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Technology and insurance: themes and challenges



01	Executive summary
02	Digital technology and insurance
07	Themes in InsurTech
12	Incumbent insurers respond
18	Insurance disrupted?
26	Conclusion
27	Data appendix

All companies mentioned, and mention of transactions between companies, in this report are based on publicly available information.

Executive summary

Advances in technology are impacting all points along the insurance value chain and re-shaping the competitive landscape.

New high-tech start-ups (InsurTech) are increasingly targeting insurance, especially personal lines distribution.

In response, insurers are setting up in-house innovation labs, partnering with large tech firms, and investing in InsurTech start-ups.

Insurers are also experimenting with new services to boost customer engagement, and collect data about new risk pools.

While some failures are inevitable, InsurTech can enable incumbent insurers to upgrade their digital capabilities.

InsurTech and BigTech do not pose an immediate competitive threat.

Most innovation in insurance tends to be incremental but future innovators may eventually piggy-back on the infrastructure being developed today.

Technology and the availability of new data sources are increasingly having an impact on insurance. Information, once digitalised, is being used to improve processes all along the insurance value chain. The rapid spread of internet-enabled sensors and ubiquitous connectivity are enabling new ways of communicating, information sharing, and insuring. New technology start-up firms – or InsurTech – are entering the industry to deliver some of the services typically provided by traditional insurers and intermediaries, and established technology giants (BigTech) are eyeing opportunities in the sector also.

Globally, InsurTech start-up activity is dominated by US-based, non-life companies, primarily in insurance distribution and related services. While predominantly focused on personal lines, InsurTech is also affecting selected commercial lines, largely in risk prevention. It is also enabling digital distribution to small- and medium-sized businesses. And some have built robo-advisors which use artificial intelligence to further increase penetration in insurance.

Re/insurers have generally been slow to embrace new technologies, but there are signs that many incumbents are looking to upgrade their digital capabilities. Some are partnering with large technology companies and are also collaborating among themselves to test new technologies such as Blockchain. Another strategy is to invest or partner with InsurTech start-ups that could help insurers in their own digital transformation. A number of large re/insurers have set up their own InsurTech venture funds. In 2016, the number of investments in InsurTech start-ups rose by 40%, and close to two thirds of the deals were funded by insurers.

Insurers also use technology to provide digitally-enabled services that involve more frequent interaction with customers. Alongside increased customer contact, the provision of these value-added services facilitates collection of data that can be used to improve underwriting and pricing decisions. Also, new risk pools are being created, and insurers are collaborating with start-ups to collect data and underwrite specialised or under-served niches.

The recent expansion in venture investments has echoes of the 1990s dot-com bubble. Inevitably, some InsurTech firms, fuelled more by hype than value-creation, will fail. But there are reasons to be hopeful that InsurTech will ultimately prove positive for the sector. The network effects associated with new technology – the tendency for it to become more valuable as more people adopt it – have grown significantly over recent years, driven by better infrastructure, smartphones, sensors, etc. And there have been few InsurTech IPOs, suggesting that entrepreneurs are focused on building a long-term relationship with investing insurers. The relatively modest investments in start-ups also means that any losses will not seriously impair insurers' balance sheets.

Recent surveys suggest that insurers are most worried about BigTech companies disrupting the industry. In principle, these firms have the financial strength, technological expertise and customer-centric focus to offer a serious competitive challenge to incumbent insurers. At the same time, potential cannibalisation of revenues, brand dilution, and tight regulatory scrutiny, are reasons why this may not be a near-term threat.

However, there is no room for complacency. The implications of digital technology for insurance will depend on how customer behaviour, insurers' risk-absorbing capabilities and regulatory frameworks evolve in response. The latest wave of technology may simply foster further incremental changes to the industry, similar to past technological developments, broadening the scope and affordability of insurance to more households and businesses. Alternatively, it could prove more transformative if some of the typical hurdles to radical innovation can be overcome, especially in relation to the capture and analysis of information to assess risk more accurately. Over time new entrants could build on the infrastructure created by InsurTech and BigTech to offer compelling new risk protection solutions that are aligned with evolving regulation, and in doing so, present a genuinely disruptive competitive threat.

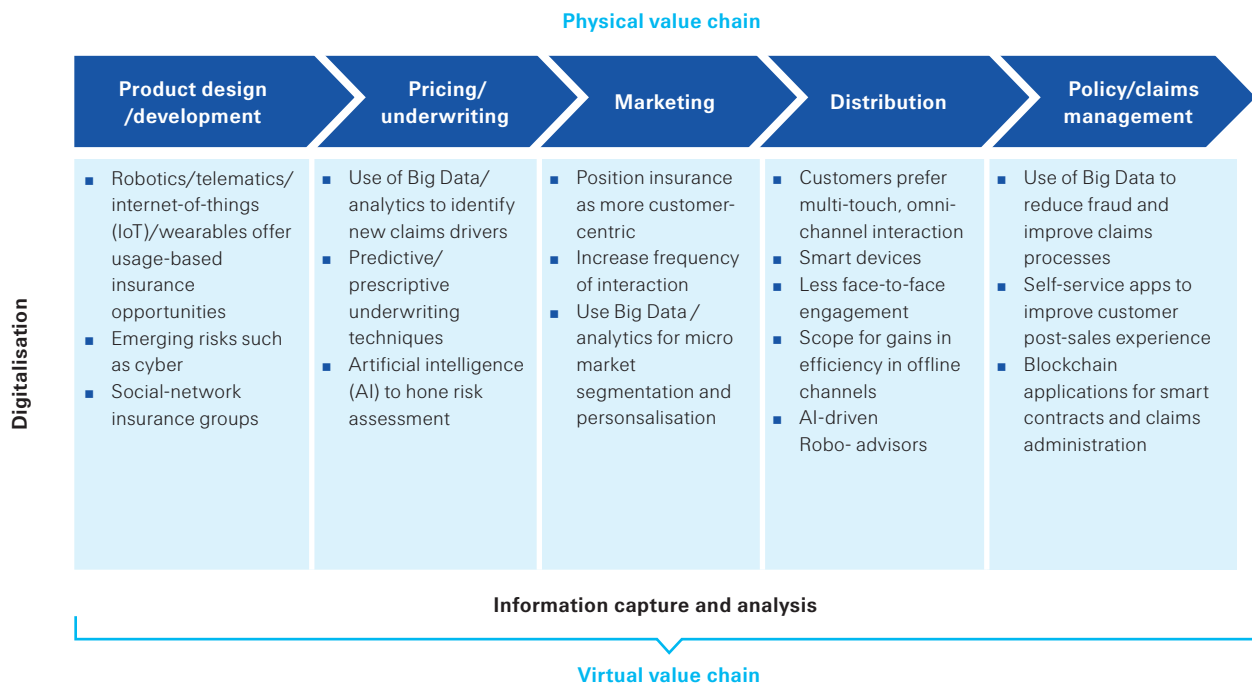
Digital technology and insurance

Technology is impacting the entire insurance value chain.

Technology is affecting the insurance value chain

Digital technology is bringing about change in the insurance industry, most notably by enabling enhanced data capture and analytics capabilities. Big Data, artificial intelligence (AI)/cognitive computing, predictive modelling, wearable devices, telematics and the Internet of Things (IoT) are having impacts all along the insurance value chain (see Figure 1).

Figure 1
Virtualisation of the value chain¹



Source: Swiss Re Institute.

Granular data and new analytical tools enable greater personalisation and more accurate underwriting of risks.

Digitalisation is helping in the design and pricing of new and existing insurance products. The growing proliferation of new data about insureds collected via sensors and smart devices permits more granular underwriting of individual risks. Smart analytics, predictive modelling and connected telematics devices allow insurers to create products and set premiums based on how insureds actually behave rather than using general proxies like age, marital status and gender to assess risk. As new hazards are identified in real time, insurers can improve their data sets to better manage eligibility, underwriting and rating.

Distribution channels are evolving.

Distribution channels are responding to changes in consumer preferences. Price comparison websites, which have been around for quite some time, are providing consumers with more information on products and costs, especially for more commoditised products like auto and travel insurance. They often sell a product directly with no agent or broker involvement. Modern consumers are more self-directed in their insurance decisions and want to interact through various channels when researching and buying insurance.

Robo-advisors could increase online insurance penetration, and reduce distribution costs.

Surveys indicate that consumers often continue to value the personal interaction and expert advice of agents and brokers, especially when it comes to complex insurance for commercial, financial and life and health risks. And in many countries traditional

¹ The first use of the term "virtual value chain" is widely attributed to J Rayport and J Sviokla in "Exploiting the Virtual Value Chain", *Harvard Business Review*, November 1995.

intermediaries still represent the dominant channel through which insurance policies are sold. In these areas, technology is being applied to improve the efficiency and effectiveness of agents and brokers. However, many individuals want a seamless shopping experience anytime, anywhere, whether online, by phone or in a store or agent's office. To this end, the development of robo-advisors which use AI to formulate automated advice and recommendations, could facilitate further e-commerce penetration in insurance, and also reduce operational costs.²

Technology applications may improve efficiency of existing claims management processes and lower costs.

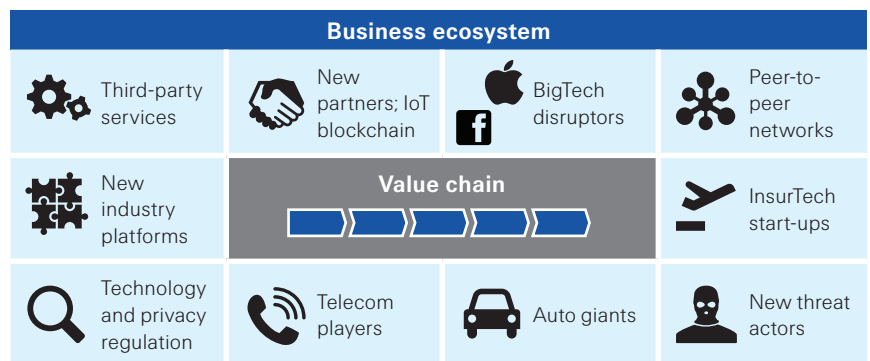
Policy and claims management is also becoming more efficient, as machine learning and pattern recognition are used to analyse handwritten and unstructured documents to expedite and detect false claims.³ Insurers are also experimenting with Blockchain technology – digital distributed ledgers which are cryptographically secure – to improve the efficiency of processes within and among existing institutions, such as in claims management or reinsurance contracts. Here Blockchains offer benefits of speedier connectivity between counterparties and potential for reduced fraud or loss adjustment expenses, all of which help lower insurers' overall costs.

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

The insurance ecosystem is changing

The impact of digitalisation extends beyond the insurance value chain itself to the whole business ecosystem in which insurers operate (see Figure 2). Industry boundaries are becoming blurred as firms in several sectors build digital platforms that can connect to different market places, supply chain hubs and financial networks.⁴ Non-insurer participants like auto manufacturers and telecoms companies too are gaining access to customer data, and digital analytics capabilities can enhance their client offering. And, with ease of internet interconnectivity, the world is moving more towards a "sharing economy" and "peer-to-peer" (P2P) platforms. In the case of insurance, these platforms allow individuals within a social network to pool premiums and underwrite each other's risks.⁵

Figure 2
Impact of technology on the wider ecosystem



Source: Swiss Re Institute.

² Accenture's survey shows that 74% of consumers are open to robo-advice to determine what coverage to purchase. See *Seven out of 10 Consumers Globally Welcome Robo-Advice*, Accenture, 11 January 2017, <https://newsroom.accenture.com/news/seven-out-of-10-consumers-globally-welcome-robo-advice-for-banking-insurance-and-retirement-services-according-to-accenture.htm>

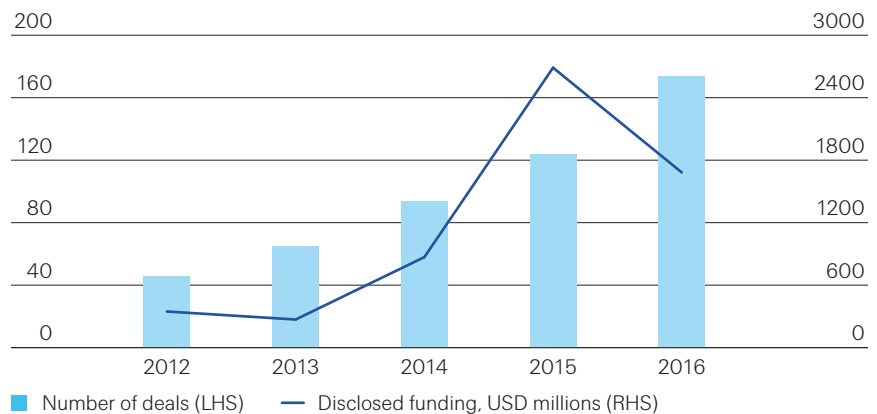
³ Machine learning helped uncover USD 98 million in fraudulent workers compensation claims by enabling prosecution to get data in millions of handwritten and unstructured documents. See "AI, Machine Learning & Pattern Recognition Help Indict 7 In \$98 Million Workers Compensation Case", *Ecmconnection.com*, 6 June 2016, <https://www.ecmconnection.com/doc/artificial-intelligence-machine-learning-pattern-recognition-help-indict-seven-0001>

⁴ External ecosystems are run by suppliers or customers. Technology vendors like Intuit and SAP run a number of ecosystems (eg, Intuit's financial APIs and SAP Ariba e-marketplaces). John Deere runs JDlink to connect partners and agricultural equipment. See H. LeHong, C. Howard, *Building a Digital Business Technology Platform*, Gartner, 8 June 2016.

⁵ The inherent affinity across those within a P2P group, often friends and family, helps screen out high-risk individuals and discourages exaggerated claims, thereby lowering costs for everyone.

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

Figure 3
Investments in InsurTech start-ups, number and value of deals



Source: *Quarterly InsurTech Briefing Q1 2017*, Willis Towers Watson Securities, Willis Re, CB Insights, April 2017.

In this paper, InsurTech refers to recently created tech companies focused on insurance and funded like start-ups.

Some of the technologies are not new and some of InsurTechs operate in other industries in addition to insurance.

Defining InsurTech

There is no industry-accepted definition of InsurTech. For some commentators the term simply denotes the application of technology to deliver more cost-effective solutions, and better user experience in insurance, irrespective of how old or young the company that develops the solution is. This paper uses a narrower definition by which InsurTech refers to tech companies that: (1) are in their early stages of operation; (2) deploy specific tech-led innovation in activities within the insurance value chain; and (3) leverage different forms of funding including, but not limited to, venture capital.⁷

Some of the technologies used by InsurTech start-ups are not especially new (eg, telematics), but the combination of technical progress – which facilitate Big Data and smart analytics – and the widespread use of digital, internet-enabled devices are allowing start-ups to influence the way in which insurance is designed, priced and sold, as well as how insurers engage with their customers. In addition, some tech start-ups may operate across several traditional industries, although the InsurTech label applies typically where insurance is one of the key areas of focus.

⁶ *Quarterly InsurTech Briefing Q1 2017*, Willis Towers Watson Securities, Willis Re, CB Insights, April 2017.

⁷ See “Gartner Says Insurance Firms Should Investigate ‘Insurtechs’ to Complement Their Own Digital Strategies”, *Gartner.com*, 24 October 2016, <http://www.gartner.com/newsroom/id/3487817>

BigTech companies have also shown interest in insurance opportunities.

More generally, new technology has wide-ranging implications for the nature of risks and how to manage them.

Alongside high-tech start-ups, established technology giants such as Google, Facebook, Alibaba and Tencent are pursuing opportunities in insurance. So far their interest has been confined to leveraging their strong logistics networks to sell specific ecommerce-related insurance or distribute conventional insurance from traditional providers.⁸ For example, Amazon partners with an existing insurer to offer additional coverage against accidental- or manufacturer-induced damage for electronic goods sold via its website.

More broadly, technology is bringing about shifts in the risk landscape and the mechanisms available to firms and individuals to monitor and manage their exposures. The proliferation of digital connectivity and resulting growth of machine-to-machine communication is enabling intelligent machines to perform all sorts of previously non-automatable tasks. A current example is the progress being made towards fully self-driving cars (see *Driverless cars*). But the IoT and wearable devices are being combined with AI to reduce accidents and injuries across a range of risks. As a result, the role of insurers is morphing from one solely concerned with loss indemnification to a broader advisory service for insureds on how to prevent, mitigate and manage their risks. This will have implications for insurers' business models, how they interact with their customers and the nature of the products and services they provide.

Technological advances are making genuinely self-driving vehicles a realistic proposition.

Autonomous cars will have important implications for insurance by reducing the cost of claims...

Driverless cars

The concept of autonomous vehicles has been around for decades although progress has been slower than many expected. In 1939, General Motors predicted that driverless cars would be available by the 1960s⁹, yet manual operated cars still dominate roads today. However, recent advances in computing power and networking technologies such as telematics, simultaneous location and mapping (SLAM), wireless connectivity, and automated traffic law enforcement are all coalescing to foster development of genuinely self-driving vehicles.

Autonomous cars will have important implications for insurance. Most obviously, a key claim is that by removing the potential for human error, driverless cars will reduce the frequency of accidents.¹⁰ This is especially the case if fully self-driving vehicles encourage greater car sharing and increased use of autonomous, on-demand taxis with resulting reductions in car ownership, traffic and congestion. In addition, smart analytics, coupled with machine learning and remote data capture, could provide the capability to assess and estimate costs for repairing vehicle damage, leading to reduced claim adjudication and payment timeframes.¹¹

⁸ Direct online insurers (eg, Zhong An, Amazon) primarily sell ecommerce-related insurance embedded in ecommerce transactions. Shipping return insurance was Zhong An's main product in 2016, followed by flight delay insurance. See "Zhong An plans to sell 5-10 percent stake ahead of IPO", *Reuters.com*, 6 March 2017, <http://www.reuters.com/article/us-china-zhongan-online-fundraising-idUSKBN16D11F>

⁹ At the 1939-1940 New York World's Fair, General Motors' interactive Futurama exhibit predicted high-speed automated roadways in 20 years. For example, see "The Original Futurama", *Wired Magazine*, http://archive.wired.com/entertainment/hollywood/magazine/15-12/ff_futurama_original

¹⁰ On some estimates, over 90% of motor accidents are caused in part at least by human error. See B W Smith, *Human error as a cause of vehicle crashes*, The Centre for Internet and Society, 18 December 2014, <http://cyberlaw.stanford.edu/blog/2013/12/human-error-cause-vehicle-crashes> for references to various underlying studies.

¹¹ "7 ways auto technology is impacting insurance coverage", *PropertyCasualty360.com*, 5 May 2017, <http://www.propertycasualty360.com/2017/05/05/7-ways-auto-technology-is-impacting-insurance-cove>

... and shifting insured risks from personal to product liability.

The market structure of the industry could also be affected. As ride sharing, car sharing and autonomous vehicles progress, there is the potential for less individual vehicle ownership and increased market share for commercially-owned vehicles. At the same time, automated driving shifts the associated risks from those related to human error to those linked to mechanical or computer malfunction. This means that liability for any resulting losses (and therefore those parties who might seek insurance) will increasingly be shifted to the manufacturer/designer of the equipment rather than the user.

But there are a number of reasons why these prospective changes in insurance will happen only slowly.

For a number of reasons, however, such wholesale changes in insurance will likely happen only gradually over time. First, globally, use of conventional vehicles will continue to grow for the foreseeable future, supported chiefly by expansion in emerging markets. Second, self-driving cars are likely to be full of expensive equipment which could increase the average cost of claims even as the number of accidents falls.¹² In these circumstances, even though the frequency of accidents might decline with greater automation, the severity of claims might not. Third, it will take time before automated vehicles are fully adopted and become commonplace given the typical slow turnover of the existing car fleet.¹³ Hesitancy among consumers to switch to autonomous vehicles will also continue to slow their adoption.¹⁴ Finally, motor insurance is for more than just road accidents: it also covers theft or natural catastrophe damage.

Most innovation in insurance tends to be incremental; could digital technology prompt more radical innovation?

In times of rapid technological change, market commentary often has a tendency to telescope the long-distant future into the very near term and also conclude that incumbent firms will be completely displaced by tech-led new entrants. In fact, historically most innovation in insurance has tended to happen incrementally, shaped by gradual shifts in customer behaviour, risk-absorbing capabilities and importantly the regulatory framework within which insurers operate.¹⁵ A key underlying issue is therefore whether the latest wave of technology will prompt more radical innovation both in terms of pushing out the technical frontiers of insurance and immediately disrupting the competitive landscape in the industry.

This paper explores the role technology is playing in shaping the insurance sector.

This paper explores in more depth the impact of technology on insurance, focusing in particular on the role InsurTech start-ups are playing in transforming the sector. It considers how incumbent insurers are responding to changing industry dynamics to ensure they remain relevant and can compete effectively in the new digital world.

¹² Liberty Mutual recently stated that since 2014, the costs of motor parts to repair an entry-level luxury car with minor front-end damage have risen 130%, due to the placement of distance sensors for adaptive cruise control and LED headlamps. Additionally, labour costs are up 18%, driven by labour for sensor installation and re-calibration. See *2016 Results Presentation*, Liberty Mutual, Slide 12, https://www.libertymutualgroup.com/about-liberty-mutual-site/investor-relations-site/Documents/Q4_2016_Earnings_Presentation.pdf

¹³ The size of the global car fleet is projected to reach the two billion mark by 2040 from around 1.2 billion today. A fraction of that is likely to be autonomous cars. By 2035, IHS estimates that 76 million vehicles with some level of autonomy will be sold globally. See "The number of cars worldwide is set to double by 2040", 22 Apr 2016, *World Economic Forum*, <https://www.weforum.org/agenda/2016/04/the-number-of-cars-worldwide-is-set-to-double-by-2040>, "Autonomous vehicle sales forecast to reach 21 mil. globally in 2035", *IHS Automotive*, 7 June 2016, <https://www.ihs.com/country-industry-forecasting.html?ID=10659115737>

¹⁴ The J.D. Power 2017 U.S. Tech Choice Study found that compared with 2016, 11% more consumers in Generation Z (born between 1995-2004), and 9% more of those born before 1946 definitely would not trust fully self-driving technology. Forty percent of baby boomers (born from 1946-64) saw no benefit from self-driving vehicles. See "J.D. Power: Consumer trust in self-driving cars drops", *The Detroit News*, 18 April 2017, <http://www.detroitnews.com/story/business/autos/general-motors/2017/04/18/jd-power-consumer-trust-self-driving-tech-drops/100603780>

¹⁵ For more discussion of innovation in insurance see *sigma* 4/2011, Product innovation in non-life insurance: where little 'l' meets big 'I', Swiss Re.

Themes in InsurTech

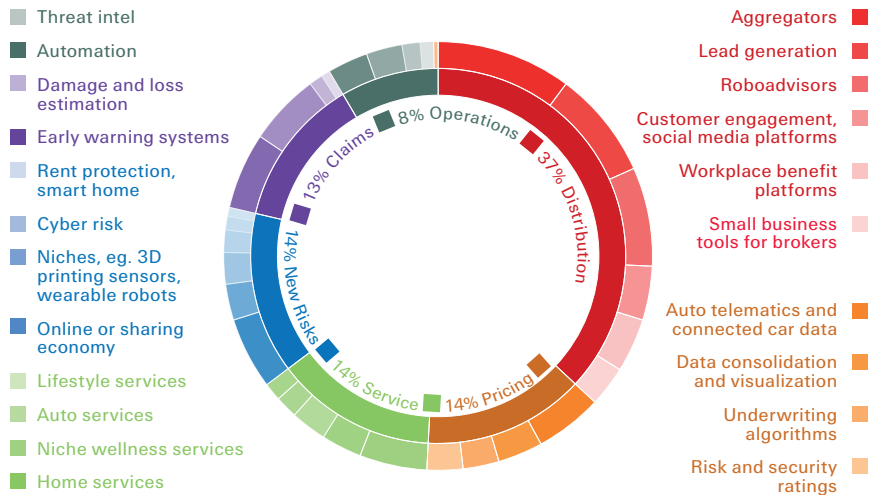
A third of InsurTech start-up investments have been in the distribution field.

Distribution is a main focus for InsurTech

To date, a main focus of InsurTech start-up activity has been the upgrading of distribution processes to improve policyholder engagement and satisfaction. Between 2014 and 2016, close to a third of all investments in InsurTech start-up projects were in the field of distribution (see Figure 4). This supports findings of a recent survey by Willis Towers Watson in which 94% of senior insurance executives said they expect distribution to be the area where digitalisation will have the greatest impact over the next five years.¹⁶

Figure 4

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



Note: Data relate to a sample of 300 of the best-known and well-funded InsurTech start-ups. Source: Swiss Re Institute, based on information from company websites and media reports.

A digital buying experience in personal lines influences what small business owners expect from their insurers.

InsurTech is also impacting how small and medium sized enterprises (SMEs) research and buy insurance. Owners of SMEs who buy their personal lines insurance on the web are likely to look online for their commercial coverage needs as well.¹⁷ Catering to this market, some InsurTech start-ups offer consumer-friendly digital broker platforms for SMEs with price comparison and other service options (see Types of digital distributors of small business insurance). Others see empowering traditional brokers through digital connection as a more effective way to modernise insurance distribution.¹⁸ For example, start-up Indio provides brokers access to a commercial market platform with centralised quoting functionality and digital tools to interact directly with clients.¹⁹

¹⁶ *Insurers under pressure to go digital*, Willis Towers Watson, 16 February 2017, <https://www.willistowerswatson.com/en/press/2017/02/insurers-under-pressure-to-go-digital>

¹⁷ Morgan Stanley and BCG estimate that by 2020, Millennials and Gen-Xers will own more than 60% of US small businesses, up from around 38% today, and that digitally underwritten insurance could grow from USD 4 billion, out of USD 100 billion in 2015, to USD 33 billion by 2020. See "Millennials drive shift in small business insurance", *Morgan Stanley*, 8 July 2016, <https://www.morganstanley.com/ideas/millennials-insurtech-disruption-in-insurance>

¹⁸ Deloitte found that 83% of American SME owners report satisfaction with their current agent. See *Small Business Insurance in Transition*, Deloitte, November 2015.

¹⁹ Indio provides a management platform for commercial insurance brokers. See "Hiscox Helps Back Indio, a Commercial Insurance Broker Platform, in \$2M Round", *Carriermanagement.com*, 2 November 2016, <http://www.carriermanagement.com/news/2016/11/02/160677.htm>

Lead generators and online search engines offer price comparison, but depend on insurers for fulfilment.

Types of digital distributors of small business insurance

There are at least three levels of sophistication among InsurTechs focused on the distribution of insurance to small businesses (see Figure 5). The first is basic, where lead generation aggregators collect information about prospective customers online or by phone and pass these on to an insurer’s direct sales channel, agent or broker. This is now being surpassed by a second level of sophistication offered by online search engines that capture more detailed information, allow customers to see indicative quotes from multiple carriers, and redirect customers to insurer websites for policy fulfilment. A limitation of online search engines is that the prices ultimately offered by insurers after data verification may be higher than the indicative quotes initially retrieved by the search engine. This can happen when customers enter incomplete or incorrect information, which subsequently needs correcting.

Figure 5
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 or directly to carriers. Customers get a follow up phone call, email, etc.	Allow customers to see rates, and policy is fulfilled on the insurer’s website. Rates are not bindable; they may change.	More sophisticated: use third-party sources to verify data and provide bindable rates.
Availability	Yes	Yes	Yes
Real-time rates	No	Yes	Yes
Direct fulfillment	No	No	Yes

Source: Swiss Re Institute, based on information from company websites and media reports.

More sophisticated digital brokers offer bindable quotes, and rich online functionality.

At the most sophisticated level online brokers (eg, Embroker, CoverHound) use data verification technology to obtain immediately bindable quotes, allowing customers to complete the process almost seamlessly online.²⁰ These platforms offer additional services (eg, help SMEs upload and compare policies, generate vendor certificates, and asset tracking), which can generate customer loyalty. At the same time, for digital brokers to gain market traction they may have to offer significant discounts to online purchasers. One survey showed that more than one third of SME customers expected cost savings of up to 20% before they would be willing to bypass their existing agents, while 15% expect savings of more than 20%.²¹ In addition, digital acquisition relies heavily on paid search marketing, which also eats into brokers’ margins.

²⁰ For more features of new models see comments by CoverHound’s CEO Keith Moore, see “Practical Tips for Disrupting Insurance Distribution”, *Carriermanagement.com*, 19 May 2016, <http://www.carriermanagement.com/features/2016/05/19/154553.htm>

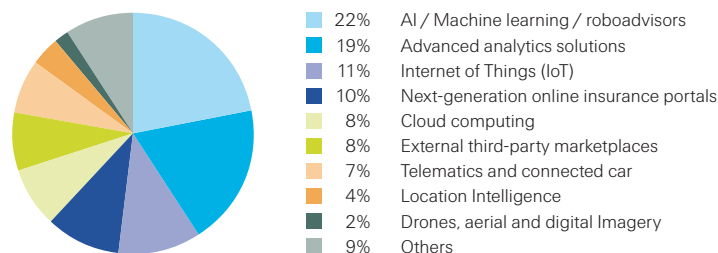
²¹ *Small Business Insurance in Transition*, Deloitte, op.cit.

Start-ups focus heavily on artificial intelligence, and advanced analytics.

Figure 6
Technology areas that InsurTech start-ups are focusing on (% share by number of start-up investments), 2014–2016

Artificial intelligence (AI) and advanced analytics: key applications

Another main theme of InsurTech start-up activity is the use of AI, sophisticated algorithms and quantitative methods to yield insights that traditional actuarial approaches are unlikely to uncover. The technologies also offer a way to accelerate adoption of new methods of analysis (eg, by using new tools developed on open-source platforms such as H2O.ai), and are becoming commoditised. Over time users may not need to have advanced data scientist skills, and will instead be able to use algorithms from existing toolkits and libraries with minimal customisation.



Note: Data relate to a sample of 300 of the best-known and well-funded InsurTech start-ups. Source: Swiss Re Institute, based on information from company websites and media reports.

AI can be an important tool in improved underwriting and distribution.

AI and smart analytics are being deployed in both customer-facing and back-office operations. So far many projects have focused on distribution. Other areas of application are the development of algorithms to process applicants’ data like personal medical history and driving records automatically. Over time this could accelerate underwriting assessment significantly, especially for more complex lines such as life insurance. The integration of cognitive computing systems with voice recognition and text reading algorithms will eventually make it possible to extract meaningful information from all sources of data, including unstructured medical reports. P&C pay-as-you-go insurance start-ups already offer products that leverage this technology.

AI start-ups look to simplify claims management, improve risk prevention and reduce fraud.

In claims management, start-ups are using advanced analytics and machine learning to create early warning systems and gather practical insights that prevent accidents, and also simplify and speed-up claims processing. Examples include using AI to detect and verify accident hot spots, estimate repair costs, and identify potential fraud.

Many start-ups have developed IoT solutions, although this results in a complicated and fragmented landscape.

Another key technology attracting start-ups is the IoT. Several firms have developed IoT-enabled devices to display and communicate information. Examples include smart home solutions, telematics devices, drones to enhance insurance assessments, and medical devices for consumer and home use. The IoT landscape is fragmented, with hundreds of start-ups. As a result, start-ups are building platforms to integrate devices connected to the IoT (eg, Human API, Neura) to make their use more convenient and secure.

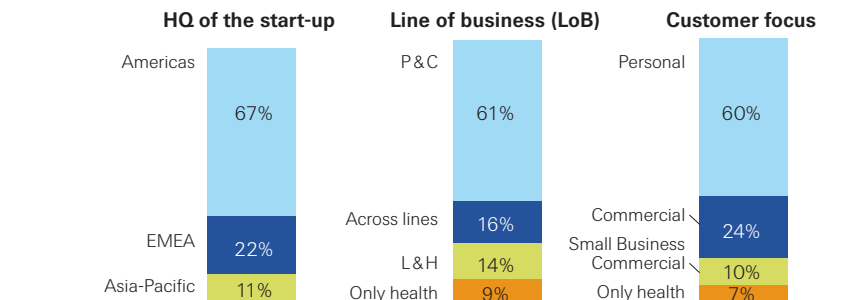
Themes in InsurTech

North America has seen most investment in Insurtech start-ups.

Figure 7

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

US-based non-life start-ups dominate
Geographically, over 65% of InsurTech deals (investments and partnerships) were in start-ups headquartered in the Americas (predominantly the US, see Figure 7). The early stage investment landscape is more established and the opportunities typically larger in the US. Investors there may also be more comfortable with the high risk-reward venture capital model than elsewhere, although insurance investors/partners have been drawn from across the world.



Note: Data relate to a sample of 300 of the best-known and well-funded InsurTech start-ups. Source: Swiss Re Institute, based on information from company websites and media reports.

Non-life insurance accounts for the lion's share of deals.

In terms of cover offered, start-ups have targeted individuals' and small businesses' non-life insurance requirements, especially motor, home and health. In some cases regulation can be a driver of InsurTech activity. For example, the US Affordable Care Act prompted an increase in the number of digital health start-ups.²² The life insurance market has proved harder to penetrate, which could be explained by the relatively high capital requirements and heavy regulation, difficulty in accessing crucial customer health data, and the cost of building a brand.

Tech-led innovation is emerging for various commercial lines of business.

Tech-led start-up activity in commercial insurance

There has been less InsurTech activity in commercial lines than in personal insurance. This likely reflects the additional underwriting complexities and more heterogeneous customer base of the commercial insurance sector. Traditional brokers continue to dominate distribution in commercial insurance, but InsurTech firms are developing a range of other applications primarily in early warning systems, loss prevention and risk assessment. Innovative tech-led solutions are being deployed in various commercial insurance lines such as workers compensation and industrial property cover (see Table 1).

²² With some consumers purchasing health insurance for the first time, technology platforms now compare plans. See "Obamacare launched a new wave of startups. Now they're bracing for what's next", *Chicagotribune.com*, 20 February 2017, <http://www.chicagotribune.com/bluesky/technology/ct-obamacare-new-start-ups-wp-bsi-20170221-story.html>

Table 1
InsurTech in commercial lines

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

Source: Swiss Re Institute, based on information from company websites and media reports.

Incumbent insurers respond

Insurers have typically *not* been at the forefront of digital technology adoption.

But things are changing with some insurers setting up in-house innovation labs, partnering with large tech companies ...

Repositioning for technological change

The insurance sector has tended to lag others in embracing digital technology. According to the recent survey by WillisTowersWatson, almost three-quarters of senior insurance executives (74%) believe insurers have failed to show leadership in digital innovation. Cost is a major challenge, with respondents citing the length of time required to commercialise new technologies (32%) and the size of investment required to transform the technology into workable business applications (24%) as hurdles.²³

However, there are signs that the industry is repositioning for technological change (see Figure 8), and incumbent insurers are spending more on new technologies. Gartner expects annual global insurer IT spending to rise by 2.9% in 2017, and to continue to grow at the same annual rate through 2020.²⁴ Several insurers have established in-house innovation labs, incubators and accelerator units to nurture technology and business ideas. Some are also partnering with BigTech companies to co-innovate and develop value-added products and services. For example, China Pacific Property Insurance, in a partnership with Baidu, has committed to provide its actuarial pricing capability and offline service network resources to a new digital auto insurance business.²⁵

Figure 8
Insurers' technology strategies



Source: Swiss Re Institute.

... and forming consortia to explore IT business opportunities.

Insurers are also collaborating among themselves to test new technology. In 2016, a group of 15 large re/insurers came together in the Blockchain Insurance Industry Initiative (B3i) to evaluate whether the technology can be deployed to make the industry operationally more efficient. This is one of 13 reported consortia of financial services firms established in 2016 to investigate Blockchain applications.²⁶ The technology is still nascent and some consortia have struggled to make progress, but such co-operation will help develop knowledge and common standards.²⁷

²³ Willis Towers Watson, op. cit.

²⁴ *Forecast: Enterprise IT Spending for Insurance Market, Worldwide, 2014-2020, 4Q16 Update*, Gartner, 30 January 2017. <https://www.gartner.com/doc/3588817/forecast-enterprise-it-spending-insurance>.

²⁵ "Chinese search giant Baidu forms new online car insurance business", *South China Morning Post*, 8 June 2016. <http://www.scmp.com/tech/china-tech/article/1968770/chinese-search-giant-baidu-forms-new-online-car-insurance-business>

²⁶ See W. Mougayar, "The State of Global Blockchain Consortia", *Coindesk.com*, 11 December 2016. <http://www.coindesk.com/state-global-blockchain-consortia/>

²⁷ C. De Meijer, "Towards smaller and more focused blockchain consortia", *Finextra.com*, 27 February 2017. <https://www.finextra.com/blogposting/13760/towards-smaller-and-more-focused-blockchain-consortia>

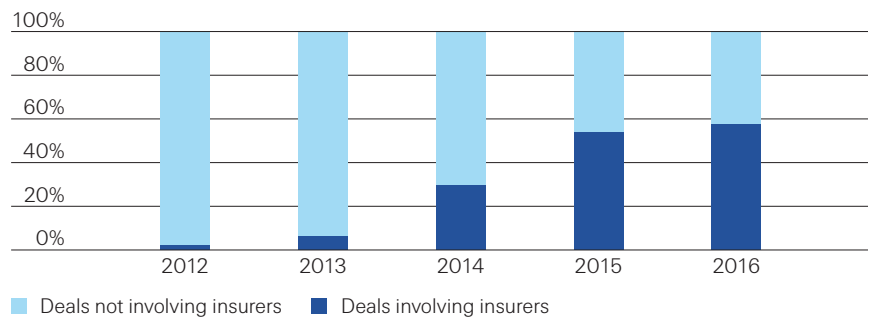
Insurers are also looking to start-ups for technologies that provide value to, and fit within, their overall innovation strategies.

Working with InsurTechs

Another strategy gaining traction is for insurers to invest in or partner with InsurTech start-up firms. The underlying aim is to gain early appreciation of the opportunities offered by new technologies, understand emerging trends and access new talent pools. In 2016, re/insurers were involved in 100 of 174 InsurTech start-ups, significantly higher than the proportion in earlier years (see Figure 9).²⁸

Figure 9

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



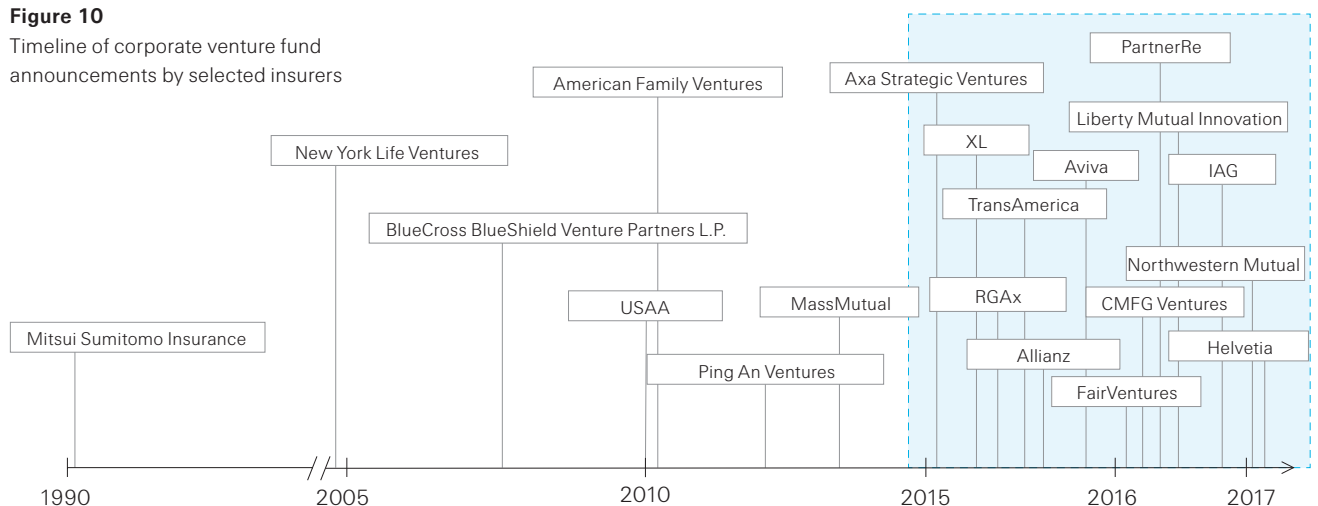
Note: This is based a wider sample of approximately 500 InsurTech deals compiled by CB Insights.
Source: CB Insights data.

Many insurers have recently set up stand-alone InsurTech venture funds.

A number of large re/insurers have set up InsurTech venture funds to take equity but non-controlling investments. For instance Axa, American Family, TransAmerica and PingAn have all dedicated funds for InsurTech or related investments. Many investment vehicles were launched over the past 12 months (see Figure 10). Research by Gartner reveals that 64% of the world's 25 largest insurers have already invested directly or indirectly via their venture capital arms in InsurTech start-ups.²⁹ Insurers typically do not go it alone and often make joint investments with companies in the telecoms, auto and technology sectors (eg, Qualcomm Ventures, Google Ventures, Intel Ventures).

Figure 10

Timeline of corporate venture fund announcements by selected insurers



Source: Insurer websites, press releases, Swiss Re Institute

²⁸ "Where Insurers and Reinsurers Invested in Tech Startups in 2016", *cbinsights.com*, 18 January 2017, <https://www.cbinsights.com/blog/2016-insurance-cvc-total/>

²⁹ Gartner predicts that 80% of life and P&C insurers worldwide will partner with or acquire InsurTechs to secure their competitive positions by the end of 2018. See J. Weiss, "Gartner Says Insurance Firms Should Investigate 'Insurtechs' to Complement Their Own Digital Strategies", *Gartner.com*, 24 October 2016, <http://www.gartner.com/newsroom/id/3487817>

Incumbent insurers respond

Insurers are also partnering with start-ups in a number of areas.

In addition to (or sometimes instead of) taking equity stakes, some re/insurers have partnered with start-ups, providing risk-absorbing capacity and operational expertise in product, pricing and underwriting (see Table 2). This can be advantageous when insurers want to attract a new set of customers that the start-up is targeting, but do not want to be permanently locked into a new technology platform. It is also easier to discontinue a relationship with a start-up if the partnership does not go as planned, or if regulations change, than it is to disband an entire in-house department dedicated to developing new business opportunities.

Table 2

Examples of insurer/start-up partnerships

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

Source: Insurer websites, press releases, Swiss Re Institute.

Start-ups can help bridge gaps in lead generation technology, provision of financial advice, and engagement via social media platforms.

Insurers have shown particular interest in distribution-related start-ups that employ technologies to help generate digital leads or produce robo-advice and price comparisons.³⁰ Examples include PolicyGenius backed by AXA and Aegon (TransAmerica), and CoverHound backed by Chubb (formerly ACE) and American Family Ventures (American Family Insurance's VC fund). Allianz invested in MoneyFarm to accelerate MoneyFarm's advisory offering in the UK and across Europe. These start-ups identify prospects through automated learning bots, provide digital finance advice, and act as policy libraries and digital concierges.

Tech start-ups provide insights on how to improve customer conversion rates and lower acquisition costs.

Part of the rationale for such investments is to understand how to unearth and design products to meet untapped demand, and/or for insurers to leverage insights to improve the effectiveness of their own sales force and lower customer acquisition costs. Ultimately, the longer-term plan may be to acquire the intermediaries outright. For example in the UK, two of the top three price comparison websites (PCWs) were eventually bought by UK carriers. But insurers need to be alert to challenges the new intermediaries face. Most obviously, attracting customers in sufficient scale to their digital services given intense competition and regulatory scrutiny over their business models.

³⁰ For a discussion of how technology is fundamentally affecting customer buying behaviour See *Digital distribution in insurance: a quiet revolution*, Swiss Re, sigma No 2 /2014, http://media.swissre.com/documents/sigma2_2014_en.pdf

Use of wearables by insurers is widespread, but customer engagement is the main driver.

Increasingly, wearables are yielding business value in the context of specialised health insurance situations.

Digital technology is also allowing insurers increased contact with customers, through the offering of additional value-added services.

These services cover a wide variety of applications for home, auto and lifestyle.

Insurers are also eyeing start-ups that make it easier to use wearables to communicate with customers about healthy living. However, the high dropout rate from device usage, coupled with data privacy and ownership issues could, in the short-term at least, limit the extent to which insurers can leverage insights from wearables for their value proposition.³¹ In addition, the benefits to health may be overstated: recent studies show that regular use of wearable trackers, that tell people how active they are, may not raise exercise levels enough to improve health.³²

The use of wearables by insurers is therefore increasingly moving beyond personal fitness to specialised cases, such as protecting workers from harm, and remotely monitoring the health of 'at-risk' policyholders (eg, patients recently discharged from hospital, or those with chronic diseases).³³ Insurers can also service policyholders with special needs, for instance by leveraging start-ups that provide pensioners and individuals living with disabilities with a platform that integrates disparate life-enhancing smart devices tailored for such groups into a single system.³⁴ Finally, some insurer-backed start-ups have developed novel applications in real-time health indicators, like an app to indicate to drivers the time needed for high blood alcohol concentration levels to fall back below the legal limit.³⁵

Experimenting with digitally-enabled value added services

Insurers have also invested in start-ups that offer a portfolio of services to existing and prospective policyholders, allowing them more frequent interaction with customers. For example, insurers have invested in market-places for auto maintenance and breakdown (eg, YourMechanic, Urgent.ly), parking platforms for drivers (eg, AppyParking, Tingchebao), and home finding, monitoring and automation solutions (eg, Ring, Vast, Opun).

In addition to deepening client relationships, these value-added services facilitate collection of data that can be used to improve underwriting and pricing decisions. Over time this should allow insurers to offer more customised products. For example, Zendrive is integrating its smartphone sensor-based automated collision detection into a family safety mobile app called Life360, which immediately alerts family members about driving accidents. American Family has an equity stake in Life360.

³¹ The abandonment rate of smartwatches is 29%, and 30% for fitness trackers, because people do not find them useful, get bored of them or they break. See "Gartner Survey Shows Wearable Devices Need to Be More Useful", *Gartner.com*, 7 December 2016, <http://www.gartner.com/newsroom/id/3537117>

³² Based on a year-long trial involving 800 workers conducted by Duke-NUS Medical School in Singapore, published in *The Lancet Diabetes & Endocrinology*. See C. Paddock, "Wearable trackers 'may not increase activity enough to benefit health'", *Medicalnewstoday.com*, 5 October 2016, <http://www.medicalnewstoday.com/articles/313292.php>, and "Use of wearable device does not improve weight loss", *Medicalnewstoday.com*, 21 September 2016, <http://www.medicalnewstoday.com/releases/313012.php>

³³ Tech start-up Wellth focuses on costly chronic diseases like asthma, and type 2 diabetes, and pays users who do things like daily medications. See "Axa invest in Wellth", AXA, <http://www.axastrategicventures.com/en/news-and-events/company/wellth>

³⁴ RGA has invested in K4 Connect, a firm that offers solutions to empower older adults and individuals living with disabilities, by integrating smart technologies into a single system. See "K4Connect Secures \$8 Million in Series A Funding Led by Intel Capital", *k4connect.com*, 24 October 2016, <https://www.k4connect.com/k4connect-secures-8-million-series-funding-led-intel-capital/>

³⁵ FLOOME, another tech start-up, monitors blood alcohol concentration and gives the necessary time to recover if above the legal limit. See "AXA Strategic Ventures invests in Floome", *AXA Strategic Ventures*, 18 January 2017, http://www.axastrategicventures.com/assets/back/uploads/companies/Floome_AXASV_VA_Final%20%3A%20PR.pdf

Incumbent insurers respond

Re/insurers are partnering with telematics providers.

With richer data on customer driving behaviour, insurers can create personalised usage-based insurance offerings. For example, in early 2017, Swiss Re, UK insurer Collingwood and pay-as-you-go car insurance start-up Cuvva teamed up to offer a new type of insurance policy for car owners in the UK.³⁶ Users pay a flat monthly fee to cover the basic protection and top up their cover by the hour when they drive. All of this is managed through the Cuvva mobile app which tracks driving behaviour. The cover enables low-mileage drivers (eg, commuters who travel to work by public transport and only use their car on evenings and weekends) to save on premiums as compared to a traditional insurance policy.³⁷

Ever more granular data are opening up new risk pools, making it possible for insurers to underwrite specialised niches.

Developing new insurance models and products

New sources of data are also opening up new risk pools, making it possible for re/insurers to underwrite specialised or under-served niches. Traditional auto and home insurance policies typically do not cover new risks like ride-sharing and home-sharing. Many insurers are responding by adding riders to existing policies to cover these risks. Some go a step further and design products to specifically address the short-term nature of the risks (eg, pay-per-use policies) by leveraging access to granular data about customers. This includes innovative usage-based, pay-as-you go insurance solutions for previously underinsured risks (see for example *Flight delay insurance solutions*).

A number of tech start-ups and insurers are developing usage-based flight delay insurance.

Flight delay insurance solutions

Flight delays can mean costs for passengers. Traditional travel insurance products covering delays are available but they typically bundle various risks together, they can be expensive and they employ delay triggers that are usually high (6+ hours). Further, making a claim can be arduous. A number of start-ups and insurers are developing much more consumer-friendly flight insurance solutions to improve the product offering.

One such product strives to automate policy purchase and claims payment.

Swiss Re has developed a flight delay insurance product that offers an easy to buy and – importantly – a fully automated purchase and (close to) real-time compensation process. Claims are automatically processed and paid when delays are confirmed by the flight data provider FlightStats. Flight delay insurance can be sold to individuals, for instance as part of the process of buying a flight ticket. It can also be sold as a bulk product whereby a corporation buys flight delay insurance on behalf of their clients and employees.

Insurers are using technology to design new insurance solutions.

Despite a reputation as innovation laggards, re/insurers' have also sought to design new technology-led products and introduce process improvements in-house. In the last five years, insurers have filed hundreds of patent applications on diverse areas related to predictive modelling, development of telematics and sensor-based pricing, car-sharing peril analysis, property value estimators, drone-based damage inspection, autonomous vehicles etc (see Table 3).

³⁶ *Swiss Re partners with Cuvva on new pay-as-you-drive insurance for car owners*, Swiss Re, 2016, http://www.swissre.com/reinsurance/insurers/casualty/swiss_re_partners_with_cuvva_on_new_pay_as_you_drive_insurance_for_car_owners.html

³⁷ Meanwhile in Asia, Swiss Re signed a strategic cooperation framework agreement with Huahai Property Insurance in December 2016. By analysing drivers' behavioural traits when behind the wheel, the telematics-based solution will score the driver and provide recommendations to improve driving performance. See V. Kuk, B. Gao, "Asia's ever-changing motor market trends", *Asia Insurance Review*, 18 March 2017, <http://www3.asiainsurancereview.com/Magazine/ReadMagazineArticle?aid=39037>

Table 3

Examples of keywords in patents filed by selected insurers

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, geo-coded 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 and 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 and 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 and system for analysing damage of products

Source: Google patent search, Swiss Re Institute.

InsurTechs, with re/insurer support, may be better placed to meet new customer preferences and emerging risks.

Insurers are also seeking partners for new risk protection products like cyber or product liability cover for robotics, where limited historical claims data means underwriters are looking to predictive analytics to augment their judgment.³⁸ Additionally, re/insurers are collaborating with start-ups that have designed digital insurance models that leverage mobile technology to provide affordable insurance for sections of communities that have been hitherto under-served. For example, with reinsurance support, a South Africa-based start-up (Zing) combines mobile technology to provide micro-insurance solutions in Sub-Saharan Africa.³⁹ And in markets where new sharing models are becoming popular, motor insurers have partnered with car-pooling programmes to offer usage-based commercial auto insurance for private-hire car drivers.⁴⁰ Insurers typically provide the risk-absorbing capacity for this new business, while the car pool handles operational and administrative functions. Table 4 provides some further examples.

Table 4

Examples of emerging risks start-ups are addressing with re/insurer backing

Type of insurance	Examples of start-ups	Description of the risk being covered
Liability for sharing economy contractors	Recomn, Bunker, Next Insurance	Insurance for small business (eg, pop-up stores, contractors like personal trainers, photographers) which covers exceptions or limitations
Coverage for home sharing economy	ShareCover, Slice, SafeShare	Insurance cover for sharing houses for short stays; Blockchain-based property insurance for the sharing economy
Coverage for car sharing economy	Drivy, Carma	Insurance coverage for carpooling and car-sharing programs
Cybersecurity bundled with insurance	My Digital Shield, Argus	Support for software's data breach guarantee; identity theft detection; protection and fraud resolution combined with insurance
On demand insurance for short-term use	Verifly, Dozr	On-demand drone insurance for recreational and commercial flights; insurance for short-term rental for heavy equipment market
Property lease guarantor services	LeaseLock, TheGuarantors	Property lease guarantor services that helps individuals secure acceptance to lease an apartment or house
Liability for new technology	New Energy Risk, Relayr, BitFlyer	Customized insurance for new technology (eg, IoT infrastructure guarantees, Clean Tech performance warranty, Liability for wearable robots, 3D printing liability, cryptocurrency exchanges).

Source: Swiss Re Institute, based on information from company websites and media reports.

³⁸ For example, specialist cyber risk assessment companies typically use sophisticated intelligence to capture and analyse real-time information present in the public and non-public domains of the internet.

³⁹ Read about the activities of Zing's different subsidiaries at <https://www.zing.world/the-zing-group>

⁴⁰ *Grab and AXA Launch First Usage-Based Insurance for Private-Hire Car Drivers*, AXA, 11 May 2016, <https://www.axa.com.sg/latest-news/2016/grab-and-axa-launch-first-usage-based-insurance>

Insurance disrupted?

Tech-led disruption is often seen as an existential threat to incumbent insurers, but the outlook need not be so bleak.

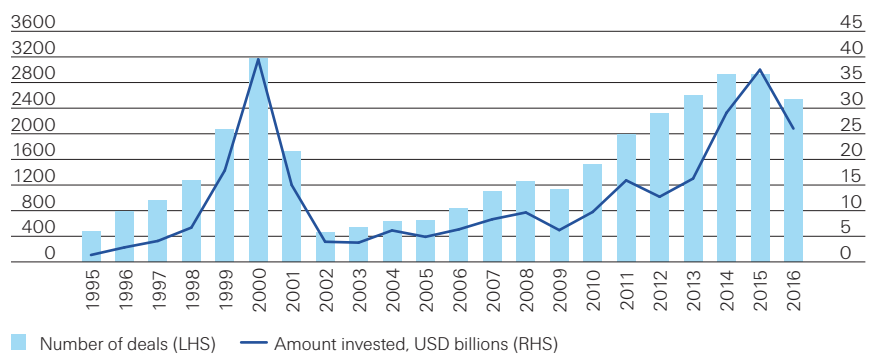
Growth in venture funding to technology companies has some of the hallmarks of the 1990s dot-com bubble.

Figure 11
Venture capital investments in the US internet and software sector, 1995–2016

Some market commentators have argued that the insurance industry is vulnerable to large-scale disruption caused by technology trends.⁴¹ Companies like Kodak, Blockbuster and Research In Motion (RIM), which saw their market share and profits decline rapidly, are often used as examples of the fate that can befall incumbents which fail to recognise the transformative nature of new technology. This chapter probes the arguments to examine how transformational and disruptive the tech-led innovation will be for insurance. It concludes that recent changes in technology are likely to prove persistent, but that they can be an enabler rather than a major competitive threat to traditional insurance companies, at least in the near-term.

Is InsurTech a replay of the dot-com bubble experience?

The pace of expansion in technology-led investments over recent years has echoes of the 1990s dot-com bubble. Then, the volume and value of investments in the US internet and software sector ramped up sharply in the late 1990s, only to unwind abruptly as the bubble burst and many tech companies folded (see Figure 11). The characteristics of the InsurTech investment cycle are different, but some analysts fear the rapid rise in investment is bidding up valuations in private placements, and that investors may be glossing over ambitious revenue targets, and mediocre or non-existent earnings growth.⁴²



Source: PricewaterhouseCoopers and CB Insights MoneyTree Explorer.

The nature of innovation means that many InsurTech start-ups will fail.

Inevitably, some of the current technology-led innovation in the insurance sector is being fuelled more by hype than performance. Much of InsurTech is at a stage where early proof-of-concept stories have triggered significant publicity, but for some projects commercial viability is still unproven.⁴³ Some new initiatives may under-appreciate the complexity of insurance. For example, start-ups seeking to engage customers more with insurance may fail to realise that many consumers want low-touch not high-touch interaction with their insurer. Many start-ups will likely fail. In the 1990s, failure rates were especially high among start-ups with less than 20

⁴¹ Commentators have said that if established insurers don't step up to capture the value themselves, venture-backed start-ups will jump in to serve customers with innovative technologies and models much like they have done in other industries — including transportation, health care, hotels and fintech. See "How Insurers Can Protect Against Digital Disruption", *Knowledge@Wharton*, 3 March 2017, <http://knowledge.wharton.upenn.edu/article/insurers-can-protect-digital-disruption-2/>

⁴² For concerns raised by venture capital firms, see D. Weil, "Amid falling valuations, VC industry is bruised but not broken", *InstitutionalInvestor.com*, 28 March 2016, <http://www.institutionalinvestor.com/article/3540905/asset-management-hedge-funds-and-alternatives/amid-falling-valuations-vc-industry-is-bruised-but-not-broken.html#.WMoWFv6a1dg>

⁴³ Two out of every three InsurTech deals in 2016 took place at the early-stage (Seed/Series A). See *Trends in Insurance Tech*, CB Insights, 11 April 2017. Seed funding supports the initial market research and development work while Series A funding provides additional funds to optimise product and user base. Beyond the development stage, additional financing is often raised to establish the business. For further explanations see: "Series A, B, C Funding: What It All Means and How It Works" *Investopedia*, 20 October 2015, <http://www.investopedia.com/articles/personal-finance/102015/series-b-c-funding-what-it-all-means-and-how-it-works.asp#ixzz4g78b1uHx>

employees, and insurers are currently mainly investing in similarly small ventures.⁴⁴ Some commentators also highlight that many InsurTechs may be concentrating on areas where the market potential is modest.⁴⁵

Network effects nonetheless mean that the chances of success of tech start-ups are higher now than previously.

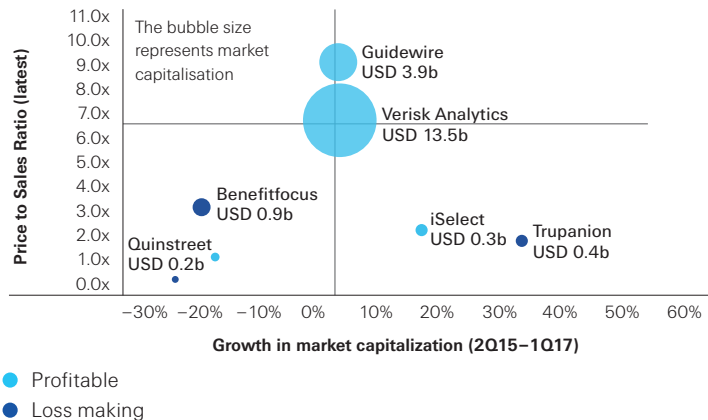
However, the network effects associated with new technology have grown significantly over recent years, and that may increase the survival chances of high-tech start-ups.⁴⁶ The internet user base has expanded tenfold since the dot-com era, driven by better delivery infrastructure and more advanced technology (smartphones, sensors etc). This has led to the growth of platforms for which an additional user increases the value to all users (eg, connected sharing economy platforms, connected cars). Such positive feedback effects often take time to build which may partly explain why previous technology-led innovations have been slow to take off, and why things may be different this time round. For example, telematics has a long history in auto insurance, but has only recently started gaining traction, perhaps because of the expansion of connected car production.⁴⁷

Further, the small number of InsurTech IPOs suggests start-ups are keen to build long-lasting, successful relationships with their investing insurers.

Moreover, at the height of the dot-com era, start-ups were often focused on progressing speedily to an IPO. This time round, there have been very few IPOs or buyouts by established firms, suggesting that start-ups are keen to build long-lasting relationships with their investing insurers, conscious of the sector expertise the latter bring.⁴⁸ And, for those InsurTech firms that have publicly listed, equity markets are demanding proof of a clear path to profitability, which should help guard against pure speculative investing. An analysis of InsurTech start-ups that have listed in recent years shows that some are already profitable on a net income basis and command high valuations (eg, Guidewire, Verisk), while analysts expect others to turn profitable in the coming year (eg, Benefitfocus, Trupanion) on the back of strong revenue growth (see Figure 12).

Figure 12

Analysis of Post-IPO performance of InsurTech companies



Notes: Growth in market capitalization for iSelect is from 4Q15; the solid lines represent value weighted averages of the relevant indicator.

Source: Thomson Reuters, CB Insights, Swiss Re Institute.

⁴⁴ Between 30% to 50% of high-tech establishments failed during the 11-year period (1990-2000). Establishments with fewer than 20 people had a higher chance of failing. For more on rates of start-up mortality, see J. Zhang, *High-Tech Start-Ups and Industry Dynamics in Silicon Valley*, Public Policy Institute Of California, 2003.

⁴⁵ See *Insurtech caught on the radar: hype or the next frontier?*, Oliver Wyman/policendirekt, 2017.

⁴⁶ A network effect arises when the use of a product or service results in an increase in its value for other network participants.

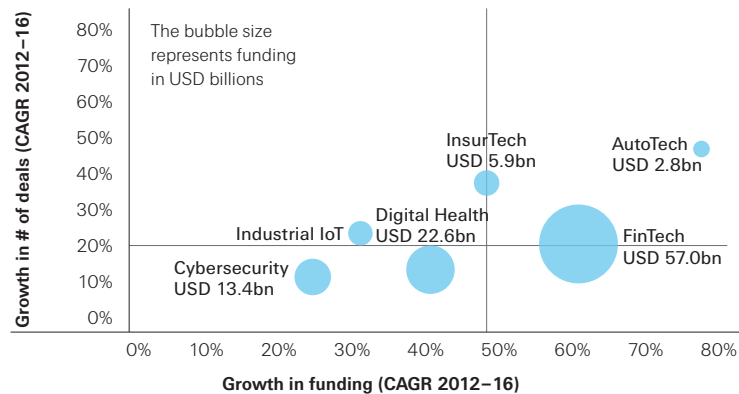
⁴⁷ Gartner expects production of new cars with data connectivity, either through built-in communications or by tether to a mobile device, to grow from 12.4 million in 2016 and to 61 million in 2020. See *Gartner Says Connected Car Production to Grow Rapidly Over Next Five Years*, Gartner, 29 September 2016, <http://www.gartner.com/newsroom/id/3460018>

⁴⁸ See "The Largest Venture Capital-Backed Insurance Tech Exits", *cbinsights.com*, 30 November 2016, <https://www.cbinsights.com/blog/insurance-tech-vc-exits/>.

Insurance disrupted?

InsurTech funding is small relative to the insurance industry, suggesting that insurers can cope with failure due to their limited exposure.

Figure 13
Global VC-backed tech start-up financing trends, 2012–2016



Note: The solid lines represent value weighted averages of the relevant indicator.
Source: CB Insights 2016 Tech Review, Swiss Re Institute.

InsurTech is an enabler: the technical knowledge gained can help insurers steer their businesses.

Ultimately there are reasons to be hopeful that InsurTech will prove a positive development for the insurance sector. Insurers' investments in InsurTech can help to stimulate innovation, identify priorities and complement existing digital insurance strategies.⁴⁹ Bringing in ideas from outside can also be a valuable tool to aid the cultural transformation of both employees and existing partners such as agents/brokers. More generally, the technologies that start-ups employ offer traditional insurers an opportunity to revamp their products, services and distribution, and to reduce costs. In this way, InsurTech start-ups can help traditional insurers improve their relevancy to customers and build trust among consumers, a feature that surveys routinely indicate is often lacking.⁵¹

Insurers have the option to delay adopting new technology and wait to see which new applications are successful.

There are natural barriers to entry in insurance, most notably regulation and the size of incumbents' in-force books. To a certain extent, these shield existing firms from external competition and afford them time to adjust to changing industry dynamics. Large incumbents can therefore choose to be selective in their investments and wait until the technology is proven, and only then acquire or use the services of InsurTech companies. The value of the wait-and-see option, though reduced by the threat of competition from new entrants, can dampen the animal spirits that can lead to excessive overvaluations.

⁴⁹ Forecast: Enterprise IT Spending for Insurance Market, Worldwide, 2014-2020, 4Q16 Update, Gartner, op. cit.

⁵⁰ See *The InsurTech Landscape 2017: Business Models and Disruptive Potential* as study by Swiss Re and St Gallen on the current InsurTech landscape. April 2017.

⁵¹ For example, research by PricewaterhouseCoopers suggests just 27% of consumers trust their insurance providers whilst less than half would turn to them for advice. See, *InsurTech: A Force For Good*, PwC, July 2016, <http://finno.nl/wp-content/uploads/sbc-pwc-insurtech-trends-report-july-2016.pdf>

This can help in assessing the full cost of InsurTech investments and avoid overpaying for stakes in start-ups.

Insurers should nevertheless be mindful about what kind of new business they write on the back of their InsurTech investments and how the regulatory architecture evolves in response to technological innovation (See *Regulation and InsurTech*). New consumers' loss experiences may be very different from more traditional policyholders. Furthermore, while InsurTech offers potential to gain customer insights, reduce costs and possibly boost loyalty, insurers' legacy systems and technical skills gaps can often present significant challenges to innovation.⁵² Even among insurers that see themselves as having a competitive advantage over their peers, 61% view legacy systems and processes as a barrier.⁵³ The cost of integrating start-up innovation and exploiting it at scale can be significant, which reinforces the point that insurers must be careful not only to avoid overpaying for stakes in InsurTech, but also recognise the potential hidden costs associated with such investments.⁵⁴

Regulators have raised a number of concerns about digitally delivered advice and insurance products.

Regulation and InsurTech

The regulatory architecture will play an important role in shaping the adoption of new technology and integration of InsurTech into the insurance landscape. In monetising the potential of technology, insurers could face regulatory challenges on data protection and privacy, providing incorrect advice, and records retention.⁵⁵ In the Euro area, for example, citizens have the right to be forgotten, a new concept for US and Asian insurers. Errors or bias in robo-advice algorithms that might contribute to systemic risk or prompt inappropriate insurance decisions that leave consumers out of pocket, is also an area of regulatory scrutiny. Likewise, it might be difficult for regulators to understand why a complex and proprietary algorithm decided to deny coverage or reject a claim undermining their ability to fulfil their core supervisory and consumer protection tasks.

They are balancing the benefits of InsurTech against the costs for policyholders and societies as a whole.

More generally, the diffusion of technology will ultimately help reduce frictions in insurance. For example, it will reduce existing cost inefficiencies as well as provide insurers with better information and a more accurate picture of the risks they underwrite. At the same time, it also raises issues of fairness.⁵⁶ The increased scope for personalised, full risk-based insurance might mean that some high-risk individuals, through no fault of their own, are denied cover or face prohibitively high insurance costs. Regulators are keen to understand the full implications of technological innovation to ensure the social value of insurance is not undermined even if, from an actuarial perspective, it benefits some policyholders.

⁵² Standard & Poor's has said that insurers may be overestimating the market impact of many of the small InsurTech firms. See "Insurtech to Become Part of Traditional Insurance Landscape: S&P Report", *Insurancejournal.com*, November 29, 2016, <http://www.insurancejournal.com/news/international/2016/11/29/433233.htm>

⁵³ *Assessing digital impact across insurer and channel operations*, a study by the Genpact Research Institute and ACORD, November 2016.

⁵⁴ Gartner anticipates that for every USD 1 spent on digital innovation/ideation initiatives, enterprises will need spend on average USD 7 for deploying the solution. The full impact on existing IT and business processes is not understood until detailed roadmaps and plans to implement the changes are made. See *Top Strategic Predictions for 2017 and Beyond*, Gartner, 14 October 2016, <https://www.gartner.com/doc/3471568?ref=SiteSearch&stkw=regulation&fml=search&srcId=1-3478922254>

⁵⁵ *FinTech: the influence of technology on the future of the financial sector*, European Parliament, 27 January 2017, <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-%2F%2FEP%2F%2FNONSGML%2BCOMPARL%2BPE-597.523%2B01%2BDOC%2BPDF%2BV0%2F%2FEN>

⁵⁶ For more discussion about fairness in insurance see for example, J. O'Neill and M. O'Neill M, *Social Justice and the Future of Flood Insurance*, Joseph Rowntree Foundation (2012).

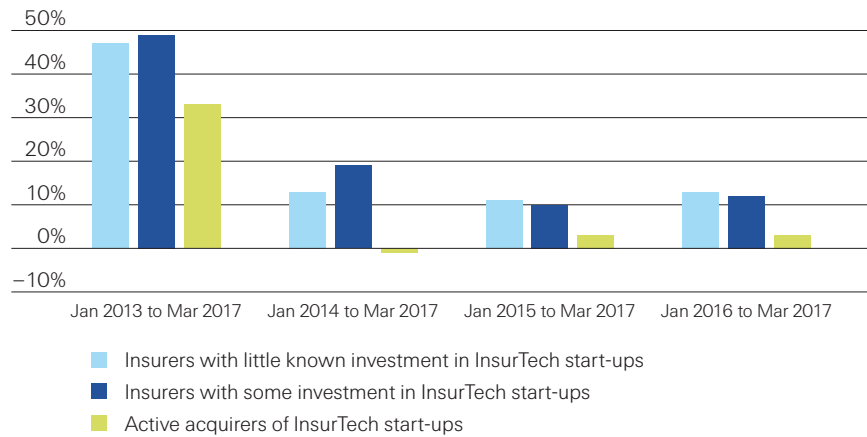
Insurance disrupted?

Muted equity market reaction to active insurers' involvement in InsurTech underscores the associated business challenges.

Figure 14

Changes in insurers' equity prices between selected dates, classified by InsurTech strategy

Simply investing in InsurTech companies is no guarantee of success. The lack of positive share price reaction for insurers that have been active acquirers of start-ups, relative to the less acquisitive insurers, implies the market remains to be convinced that insurers automatically derive significant competitive advantage by engaging with InsurTech start-ups (see Figure 14). As with any strategic investment, insurers need to work hard to ensure effective collaboration with start-ups in which culture and working practices might not always align with those of large corporate organisations.



Source: Reuters, Swiss Re Institute.

BigTech firms have so far limited their interest in insurance to niche markets.

Threat from BigTech?

In such a setting, established technology giants like Google, Facebook, Apple or Amazon with huge financial resources, deep knowledge of technology and a pedigree for driving innovation forward, could be well placed to make further inroads into the insurance market. This is especially true given that such BigTech companies already have some experience of insurance, albeit largely in niche markets (see Table 5), and do not have the same legacy system issues facing traditional insurers.

Table 5

Selected tech giants' recent forays into the insurance industry

Firms	Role in insurance industry
Google	<ul style="list-style-type: none"> Dec-16: Google Ventures participated in funding online homeowner and renters' insurance carrier Lemonade Sep-16: Launched an "Advanced Solutions Lab" for insurers to work with its machine learning experts Oct-15: Google Ventures invested in Collective Health; provider of an employer-sponsored health insurance platform Sep-15: Google's growth equity fund CapitalG invested in York-based health insurer Oscar Health Jun-15: Google's Nest partnered with insurers to help offset the costs of a Nest Protect smoke detector Mar-15: Briefly experimented with its own auto insurance comparison portal 'Google Compare' in the US Dec-14: Google's Niantic Labs partnered with AXA to integrate the brand into Google's interactive mobile game
Facebook	<ul style="list-style-type: none"> Mar-17: Chatbot platform on Messenger used as an ecosystem to distribute and service insurance offerings Nov-16: Facebook initially agreed to allow its posts to be mined to offer insurance quotes, but held back
Amazon	<ul style="list-style-type: none"> Sep-16: Promoting the possibilities of its virtual assistant (Alexa) as a business tool in insurance Apr-16: Partners with insurer on own-brand insurance, "Amazon Protect" for electronics sold via its website
Apple	<ul style="list-style-type: none"> Mar-17: Consumers combine iPhone camera, Messages and Apple Pay to buy insurance sold by start-ups Sep-14: Partnership with health insurers to offer mobile data on steps walked, calorie and heart rate data Aug-13: Relies on insurers to underwrite a warranty service for its devices (AppleCare+)
Baidu	<ul style="list-style-type: none"> Jun-16: Joint venture (JV) with China Pacific Property Insurance to design new products for auto insurance Nov-15: JV with Allianz to launch Bai'An, a new "scenario-based" insurer eg, ticketing and takeout delivery Jan-15: Teamed up with Launch Tech and Ping An to launch vehicle telematics device Golo
Tencent	<ul style="list-style-type: none"> Jan-17: JV to develop an insurance company in Hong Kong with Aviva to focus on digital insurance Nov-15: Tencent-backed online bank Webank launched its first insurance product with Guohua Life Insurance Sep-15: JV with state-run CITIC Guoan to set up an online life insurance firm Jun-15: Alibaba and Tencent-backed Zhong An raised USD 931 million to set up an online insurance firm Dec-14: Pony Ma of Tencent, Jack Ma of Alibaba, and others, invested USD 4.7 billion in Ping An Insurance Mar-14: Tencent collaborated with Taikang Life to offer WeChat users health insurance protection
Alibaba	<ul style="list-style-type: none"> Sep-15: Alibaba's Ant Financial agrees to acquire 60% of Chinese insurance firm Cathay Insurance Jul-15: eBaoTech partners with Alibaba to launch an insurance cloud infrastructure platform Jul-15: Alibaba Health partners with CPIC Allianz on health reform; to explore commercial insurance services

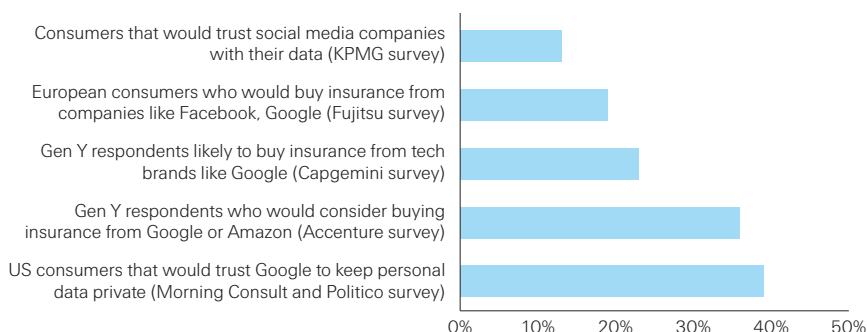
Source: Website articles, press releases, CB Insights, Swiss Re Institute.

But some fear that tech giants could use their financial clout and technology knowledge to disrupt insurance.

BigTech firms already have strong brand appeal to younger generations (see Figure 15). Hence, should they expand into insurance, BigTech players may actually represent a more credible competitive threat to incumbent insurers than InsurTech.

Figure 15

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



Source: KPMG (2016), Fujitsu (2016), Capgemini (2016), Accenture (2016), Politico (2017).

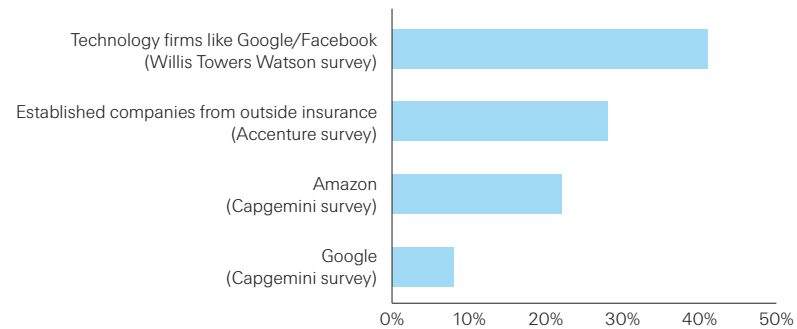
Insurance disrupted?

Especially the likes of Google, given its access to vast data on customers.

Figure 16

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

Surveys suggest that insurers are worried about BigTech. In a recent survey by Accenture, 22% of traditional insurers said they see established companies from outside insurance posing the greatest disruption risk to the industry.⁵⁷ Among the tech giants, Google and Amazon are seen as a particular threat given their access to vast amounts of data on prospective customers (see Figure 16). For instance Google, with products such as Nest, could seek to pick off more aspects of the insurance value chain precisely because of what it knows and learns about consumers.



Source: Willis Towers Watson (2016), Accenture (2016), Capgemini (2016).

But fear of displacing significant advertising revenue from insurers will likely act as a deterrent.

However, there are also reasons to think that BigTech need not be a significant near-term threat. Many tech giants survive on advertising revenues (over 90% of revenues in the case of Google and Facebook) and insurers, with their large marketing budgets, are a key customer base. For example, some estimates show that financial services firms, including insurers could account for close to 20% of Google's revenue from advertising.⁵⁸ Fear of cannibalising other parts of their business could therefore act as a deterrent for BigTech. Google briefly experimented with its own auto insurance comparison portal "Google Compare" and applied for licences to sell insurance in several US states, only to shut the operation down after a few months to focus on its core advertising platform.⁵⁹ BigTech firms also probably see insurers as ideal partners for new and emerging revenue streams. As they become more IoT and AI-focused, the BigTech firms often depend on insurers to market their devices and leverage their AI tools.^{60,61}

Worries about brand dilution by too close involvement with insurance might also be a restraining factor.

A second factor which could deter further BigTech entry into insurance markets is brand dilution. Technology platform companies might struggle to sustain their reputation for customer-centricity should they morph into full-blown insurers, where the complex and often emotionally charged nature of interactions with policyholders, especially after policy issuance, can weaken trust. For example, consider a situation where Google or Facebook cannot provide a replacement car after an auto accident, needs to dispute claims, or decides to deny them altogether. Newer entrants are already discovering that a rich user interface and speed of digital interaction at

⁵⁷ *The Rise of InsurTech*, Accenture, 2017, <http://www.fintechinnovationlablondon.co.uk/pdf/The-Rise-of-InsurTech.pdf>

⁵⁸ See "Industries That Spend The Most on Google Advertising", *Statisticbrain.com*, March 2015, <http://www.statisticbrain.com/industries-that-spend-the-most-on-google-advertising/>

⁵⁹ At the time of its closure, Google said that Compare "hasn't driven the success we hoped for", and that it would be "focusing more intently" on its AdWords platform and innovations to provide "financial services with the best return on investment". See "Google Is Closing Google Compare, Its Financial Services Comparison Service", *Techcrunch.com*, 23 February 2016, <https://techcrunch.com/2016/02/23/google-is-closing-google-compare-its-financial-services-comparison-service/>

⁶⁰ Discovery, the health insurance administrator, has distributed nine of every 10 Apple watches in South Africa to encourage its members to exercise. R. Bonorchis "Africa's Biggest Apple-Watch Seller Readies Move to Banking", *Bloomberg.com*, 16 August 2016, <https://www.bloomberg.com/news/articles/2016-08-15/africa-s-biggest-apple-watch-seller-readies-move-into-banking>.

⁶¹ See "Google Looks to Partner With Insurance Companies in France", *Fortune.com*, 13 September 2016, <http://fortune.com/2016/09/13/google-france-insurance-partners/>

purchase are not enough to guarantee customer satisfaction when the time comes to settle claims.⁶²

The prospect of tight regulatory scrutiny could also limit BigTech ambitions in insurance.

Finally, tight regulatory scrutiny over the use of customers' data could prove unwelcome for BigTech firms. Worries that the use of Big Data could result in high-risk individuals facing prohibitively expensive premiums or being unfairly denied insurance are at the forefront of regulators' minds.⁶³ The US Federal Insurance Office recently noted that certain Big Data methodologies may hide intentional or unintentional discrimination against protected classes "by generating customer segments that are closely correlated with race, gender, ethnicity, or religion".⁶⁴ At present, BigTech firms have to deal with relatively light regulatory regimes, but should they choose to become risk underwriters, regulators could feel obliged to mandate coverage or limit premiums for high-risk individuals. That could offset any advantage they would have otherwise enjoyed.

However, the disruptors of tomorrow may not yet have been born, so incumbent insurers cannot afford to ignore the digital challenge.

All told, even if moves by BigTech in insurance do not represent a huge competitive threat today, there is no room for complacency among incumbent insurers. New entrants could over time build on the infrastructure created by these technology companies to offer compelling new value propositions. BigTech firms are competing to acquire companies and develop AI expertise in areas that are very relevant for insurance, such as speech analytics/conversational interface, computer vision, and auto & robotics.⁶⁵ Also, a new breed of start-ups could yet emerge to take advantage of second- and third-generation products fostered by new technology.

Blockchain might ultimately underpin crowd-based P2P insurance platforms to replace traditional insurers and intermediaries.

The ongoing trends toward real-time risk assessment, product and process simplification and automation and robo-advisors could accelerate moves towards more radical business models in insurance. For instance, further development of Blockchain technology together with smart contracts stored on the Blockchain and executed automatically once particular verifiable criteria are fulfilled, could in principle mean that many functions of a traditional insurer are ultimately performed by a P2P network.⁶⁶

Insurers must continue to innovate if they are to remain relevant.

As a result it is important that insurers continue to innovate, embrace new ideas and remain flexible in order to respond as technology advances and customer risk preferences and profiles shift. Successful companies are likely to benefit from a balanced innovation portfolio that spans not only many areas – products and services, processes, strategy and even the organisations' core business model – but also varies the degree of innovation from incremental to more radical departures from the status quo.

⁶² For example, US start-up insurer Lemonade reportedly found that many policyholders new to insurance buy the "bare minimum in coverage", and if they do have a claim it puts Lemonade in a "tough spot" of having to explain that they cannot be covered. See J. Hageman, "It's not easy being a chatbot", *Lemonade.com*, March 2017, <https://www.lemonade.com/blog/the-empathetic-bot/>

⁶³ "Big Data, financial services and privacy", *Economist.com*, <http://www.economist.com/news/finance-and-economics/21716621-should-our-bankers-and-insurers-be-our-facebook-friends-big-data-financial>

⁶⁴ See *Report on Protection of Insurance Consumers and Access to Insurance* Federal Insurance Office, U.S. Department of the Treasury, November 2016, https://www.treasury.gov/initiatives/fio/reports-and-notice/Documents/2016_FIO_Consumer_Report.pdf, p6.

⁶⁵ "The Race For AI: Google, Twitter, Intel, Apple In A Rush To Grab Artificial Intelligence Startups", 30 March 2017, *cbinsights.com*, <https://www.cbinsights.com/blog/top-acquirers-ai-startups-ma-timeline/>

⁶⁶ For a fuller discussion of the potential for Blockchain to be used to create a near-autonomous, self-regulated insurance business model for managing policy and claims see for example: R. Huckstep, "What does the future hold for blockchain and insurance?", 14 January 2016, *Dailyfintech.com*, <https://dailyfintech.com/2016/01/14/what-does-the-future-hold-for-blockchain-and-insurance/>

Conclusion

Historically, insurers have not been pioneers in technology adoption. There are signs the sector is gearing up now.

Successful insurers will be those that leverage new technology to acquire new customers, improve underwriting and increase efficiency.

Such innovation will be crucial in responding to current and future competitive threats.

Advances in technology are bringing about change in the traditional value chain and reconfiguring the competitive landscape of insurance. After a slow start, insurers are responding to the implications of the digital transformation. Many are re-positioning their business models, including by investing in tech-led start-ups, especially those focused on distribution.

Some recent high-tech ventures will inevitably fail. The dot-com bubble of the 1990s is a sobering reminder of how tech-led investments can be prone to over-exuberance. But there are reasons to believe that things will be different this time. Beyond reaping pure financial returns from InsurTech, successful insurers will be those that can leverage insights from their investments, partnerships and collaborations to upgrade their business practices. These firms will use technology to acquire new customers and increase engagement, provide and monetise new services, improve underwriting (including of new risks), and reduce back-office costs.

Full-scale disruption of existing insurance sectors seems unlikely, at least in the near term. Incumbent institutions have time to adjust to the changing risk environment, shifts in customer attitudes and accelerating advances in technology. Utilised more fully and intelligently, the latest technology presents an opportunity to the insurance industry to reinforce its relevance to its clients. While sheltered somewhat by regulation, insurers must nevertheless continue to embrace both incremental and sometimes more radical innovations. This will be essential in not only competing with the current wave of entrants to the sector, but also in positioning themselves to be able to respond to future competitors.

Appendix

This appendix summarises a selection of InsurTech start-ups and briefly describes their value proposition.

InsurTech investments and partnerships

The InsurTech start-ups in this list are categorised by primary area of innovation, but may also be relevant in other areas of the value chain. In most cases, these start-ups have an insurer, its venture fund or a subsidiary as an investor, partner, customer or founder. All company mentions, and mention of agreements/deals between companies, in this report are based in public available information and as such, the list is not exhaustive.

Table A1

Distribution start-ups (digital engagement, lead generation, broker enablement, price comparison, aggregators and brokers)

Start-ups	Insurers	Description of the technology value proposition
Bloom	Allianz	Web-based advisor; allows savers to outsource management of 401k/403b accounts
Clark	N/A	Insurance robo-advisor, iOS and Android apps that help manage and purchase insurance
Coverfox	N/A	Online insurance portal for car, bikes, health, term-life and travel
CoverHound	ACE, American Family	Online insurance comparison shopping. Also offer quotes for ride-sharing and commercial insurance
Embroker	XL Innovate	Free online technology platform, data, and expertise of experienced commercial brokers
Gobear	Aegon	Free comparison portal based on financial needs, and not influenced by service providers' advertising
Hearsay Social	New York Life	Addresses compliance requirements for carriers so that advisors can participate in social media
Hixme	Aegon (TransAmerica)	Workplace healthcare: migrating covered lives from large group to the individual market
Hootsuite	Legal & General	Platform for managing social media; integrates Twitter, Facebook, Instagram, LinkedIn, YouTube, etc
LearnVest	Northwestern Mutual	Robo-advisor: online personal banker which recommends a portfolio of investments
MoneyFarm	Allianz	Online personal banker, which recommends a portfolio of investments
NetworkedInsight	American Family	Tools that crawl the social web and analyse data for marketers
PolicyGenius	AXA, Aegon	Quoting engine that offers comparisons, including life, disability, health, pet insurance policies
Simplesurance	Munich Re, Allianz	Software that makes it easier for customers to insure retail purchases directly at the online check-out
SoundHound	Sompo Japan	Voice-enabled AI and conversational intelligence technologies
Spredfast	American Family	A social relationship platform which helps insurers use multiple popular social channels
Vlocity	New York Life	Provides policy acquisition and lifecycle management tools for agents

Source: Swiss Re Institute, based on information from company websites and media reports.

Table A2

Solutions and services start-ups (customer engagement, prevention and customization)

Start-ups	Insurers	Description of the technology value proposition
All Set Works	Liberty Mutual	Enables users to search and find home cleaning services providers
AppyParking	Aviva	Accesses parking data to enable users to find parking zones, registered driveways and carparks
Building Engines	Mass Mutual	Commercial property management platform, greater visibility, reporting and analytics for landlords
Canary	Liberty Mutual	Partnership with smart home device to get a discount on home insurance
Cozy	American Family	Rent management services such as collecting rent and screening tenants online
Everplans	Aegon, RGAX	Online estate & legacy planning platform
Forevercar	CUNA Mutual Group	Web portal that helps users purchase extended vehicle warranties, service plans, and mechanics
GOQii	Max Bupa	Fitness technology player offering pre-emptive wellness solutions
Life360	American Family	Location-sharing and tracking, uses smartphones to automatically detect accidents
Neura	AXA	Privacy platform for IOT: personalizes apps and devices based on what each person wants to share
Openbay	Allstate, State Farm	Online marketplace for non-collision auto-repair and maintenance services
Opun	Aviva	Home improvement services platform with integrated credit finance and home improvement warranty
Quietyme	American Family	Noise monitoring and reporting system for the hospitality and healthcare industry
Ring	American Family	Home safety: discount to home and condo policyholders once a video doorbell device is installed
Tingchebao	Ping An	App allowing users to find and buy available parking spaces, and on-demand valet service
TRUECar	USAA	Automotive pricing and information website for buyers and dealers in new and used cars
Tuition.io	MassMutual	Student loan employee contribution- like a 401(k); the money pays down student loan balances
Urgent.ly	Allianz	In emergencies, drivers connect to service providers in real-time via their smartphone's map
YourMechanic	American Family	Online marketplace to find local mechanics for home or office car repair services

Source: Swiss Re Institute, based on information from company websites and media reports.

Table A3

New risk pool start-ups (addressing new or unmet needs)

Start-ups	Insurers	Description of the technology value proposition
Argus Cyber	Allianz	Automotive cyber security for manufacturers to protect connected vehicles.
Bitflyer	Mitsui Sumitomo Insurance	Insurance for users of cryptocurrency exchanges. Protects for losses at the exchange and customer
Bitsight	Axis Insurance	Security ratings platform to continuously analyse vast amounts of external data on security issues
Bunker	American Family	Contract-related insurance marketplace for the gig economy
Carma	Assurant	Insurance coverage for carpooling and car-sharing programs
Cuvva	Collingwood	Insurance for owners who use cars infrequently; payment per hour of usage rather than annual cover
Cyberdyne	AIG and Daido Life	Insurance for users of wearable robots for rehabilitation and work, medical based robotic devices, etc
CyberGRX	MassMutual	Software platform and business processes to help firms assess security risks and risks of partners
Cyence	Several insurers	Platform for the economic modelling of cyber risk.
Dozr	Fairfax	Integrating insurance into a short-term rental platform for the heavy equipment market
Drivy	Allianz	P2P car sharing service allowing users to rent out cars across several French cities
GamaSec	Assurant	Support for software's data breach guarantee, protecting small businesses
Grab Taxi	AXA	Usage-based insurance private hire car drivers
K2 Intelligence	AIG	Investigative consultancy with risk services and solutions to corporations, sovereign nations, etc.
Kabuku	Mitsui Sumitomo Insurance	Digital fabrication platform that lets makers upload 3D printed designs and sell them to consumers
LeaseLock	American Family	Property lease guarantor that helps individuals lease a home in exchange for one-time rent payment
MyDigitalShield	Assurant	Support for software's data breach guarantee, protecting small businesses
New Energy Risk	XL	Performance warranty to enable 'clean tech' companies raise project financing in order to grow
Next Insurance	Markel Corp.	Tailored coverage for niche professionals, eg, personal trainers; payable in monthly instalments
Ola Cabs	Bajaj Allianz	Ride sharing: The partnership will provide online motor insurance solutions to drivers
OneAssist	Assurant	Protection & assistance services to wallets and smartphones.
Open Mobile	Assurant	Mobile upgrade and protection without an annual contract and device financing requirement
Particeep	AXA	Software to build crowdfunding platforms to raise money
PriceMethod	AXA	Data-driven dynamic pricing platform for rentals on Airbnb, VRBO, HomeAway
ProtectMyID	AIG	Identity theft detection, protection and fraud resolution combined with insurance
Quilt	Security First Insurance	Online renters' insurance product
RecomN	Allianz	Digital service that helps users find service professionals recommended by people in their community
Relayr	Munich Re	Customized insurance products to facilitate IoT infrastructure investments by industrial customers
Safeshare	Lloyd's	Blockchain-based property insurance for the sharing economy (with Vrumi), underwritten at Lloyd's
Slice Labs	Munich Re, XL	On-demand insurance for the sharing economy, eg, home-share, ride-share, contract workers
The Guarantors	Hanover Insurance Group	Lease guarantee service helps students, internationals, get approved to rent an apartment in 12 hours
Tongjubao	N/A	P2P start-up insures Chinese customers against social risks like divorce or missing children
Trov	Suncorp, AXA, Munich Re	On-demand personal item insurance app
Vacasa	Assurant	Liability coverage and property insurance to homeowners in the Vacasa home sharing network
Verify	Global Aerospace Insur.	Drone insurance for recreational and commercial flights; covers 1/4 mile around the user for one hour

Source: Swiss Re Institute, based on information from company websites and media reports.

Table A4

Underwriting, claims and inforce policy management start-ups (faster, more insightful processing)

Start-ups	Insurers	Description of the technology value proposition
1concern	American Family	Rapid damage estimates across natural disasters using artificial intelligence
AirPhrame	American Family	Aerial imaging and mapping service for commercial markets using unmanned vehicles
Airware	State Farm	Provides software and services that help large enterprises use drones throughout their operations
Argo Risk Tech	Argo Insurance	Reduces accidents via digital process documentation, eg, safety inspections, hazards, liquid spills
The Floop	Direct Line	Provider of telematics services, analytics and predictive scoring functions to the insurance industry
H C Safety	AIG	Human Condition Safety: Wearable safety tech, artificial intelligence for the construction industry
Human API	N/A	Making structured digital health data on consumers available to insurers, providers, and developers
K4 Connect	RGA	Software to integrate many smart devices into one system - tailored for seniors, ones with disabilities
Katasi	American Family	Develops tools that eliminate the temptation of texting while driving; helps drivers focus on the road
Lightfoot	Allianz	Programme to encourage and reward better driving among UK fleets
Oxdata (H2O.ai)	Aegon (TransAmerica)	Open source machine learning platform that makes it easy to build smart applications.
Passport Card	Allianz	Travel card - offers No out of pocket expenses for medical care and no tedious claim filing procedures
Praedicat	Allianz	Better predict future liability catastrophe risks, eg, asbestos, and gain insights on emerging risks
Rippleshot	CUNA Mutual Group	Highlights cards most likely to see fraud, prescribes which transactions to decline in real-time
Snapsheet	Liberty Mutual, Intact Fin.	Mobile auto physical damage claims platform to file members' auto damage claims via smartphone
Synerscope	Achmea	Big Data analysis software that allows domain analysts to make sense of their big data.
Understory	Amica Mutual Insurance	Weather sensor data to improve claims handling
WayGum.io	Hartford Steam Boiler	Industrial IoT- enabling mobile devices to control machines that are hard to reach physically
Wellth	AXA	Pays users of costly chronic diseases do things like daily medications, tracks actions via technology
Zendrive	N/A	Leverages mobile sensor data to provide actionable insights to drivers

Source: Swiss Re Institute, based on information from company websites and media reports.

Table A5

Operations, administration and policy servicing start-ups (automated processes & transactions)

Start-ups	Insurers	Description of the technology value proposition
Blockstream	AXA	Provider of blockchain technologies
Cipher Cloud	Aegon (TransAmerica)	Cloud information protection solutions for enterprises
DataRobot	New York Life	Helps users build predictive models faster in the cloud; a co-pilot builds and tests 100s of models
Digital Guardian	MassMutual	Cyber security - Monitors data and system events, and forms policies around where the data can go
ID.me	USAA	Technology platform that allows to authenticate policyholder identity digitally
Indico	John Hancock	Text and image analysis to use machine learning in investment decisions
iPipeline	Several insurers	SaaS solution to drive straight-through-processing, aggregates 120 carriers, 875 distributors
Jamii Africa	Jubilee and Vodacom	Mobile policy management platform that performs administration activities of an insurer
Narrative Science	USAA	AI authoring platform that converts data into meaningful narratives that people can read
One, Inc	AXA, MassMutual	SaaS operating system for insurance companies
Pwnie Express	MassMutual	Addressing emerging threats of wireless workplace - dashboard shows all devices near a firm
Pypestream	No named insurers	Chatbot mobile messaging platform that uses intelligent automation to talk to customers
Recorded Future	MassMutual	Analyses the web for trending signals to get insight into emerging cyber threats
RiskIQ	MassMutual	Threat management platform to monitor, detect, and act against threats
SkyCure	New York Life	Mobile defense: Predictive technology and crowd data to identify threats and secure mobile devices
SPIXII	Allianz	Automated insurance agent - to talk to customers via programs like Facebook Messenger and Skype
Sureify Labs	Hannover Re	Web and mobile quoting, application and fulfilment, and integration with consumers' social networks
Tamr Inc	MassMutual	Unified data: Helps insurers use the data scattered in silos and sources across the organisation

Source: Swiss Re Institute, based on information from company websites and media reports.

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