Analytics, Cognitive and IOT for Insurance

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Agenda

- IBM POV on IoT for Insurance
- The art of the possible - a demo and use case videos
- Review of IBM IoT4I solution details
- More on analytics
- Summary

Point of View on IoT for Insurance

What's Putting the World's Top Executives on Edge?

"The Uber Syndrome, where a competitor with a completely different business model enters your industry and flattens you."

CIO, Transportation, United States

"The boundaries of competition are becoming ambiguous."

Yong Eum Ban, CFO, JoongAng Media Network, South Korea

IBM Watson IoT

Can You See the Competition Coming?

- ✓ **Synergistic Partnerships**
  - ➢ Insurance Companies Partnering with IoT Enablers, Sensor and Auto Manufacturers
- ✓ **New Products from Current Competitors**
  - ➢ Products Enabled by IoT
- ✓ **Competing Products from Non-Traditional Competitors**
  - ➢ Auto Manufacturers and Retailers Selling Insurance, Telecoms with tracking programs, etc.

Carriers who exploit the insight and digital engagement available through IoT, analytics and cognitive will win in the market through new revenue sources, differentiated value/price positions and customer relevance

Seize Opportunities for Disruption Before Your Competitors Do

- To outthink challenges, competitors and limits, you must conceive of new opportunities you couldn't imagine before.

54%
of CXOs

Expect more competitors from outside their industry, while only 29% expect more competition from within their industry.

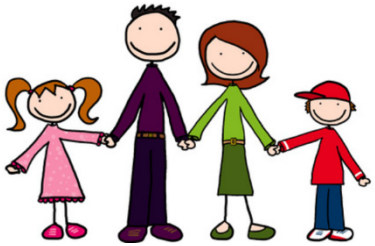
"The boundaries of competition are becoming ambiguous."

Yong Eum Ban, CFO, JoongAng Media Network, South Korea

"10-15% of our revenue in the next 2-3 years will not come from core insurance verticals"

Multiple *Top 10 Traditional U.S. P&C Carriers*

The Problem and the Battleground



@ Inception

Policyholders

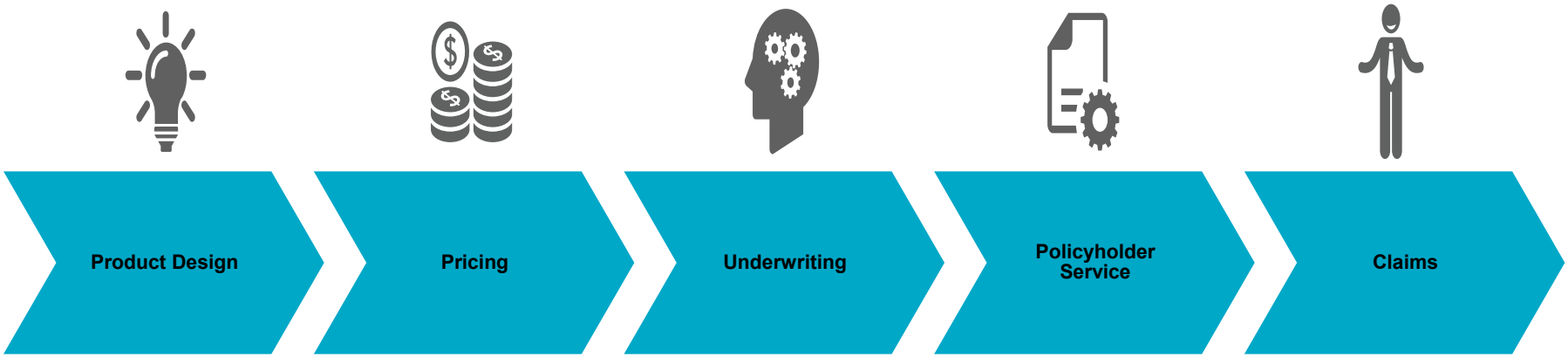
Snapshot of Exposure Information

Insurers

Policyholder Database

Who can make themselves a focal point of every day life for their customers?

IoT can impact every part of the insurance value chain



- Types of sensors
- Sensor output
- Type of network
- Feedback control effectiveness

- New data elements
- New pricing algorithms based on models/analyses

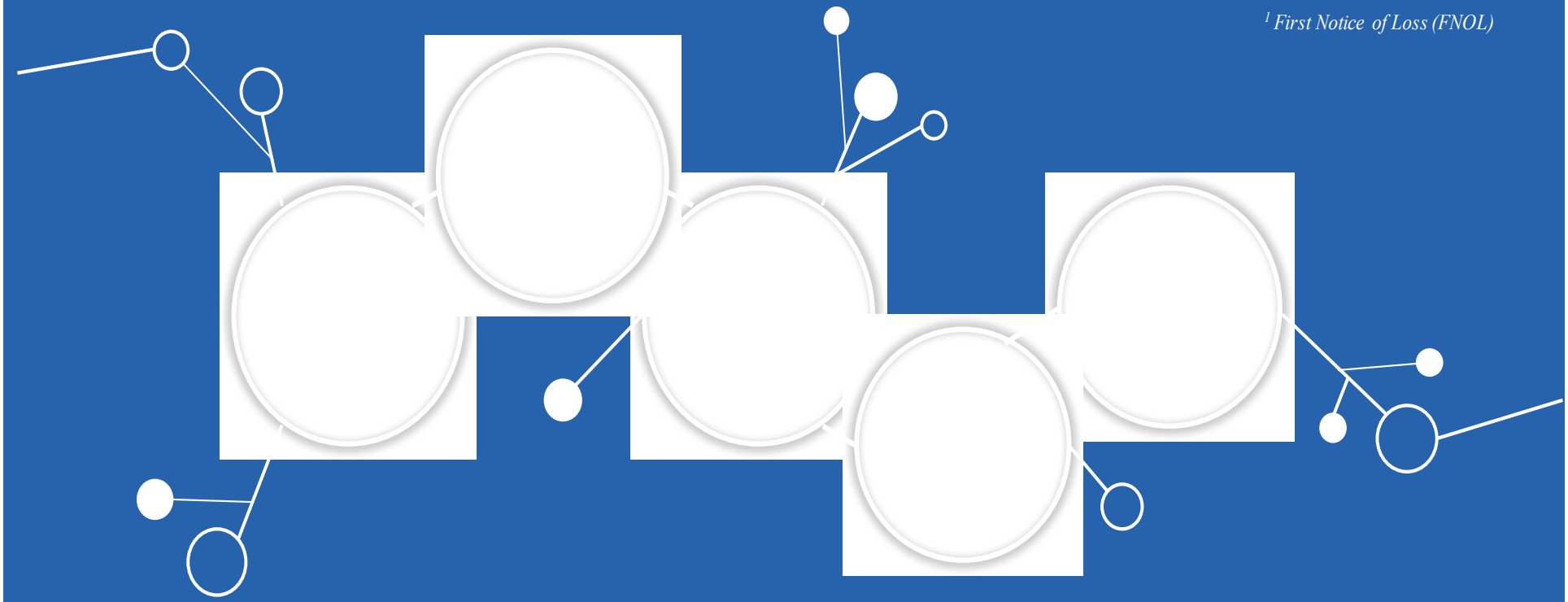
- New elements in scores and decisions: based on prior or current output of sensors
- New kinds of data and information (video or images)

- Responsible for feedback and control operation
- Must work well with people and objects
- Must understand how to impact motivation and behavior

- Use new data elements, models, analyses to understand causation and responsibility
- Fraud mitigation tools use broader and better data and algorithms

Top 5 Benefits of IoT to the Insurance Industry

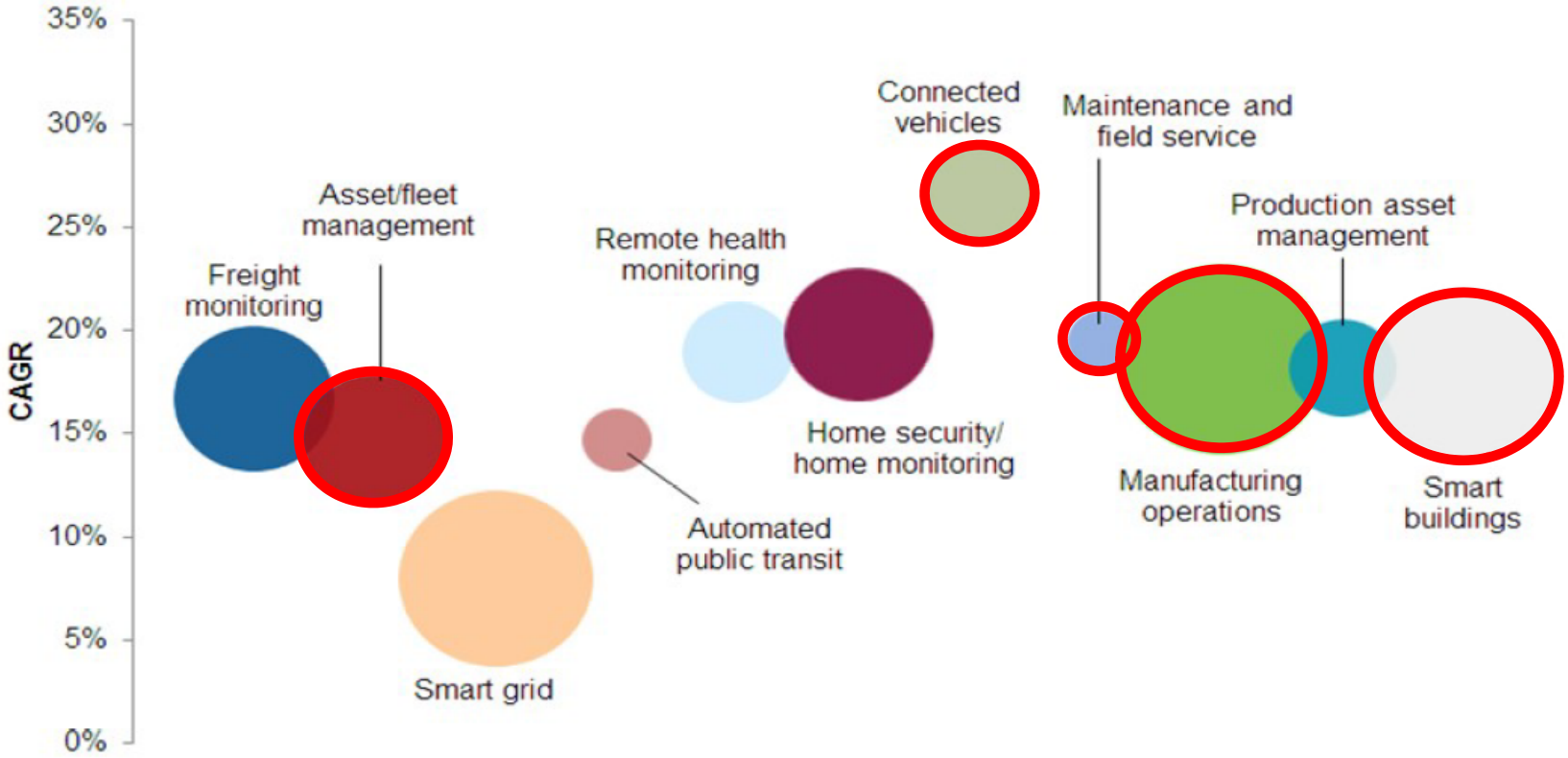
What we learn from the physical world will transform several industries, including the Insurance Sector in which IoT will have one of the greatest impacts.



[1] *First Notice of Loss (FNOL)*

Leverage the Power of IoT to Access New Revenue Streams

Worldwide Internet of Things Revenue by Select Use Case, 2015



Note: Bubble size represents revenue opportunity.

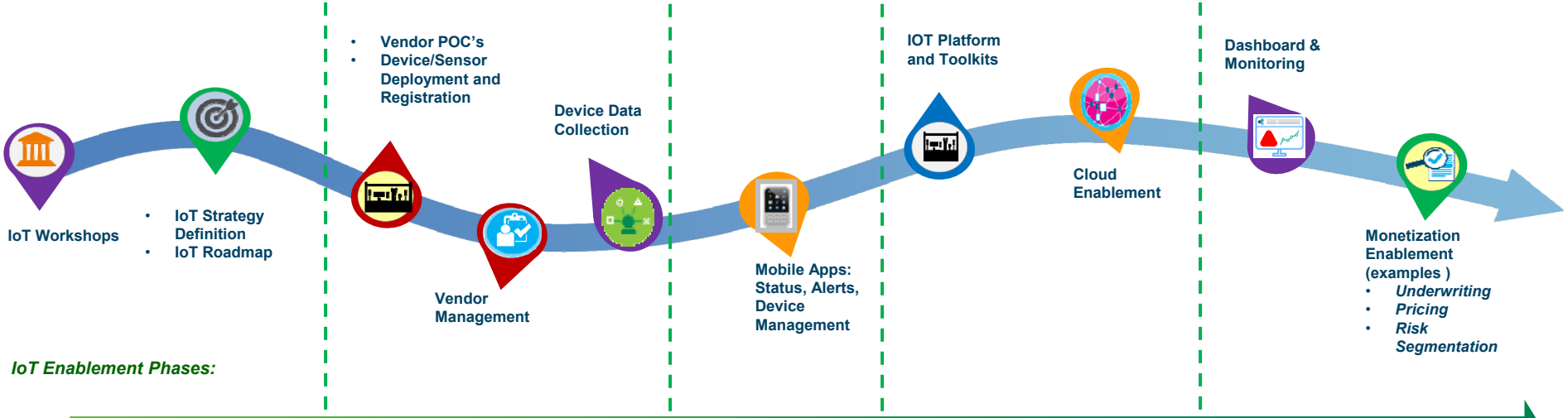
Source: IDC, 2015

Current research indicated that "**smart insurers**" could get access to multiple sources of new revenues if they leverage IoT

The IoT Journey

The IoT adoption pattern varies by geo and carrier. We are working with customers on many IoT projects with a variety of entry points.

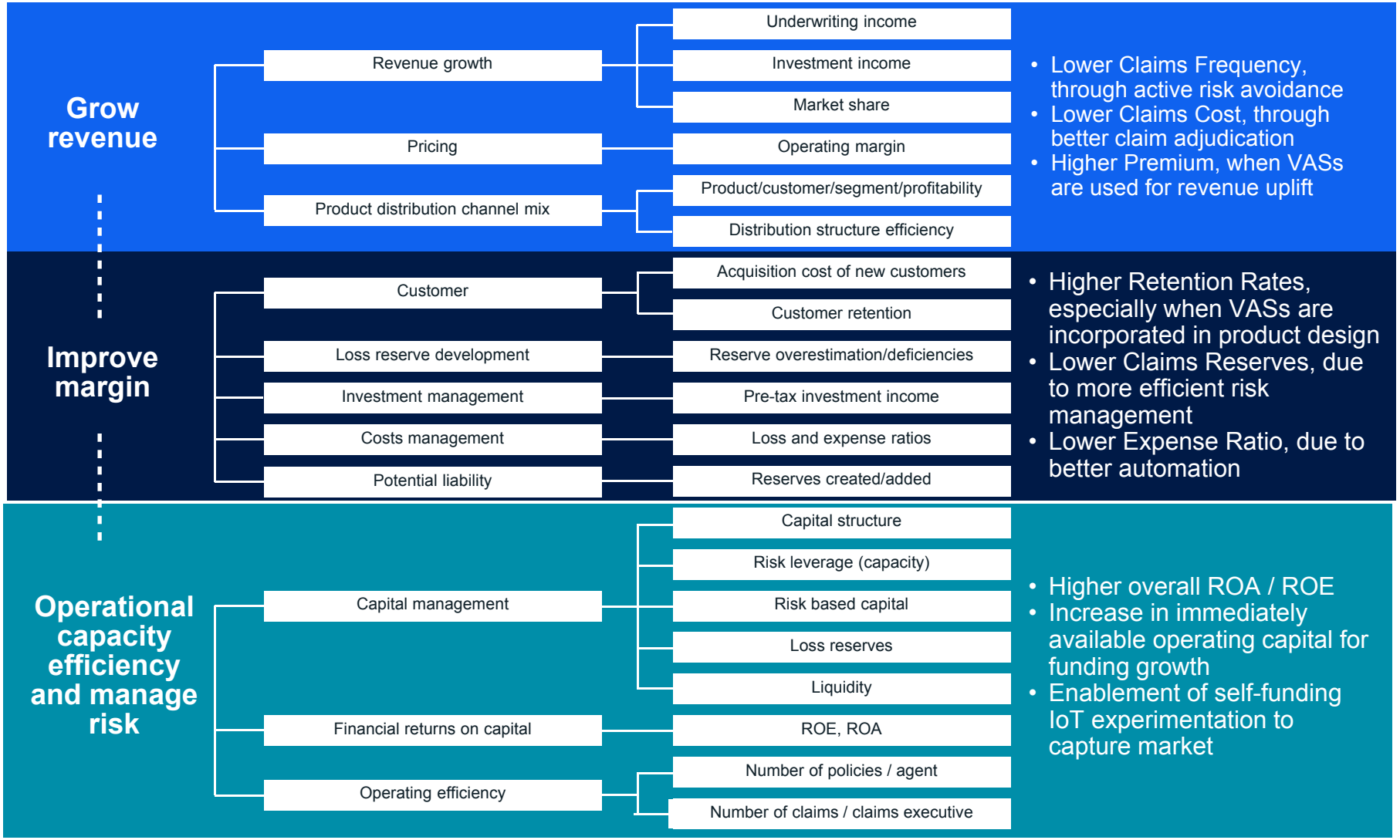
Insurance Carrier IoT Journey



IoT Enablement Phases:

	IoT Foundation	Device Deployment	Mobile Access	Platform Management	Cognitive & Analytics
Carrier Value Proposition	• Provides clients with an expert view of IoT as well as an understanding of solutions and the value. • Establishes framework for IoT journey • Enables client to align IoT transformation to overall business objectives • Identifies new services and business models	• Enables a launch point for a carrier interested in pursuing IoT initiatives. • Demonstrates value through tangible outcomes including functioning devices, collection/aggregation of sensor data • Drives insured participation • Carrier Value Added Service	• Drives insured customer engagement • Sense of safety and protection is increased • Carrier brand positioning • Carrier Value Added Service	• Single, secure platform ensuring best-in-class performance • Flexibility and openness to accommodate wide ranges of devices and their integration • Foundation for data aggregation and analytics	• Real time view and analysis of sensor/risk data. • Enables proactive risk management/loss control. • Cost savings for underwriting company and end customer • IoT data insights generation and enabler of IoT data monetization • Deeper cognitive insights through integration with structured and unstructured risk and loss data

Understand the monetization...including the below the line items



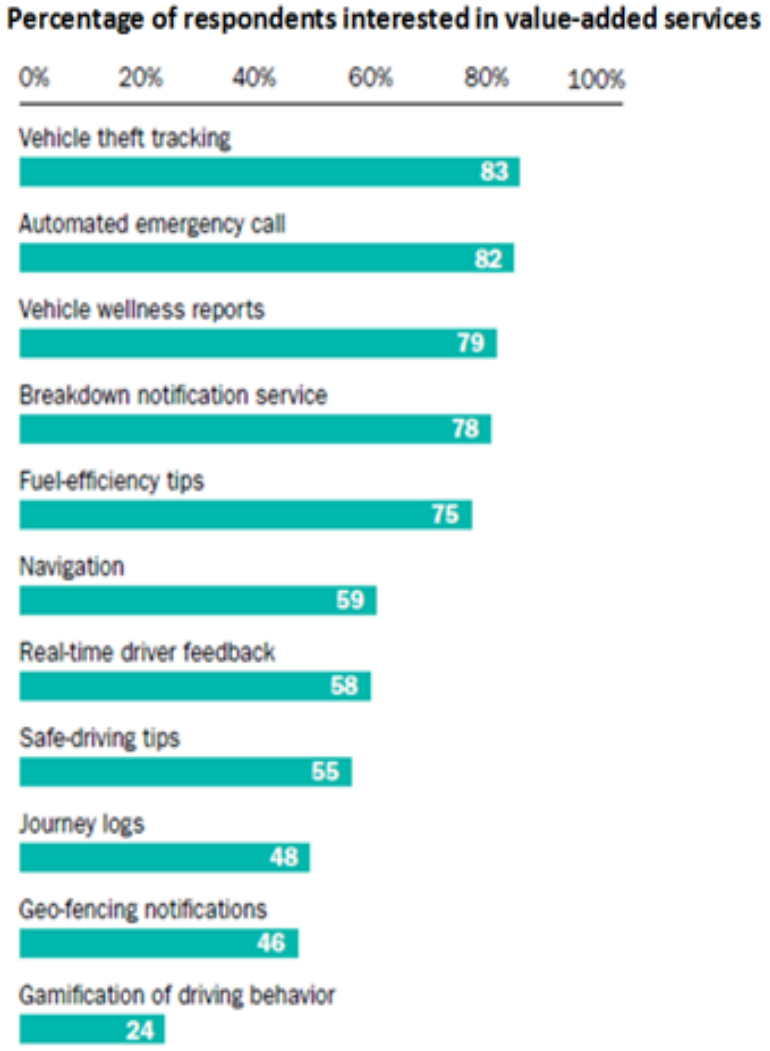
The Internet of Things (IoT) coupled with analytics and cognitive has the potential for both disrupting consolidated business models and enabling new sources of revenue

Insurers are using consumer desired VAS to provide better financial outcomes:

Consumers and Companies are demanding additional telematics functions beyond a new rating variable and discounts

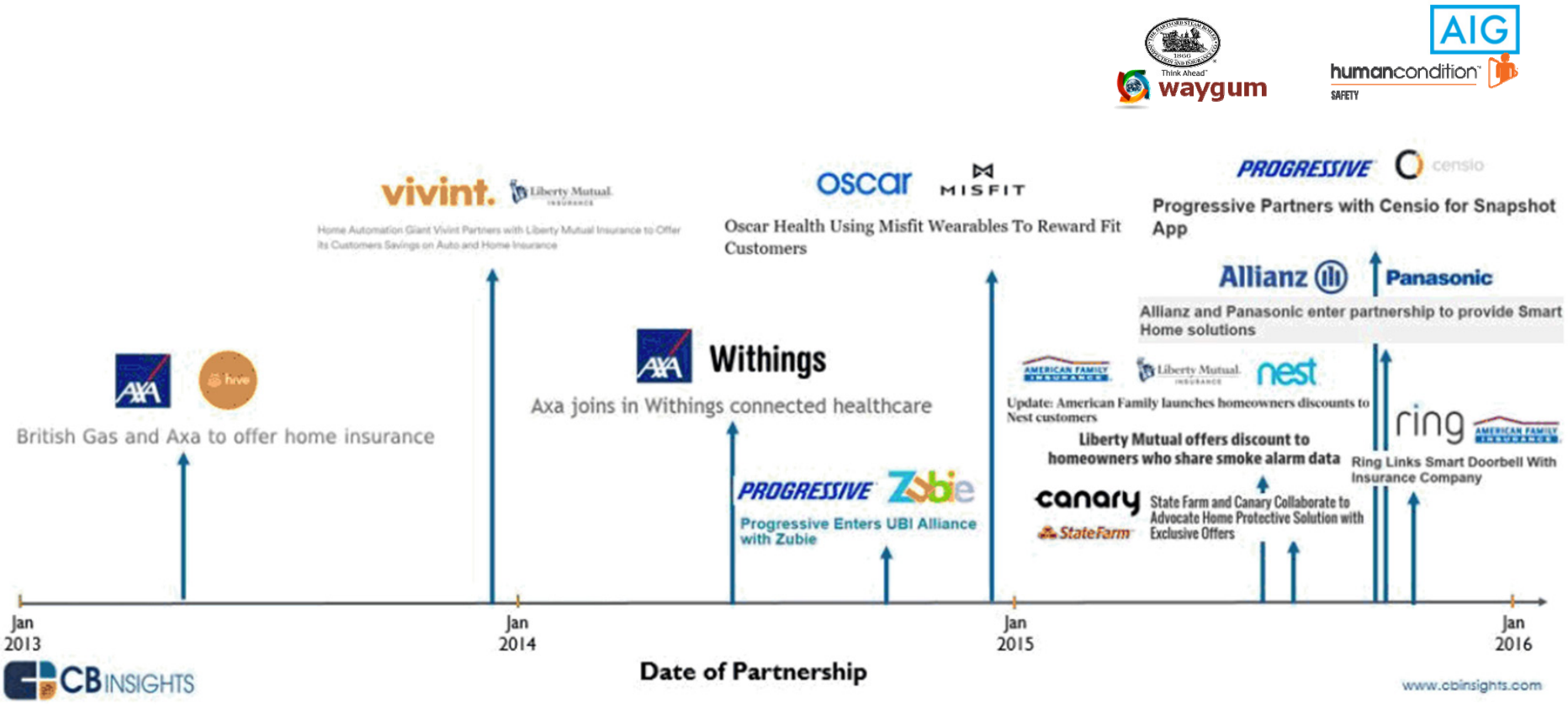
Unique *Value-added services* have become the new battlefield for new policyholder acquisition

For insurers, the ability to provide and monetize new value-added services is the battlefield for customer engagement and true competitive differentiation

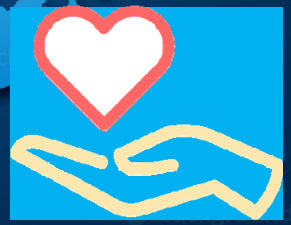


The Time To Act Is Now

Carriers are entering exclusive partnerships and conducting early pilots focused on gaining new insight, revenue sources and customer engagement



Global Insurance IoT Use Cases



IoT for Insurance =

Platform + Ecosystem + Analytics + Cognitive

What is Cognitive IoT?

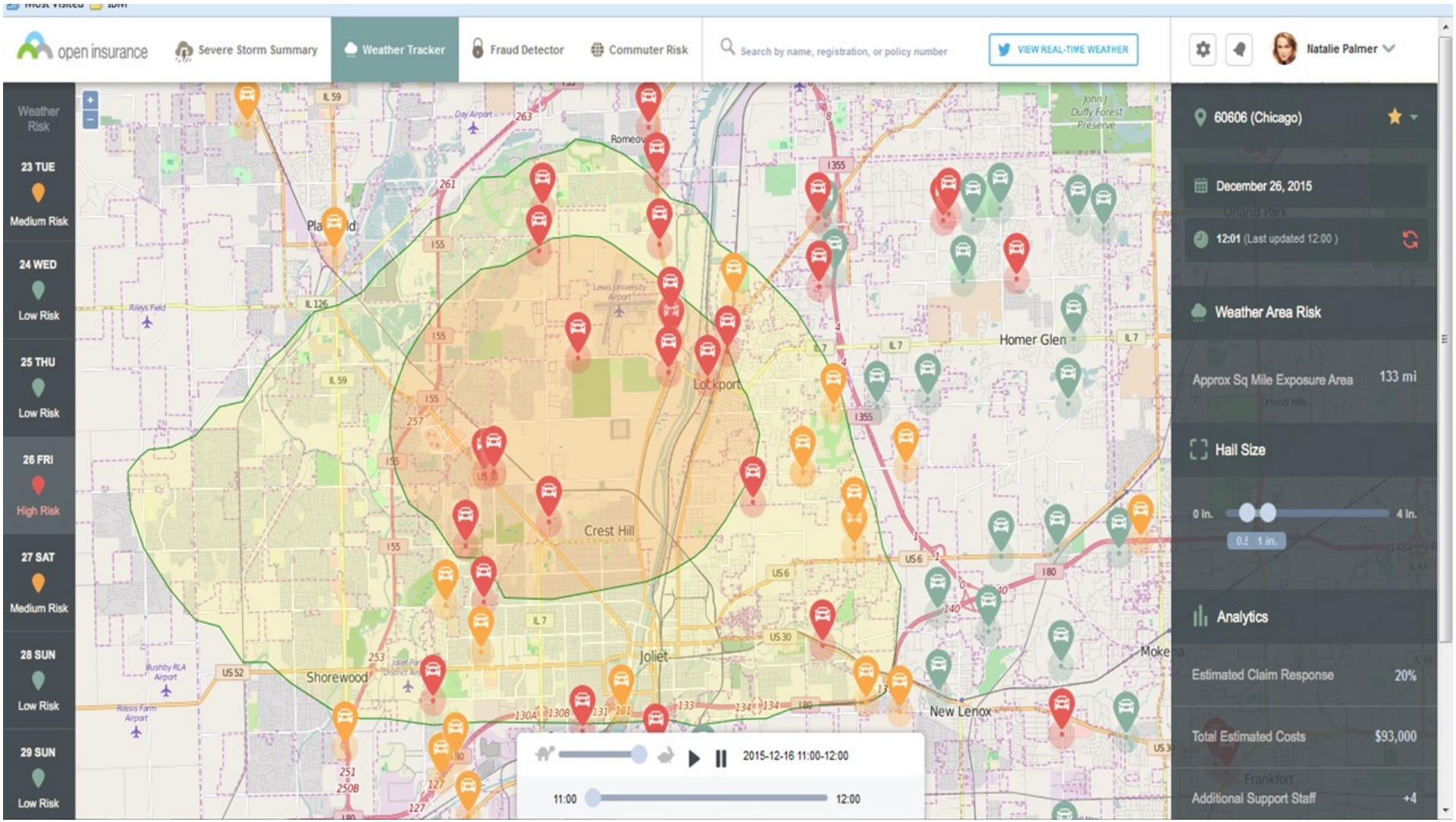
Cognitive IoT is the use of cognitive computing technologies in combination with data generated by connected devices and the actions those devices can perform.

- Cognitive Technologies
  - perceiving, analyzing, reasoning, learning, anticipating, interacting
- Data
  - from the interconnected digitized world with elements from the physical, social and virtual realm
- Actions
  - prescriptive actions, insights, recommendations and assistance

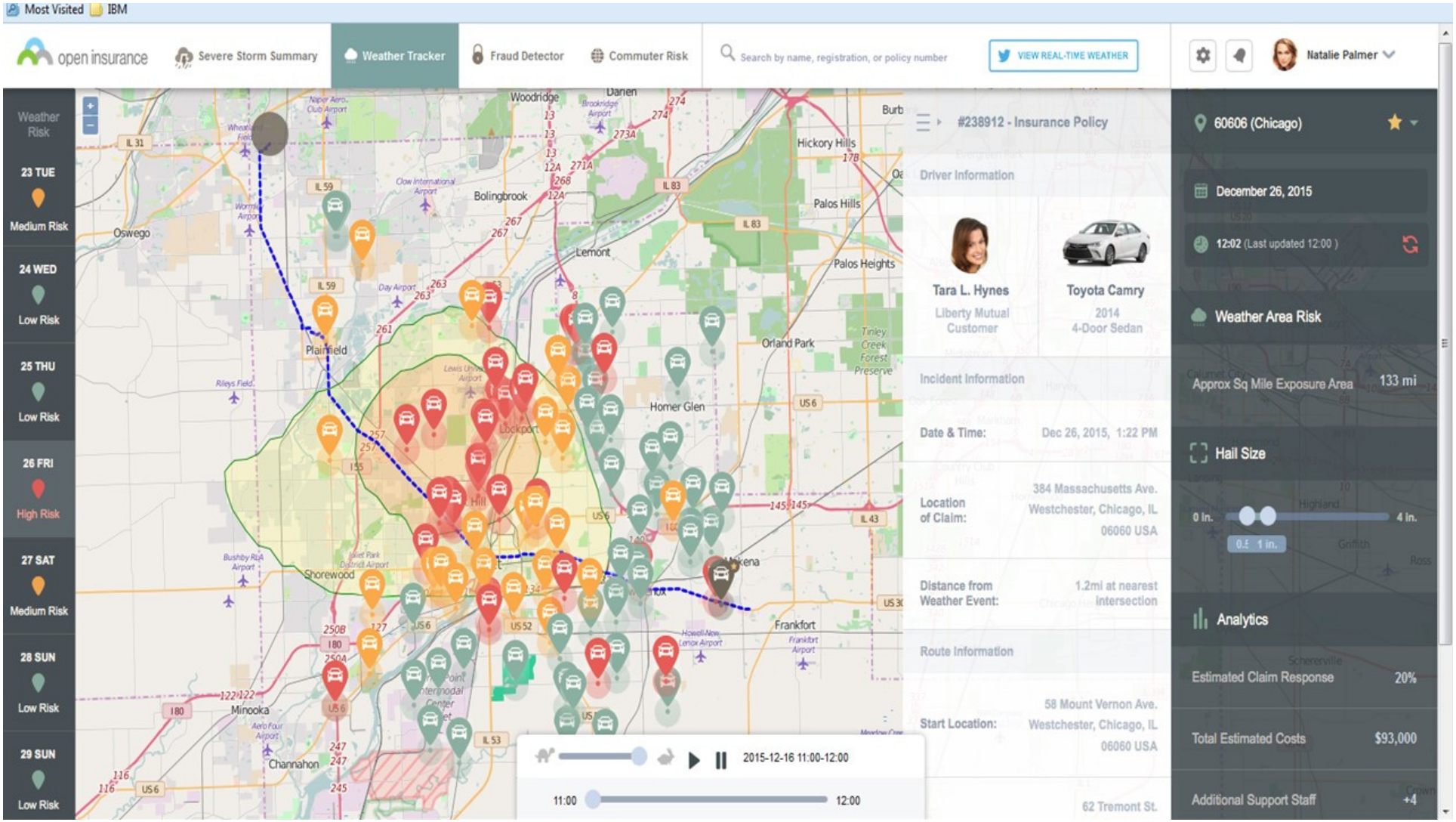
The ability for a system to learn and adapt in real-time, while dealing with huge quantities of information

The Art of the Possible – IOT with Telematics Data and Weather

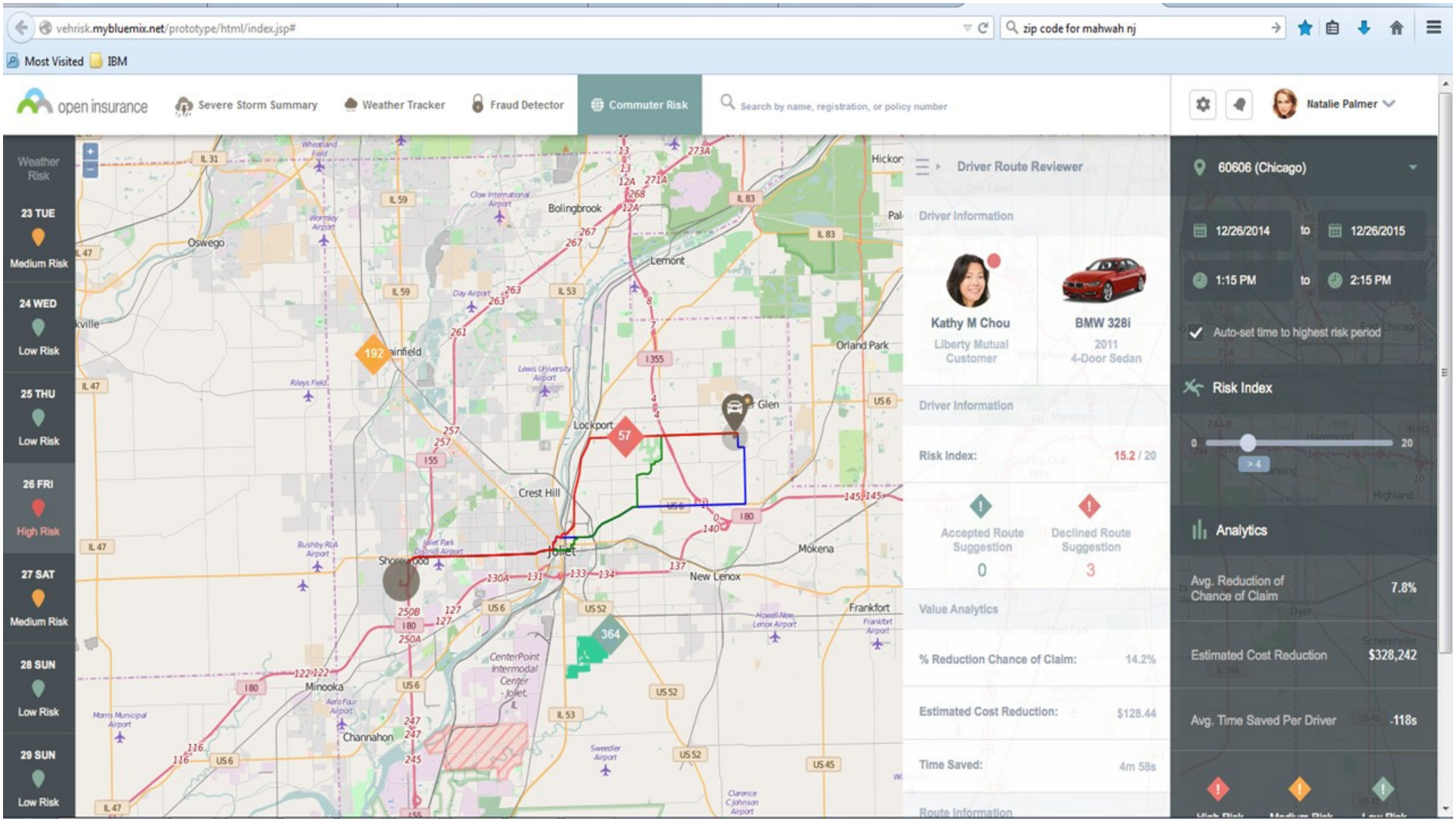
Weather Tracker



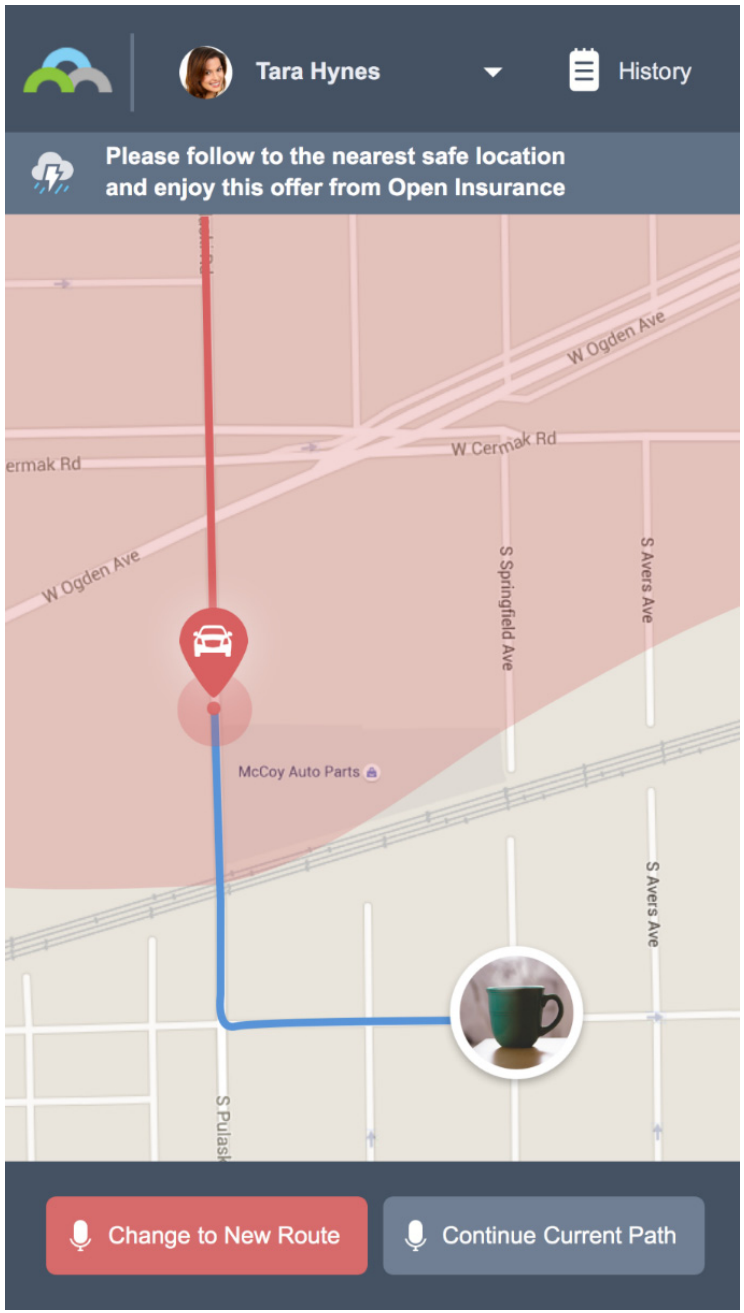
Weather Tracker – Route Prediction



Commuter Risk



Mobile Alert Screen



Advanced analytics generates insights about customer driving behavior that improves carrier and customer relationships

360° View of the Customer

Location, frequent routes
Understand where and how often customer frequent merchant stores

Optional Historical weather data
Understand how seasonality and local weather conditions affect customer behavior

User and car profile
Understand how demographics such as gender, address, and expected income affect segmentation of risk

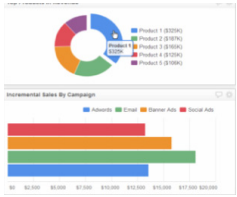
Historic promotion offerings / conversion rates
Understand how which customers have the greatest propensity to buy additional products and services

Advanced Analytics Engine

Prediction and Optimization Engine Watson IoT

Analytics Platform

Promotion Performance



Deeper insight on driver behavior

Customer Profiles

Improve targeting through Aggregation of customer data insights

Promotion Recommendations

Improve product portfolio mix to optimize ROI

Telematics and Value Add Data Matched With Claims

- 7674 cars
- 18 months period of time
- 3.4 M trips recorded
- 4.3 M behaviors captured
- 15~30s GPS sampling rate

Telematics Data

- 3.0 M claims in total
- 49% no onsite investigation
- 8% without address info
- 4% with Lon and Lat info
- 39% need address parsing

Claim Data

- Hourly Interval
- 20 KM Resolution
- 47 Weather Types (Merged into 8 Types)
- 18 Weather Metrics

Weather (IBM TWC)

- NavInfo Map (2011 Ver)
- Baidu Geocoding API
- Baidu POI Searching API
- 1.89 Million Segments
- 550K Square Kilometers

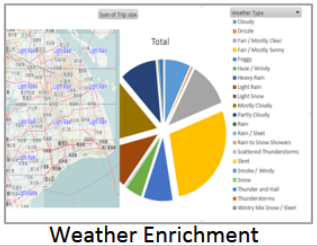
Map Data (External)

Telematics Data Analysis

Noisy Trip (prior Map Matching)

Quality Trip (post Map Matching)

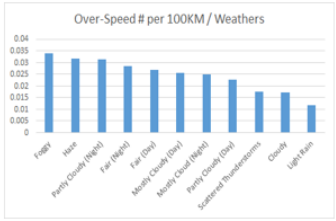
Route Pattern Familiarity



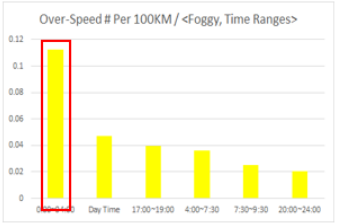
Weather Enrichment

Contextual Driving Behavior

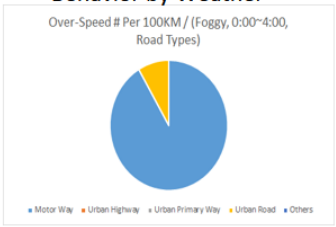
Contextual Behavior Model



Behavior by Weather

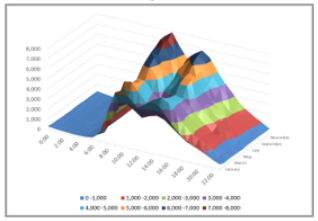


Behavior by Weather/Time

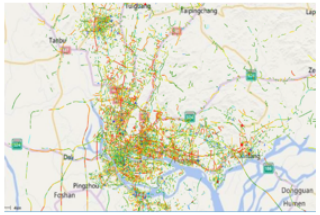


Behavior by Weather/Time/Road

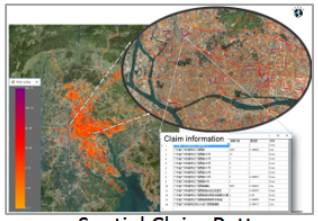
Claim Data Analysis



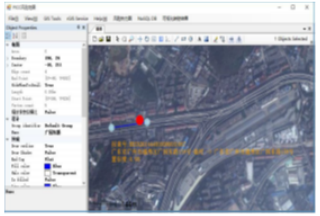
Temporal Claim Pattern



Risk Map

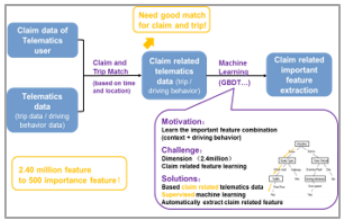


Spatial Claim Pattern

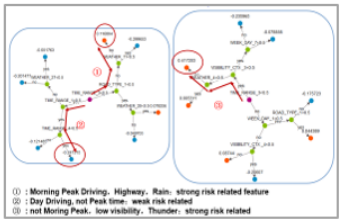


Claim Address Resolution

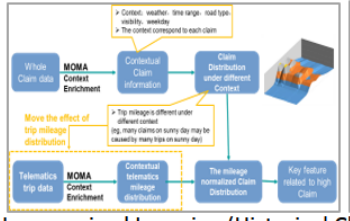
Risky Feature Analysis (Ongoing)



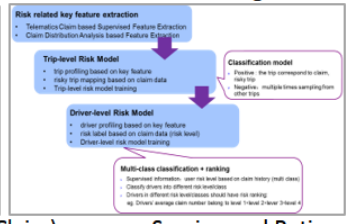
Supervised Learning (Claim + Trip)



GBDT Feature Learning Method



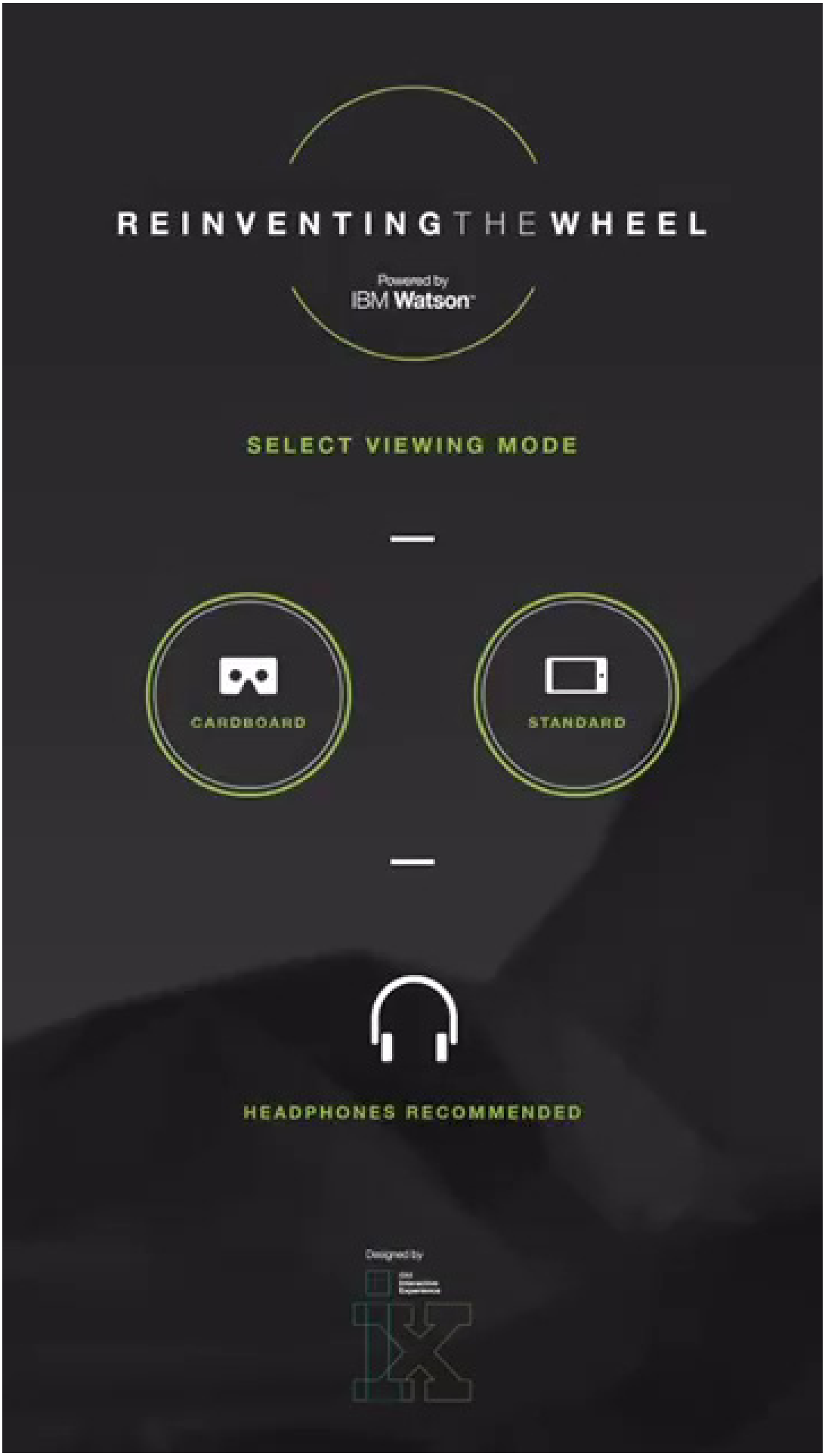
Unsupervised Learning (Historical Claim)



Scoring and Rating

IBM Watson IoT

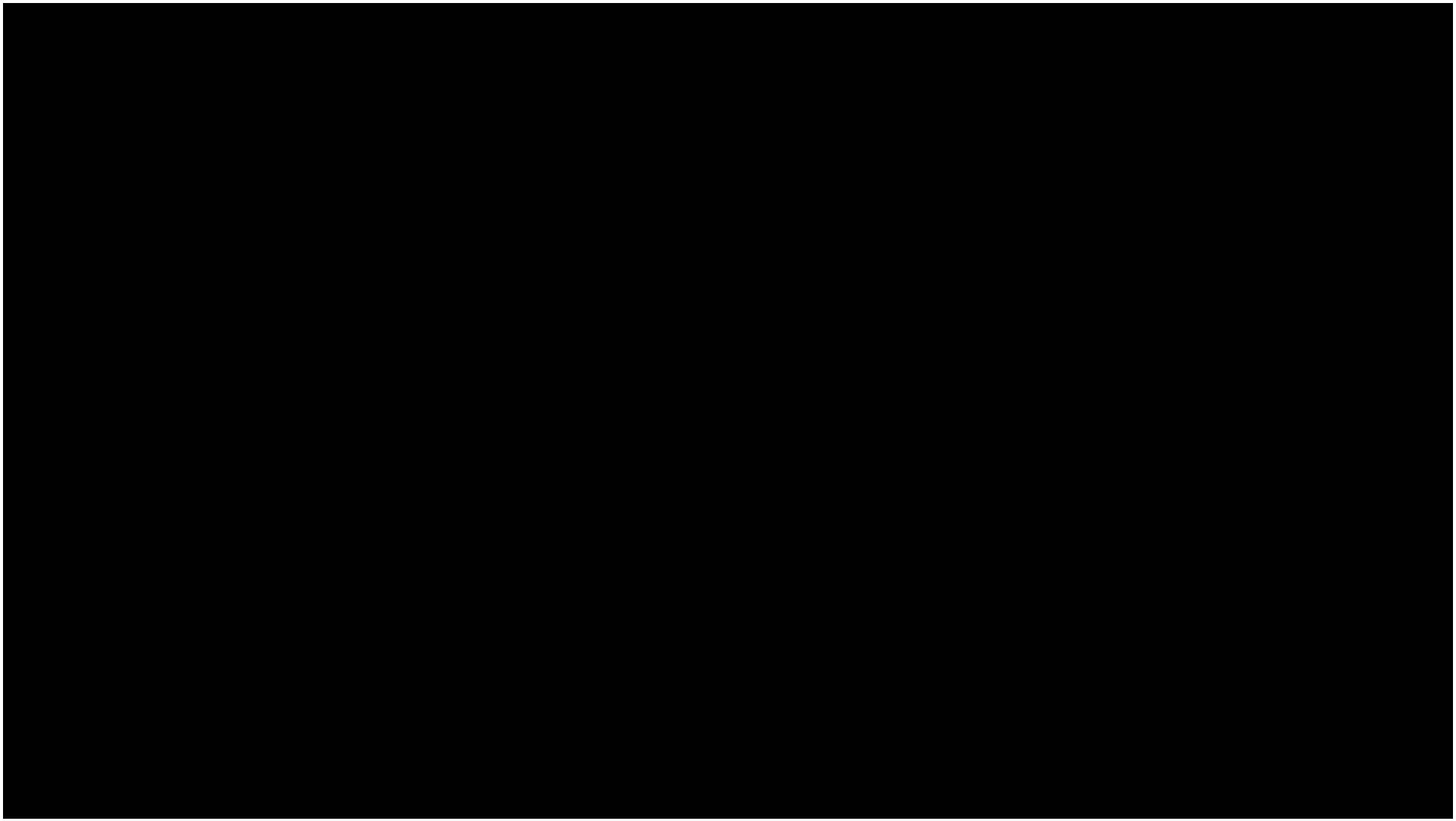
The Art of the Possible - Cognitive IoT


REINVENTING THE WHEEL
Powered by
IBM Watson
SELECT VIEWING MODE
CARDBOARD
STANDARD
HEADPHONES RECOMMENDED
Designed by

The Speed and Power of IOT, Connected Building

Telematics, IOT and Analytics

If we can power this boat, imagine what we can do for you…….



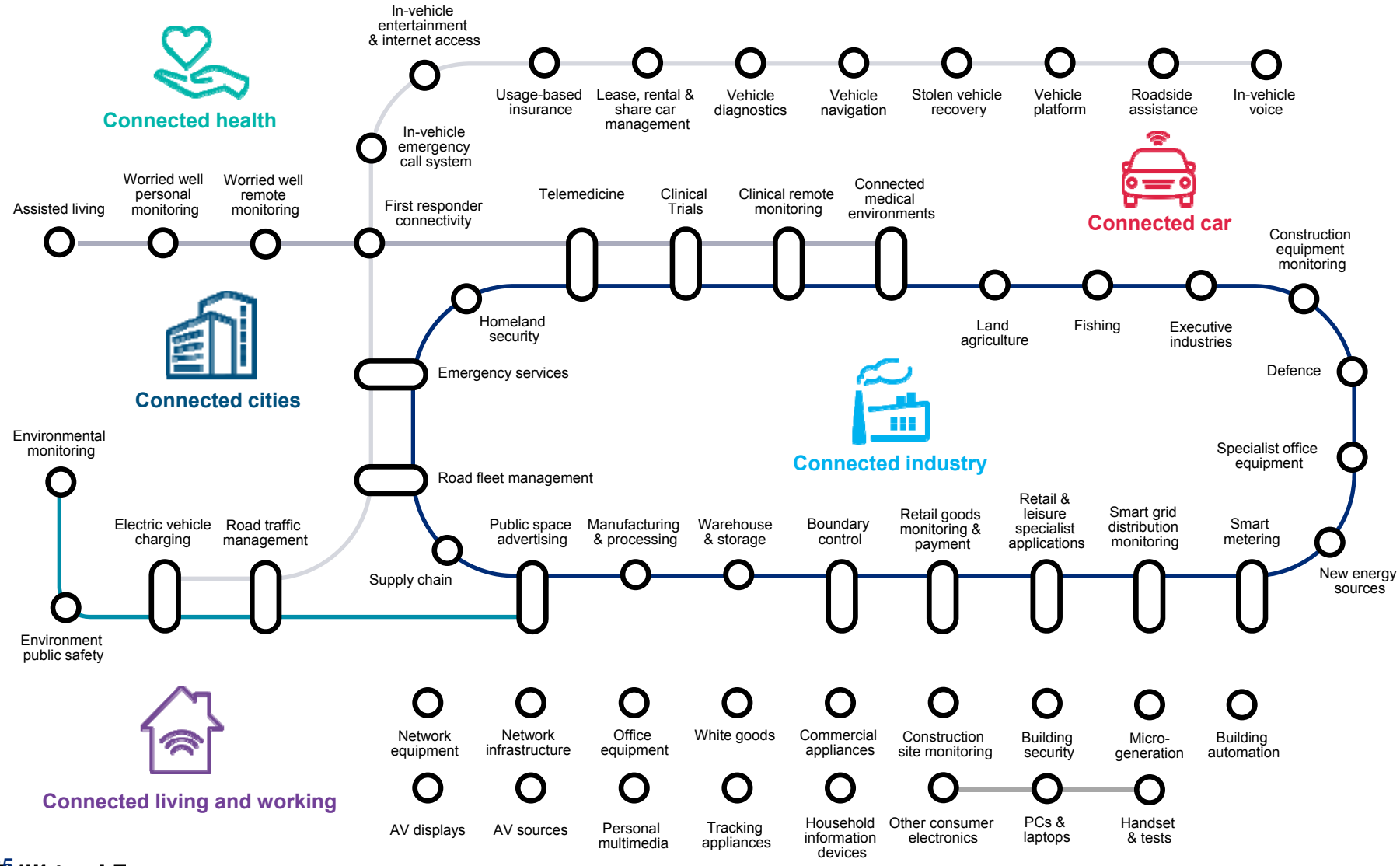
IoT4I Details

An IoT platform and ecosystem often don't get people excited. However, their characteristics REALLY matter.

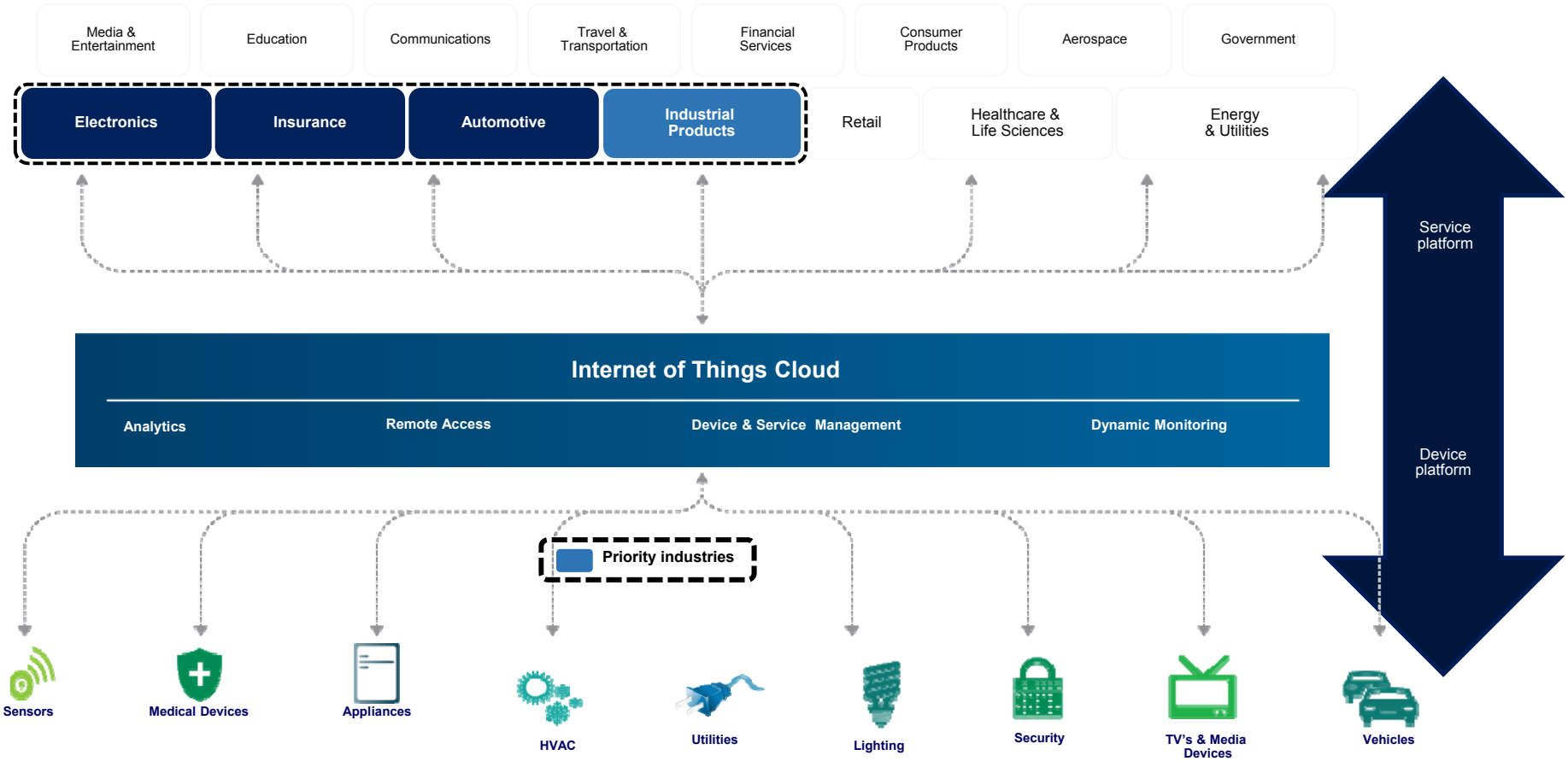
IoT for Insurance =

Platform + Ecosystem + Analytics + Cognitive

A key feature of the IoT is that multiple use cases can be enabled by a shared infrastructure



A robust Internet of Things platform will support a two-sided business model and level of control and flexibility for innovative services & experiences across industries



Hackers are targeting your smart devices

OCT 25, 2016 | BY PATRICIA L. HARMAN, PROPERTYCASUALTY360.COM

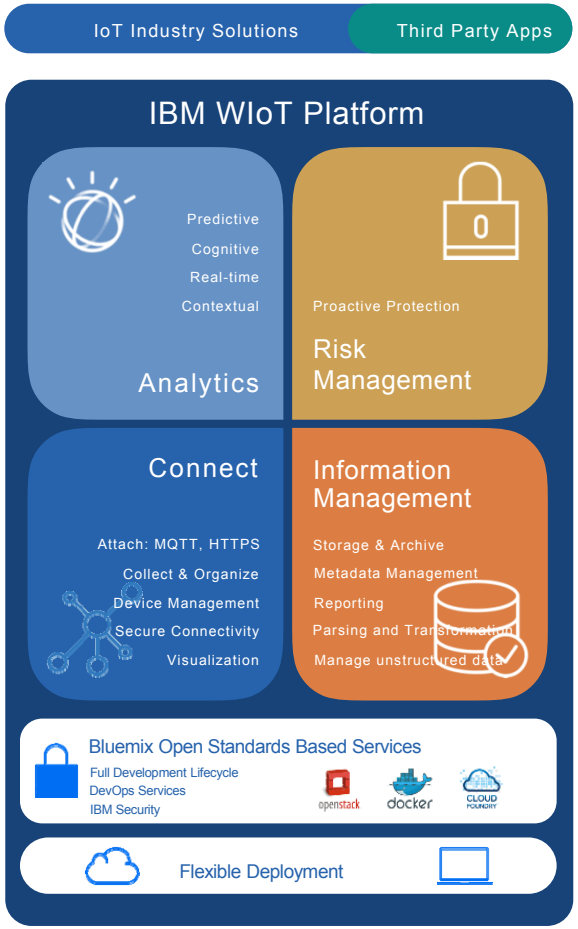
SHARE THIS STORY

More than just computers are vulnerable to attacks by cyber criminals. (Photo: Shutterstock)

There is a major trend to connect everyday items to the internet — everything from remote access cameras, security systems, baby monitors, lights and refrigerators to personal tracking tools and other monitoring systems, but a recent distributed denial of service attack illustrated just how vulnerable all of these devices are to hacking.

Unknown hackers used millions of internet of things devices found in homes and offices to facilitate a massive cyber attack that disrupted access to sites such as Twitter, Amazon, Netflix, PayPal, The New York Times, CNN and other businesses that were customers of Domain Name Server provider Dyn Inc. The attacks came in three waves and affected users as far away as Europe and Australia, and disrupted business for multiple online retailers.

What Makes IBM's Watson IoT Platform Different?



Industry Leading Analytics

Watson-inside machine learning and cognitive

Industry models deep, industry-specific analytics models

Third party data sources leading the industry and partnering with outside data providers (for example, Weather Company)

Industry integrations easily push and pull data from leading industry solutions, both IBM's and its multiple partners

Most Trusted IoT Platform

Device neutral. IBM does not compete with its sensor, gateway, network, or processor partners

Built on open standards

Data neutral IBM's business model does not depend on owning its customer's data

Privacy protection and access control

Platform to platforms IBM is committed to integrating with other leading platforms so customers aren't forced to chose proprietary tech stacks

IoT specific security security micro-services built specifically for IoT-based solutions.

By design, the WIoT platform supports **cross industry use cases**

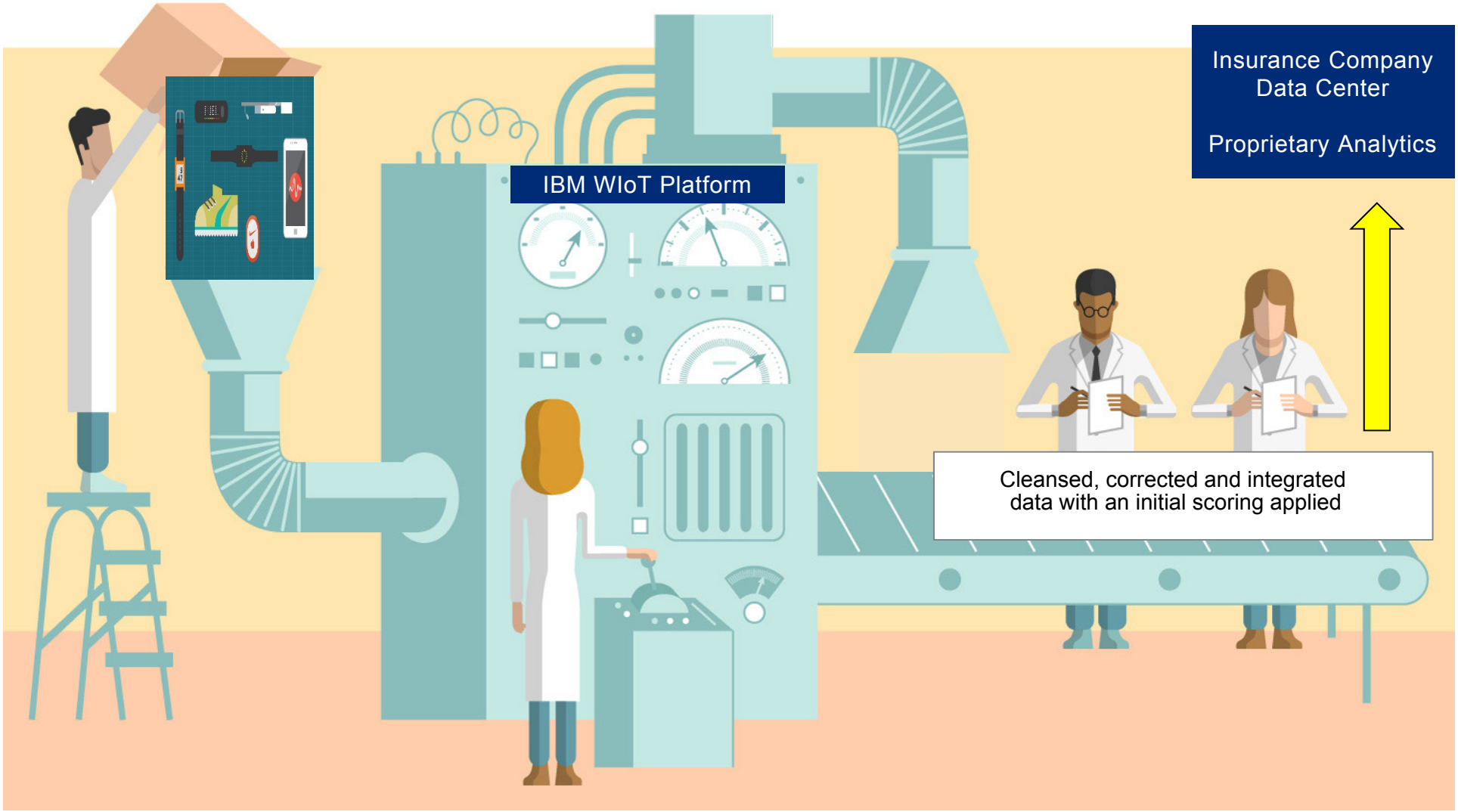
A Hybrid Approach to IoT is Required

IBM & Cisco Deliver the First Analytics and Cognition Solution for IoT Where Needed, When Needed

- Edge & fog computing processing data to optimize real time data
- Built in intelligence that expands network capabilities without impacting bandwidth
- Monitors asset behavior against performance models
- Edge performance analytics to get insight in context
- Disparate data is connected automatically, where its needed, based on content, reducing complexity and cost

- Define analytics in the cloud and run where it makes sense with a single hybrid solution
- Filter low value data and only move high value data to the cloud
- Apply advanced analytics, including cognitive, predictive, & machine learning
- Enrich with Weather Company data improve analytics insights
- Incorporate internal and external data sources to improve context

Why a SaaS Delivery Model is Important



IBM IoT Partnership Ecosystem

Join forces with IBM and its wide-ranging set of silicon and sensor partners to design, build, or enhance your own IoT devices. Our deep asset and partnership ecosystem enables all solution layers.

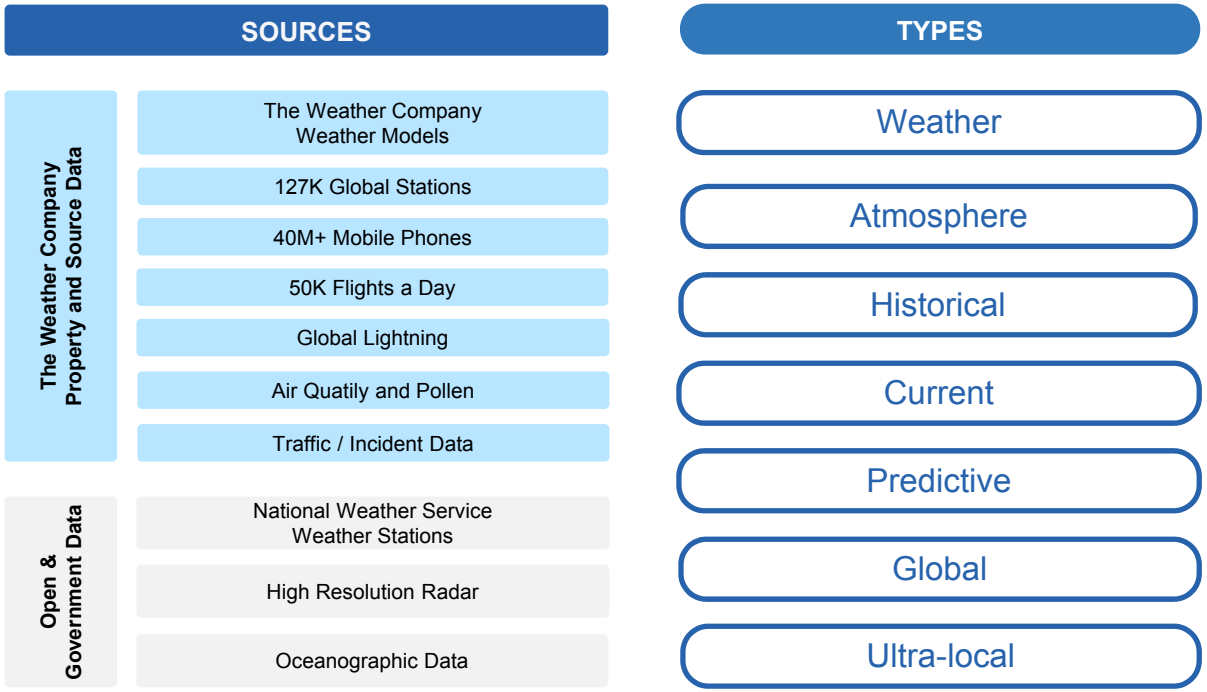
The Weather Company's platform ingests, processes, analyzes and distributes enormous data sets at scale, reliably, in real time.

The platform generates an astonishing **4 GB of data each second**. Its sophisticated models are capable of analyzing data from **3 Billion** weather forecast reference points, over **40 million** mobile phones, **50,000 flights per day**, and more.

Weather Company's mobile and web properties handle approximately **26 Billion requests a day**, over 7 times the volume of the leading search engine, and is the **fourth most daily used mobile app** in the US, serving **66 Million** unique monthly app visitors.

Our Weather company acquisition combines two of the largest and most dynamic data platforms in the world.

The Weather Company
An IBM Business



IoT Shield Architecture

Shields - Your Guardian Angel

- The Shield analytics work as a personal protective application
- They allow an intuitive specification of rules that act on senor data that govern the personal wellness and safety of their owner, detect hazards and can trigger a notification process through many channels
- Shields can run on the edge or in the cloud. An edge implementation can support significant data privacy concerns

BLE/ANT+ / CPU

Accelerometer:
- Speed-X
- Speed-Y
- Speed-Z

Environmental-sensing:
- temperature
- light
- noise
- oxygen deficiency
- carbon monoxide

GPS Sensor:
- location

Bio-sensing:
- heart-rate
- Body temperature

Hazards Detection

- Excessive lifting, pushing, carrying
- Fatigue
- Alertness
- Dehydration
- Fall / Injury
- Use of safety equip

Alert Employee

Inform Supervisor and Emergency Center

Broadcast message to nearby employees

IBM SW

Federated Analytics
Detective (real-time) / Predictive

What is a Shield ?

- A shield is an analytic. Each shield reflects a single hazardous situation or insurance risk
- Shields are the key executable building blocks can be executed on several runtimes. Currently: Node/ JS ; planned: RTI / Quarks ,Python
- It is a form of an “intelligent rule” (Hazard Detection-Condition-Action):

Hazard Detection

Check conditions

Expedite Response/Alerts

Steam analytics employed over sensor data: simple threshold function, statistical, or a ML model.

Location, time, identity, …

The action part of a shield. Sent push to Insured, Send email to Insurer, call 911

But where should the various shields execute?

(a) Cloud, (b) On edge/phone device, (c) Depending on circumstances?

Shields Examples

Hazard Detection

Check conditions

Expedite Response/Alerts

Simple Shields: Rule base , Multi sensor , Time window

Detect "Water leak" hazard if water sensor == wet for last 4 minutes && water valve == close	Check: (location == @home) && (08:00 < now < 18:30)	send push notification to Insured.phone-number
Detect "overexertion" hazard if last 20 reading of heart-rate > 80 && Heat index > 80	Check: (location == @work) && (23:00 < now < 05:00)	send push notification to Employee.supervisor.phone-number

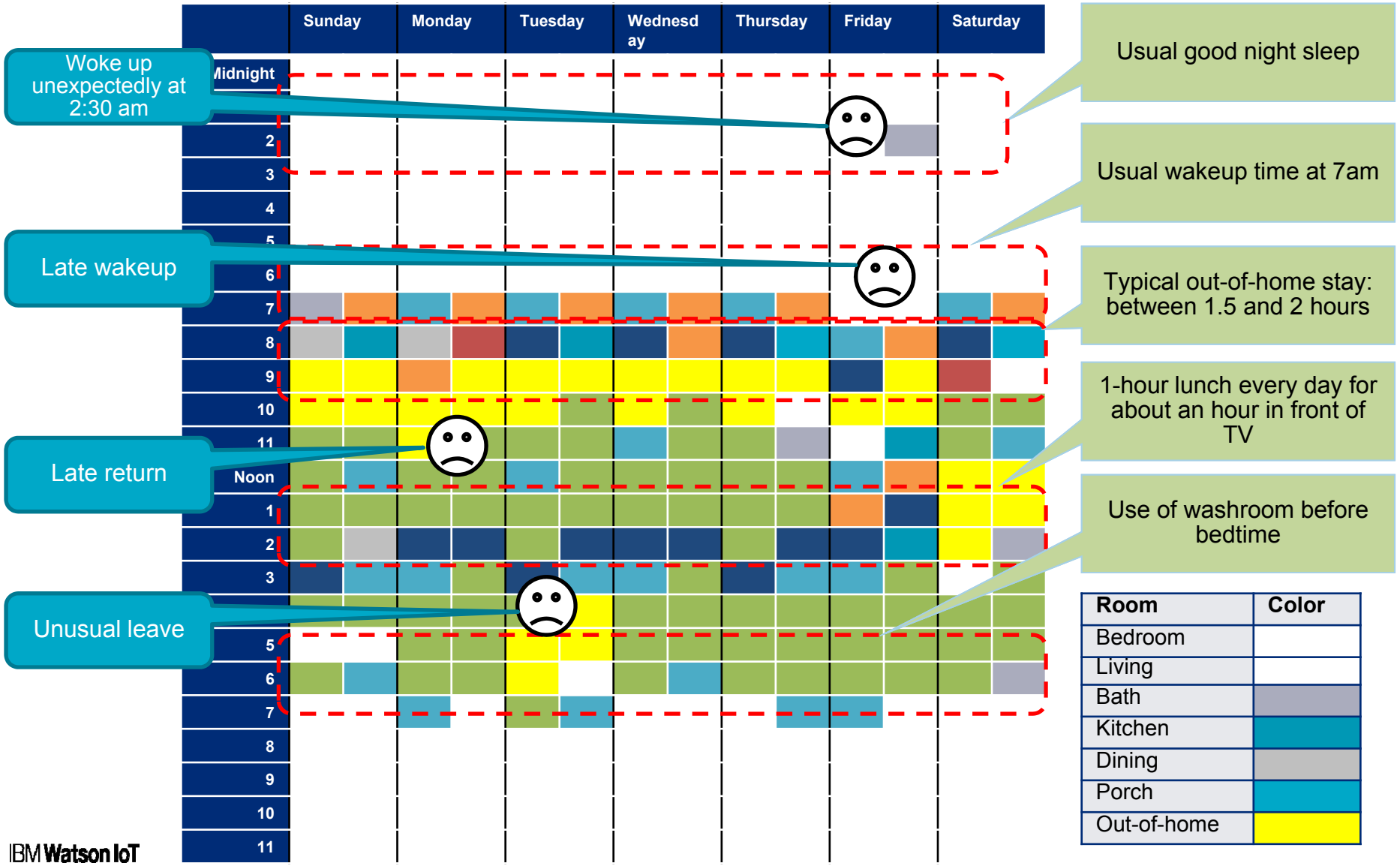
Complex Shield: ML , Aggregations, Personalization

Detect "Anomaly Water leak" risk 2 or water sensor == wet for last 30 sec && water valve == open && current temp < avg temp + 20 && weather == dry	Check: (location != @home) && (08:00 < now < 18:30)	send push notification to Insured.phone-number send SMS to available plumber.phone-number
Detect "overexertion" hazard if last 20 readings (heart-rate) > Avg Rest HR && normal heat index for location> 80	Check: (location == @work) && (23:00 < now < 05:00)	send push notification to Employee.supervisor.phone-number

Cognitive Shield : Cognitive Diagnostics , Pattern Recognition (Activity, Gestures) , Shields Personalization , Offline Learning

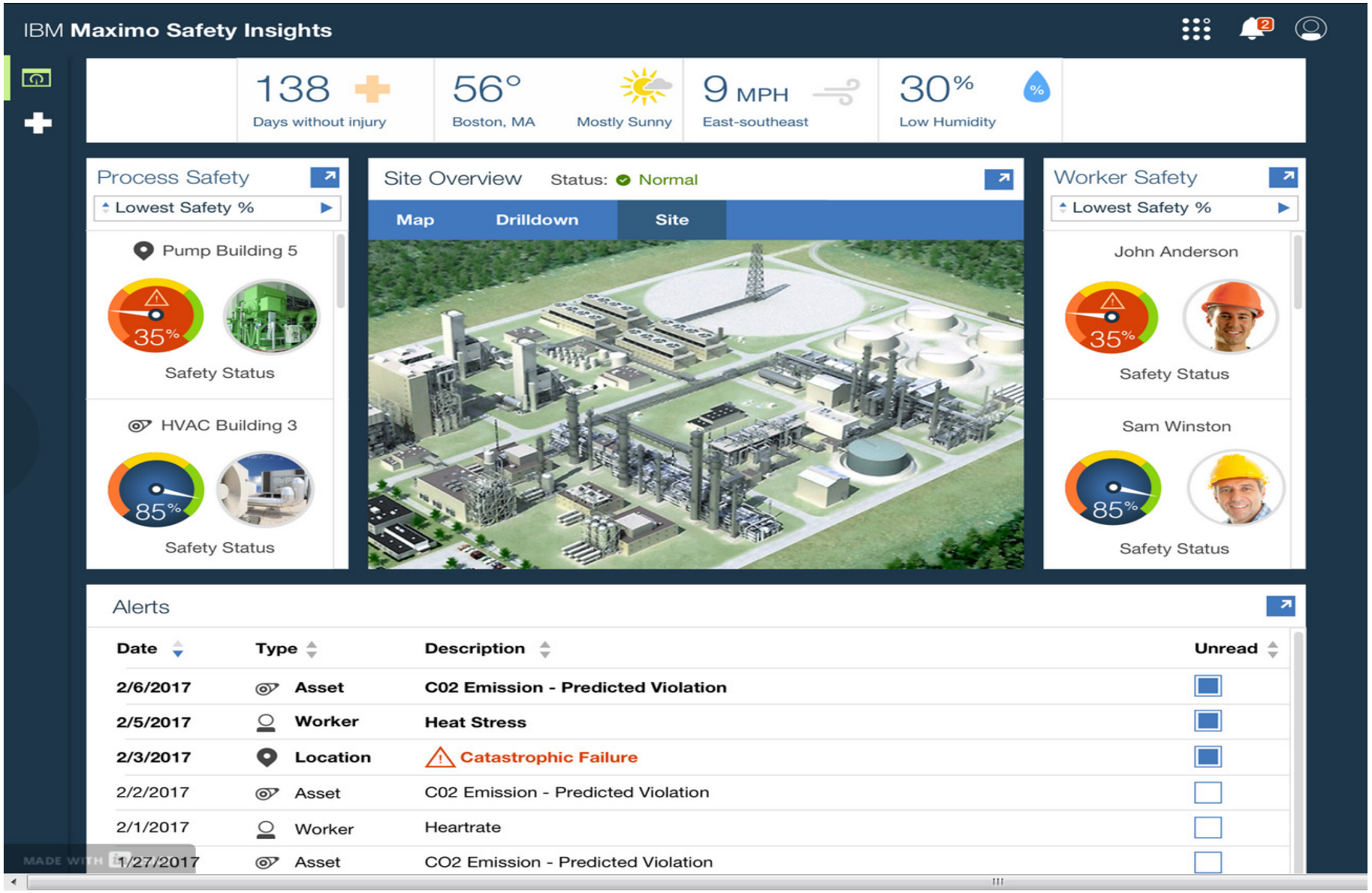
Prevent "Heat Stress" hazard
If user spent last 30 minutes at heat index > 85 && and user situation is "intensive physical working" , and body temp > avg body temp for "intensive physical working" activity || body temp > body temp at beginning of shift + 3
&& User specify "dry throats" and drowsiness && system didn't capture water intake gestures

Smart “check-ins” are triggered by deviation from behavioral habits



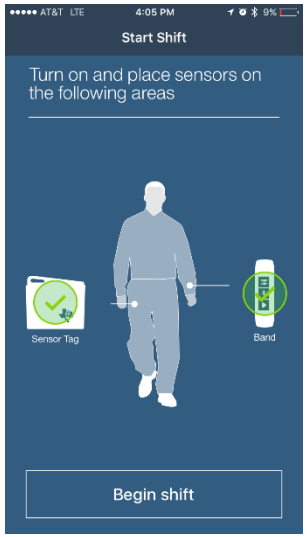
IBM Watson IoT

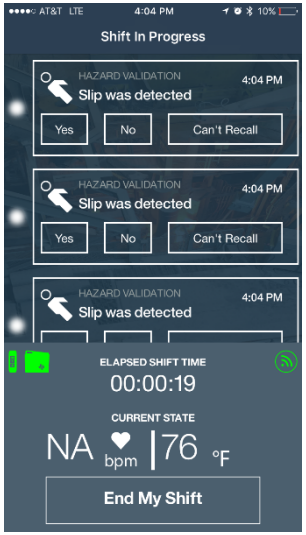
Industrial Safety Insights

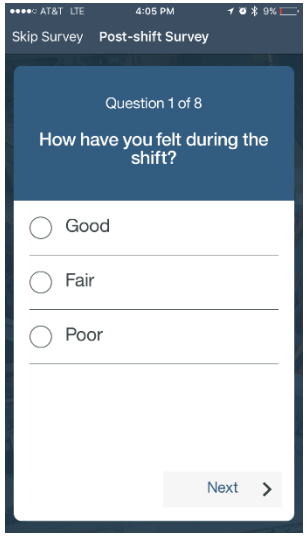


Solution Apps and Dashboards

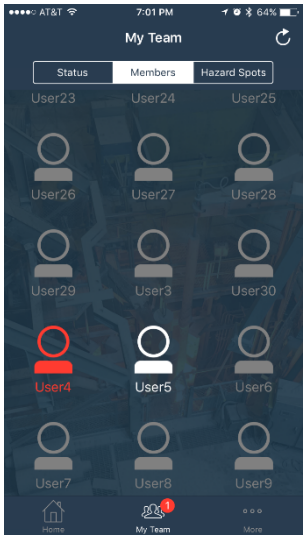
Worker App

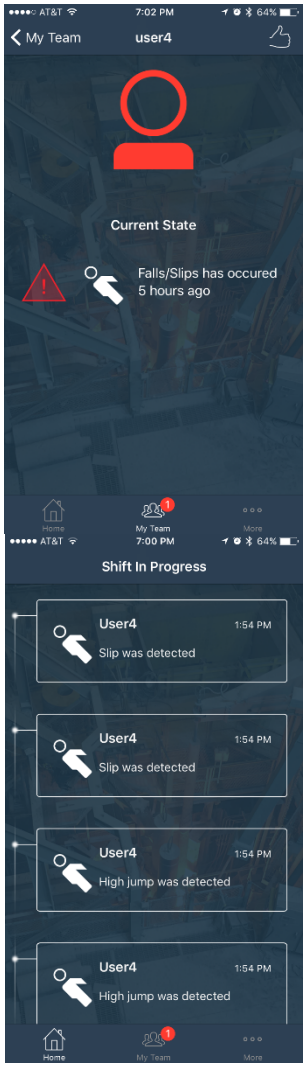






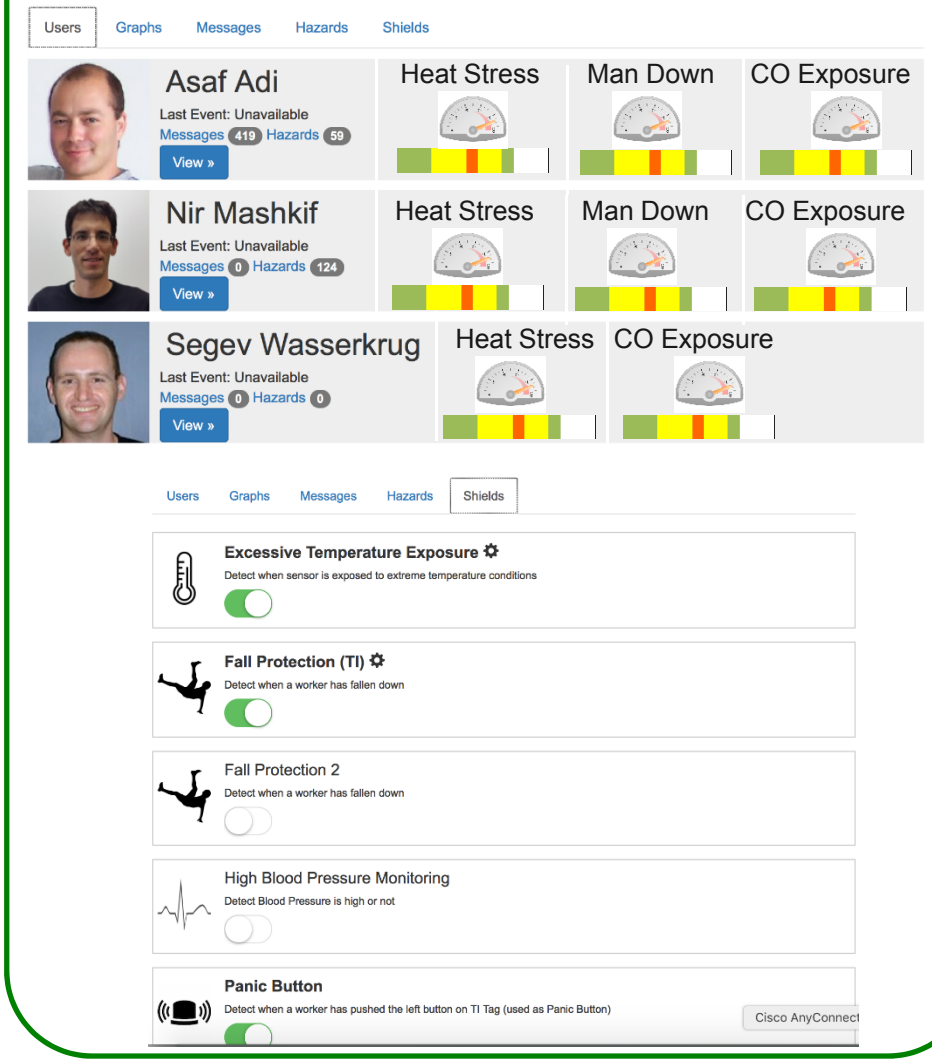
Supervisor App



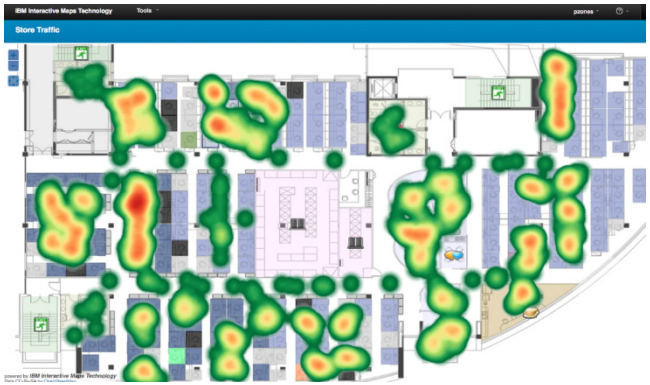


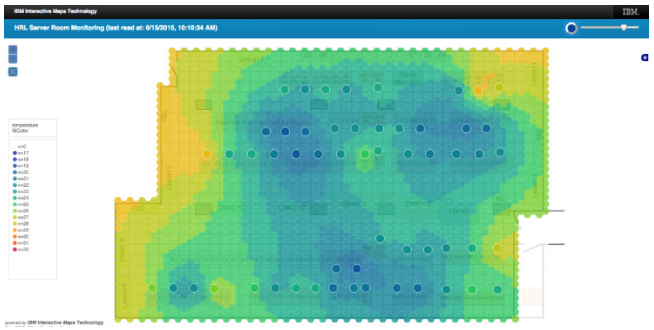
Solution Apps and Dashboards

Management Dashboard



HSE Dashboard





More Historical Analytics

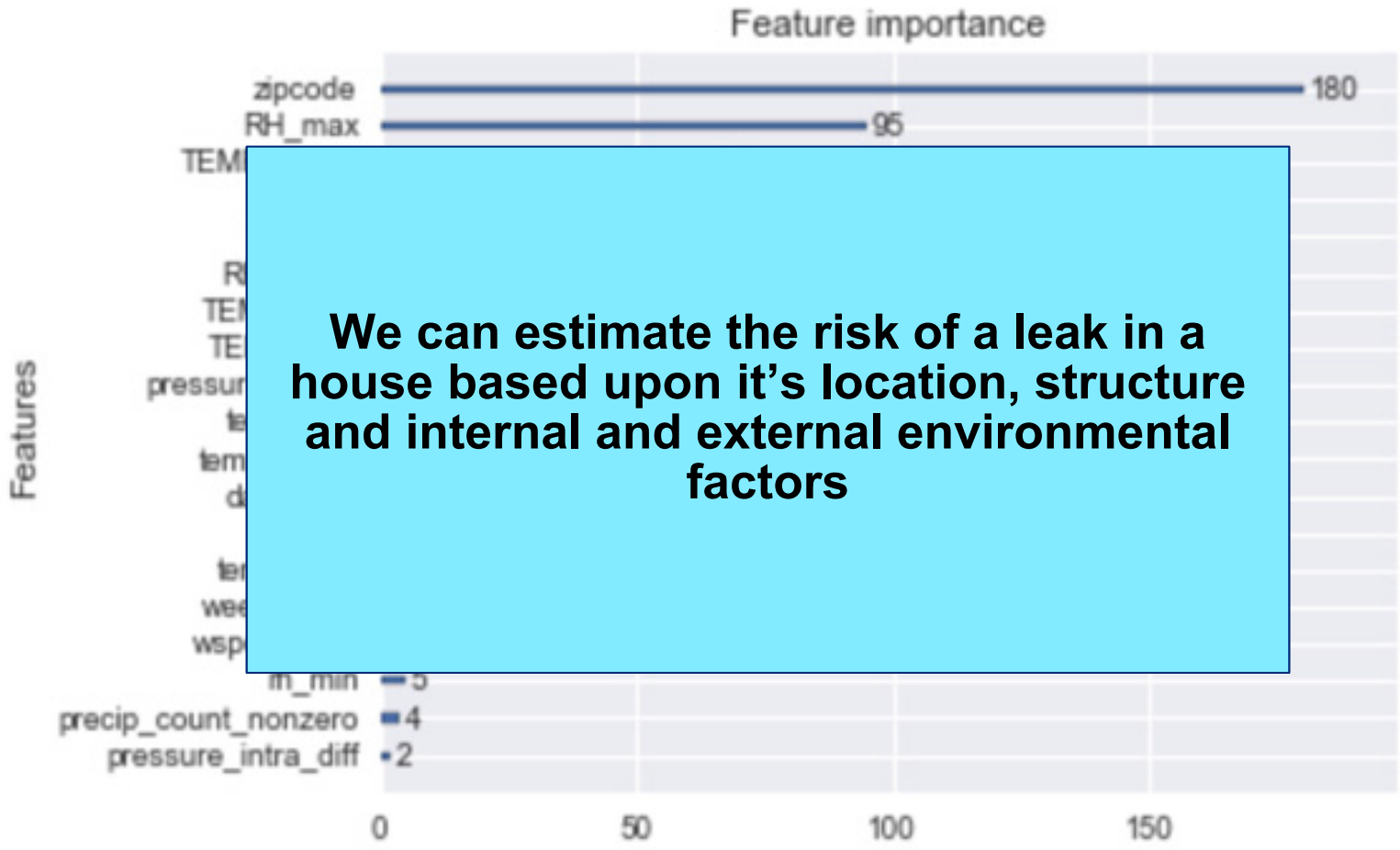
Beyond basic sensor trips, there is a wealth analytical insights held within IoT insurance data.

Leveraging our best of breed analytics and data science capabilities, we have developed a practice which can deliver these insights to insurance companies, device manufacturers, etc.

Insights – Water leak alarm likelihood estimation

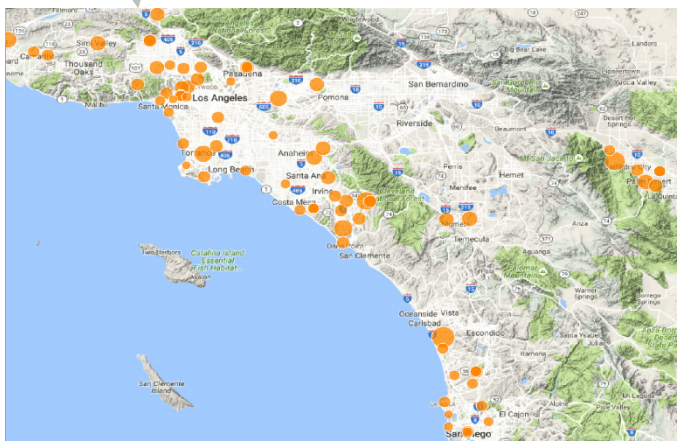
- Goal: Estimate the likelihood of a leak alarm in a day by household and obtain insights of alarm triggers
- Inputs:
  - All related sensor measurements including temperature, humidity, etc.
  - External weather conditions
- Outputs:
  - Water leak likelihood score by household
  - Triggers

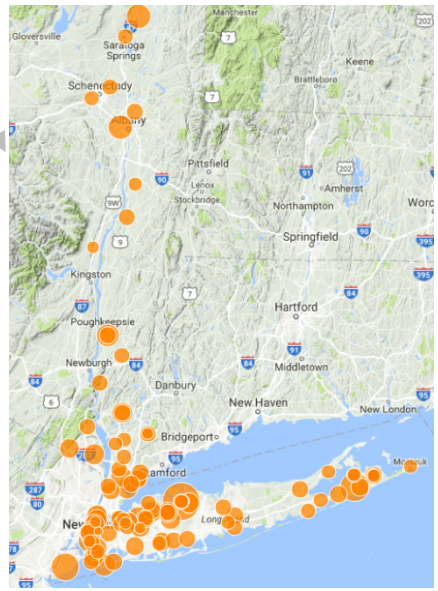
Results



We can estimate the risk of a leak in a house based upon it's location, structure and internal and external environmental factors

Insights – Household energy consumption index

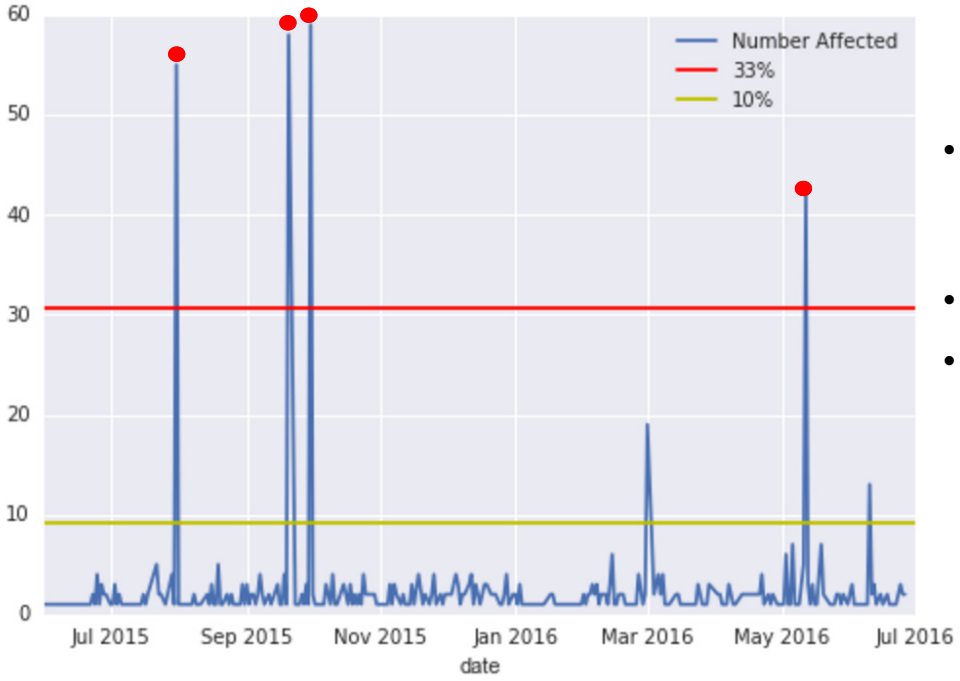




- Household energy consumption index is calculated based on the indoor and outdoor temperature difference

- Every circle is one zip code; Bigger the circle size → higher the energy consumption
- On average, NY people consume more energy than CA

Insights – Sensor Disconnect Causual Inference



- Goal: Determine the cause of sensor disconnections, e.g., power outage or wifi disconnection
- Method: Apply neighborhood similarity analysis
- Result: More neighborhoods having dead sensors, the higher likelihood it is due to power outages

Summary

Critical Success Factors

Identify as many potential use case as possible. Think outside of the box. Cross industry boundaries

- Best practice - establish a cross LOB team to prioritize use cases

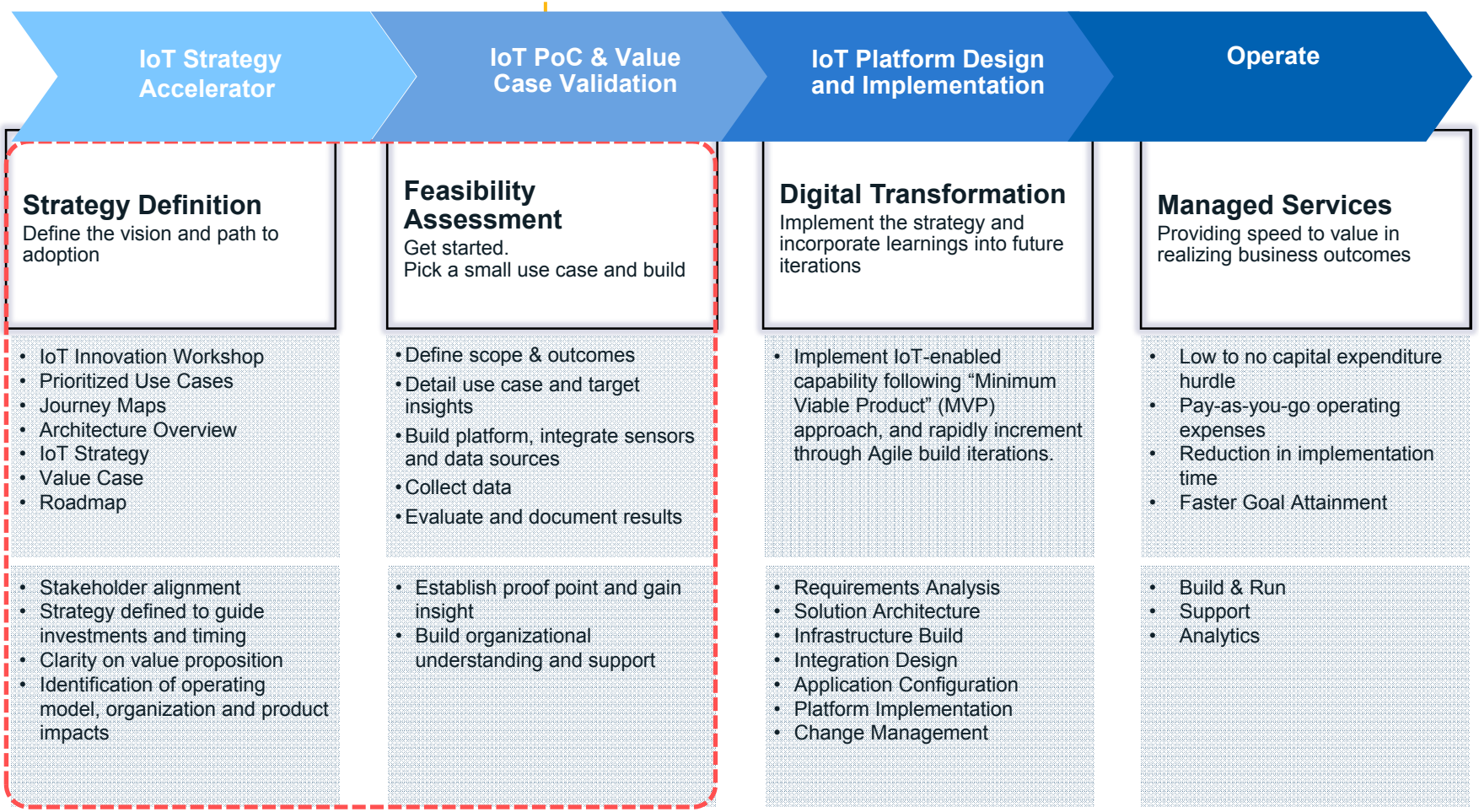
Executive project stewardship from LOBs and IT

- Cultural changes are often the hardest to overcome

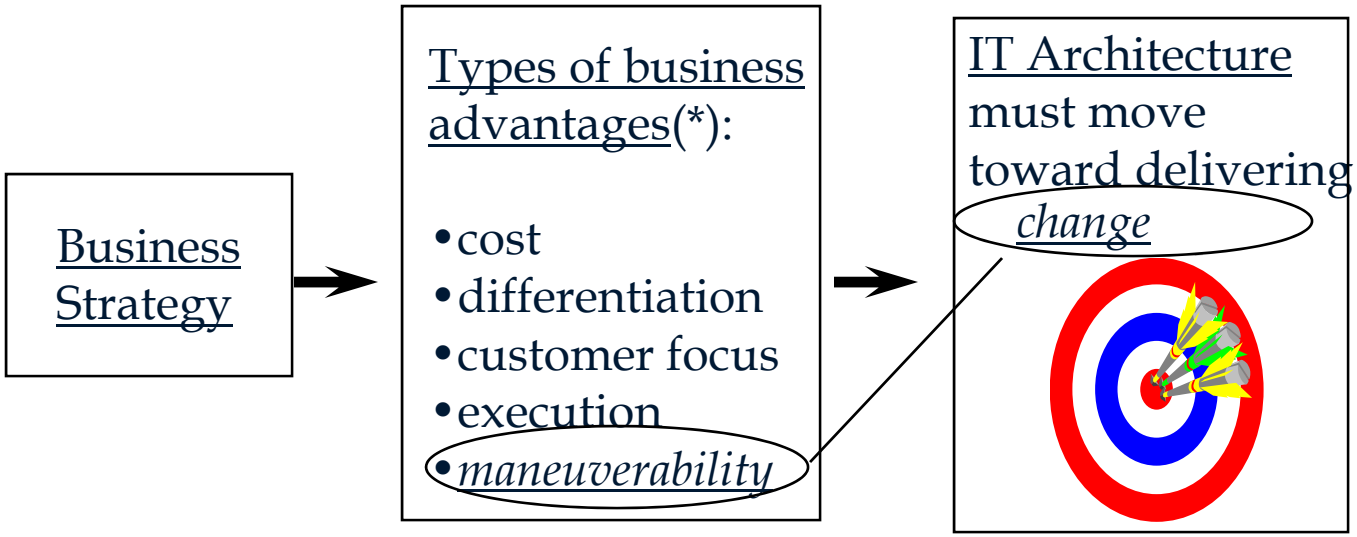
Having lots of data is great. Delivering real-time insights is better.

Think about your vision for a unified client experience. How will you integrate the data and run integrated analytics?

Engagement Models



Why Does a Robust IoT Platform and Ecosystem Matter?



An organization's ability to *maneuver* is the only advantage competitors cannot take away

Thank you

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