

# Technology and insurance: themes and challenges

November 2017

Analyze / Adopt



Adapt / Act



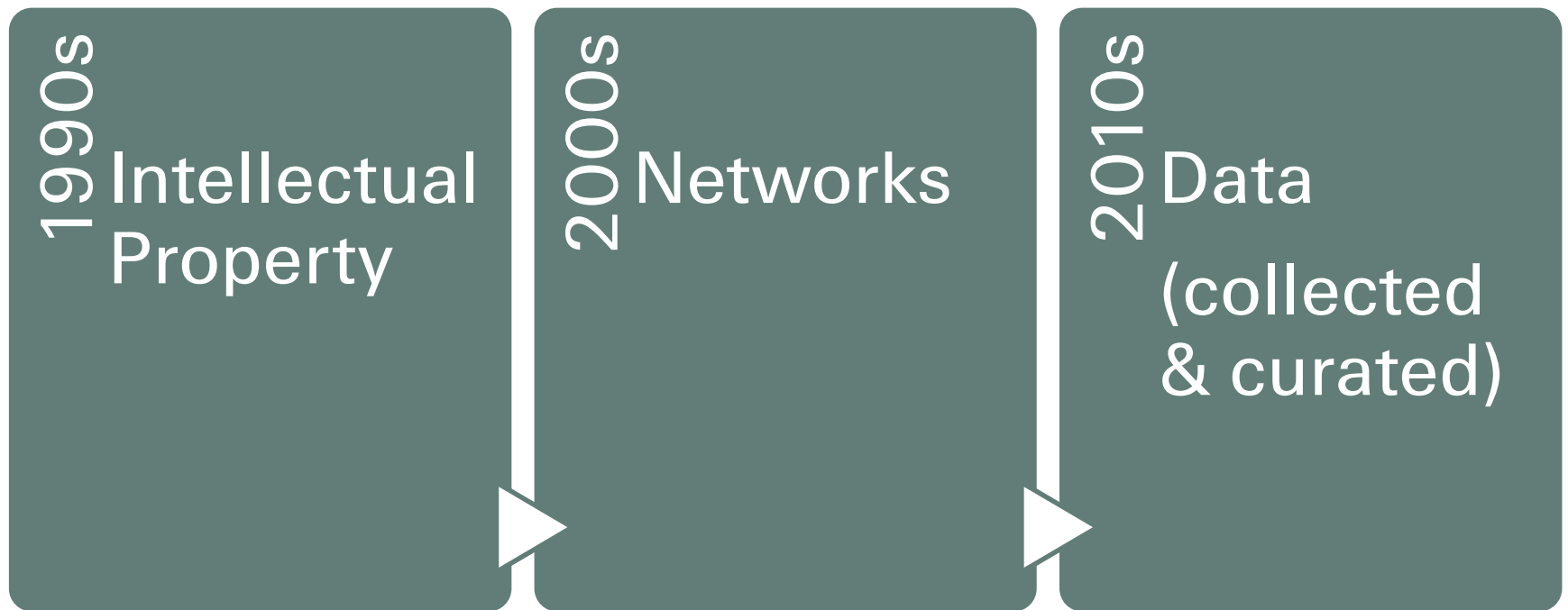
# Outline

- Data, technology, and analytics trends
- Insurance from a technology perspective
- Insurtech
- Insurance companies meet insurtech
- Bigtech and insurance
- Final remarks

Developing ecosystem connecting data, technology and analytics

# **DATA, TECHNOLOGY, AND ANALYTICS TRENDS**

## Drivers of value in the technology sphere



# Capacity opportunities and challenges

- Moore's law: Processing speed doubles every 18 months– *reaching physical limit*
- Kryder's law: Storage capacity doubles every 12 months– *actual increase may be more like 15% per year– but likely to accelerate*
- Nielsen's law: Bandwidth doubles every 21 months

*Collecting, curating, and coordinating data have replaced processing data as the binding constraints on evidence-based R & D efforts.*

*Open-source algorithms are relatively less valuable than data access & insight.*

# Data is the new “oil” – extract, refine, distribute

- Collect
  - Structured: Time series
  - Unstructured: Text, audio, and video
  - Moore’s law gives way to Kryder’s & Nielsen’s laws as binding constraint
  - *Key is finding novel data*
- Curate
  - Manage heterogeneous formats
  - Address noisy & missing data
  - *Key is ensuring data is reliably retrievable in the future*
- Contemplate
  - Beware quantifauxcation (assigning a meaningless number, then pretending that since it’s quantitative, it’s meaningful– Stark [2015])
  - Address cognitive biases
  - *Better to be approximately correct than precisely wrong*

# Contemporary challenges of managing massive data growth

- Volume: Size of managed data
- Velocity: Speed of data arrival and processing
- Variety: Types of data including structured and unstructured
- Veracity: Accuracy, precision and relevance of data

*Assessment of data along these dimensions should inform technology architecture, process, and model choices*



# Marrying finance and technology

- Fintech
- Insurtech
- Regtech [Both compliance and supervision]
- Robotic process automation (RPA) [Processtech?]

*Trust, brand, & regulations continue to hinder small startups.*

*Data access, management, & understanding continue to be critical.*

# Machine intelligence: Finding, then replicating patterns

- Categories of machine intelligence
  - Artificial general intelligence
  - Artificial intelligence
  - Augmented intelligence
  - Deep learning
  - Machine learning
  - Natural language processing
  - Process automation
- Primary challenge is quality of data– biased, insufficient for training, rendered obsolete by regime/structural changes
- Noise is not always a problem– depends on its attributes

# Deep learning

- Relies on multi-layered relationships
- Limited by training data availability
- Operates as a black box
- Model validation approach will have to change to accommodate
- Supervised deep learning may have more application in risk management than unsupervised deep learning
- Success to date has been limited; however, may eventually have successful applications

# Marrying qualitative and quantitative data

- Roughly 90% of available data are qualitative and unstructured e.g., articles, blogs, e-mail, regulatory filings, slide presentations, social media, etc.
- Quantitative data may not reflect all forward-looking risks (e.g., Environment, Social, Governance-- ESG)
- Transforming qualitative data into indicators and combining in some way (e.g., shading, weighted combinations, etc.) with quantitative data may be a path to improving existing models

# Analytics-based demands tend to outstrip capacity

- Longer, richer and more robust time series
- Faster computation– especially simulations (reduce hours/days to minutes/seconds)
- Larger, noisier datasets
- Machine intelligence (NLP, Deep learning, etc.) requires more data, more storage and more compute power

# Insight pyramid

Actionable  
insight

Visualization

Algorithmic processing

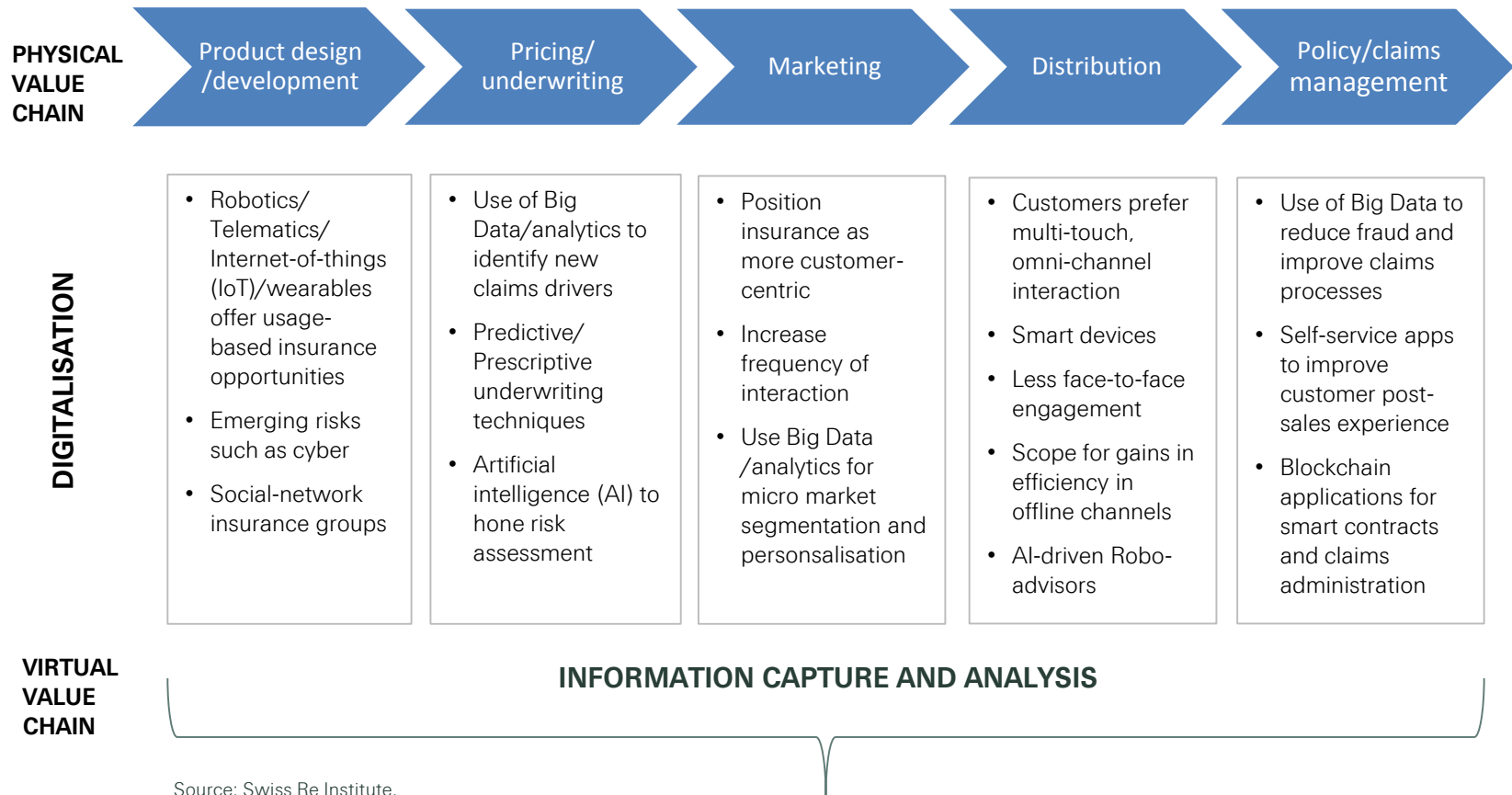
Data wrangling & curation  
(collecting, joining, cleaning,  
formatting, loading-- ETL)

Technology themes in insurance

# **INSURANCE FROM A TECHNOLOGY PERSPECTIVE**

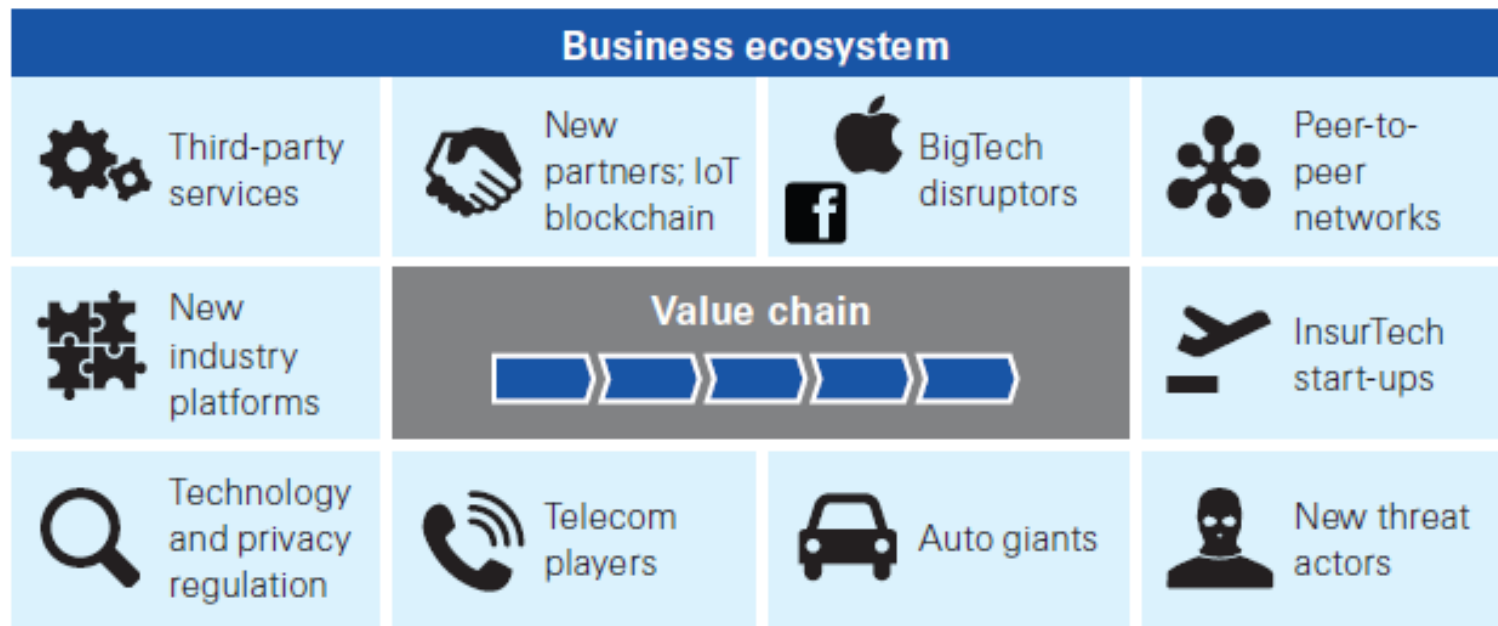
# Technology is affecting the insurance value chain

## Virtualisation of the value chain





# Digitalisation not only affects the value chain but also impacts the wider business ecosystem



Source: Swiss Re Institute.

# Perfect storms and black swans

- Scenario-based analyses vs. forecasts
- Deeper analyses of underlying assumptions, relationships, and data
- More focus on tools/processes to manage multiple sets of scenarios and analyses across time
- Renewed efforts to enforce *preproducibility*, *reproducibility*, and *out-of-sample testing*
- Process management systems with robust audit logs are more important than ever

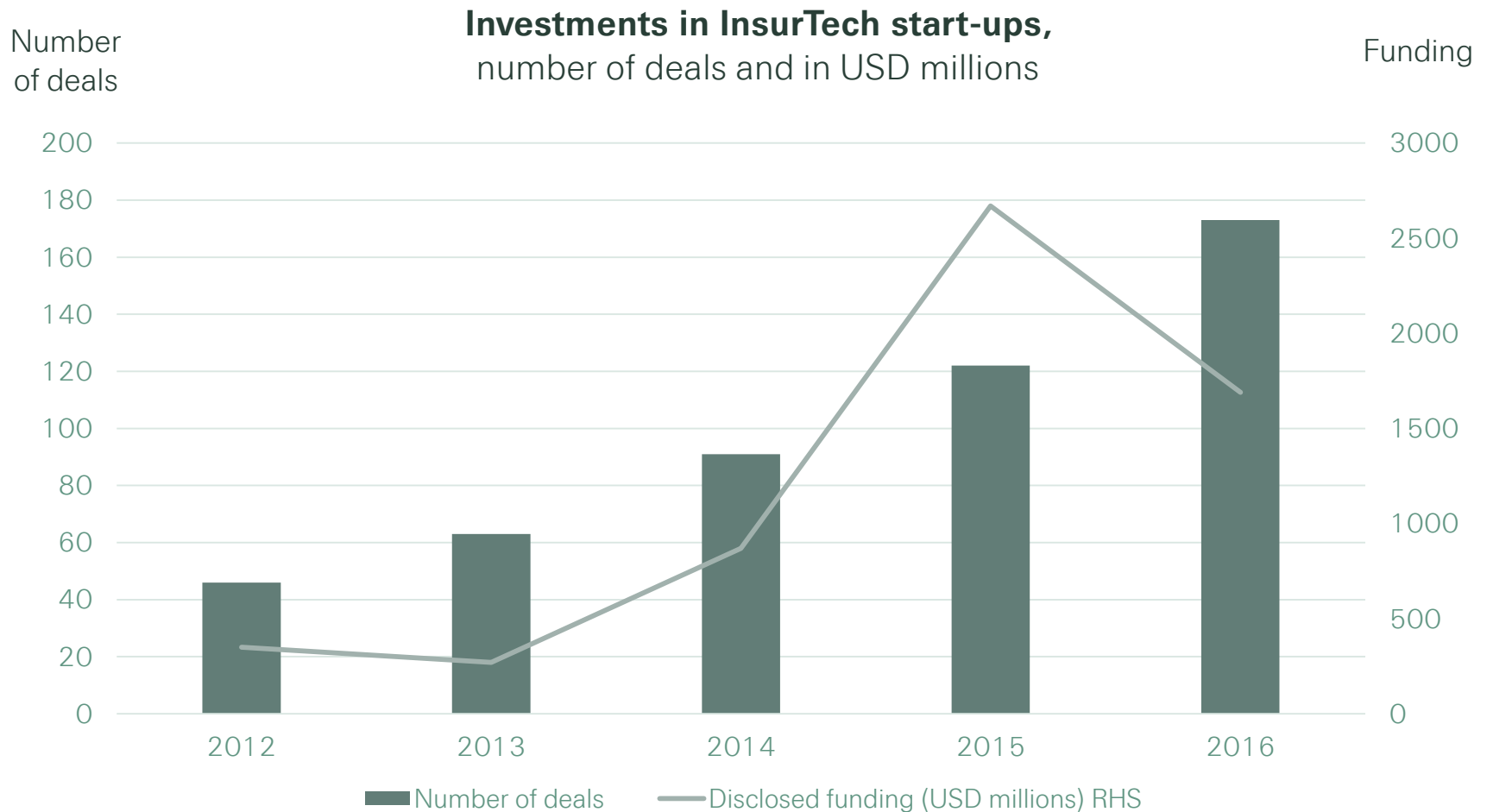
# Regulatory challenges

- Managing/maintaining multiple, fragmented, and varying databases for validation and audit
- Open source tools
- Concerns about the Cloud
- Black-box nature of machine intelligence creates challenges for validation
- Data privacy rules (differs across jurisdictions)
- Cyber-security

Marrying insurance and technology

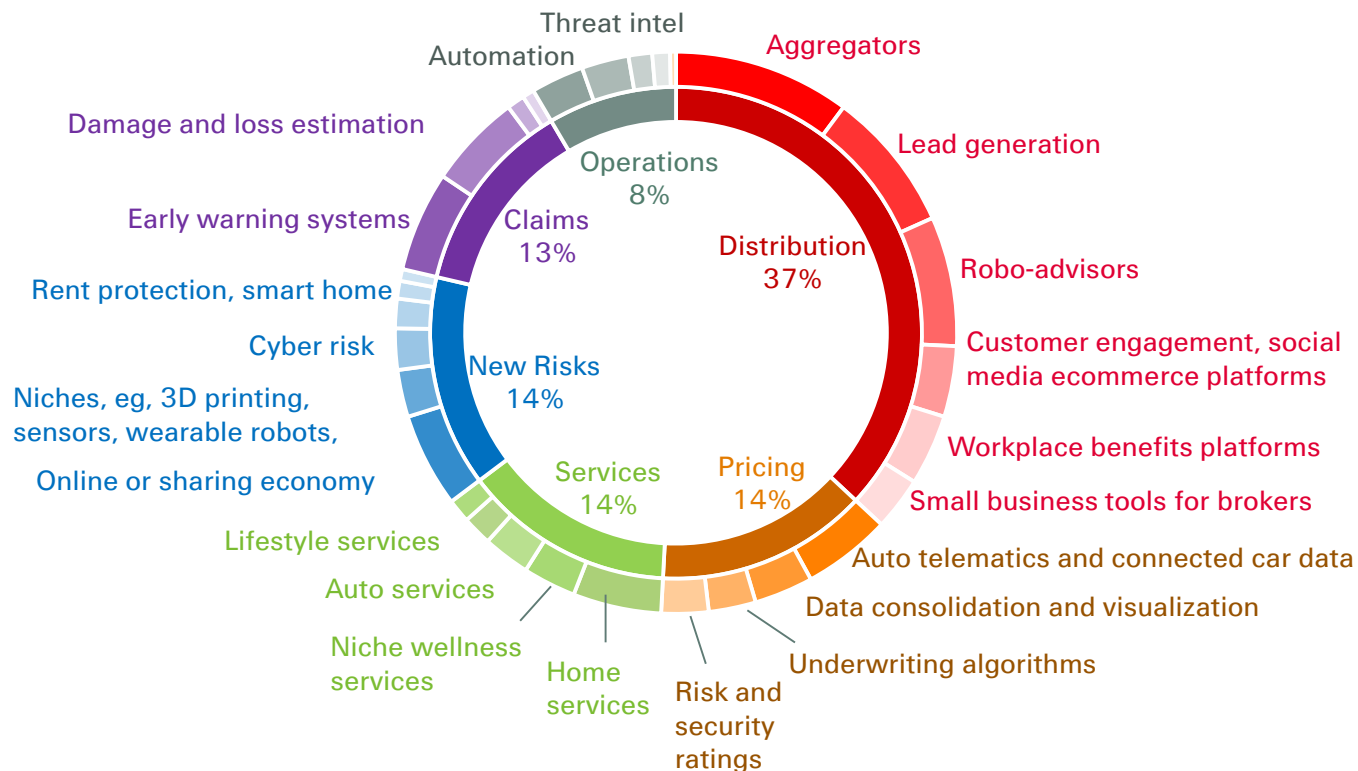
**INSURTECH**

## Investments in high-tech start-ups in insurance (InsurTech) have grown rapidly over the last five years.



# Technology applications in distribution, services, and new risk pools are of greatest interest to insurers

**Investment focus in InsurTech** (% share by number of start-up investments), 2014-2016















# InsurTech start-ups offer consumer-friendly digital broker platforms for small & medium enterprises (SMEs)

## Levels of sophistication among InsurTech agencies that distribute small business insurance

	Lead aggregators	Insurance search engines	Online insurance agencies
Customer experience	Sell leads to agents, direct channels of carriers. Customers get follow up call, email, etc.	Allow customers to see rates; policy is fulfilled on the insurer website. Rates are not 'bindable'; may change.	More sophisticated - use third-party data to verify data, and provide 'bindable' rates.
Multiple carriers	Yes	Yes	Yes
Real-time rates	No	Yes	Yes
Direct fulfillment	No	No	Yes

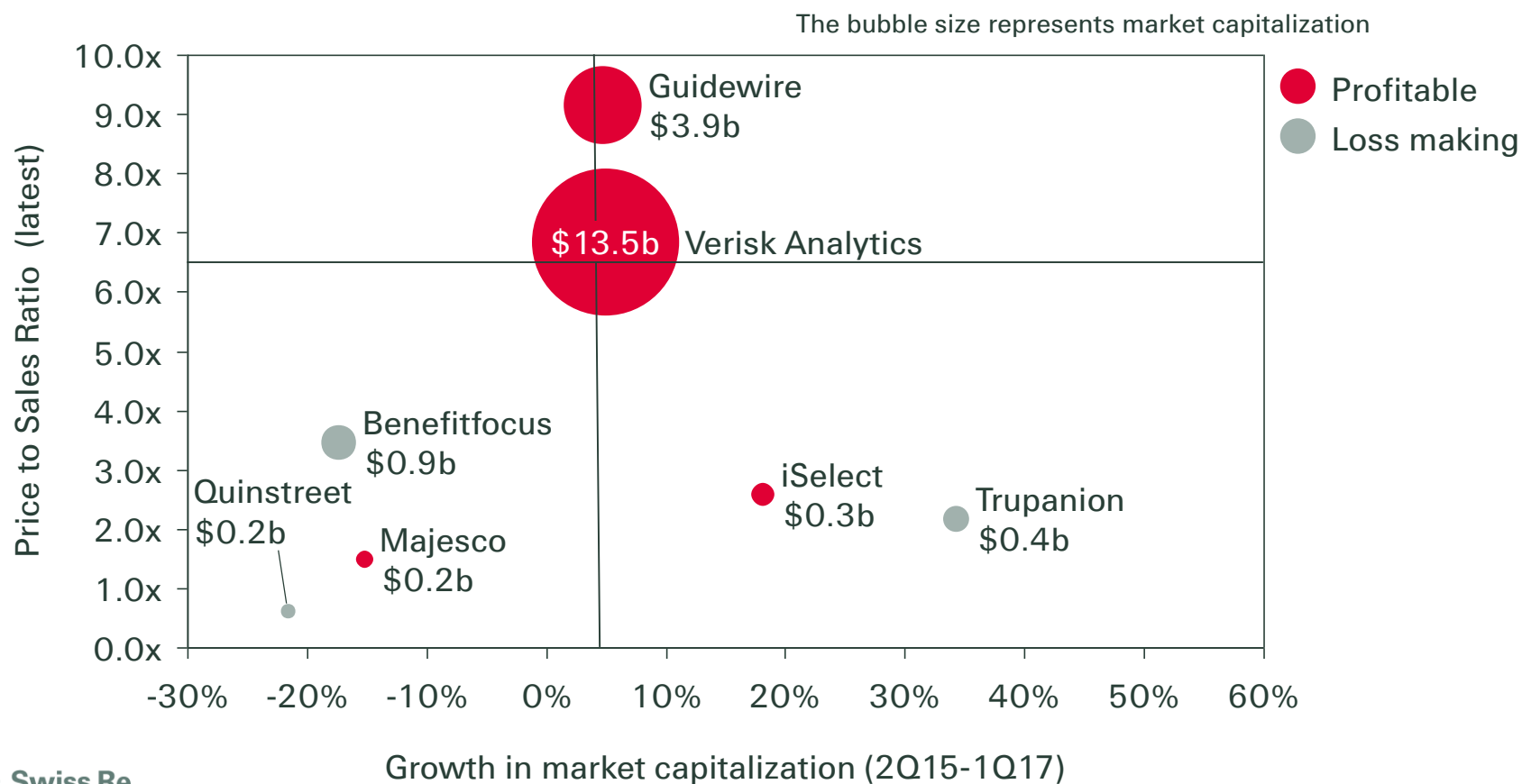
## In commercial lines, InsurTech firms are developing a range of applications (activity is lower than personal)

Line of business	Use cases InsurTech in commercial insurance	Examples of start-ups
<b>Workers compensation</b>	<ul style="list-style-type: none"> <li>Monitor incidents via posture devices, wearables.</li> <li>Real time alerts, behavior modification.</li> <li>Telemedicine; lower time to return to work.</li> </ul>	 
<b>Industrial equipment</b>	<ul style="list-style-type: none"> <li>Enabling devices to control hard-to-reach machines.</li> <li>Data intelligence on productivity, preventative maintenance.</li> </ul>	 
<b>Commercial real estate</b>	<ul style="list-style-type: none"> <li>Smart buildings and equipment monitoring.</li> <li>Noise monitoring and reporting, property management platforms.</li> </ul>	 
<b>Commercial auto</b>	<ul style="list-style-type: none"> <li>Reward better driving among fleets.</li> <li>Fleet performance, vehicle servicing</li> </ul>	 
<b>Group health and benefits</b>	<ul style="list-style-type: none"> <li>Move employer-owned benefits to private programs.</li> <li>Other benefits, eg, student loan contribution.</li> <li>Treat productivity issues, eg, heavy drinkers.</li> </ul>	 
<b>Cyber risk</b>	<ul style="list-style-type: none"> <li>Threats related to the wireless workplace.</li> <li>Information sharing – breach data.</li> </ul>	 



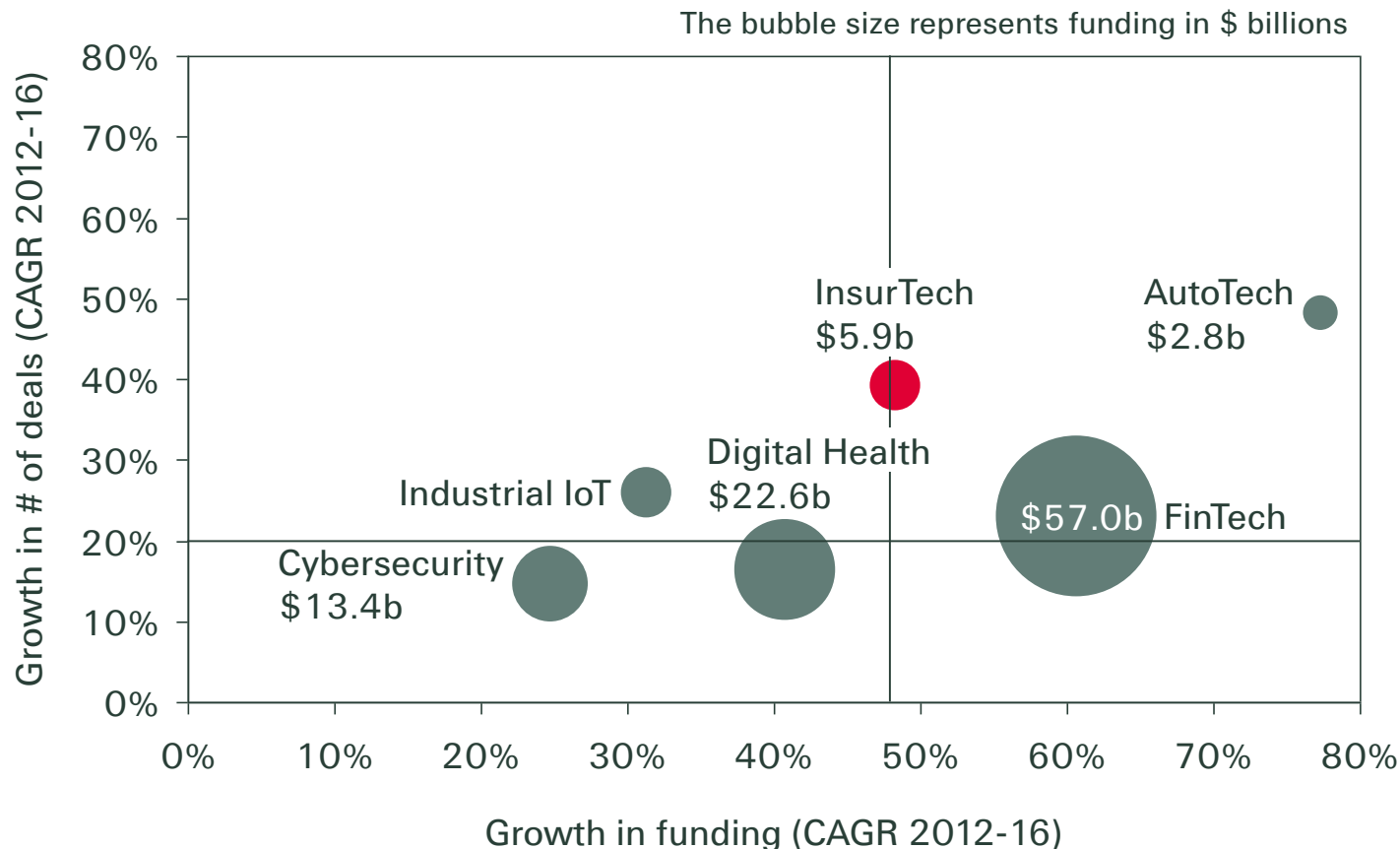
Few InsurTech firms are listed, of which larger profitable ones command higher price-to-sales ratios; acquisition by insurers is also a possible option

### Analysis of Post-IPO performance of InsurTech companies



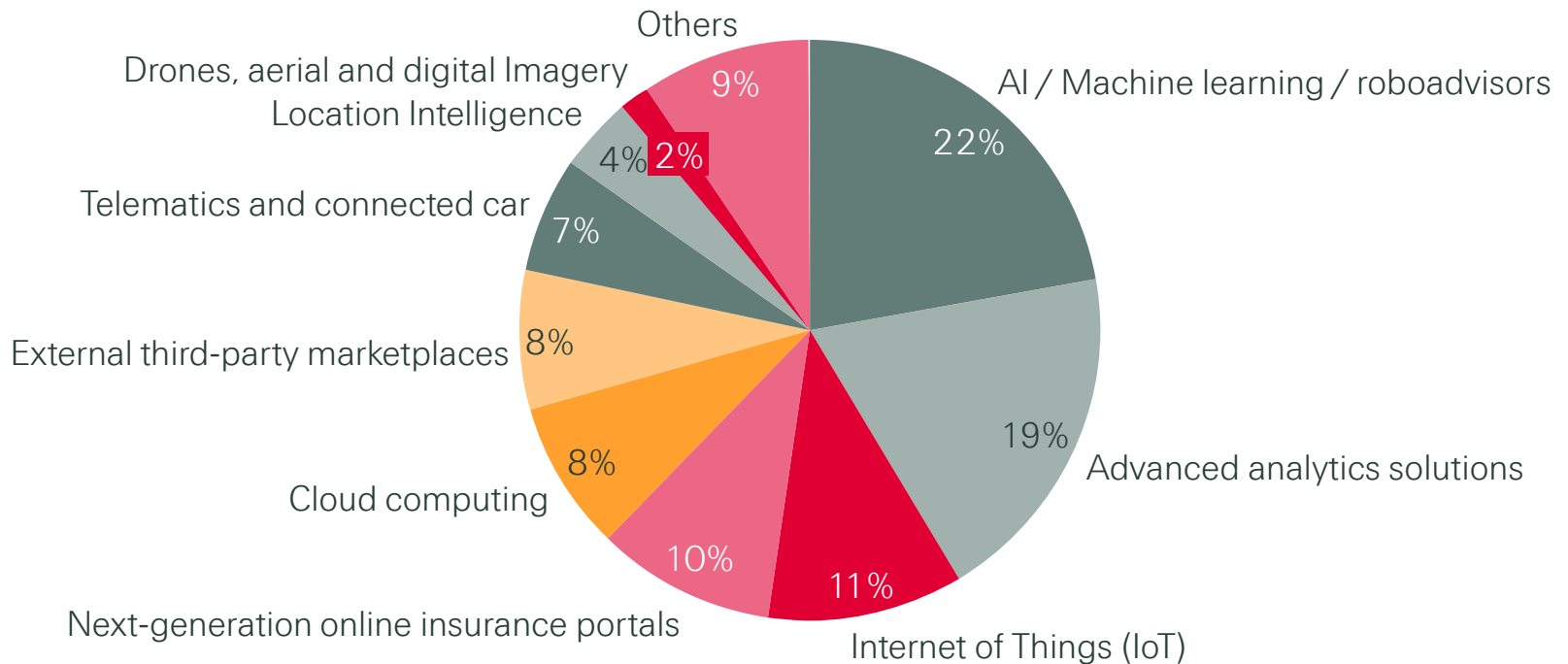
# Venture investors put \$57B into FinTech startups over the last five years, of which \$6B was in InsurTech

## Global Tech Financing Trends (2012 to 2016)



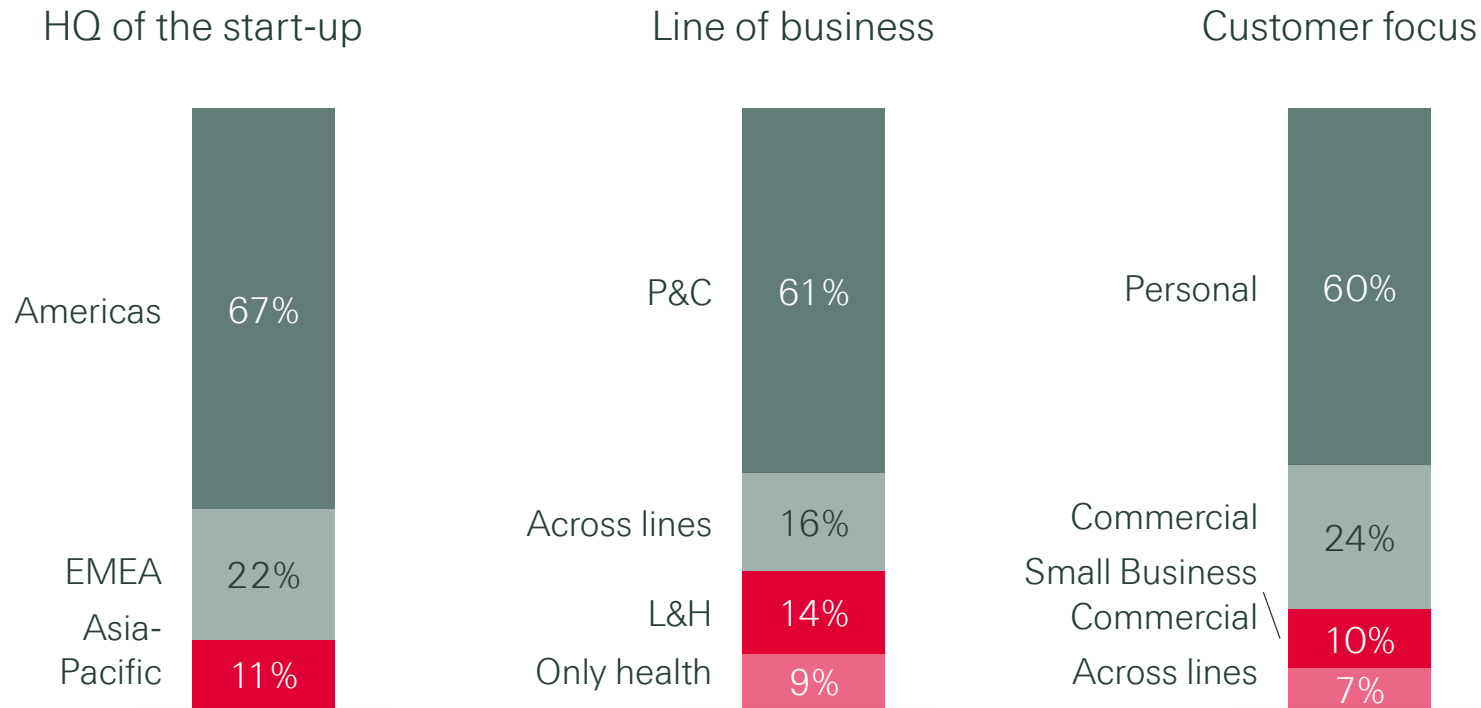
# Lead technology of the InsurTech startups and their application across the value chain

**Technology areas that InsurTech start-ups are focusing on**  
(% share by number of start-up investments), 2014-2016



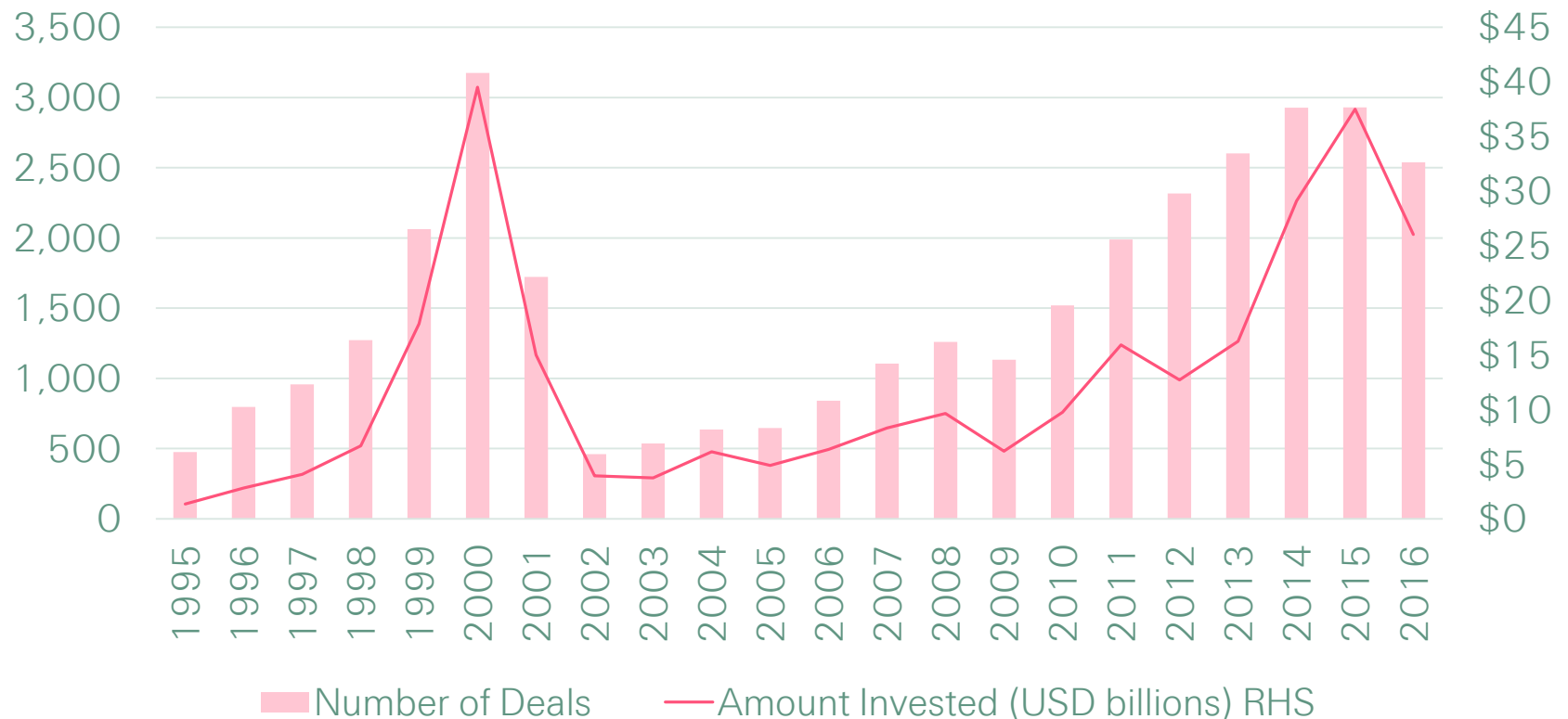
# Geographically, over 65% of InsurTech investments and partnerships were in start-ups headquartered in the Americas (predominantly the US)

## HQ, LOB and customer focus of InsurTech start-ups, 2014-2016



# The pace of expansion in technology-led investments over recent years has echoes of earlier episodes

## Venture capital investments in the U.S. to the Internet and software sector, 1995-2016



Insurance industry response to technological change

# **INSURANCE COMPANIES MEET INSURTECH**

# There are signs that the industry is repositioning to technological change

## Insurers' technology strategies

### Venture investments



Invest in InsurTech start-ups with a proven business model, product, customers, first revenues

### Start-up partnerships



Insurers run pilots with InsurTech start-ups, act as capacity providers, and offer claims management expertise

### Innovation labs and accelerators



Nurtures in-house teams, and less mature InsurTech start-ups. Turn ideas into business applications. Insurers support with initial funding and networks

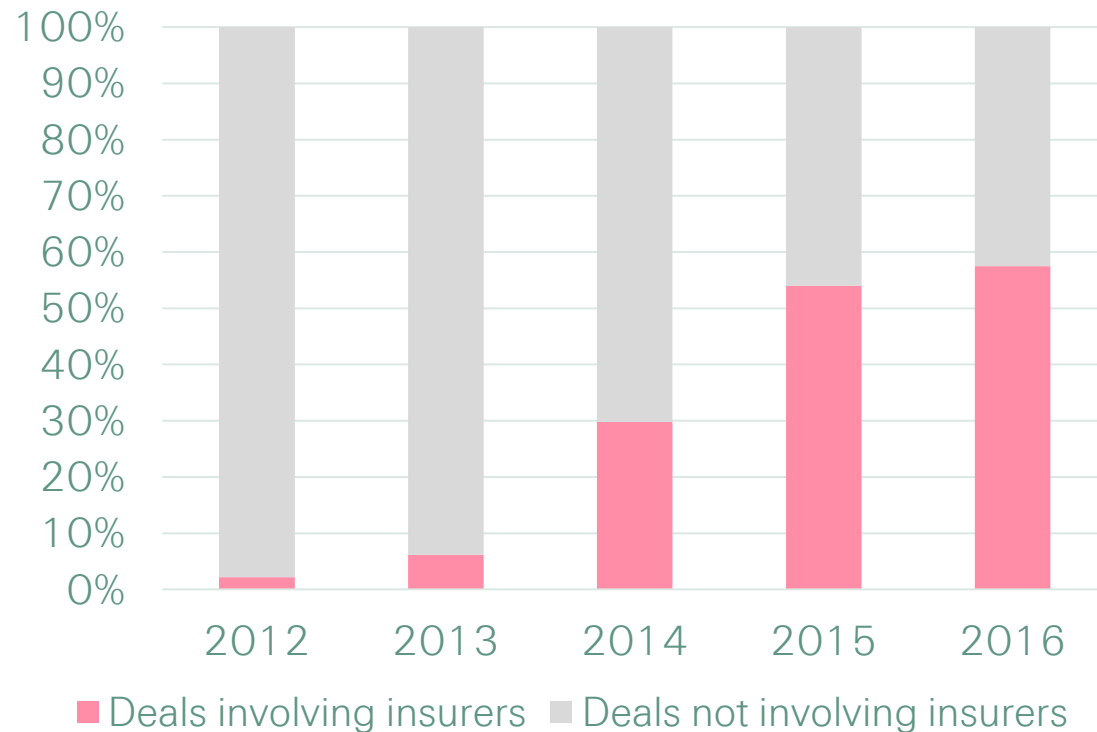
### Contracts with large tech vendors



Consulting for business model innovation. Multi million dollar projects to tap expertise in business processes, tech and integration

# Insurers are investing in or partnering with InsurTech start-up firms

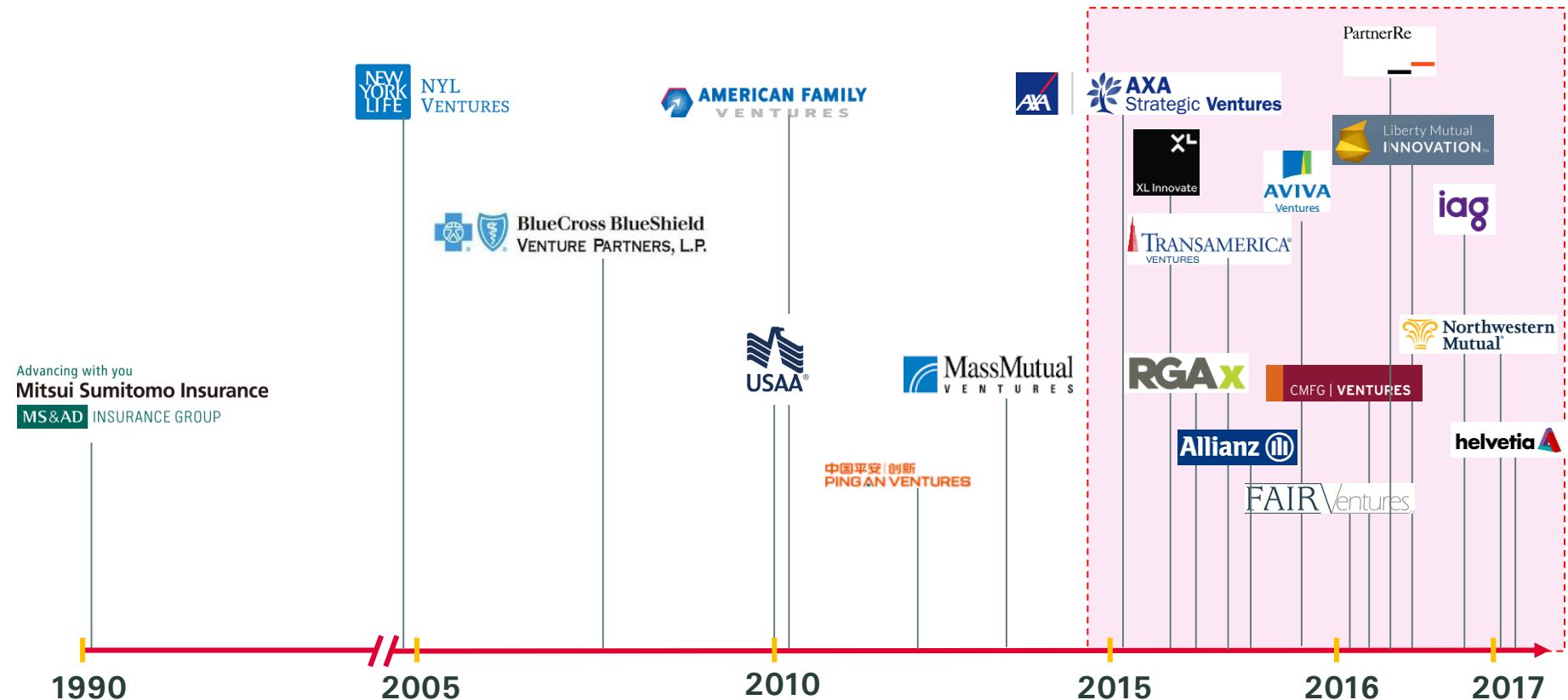
**Proportion of investments in InsurTech start-ups with re/insurer involvement**















# Insurers have launched venture funds in order to get an early insight into the application of new technology...

## Timeline of corporate venture fund announcements by selected insurers



... and have also entered into several new partnerships in smart home, distribution, and elsewhere



















Start-up	Description of partnership
 UNDERSTORY	The insurer and the <b>weather sensor</b> data startup aim to improve claims handling
 carma	Insurance coverage for Carma's <b>carpooling</b> and car-sharing programs
 Airware	Airware selects and customizes <b>drones</b> and pilots that the insurer uses
 openbay	Allows policyholders to receive multiple price quotes and schedule <b>auto repairs</b>
 indico	Text and image analysis to enhance <b>machine learning</b> in investment decisions
 BITSIGHT	Provides <b>security ratings</b> to a specific group of policyholders
 censio	Sensor technology to measure <b>driving habits</b> and in-car smartphone usage
 CYBERDYNE	Develop insurance for users of <b>wearable robots</b> for rehabilitation and work
 bitFlyer	<b>Cryptocurrency insurance</b> protects losses at the exchange and customer levels
 GamaSec	Insurers support the limited warranty issued with its <b>website security</b> offering

## Re/insurers' have also sought to design new tech-led products and introduce process improvements in-house

Insurers	Extract of selected patent keywords (not exhaustive)
Progressive	Mobile insurance platform, Customizable insurance, Motor vehicle monitoring system for determining cost of insurance, Rich claim reporting system
Hartford Fire	Telematics based underwriting, Analysing sensor data, Using mobile devices for medical monitoring, Geocoded insurance processing using mobile devices
Allstate	Driving analysis using vehicle-to-vehicle communication, Assistance on the go, Route risk mitigation, Feedback loop in mobile damage assessment & claims
State Farm	Providing driver feedback using a handheld mobile device, Automated texture data analysis, Grid-based insurance rating
MetLife	Use of drones for underwriting related activities, Visual assist for insurance facilitation processes, Sensor-enhanced insurance coverage & monitoring
Tokio Marine	Mobile road-assist system, Attribute forecasting system, System and method for supporting provision of rating related service
Sompo Japan	Generating index for evaluating driving, Information processing apparatus, Vehicle-mounted device, Method for analysing damage of products

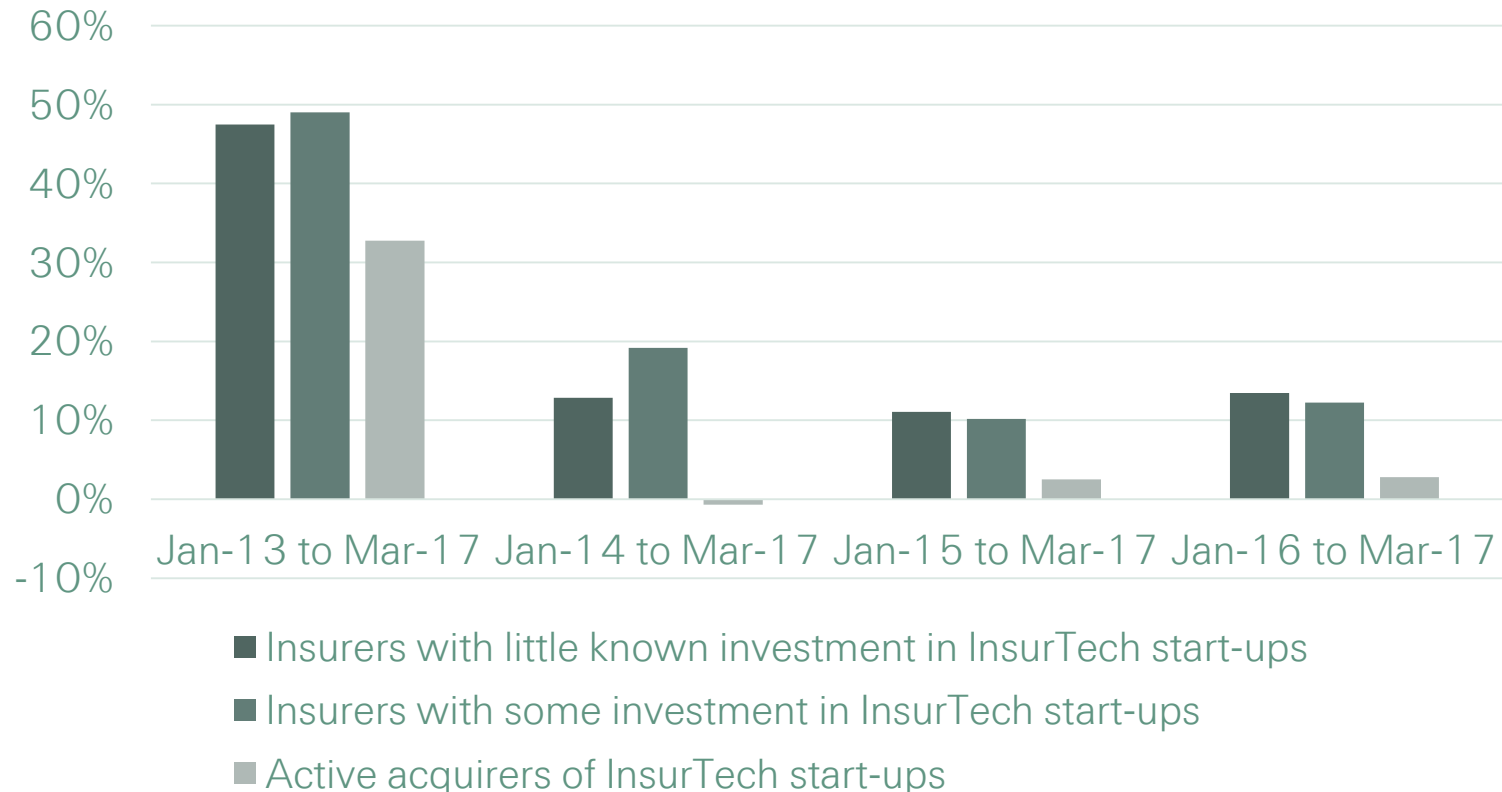
# Insurers are also seeking partners for new and innovative risk protection products

## Examples of emerging risks that start-ups are addressing with insurer backing

Type of insurance	Examples of start-ups	Short description of the risk being covered
Liability for sharing economy contractors	  	Insurance for small business (eg pop-up stores, contractors like personal trainers, photographers) covers exceptions or limitations
Coverage for home sharing economy	  	Insurance cover for sharing houses for short stays, Blockchain-based property insurance for the sharing economy
Coverage for car sharing economy	  	Insurance coverage for carpooling and car-sharing programs
Cybersecurity bundled with insurance	 	Support for software's data breach guarantee, Identity theft detection, protection and fraud resolution combined with insurance
On demand insurance for short-term use	 	On-demand drone insurance for recreational and commercial flights, Insurance for short-term rental for heavy equipment market
Property lease guarantor services	 	Property lease guarantor services - helps individuals secure acceptance to lease an apartment or house
Liability for new technology	  	Customized insurance for new technology. eg, IoT infrastructure guarantees, Clean Tech performance warranty, Liability for wearable robots, 3D printing liability, cryptocurrency exchanges

# The market remains to be convinced that insurers derive competitive advantage by engaging with InsurTech start-ups

**Share price appreciation for insurers, classified by InsurTech strategy, 2013-2017 (cumulative)**

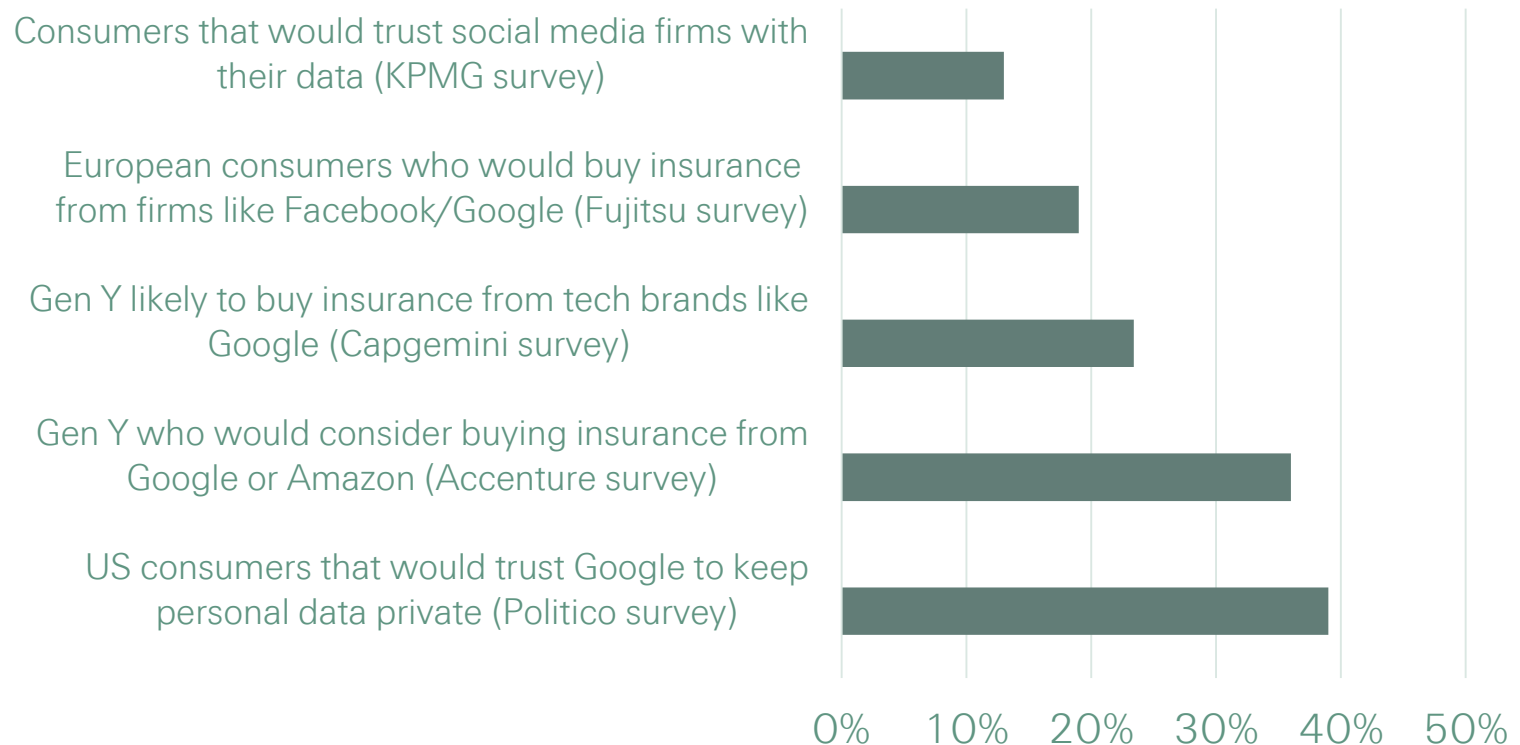


Bigtech (FAANGS & BATS) may constitute a bigger threat to insurance

# **BIGTECH AND INSURANCE**

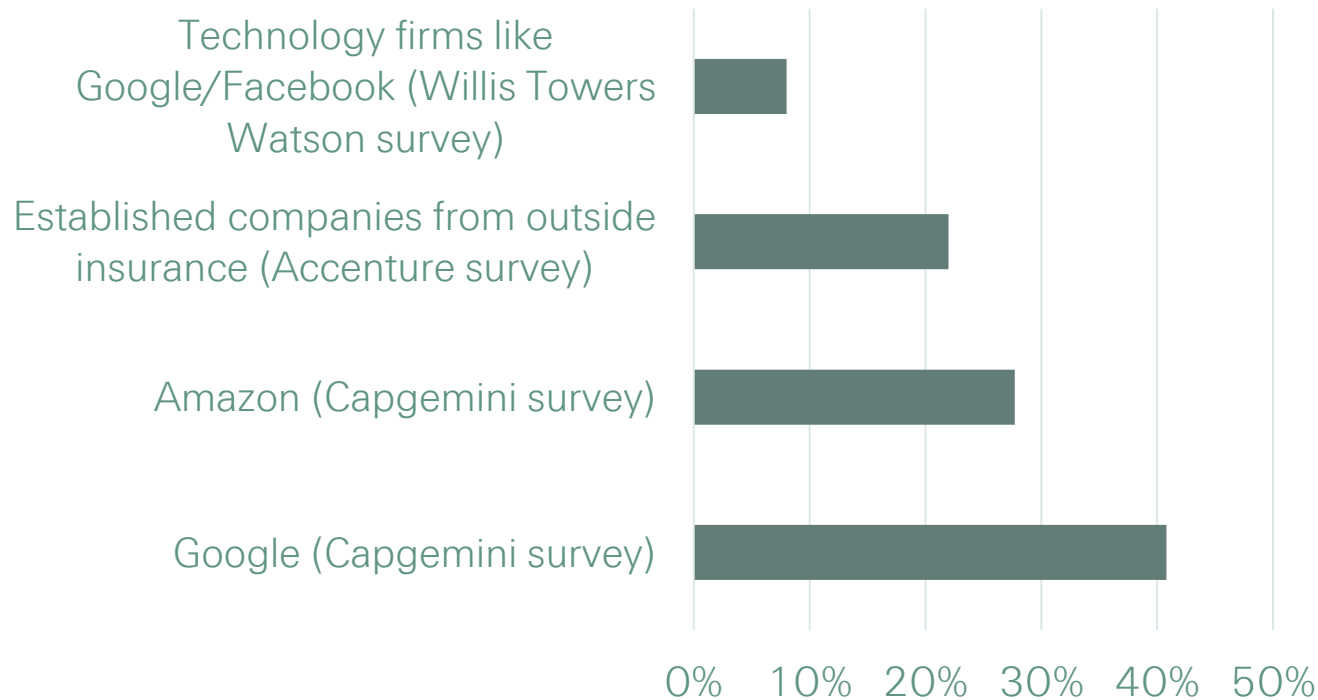
# Coupled with strong brand appeal to younger generations BigTech players may actually represent a more credible competitive threat to incumbent insurers than InsurTech

## Summary of surveys about how consumers perceive BigTech (% of respondents)



Among the tech giants, Google and Amazon are seen as a particular threat given their access to vast amounts of data on prospective customers

**Insurers' perceptions of the threat from new entrants in the insurance industry**  
(% of respondents)





# BigTech companies already have some experience of insurance, albeit largely in niche markets

## Selected tech giants' recent forays into the insurance industry (US, and EMEA)

Tech firms	Role in insurance industry
<b>Google / Alphabet</b>	<ul style="list-style-type: none"><li>• Mar-17: Insurers experimenting with the voice-activated speaker, Google Home as a channel for offering advice.</li><li>• Sep-16: At Monte-Carlo asked for partners to develop bundles that blend tech. and hardware with insurance.</li><li>• Sep-16: Launched an 'Advanced Solutions Lab' for insurers to work with its machine learning experts.</li><li>• Jun-15: Partnerships with insurers through its Nest product line and investments in start-ups that use wearables.</li><li>• Mar-15: Briefly experimented with its own auto insurance comparison portal 'Google Compare' in the US.</li></ul>
<b>Facebook</b>	<ul style="list-style-type: none"><li>• Mar-17: Chatbot platform on Messenger used as an ecosystem to distribute and service insurance offerings.</li><li>• Nov-16: Facebook blocked insurer's car insurance discount plan.</li><li>• Ongoing: Fraud investigators independently use Facebook to unearth the 'real' truth behind claims.</li></ul>
<b>Amazon</b>	<ul style="list-style-type: none"><li>• Mar-17: Lloyds offers loss-of-income policies for sellers suspended from Amazon; Amazon is not involved.</li><li>• Sep-16: Promoting the possibilities of its assistant (Alexa) as a serious business tool in insurance.</li><li>• Apr-16: Partners with insurer on own-brand insurance, 'Amazon Protect' for electronics sold on its website.</li></ul>
<b>Apple</b>	<ul style="list-style-type: none"><li>• Mar-17: Consumers combine iPhone camera, Messages, and Apple Pay to buy insurance sold by start-ups.</li><li>• Sep-16: Insurers distribute Apple watches to encourage policyholders to exercise.</li><li>• 2016 : Relies on insurers to underwrite a warranty service for its devices (AppleCare+ is backed by AIG).</li><li>• Sep-14: Partnership with health insurers to offer mobile data on steps walked, calorie and heart rate data.</li></ul>

# BigTech companies already have some experience of insurance, albeit largely in niche markets

## Selected tech giants' recent forays into the insurance industry (Asia)

Tech firms	Role in insurance industry
<b>Baidu</b>	<ul style="list-style-type: none"><li>• Jun-16: JV with China Pacific Property Insurance to design new products for auto insurance.</li><li>• Jun-16: Testing its self-driving cars and expects to start mass production of such cars in coming five years.</li><li>• Nov-15: JV with Allianz to launch Bai'An, a new "scenario-based" insurer eg, ticketing and takeout delivery.</li><li>• Jan-15: Teamed up with Launch Tech and Ping An to launch vehicle telematics device Golo.</li></ul>
<b>Tencent</b>	<ul style="list-style-type: none"><li>• Jan-17: To develop an insurance company in Hong Kong with Aviva to focus on digital insurance.</li><li>• Nov-15: Tencent-backed online bank Webank launched its first insurance product with Guohua Life Insurance.</li><li>• Sep-15: A joint-venture with state-run CITIC Guoan set up an online life insurance firm.</li><li>• Jun-15: Alibaba and Tencent-backed Zhong An raised \$931M from investors.</li><li>• Dec-14: Pony Ma of Tencent, and Jack Ma of Alibaba were among investors in \$4.7B stake in Ping An Insurance.</li><li>• Mar-14: Tencent collaborated with Taikang Life to offer WeChat users health insurance protection.</li></ul>
<b>Alibaba</b>	<ul style="list-style-type: none"><li>• Sep-15: Alibaba's Ant Financial agrees to invest \$188M for 60% of China insurance firm Cathay Insurance.</li><li>• Jul-15: eBaoTech partners with Alibaba to launch an insurance cloud infrastructure platform</li><li>• Jul-15: Alibaba Health partners with CPIC Allianz on health reform, to explore commercial insurance services.</li></ul>

Process trumps algorithms and the future is hard to predict

**FINAL REMARKS**

# Trends in data, models, and decision support

- Data (particularly unstructured) is available in ever increasing quantities
- Data regulation has become much more complicated
- Data are plentiful, but noisy– often noise characteristics are misunderstood
- Non-linear, self-reinforcing processes under more scrutiny
- Averages less important than distributions
- Behavioral studies have become a focus, feature, and a fear-monger
- Model validation is different & difficult in a machine-intelligence-based world

*Thus...*

*Inference to the best explanation can be hard to implement in practice and data-intensive models are often hard to validate plus...*

*tech does not address every challenge!*



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