# The Internet of Things

## A Connected World

**Internet of Things Overview**

IBM Watson IoT Overview

IBM Watson IoT Training Resources

Next Steps and Q&A

# Beginnings

The phrase “Internet of Things” originated in 2008/2009.

Kevin Ashton, co-founder of MIT’s Auto-ID center is known for inventing the term "the Internet of Things" to describe a system where the Internet is connected to the physical world via ubiquitous sensors

# Definitions

**Wikipedia:**
“The internet of things (IoT) is the network of physical devices, vehicles, buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.”

**http://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT**:
“The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.”

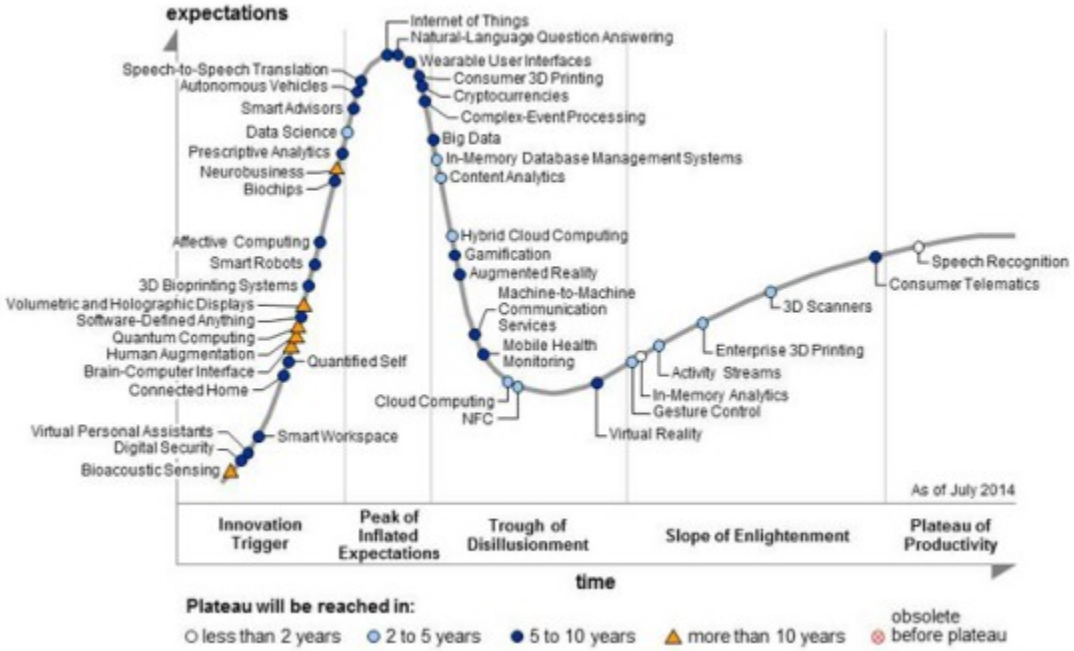
**http://www.ibm.com/internet-of-things/learn/library/what-is-iot/**
“Internet of Things, or IoT, refers to the growing range of Internet-connected devices that capture or generate an enormous amount of information every day. **For consumers**, these devices include mobile phones, sports wearables, home heating and air conditioning systems, and more. **In an industrial setting**, these devices and sensors can be found in manufacturing equipment, the supply chain, and in-vehicle components”

# Attributes of “Thing”

There are seven main attributes that make ‘things’ a part of the IoT:

- ✓ Sensors
- ✓ internet connectivity
- ✓ Processors
- ✓ energy-efficiency
- ✓ cost-effectiveness
- ✓ quality and reliability
- ✓ security.

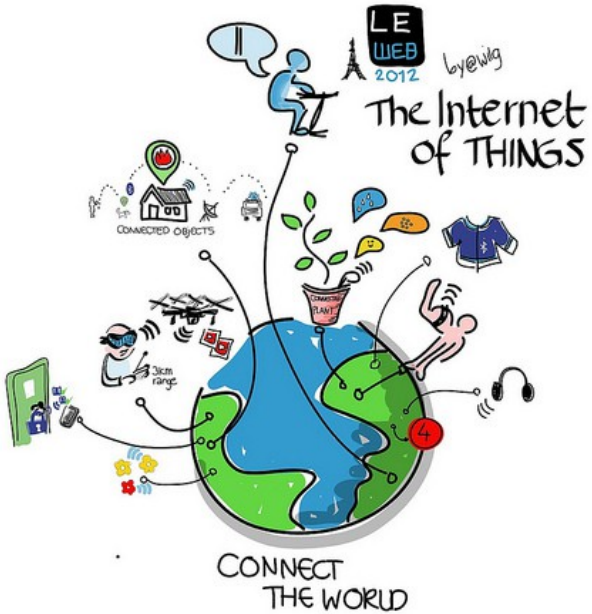
# Gartner Hype Cycle for Emerging Technologies



# IoT today and the future

**9 billion** devices around the world are currently connected to the Internet, including computers and smartphones

The number is expected to increase dramatically within the next decade, with estimates ranging from **50 Billion devices** to reaching **1 trillion**




The Internet of Things has the potential to create economic impact

***of $2.7 trillion to $6.2 trillion*** annually by 2025

# Why Connect Things?

# The Opportunity

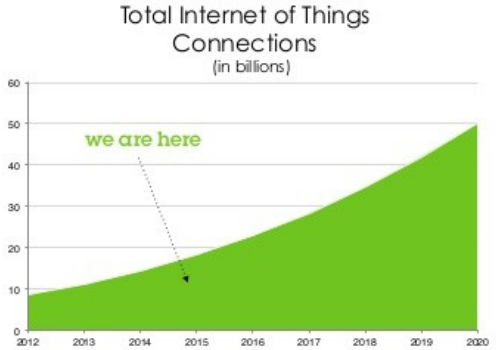
The number of connected things exceeded the number of people on earth in 2008.

Only about 1% of the things are currently connected to the internet.

With IPV6, there are more web addresses than atoms on the earth's surface.

**Why Is It Important?**

The amount of Internet of Things (IoT) connections is about to **explode**.



# Many Industries Will Benefit

Top Ten in GSMA "Connected Life" 2020 Forecast ($4.5T):

| | | |
|---|---|---|
| 1. | Connected Car | **$600 billion** |
| 2. | Clinical Remote Monitoring | **$350 billion** |
| 3. | Assisted Living | **$270 billion** |
| 4. | Home and Building Security | **$250 billion** |
| 5. | Pay-As-You-Drive Car Insurance | **$245 billion** |
| 6. | New Business Models for Car Usage | **$225 billion** |
| 7. | Smart Meters | **$105 billion** |
| 8. | Traffic Management | **$100 billion** |
| 9. | Electric Vehicle Charging | **$75 billion** |
| 10. | Building Automation | **$40 billion** |

Source: http://www.globaltelecomsbusiness.com/article/2985699/Connected-devices-will-be-worth-45t.html



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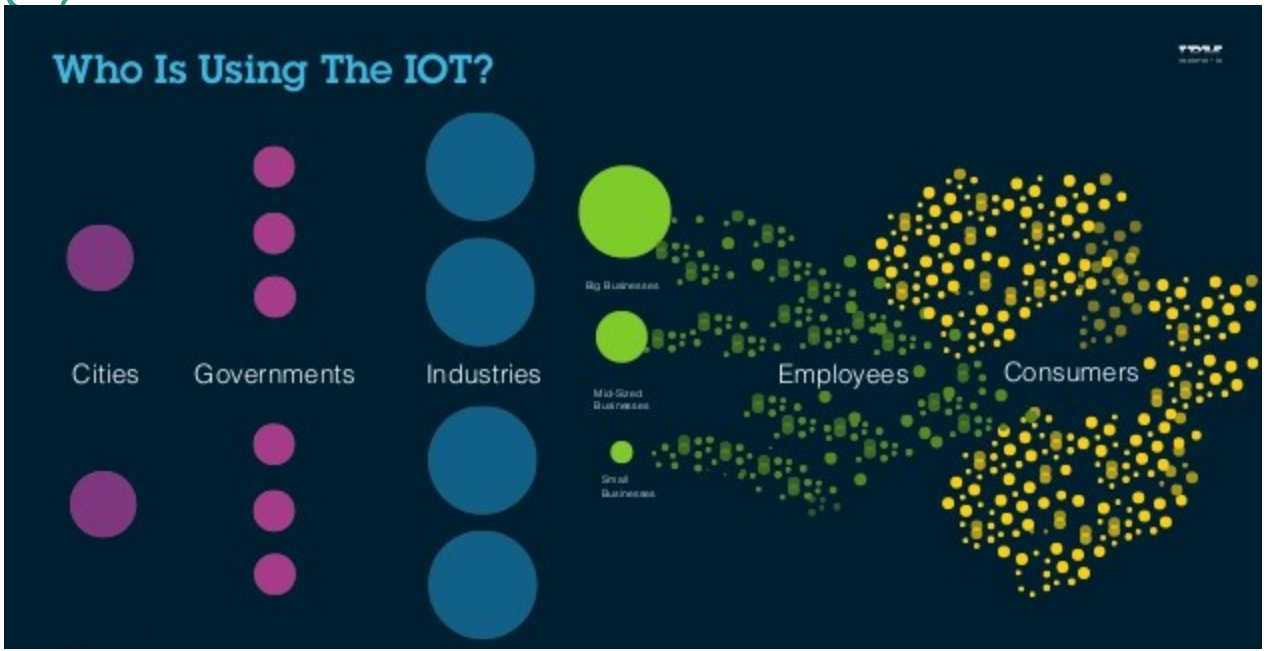
# Who is using the Internet of Things?



# Enterprise IoT Innovators Face Five Key Challenges

## 1 Entirely New Security Threats

- Devices are no longer contained and protected within traditional data centers.
- Automobiles, power plants and medical devices are under growing attacks from hackers.

## 2 Fundamental Shifts in Business Models

- One-time purchases will be transformed into long term service revenue streams.
- Traditional manufacturing and place-based businesses must become IT-centric organizations.

## 3 Unprecedented Data Volumes

- Real world sensors will generate entirely new kinds of data as well as volumes 1000's of times higher than pre-IoT systems.
- Traditional reporting and analytics will be eclipsed by big data and machine learning.

## 4 New Privacy Landscape

- Millions of sensors are collecting physical world data on people and objects.
- Consumers and legislators are slowing grasping the implications and stiffer regulations are likely.

## 5 Incompatible Standards

- A proliferation in competing platforms and incompatible standards raises costs, time-to-market and risks for IoT innovators.

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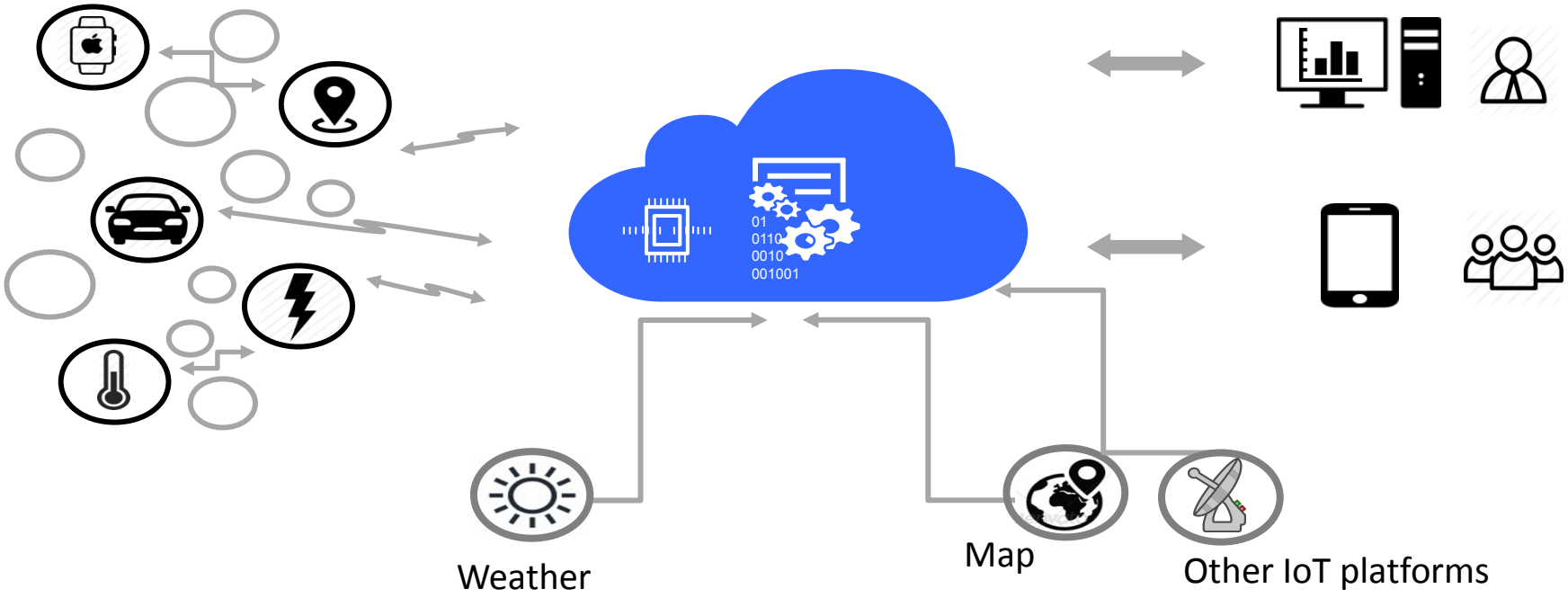
# Overview of Watson IoT platform



# Building an IoT PaaS on the power of Bluemix

- Over 120 Services and APIs in Bluemix Catalog at https://console.ng.bluemix.net/catalog/
- Use the “Internet of Things Platform Starter” to get started with your IoT application

# IBM Watson IoT Platform
## Everything you need to Innovate with IoT

A new offering within IBM's Bluemix PaaS offering that allows Internet-connected devices to be integrated directly into Bluemix solutions

Th

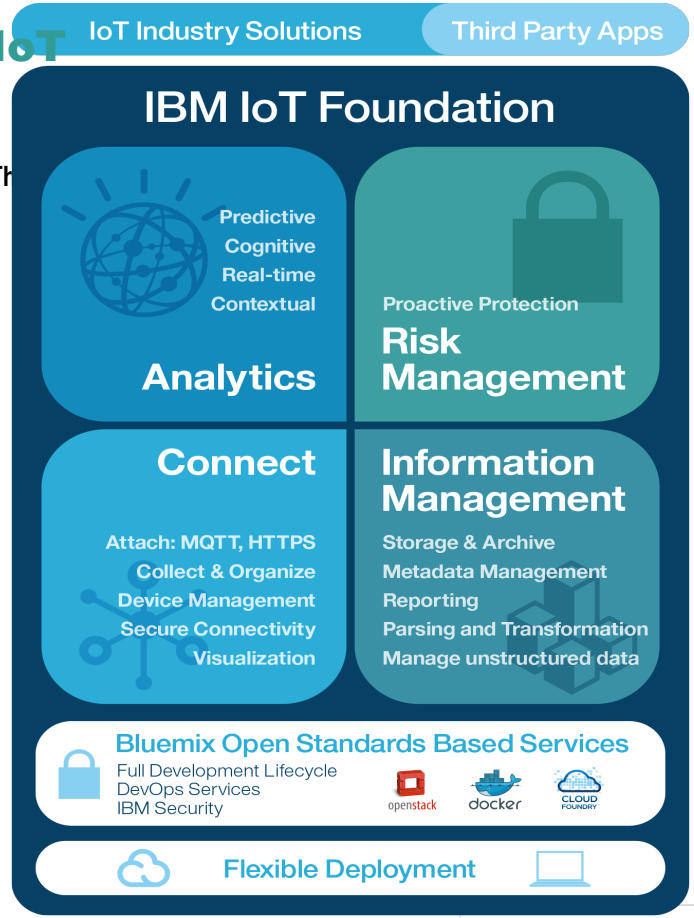
## IBM IoT Foundation offerings

### IBM IoT Foundation Connect
Attach, Collect & Organize, Device Management, Secure Connectivity, Visualization

### IBM IoT Foundation Information Management
Storage & Archive, Metadata Management, Reporting, Streaming data, Parsing and Transformation, Manage unstructured data

### IBM IoT Foundation Analytics
Predictive, Cognitive, Real-time, and Contextual

### IBM IoT Foundation Risk Management
Security Analytics, Data Protection, Auditing/Logging, Firmware Updates, Key/Cert Mgmt, Org Specific Security






https://internetofthings.ibmcloud.com/#/

# developerWorks Recipes

## Ecosystem & partnership strategy extend the IBM IoT platform

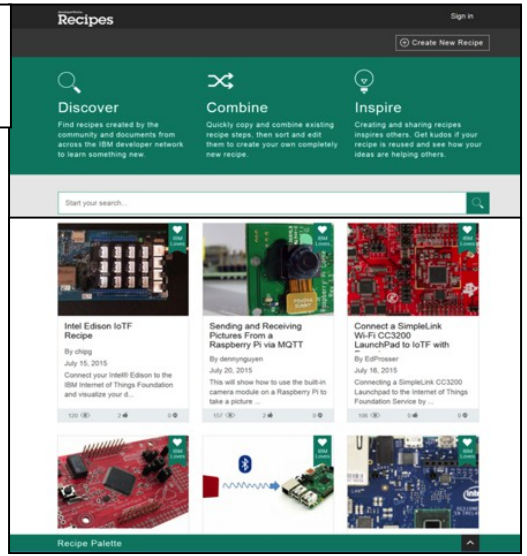
https://developer.ibm.com/recipes/

**Derive IoT value on the Cloud through strong industry partnerships and open ecosystem**

Examples:

ARM, intel, Texas Instruments, at&t, Sprint

developerWorks Recipes



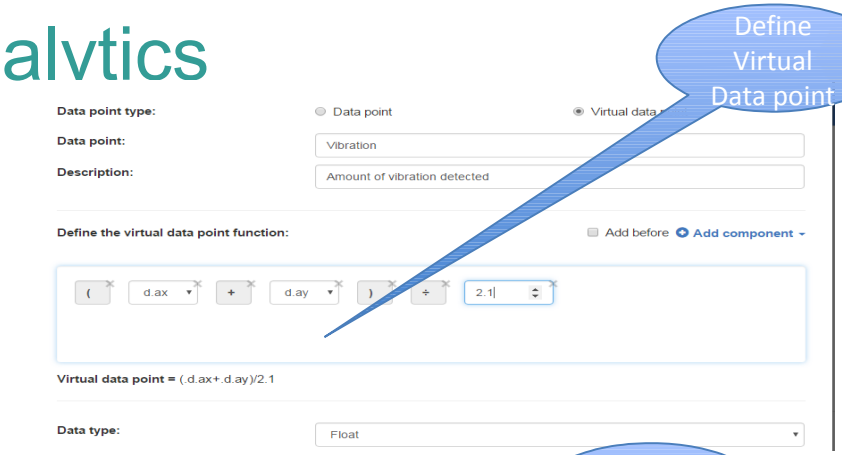

**Wide variety of supported devices**

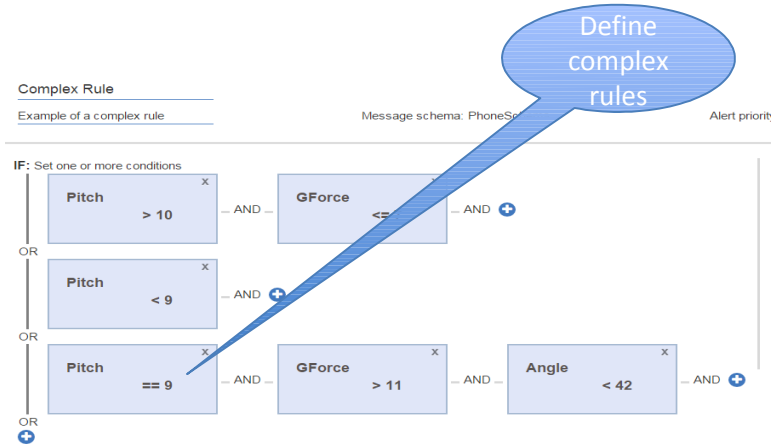
- ✓ Self Service
- ✓ Open ecosystem
- ✓ Simple tutorials
- ✓ Connect in moments

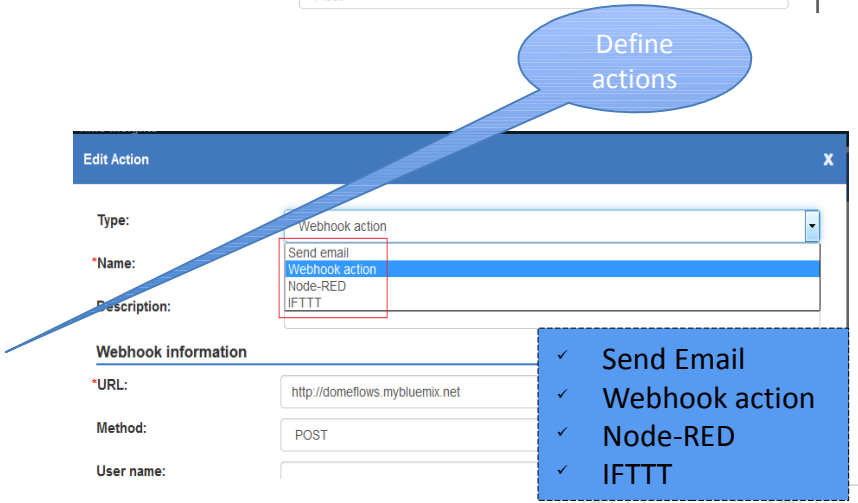
# Watson IoT Platform Analytics

## Real-Time Insights

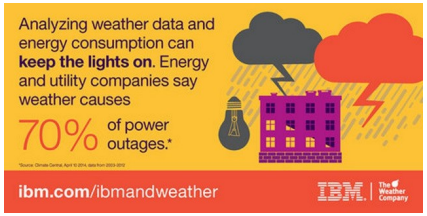
- With IBM® Watson™ IoT Platform Analytics Real-Time Insights on Bluemix (IoT Real-Time Insights), you can perform analytics on real-time data from your Internet of Things devices, and gain insights about their health and the overall state of your operations.
- Based on Spark platform
- Highly scalable
- Parallel execution of tasks



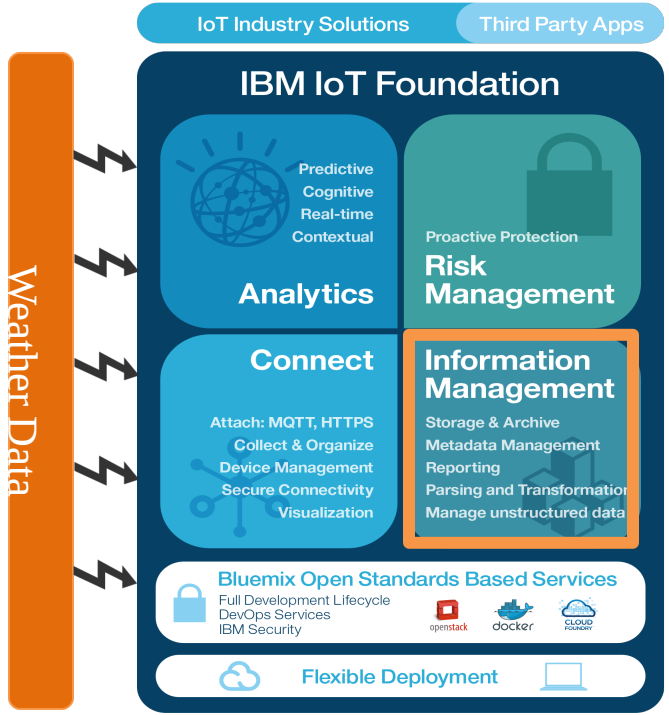



# Combining weather, analytics and IoT to deliver better outcomes



## Weather assets fuel IoT transformation across industries

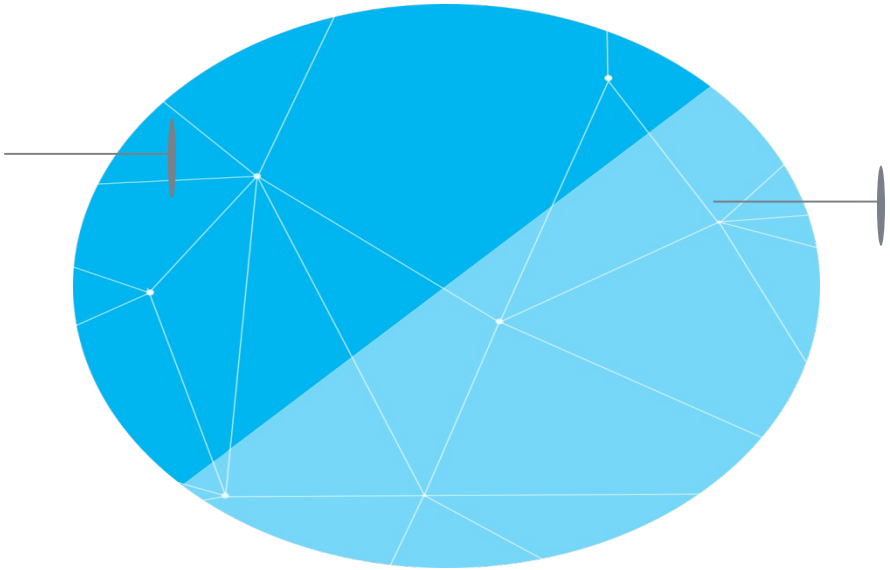
- Incorporate weather data into your IoT applications
- Combine weather data in your data set to gain more insight
- “Insights for Weather” API now available on Bluemix



# Cognitive Systems

**Humans excel at:**

Common Sense
Morals
Imagination
Compassion
Abstraction
Dilemmas
Dreaming
Generalization



**Cognitive Systems excel at:**

Natural Language
Machine Learning
Eliminate Bias
Endless Capacity
Locating Knowledge
Pattern Identification

# Cognitive systems - APIs provide developers easy access to cognitive building blocks

A collection of REST APIs and SDKs that use cognitive computing to solve complex problems.

Cognitive

http://www.ibm.com/internet-of-things/iot-platform.html#tab3

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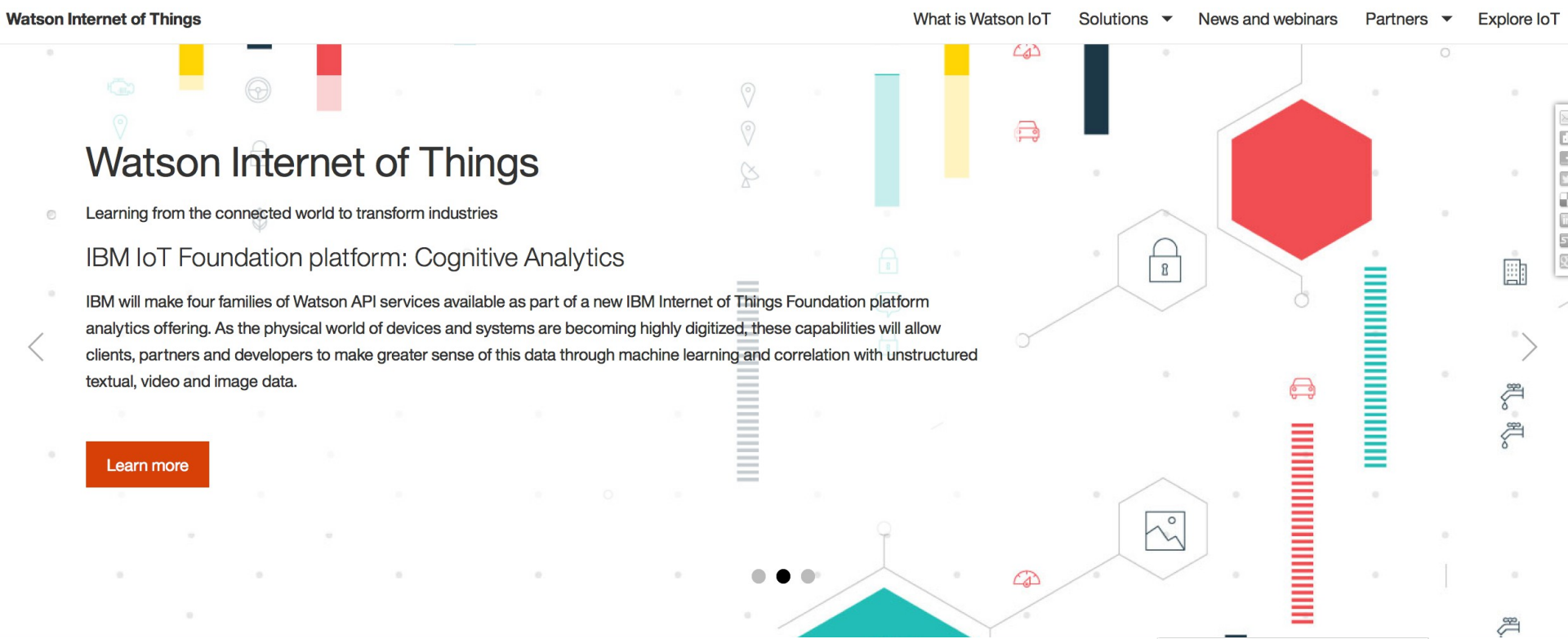
# New IoT digital experience

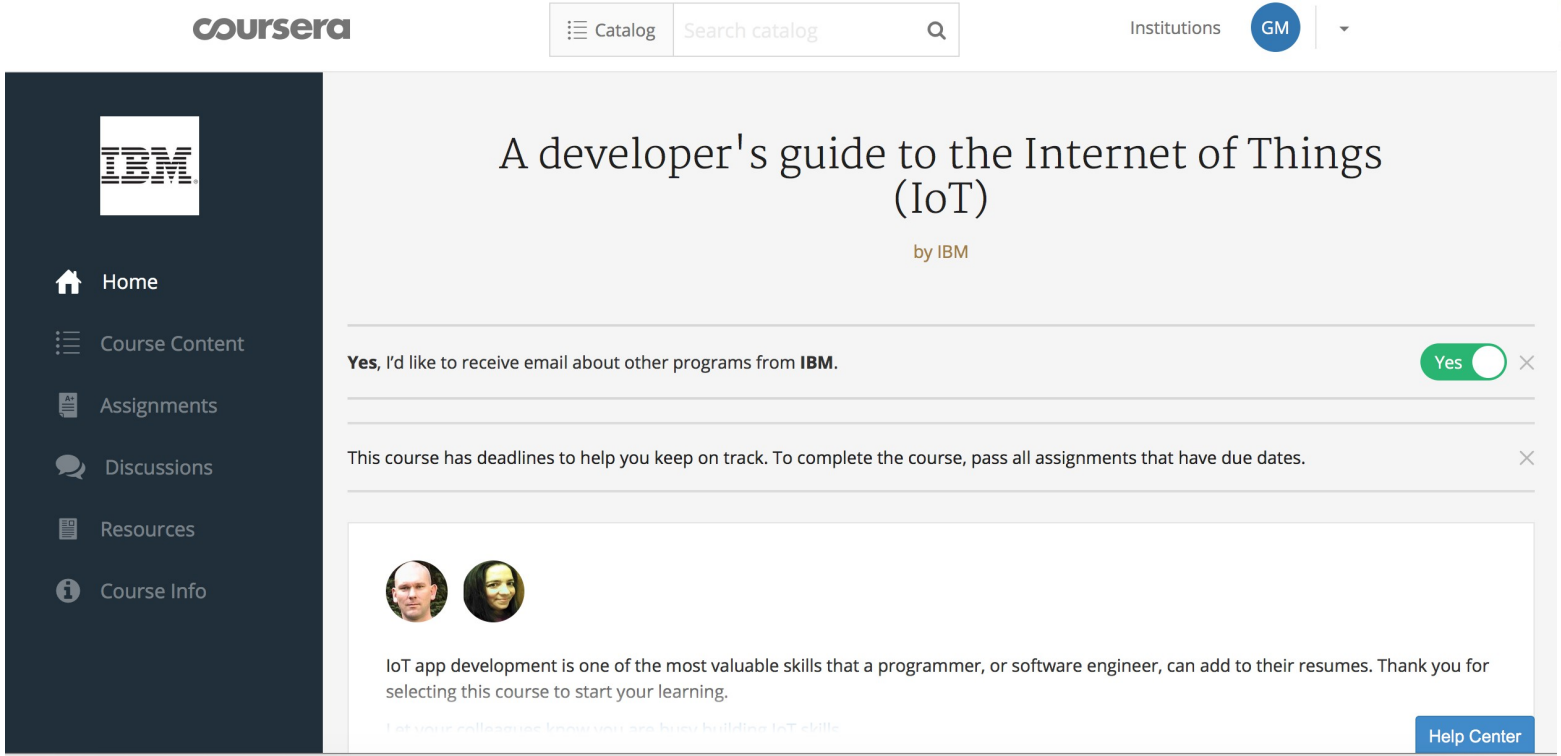
## Engage developers, CTOs and product engineers to quickly evaluate trials



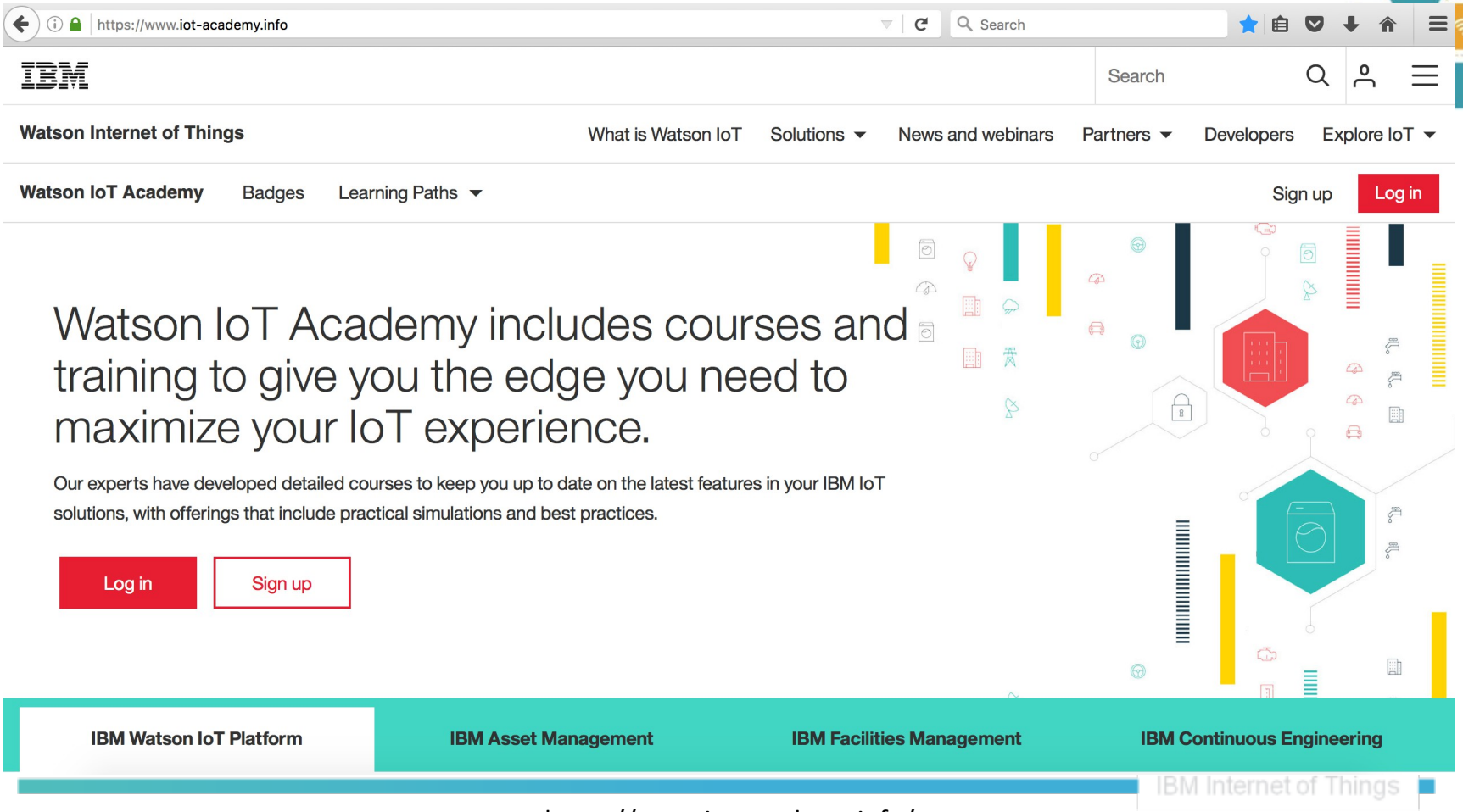



www.ibm.com/iot

# IBM IoT Coursera Online Course




https://www.coursera.org/learn/developer-iot/home/welcome




https://www.iot-academy.info/

# IBM IoT Resources

- Educator's Guide: IBM Academic Initiatives IoT Educator's Guide

- Key online courses:
  - IBM IoT Coursera course
  - Getting Started with IBM Bluemix
  - IBM Watson IoT Academy

- Getting started:
  - Watson IoT Homepage
  - Watson IoT platform page
  - Watson IoT developers page
  - DeveloperWorks Recipes to connect your devices to the Bluemix cloud

- Play with our sample app

- Quickstart with your smartphone
  - Use the simulated device and sensors to experience the IBM Watson IoT Platform

- Demo:
  - Intro to Bluemix and Internet of Things Foundation - Part 1
  - Intro to Bluemix and Internet of Things Foundation - Part 2
  - Connected Car
  - IBM IoT overview and Connected Car demo
  - Smart Buildings with Sogeti (Recorded)
  - Smart Buildings with Sogeti (Manual; password: sogetiibm)
  - Bluemix and Internet of Things
  - IBM Python app with a Raspberry Pi and Bluemix
- Tutorial:
  - IoT Python app with a Raspberry Pi and Bluemix
  - Build a connected-car IoT app with Geospatial Analytics
- Whitepaper:
  - Is your business ready for the Internet of Things
  - Four ways to drive service innovation with the Internet of Things
  - Deriving business value from the Internet of Things
  - The rise of the machine data - Are you prepared?
  - IBM MessageSight in the Automotive Industry
  - IBM Point of View: Internet of Things Security
- Redbook: The Interconnecting of Everything

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