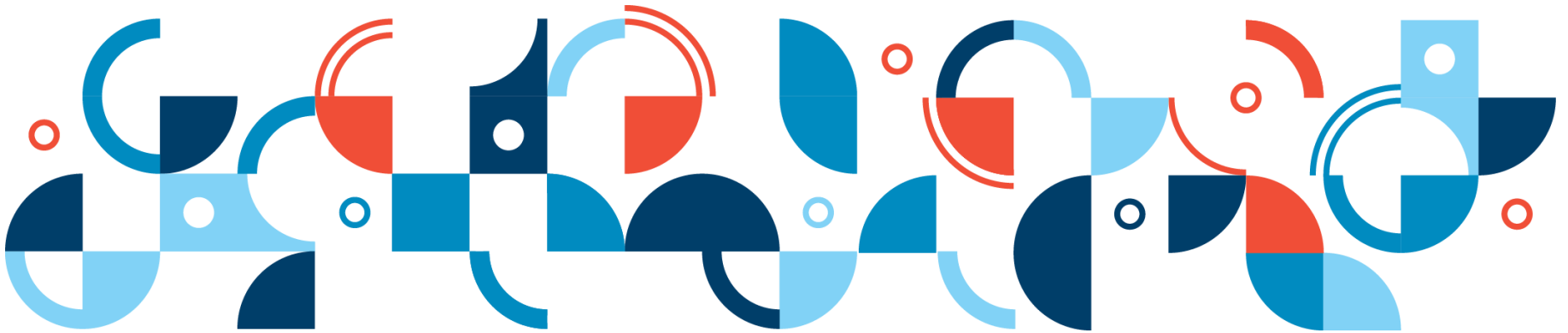


August, 2014

# IBM Internet of Things Foundation Roadmap



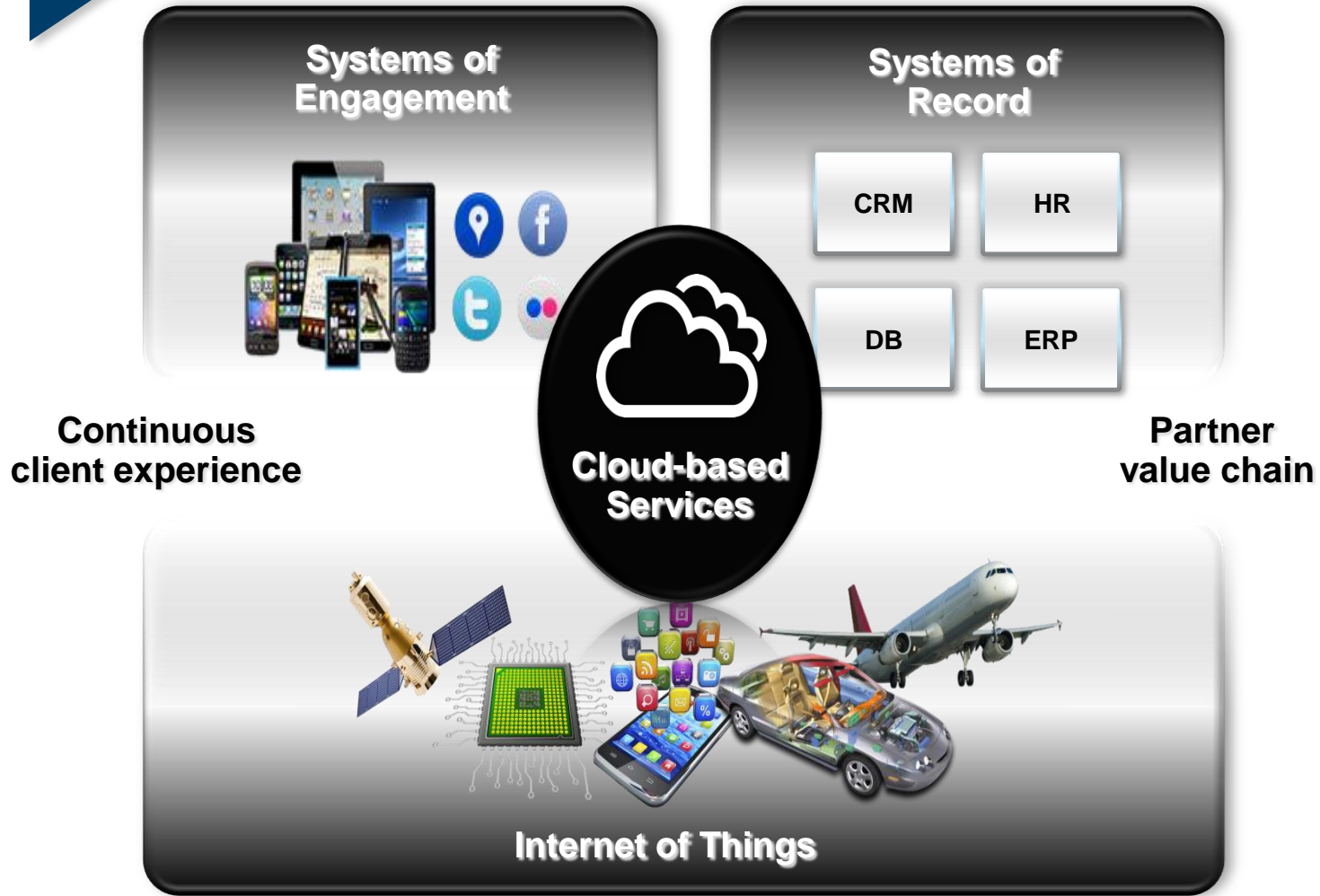
# Mobile re-inventing everyday Live



## Systems of Interaction



# Systems of Interaction



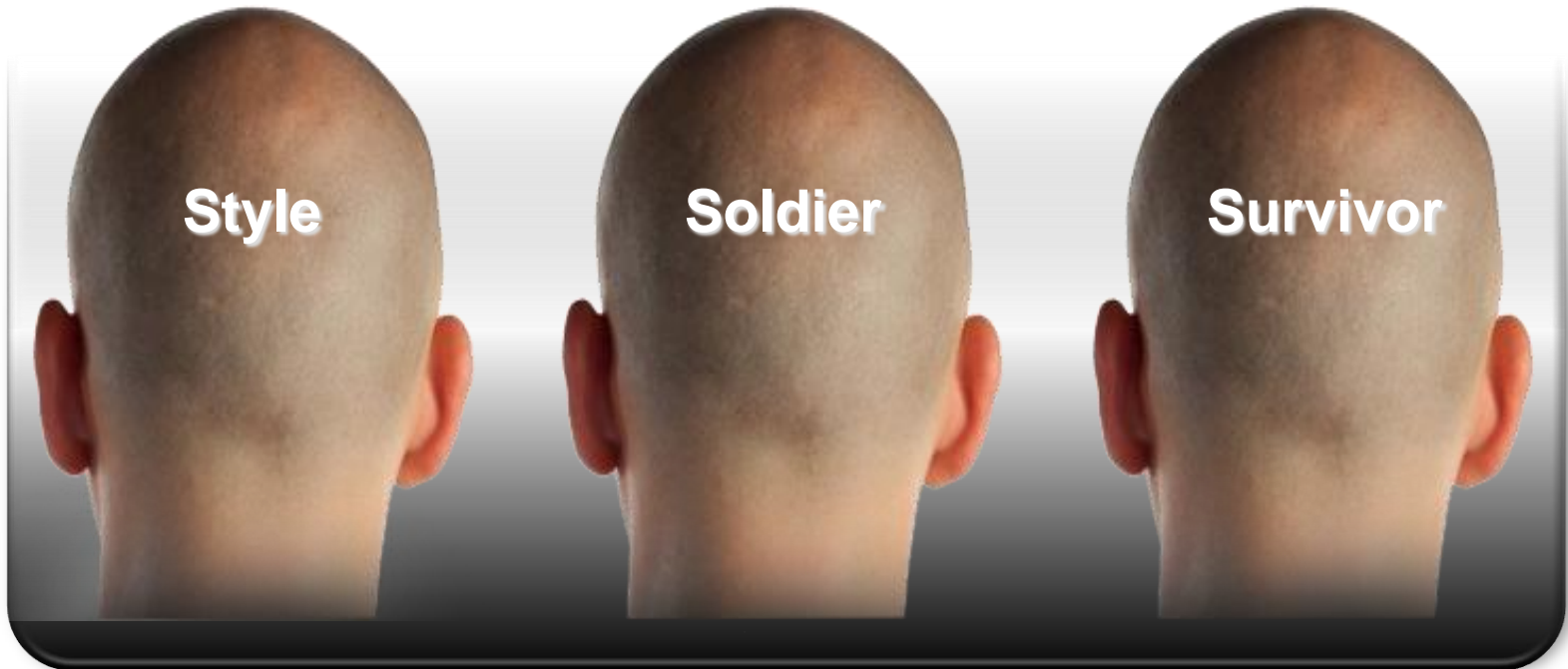


## Types of Interactions

**Time and Location**

**Social and Behavior**

**Multi-channel**



**The power of context**

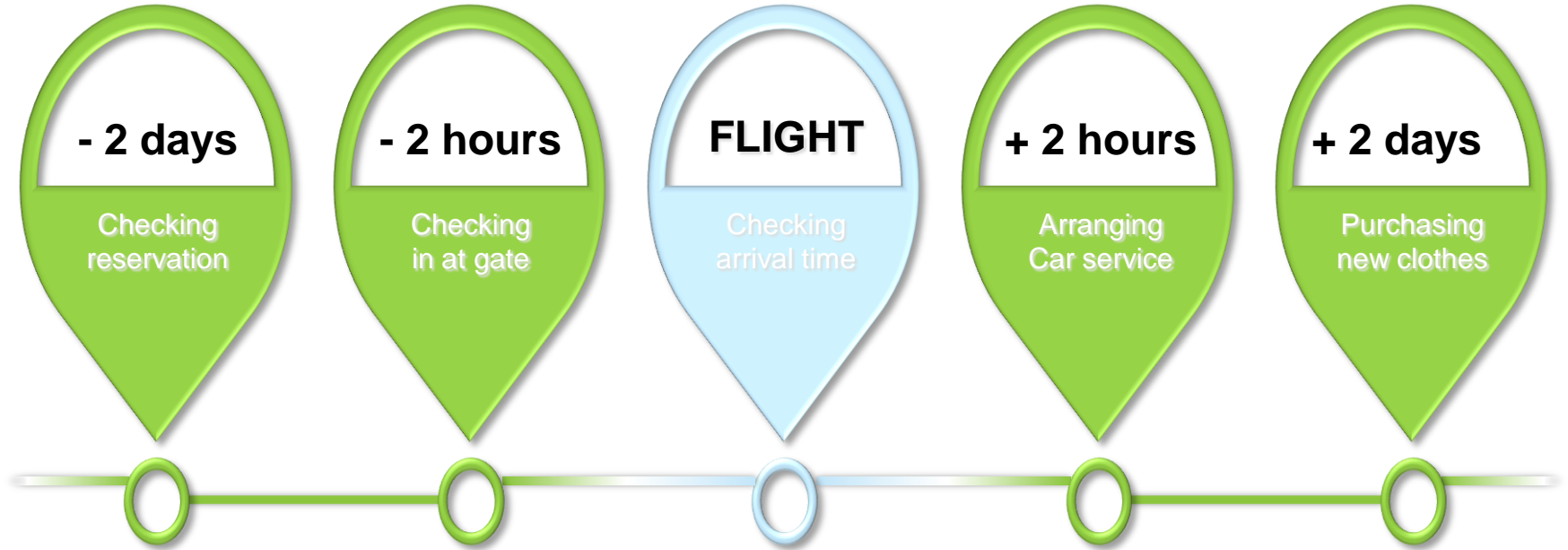


# Extended Transaction Scope

**Time and Location**

Social and Behavior

Multi-channel



**Airline example based on user time**



# Insights driving actions

Time and Location

Social and Behavior

Multi-channel



**Credit card program example**

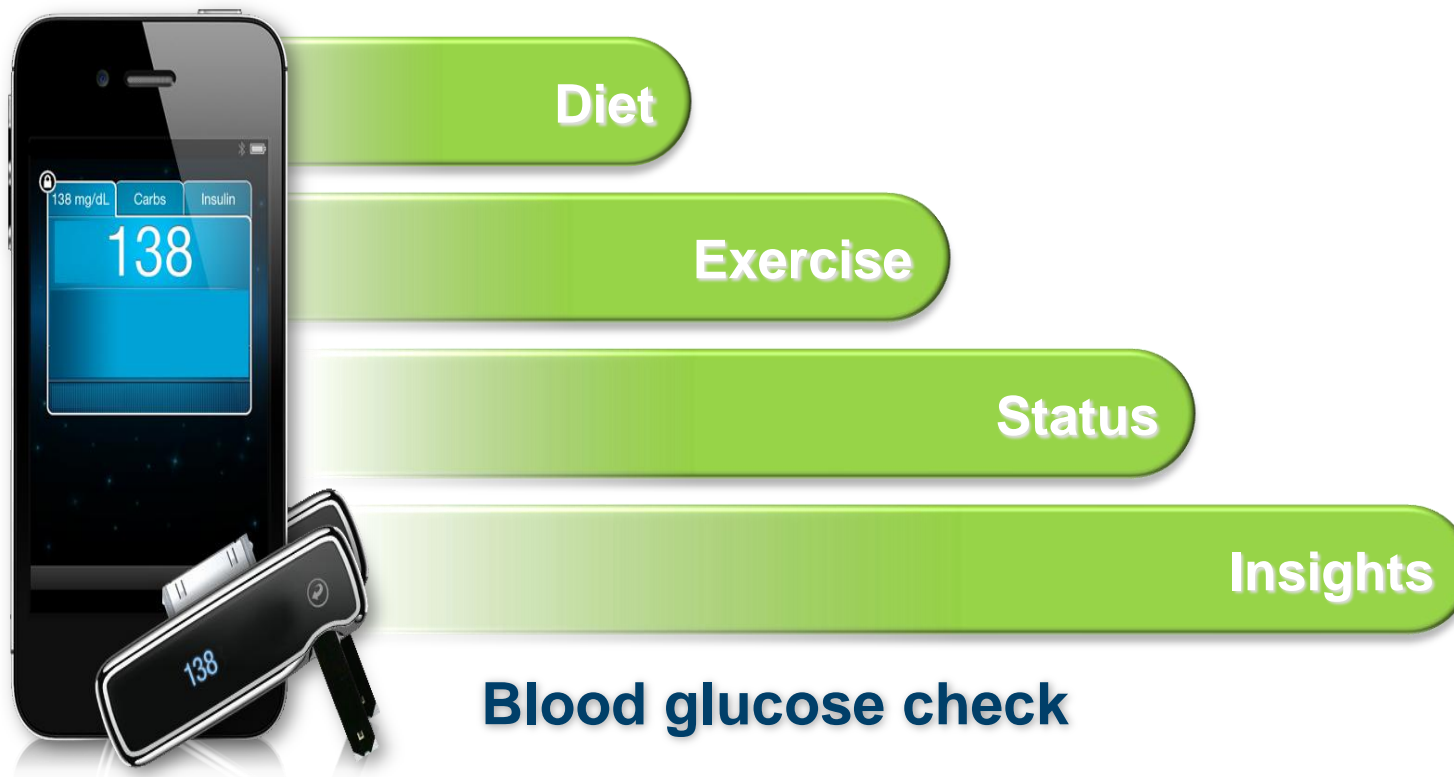


# 360° experience

Time and Location

Social and Behavior

**Multi-channel**





## Systems of Interaction

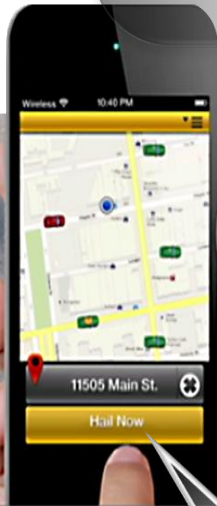
- ▶ **Detect – opportunities to engages users**
- ▶ **Enrich – content with historical data and trends**
- ▶ **Perceive – “in the now” context**
- ▶ **Act – on new insights gained**





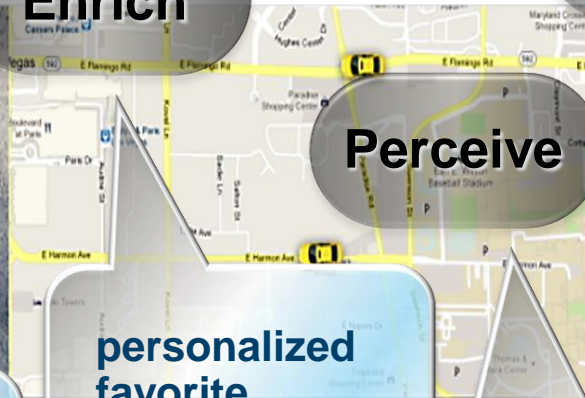
# Systems of Interaction

**Detect**



**hail now!**

**Enrich**



**personalized  
favorite  
destinations**

**Perceive**

**location, traffic,  
proximity, direction**

**Act**

**arrival,  
payment**

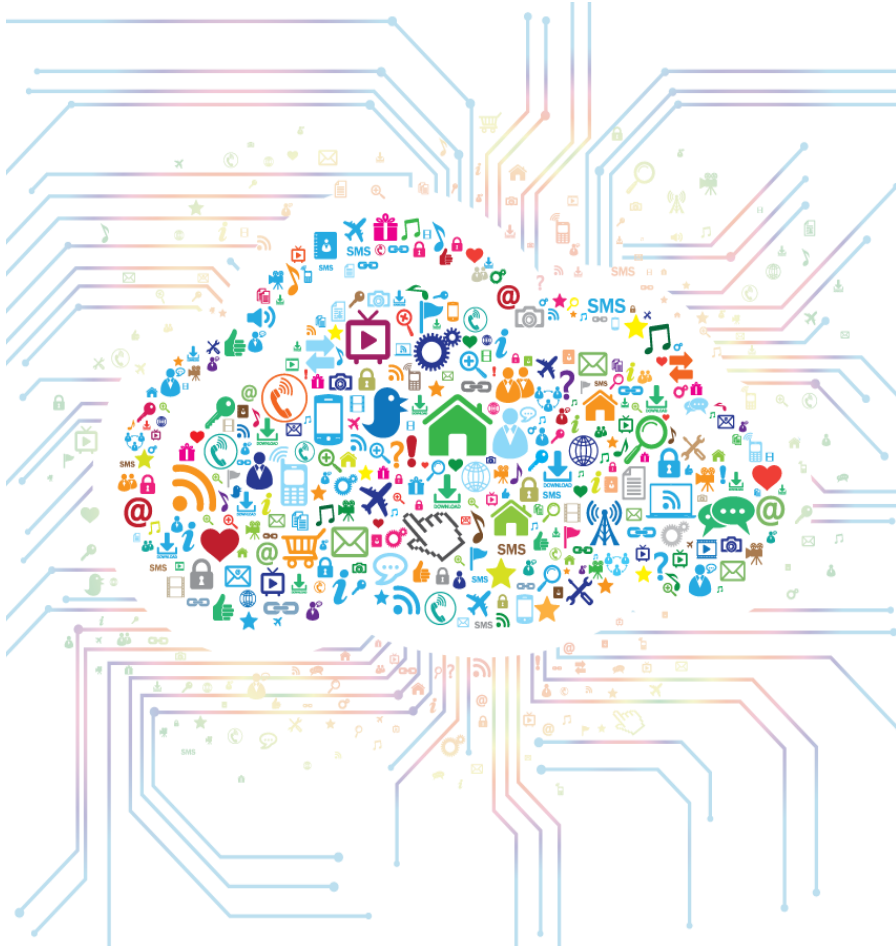


# Agenda

- **Marketplace**
- Deliveries
- Direction
- Proof Points



# Internet Of Things Forecast *2020 View*



- **212B** Installed Things
- 30B autonomously connected things
- Public Sector, Distribution & Services, Manufacturing & Resources, and Consumers Lead Segment Growth Rates
- Approximately 3 Million Peta Bytes Of Embedded Systems Data (Excludes Streaming, Surveillance Type Data)
- **\$8.9Trillion** Of Business Value

Source: IDC, December 2013

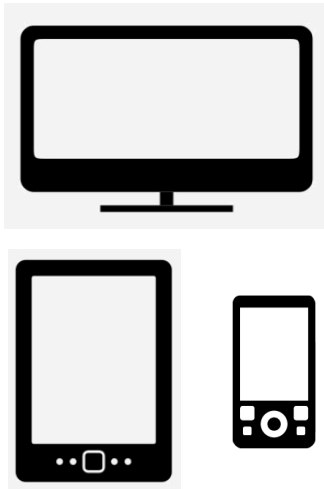
# IoT drives **Industry Conversations**

	Banking	Healthcare	Automotive	Retail	Transport	E&U
<p><b>Monetize</b></p>	<p>Cash replacement solutions</p> <p>Mobile Banking</p>	<p>Paid home care family services</p>	<p>Pay-per-drive car rental</p>	<p>Cash replacement</p> <p>Sensor enabled Loyalty cards</p>	<p>Paid Alerts to travellers</p> <p>Congestion charging</p>	<p>Pay-per-use energy</p>
<p><b>Optimize</b></p>	<p>Optimized Cash management</p>	<p>ER Bed Resource Mgmt</p>	<p>Component predictive replacement</p> <p>Fleet mgmt</p>	<p>Delivery and stock replenishment optimization</p> <p>Store layout optimization</p>	<p>Smart Cities Traffic mgmt</p> <p>Airport Management</p>	<p>Delay non-essential supply during peak loads</p>
<p><b>Extend</b></p>	<p>Banking the un-banked</p> <p>Biometrics</p> <p>Smarter Subsidies</p>	<p>Life style monitoring</p>	<p>In-car Movies, Music, Games</p> <p>Highly Automated Driving</p>	<p>Smart Vending Machines</p> <p>Delivery Lockers</p>	<p>Mobility Services</p>	<p>Smart home services</p>
<p><b>Control</b></p>	<p>Remote ATM Management</p> <p>Dynamic Authorization</p>	<p>Remote Hospital environment Mgmt</p>	<p>Remote Drive-train optimization</p>	<p>Store energy mgmt</p> <p>Store parking mgmt</p> <p>Dynamic price labels</p>	<p>Crowd mgmt</p> <p>Timetable mgmt</p> <p>Asset mgmt</p>	<p>Remotely control consumer devices</p>

# Technology shift: Consumers lead the Internet of things

## Today

A few connected devices per person...



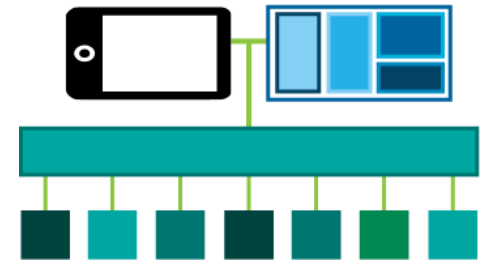
## Tomorrow

Almost every device that consumers own will be connected, and many new ones will be created to leverage the value created by consumer connections.

- Window Lock
- Toothbrush
- Door Lock
- Garage Door
- Dishwasher
- Garden Moisture
- Home Lights
- Washing Machine
- Coffee Maker

## Integration

Cross-platform integrators will connect devices and automate personal activity:



→ *Just as consumers have led enterprises in embracing new mobile services, we believe they will lead the adoption of connected devices & integrated services*

## Three Key Areas for focus

		Focus	Key Industries
1	<b>Connected Vehicle</b>	Telemetry, tracking and interaction for vehicles	Automotive, Government, Travel & Transportation
2	<b>Industrial M2M</b>	Telemetry from industrial operational equipment	Manufacturing, Energy & Utilities, Oil & Gas, Rail
3	<b>Connected Silicon</b>	New applications around new devices using connected silicon	Consumer Electronics, Healthcare & Fitness, Telecommunications

## Developer Outreach is key

### ▪ Online Demos

- Range of m2m & IoT demos today at <http://m2m.demos.ibm.com>
- Adding additional Industry use cases all the time

### ▪ Developer Community

- IoT developerWorks community and Social presence (Twitter, Tumblr, Facebook Follow @IBMIoT)
- Recipes showing how to connect range of devices and develop applications
- Key event participation at industry & developer IoT events

### ▪ Developer Events

- dev@Pulse – IoT hackathon
- dev@IMPACT & Sportshack – IoT hackathon
- Bluemix garages
- Ongoing Hackathons around the world in 2H2014



# Agenda

- Marketplace
- **Deliveries**
- Direction
- Proof Points

# All Internet of Things Use Cases have **common requirements**

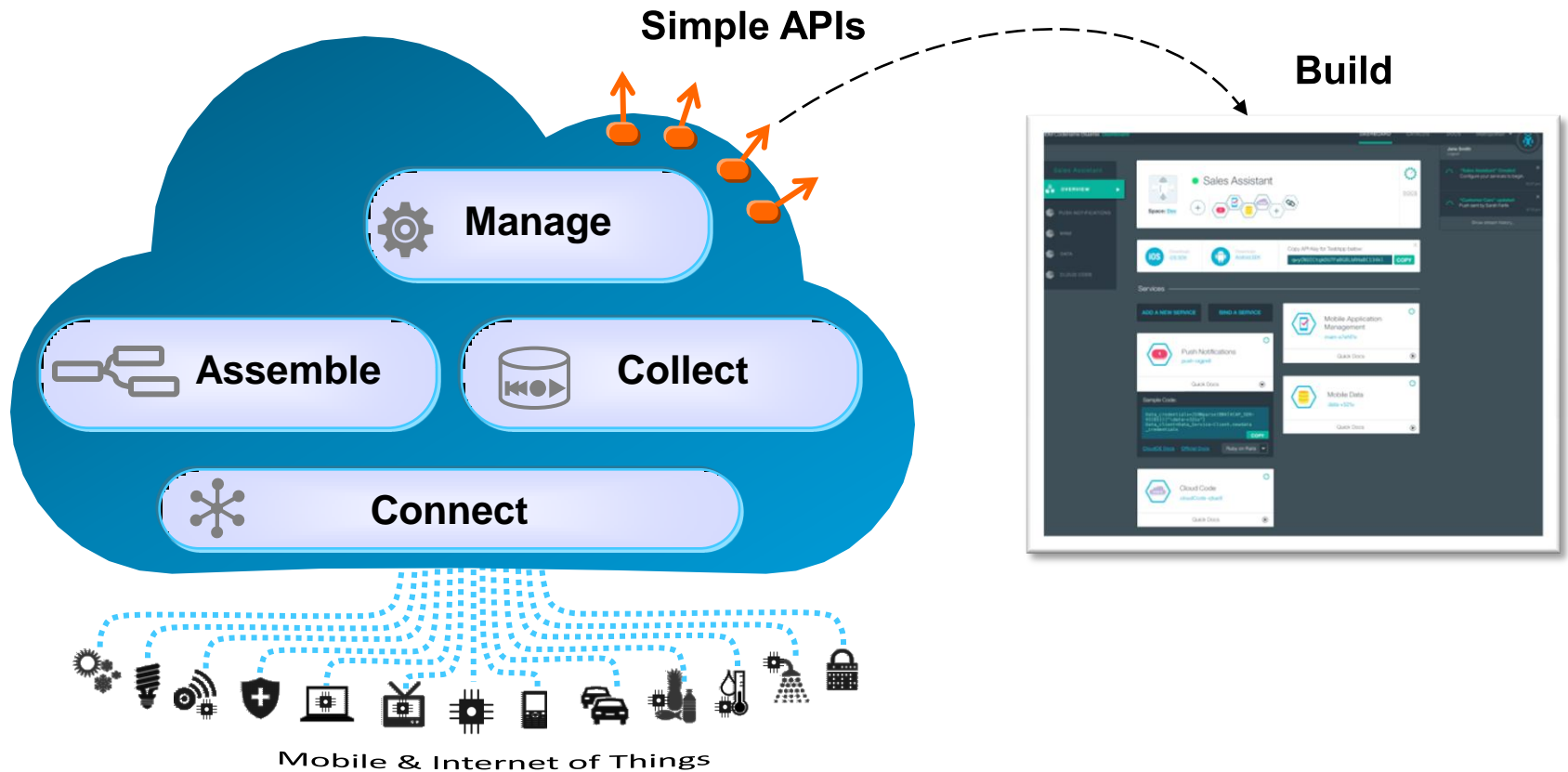
## Core Requirements

- Easily on-board connected “things”
- Create a real-time communication channel with the “thing”
- Begin capturing data from the “thing”
- Visualise the data from the “thing”
- Collect data in a historian DB
- Provide access to the collected data
- Manage the “things” and the connectivity to them
- Secure the data from the “thing” and control access to that data
- Pay for the service based on usage

## Extended Requirements

- Perform analytics both in real-time and on historical trend data
- Trigger events based on specific data conditions
- Interact with the “thing” from business apps and/or from mobile devices
- Send commands to the “thing”

# IBM Internet of Things Foundation **Today**



# Try our Internet of Things QuickStart ...

IBM Internet of Things Cloud

IoT Cloud DevWorks BlueMix

IBM

Welcome Data Dashboard

Ready to view data?

MAC Address

Go

Cloud-connect your Things in minutes  
Write apps that use the data from real physical devices

What next?

Want to find out more as we introduce incremental early access Internet of Things capabilities for you to try?

Register here to be notified as more function is made available.

Register

**Are you ready to connect your device to our Internet of Things Quickstart?**  
Just enter your device ID and click Go.

**Do you need to set up your device?**  
Follow our simple recipes to configure, connect and visualize.

**Take the next step**  
Build an app using Internet of Things data with our BlueMix application development platform.

[www.internetofthings.ibmcloud.com](http://www.internetofthings.ibmcloud.com)

# Internet of Things is part of our **Bluemix** Platform

**IBM Bluemix** DASHBOARD CATALOG PRICING DOCS COMMUNITY npostle@uk.ibm.com

*Starters // Choose a package of sample code and services, or start from scratch*

### Boilerplates

Get started with a new app, now

- Java DB Web Starter (IBM)
- Java Web Starter (IBM)
- Mobile Cloud (IBM)
- Node JS Web Starter (IBM)
- Internet of Things Starter (Community)
- Node-RED Starter (Community)

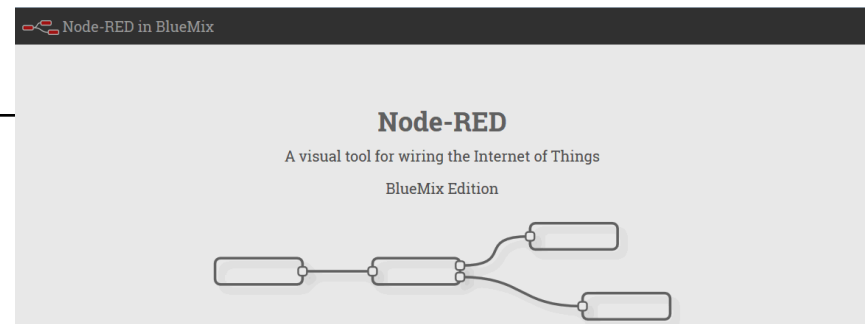
### Internet of Things

A new generation of applications

- Internet Of Things (IBM BETA)
- Wearable Fitness (Community)

IBM Cloud: Think it. Build it. Tap into it.

## Node-RED in Bluemix



The screenshot shows the Node-RED interface in a browser window. The address bar displays `iot-nodered.ng.bluemix.net/red/`. The browser's search bar contains "DuckDuckGo". The Node-RED interface includes a "Deploy" button and a menu icon. On the left, there are panels for "inputs" and "outputs". The "inputs" panel lists: inject, mqtt, http, websocket, tcp, udp, and iot. The "outputs" panel lists: debug and mqtt. The main workspace, titled "Sheet 1", contains a flow diagram with the following nodes: a blue "iot" node with the MAC address "25:91:FE:BE:C3:53", a green "device data" node, an orange "temp" node, a yellow "temp thresh" node, two orange nodes labeled "safe" and "danger" (each with a curly brace icon), and a green "cpu stat" node. The flow starts with the "iot" node connected to "device data", which then connects to "temp". "temp" connects to "temp thresh", which then branches into "safe" and "danger". Both "safe" and "danger" connect to "cpu stat".

# What You Can Do

- **Select from a growing list of device recipes**
- **Simply connect & “recognize” device types**
- **Visualize real-time data stream**
- **Visually define logic flows using Node-RED**

### Device Recipes

Pick from the recipes below to connect a real physical device to the Internet of Things. We'll be adding new device recipes over time, but if you've got your own device there's nothing to stop you improving with it!

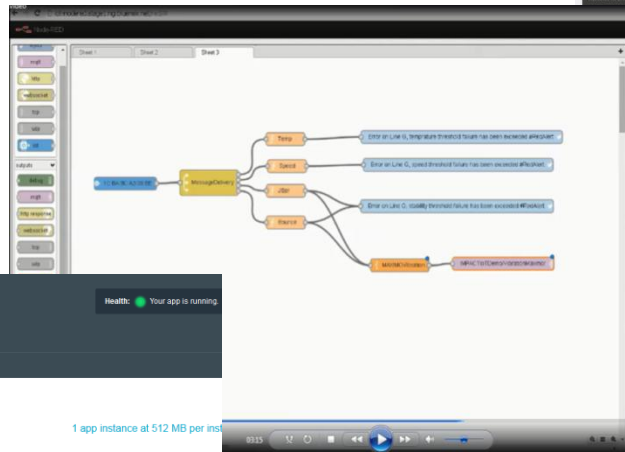
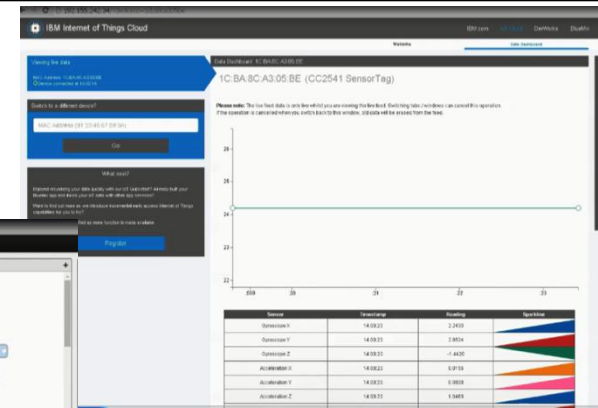
ARM  
mbed

Texas Instruments  
SensorTag +  
BeagleBone

intel  
Galileo

Raspberry Pi  
Model B

Improvise  
my own device



myIoTstarter application interface. The top section shows 'App Runtime' with a 'Node-RED' service icon and the text '1 app instance at 512 MB per instance'. The bottom section shows 'Services' with 'InternetOfThings' and 'TimeSeriesDatabase' services listed.

- **Mix with other services in BlueMix**
- **Build applications that incorporate IoT**

## Internet of Things Foundation **Beta**

New in July !

- **Open beta** program
- Allows more permanent usage of the IoT service in a secure fashion
  - Provides **user & device registration** function
- Users can **register and add up to 10 devices** to an IBM ID
  - With 10 subscribing apps per account
- **Security** of data, the device and the communications channel
  - TLS + authentication and authorisation for devices & applications
- Allows publish of information to registered devices (i.e. **send commands** to devices)
- Allows embedded device developers to be able to change data device is producing with minimal coding
- **Inbuilt historian** with API for time series data access



# Internet of Things Foundation **beta**

New in July !

IBM Internet of Things Cloud

IoT Cloud Recipes Quickstart Log In

The IBM Internet of Things (IoT) Cloud: a platform for the creation of innovative end-to-end solutions

Try it out with our Quickstart Sign up now for our Beta

To start with, the IBM IoT Cloud Beta will enable you to

- Create an Organization
- Register **up to** 10 devices to your Organization
- Securely connect your devices to the service
- Have devices send events to the cloud and receive commands from the cloud
- Store device events for 7 days
- Create API-Keys to access your data from applications in Bluemix or elsewhere

Sign up now for our Beta

Get some inspiration for IoT Solutions

- Alerts to your mobile**  
Recreate the 2014 IBM
- The Internet of Fruit**  
IoT combined with Makey
- Controlling Drones**  
Hover, rotate and even do

# Example Device addition



IBM Internet of Things Cloud

Organization: DefaultOrg (zphstd)

Devices (1) API Keys (0) People (1)

This table shows the devices which have been added to your organization. Add and remove devices, or see more information on a device to view and chart the data being received by the IoT Cloud. If you want to share the data from your devices outside of the IoT Cloud, use the API Keys tab.

[Add Device](#) [Remove Device\(s\)](#)

ID	Date Added	Added By	Type	Options
123456789112	Tue Jul 15 2014	npostle@uk.ibm.com	Texas Instruments CC3200	<a href="#">Remove</a>

[Add Device](#)

IBM Internet of Things Cloud

Organization: DefaultOrg (zphstd)

Devices (0) API Keys (0) People (1)

Welcome to your IBM IoT Cloud

You have no devices registered and connected to your organization yet. View our sample [Recipes](#) to see the devices we support and what you can do with them.

*Please note: During the Beta, all data from connected devices will be stored for 7 days in our database.*

[Add Device](#)



IBM Internet of Things Cloud

Device Registration

**ADD DEVICE** Step 2 of 2

**Connect Your Device**

Your devices must be registered with a unique credential to ensure that only people in your organization can see the data.

Your Texas Instruments CC3200 has been added, but it will not send data to your organization until you add this credential.

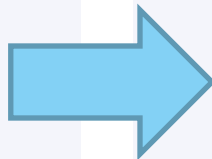
- Take note of or copy the following information for device ID 123456789112

```
org=zphstd
type=iotsample-ti-cc3200
id=123456789112
auth-method=token
auth-token=Xgjj@b1iu@JJSYb@7a
```

*Authentication tokens are non-recoverable, if you misplace this token during the beta you will need to re-register the device to generate a new authentication token.*

- Copy the unique credentials into the device configuration file on your device. [Find out how](#)

[Done](#)



IBM Internet of Things Cloud

Device Registration

**ADD DEVICE** Step 1 of 2

**Register Device**

To help you get the IoT Cloud connection software onto your device, visit our [Recipes](#).

Let us know your device type and device ID (for example, the MAC address), so the device can be associated with a selected organization.

Device Type:

Organization: DefaultOrg

Device ID:

[I don't want to add this device](#) [Continue](#)

## Informix Time Series technology underpins the IoT Foundation

- **Performance**
  - Loads hundreds of thousands of records per second
  - Time series queries run orders of magnitude faster than purely relational
  - Performs operations hard or impossible to run in traditional database
  - Combine time series and spatial data
- **Space Savings**
  - Saves at least **50%** over traditional relational database storage
- **Flexibility**
  - Develop proprietary algorithms to run inside the database
  - Join time series, relational, and spatial data all in the same query
- **Simplicity**
  - Integrates easily with any ODBC/JDBC based tools and applications
  - Conceptually closer to how users think of time series

# Building an **Internet of Things PaaS** on the power of **BlueMix**



**Big Data and Analytics.**



**Cloud Integration**



**Dev Ops**



**Watson**



**Cloudfant**



**SQL Database**



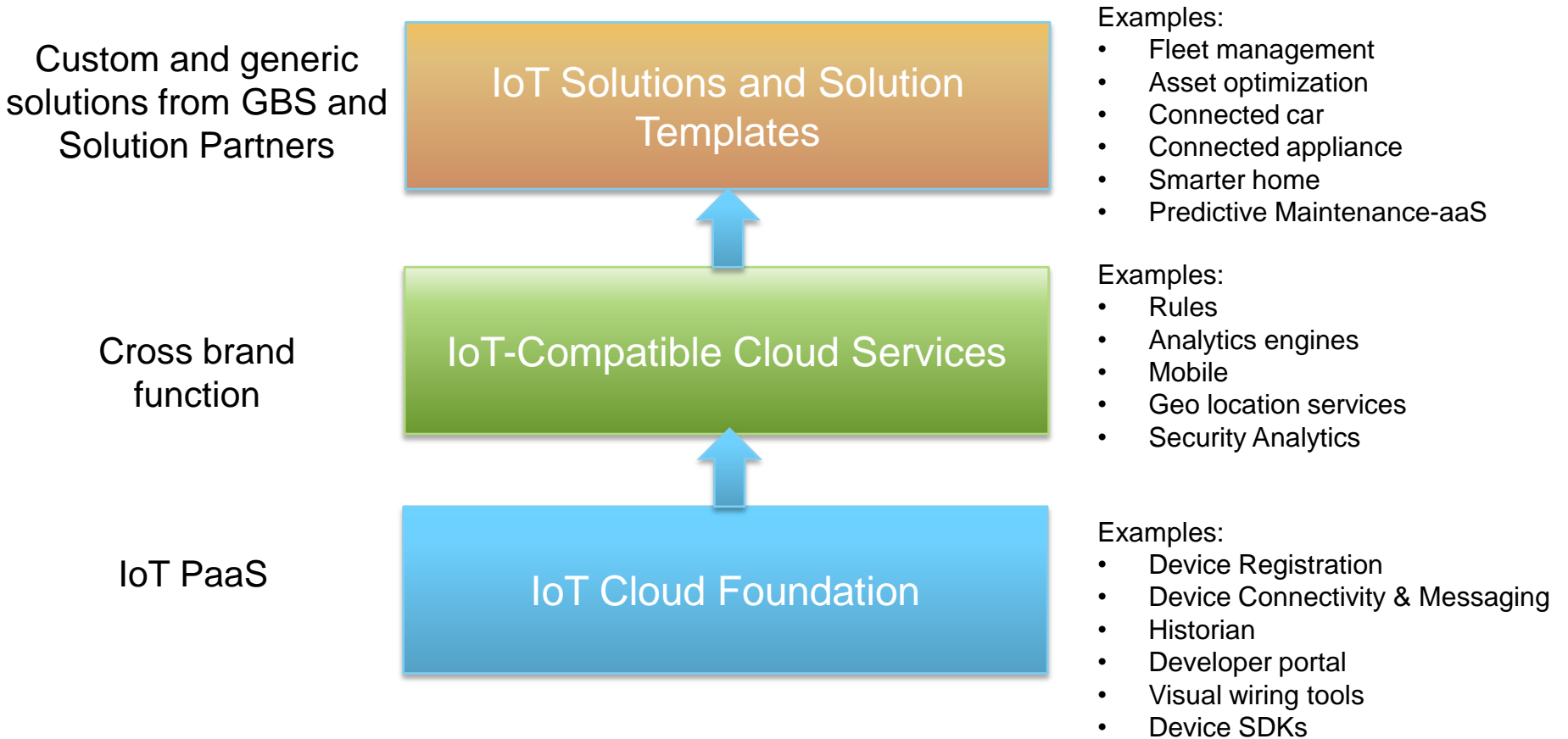
**Cloud Code**



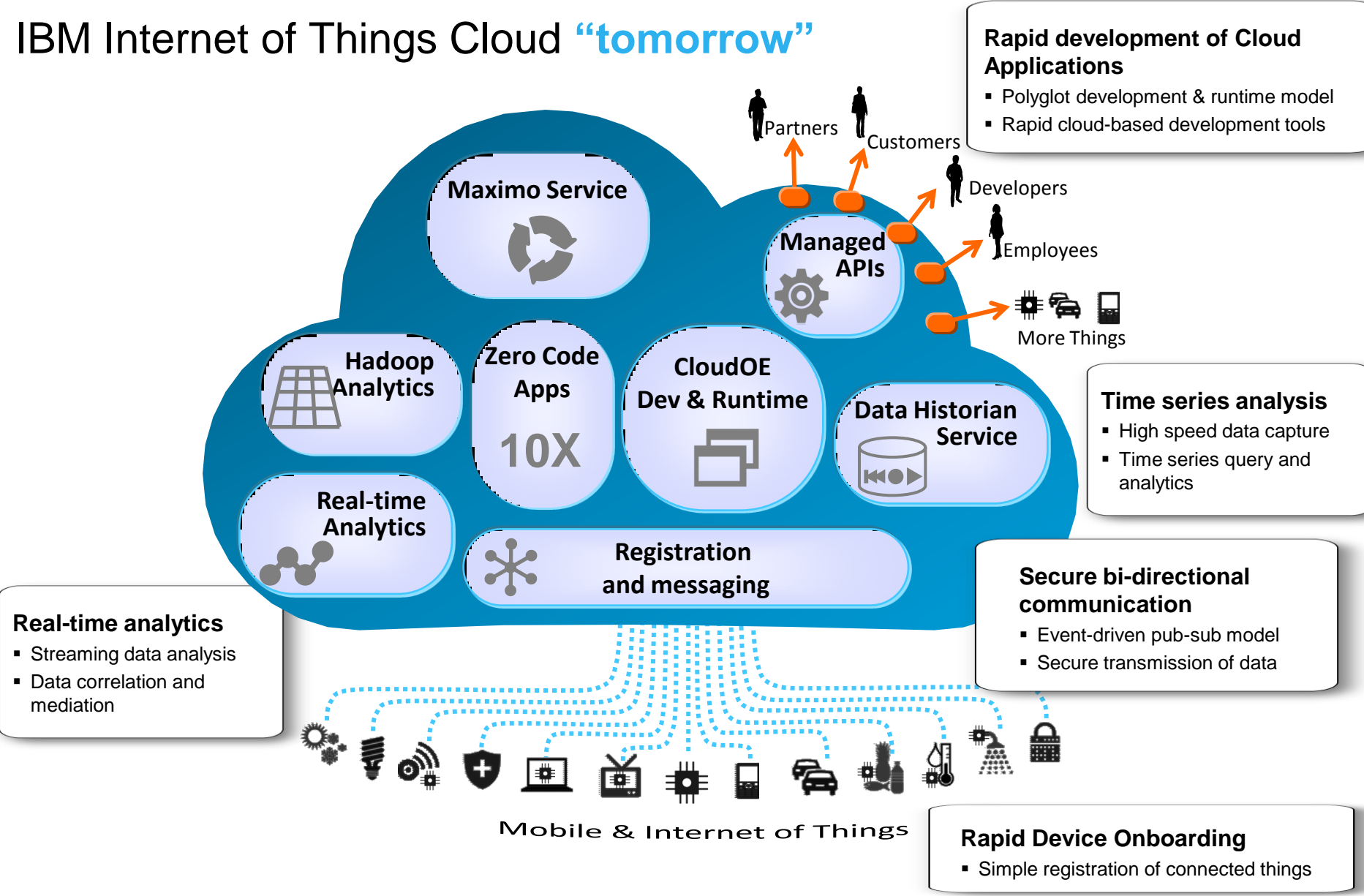
**Push Notifications**



# IoT Cloud Layers for **Composable Business**



# IBM Internet of Things Cloud "tomorrow"



**Rapid development of Cloud Applications**

- Polyglot development & runtime model
- Rapid cloud-based development tools

**Time series analysis**

- High speed data capture
- Time series query and analytics

**Secure bi-directional communication**

- Event-driven pub-sub model
- Secure transmission of data

**Real-time analytics**

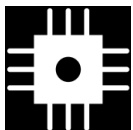
- Streaming data analysis
- Data correlation and mediation

**Rapid Device Onboarding**

- Simple registration of connected things

## Summary

- IoT QuickStart, Bluemix IoT Service and IoT Foundation open beta
  - Get going now with set of typical embedded devices
- Function will be delivered incrementally (cloud delivery model)
- Internet of Things PaaS delivered using Bluemix services
  - some will migrate into core “IoT Cloud Foundation” over time
- Production ready end of 3Q 2014
- Ongoing partnership announcements across the ecosystem



**instrumented**



**interconnected**



**intelligent**

## Next Steps

### 1. Think about how Internet of Things will change *your* business

- Learn from those already on their journey
- Focus on monetizing, optimizing, extending or controlling your world

### 2. Learn more

- Try [IBM Internet of Things Cloud Quickstart](#)
- Play with [Node-Red](#)
- Start using [Bluemix](#)

### 3. Get Involved

- Use the [Internet of Things Foundation beta](#) – share your feedback

### 4. Schedule Internet of Things Workshop

- Speak to your IBM representative about a best practices workshop including exploration of use case & value assessment





## Resources

- Try our Internet of Things Cloud Quickstart at [internetofthings.ibmcloud.com](http://internetofthings.ibmcloud.com)
- Check out recipes to connect your devices & learn how to build a Bluemix IoT app  
[ibmdw.net/iot](http://ibmdw.net/iot)
- Stay social ... follow & interact  
[@IBMIoT](https://twitter.com/IBMIoT)  
[twitter.com/IBMIoT](https://twitter.com/IBMIoT)
- Check out articles on our blog  
[ibminternetofthings.tumblr.com](http://ibminternetofthings.tumblr.com)

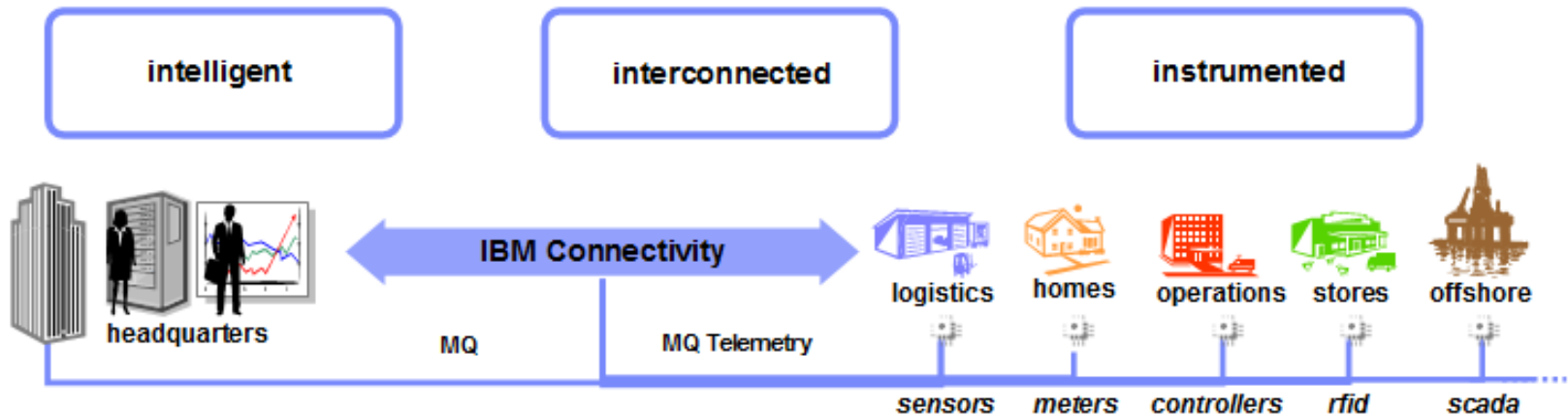
# Agenda

- Marketplace
- Deliveries
- Direction
- **BACKUP - Proof Points**

# MQTT – the protocol for the Internet of Things



- Messaging optimized for mobile, web, smart sensors & m2m devices
- Publish/subscribe paradigm
  - Simple communication to many devices
- Lightweight, low footprint & bandwidth, high performance
- Enables intelligent decision-making based on remote real-world events
- Remote management of static or moving assets, people, locations
- Open standard with Industry leadership & mindshare
  - MQTT Protocol and client code contributed to open source Eclipse Paho project
    - see [MQTT.org](http://MQTT.org) and [Eclipse Paho](http://Eclipse Paho)
  - Being standardised in OASIS currently



# IBM MessageSight

- Extends IBM’s Messaging leadership to the Internet for mobile applications and the Internet of Things
- Optimized to reduce data costs, power requirements and operational costs while bring a better/faster user experience to the mobile application and device worlds
- IBM’s proven OpEx-saving appliance form factor
- Based on open standards



**Designed for Mobile Apps and Devices**

- Optimized connectivity for Mobile Applications and devices
- Efficient open protocol
- Event-driven responsiveness
- Open and industry agnostic
- Fine-grained security policies

**Developer Friendly**

- Active dev community
- Free dev virtual appliance
- Simple yet powerful APIs
- Quick ramp messaging paradigm
- 40+ MQTT clients for all platforms

**Reduce OpEx Costs**

- Up and running < 30 minutes
- Task oriented web-based UI
- Designed to be operated in the data center with the skills of personnel who operate routers and other network gear

**Proven IBM Appliance Platform**

- Hardened Appliance Form Factor driven by secure firmware that can't be tampered
- No user-visible OS
- Can't be compromised by 3<sup>rd</sup>-party code
- Much more inexpensive to maintain than servers

**Integrates**

- JMS
- WebSockets
- MQ
- Integration Bus
- Worklight
- InfoSphere Streams
- Workload balancing across Application Servers

**Internet Scale**

- 13M non-persistent msg/sec
- 400K persistent msg/sec
- 1M concurrent connections
- Predictable microsecond latency under load
- Highly available

# What We Announced at **IMPACT**

## New IoT Cloud Service

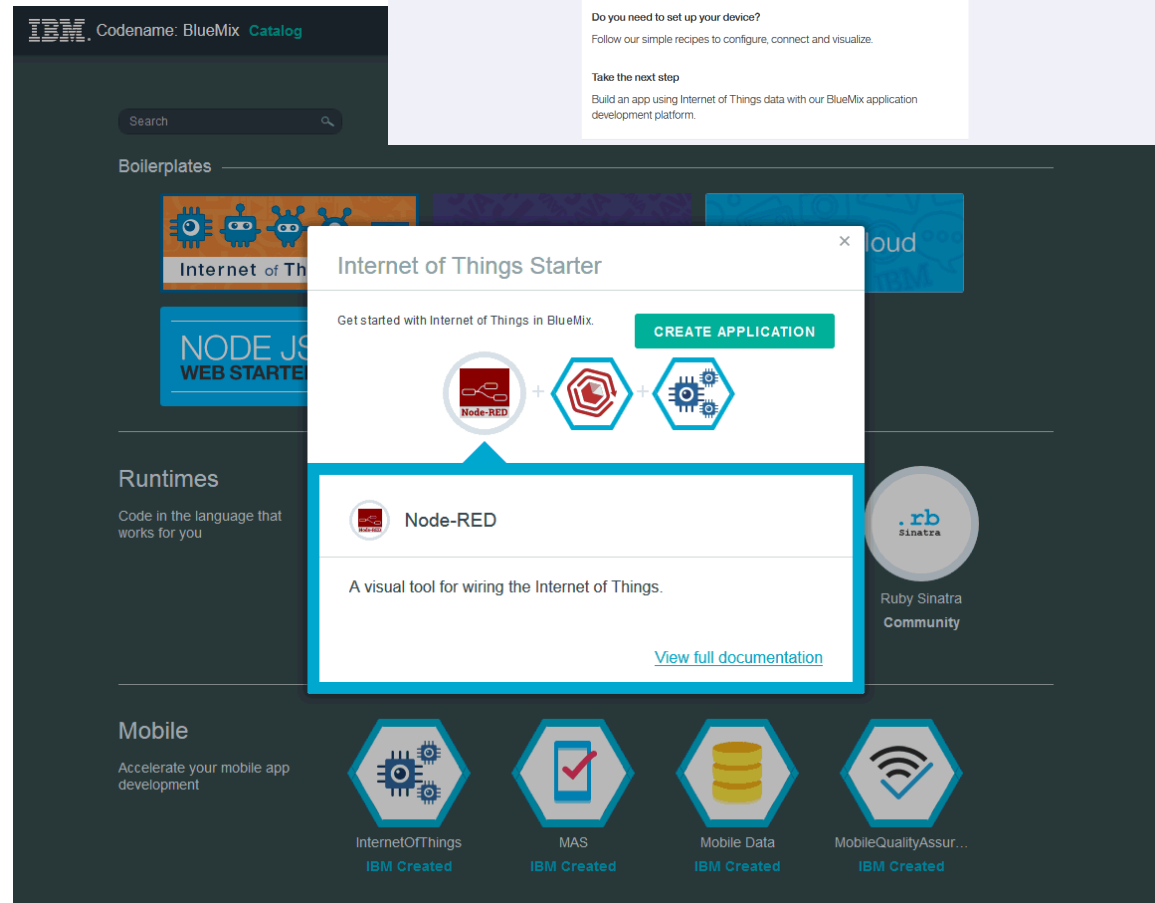
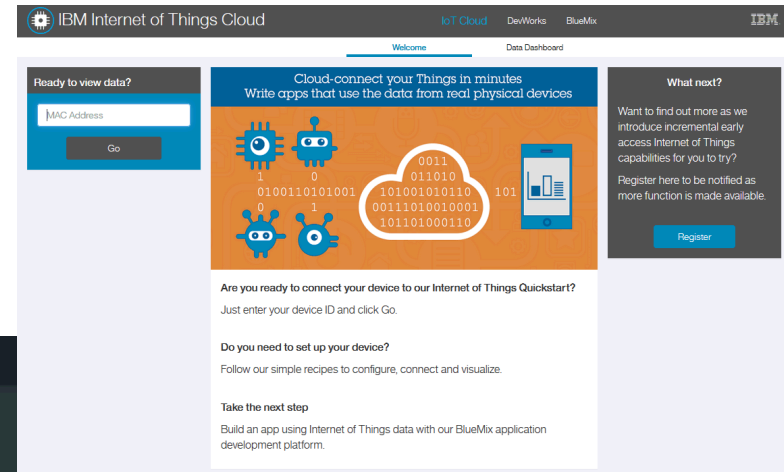
- Connect devices
- Create full-duplex real-time connections

## IoT Starter Boilerplate in Bluemix

- IoT Cloud Service
- Time Series Service
- Node-RED

## IoT Recipes

- Simple recipes for connecting common boards & chips



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