Delivering secure, real-time business insights for the Industrial world

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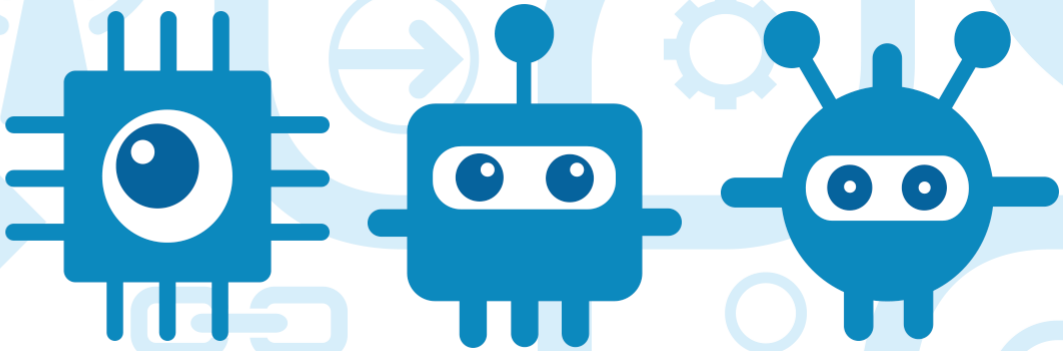
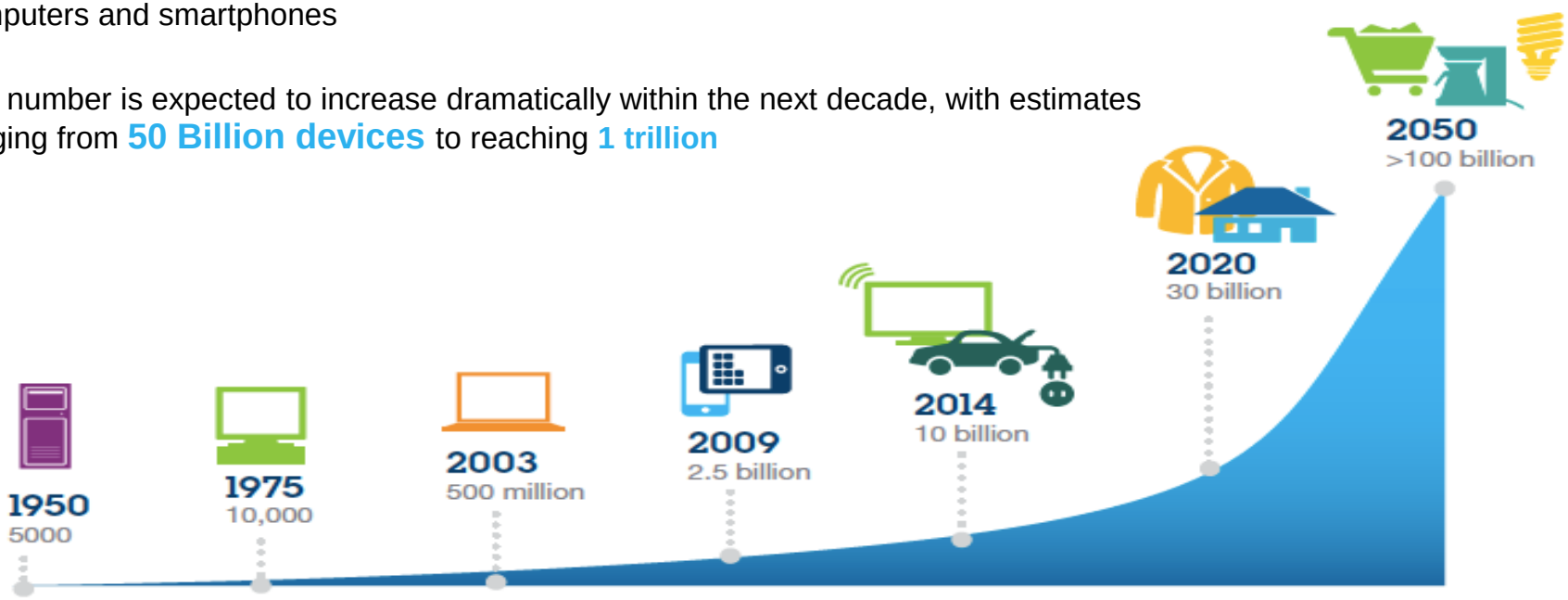


We are on the threshold of massive explosion of connected things

10 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

IoT is revolutionizing industries

Control

- Remotely affect behavior by controlling things
- Make remote adjustments

Optimize

- Improve efficiency of activities with data from things
- Anticipate & predict optimal actions and responses

Extend

- Provide more value through connected things
- Deliver data, content, services through things

Monetize

- Charge for usage that is tracked by things
- Enable Pay-per-use models of things

How get from Sensors to Business Insight

Connect

Collect

Manage

Assemble

Insight!!

Step 1: Connect

Connect

Collect

Manage

Assemble

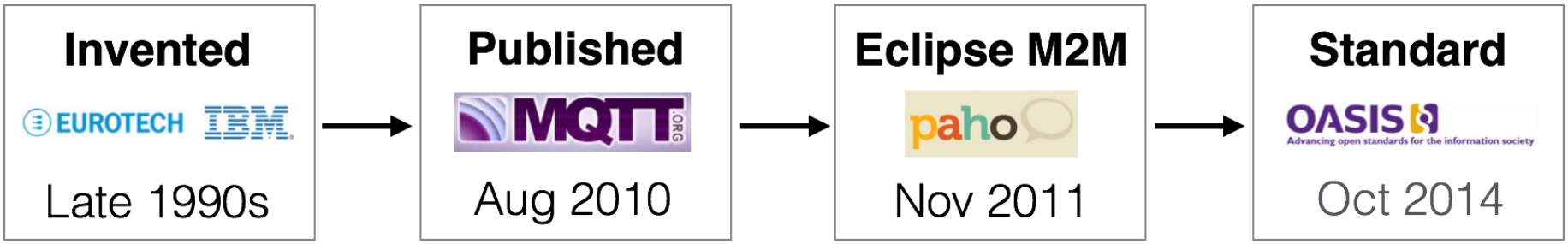
Insight!!

Connecting IoT devices brings new Challenges

- Volume (cost) of data being transmitted (especially with limited data plans)
- Power consumption (battery powered devices)
- Responsiveness (near-real time delivery of information)
- Reliable delivery over fragile connections
- Security and privacy
- Scalability

MQTT lightweight reliable messaging

- **open** open spec, standard 40+ client implementations
- **lightweight** minimal overhead efficient format tiny clients (kb)
- **simple** 43-page spec connect + publish + subscribe
- **bi-directional** full duplex communications
- **reliable** QoS for reliability on unreliable networks



MQTT is truly lightweight

small header size

PUBLISH 2-4 bytes
CONNECT 14 bytes

HTTP 0.1-1 KB

binary payload (not text)

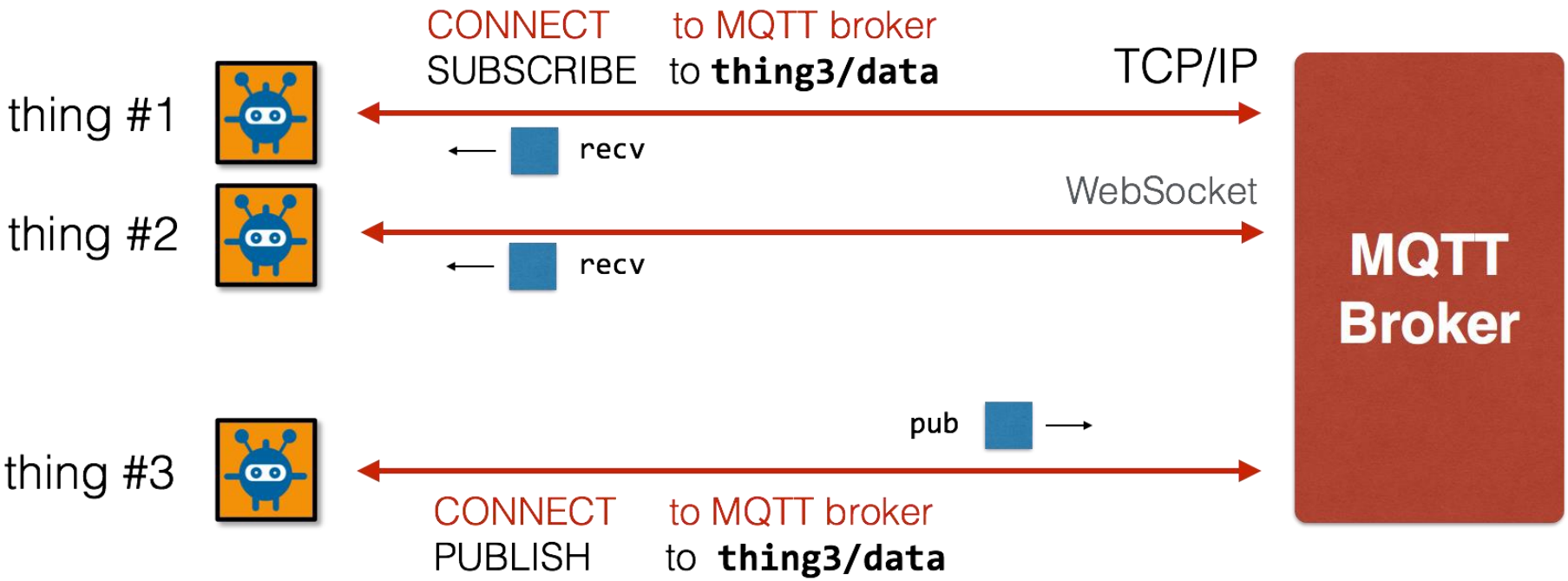
small clients: 30 KB (C), 100 KB (Java)

minimal protocol exchanges

MQTT has configurable keep alive
(2 byte PINGREQ / PINGRES)

efficient for battery life: http://stephendnicholas.com/archives/1217

MQTT is bi-directional pub-sub



MQTT is simple to implement

Connect

Subscribe

Publish

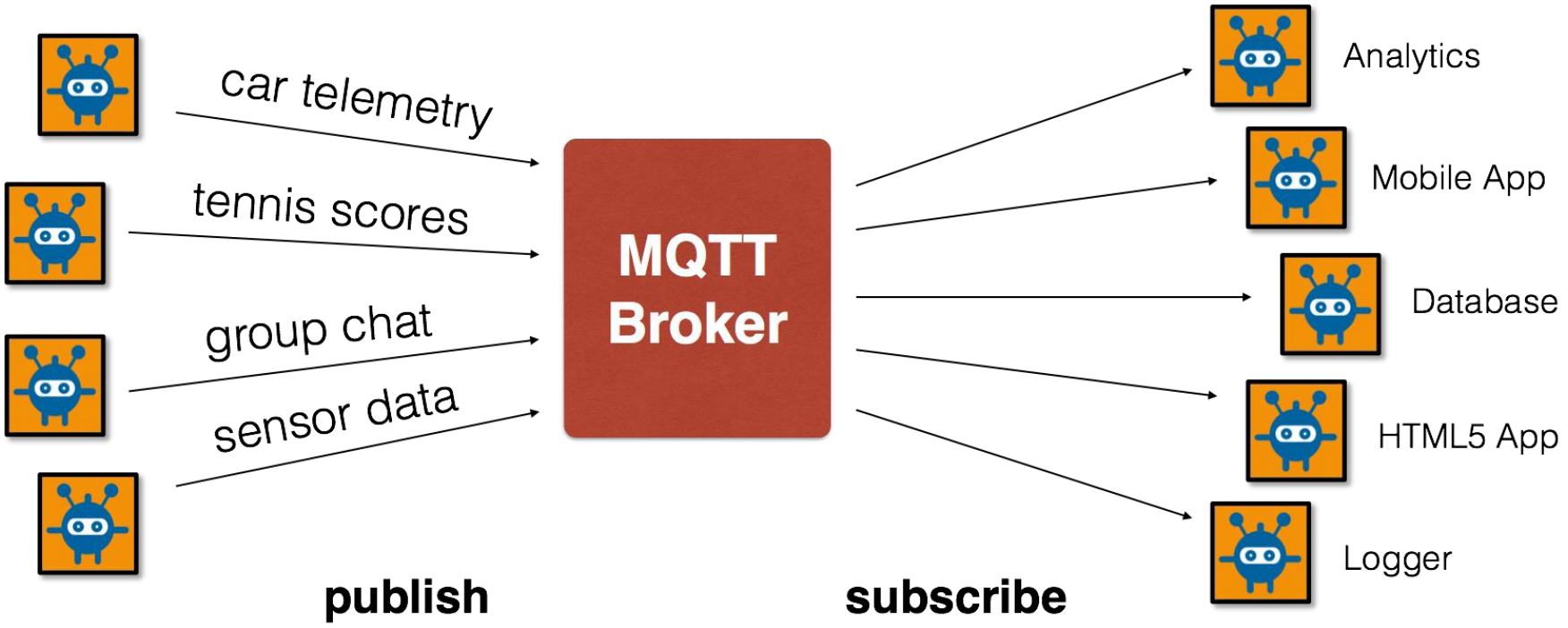
Unsubscribe

Disconnect

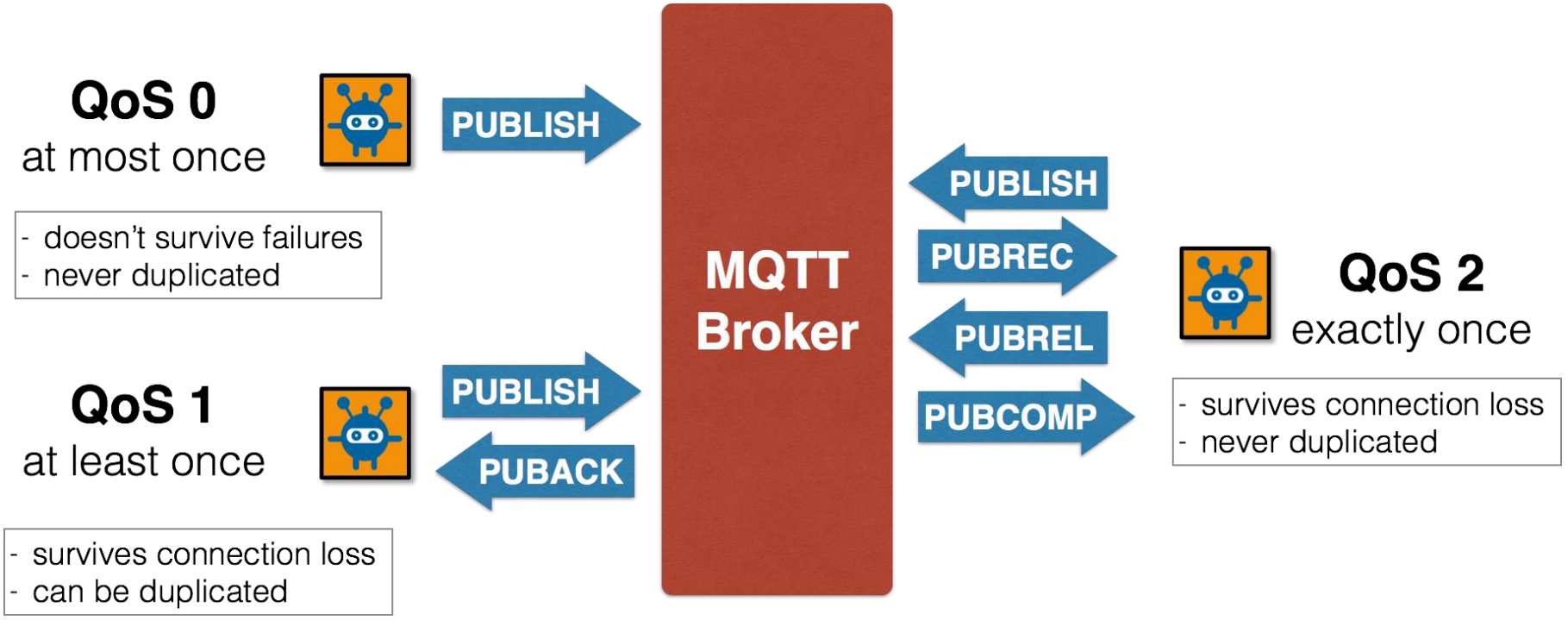
```
client = new Messaging.Client(hostname, port, clientId)
client.onMessageArrived = messageArrived;
client.onConnectionLost = connectionLost;
client.connect({ onSuccess: connectionSuccess });

function connectionSuccess() {
     client.subscribe("planets/earth");
     var msg = new Messaging.Message("Hello world!");
     msg.destinationName = "planets/earth";
     client.publish(msg);
}

function messageArrived(msg) {
     console.log(msg.payloadString);
     client.unsubscribe("planets/earth");
     client.disconnect();
}
```

Eclipse Paho JavaScript MQTT client

PUB/SUB decouples senders from receivers



MQTT is reliable



Securing the communication

- MQTT spec doesn't define security model aside from username/password authorization on connection
- Brokers *can* implement support for SSL/TLS and policies for connection and messaging

ex. organize topic space by "group"
username associated with a group

bboyd is in group "IBM" and can pub/sub **`IBM/bboyd/#`**

Step 2: Collect and Manage

Connect

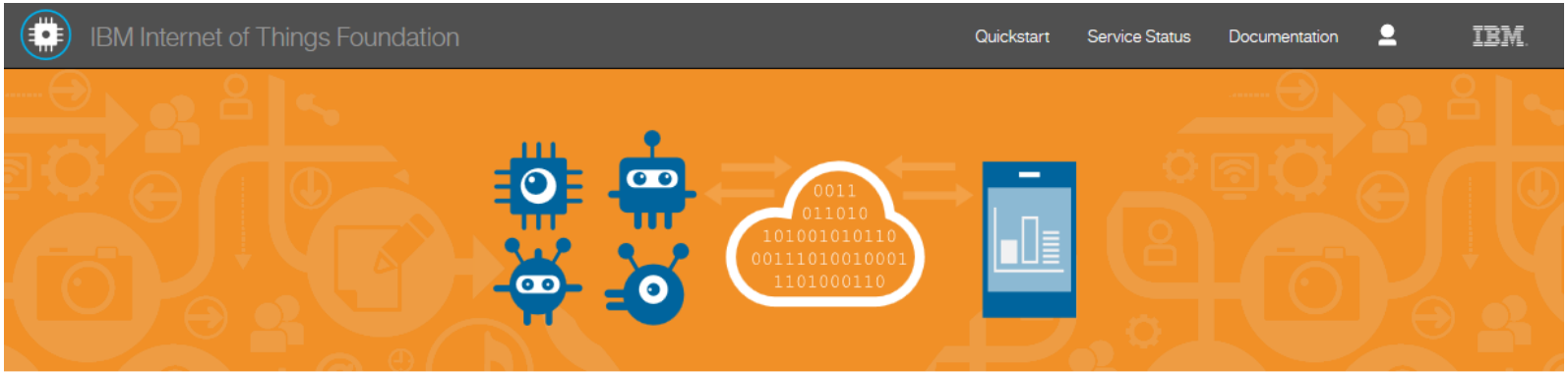
Collect

Manage

Assemble

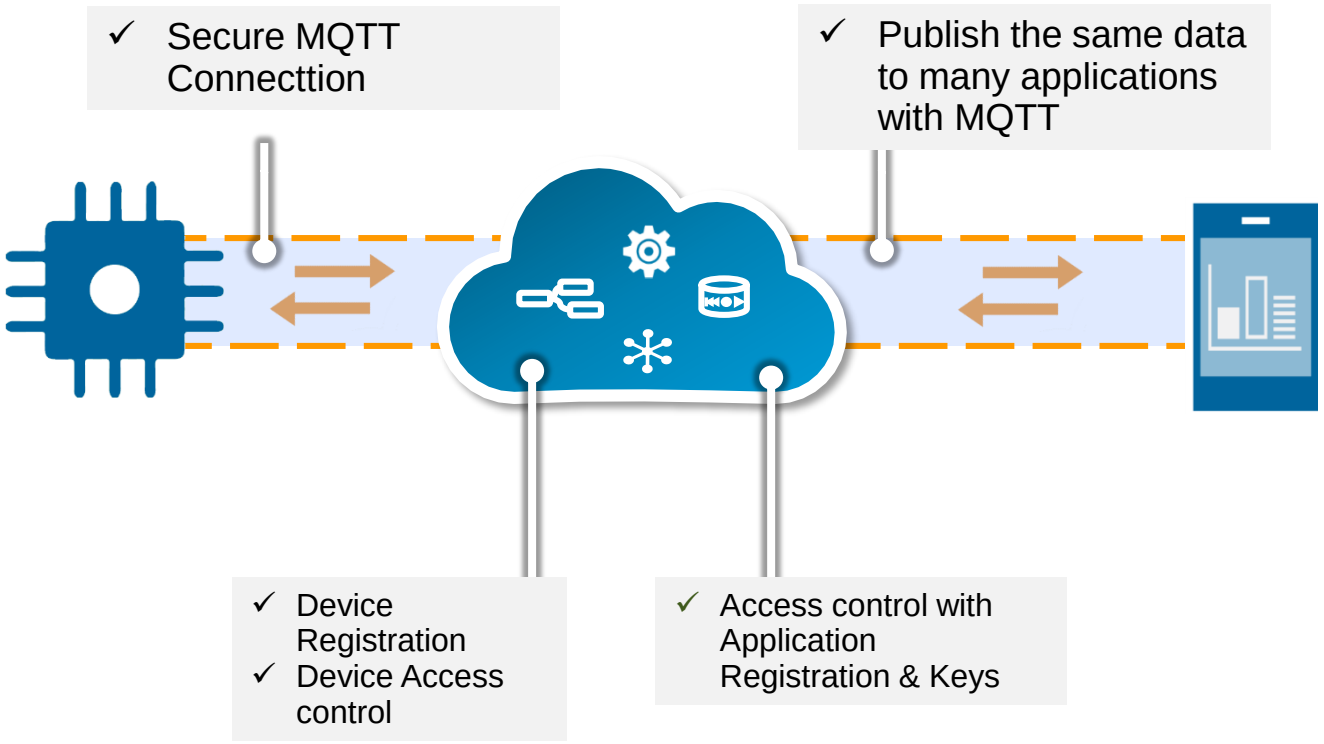
Insight!!

IBM Internet of Things Foundation



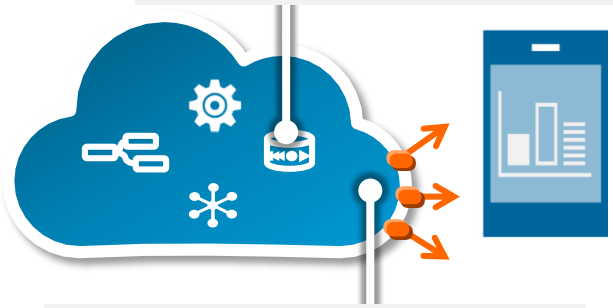
A fully managed, cloud-hosted IoT service to quickly derive value from connected devices

Cloud-hosted Service to securely connect Devices and Applications

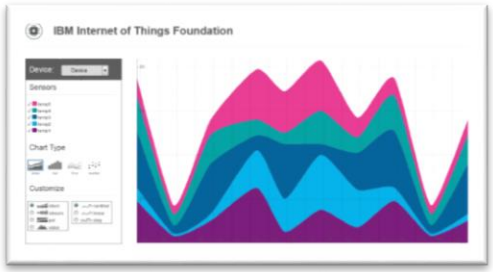


Cloud-hosted IoT Service for collecting IoT data

- ✓ Time based store of Historical Data
- ✓ Via built in Time-series database technology



- ✓ Data access for Visualisation
- ✓ Data access for Analytics
- ✓ Via Historian REST APIs
- ✓ Via visualisation recipes



Cloud-hosted IoT Service for Managing

- Remotely monitor the connectivity of devices
- See the last messages sent
- Disable device and application connections
- Understand service status

✓ Device dashboard
✓ Register/Deregister device or application
✓ Service dashboard and tweets @IoTFNotify

Step 3: Assemble and get Insight!

Connect

Collect

Manage

Assemble

Insight!!

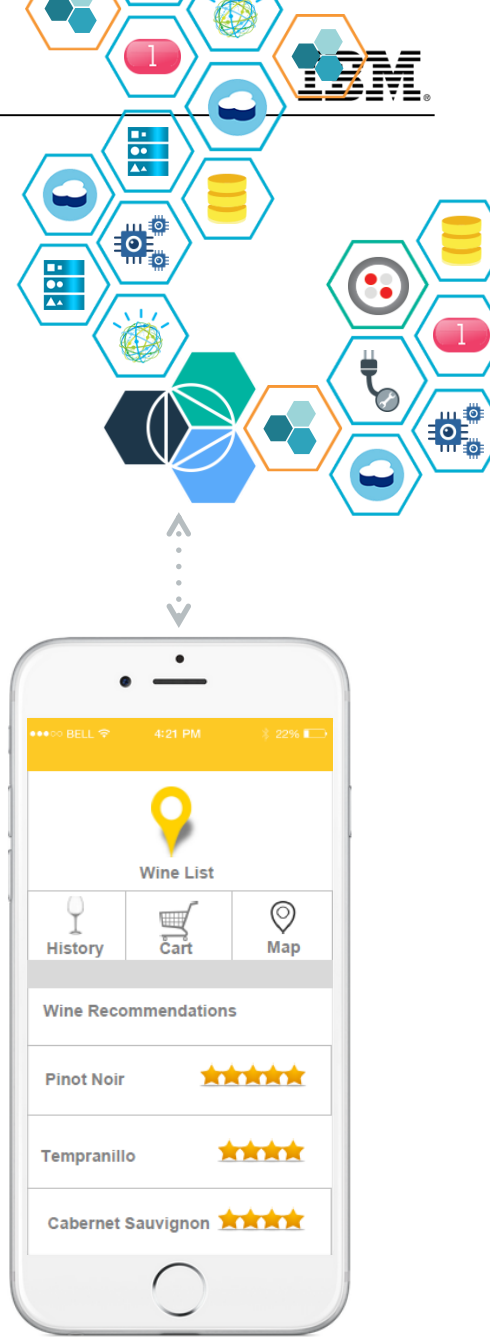
IBM **Bluemix**

The Digital Innovation Platform

Focus on building differentiation and rent the rest

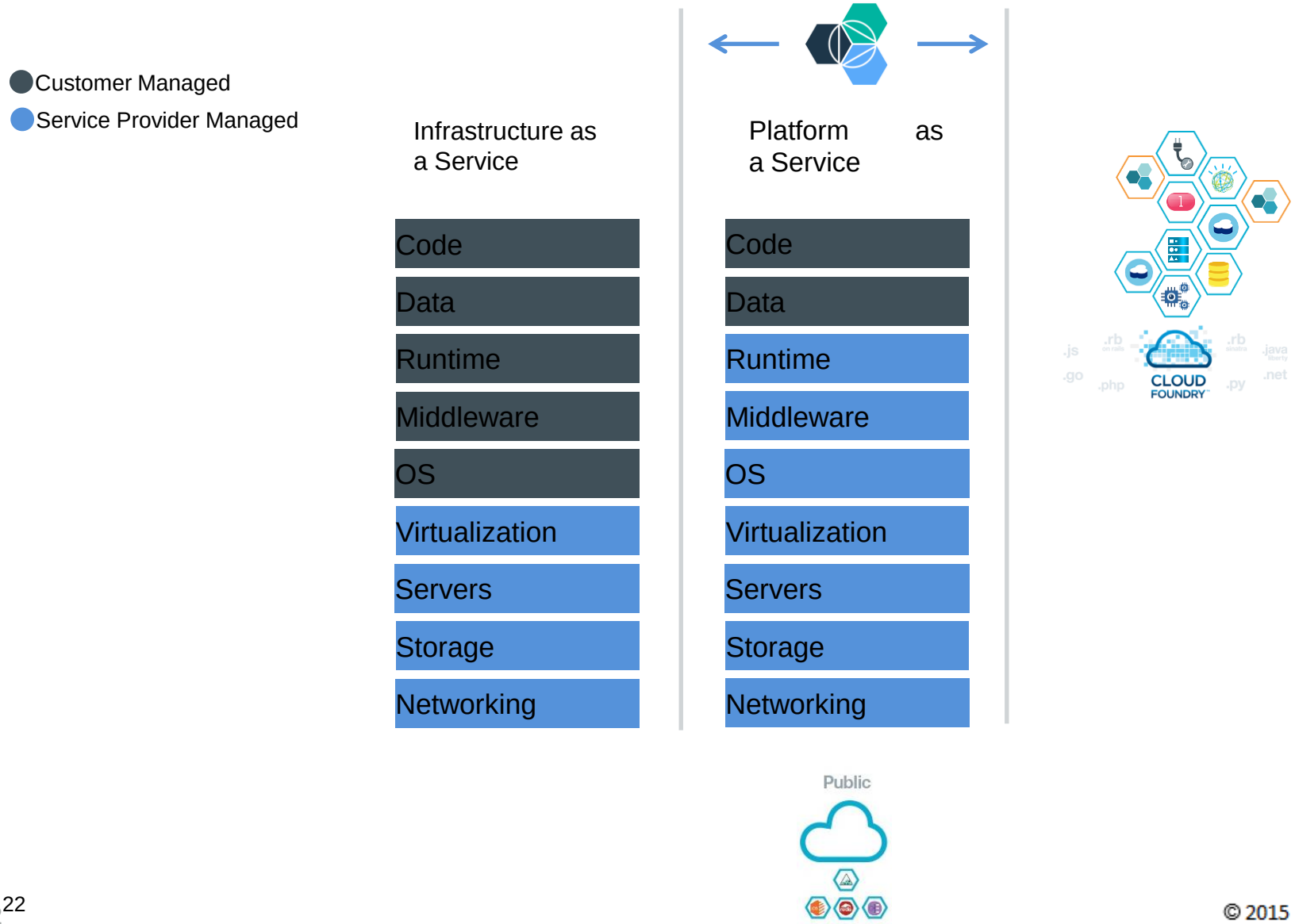
Devs can quickly compose apps with new APIs and digital services to add features and increase engagement in areas like:

Analytics, cognition
Mobile, location
Internet of Things
Social engagement
Identity
Reviews
Travel
Messaging
…
His/her company's private APIs and services



Bluemix started as a public PaaS

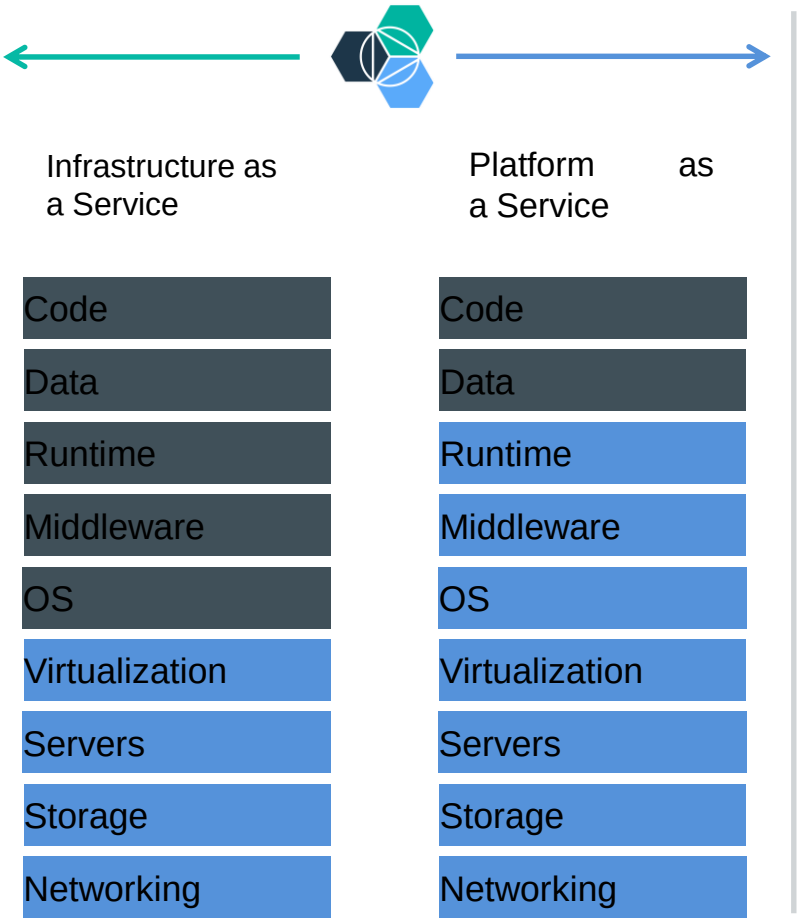
Bluemix started with a major focus on developer productivity in the public cloud.



Bluemix is now even more flexible.

Capabilities in Bluemix now span **PaaS** and **IaaS** and can be delivered as a **public**, **dedicated**, or **on-premises*** implementation.

- Customer Managed
- Service Provider Managed



Built on open technologies:

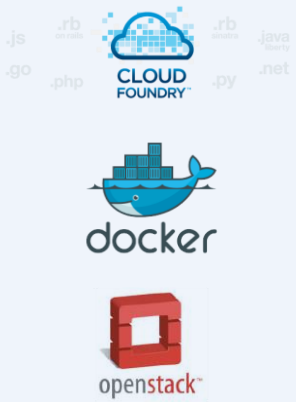
*Bluemix Local coming Summer 2015

An Open Platform

You choose how you build, deploy, and manage your apps. The platform takes care of the rest.

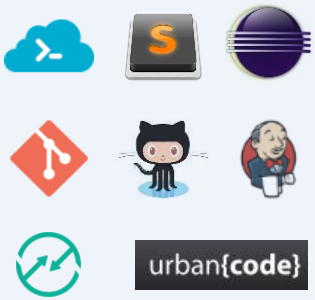
Compute

Choose the level of **infrastructure abstraction** based on your app's architectural needs.



Dev Tooling

From editors to source code management to continuous delivery, you can **use Bluemix' powerful tooling** or easily **bring your own**.



Location

Deploy apps to Bluemix **Public** (in a growing number of geos), your own **dedicated cloud** Bluemix, or one that runs **within your data center (Local*)**.

Services

Pick from a catalog of **IBM**, **third party**, **open source**, or **your own** services to extend your apps.

*Bluemix Local coming Summer 2015

Examples of Services available on the Platform

Geospatial Analytics: Connect to data sources that support the MQTT protocol and monitor devices as they move into geographic regions of interest.

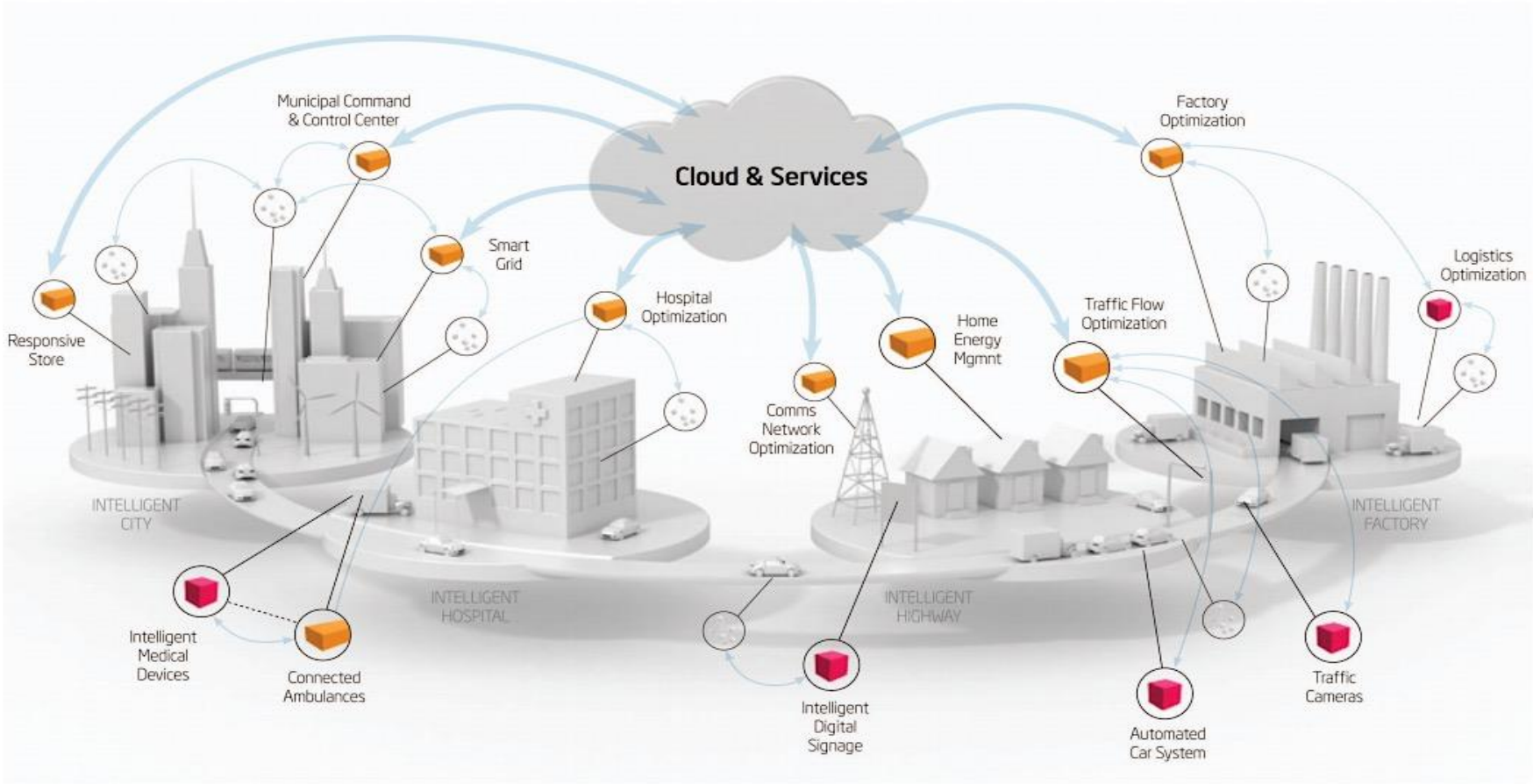
Dash DB: dashDB is a data warehousing and analytics solution. Use dashDB to store relational data, including special types such as geospatial data. Then analyze that data with SQL or advanced built-in analytics like predictive analytics and data mining, analytics with R, and geospatial analytics.

IBM Analytics for Hadoop: This service provides an easy way to access data on Hadoop clusters, build applications, and analyze structured or unstructured data. Visualize your findings in charts and graphs. You can bring your data into Hadoop for analysis without worrying about setting up or configuring Hadoop.

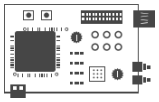
Times Series Database (powered by Informix): Consolidates and organizes massive amounts of time-stamped data for consistently fast analysis.

Node Red: Develop, deploy, and scale server-side JavaScript® apps with ease. The IBM SDK for Node.js™ provides enhanced performance, security, and serviceability.

Combining data from different sources in the Cloud creates new opportunities



Business Insight from Sensors



Your devices or gateways

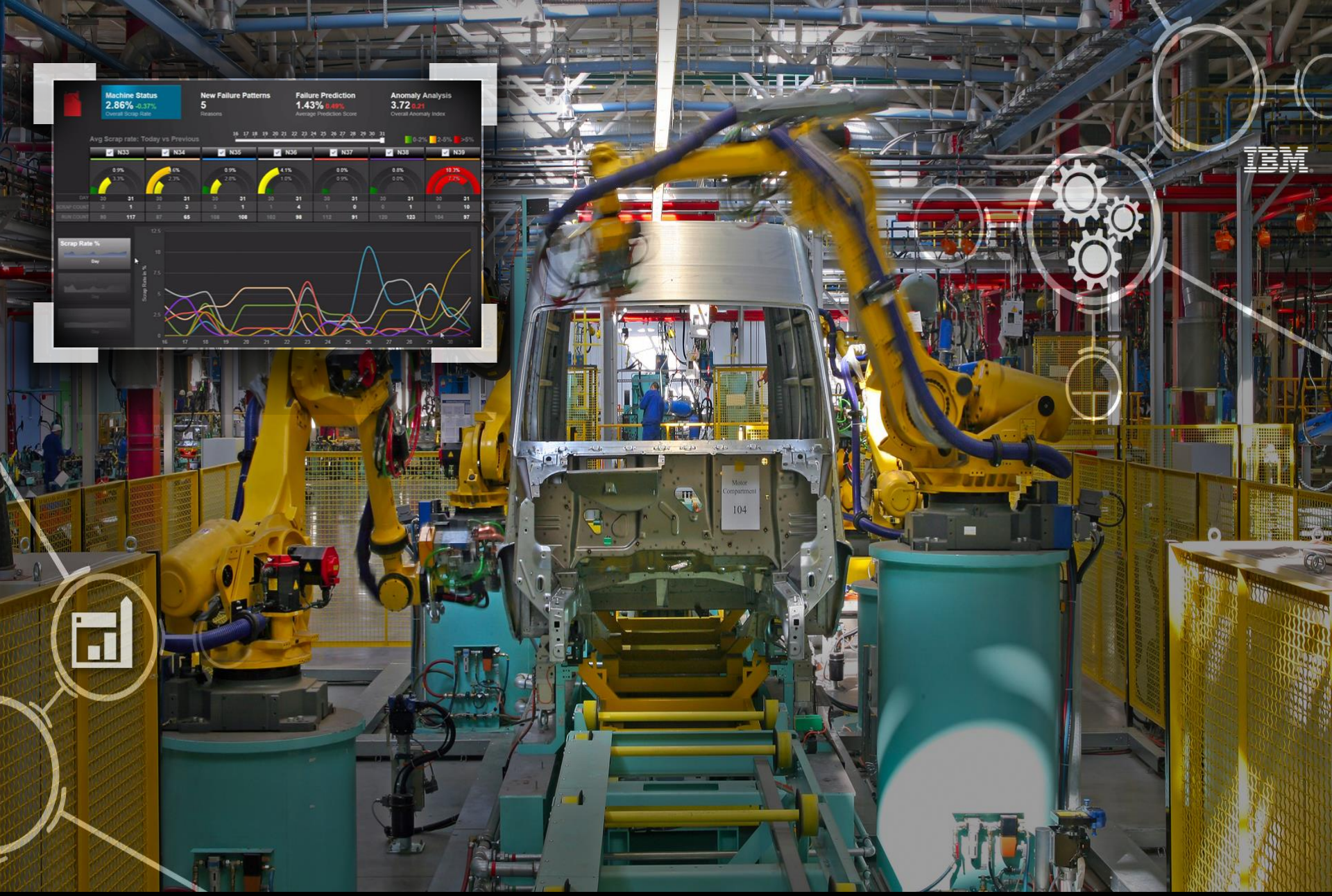
+

Internet of Things Foundation

+

=

Business Insight



#IoTnow

Better business performance from insights and interaction

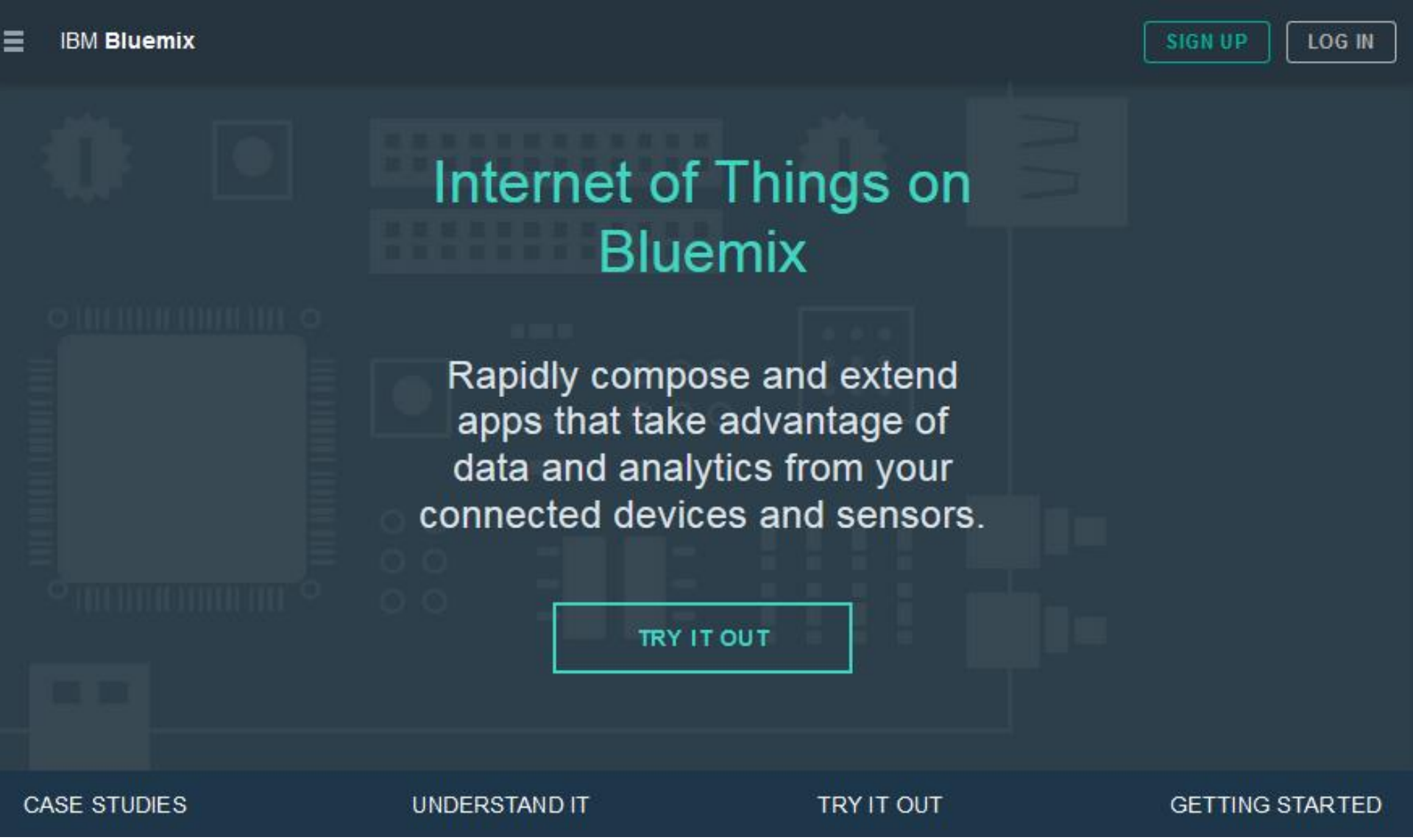
Asset Performance Management

decrease down time
lower operating costs
improve performance

Dynamically adjusted people flow

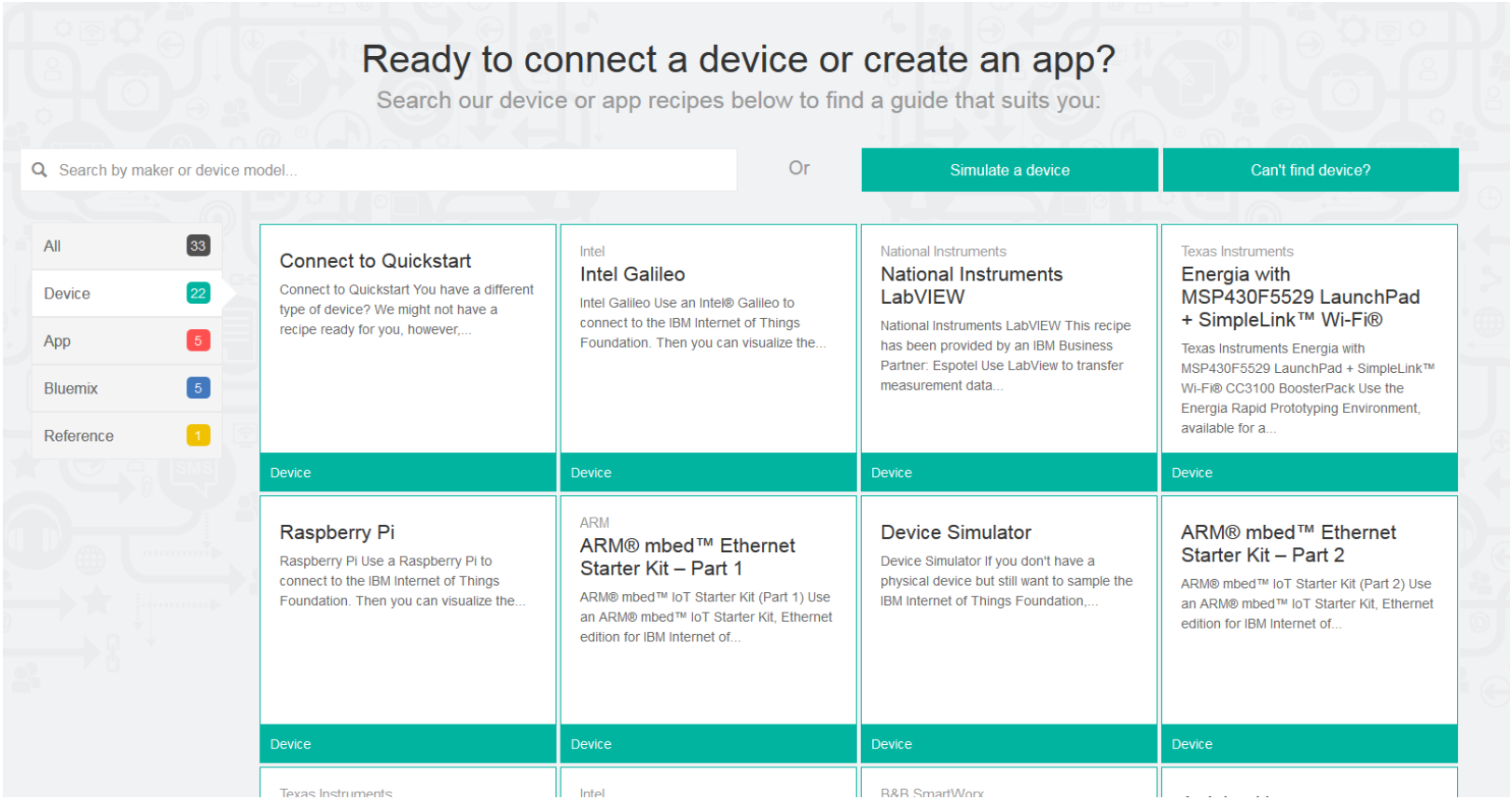
improving user experience through better control in busy environments

Demo – Time permitting



IoT Zone in **Bluemix** bluemix.net/solutions/iot

Recipes to get started Fast



Summary and Call to Action

- It is now easier than ever to connect devices to the Cloud
- With the right platform it is easy to collect many sources of data and compose services to get new Business Insights
- The world is ready for the next disruptor.

Who are **you** going to disrupt?