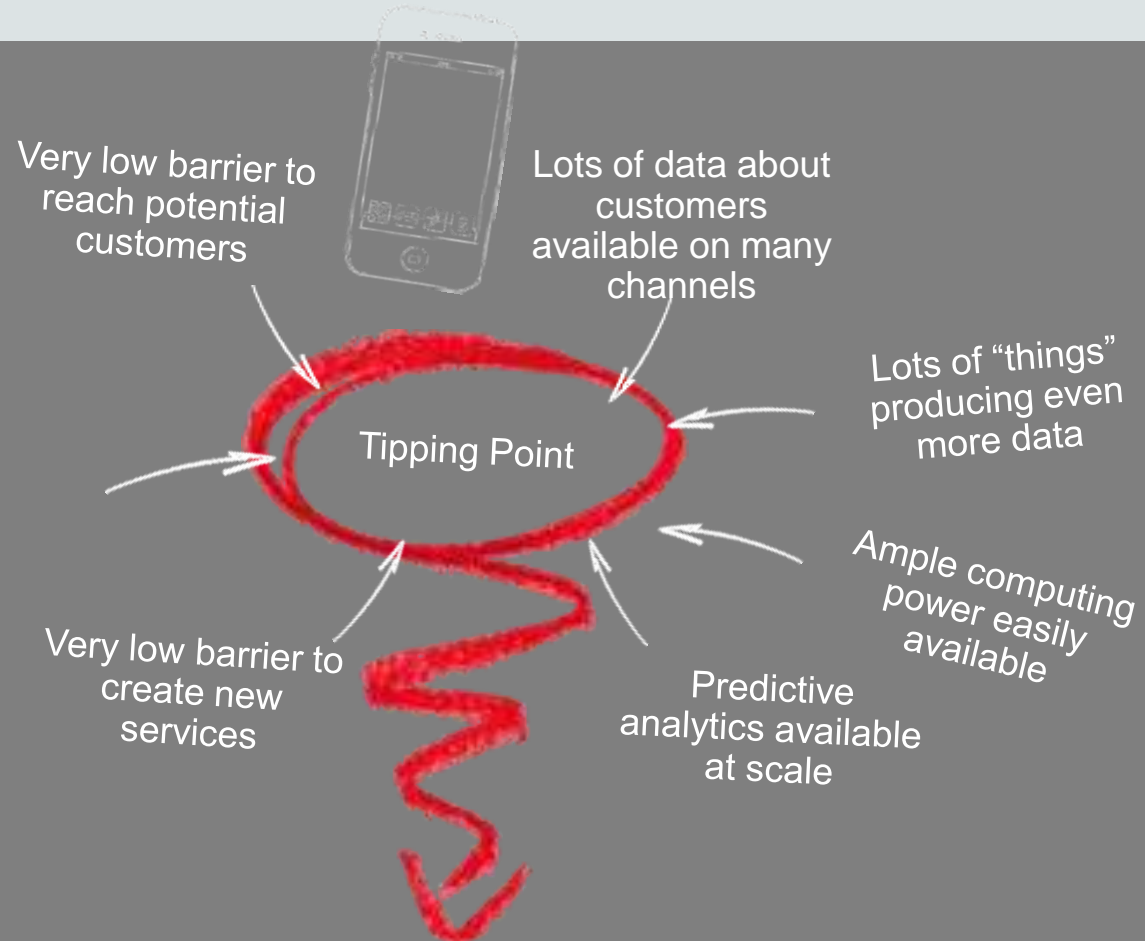
The Internet of Things: smart products and services

Duško Vukmanović,
Master Principal Sales Consultant FMW
Oracle Corporation

Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Industries are being disrupted



Cost and Time-to-Market for new Services

Scale of addressable market



New competitors are disrupting traditional companies at a very fast pace

Potential



Internet of Things in 2016

It is estimated that we will have over 6 Billion IoT devices

▶ **Volume**

Including:

Wearables, Smart Homes, Smart Grid, Connected Cars, Oil/Gas pipelines, railroads, Industrial sensors

▶ **Variety**

Streaming real time data, events & logs

▶ **Velocity**

.....to intelligent backend systems.

IoT Trends

Customer Service, IT and Product Development will see the most benefits from IoT

50.1

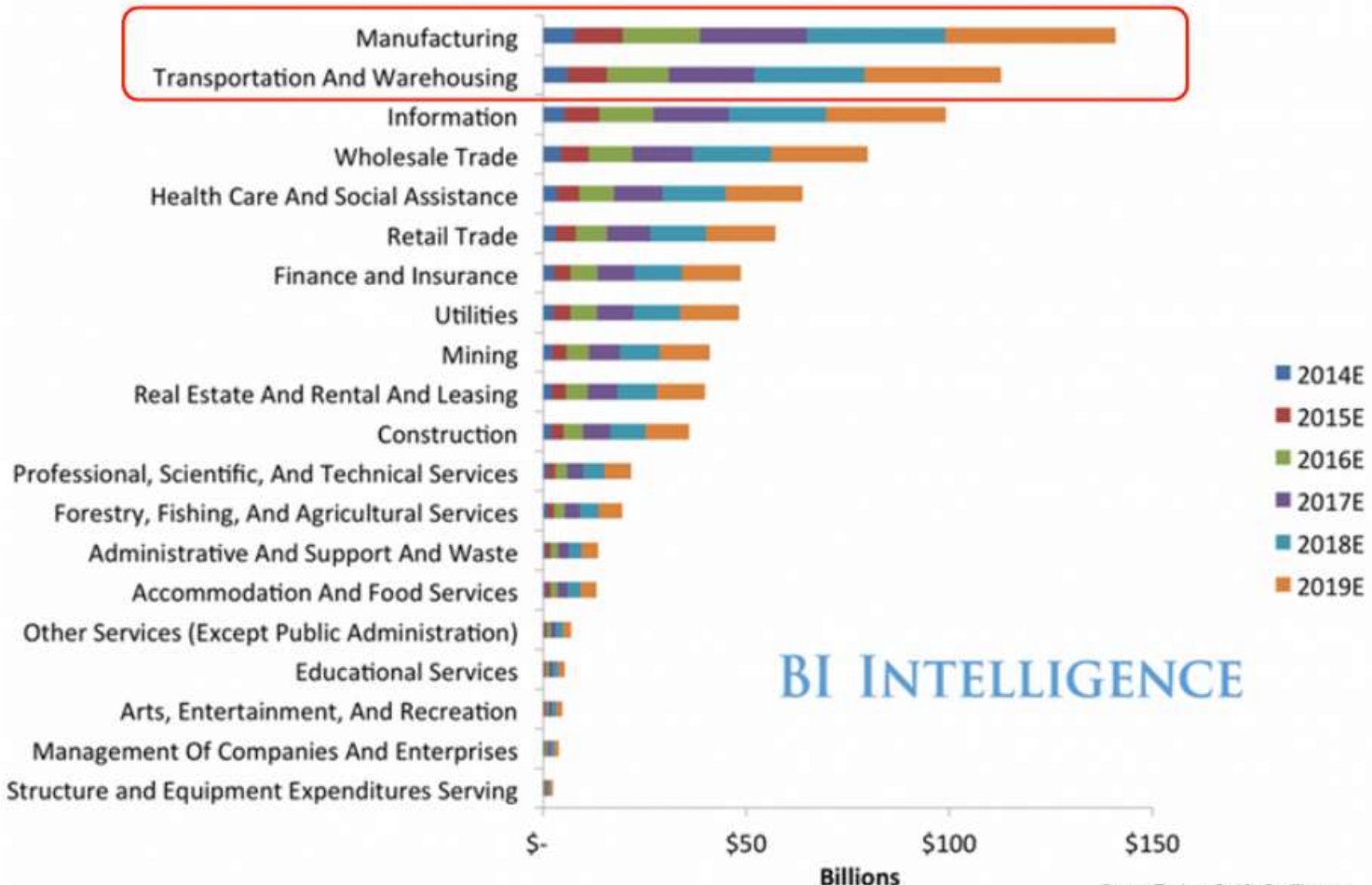
Billions of devices are projected to be **connected by 2020**

1,222

Exabytes of enterprise data was **generated through IoT** in 2014

Source Notes: Deloitte 2016 <http://www2.deloitte.com/content/dam/html/us/analytics-trends/2016-analytics-trends/pdf/analytics-trends.pdf>

Investments in IoT Solutions by Industry



BI INTELLIGENCE

Source: Business Insider Intelligence



IoT and the end of free will

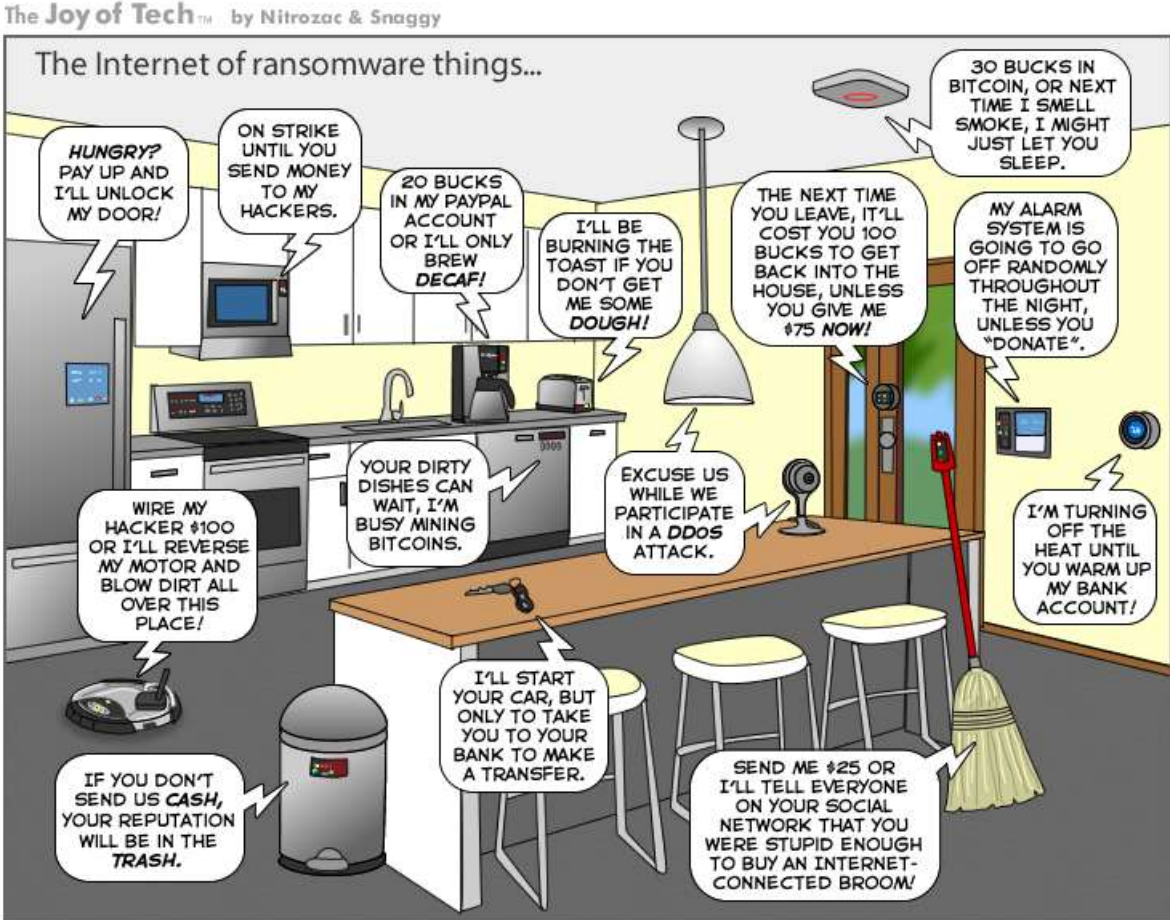
In the age of data, algorithms have the answer



Yuval Noah Harari on big data,
Google and the end of free will
<https://www.ft.com/content/50bb4830-6a4c-11e6-ae5b-a7cc5dd5a28c>

IoT and the end of free will

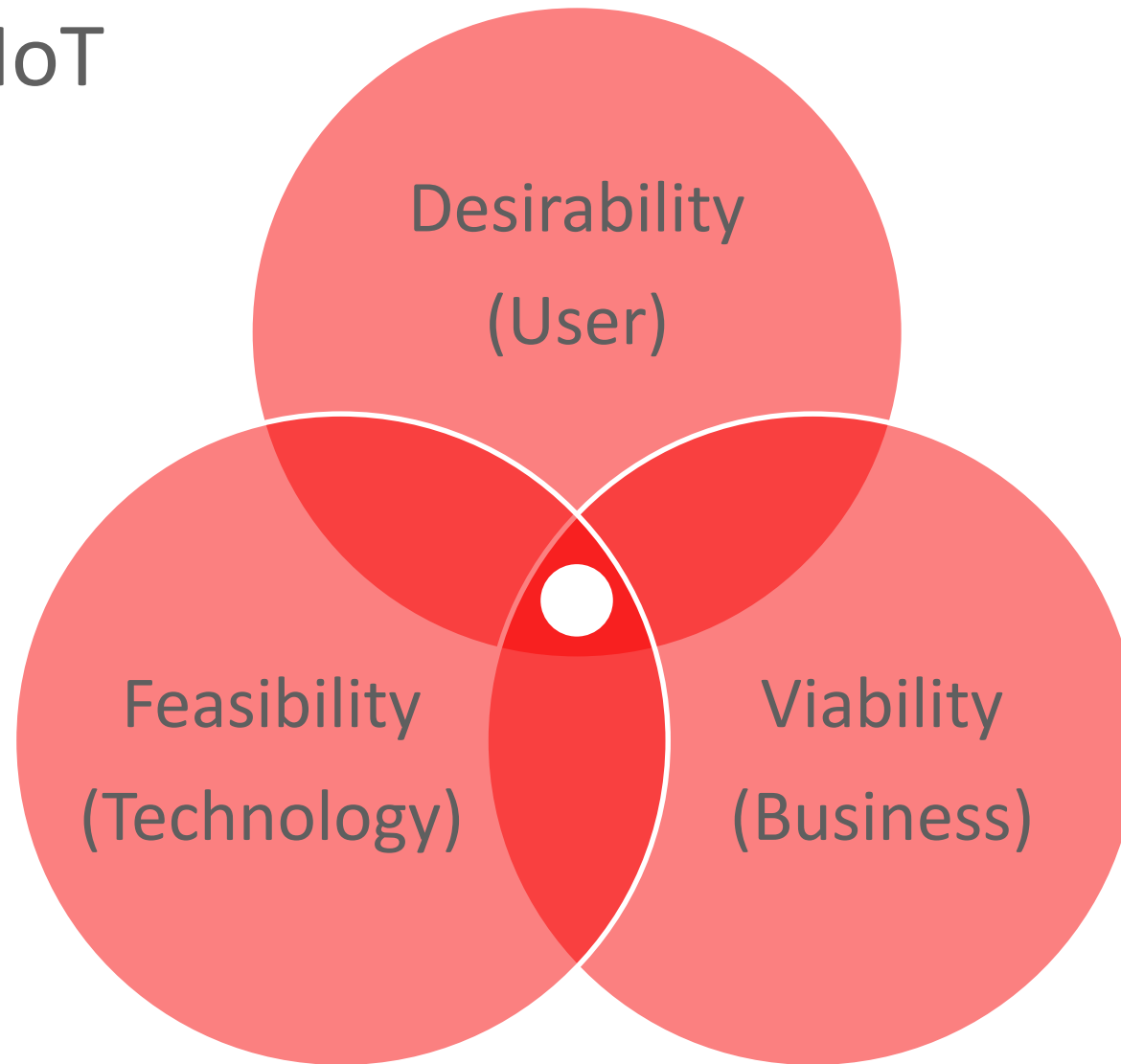
The IoT ransomware





Transformation

Sweet spot of IoT



The Internet of Things Needs Design,
Not Just Technology
Scott A. NelsonPaul Metaxatos
<https://hbr.org/2016/04/the-internet-of-things-needs-design-not-just-technology>

IoT is enabling new business models..



Maintenance

Break / Fix
or Scheduled

Predictive
Prescriptive



Consumption Model

Ownership

As a Service



Business Analytics

Static
Analytics

Real-Time
Big-Data
Analytics



Service

Central
Service

Self-Serve /
Self-Guided
Service

Bosch Rexroth and Oracle

Working together to Deliver Industry 4.0 Solutions



Rexroth
Bosch Group

ORACLE

Opportunity for the IoT Ecosystem



DEVICE OEM



SOLUTION PROVIDER



ISV



SYSTEM INTEGRATOR

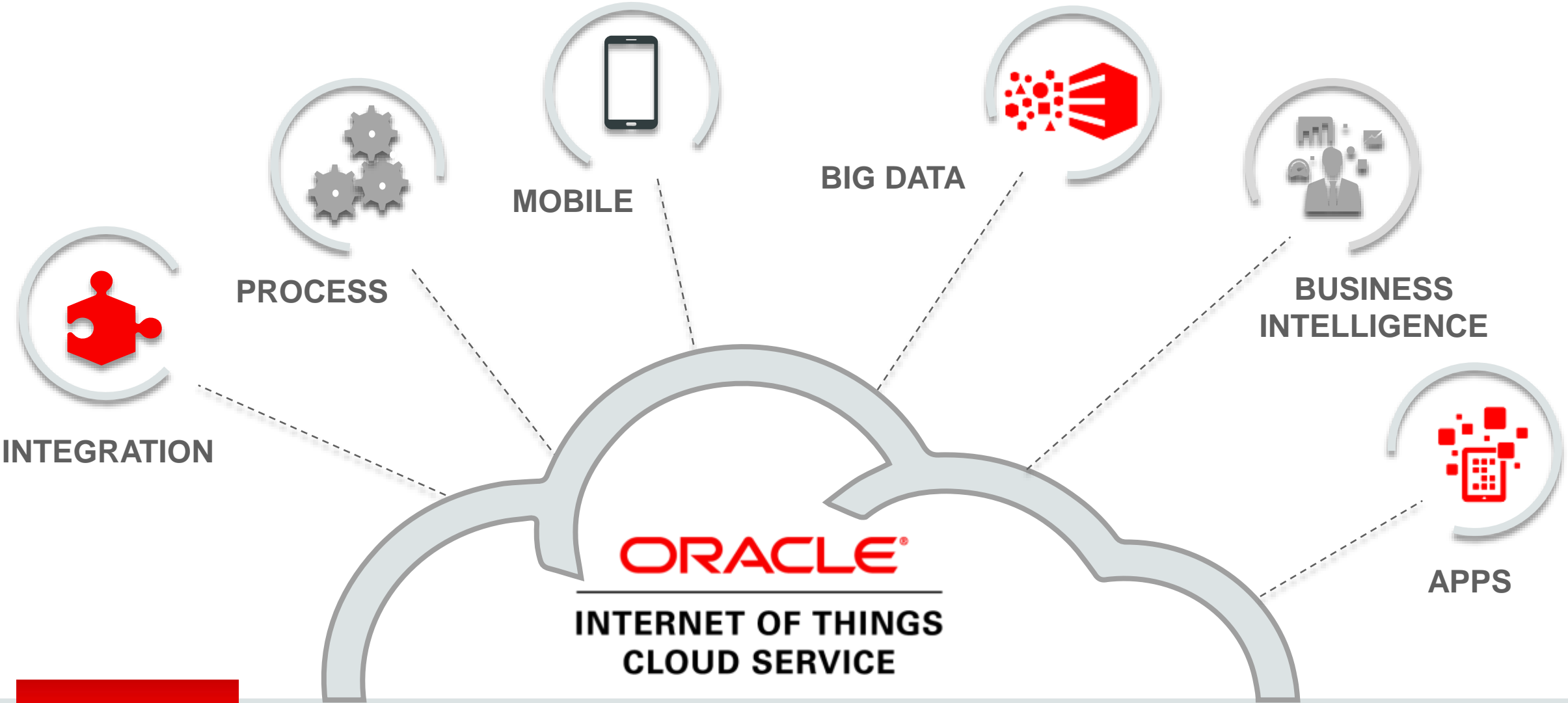


SERVICE PROVIDER



CUSTOMER

Oracle Internet of Things



IoT Fundamentals

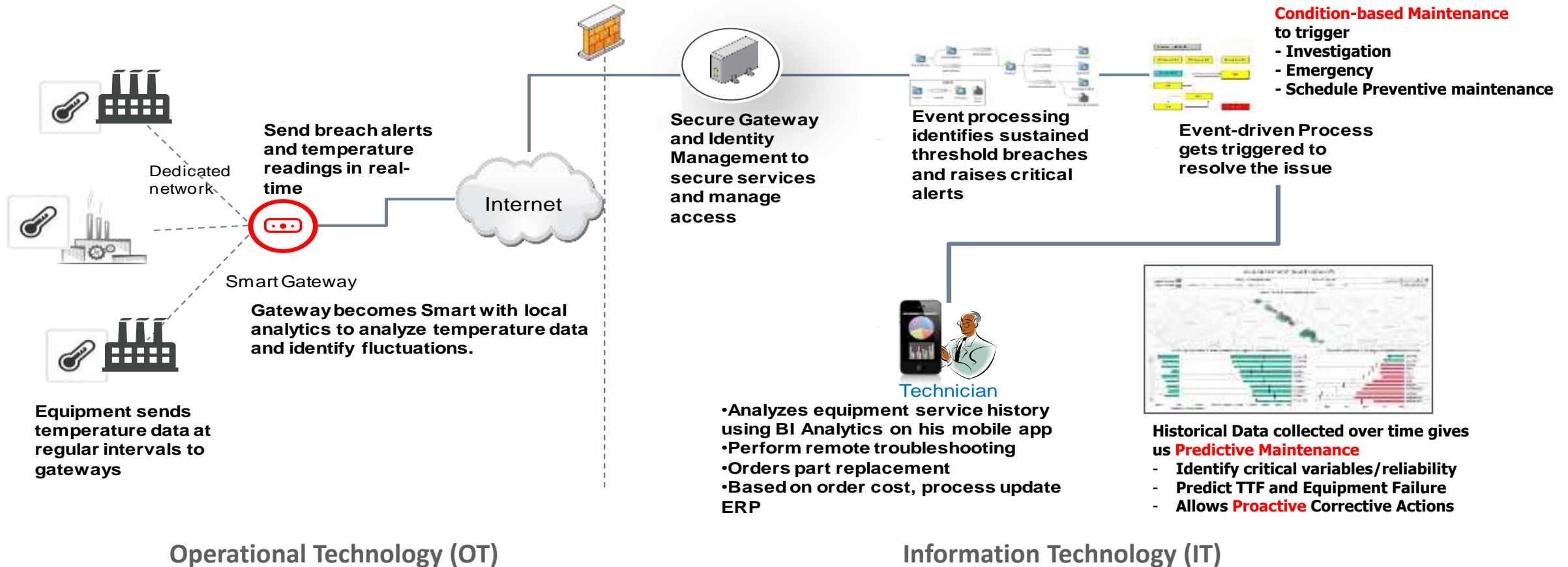
- Secure device connectivity
- Standards
- Reliable messaging
- Dynamic scale
- Time and cost to Proof of Concept

Enabling



Big Picture of an IoT Solution

End to End integration with Maintenance applications



Oracle Internet of Things Cloud Service

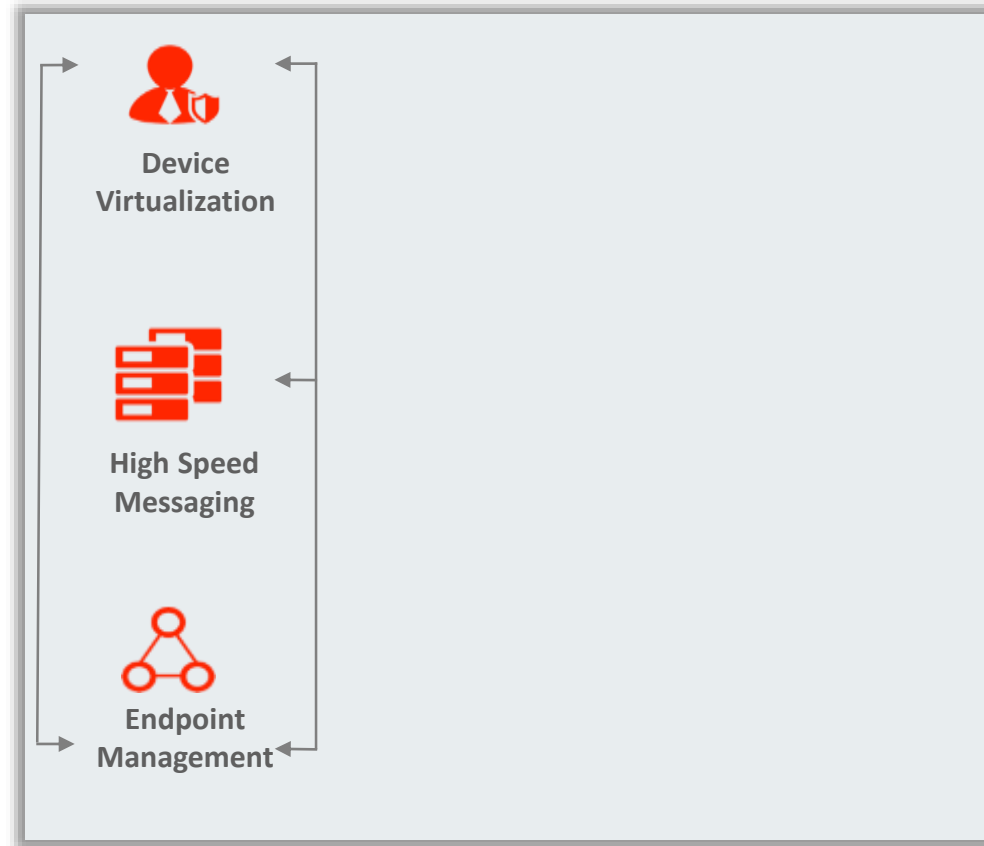
IoT Cloud Service



Connect

**Abstract complexity associated
with device connectivity**

**Standardize integration of devices
with enterprise**



Oracle Internet of Things Cloud Service

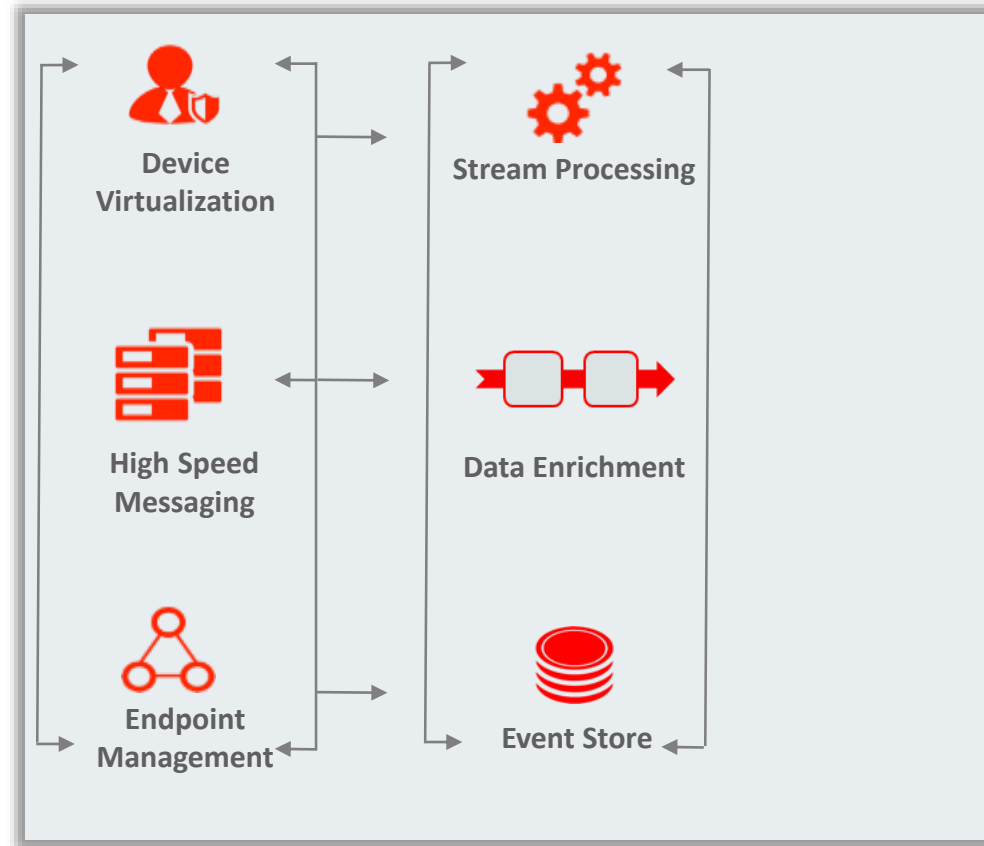
IoT Cloud Service



Analyze

Reduce noise and detect business events at real-time

Enable historical big-data analysis



Oracle Internet of Things Cloud Service

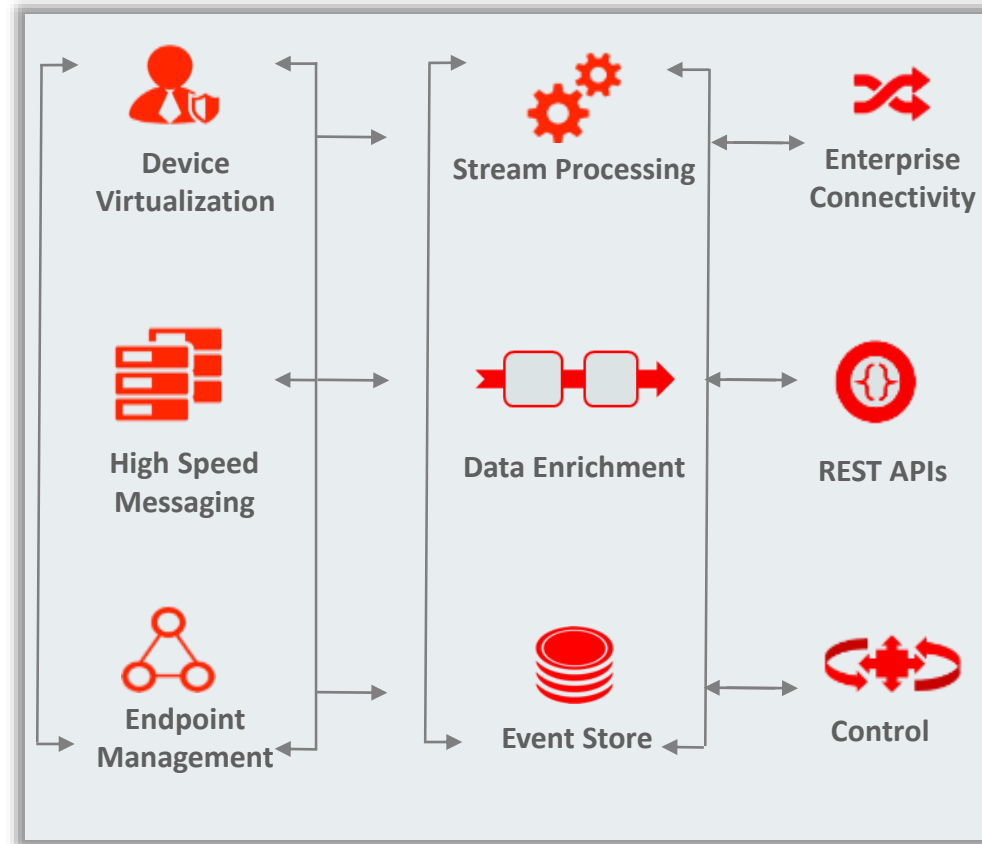


Integrate

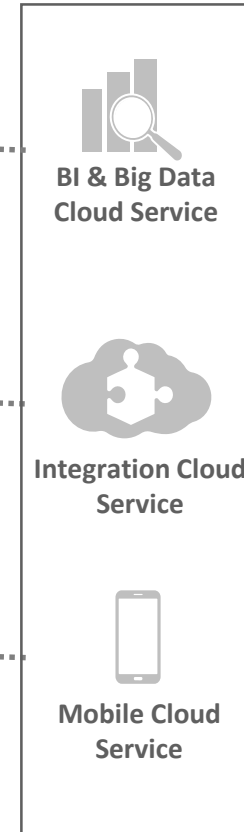
Make enterprise processes IoT friendly

Allow enterprise & mobile applications to control devices

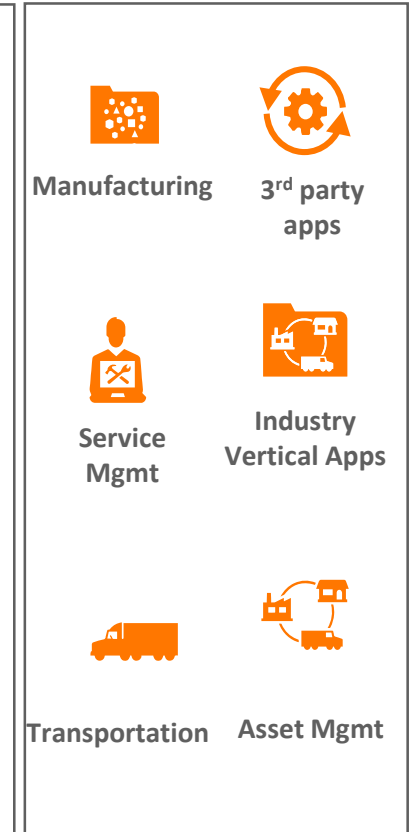
IoT Cloud Service



Oracle Cloud Services



Enterprise Apps *Cloud or On Premise*



Oracle Internet of Things Cloud Service

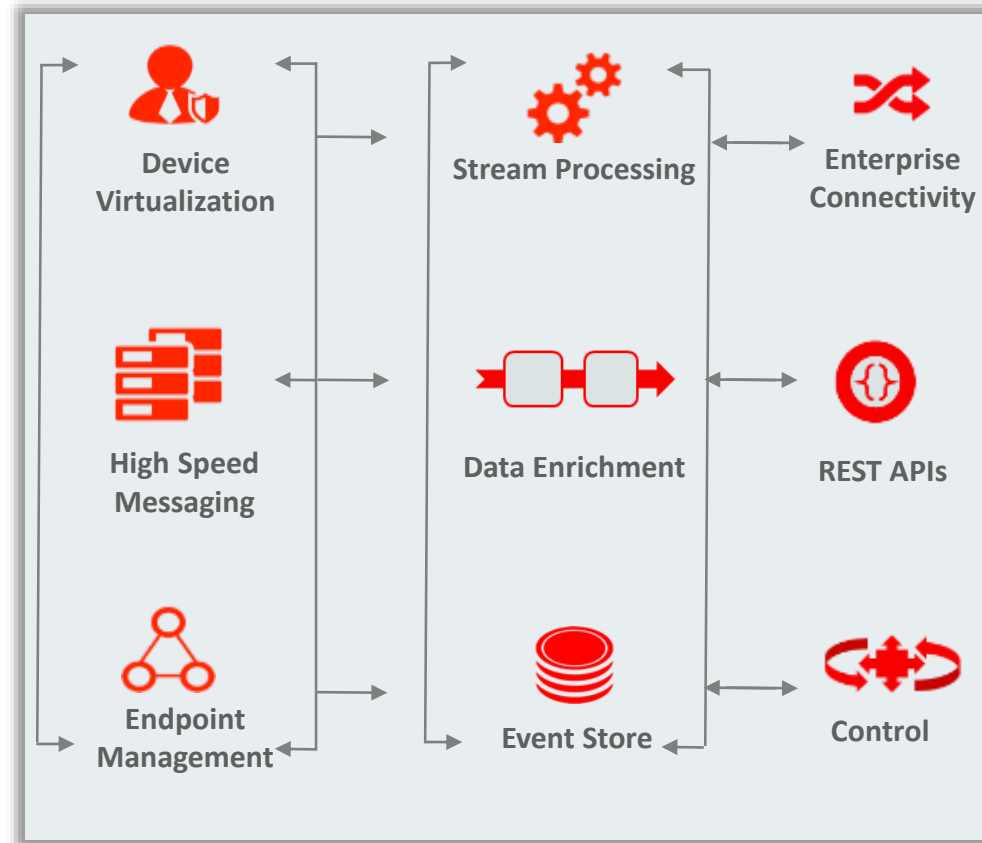
Flexible Topologies

Connect 3rd party gateways using Gateway Software

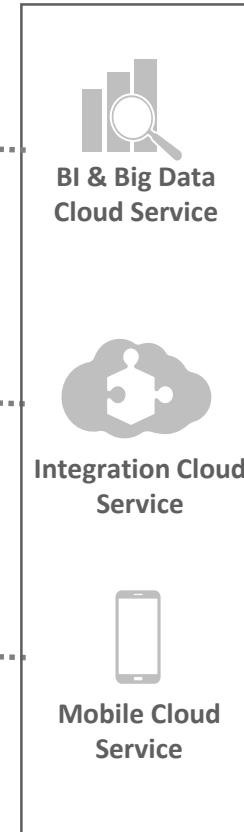
Connect 3rd party gateways using Client Library

Connect 3rd party devices directly using REST APIs

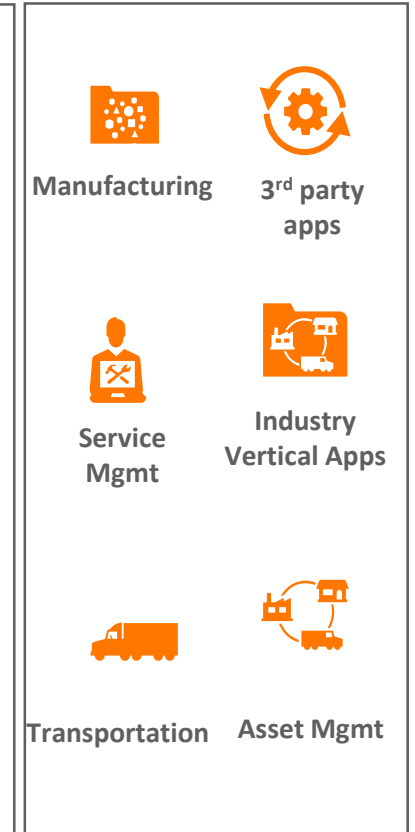
IoT Cloud Service



Oracle Cloud Services

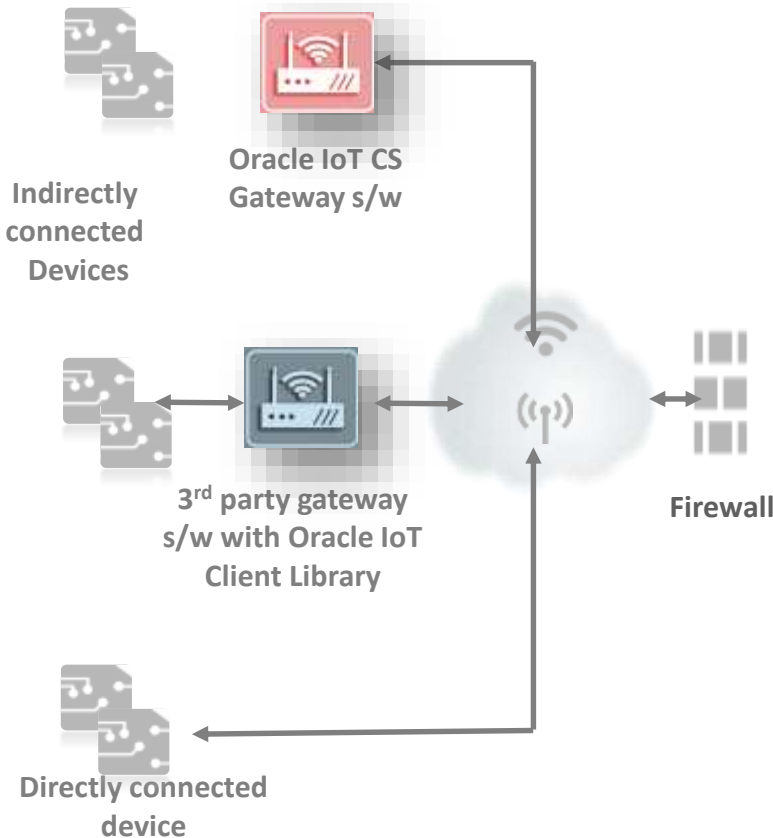


Enterprise Apps *Cloud or On Premise*

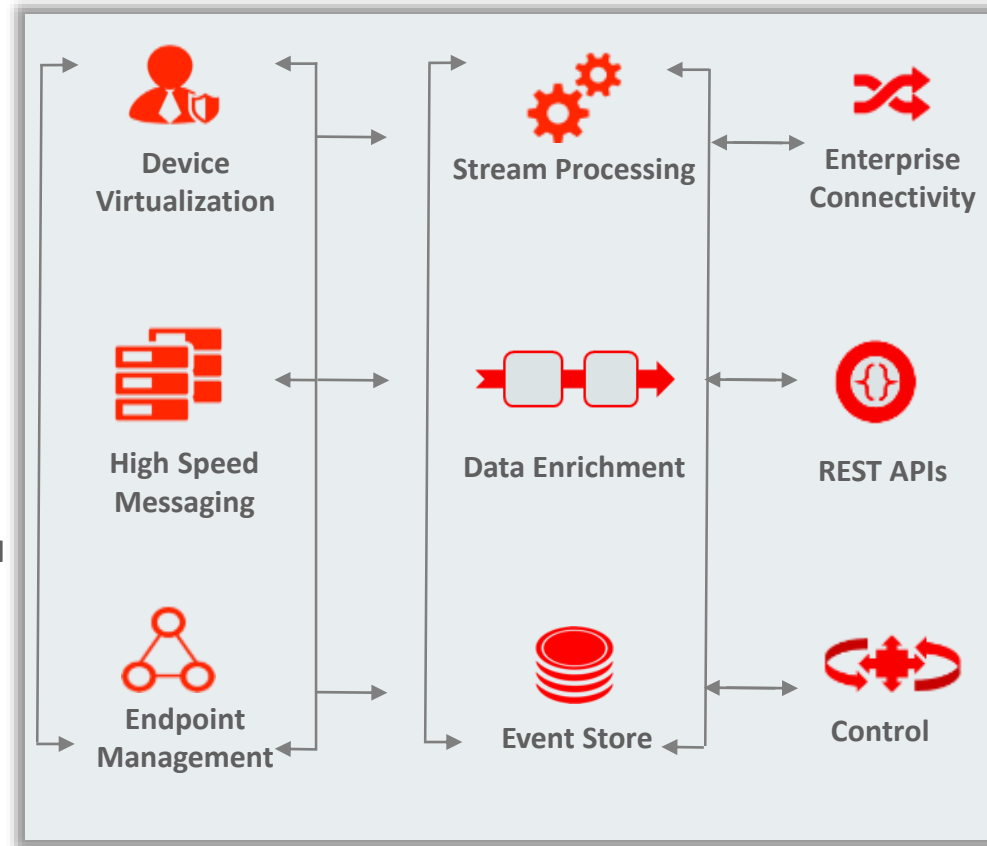


Oracle Internet of Things Cloud Service

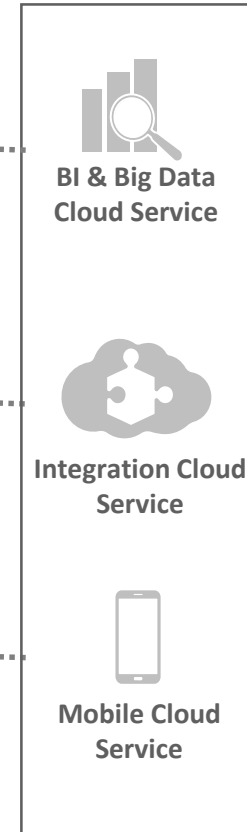
IoT Cloud Service Client Libraries & Gateway



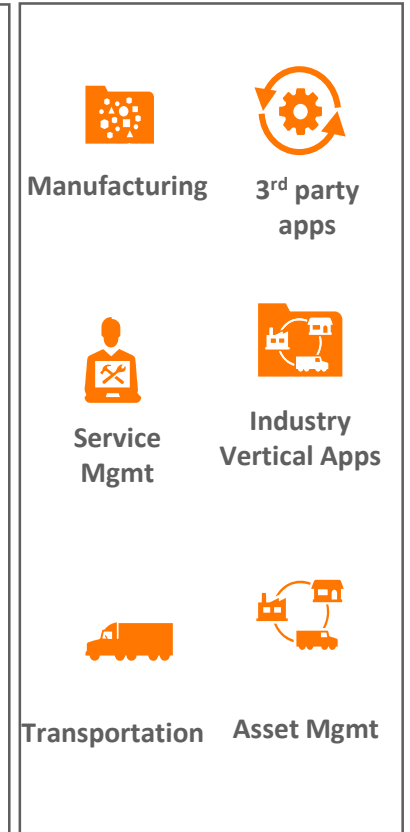
IoT Cloud Service



Oracle Cloud Services

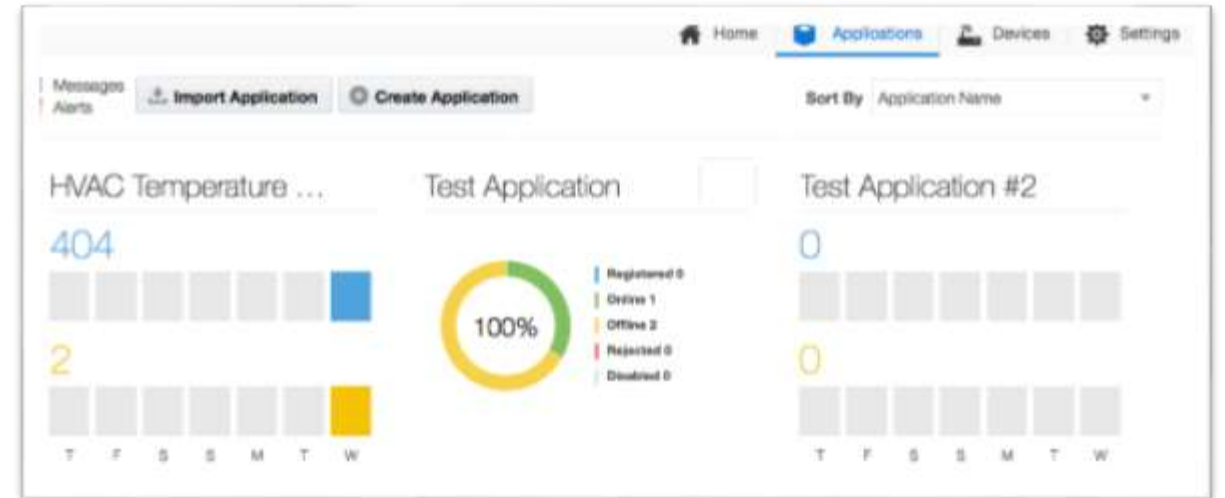


Enterprise Apps *Cloud or On Premise*

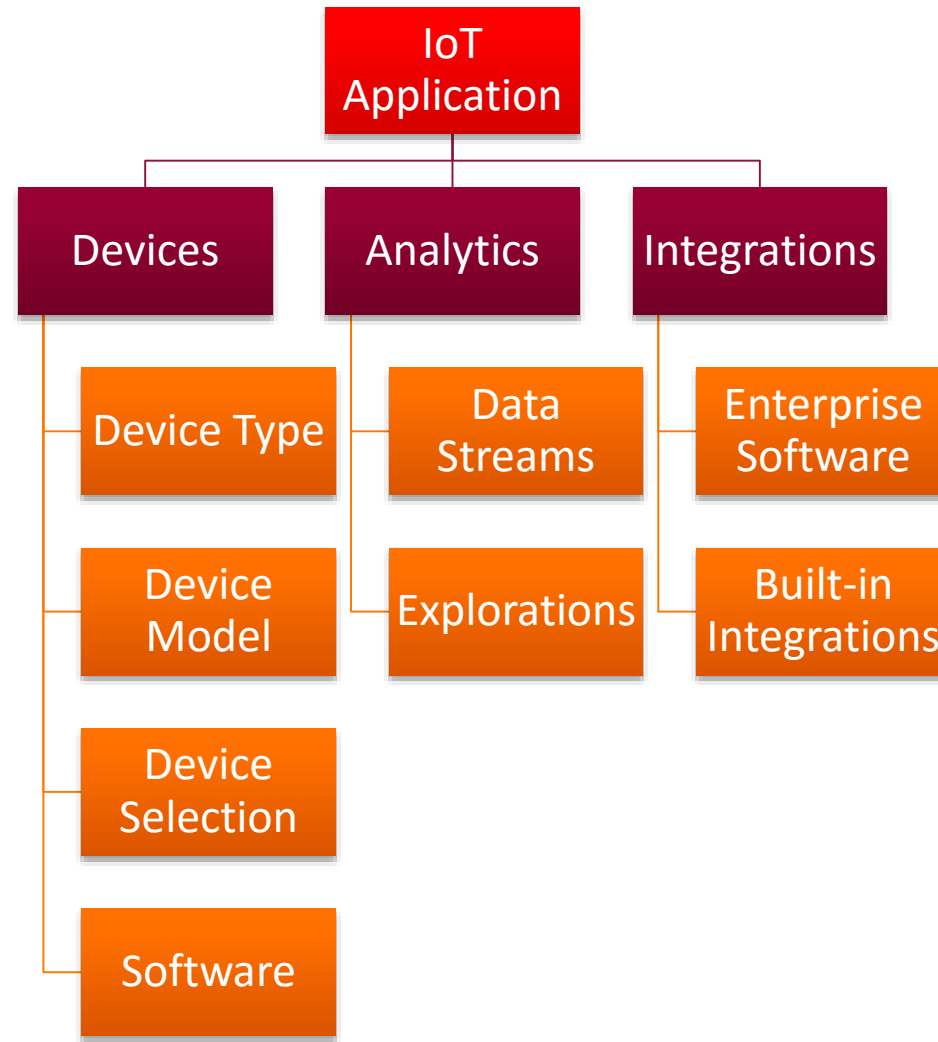


IoT Applications

- IoT Applications describe all of the components required to deploy an end-to-end IoT solution
 - More intuitive model for development : separate application development from device connectivity management
 - IoT Application + Batch Registration of devices = basic deployed solution
- Applications can be exported and imported between instances
 - Migrate configurations and data across development, test and production environments



Anatomy of an IoT Application in Oracle IoT Cloud Service



Let's consider a news story

BestHVACEquipments CEO apologies for malfunction Offers every customer to replace their HVACs

As details emerge in a third isolated case of a faulty HVACs in as many as six weeks, the CEO of BestHVACEquipments has issued apologies to customers. The company has issued a statement that they are yet to understand the cause of these problems, and has offered to replace every HVAC manufactured in the past 2 years.

Four other incidents were reported on Facebook and Twitter that might be linked to the exact problem. The company is fearing a lawsuit of being negligent about it's manufacturing practices...

The 5-Ms Analysis



- **Man**
 - Who was operating the machines on which faulty HVACs were produced?
 - Were they trained appropriately?
- **Machine**
 - Which robots were used in production of these HVACs?
 - Were these machines operating properly?
- **Method**
 - What inspections were performed on these treadmills?
 - Were appropriate SOP procedures followed?
- **Materials**
 - Which raw material batches were used during the production?
 - Which suppliers were used?
- **Measurements**
 - What were the test results?
 - Were the machines calibrated?

Time for IoT Opportunities in Manufacturing



Are there **patterns** of events that cause the equipment to fail ?

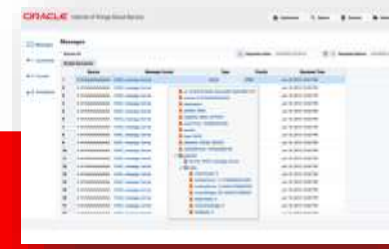
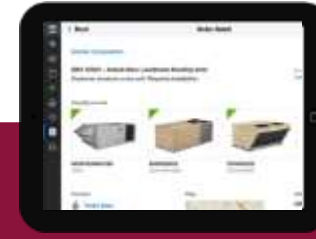
Is there a **correlation** between machine parameters and product quality ?

What are the **top factors/influencers** that affect product yield ?

Can we **predict** the likelihood of certain product defects ?

What's the downstream **impact** of yield change or defective parts ?

Preventative Maintenance For Customer Satisfaction



Acme Corp, a manufacturer of commercial HVAC systems, is using Oracle IoT Cloud Service to enable preventative maintenance

Prior to shipping the HVAC to a customer, Acme's service admin registers the HVAC to provide it a trusted identity

Acme's onsite technician receives a work order to install & connect the HVAC

Acme's data analyst starts monitoring streaming sensor data from HVAC



6 months later ...



To auto-predict potential outages, data analyst configures an analytics rule to analyze real-time streaming data from the HVAC

A potential outage event is auto-detected triggering automatic generation of a preventative maintenance work order for Acme's onsite technician

Acme proactively prevents an outage leading to excellent customer satisfaction

HVAC JOURNEY

Acme Corp

Acme Service Admin

Acme Onsite Technician

IoT Cloud Service Demo



An alternative news story



BestHVACEquipments CEO explains how IoT and Big Data helped fix potential issues even before they occurred

“I always believed that digitization was the key to remain competitive”, said the CEO of BestHVACEquipment in an interview yesterday. He explained how he had used cloud platforms to take the sensors data from the machines to combine with the historical data to predict the potential failures, and fix the root causes before the failures actually occurred.

He added, “when we started streaming data from all of our factories and from all products in the fields, we quickly realized that we are transforming into a data-rich company”. It was only a matter of time before this company put the data collected over years to work to gain valuable insights into the operations.

New Oracle IoT Applications

Asset Monitoring

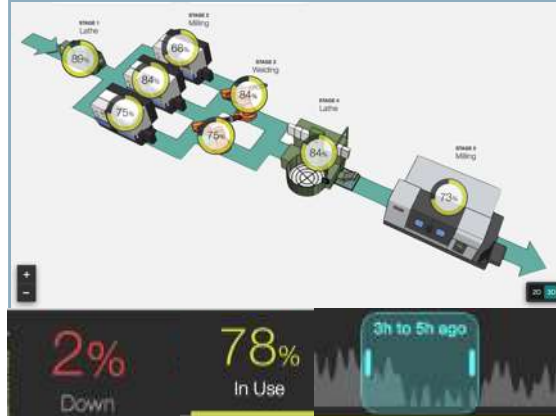



95% Asset Availability

1 Open Incidents

For monitoring assets, their utilization, availability, and data from connected sensors

Production Monitoring





2% Down

78% In Use

3h to 5h ago

Manufacturing factory floor equipment monitoring and prognostics

Fleet Management



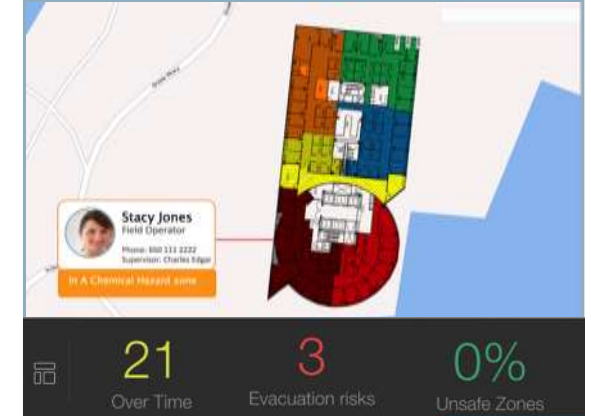

68% On Track

5% Down

3 Driver Alerts

For medium sized business who have fleets of vehicles (trucks, buses, maintenance vehicles, delivery vehicles)

Connected Worker



21 Over Time

3 Evacuation risks

0% Unsafe Zones

For tracking employees in Mining industry, Engineering and Construction industry

Achieving business outcomes

Connect and stream

- In hours, not weeks

Out of the box Dashboard

- Health
- Performance
- Location

Data Lake

- Painless plumbing

Domain Expert

- Business User friendly experience

Predictive Model

- Productivity of Data Scientists

Forecasting

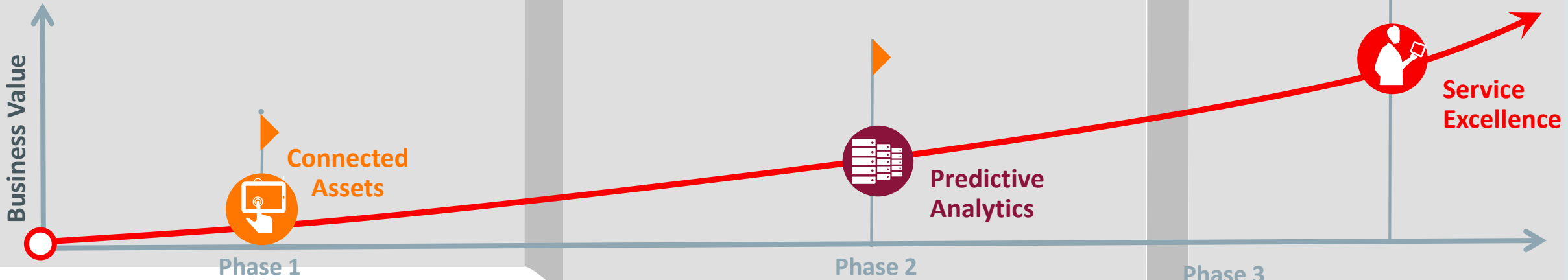
- Real time insights

Business App Integration

- No integration tax

Business Transformation

- Pump-hour as a service



ORACLE®