Insurance: The World's Original Big Data Industry

Maintaining Relevance and Growing Value in the 21st Century

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Insurance: The World's Original Big Data Industry

- A History of Insurance Data Needs Since the Beginning of Time
- Fast Forward: To the United States Today
- Data and Regulation
- Staying Rooted in Reality in the Age of Disruption
  - The Technolgy Hype Curve
- Future Shock: InsurTech and Blockchain
- Can the Insurance Industry Win the War for Data Talent?
- Q&A

A History of Insurance Data Needs Since the Beginning of Time

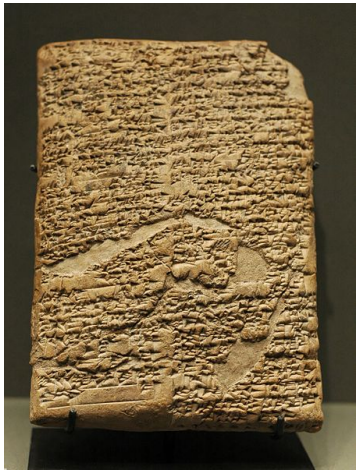
The Roots of Insurance Data Problems Extend Back Thousands of Years

In the Beginning…

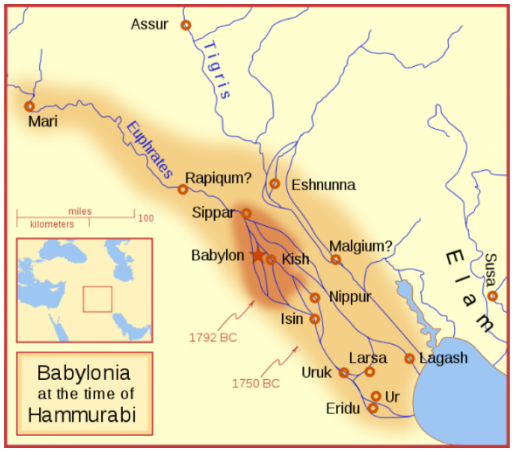
Civilizations Long Ago Discovered the Benefits of Risk Pooling—and the Need to Gather Data to Assess Risk

Babylonian Big Data: The Origins of Insurance

- **Earliest Forms of Insurance Date to 1800 BC in Babylon**
  - **Code of Hammurabi (Babylonian King)**
  - **282 clauses on the topic of "bottomery"**
  - ***Bottomery* is a loan taken out by the owner of a ship to finance its voyage (no premium involved)**
  - ***The interest on the loan covered the insurance risk***
  - **If ship was lost, loan didn't have to be repaid**



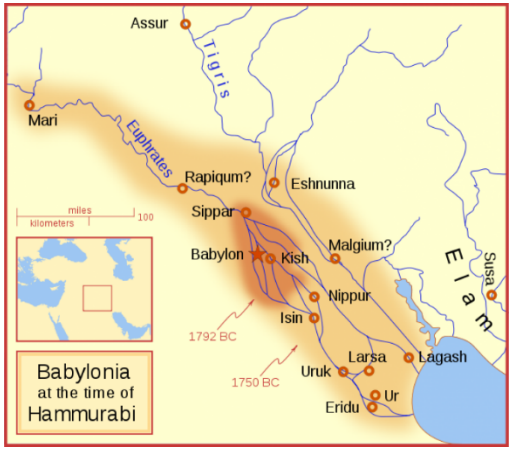
- **So What Did Babylonian "Big Data" Look Like?**
  - **Interest rate on the bottomery (loan)**
  - **Rate of interest reflects the likelihood of loss**
  - **Should be a function of frequency of loss**
  - **By the time of Hammurabi, ancient merchants had hundreds of years of experience sailing rivers, Eastern Mediterranean and Red Sea**
  - **But "Recall" was likely the most common "source" of data**



Sources: Elements drawn from *Against the Gods: The Remarkable Story of Risk,* Peter L. Bernstein.

Babylonian Big Data: The Origins of Insurance

- **So What Did They Come Up With?**
  - **In boats like these?**
  - **And across vast trading routes like this?**

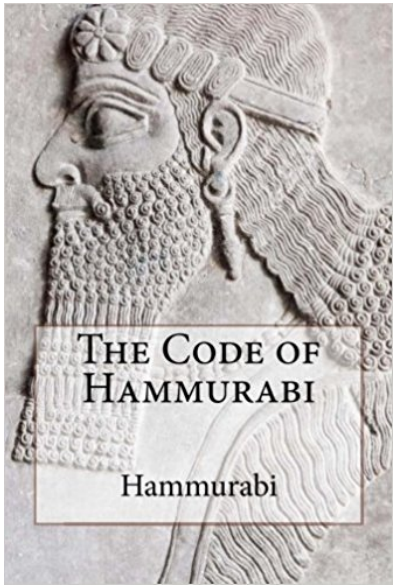


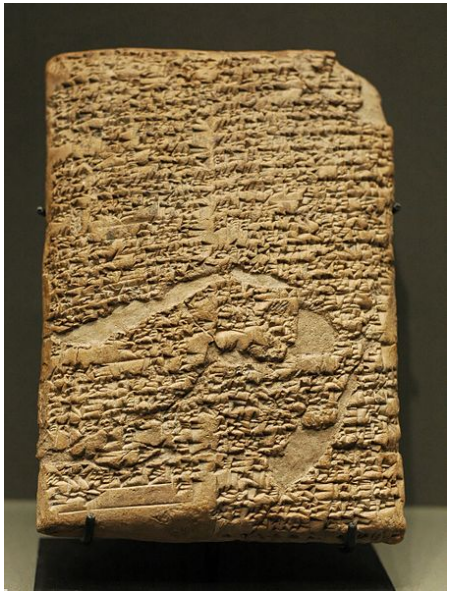
20%

Sources: Center for Risk and Uncertainty Management, University of South Carolina research.

Babylonian Big Data: The Origins of Insurance

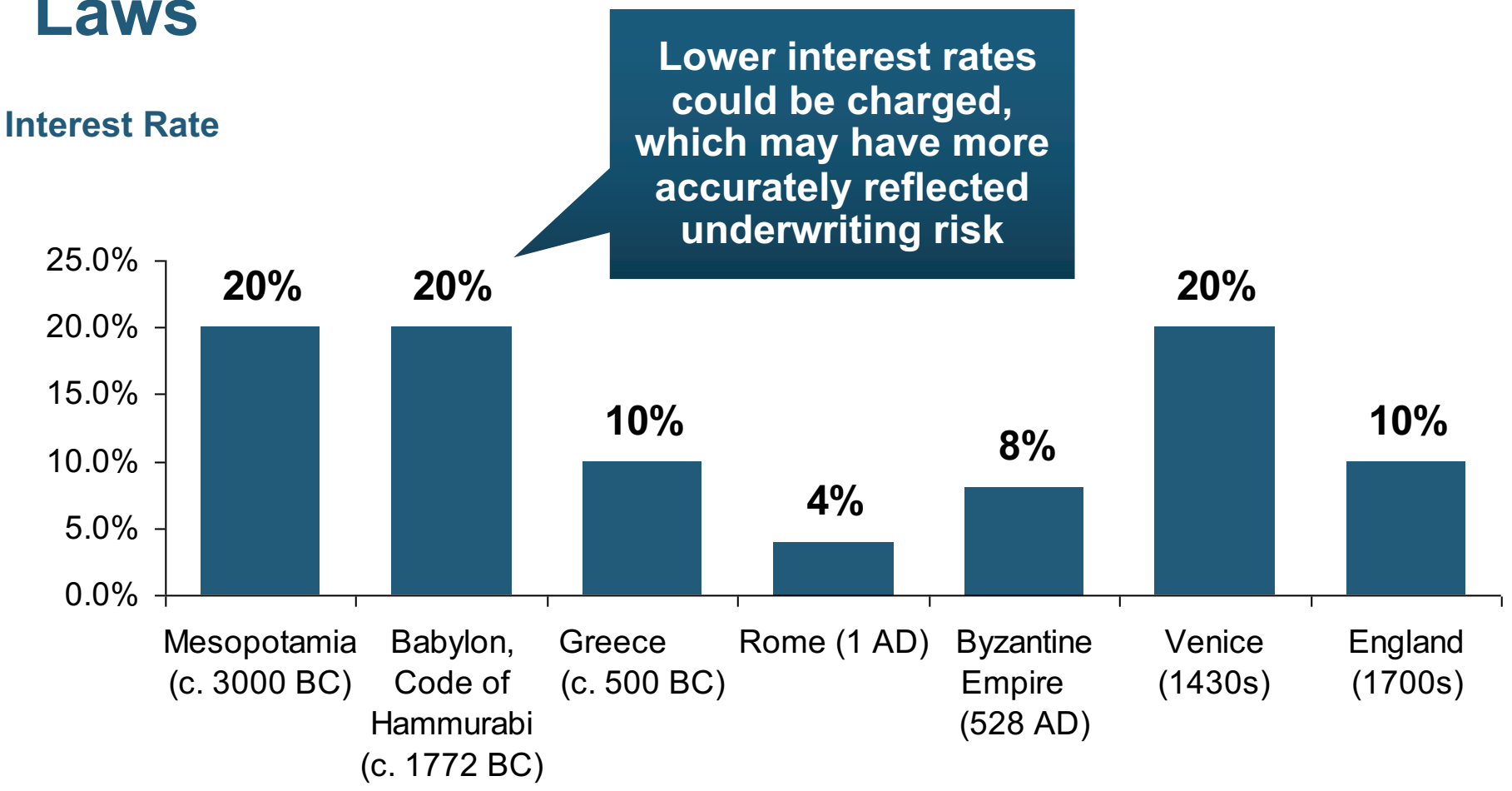
- **How Did They Come Up With That?**
- **Because Hammurabi Said So!**
  - **He also said: "*I am the King who is first among Kings; My ability has no rival*"**
- **The Punishment for Merchants Charging More than 20%?**
  - ***Forfeiture of the principal!***





Sources: Center for Risk and Uncertainty Management, University of South Carolina research.

Bottomery Remained Common for Many Centuries, with Interest Rates Often, but Not Always Dictated by Fiat and Limited by Usury Laws



Sources: Center for Risk and Uncertainty Management, University of South Carolina research; Bank of England.

Origins of Insurance…The Emperor's Data

- **Roman Emperor Claudius (10BC – 54AD)**
  - **Droughts/pestilence caused frequent famines**
  - **Eager to boost grain trade, Claudius became a 1-man, premium free insurance company by personally guaranteeing the storm losses of Roman merchants *(also granted citizenship to sailors)***
  - **But sailing around the Mediterranean was dangerous *(and apparently lonely too…Claudius exempted sailors from laws that penalized adultery and celibacy)***
  - **Also reduced taxes on communities impacted by drought or famine (form of ancient disaster aid)**

- **Data Requirements:**
  - **Measure of local famine severity (triggering event)**
  - **Sense of frequency and severity of merchant ship losses**
  - **Still, "Recall" likely the most common "source" of data**
- **ALSO: Greek/Roman Occupational Guilds→Early Life Insurance**
  - **Paid into pool that made payment to deceased member's family**

Sources: Elements drawn from *Against the Gods: The Remarkable Story of Risk,* Peter L. Bernstein.

Origins of Insurance…Distance Requires Data

- **The Rise of Long Distance Trade: The Explosion of Risk and Reward**
  - **14th Century: Italian city states such as Venice and Genoa became global centers for trade and where earliest written insurance contract originated**
    - **The word "*policy*" is from the Italian "*polizza*" meaning *promise* or *undertaking***
  - **Bruges, Antwerp followed in the 15th century, Amsterdam by 17th century**
  - **By 1600 England had become a major trading nation**

- **Managing Such Global Risks Required a Quantum Leap in Data**
  - **Ship, crew, cargo, destinations**
- **Also Required More Organized Means of *Record Keeping***
  - ***Data Storage* becomes and issue**
- **More Systematic Means for Analyzing Risk Needed Too**
  - ***Data Analytics*: The birth of modern statistical science was underway**

Sources: Elements drawn from *Against the Gods: The Remarkable Story of Risk* by Peter L. Bernstein, J. Wiley & Sons (1996); *Insurance Perspectives*, G. Gibbons, G. Rejda and M. Elliott., American Institutes for CPCU (1992).

Origins of Insurance…Regulation Arises from the Lack of Information and Data

- **Early Insurance Market Shortcomings Made the Need for More Data and Better through Regulation Obvious (Eventually)**

- **From Expensive Cargo/Ships Arose Disputes and the Need for Certainty and the Foundations for Insurance Regulation Were Laid**
  - ***"For whom they insure, it is sweet to them to take the monies; but when disaster comes, it is otherwise, and each man draws his rump back and strives not to pay."***
    - **Franceso di Marco Datini, Florentine Merchant, 14th Century, complaining about insurers of his era (Datini left 400 marine insurance policies in his estate when he died)**
  - ***"For even though I were to live a thousand years, never again would I underwrite insurance."***
    - **Guiglielmo Barberi, 14th Century, lamenting the loss of a bale of cloth and a barrel of furs he had underwritten on a ship that had been plundered by pirates, but had no ability to pay**

Sources: Elements drawn from *Against the Gods: The Remarkable Story of Risk* by Peter L. Bernstein, J. Wiley & Sons (1996); *Insurance Perspectives*, G. Gibbons, G. Rejda and M. Elliott., American Institutes for CPCU (1992); Insurance Information Institute.

Origins of Insurance…Regulation Arises from the Lack of Information and Data

- **London and the Dawn of Insurance Regulation**
  - Italian forms of marine insurance contracts were used in London since at least the 15th century
  - London merchants frequently acted as underwriters
  - Contracts were negotiated by commodity brokers
  - Notaries drafted/delivered policies and kept registers of policies written
  - Chamber of Assurances established in 1576 and until 1690 all policies had to be registered in its office in the Royal Exchange

- **1601: Francis Bacon Introduces Bill to Regulate Insurance Policies**
  - Bacon recognized the ubiquity and of utility of insurance contracts which were *"tyme out of mynde an usage amonste merchants, both of this realm and of forraine nacyons."*
  - Led to 1601 Act of Parliament that formally recognized that the benefits of insurance justified legal sanction, with the government willing to enforce insurance contracts and resolve disputes

Sources: Elements drawn from *Against the Gods: The Remarkable Story of Risk* by Peter L. Bernstein, J. Wiley & Sons (1996); *Insurance Perspectives*, G. Gibbons, G. Rejda and M. Elliott., American Institutes for CPCU (1992); Insurance Information Institute.

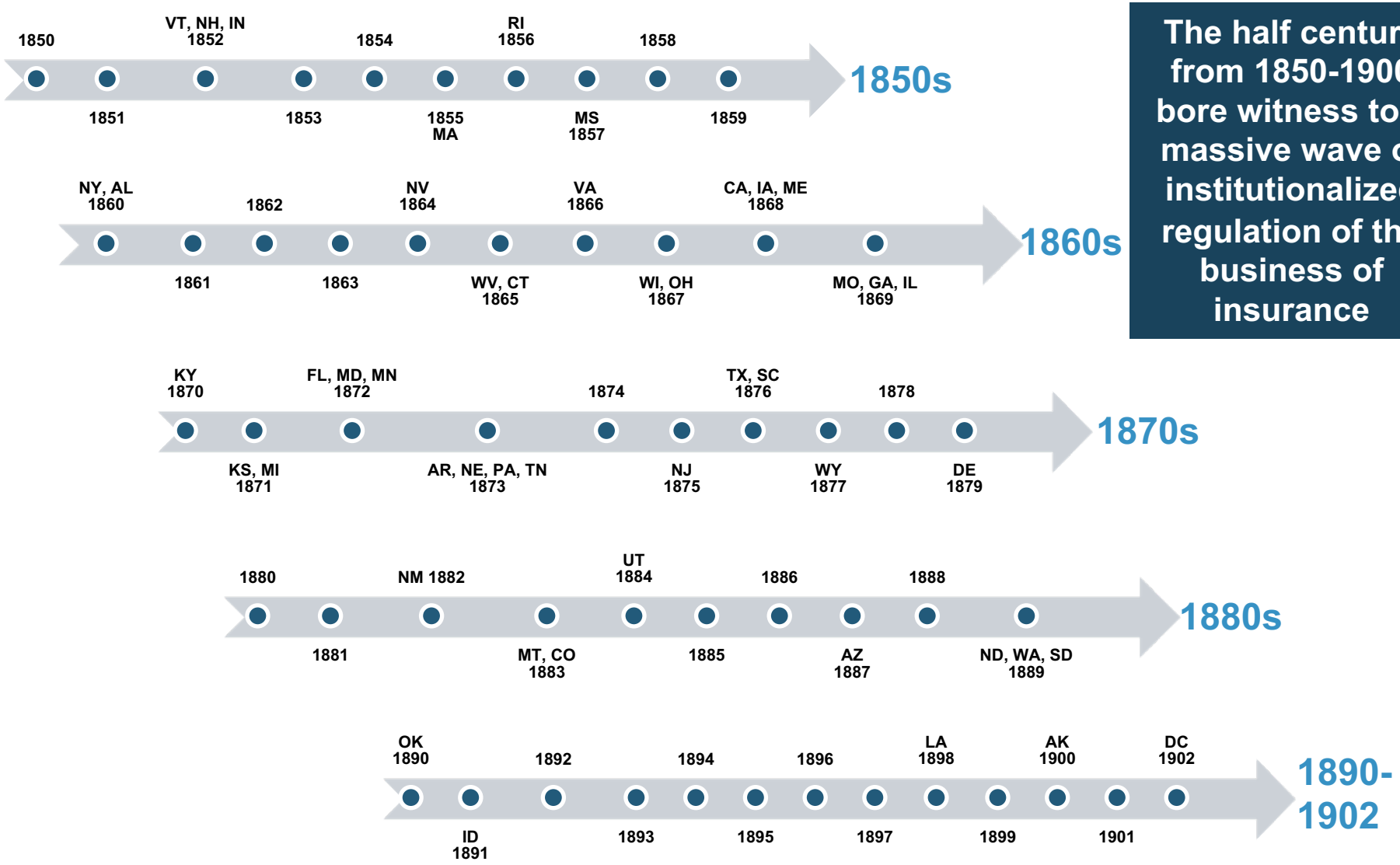
Fast Forward to the United States

Insurance Regulation Has Always Relied on "Big Data"

Data-Driven Regulation Has Produced Tangible Value for Consumers

Regulators of the Future Will Be Challenged by Data Volume and Complexity

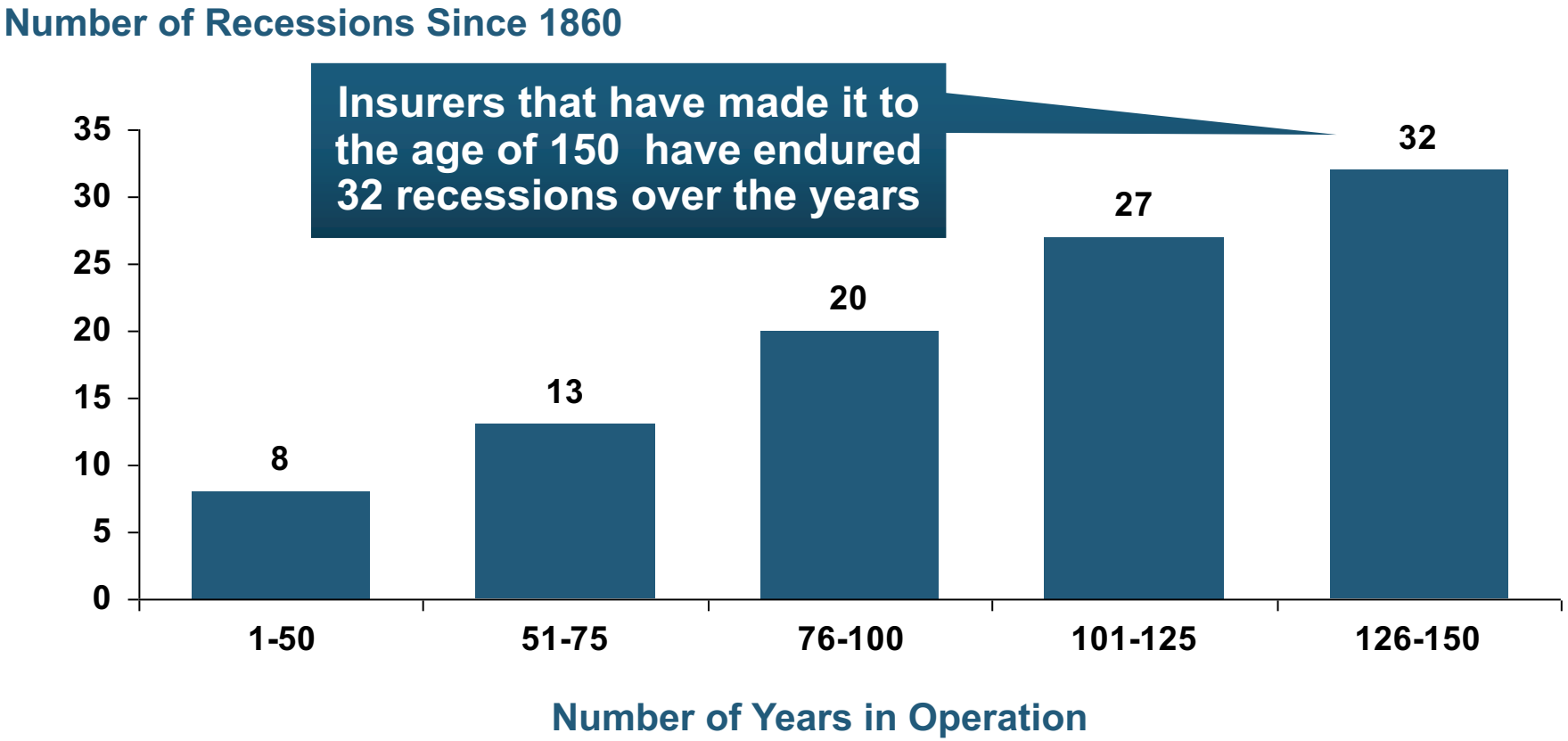
Year of Establishment of Insurance Regulator Supervision



The half century from 1850-1900 bore witness to a massive wave of institutionalized regulation of the business of insurance

Sources: Insurance Information Institute based on information in Appendix IV of *The History of the National Board of Fire Underwriters: Fifty Years of a Civilizing Force*, Harry Chase Brearly, published by Frederick A. Stokes Co. (1916).

Number of Recessions Endured by P/C Insurers, by Number of Years in Operation

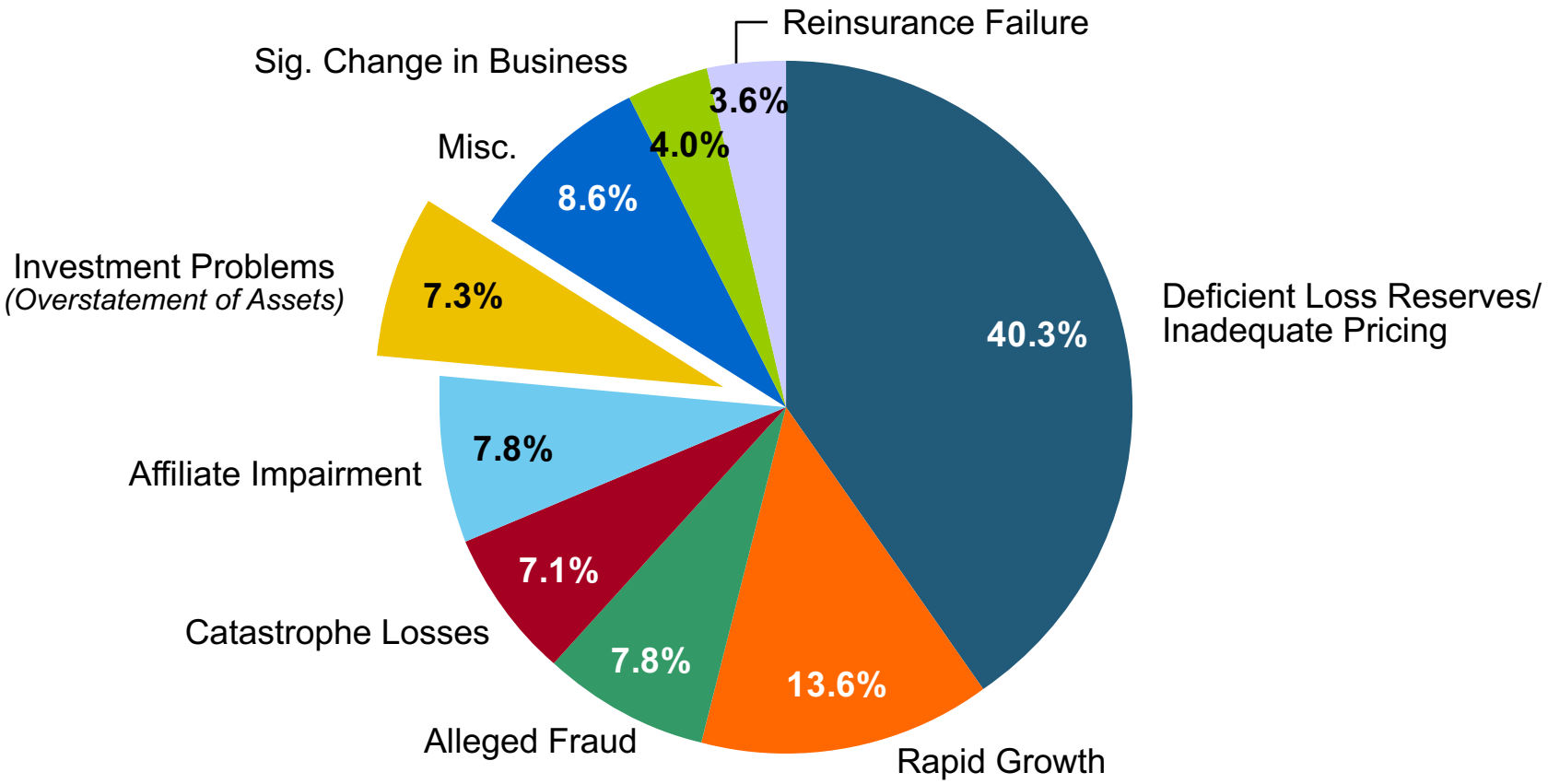


Solid Data on What Drives Insurer Insolvencies Contributes to Insurer Longevity and Consumer Protections by Making Insolvencies Rare

Sources: Insurance Information Institute research from National Bureau of Economic Research data.

Reasons for US P/C Insurer Impairments, 1969–2010

Data Speaks: Historically, Deficient Loss Reserves and Inadequate Pricing Are By Far the Leading Cause of P-C Insurer Impairments. Investment and Catastrophe Losses Play a Much Smaller Role. This fact drives much of modern insurance regulation, keeping P/C impairment rate < 1%



Source: A.M. Best: *1969-2010 Impairment Review*, Special Report, April 2011.

Pros of Big Data for Regulators, Insurers and Customers

- Improve solvency through the ability to more accurately assess risk
- More accurately underwrite, price risk and incentivize risk reduction
  - Example: Telematics
- Streamlining of claims process
- Improve marketing effectiveness by tailoring products to individual preferences
- Create operating efficiencies by streamlining the application process
- Reduce fraud through better identification techniques

Source: NAIC, Center for Insurance Policy and Research, *Big Data,* Jan.2018: http://www.naic.org/cipr_topics/topic_big_data.htm

Big Data Concerns for Regulators

- Insurance regulatory resources for reviewing increasingly complex rate filings
- Lack of transparency and potential for bias in the algorithms used to synthesize big data
- Highly individualized rates that lose the benefit of risk pooling
  - Will the Law of Large Numbers become irrelevant?
- Collection of information sensitive to consumers' privacy or potentially discriminatory
- Cyber threats to stored data

Source: NAIC, Center for Insurance Policy and Research, *Big Data,* Jan.2018: http://www.naic.org/cipr_topics/topic_big_data.htm

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Staying Rooted in Reality in the Age of Disruption

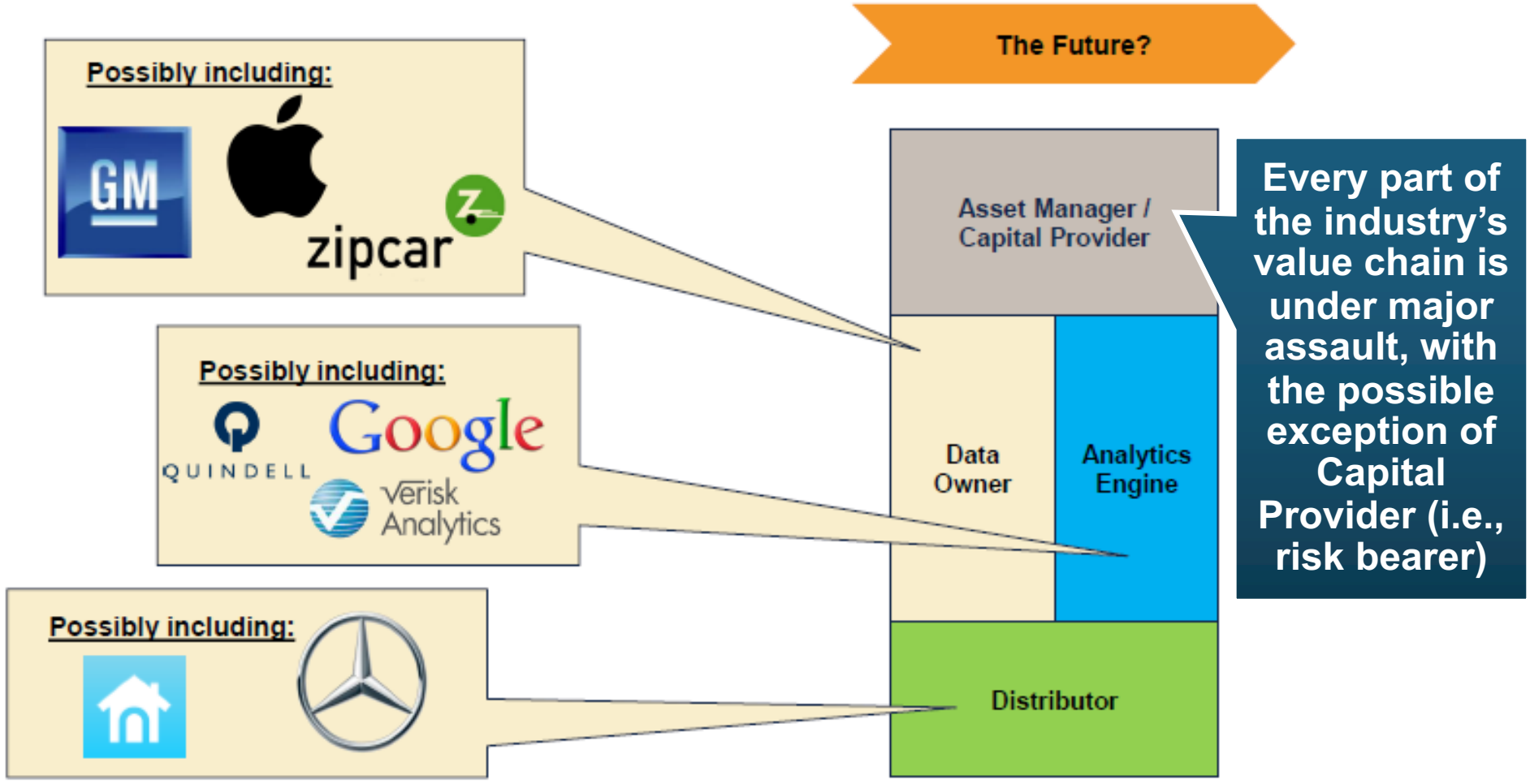
Reality vs. Drinking the Silicon Valley Kool Aid

Big Data: The Amount of Data Available to Insurers Will Soon Be Limitless

- **The Quantity and Nature of Data that Are Available to Insurers Is Increasing Rapidly and Will Increase Almost without Bound for the Indefinite Future**
- **Data Generation (Supply) and Consumption (Demand) Will Accelerate at Each Point in the Insurance Industry's Value Chain**
- **A Major Question Is Who Will "Own" Each Component of that Value Chain in the Future**
- **IoT, InsurTech/FinTech Innovations Will Drive the Re-Shaping of the Industry in the Immediate Future**

Sources: Elements drawn from *Against the Gods: The Remarkable Story of Risk,* Peter L. Bernstein.

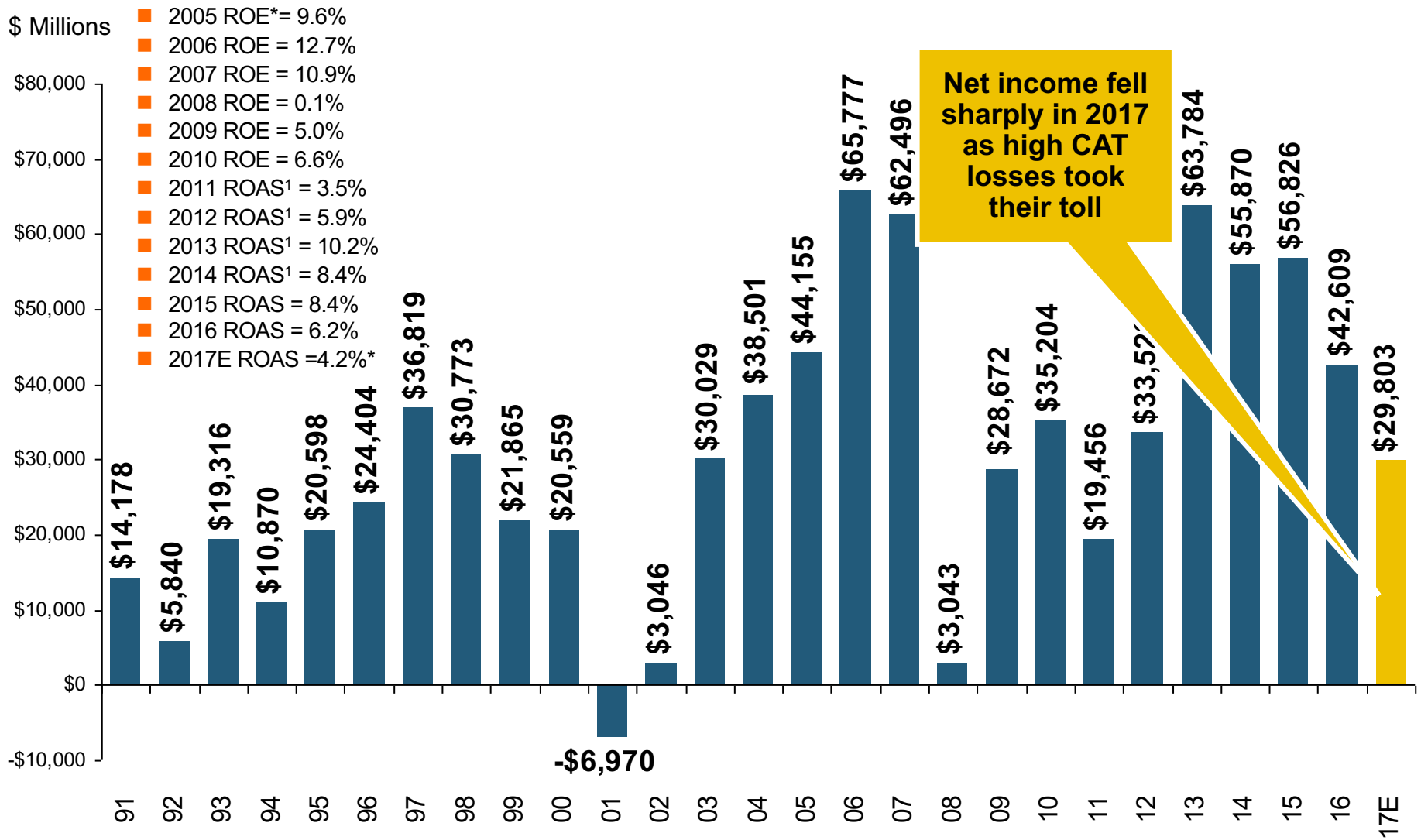
The Internet of Things and the Insurance Industry Value Chain



Who owns the data? Where does It flow? Who does the analytics? Who is the capital provider?

Source: Willis Capital Markets & Advisory; Insurance Information Institute.

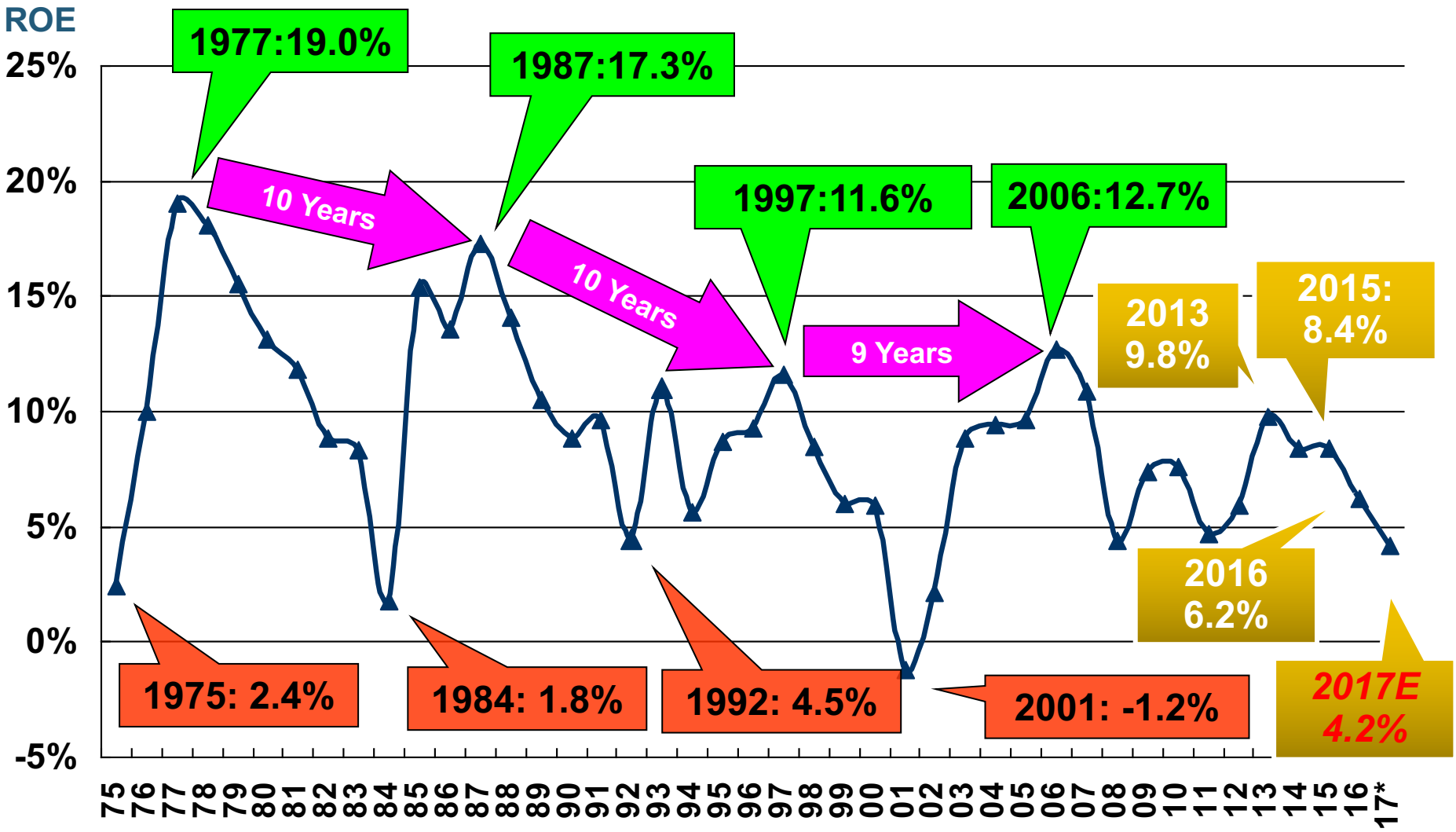
P/C Industry Net Income After Taxes 1991–2017E



•ROE figures are GAAP; [1]Return on avg. surplus. Excluding Mortgage & Financial Guaranty insurers yields a 8.2% ROAS in 2014, 9.8% ROAS in 2013, 6.2% ROAS in 2012, 4.7% ROAS for 2011, 7.6% for 2010 and 7.4% for 2009; 2016E is annualized figure based actual figure through Q3 of $31.8B.

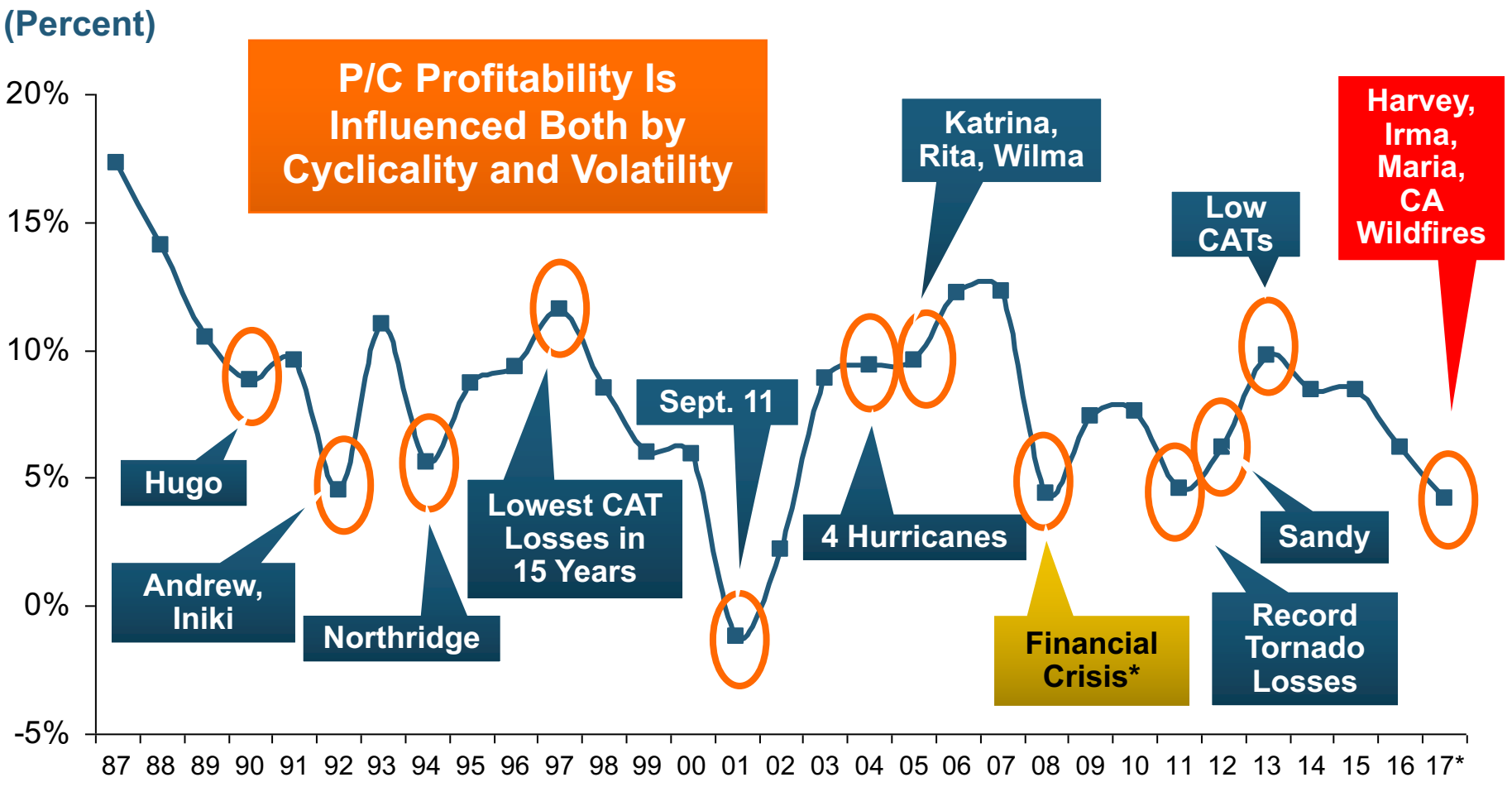
Sources: A.M. Best, ISO; USC RUM Center estimate (2017 based on actual NIAT of $22.352 though Q3 and ROAS of 4.2%).

Profitability Peaks & Troughs in the P/C Insurance Industry, 1975 – 2017:Q3



*Est. for 2017 based on actual ROAS of 4.45 through Q2; Profitability = P/C insurer ROEs. 2011-16 figures are estimates based on ROAS data. Note: Data for 2008-2014 exclude mortgage and financial guaranty insurers.
Source: NAIC, ISO, A.M. Best, Conning, USC RUM Center estimates.

ROE: Property/Casualty Insurance by Major Event, 1987–2017E



*2017 Estimate based on actual ROAS through Q3 of 4.2% with USC Center for Risk and Uncertainty Management estimate for the full year.
Excludes Mortgage & Financial Guarantee in 2008 – 2014.
Sources: ISO, *Fortune*; USC RUM Center.

Staying Rooted In Realty:
An Example

It's Easy to Look Ahead to the Finish Line and Underestimate What it Takes to Get There

Big Data→Big Disruptors…Big Challenges

- **Suppose you were able to go back in time—a century—to the 1918 IDMA Conference. A speaker posed the following question:**

***Question:* What will happen first—cars will drive themselves or men will fly to the moon and back?**

- **Most, if not all attendees would have said cars will drive themselves (and fly too!)**

- **The Point:** Creating a safe, affordable, truly autonomous vehicle isn't rocket science. *It's harder*. *A lot harder*.

Things Its Easier to Do than Drive an Autonomous Vehicle Down a Street in Tempe, AZ, Without Killing Someone

- **Fly to the Moon and Back**
  - Apollo 11 (1969)

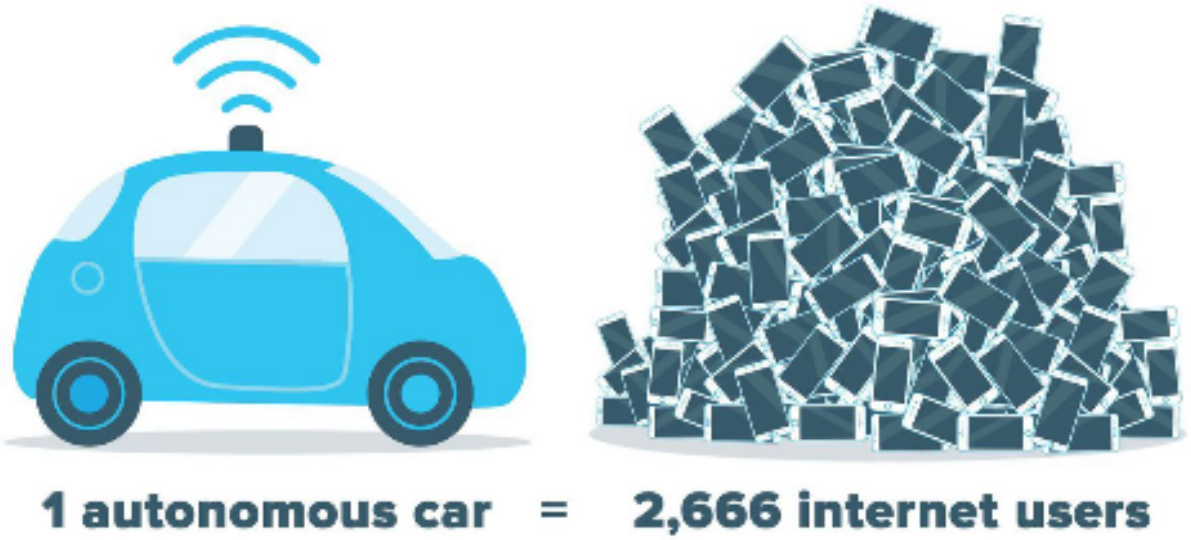
- **Clone a Mammal**
  - Dolly the Sheep (1996)

- **Create a Mobile Device that Will Allow People to Communicate Anywhere, Anytime**
  - Cell Phone Invented by Motorola (1973)

- **The Point:** Creating a safe, affordable, truly autonomous vehicle isn't rocket science. *It's harder*. *A lot harder*.

- **Data Implications:** Insurers of the future may drown in data on the very long and bumpy road to autonomy

Autonomous Vehicles: Will Insurers Drown in the Data?



- The average human by 2020 will generate about 1.6GB in data every day
- The average autonomous vehicle will process about 4,000GB per day—as much as nearly 2,700 humans
- Are insurers ready for this?

Source: Intel

Autonomous Vehicles: Will Insurers Drown in the Data?

- **Each level of automation creates an exponential increase in the amount of data generated (Level 3 available to consumers now)**
- **But it is clear from deaths involving Uber and Tesla vehicles that the data and/or software still have a long way to go**

AUTOMATION LEVELS OF AUTONOMOUS CARS		
LEVEL 0	No Automation	The car has no automation features
LEVEL 1	Driver Assistance	The system can handle one task at a time, such as automated breaking
LEVEL 2	Partial Automation	Has two or more automated functions
LEVEL 3	Conditional Automation	Can perform all aspects of dynamic driving, but still requires a driver on request
LEVEL 4	High Automation	The car can be completely driverless in certain conditions
LEVEL 5	Full Automation	Can perform all aspects of dynamic driving in any environment, no driver presence needed

Source: Tuxera.com at: https://www.tuxera.com/blog/autonomous-cars-300-tb-of-data-per-year/

Autonomous Vehicles: Data Generation Is a Direction Function of Number/Type of Sensors

- **Each level of automation creates an exponential increase in the amount of data generated (Level 3 available to consumers now)**
- **But it is clear from deaths involving Uber and Tesla vehicles that the data and/or software still have a long way to go**

CAR AUTOMATION SENSORS		
Sensor type	**Quantity**	**Data generated per sensor**
Radar	4–6	0.1–15 Mbit/s
LIDAR	1–5	20–100 Mbit/s
Camera	6–12	500–3500 Mbit/s
Ultrasonic	8–16	<0.01 Mbit/s
Vehicle motion, GNSS, IMU	-	<0.1 Mbit/s

Source: Tuxera.com at: https://www.tuxera.com/blog/autonomous-cars-300-tb-of-data-per-year/

Autonomous Vehicles: Doing the Data Math

- **Each autonomous vehicle generates 25-40GBits/second or approximately 19TB/hr.**
  - **If you tried to store this data on your iPhone w/32GB storage, you'd run out of space in less than 7 seconds**
  - **A laptop with 240BG storage would run out of space in less than 1 min**
- **According to the AAA, the average American drives about 17,600 minutes per year**
  - ***Depending on the level of autonomy, a single car could generate between 380TB and 5,100TB per year***
  - **There are approximately 263 million registered vehicles in the US**
  - **You do the math!**

NOTE: 1 Terabyte = ~1 trillion bytes = 1,000GB

The Point: Storing and processing this much data in a fast, seamless and cost efficient manner is a major technological challenge that is currently beyond auto makers and insurers alike

Source: Tuxera.com at: https://www.tuxera.com/blog/autonomous-cars-300-tb-of-data-per-year/

Autonomous Vehicles: Many Other Obstacles

- **The Average Age of a Car on the Coad in the US is 11.8 Years**
  - **Even if 100% of all vehicles sold in the future were fully autonomous, it would be 2030 before 50% of vehicles were driving themselves**
- **Technology Reliability**
  - **Auto manufactures today still recall millions of cars for floor mats, air bags and ignition switches**
  - **History suggests that autonomous vehicle technologies will experience frequent problems**
- **Highway Infrastructure**
  - **US road and highway system is not even remotely close to allowing all weather, fully autonomous operations—and there is no money to get it there**
- **Regulation and Litigation**
  - **Uber settled within 2 weeks**

Source: Tuxera.com at: https://www.tuxera.com/blog/autonomous-cars-300-tb-of-data-per-year/

A Few of the (Many) Technological Hurdles Facing Autonomous Vehicles

Tech Hurdle	Discussion of Problem
Inability to Operate Safely in All Weather Conditions	Heavy rain, snow, fog and compromise radar and lidar sensor technologies, requiring humans to intervene
Driving Safely Despite Unclear Lane Markings	Vehicle can have difficultly making guidance decisions when lines on roads are faint or absent.
Reliably Recognizing Traffic Lights that Are Not Working Properly	If lights are out (e.g., power outage), vehicle has no understanding of how to operate. Requires that a machine be taught human intuition understand cooperation among multiple vehicles as well as external input from non-drivers (e.g., police)
Ability to Respond to Spoken Commands or Hand Signals from Law Enforcement, Highway Safety Employees, Construction Crews, Pedestrians, Cyclists, etc.	Verbal instructions, eye contact, hand signals, gesturing all play extremely important roles in driving, more so than is generally appreciated or understood.

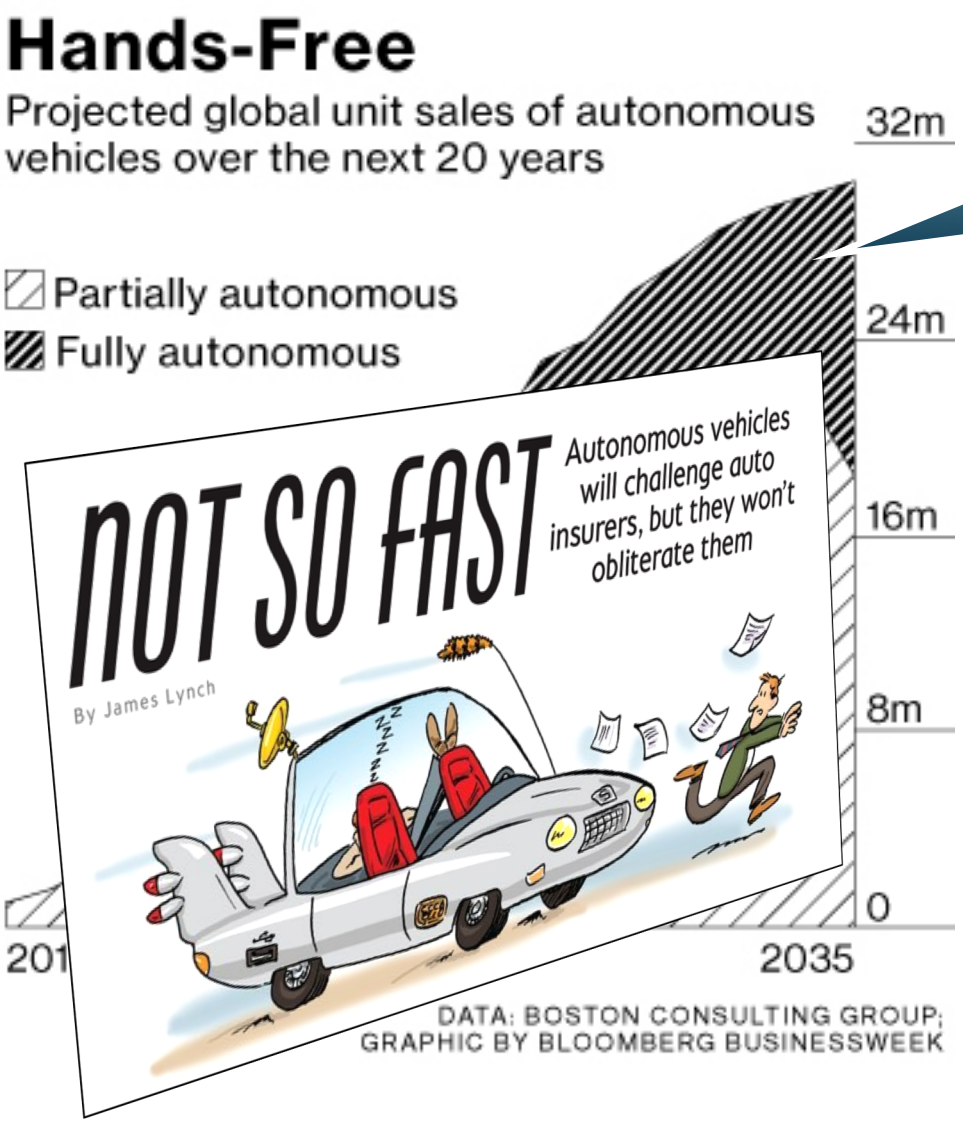
Source: Adapted from: *Technologists Face Hurdles Before They Take Wheel*, John Markoff, New York Times, June 8, 2017.

A Few of the (Many) Technological Hurdles Facing Autonomous Vehicles

Tech Hurdle	Discussion of Problem
Making Left Turns Into Intersections with Fast Moving Traffic	Crossing or merging into rapidly flowing lanes of traffic is a complex task that often involves making eye contact with other drivers. Researchers experimenting with electronic signals or V2V communications.
Small Object Detection and Avoidance	Vehicles can detect objects in roadways, but do not possess reliable "scene understanding" that would allow the vehicle to distinguish between a small bad on the road that is empty (or full of paper refuse such as a McDonald's bag) or is solid and could damage the vehicle
Cybersecurity	There is no evidence that autonomous vehicles will be any more secure than any other networked computer (autonomous vehicles are essentially computers on wheels). *Imagine a WannaCry-like randsomware attack striking millions of vehicles while being operated…Pay now or die???*

Source: Adapted from: *Technologists Face Hurdles Before They Take Wheel*, John Markoff, New York Times, June 8, 2017.

Media is Obsessed with Driverless Vehicles: Often Predicting the Demise of Auto Insurance



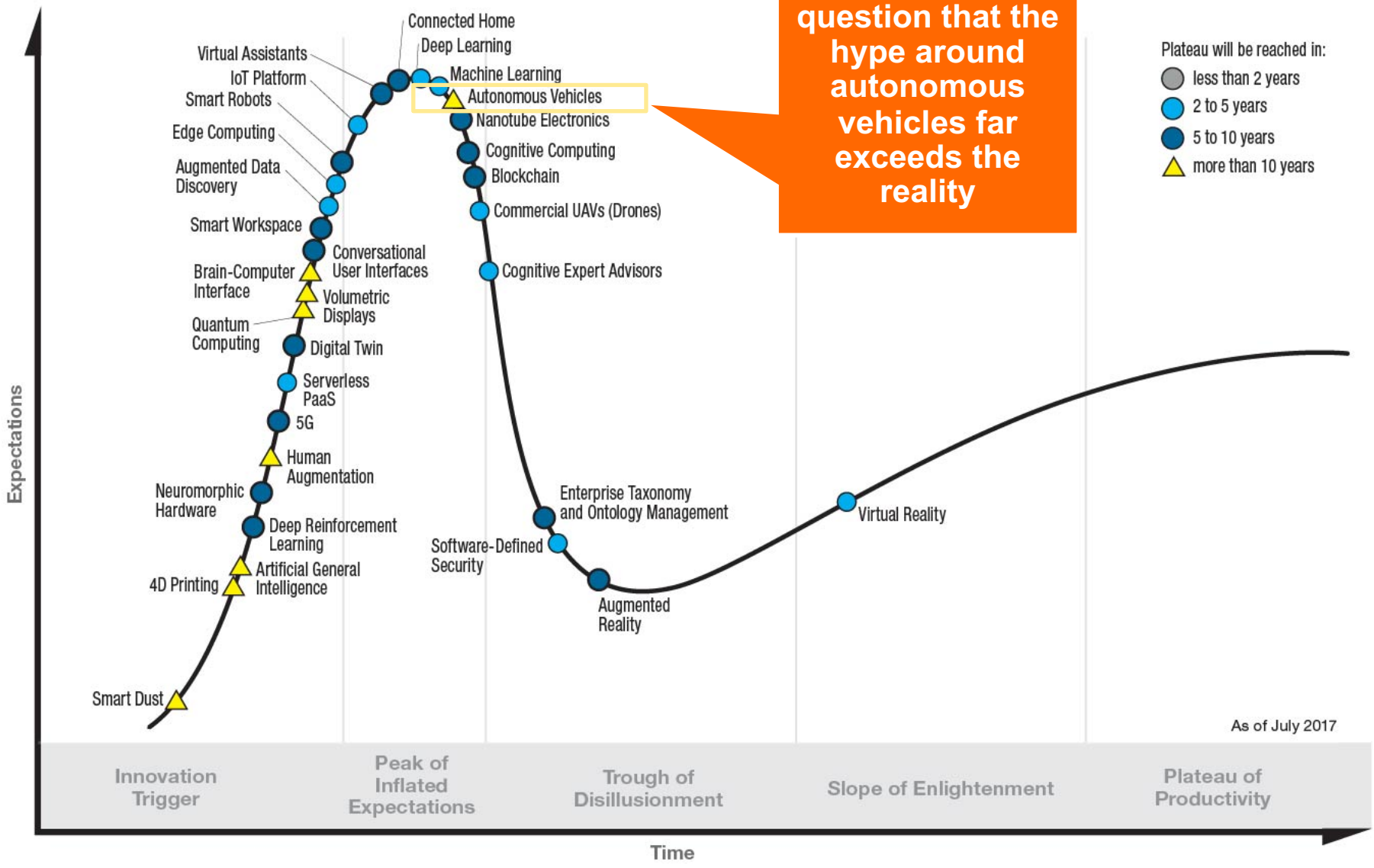
By 2035, it is estimated that 25% of new vehicle sales could be fully autonomous models

Questions

- **Will Google or (Amazon) take over the industry?**
- **Will the number of auto insurers shrink?**
- **How will liability shift?**

Source: Boston Consulting Group.

Gartner Hype Cycle for Emerging Technologies, 2017

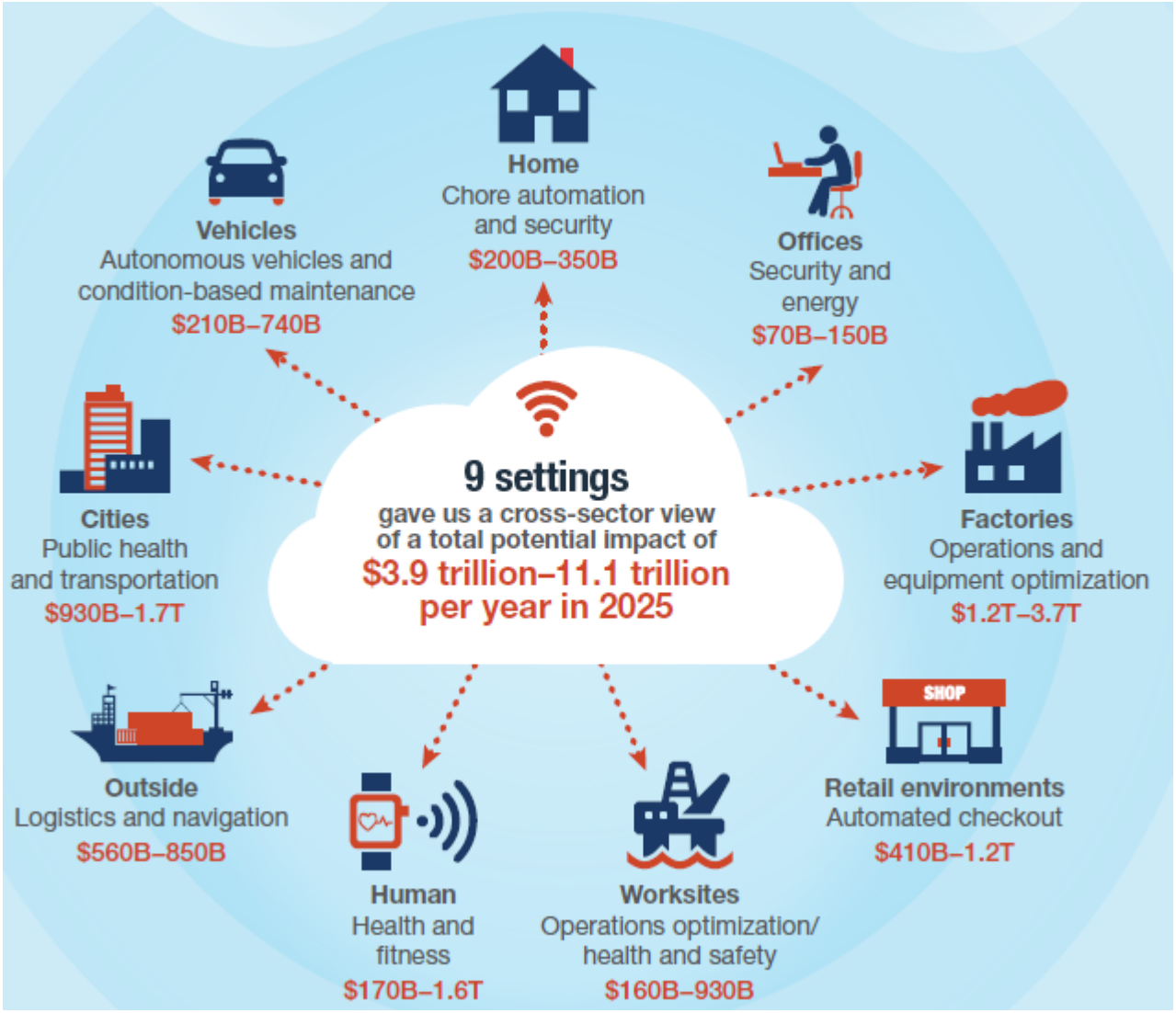


Source: Gartner.

Most-Hyped Technologies Impacting Insurers Today, Based on Gartner's Hype Curve

- Autonomous Vehicles
- Connected (Smart) Homes
- UAVs (Drones)
- Blockchain
- Machine Learning

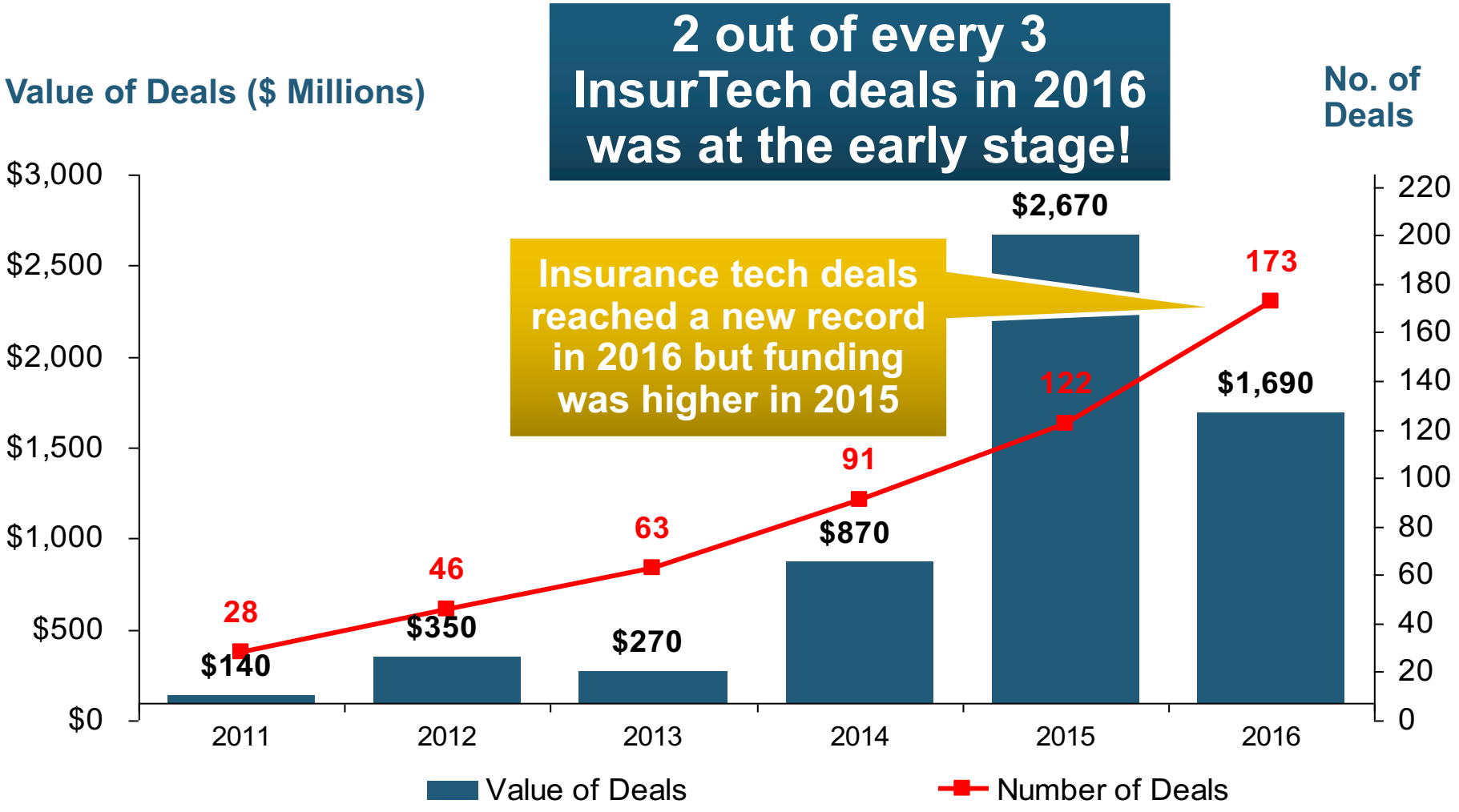
The Internet of Things and the Insurance Industry



Sources: McKinsey Global Institute, *The Internet of Things: Mapping the Value Beyond the Hype*, June 2015; Insurance Information Institute.

- **The "Internet of Things" will create trillions in economic value throughout the global economy by 2025**
- **What opportunities, challenges will this create for insurers?**
- **What are the impact on the insurance industry "value chain"?**

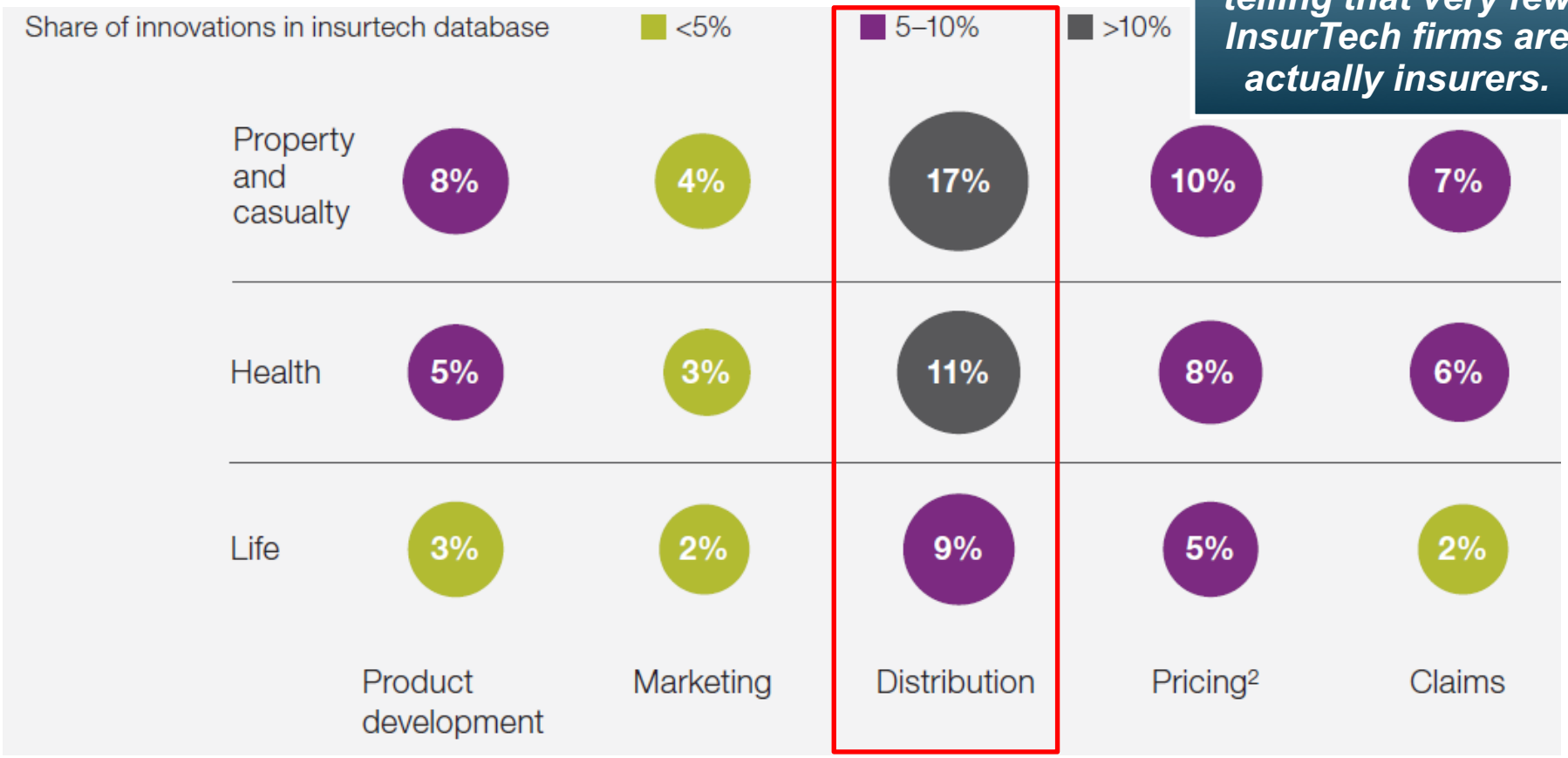
InsurTech Annual Financing, 2011 – 2016



Source: CB Insights at https://www.cbinsights.com/blog/2016-insurance-tech-funding/

InsurTechs Are Focusing on Distribution and Pricing

InsurTech firms across all insurance segments tend to focus on Distribution. *It is telling that very few InsurTech firms are actually insurers.*



Source: Panorama by McKinsey, "*Insurance Beyond Digital: The Rise of Ecosystems and Platforms,"* Jan. 2018.

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Blockchain

Reinventing the Insurance Industry from Within?

Blockchain: Is Distributed Data a Game-Changer for Insurers?

- **What Is a Blockchain?**

- A blockchain is a digitized, distributed (decentralized), public ledger
  - A blockchain grows as 'completed' ***blocks*** (the most recent transactions) are recorded and added to it in chronological order, thereby allowing market participants to keep track of transactions ***(the chain)*** without central recordkeeping

- Each **node** (a computer connected to the network) gets a copy of the blockchain. For a record to be added to the chain, it typically needs to be validated by a majority of the computers in the network and is stored using a **cryptographic hash**, a digital fingerprint that prevents misuse.
  - Importantly, no single entity runs the network or stores the data (i.e., it is distributed), hence it is extremely secure

Source: GenRe, Risk Insights, *Unblocking Blockchain,* no. 5, 2018.

Blockchain: Is Distributed Data a Game-Changer for Insurers?

- **What Can Blockchain Technology Be Used For?**
  - **Blockchain technology** may be used in any form of asset registry, inventory and exchange. This includes transactions of finance, money, physical property, contracts and intangible assets, including health information.

- **Are There Applications to Insurance?**
  - **Yes.** The fact that a blockchain is a resilient, tamper-proof and decentralized store of transactions suggests a multitude of applications in the insurance industry.

Source: GenRe, Risk Insights, *Unblocking Blockchain,* no. 5, 2018.

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- **Are There Applications to Insurance?**
  - **Yes.** The fact that a blockchain is a resilient, tamper-proof and decentralized store of transactions suggests a multitude of applications in the insurance industry.
  - **Smart Contract:** The most discussed blockchain application

Source: GenRe, Risk Insights, *Unblocking Blockchain,* no. 5, 2018.

Blockchain: A Game-Changer for Insurers?

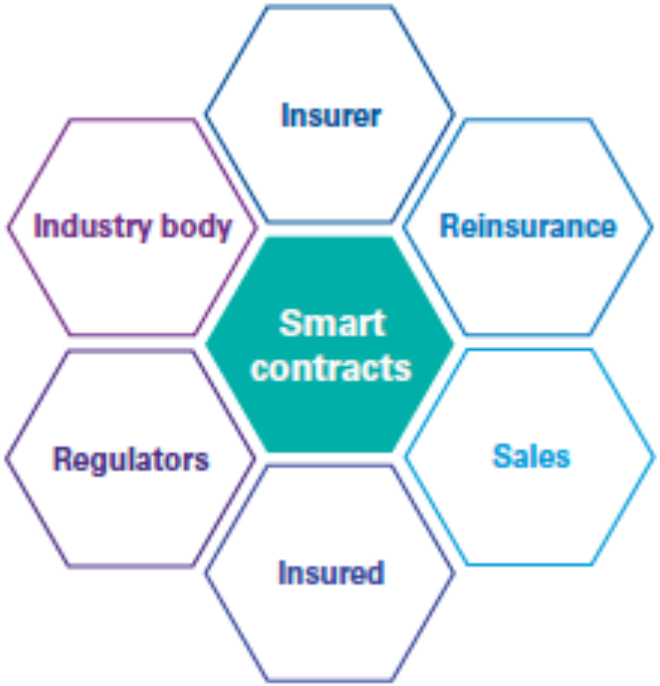
- **What is a Smart Contract?**
  - A **Smart Contract** is a contract that encapsulates the terms, conditions and triggers that enable a transaction and thereby allows the automatic processing and settlement of transactions.
  - This is possible because Blockchain ecosystems enable a large number of organizations to join together as peers to offer services, data or transactions that serve specific customers or complex transaction workflows

- **Common Early Application:** Self-executing smart contracts can be used to automate insurance policies
  - A policy could be coded to pay when the conditions are undeniably reached and decentralised data feeds and verify the event has occurred with certainty
  - Fraud prevention/detection is another obvious application

Source: GenRe, Risk Insights, *Unblocking Blockchain,* no. 5, 2018.

Blockchain: A Game-Changer for Insurers?

Popular Uses of Smart Contracts



Popular use cases for insurance

— **Travel and life insurance:** Develop a 'pay as you travel' insurance model that provides immediate payouts in the event of delays or cancellation.

— **Personal accident insurance:** Create a transparent and seamless claims journey that dramatically improves customer satisfaction.

— **Record keeping:** Leverage blockchain to create, organize and maintain company records in a single, reliable and accessible repository.

— **Digital identities:** Use blockchain data and digital ledgers to digitize and validate customer information and improve compliance.

— **Claims management:** Automate the verification of coverage and streamline claims settlement to improve operational efficiency and remove costs.

— **Reinsurance claims:** Allow for the automation of straightforward claims triggered by smart reinsurance contracts and models.

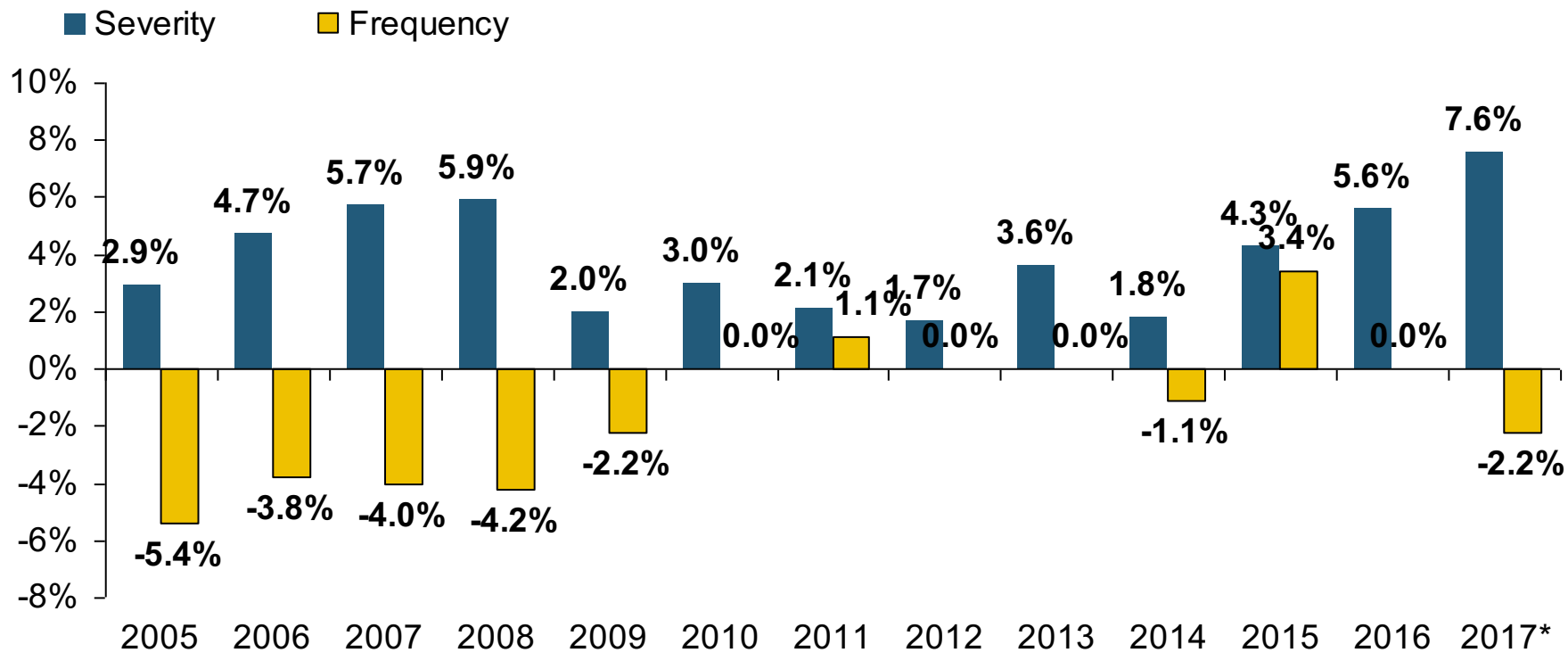
— **Surety insurance:** Create a 'golden source' of information on surety bonds that is available in real-time to all participants.

— **Peer-to-Peer insurance:** Build a peer-to-peer network to establish smart contracts without the need for an intermediary or administrator.

Source: KPMG, *Blockchain Accelerates Insurance Transformation*, 2017.

Bodily Injury: Severity Trend Is Up, Frequency Decline Returning?

Annual Change, 2005 through 2017*



BI Severity Trend is a Major Cost Driver

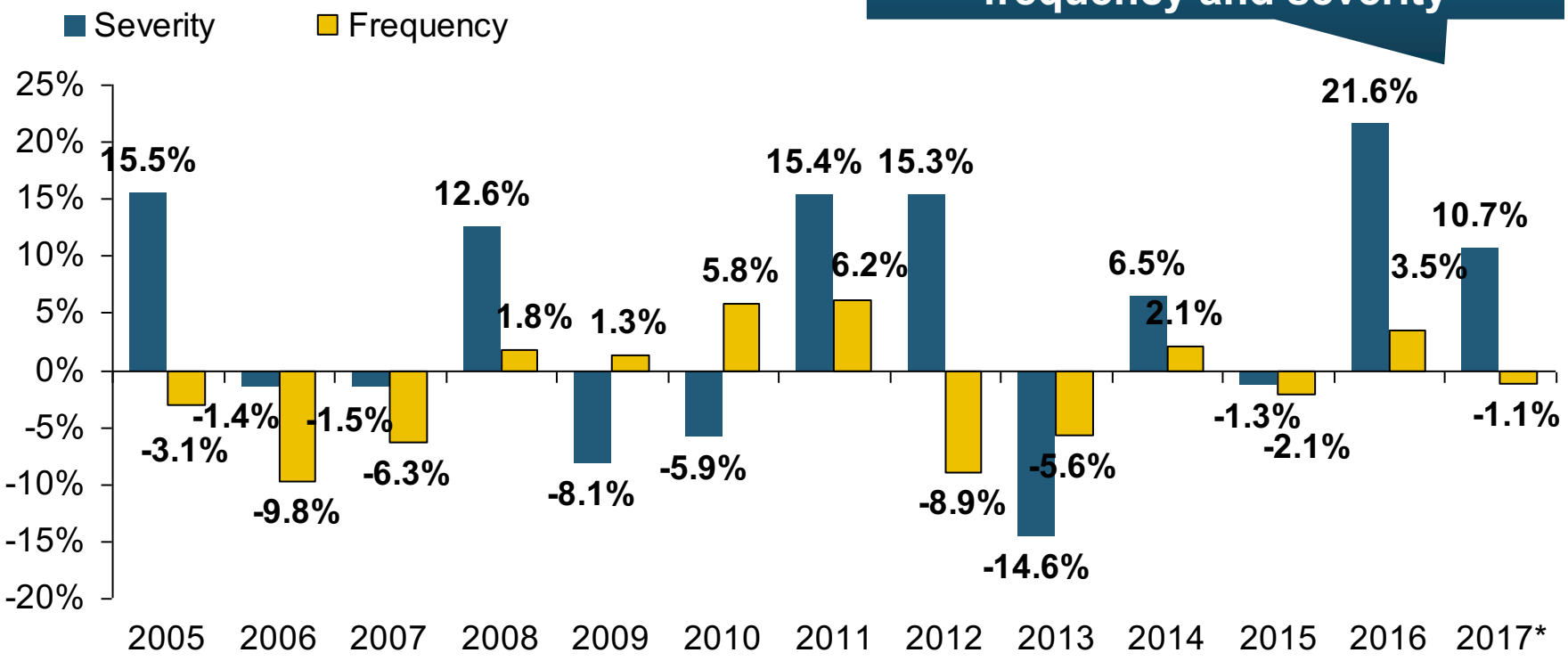
*2017 figure is for the 4 quarters ending 2017:Q3.

Source: ISO/PCI *Fast Track* data; Insurance Information Institute

Comprehensive Coverage: Frequency and Severity Trends Are Volatile

Annual Change, 2005 through 2017*

Severe weather is a principal cause of the spikes in both frequency and severity



Weather Creates Volatility for Comprehensive Coverage. Comprehensive Losses Were Up 24.9% in Q3:2017 Due Largely to Hurricanes Harvey and Irma

*2017 figure is for the 4 quarters ending with 2017:Q3.

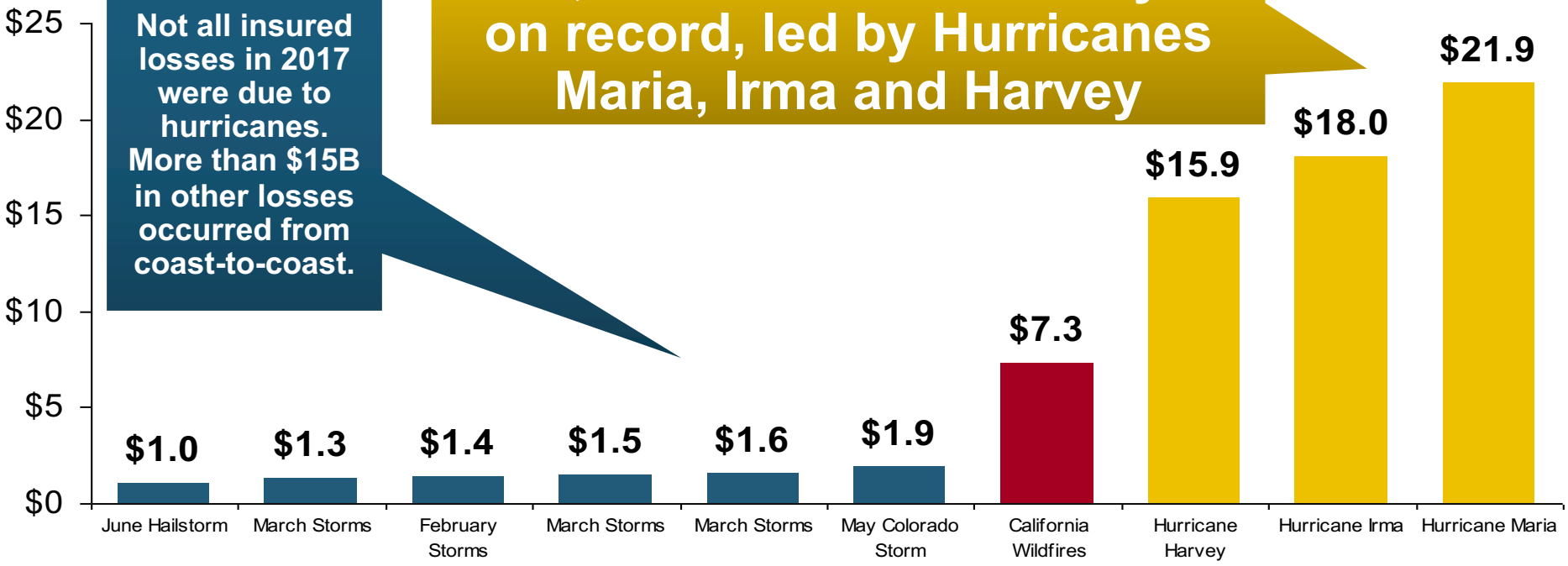
Source: ISO/PCI *Fast Track* data; Insurance Information Institute

Top 10 US Catastrophe Losses of 2017, by Insured Loss

(Insured Losses, 2017 Dollars, $ Billions)*

YTD insured CAT losses in the US totaled $72 billion by late 2017, the second costliest year on record, led by Hurricanes Maria, Irma and Harvey

Not all insured losses in 2017 were due to hurricanes. More than $15B in other losses occurred from coast-to-coast.



*As of Nov. 14, 2017.

Sources: PCS; Insurance Insider: http://www.insuranceinsider.com/-1270818/9.

Blockchain: A Game-Changer for Insurers?

Possible Insurance Processes Transformations

Insurance processes	Current activity	Future activity
Policy sales	— affect sales — coordinate sales by establishing sales territories, quotas and goals — establish training for reps — determine potential customers	— policy as a smart contract sale — sale for oracles, innovative coverage, riders and payout triggers — more insight into customer for coverage insights
Incident management	— capture NOL — determine liability for loss or damages — correspondence management — benefit calculation — customers interactions	— accident notifications by smart contract oracle initiated prevention and recovery workflows
Claims management	— information gather for purpose of setting claim — settled claims review — report irregularities — legal counsel consultation	— claims validation and loss determination by smart contract, oracles, smart underwriting and/or blockchain insight
Reserve calculation	— forecast risk and liability for payment of future benefits — ascertain premium rates and cash reserves	— real time data flows and claims determination provide faster insights for reserve calculation impacting support processes
Reinsurance	— reduce exposure to loss — risk transfer for higher limits — income smoothing by diversification — surplus relief, arbitrage, expertise	— industry consortiums to assess retrocessions in an automated manner using smart contracts
Underwriting	— evaluate risk and exposures of potential clients — determines risk, coverage and premium	— risk liability reduced along with premiums and claims payout. Multiple underwriting models to evolve
Fraud, risk determination	— special investigation units to determine insurance fraud — determine falsifying facts of an accident — internal fraud determination	— claims fraud determination with quicker turnaround reducing recovery risks

Some impact Moderate impact Significant impact

Source: KPMG, *Blockchain Accelerates Insurance Transformation*, 2017.

Talent Wars

Can the Insurance Industry Win the War for Talent?

Insurance is Not the Only Industry that is Interested Increasing the Data Analytics Skills of New Talent

Can Insurers "Win" the War on Talent?

- **Hiring Needs:** The industry has a stated need of hiring some 400,000 people over the next several years

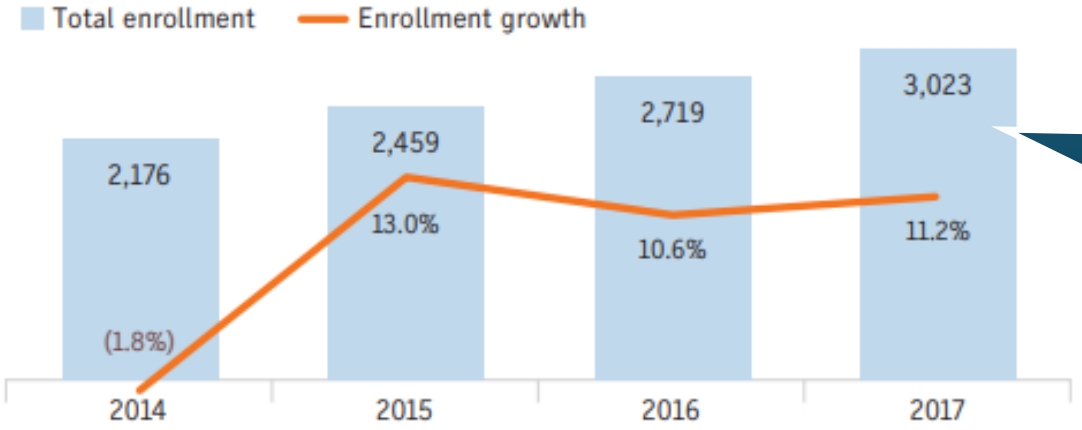
- **Inclusive Approach:** The industry's approach has been to suggest that virtually everyone, from any background can build a rewarding career in the insurance industry

- **So Far, So Good:** To date, the industry's diligence and efforts seems to be meeting with success
  - *Insurers seem generally to be successful in their overall recruiting efforts*

Can Insurers Win the War for Talent?

ENROLLMENT TRENDS

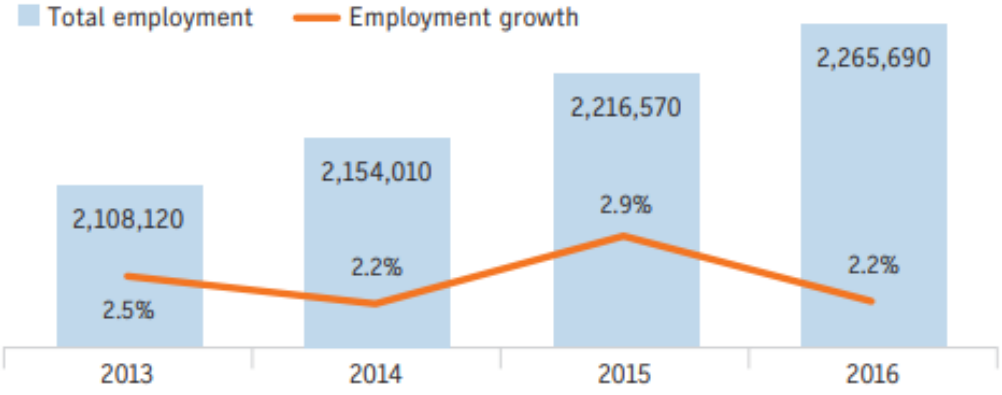
Based on the annual enrollment of students majoring in risk management and insurance programs for the *BI*'s largest 10 undergraduate programs, 2014-2017.



The number of RMI majors is up sharply

EMPLOYMENT TRENDS

Industry-specific national employment figures for insurers and related activities sector, 2013-2016



Overall employment is up too

Source: *Business Insurance*, 2017 Risk Management and Insurance Schools Ranking and Directory,

Can Insurers "Win" the War on Talent?

- **Data Gap?:** While the industry overall may be able to reach its hiring goals, will there be a gap when it comes to data talent?
  - The answer is likely to be yes
  - Demand for data talent across all industry's is fierce
  - Existing available talent pool may not have sufficient analytics skills
  - Universities may be lagging behind
- **What Are Universities Doing?**
  - Increasing statistics course requirements for all business majors
  - Developing a "Data Analytics" concentration across all majors
  - Creating new courses focused on FinTech, Blockchain, Machine Learning, AI, etc., involving faculty with diverse backgrounds
  - Including more analytics work in many of the required courses across most majors

QUESTIONS?

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Thank you for your time and your attention!

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