Predictive Modeling INSIGHTS CONFERENCE

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Welcome to Advisen's 2017 Predictive Modeling Insights Conference

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Welcoming Remarks

David Bradford
Co-Founder & Chief Strategy Officer
Advisen

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Thank you to our Advisory Board

Ben Fidlow, Willis Towers Watson
Kimberly Holmes, XL Catlin [2017 Conference Chair]
Don Mango, Analytics Advisory, Guy Carpenter
Aleksey Popelyukhin, Swiss Re

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carebridge international

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Opening Remarks

Kimberly Holmes
Global Head of Strategy
XL Catlin
2017 Conference Chair

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Keynote Address

Jeffrey Strickland
Principal Analytics Consultant
Humalytica Analytics, LLC

Who will Click, Who will Buy, and Who will Die

Data Science & Predictive Modeling in Context

The Last 10 Years or So…

- The Birth of Data Science – What a ludicrous idea!
  - Fiction
    - This is really ground-breaking work
  - Fact
    - Old stuff repackaged
    - New stuff conceived
  - Reality
    - Data Science is a hybrid creature

The Present – Maybe…

- Well, maybe it wasn't such a bad idea after all…
  - Fiction
    - Predictive modeling had revolutionized the industry
  - Fact
    - We added a tool to a vast toolset
  - Reality
    - The industry still distrusts models – and rightly so?

- But the Internet of Things (IoT) is absolutely absurb!

The Future Certainly

- This algorithm really is learning – and maybe IoT was not such a bad idea…
  - Fiction
    - ❖ If you build it, they will use it
    - ✓ Learning algorithms will revolutionize the industry
  - Fact
    - ❖ Fewer than 25% of decision makers use predictive model results
    - ✓ Alan Turings machine learned and broke the German Enigma Code
  - Reality
    - We will always distrust models – and rightly so?

The truth of the matter

- Every model I ever built is wrong!

"All models are wrong; some are useful."

—George Box

- All models are abstract representations of reality
- All models are built based on simplifying assumptions

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Preventive Analytics – The Actual Cutting Edge

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Preventive Analytics – The Actual Cutting Edge

Don Mango
Vice Chairman, Analytics Advisory
Guy Carpenter
Moderator

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Prevent(at)ive Analytics

Risk and Opportunity

- **Don Mango**, Vice Chairman, Analytics Advisory, Guy Carpenter (Moderator)
- **Jim Paugh**, SVP and Co-Founder, Care Bridge International, Inc.
- **Michael Reilly**, Managing Director, Accenture Strategy

IoT Impacting every part of the insurance value chain

Product Design

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

Pricing

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

Underwriting

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

Policyholder Service

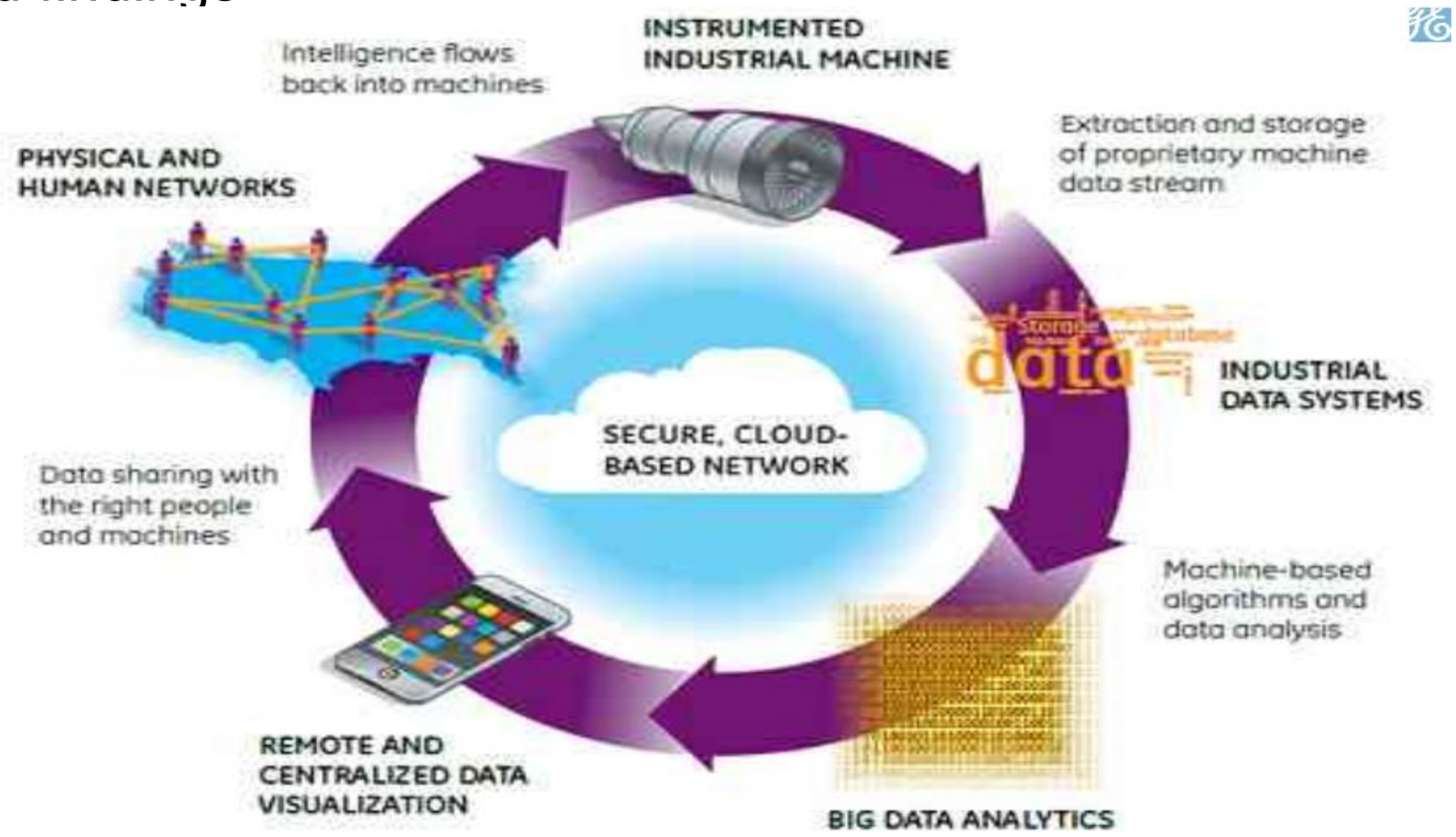
- Responsible for feedback and control operation
- Must work well with people and objects
- Must understand how to impact motivation and behavior

Claims

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

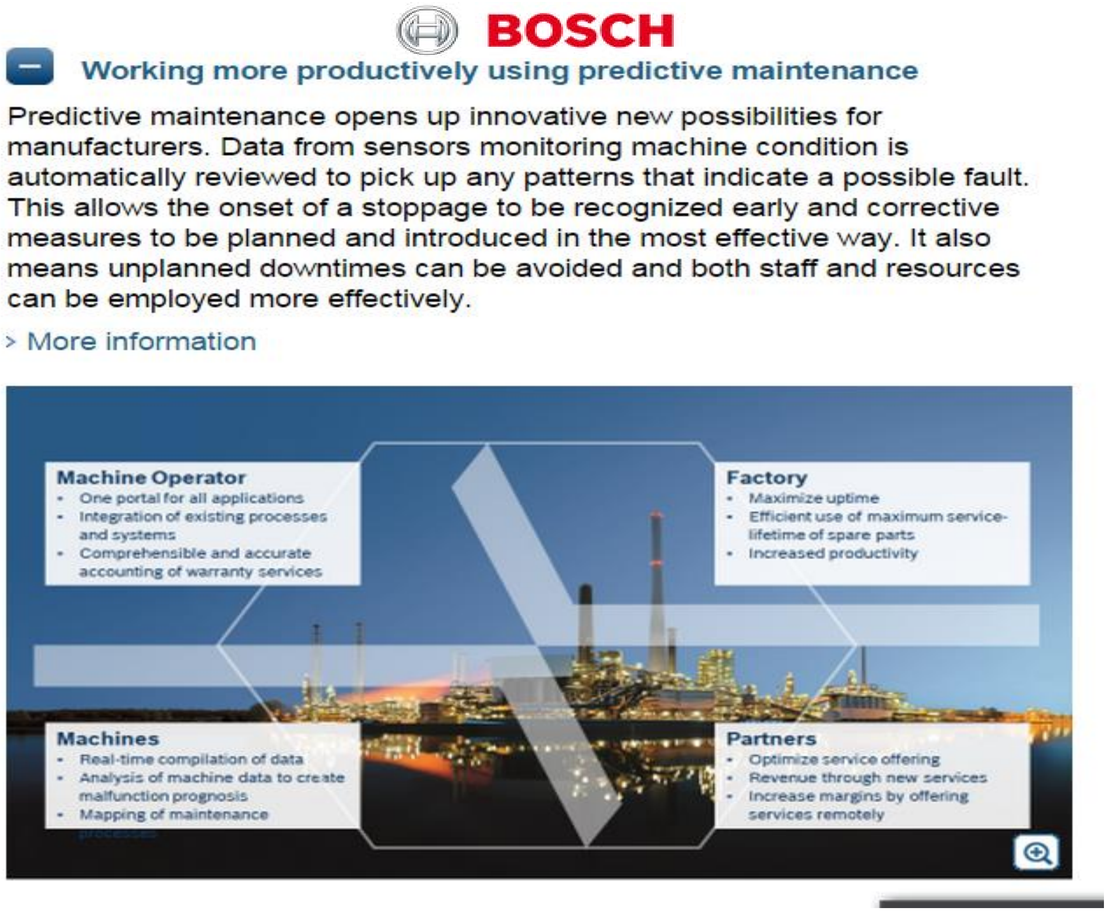
GE is betting big on the “Industrial Internet”

- Any insurer writing coverage of industrial properties needs to tap into these data, analytics and findings



Source: http://www.gereports.com/post/76430585563/new-industrial-internet-report-from-ge-finds#

Other manufacturers and providers of industrial control systems are jumping on the bandwagon



- abc

Source: http://www.rockwellautomation.com/global/innovation/connected-enterprise/operationalizing.page?gclid=CNa6mvCAgcgCFRSDfgodjL8NmQ
http://www.industry.siemens.com/topics/global/en/digital-enterprise-suite/Pages/Default.aspx
https://www.bosch-si.com/products/bosch-iot-suite/iot-use-cases/internet-things-cases.html

OUR APPROACH

A Partnership in Risk Management

Personal relationships. Face-to-face meetings. Ongoing dialogue. This is what you can expect from your FM Global client service team.

That's because, when your business continuity is at stake, you need more than an insurance company. You need a true business partner in risk management and resilience. That's what you get with FM Global. Where other insurance companies rely primarily on actuarial tables, we use a hands-on, engineering-based approach.

The result? Property insurance coverage based on the realities of your business and your particular property risk management challenges.

ENGINEERING EXPERTISE

Put engineering to work for your business, and see why it's integral to our approach.

Research and Testing

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Risk Solutions

01 02 03 04

Welcome to Hartford Steam Boiler

Backed by 150 years of leadership, Hartford Steam Boiler (HSB) sets the standard in equipment breakdown insurance and other specialty insurance and reinsurance coverages worldwide, with technical knowledge, superior risk solutions and customer commitment you can count on. HSB shows you how to stay ahead of emerging risks in a complex world.

» Learn more

Lights out

How to prepare your home for a power outage.

» [click to continue]

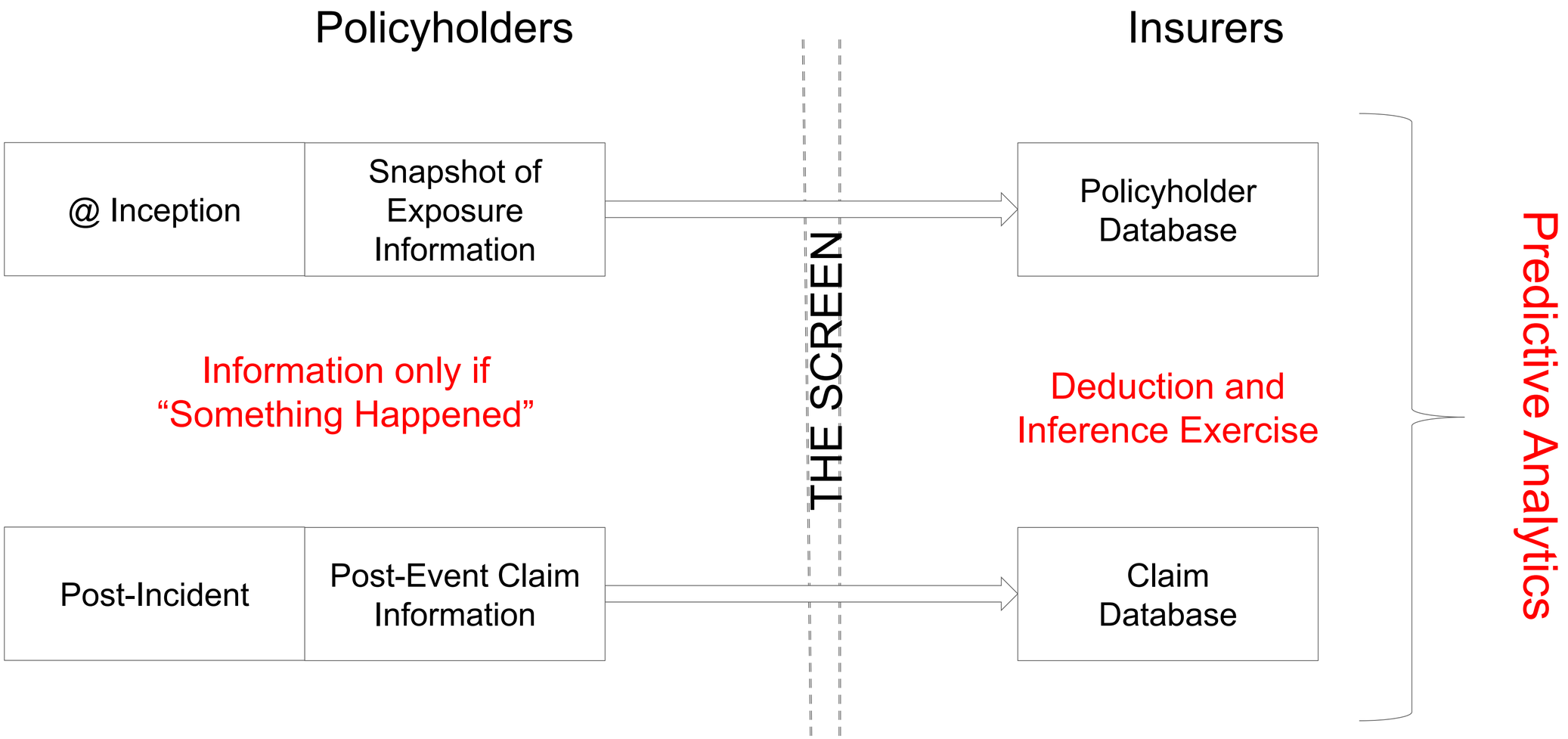
Home Systems Protection

HSB Home Systems Protection closes gaps in standard homeowners insurance policies by providing breakdown coverage for systems, appliances and electronics homeowners value and rely on for everything from heating and cooling, water and power, to communications, security and entertainment.

Impacts: Loss Mitigation → Elimination

- Frequency and Severity reduction → insured event prevention and elimination
  - Mass reduction in “Attritional Loss” component
  - Aka the ballast that pays for a lot of the infrastructure
  - Across all lines of business
- This is what FM Global and HSB have been doing in Equipment Breakdown for decades by employing large teams of inspection engineers
  - Only now it can be scaled to all types of operations, and without the need for as many inspection engineers

From Effects Analysis “Behind the Screen”…



…To Causal Analysis and Preventive Analytics

Policyholders	Intermediary (?)	Insurers	Who Owns What?
Electrical Engineers	REAL TIME	Sensor Data	Ownership?
Reliability Engineers	Monitoring	Maintenance	Mitigation Vertical Integration DBOI
Operations and Industrial Engineers	Causal Analysis	Business Interruption	Network Restoration Opportunities?

Prognostics and Health Management
A New Engineering Discipline

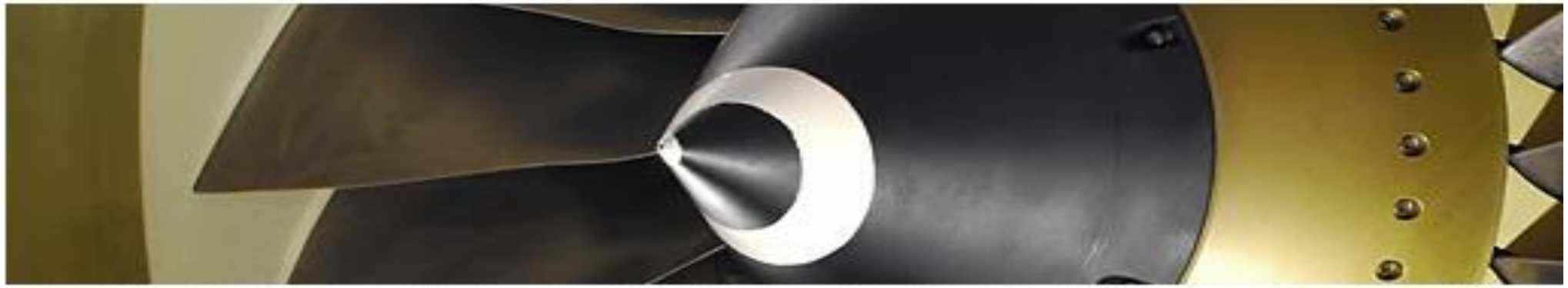
phmsociety

Username or e-ma

New to the PI

home | about | conferences | journal | competition | publications | community

Mission | Officers | Directors | FAQ



Home » About

about the prognostics and health management society

Prognostics and Health Management
A New Engineering Discipline

- Prognostics and Health Management is the engineering discipline focusing on
  - Using sensor data in industrial settings (e.g., GE Industrial Internet),
  - Combined with Machine Learning and Artificial Intelligence,
  - To monitor equipment status and forecast likely sources of breakdown
  - And proactively recommend preventive maintenance and parts replacement

GE
Energy

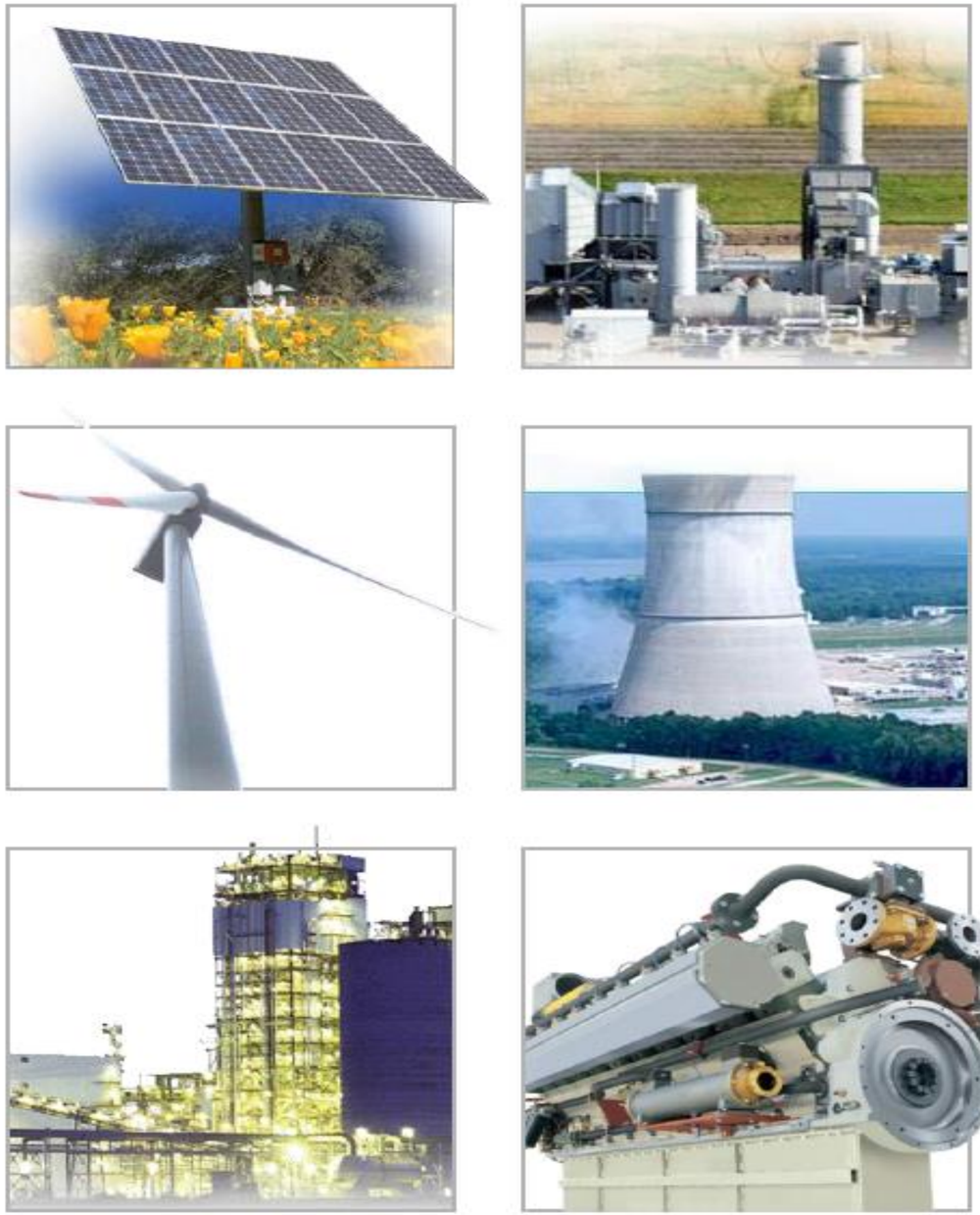
The *business* of PHM :

An "Actuarial Engineering" perspective

Annual Conference of the Prognostics & Health Management Society 2010

October 10-14, 2010
Portland, Oregon

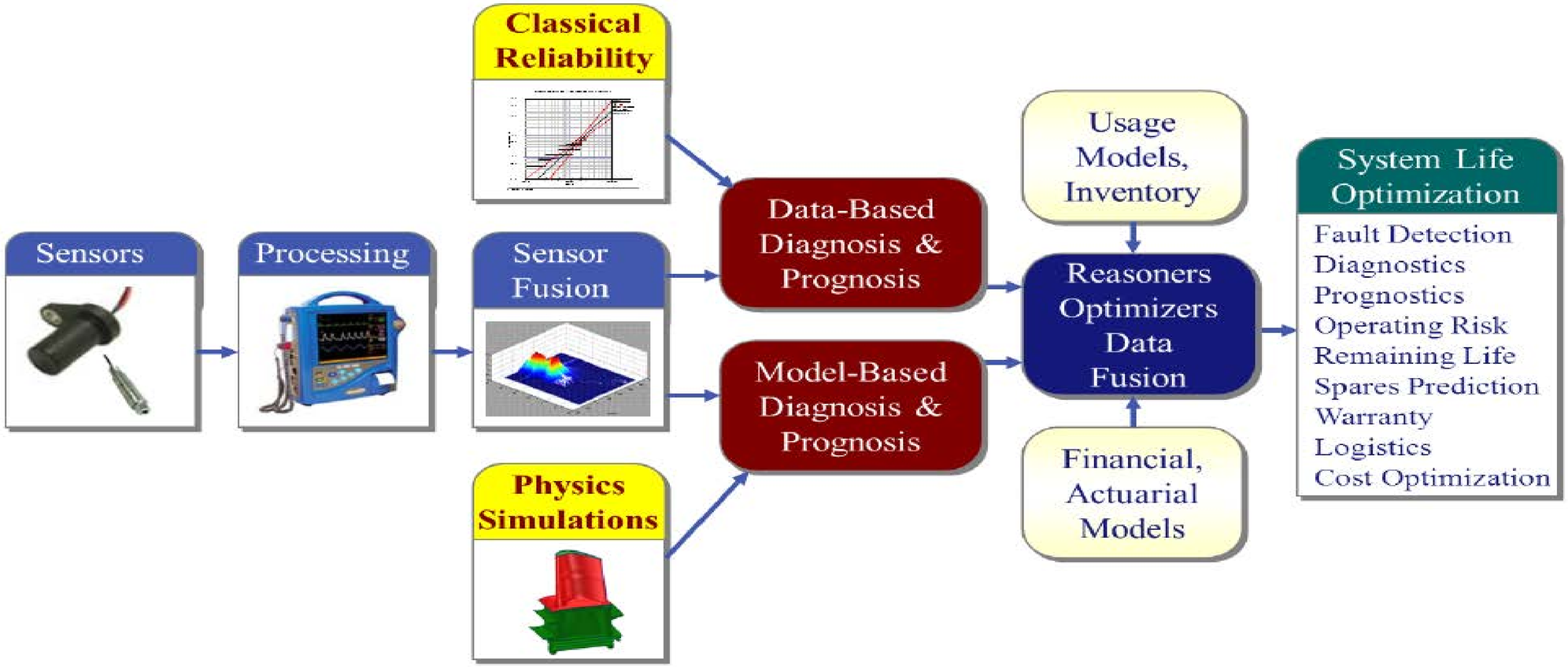
Sameer Vittal, PhD
GE Energy – Advanced Technology Operations



https://www.phmsociety.org/sites/phmsociety.org/files/PHMconference2010_SameerVittal.pdf

PHM As Part of Risk Management

- PHM + Life-Extending Controls provide the "vital knobs" to manage operational risk in portfolio's of monitored assets
- It's an "early warning system" .. For emerging/ systemic issues
- Effective risk transfer mechanism .. From unplanned to planned maintenance



Analytic-Powered Outcomes®

Preventive Analytics

People – Process - Technology

- **Apple**
  - ResearchKit/CareKit
- **Android**
  - ResearchStack
- **OBD-II**
  - Mojio/Kickstarter
- **Asset Control**
  - Lojack

- **Home Voice Assistance**
  - Echo, Alexa, SIRI
- **Connected Equipment**
  - Smart Grid,
  - BigFoot,
  - Stream my Data,
  - Powerhouse Dynamics
- **GNSS**
  - Kapsch

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Current to Potential State

		Current State	Potential P/C State
People	Facial Recognition	• Autism ID at early age	• Driver alertness
	Activity Monitor	• Heart Rate/Glucose	• Promote Wellness
		• COPD	• WC – monitor/sentinel
		• AsthmaMD	• WC – monitor/sentinel
	Drug Monitor	• Chronic Pain Management	• WC – monitor/sentinel
		• Opioid Measurement	• WC – monitor/sentinel
Process	Energy Monitor	• Theft	• Energy use
		• Real time billing	• Food Safety – Oven, Refrigeration Dairy/Juice/Seafood/Restaurant
		• Field Service Visits	• Fire Safety – overload, smoke detectors
Technology	Home Assistant	• Shopping, monitoring	• Security, theft, policy marketing
	GNSS	• Road Tolls	• Fleet Management, Driving Patterns
	Weather	• COPD Monitor/Alert	• Claim Management, Injury prevention (falls)
	Asset Protection	• Auto/Computer Theft	• Auto Theft/Computer Theft
	Transportation	• OBDII	• Wired Car, Driving patterns, Brand performance
		• Gig Economy	• Autonomous Autos

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accenture strategy

Preventative Analytics

2017

High performance. Delivered.

Strategy | Consulting | Digital | Technology | Operations

The rise of preventative analytics is being driven by the need for new competitive capabilities

Global trends driving commoditization and consolidation are forcing carriers to seek new sources of distinction.

1. Global Economic Recession

- Low interest rates globally in the last 5 years – 7 years
- Slowed market expansion across industries causing pricing pressures for insurers

2. Slow Growth

- Slower historical growth in the Insurance markets (x% for commercial and y% for Life)
- Similar future projections for slow growth for next 5-7 years

3. Market Consolidation

- M&A activity at a high pace worldwide for 5 years (e.g. ACE / Chubb, Willis Towers Watson, etc.)

4. Regulatory Requirements

- Growing regulatory oversight continues to increase costs for both P&C and Life Insurance companies
- Political changes (e.g., Brexit) adding regulatory uncertainty

5. Commoditization

- Increasing similarity in insurance products offered due to the availability of data, analytics and platforms that are leveling the playing field for insurers

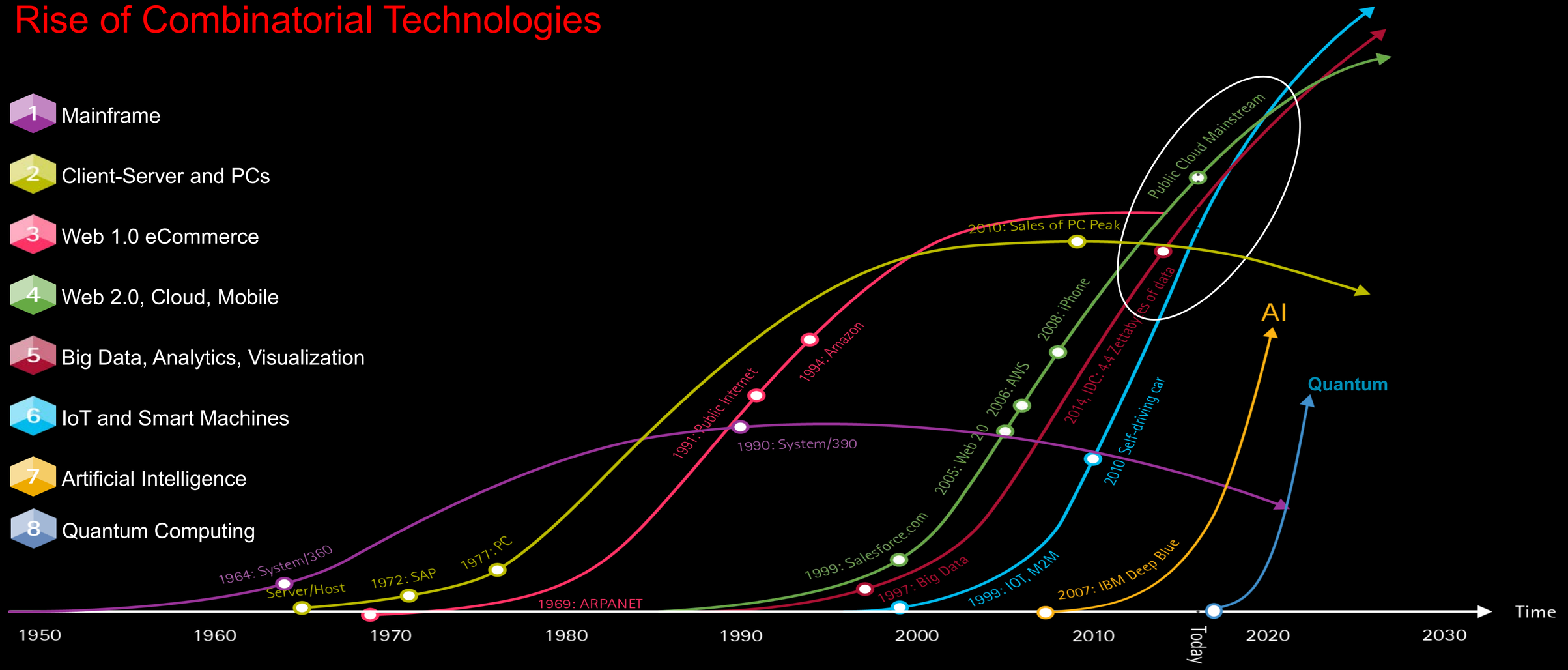
6. Venture Capital Flow

- Infusion of new sources of capital is increasing competition are insurance carriers – Peer-to-peer, Self-insurance, etc.

- **Continued declined in commercial pricing for the last 5 years – average decline of 3.5% and 3.9% for Q2 2016**
- **Increase in Combined Rations driven by reduction in rates and increase in Catastrophic claims – 2.2% increase in 2016**
- **Alternative capital now represents 12% of Global Reinsurance Capital Base**
- **Regulatory changed causing stricter process and risk policies for carriers (e.g., BREXIT**

The rise of preventative analytics is possible today because of the combinatorial technologies that have emerged.

Rise of Combinatorial Technologies



Preventative Analytics are as varied as the industries you write, with new ones emerging constantly.

Existing Carriers

Canal INSURANCE

New Carriers

beam

Third Parties

Internal Solutions

- Adaptive Book Management
- Intelligent Underwriting
- Preemptive Claims handling and preparpation

The limiting factor before you in preventative analytics is not technology. It is simply imagination and will.

"It is not the strongest of the species that survives, nor the most intelligent. It is the one that is most adaptable to change."
attributed to Charles Darwin

Getting Started in Preventative Analytics:

1. Understand what are the preventable claims for your product or industry
2. Imagine what is the solution to prevent those claims
3. Determine how that solution can be compelling to your customers and your company
4. Figure out how to get there considering all possible paths – build, buy, partner, etc.

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Prevent(at)ive Analytics Panel Discussion

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Prevent(at)ive Analytics Audience Participation

THANK YOU!

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Preventive Analytics – The Actual Cutting Edge

Don Mango
Guy Carpenter

Jim Paugh
Care Bridge International, Inc.

Michael Reilly
Accenture Strategy

Morning Break

Coming up next…

The Data Firehose – How to Channel It

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The Data Firehose – How to Channel It

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The Data Firehose – How to Channel It

Ben Fidlow
Global Head of Core Analytics
Willis Towers Watson
Moderator

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The Data Firehose – How to Channel It

- **Ben Fidlow**, Global Head of Core Analytics, Willis Towers Watson (Moderator)
- **Aleksey Popelyukhin**, Head of Actuarial Data Services, Swiss Re
- **Dan Root**, VP, Business Solutions Consultant, Strategic Analytics, XL Catlin
- **Jayesh Srivastava**, Head of Global Professional Analytical Services, Dun & Bradstreet

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The Data Firehose – How to Channel It

Ben Fidlow
Willis Towers Watson

Aleksey Popelyukhin
Swiss Re

Dan Root
XL Catlin

Jayesh Srivastava
Dun & Bradstreet

Conference Luncheon

Coming up next…

Disrupting Distribution

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Disrupting Distribution

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Disrupting Distribution

David Bradford
Co-Founder & Chief Strategy Officer
Advisen
Moderator

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Disrupting Distribution

- **David Bradford**, Co-Founder & Chief Strategy Officer, Advisen (Moderator)
- **Michael Fitzgibbon**, Chief Underwriting Officer, Slice Labs Inc.
- **Karl Stark**, CEO, Elagy

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Disrupting Distribution

David Bradford
Advisen

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Slice Labs Inc.

Karl Stark
Elagy

Smart Applications

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Smart Applications

Jim Blinn
EVP of Client Solutions
Advisen
Moderator

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Smart Applications

- **Jim Blinn,** EVP of Client Solutions, Advisen (Moderator)
- **Scott Henck,** Senior Vice President, Global Claims, Chubb
- **Ashish Kohad,** AVP, Predictive Analytics CoE, Zurich
- **Louis Stone**, Managing Director- Head of Business Development, Symbiont.io

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Smart Applications

Jim Blinn
Advisen

Scott Henck
Chubb

Ashish Kohad
Zurich

Louis Stone
Symbiont.io

Afternoon Break

Coming up next…

Regulation: The Difference between ‘Possible’ and ‘Allowed’

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Regulation: The Difference between 'Possible' and 'Allowed'

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Regulation

Rick Bortnick
Senior Counsel
Traub Lieberman Straus & Shrewsberry
Moderator

Regulation

- **Rick Bortnick,** Senior Counsel, Traub Lieberman Straus & Shrewsberry (Moderator)
- **Cindy Maike,** General Manager – Insurance, Hortonworks
- **Matthew Mosher,** Executive Vice President & Chief Operating Officer – Rating Services, AM Best

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Regulation

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Hortonworks

Matthew Mosher
AM Best

What's the 'Next Big Thing'?

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What's the 'Next Big Thing'?

Philip L. Schwartz
Chief Global Architect for Insurance
IBM Watson Internet of Things

Analytics, Cognitive and IOT for Insurance

Predictive Modeling Insights Conference
January 19, 2017

Philip L. Schwartz
Chief Global Architect for Insurance, Watson IoT

schwa@us.ibm.com

IOT4INSURANCE.COM

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- The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.
- The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.
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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*

Disruption

The Problem and the Battleground

@ Inception

Policyholders

Snapshot of Exposure Information

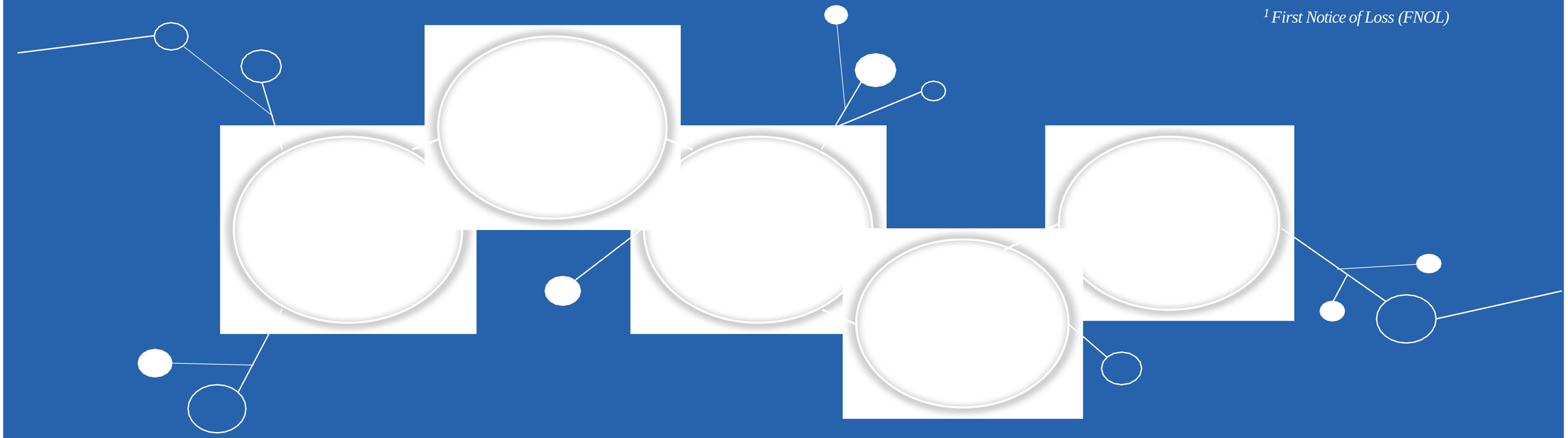
Insurers

Policyholder Database

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

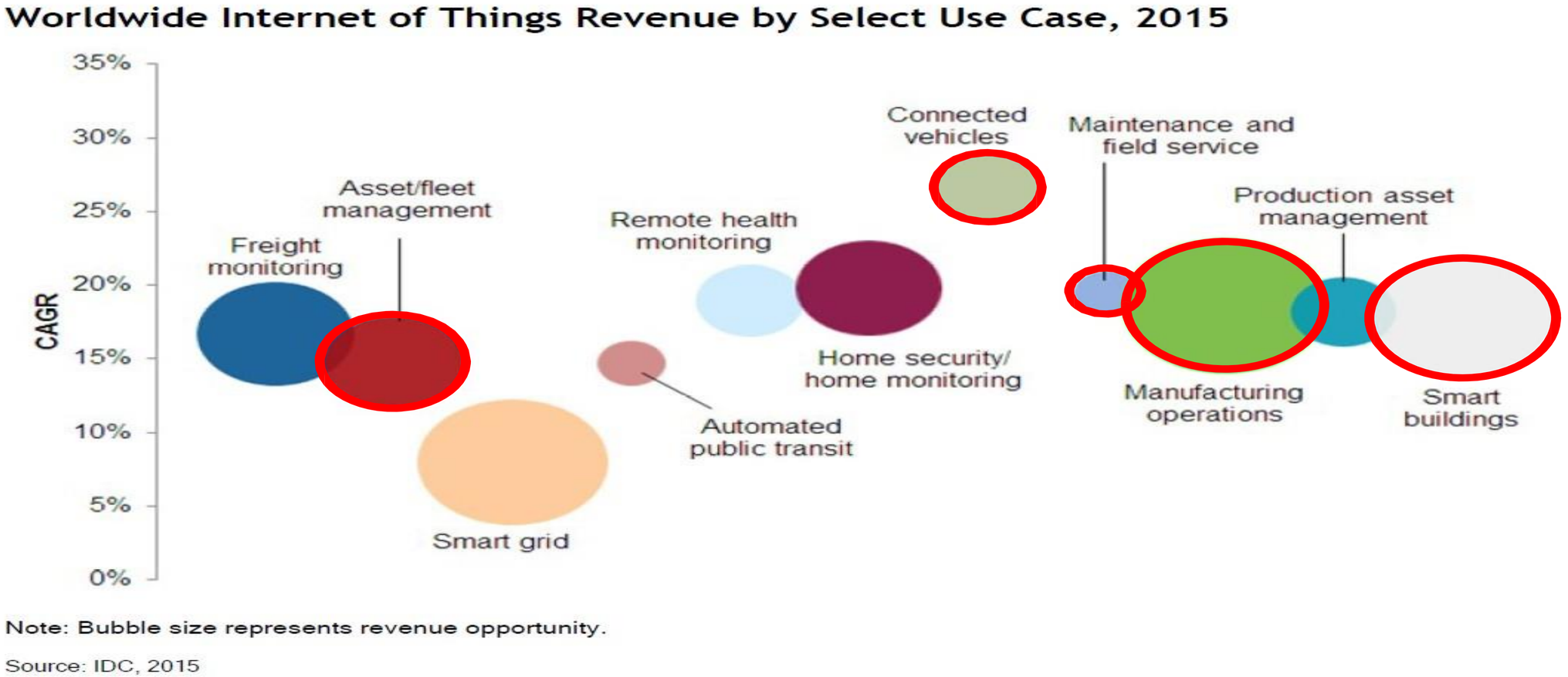
Top 5 Benefits of IoT to the Insurance Industry

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

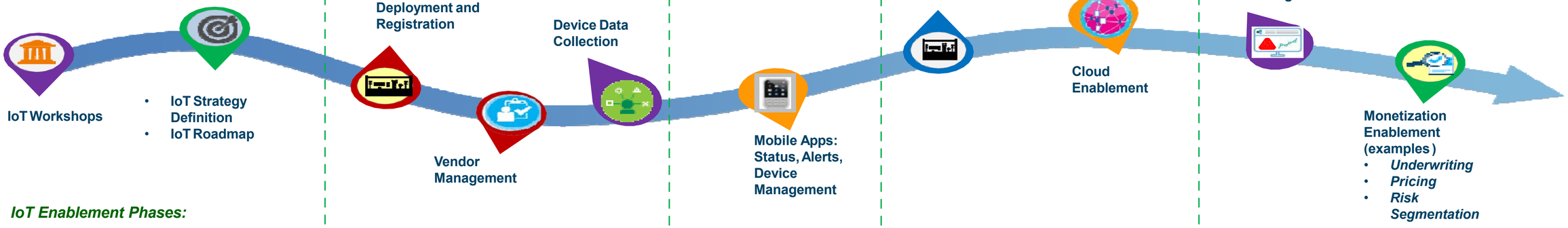


Current research indicated that "**smart insurers**" could get access to multiple sources of new revenues if they leverage IoT

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.

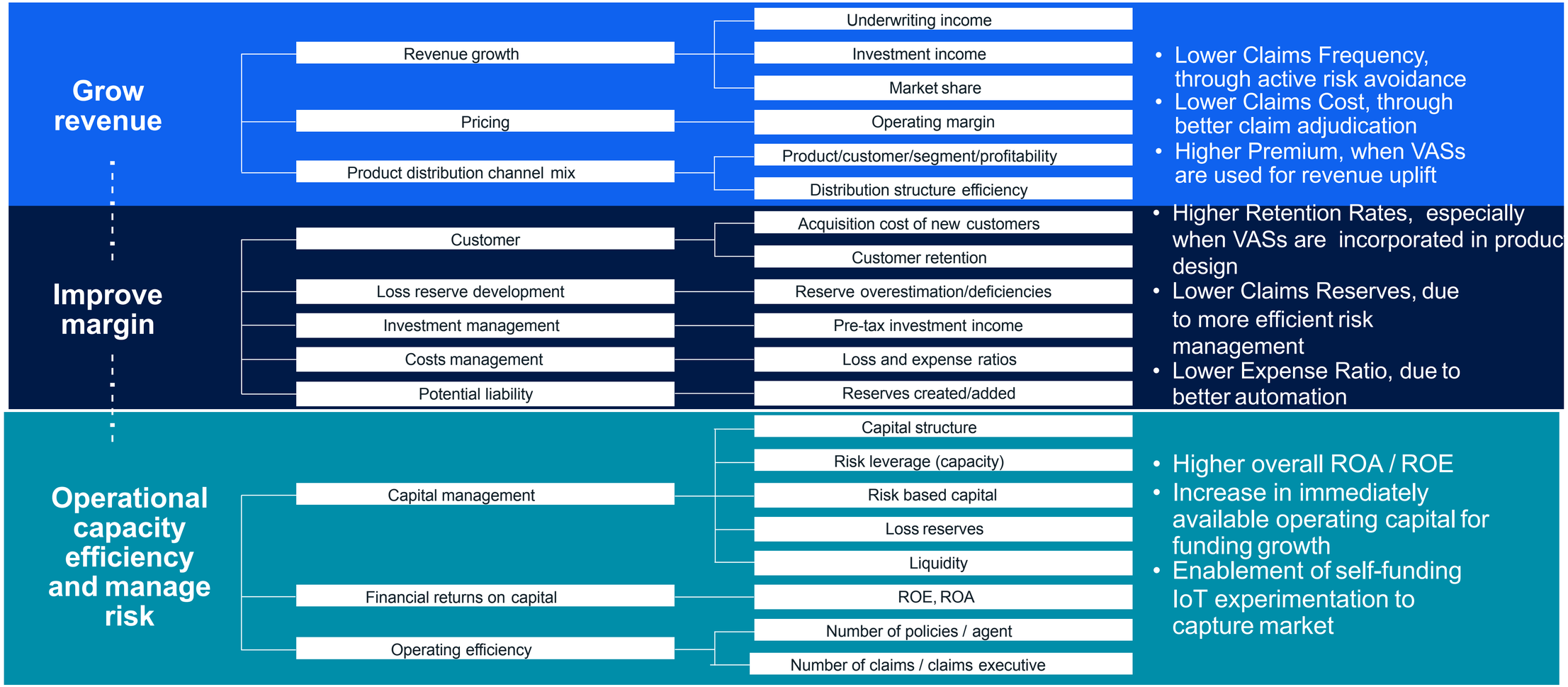
Insurance Carrier IoT Journey



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



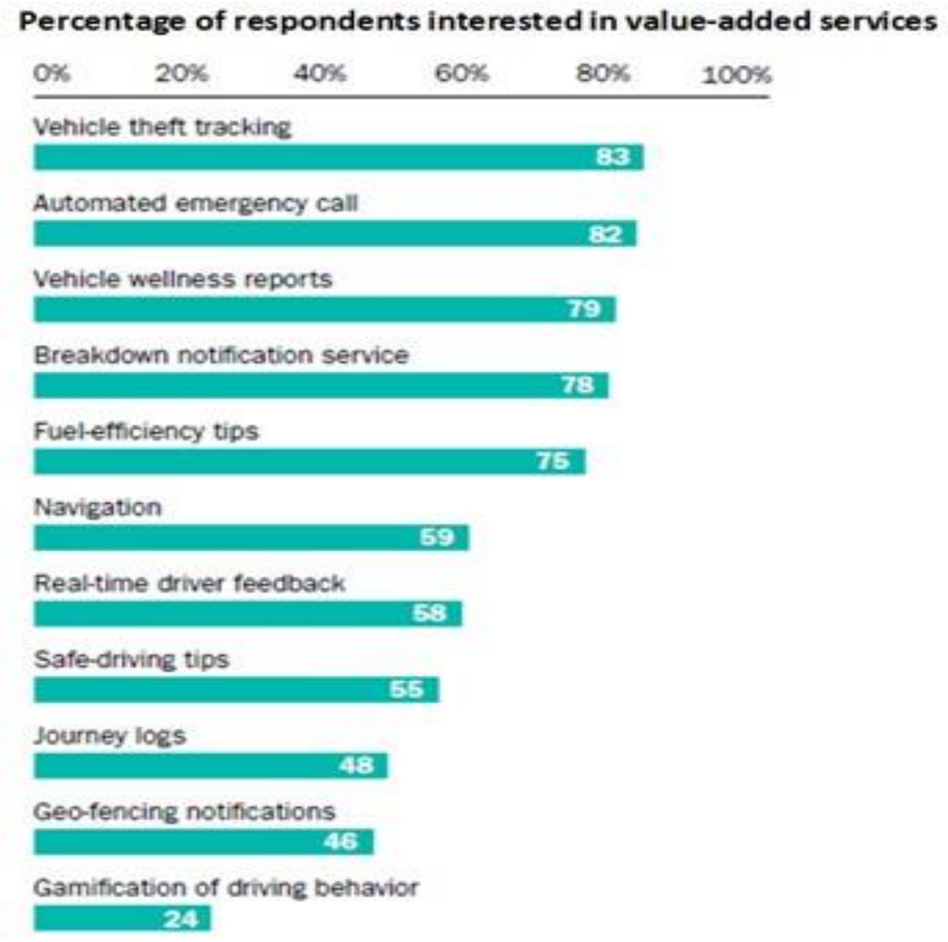
The Internet of Things (IoT) coupled with analytics and cognitive has the potential for both disrupting consolidated business models and enabling new sources of revenue

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

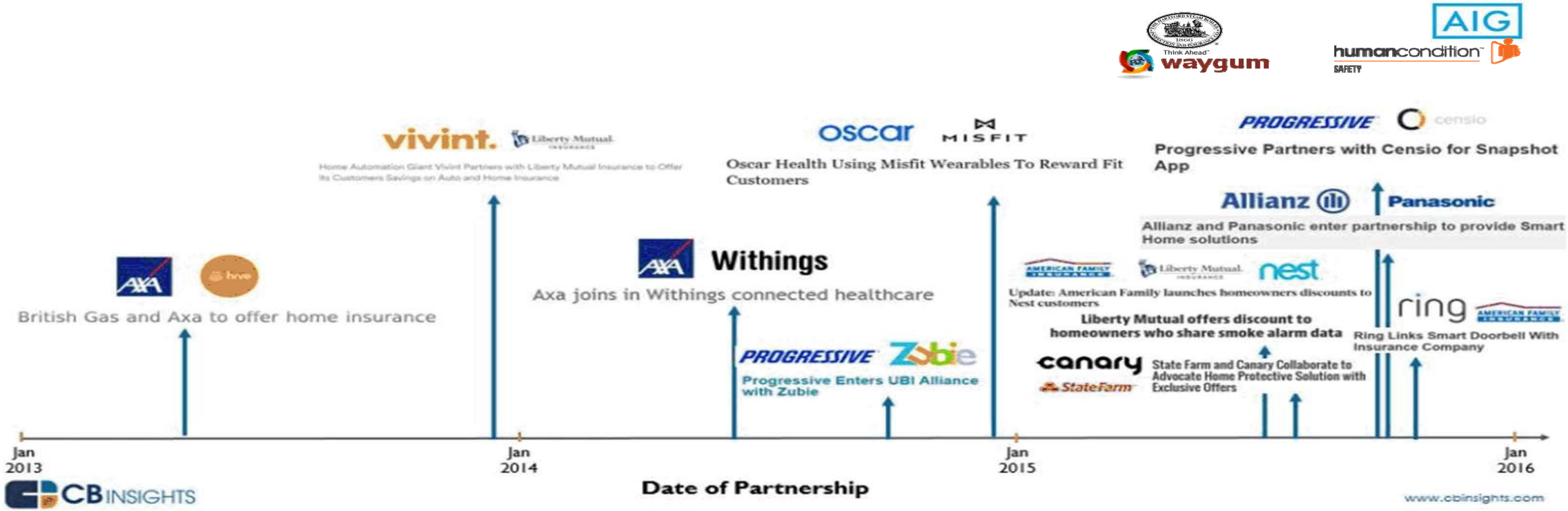
For insurers, the ability to provide and monetize new value-added services is the battlefield for customer engagement and true competitive differentiation



Source: Towers Watson

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.

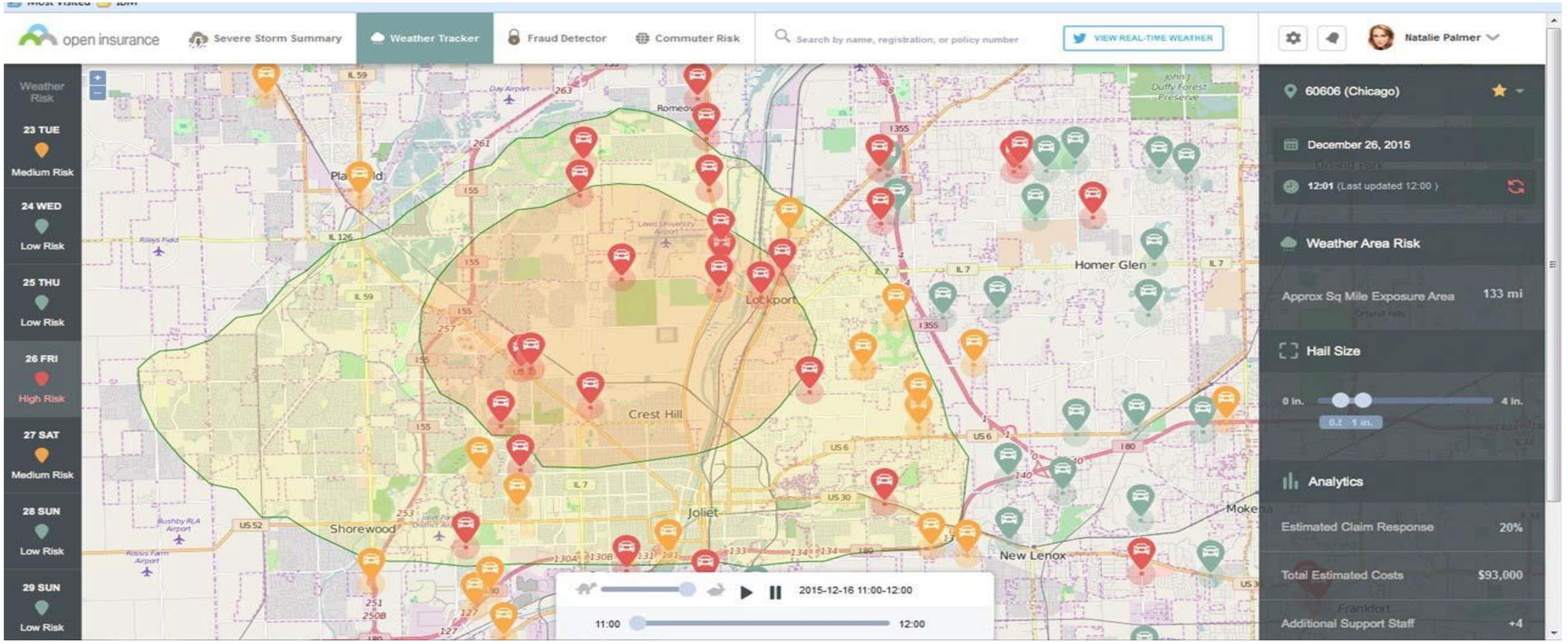
- Cognitive Technologies
  - perceiving, analyzing, reasoning, learning, anticipating, interacting
- Data
  - from the interconnected digitized world with elements from the physical, social and virtual realm
- Actions
  - prescriptive actions, insights, recommendations and assistance

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

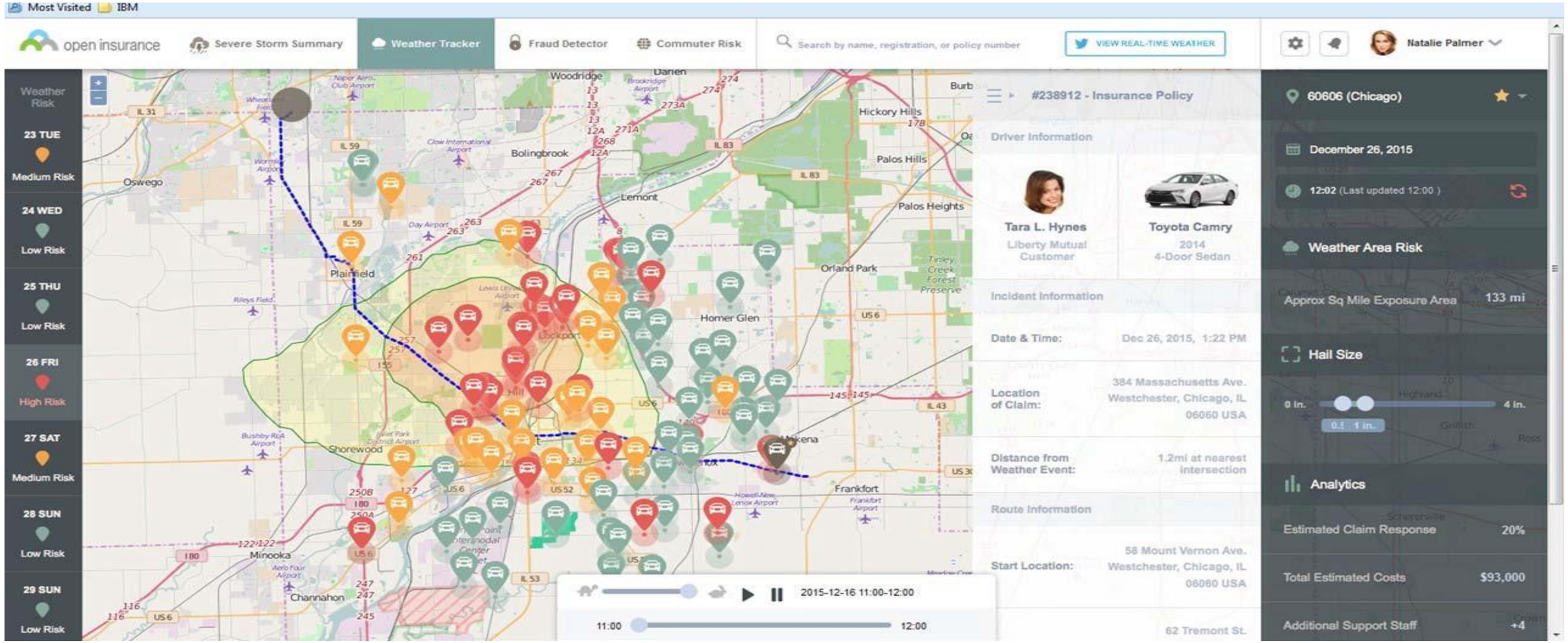
The Art of the Possible – IOT with Telematics Data and Weather

IBM Watson IoT

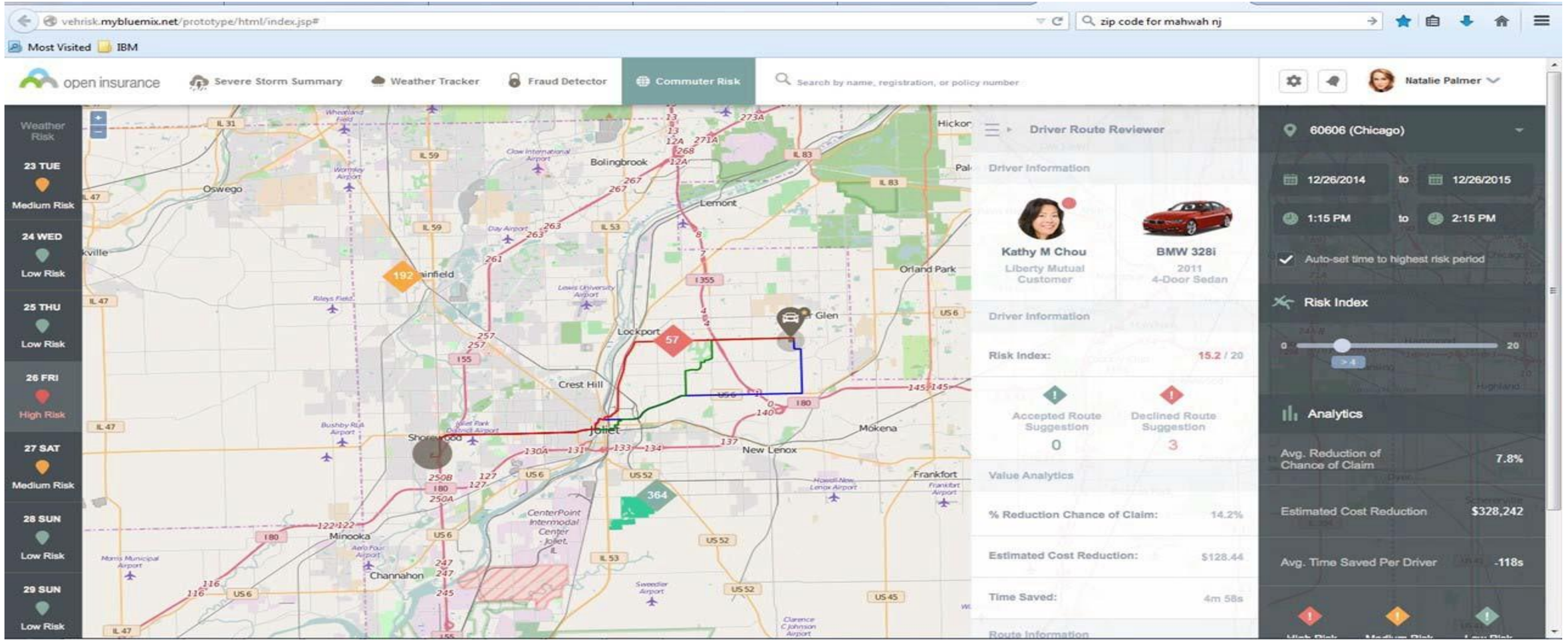
Weather Tracker



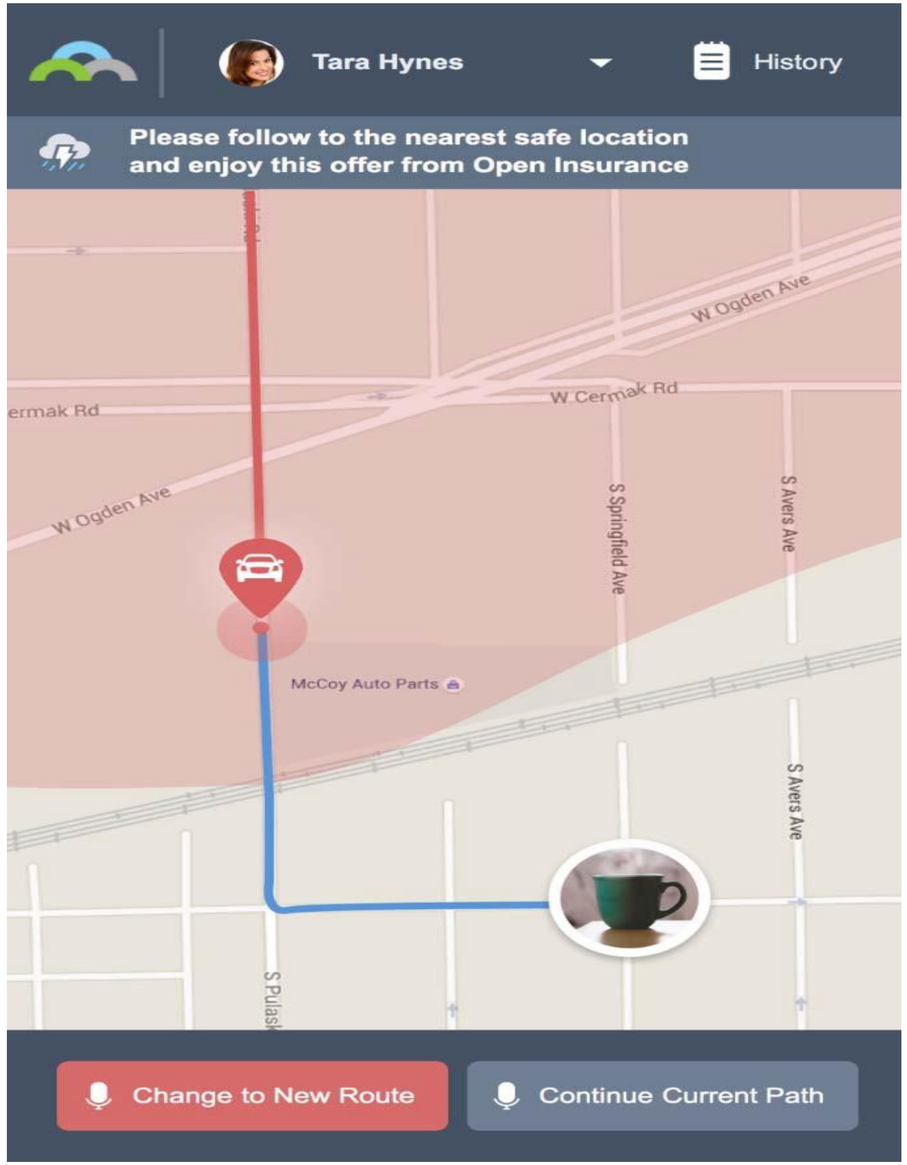
Weather Tracker – Route Prediction



Commuter Risk



Mobile Alert Screen



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

360°View of the Customer

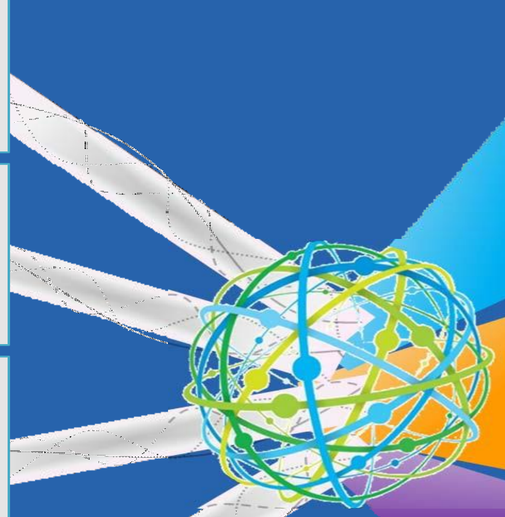
Location, frequent routes
Understand where and how often customer frequent merchant stores

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

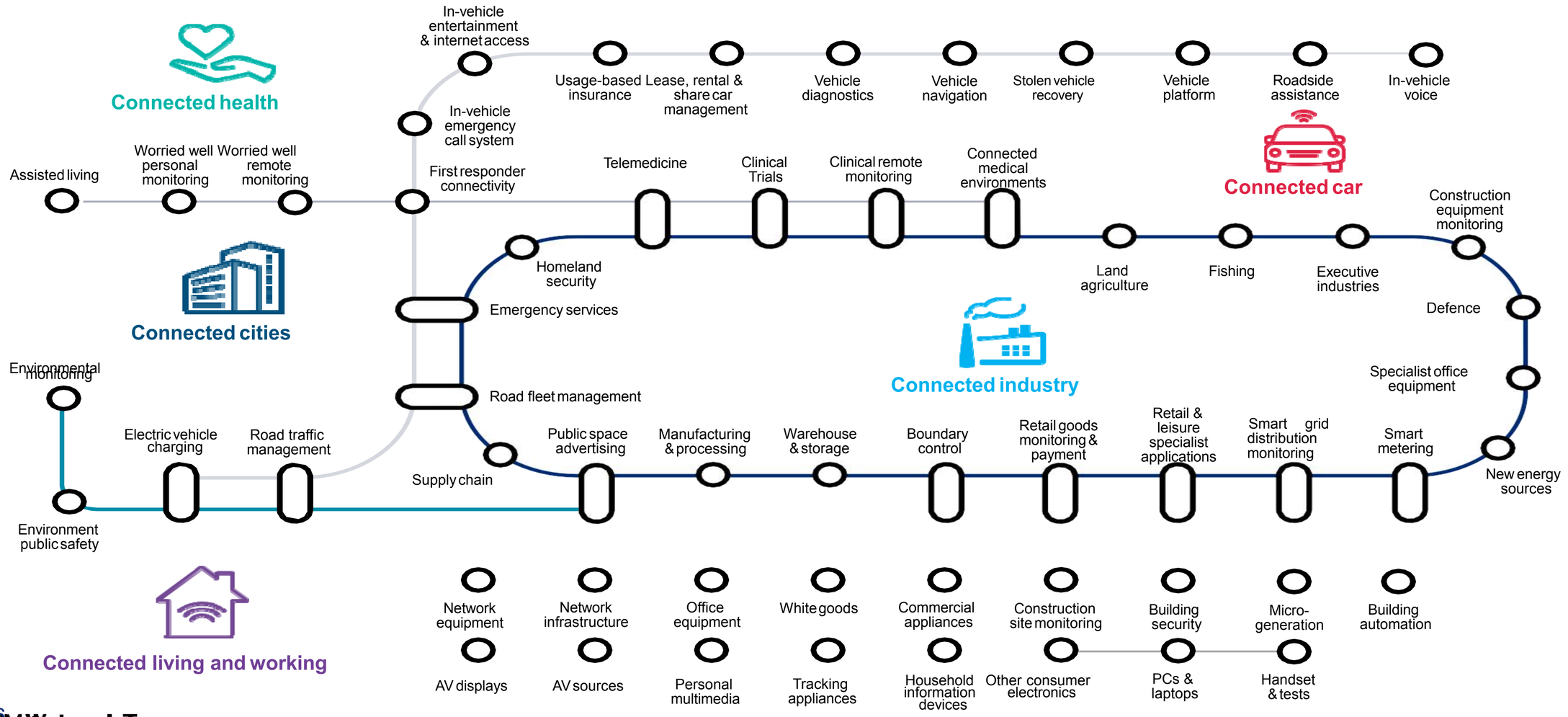
IoT4I Details

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

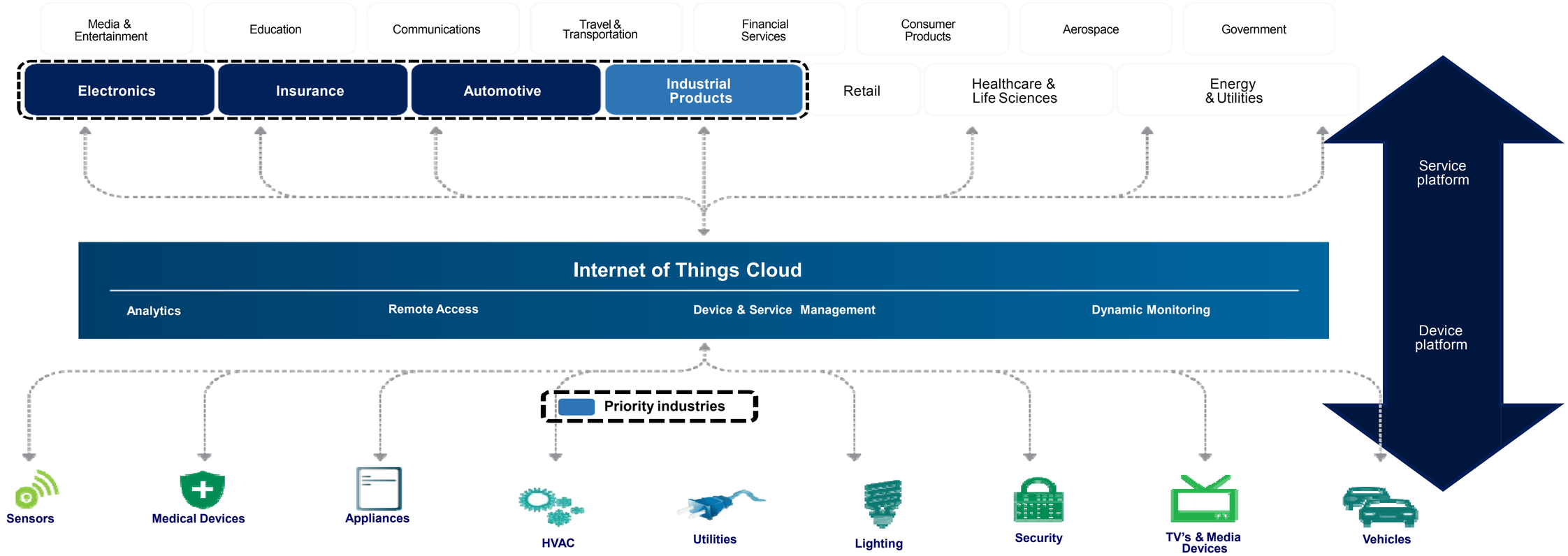
IoT for Insurance =

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



PROPERTY CASUALTY360°

eNewsletters | Magazines | Feedback?

Hackers are targeting your smart devices

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

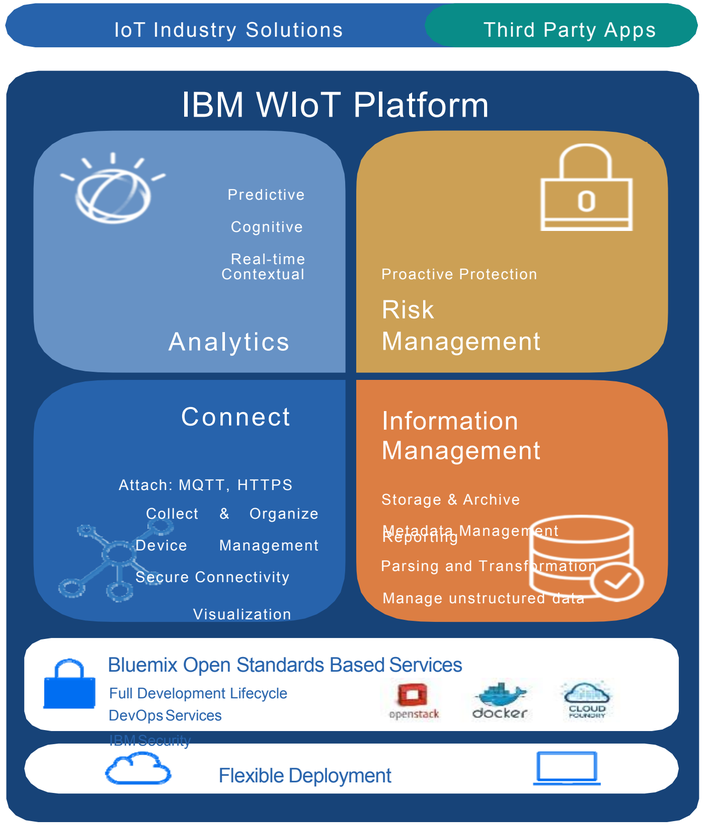
SHARE THIS STORY

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**

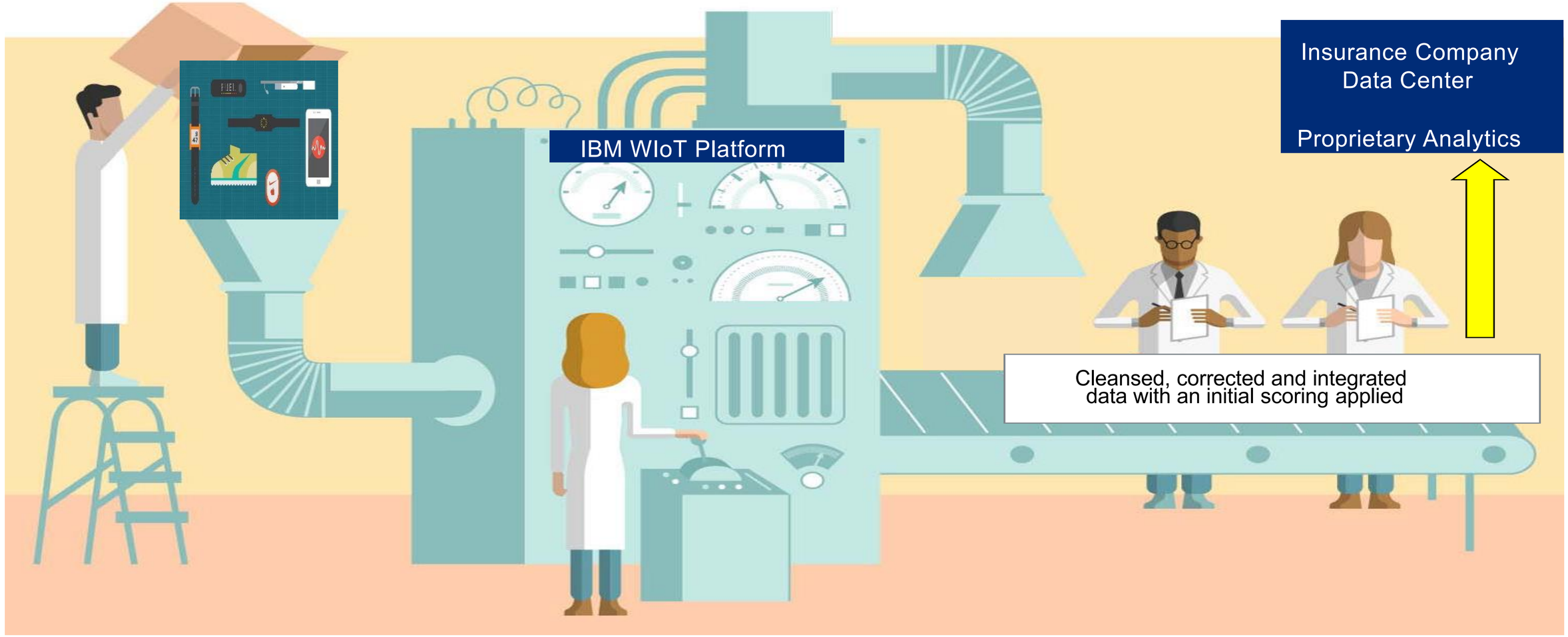
A Hybrid Approach to IoT is Required

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

SOURCES	
The Weather Company Property and Source Data	The Weather Company Weather Models
	127K Global Stations
	40M+ Mobile Phones
	50K Flights a Day
	Global Lightning
	Air Quatily and Pollen
	Traffic / Incident Data
Open & Government Data	National Weather Service Weather Stations
	High Resolution Radar
	Oceanographic Data

TYPES

- Weather
- Atmosphere
- Historical
- Current
- Predictive
- Global
- Ultra-local

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

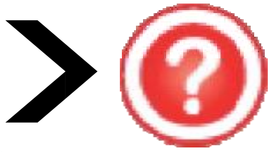
IBM SW

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

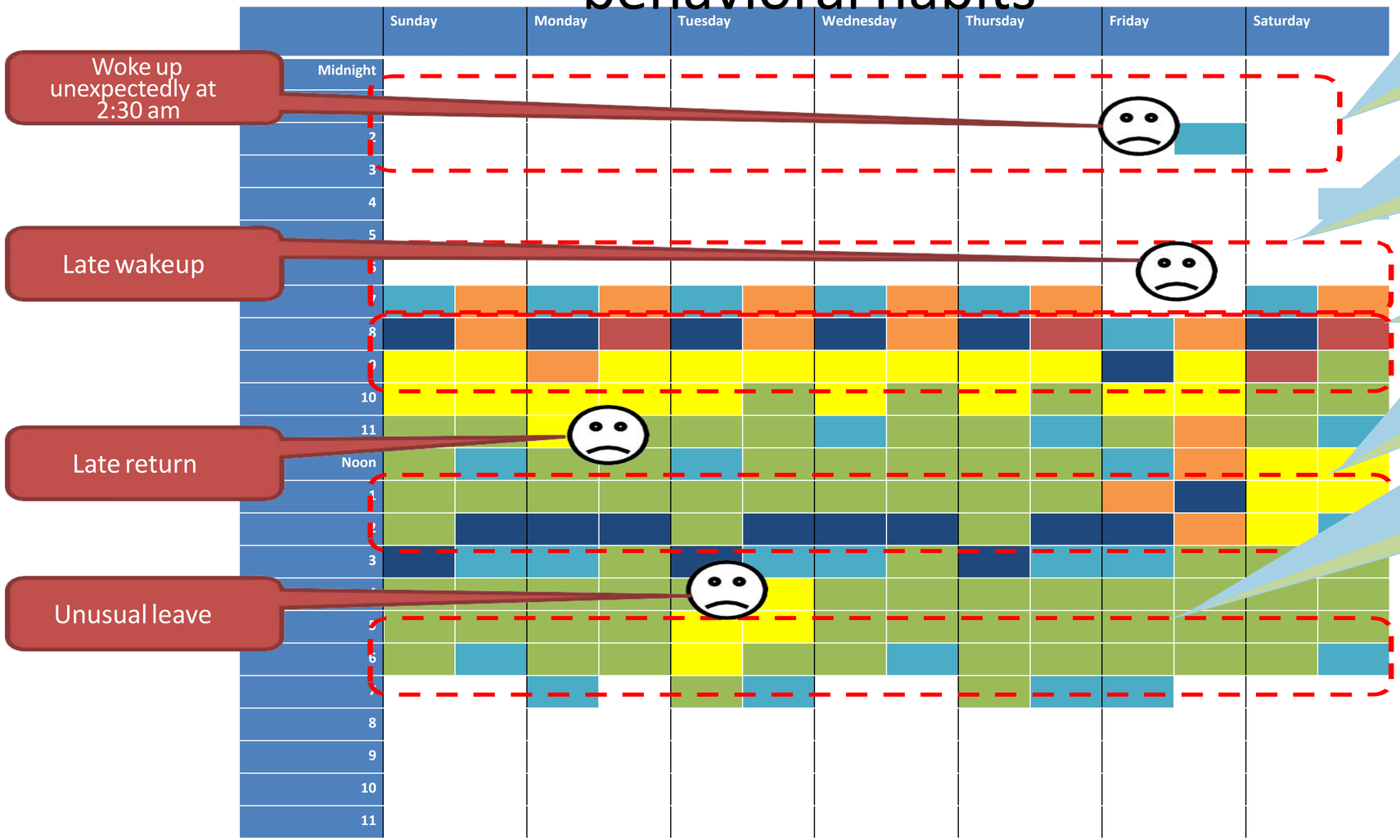
Detect "Anomaly Water leak" risk 2 or water sensor == wet for last 30 sec && water valve == open && current temp < avg temp + 20 && weather == dry	Check: (location != @home) && (08:00 < now < 18:30)	send push notification to Insured.phone-number send SMS to available plumber.phone-number
Detect "overexertion" 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



Usual good night sleep

Usual wakeup time at 7am

Typical out-of-home stay: between 1.5 and 2 hours

1-hour lunch every day for about an hour in front of TV

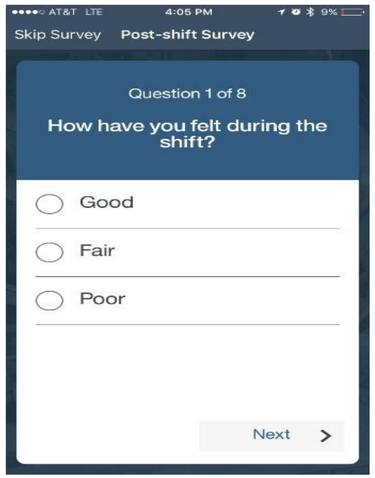
Use of washroom before bedtime

Room	Color
Bedroom	
Living	
Bath	
Kitchen	
Dining	
Porch	

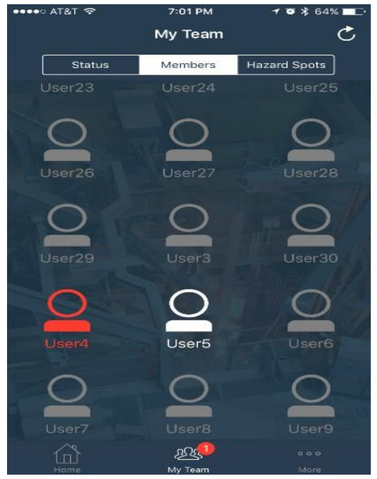
Out-of-home

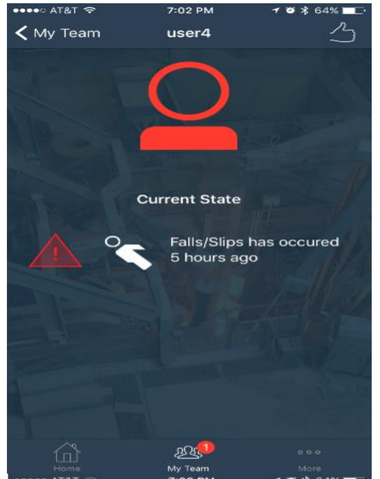
Solution Apps and Dashboards

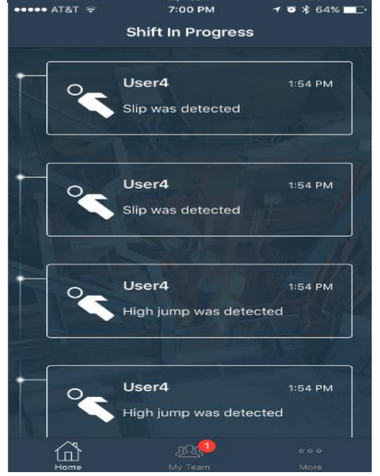
Worker App



Supervisor App

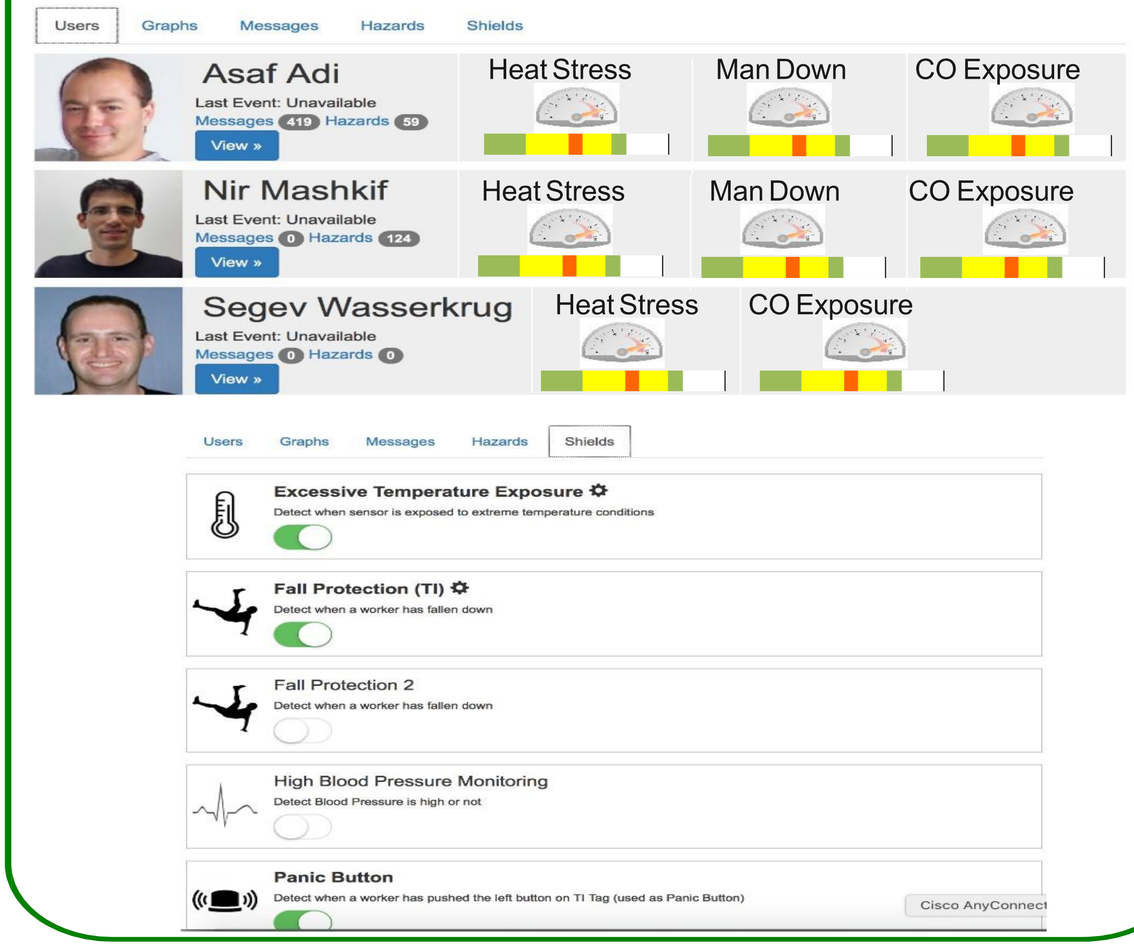




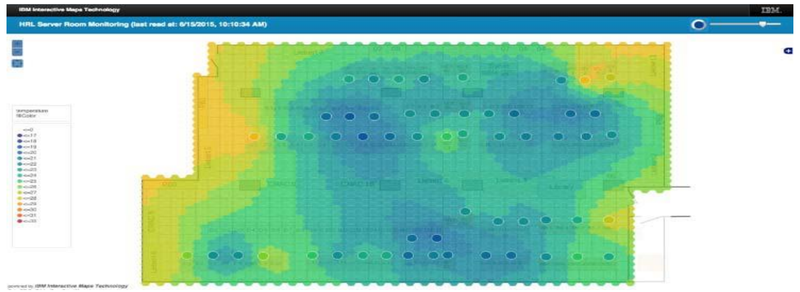


Solution Apps and Dashboards

Management Dashboard



HSE Dashboard



More Historical Analytics

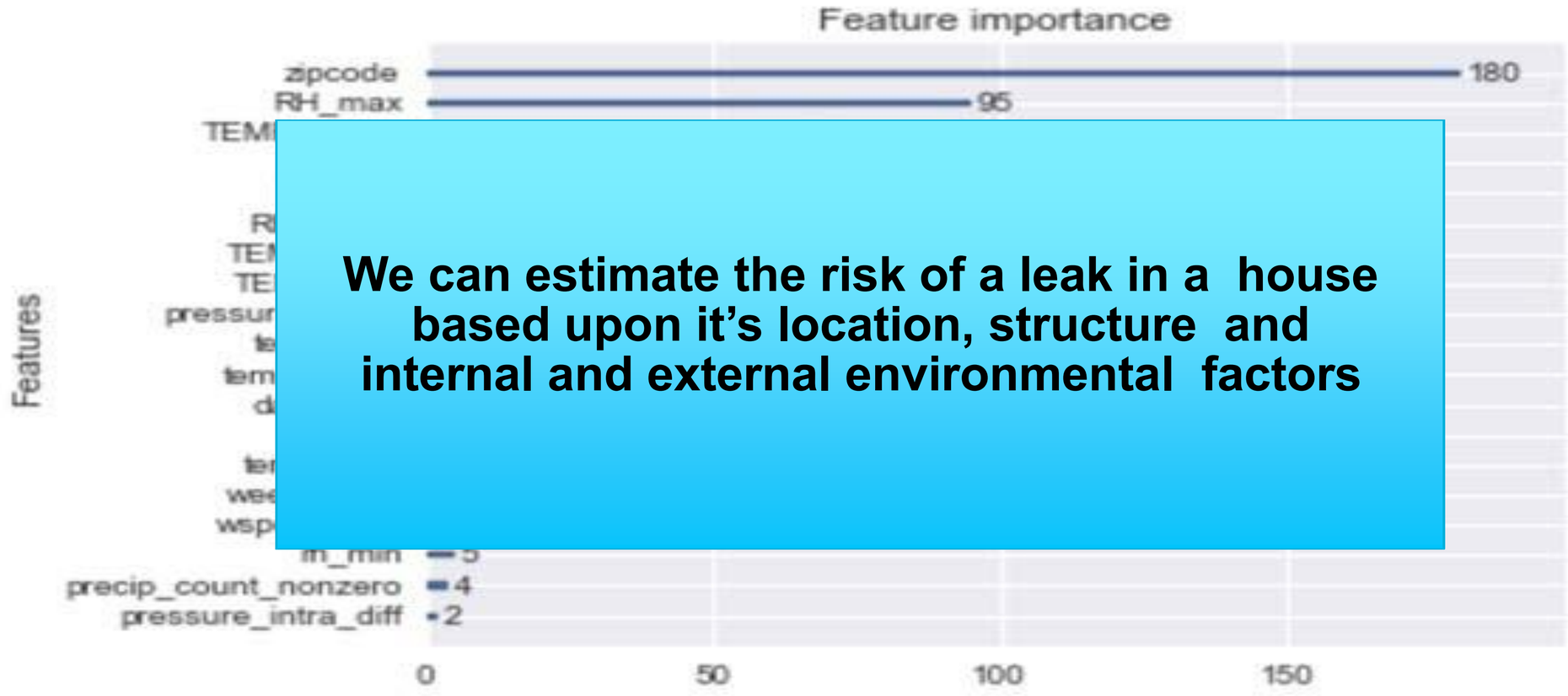
Beyond basic sensor trips, there is a wealth analytical insights held within IoT insurance data.

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

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

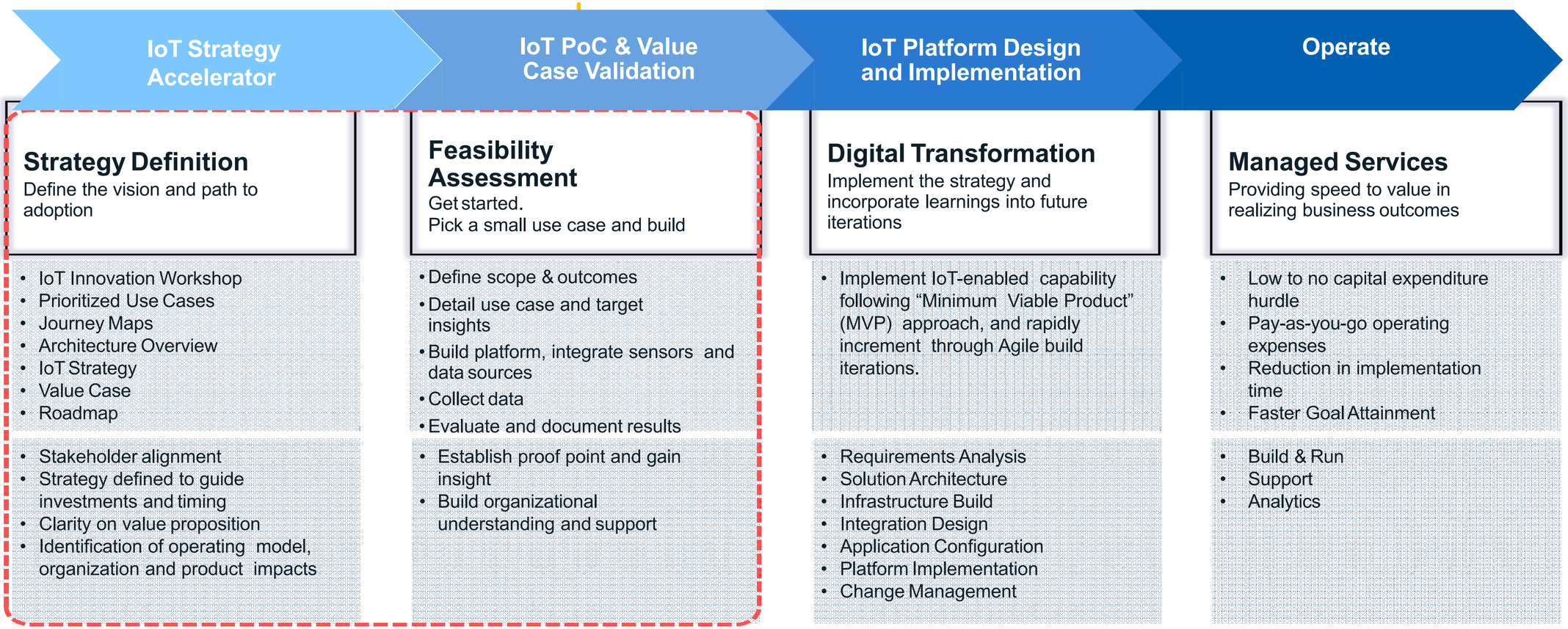
-Cultural changes are often the hardest to overcome

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

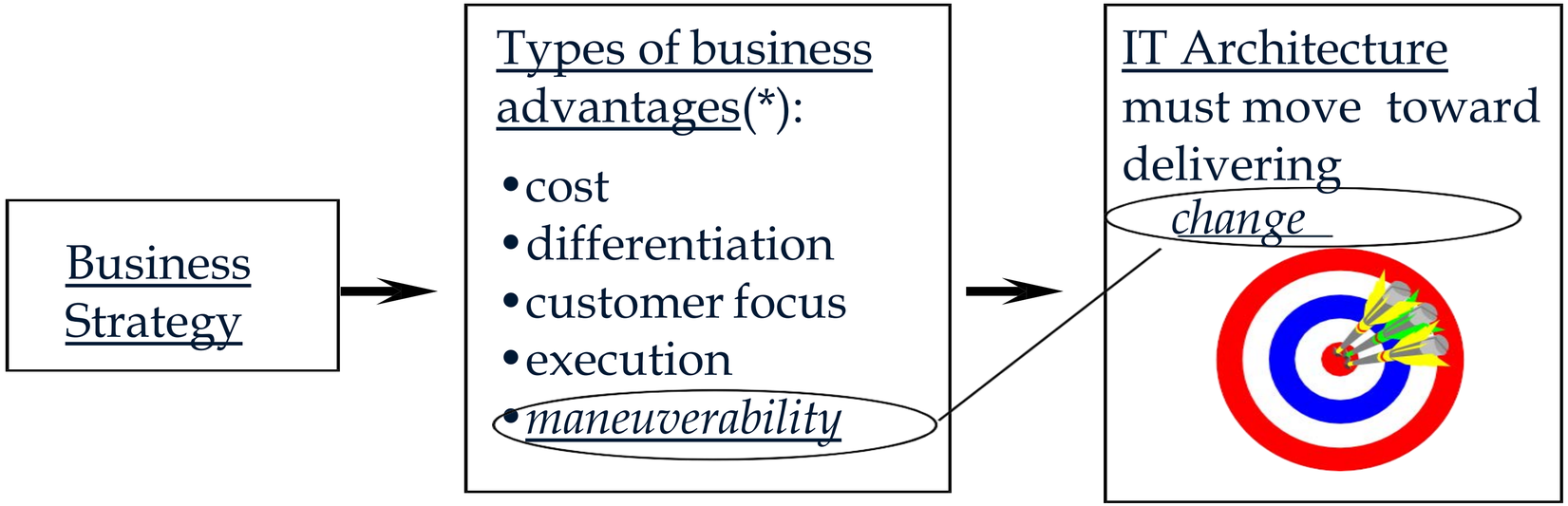
Think about your vision for a unified client experience.

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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