



By Shanique (Nikki) Hall, CIPR Manager

◆ INTRODUCTION

What was once science fiction has fast become a fundamental part of our everyday lives. The notion of artificial intelligence (AI), whether on movie screens or in science-fiction books, has long been part of our imaginations. While robots have yet to take over the world, the use of AI has increased exponentially across industries over the past several years. The rise in accessible data, increased computing capabilities and changing consumer expectations has led to a strong acceleration of AI development. We are now using AI throughout the landscape of our lives—often without realizing it—whether it is Google’s search engine, a virtual assistant (such as Apple’s Siri), or online stores that know what you want before you log in.

We have gotten so comfortable with technology doing new and amazing things every day we often do not stop to think about the science behind it. At its essence, AI can be defined as the science of making computers do things requiring intelligence when done by humans, including learning, planning, reasoning, problem solving and decision-making. Various AI-related technologies, such as natural language processing (NLP), computer vision, robotics, machine learning and speech recognition, have substantially progressed over the years to coalesce into systems that do, think, learn and continuously adapt.

Consequently, AI is rapidly evolving and creating viable opportunities for business growth. It is disrupting and improving organizations across all industries, including insurance. Companies such as IBM, Apple, Google, Facebook and Amazon are leveraging AI platforms and solutions for customers, partners and employees. While insurers are in the early stages of catching this wave, they are said to be ripe for transformation in areas such as underwriting, customer service, claims, marketing and fraud detection. Three-quarters of insurance executives (globally) believe AI will either significantly change or completely transform the industry over the next three years, according to Accenture’s *Insurance Technology Vision 2017* report (Accenture Report).

Advances in AI have also caught the attention of venture capitalists and other investors. InsurTech (technology based solutions for insurance) startups in AI were one of the hottest tickets in 2016. According to the Accenture Report, the number of InsurTech startups with a focus on big data, AI, and the Internet of Things (IoT) has skyrocketed in recent years, attracting nearly half of the total funding spent globally on Insurtechs in 2016. InsurTech startups are said

to be using AI technology to enhance customer experience by improving convenience, transparency, timeliness and customer engagement.

There are a number of new and emerging technologies set to revolutionize the financial services and insurance industry, including, telematics, IoT, blockchain, digital platforms and AI. These breakthrough technologies are reshaping the insurance industry by providing innovative ways to measure, control and price risk; engage with customers; reduce cost; improve efficiency; expand insurability; and create new products and business models.

The NAIC recently formed the Innovation and Technology (EX) Task Force to explore the technological developments in the insurance sector. The Task Force will provide a forum for discussion of innovation and technology developments in order to educate state insurance regulators on how these developments will affect consumer protection, insurer and producer oversight, and the state insurance regulatory framework.

◆ ARTIFICIAL INTELLIGENCE

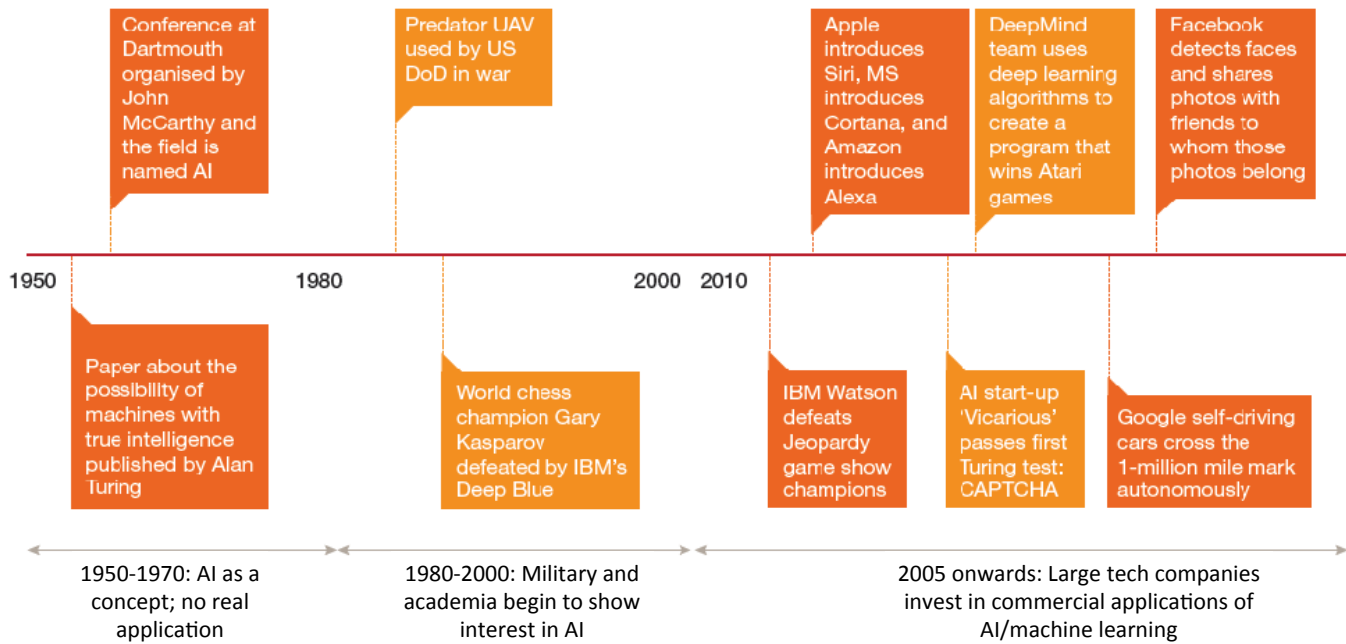
AI is the study and development by which a computer and its systems are given the ability to successfully accomplish a task typically requiring a human’s intelligent behavior. Merriam-Webster defines AI as a branch of computer science dealing with the simulation of intelligent behavior in computers; and the capability of a machine to imitate intelligent human behavior.

Currently, within traditional industries, many tasks are achieved by humans—for example, gathering information, analyzing data by running a model or using personal judgment, and finally making a decision. Algorithms or machines are used to assist humans, but the tasks are still led by humans. AI allows technology to replace humans on all of these steps—from data collection and analysis down to the final decision-making.

Over the years, scientist have consistently tried to find a way to bridge the gap between man and machine. English computer scientist Alan Turing is widely considered to be the father of AI. In the 1940’s, at the dawn of computing, Turing was grappling with the question: “Can machines think?” He later published a paper in 1950 entitled, *Computing Machinery and Intelligence*, in which he described what is now known at the “Turing Test” for determining whether a machine is “intelligent.” During this time, the term AI had not been coined. John McCarthy later coined the term in 1955, a

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FIGURE 1: EVOLUTION OF ARTIFICIAL INTELLIGENCE



Source: PwC Analysis.

few years after Alan Turing's death. Since the advent of the Turing Test, it has been widely used as a benchmark to see if humans can create machines with a high enough level of AI, which is "indistinguishable" from humans. In June 2014, Eugene Goostman, a Ukrainian chatbot, was the first computer program to pass the Turing Test. Goostman managed to convince 10 out of 30 judges it was a real person during the course of a five-minute chat conversation.

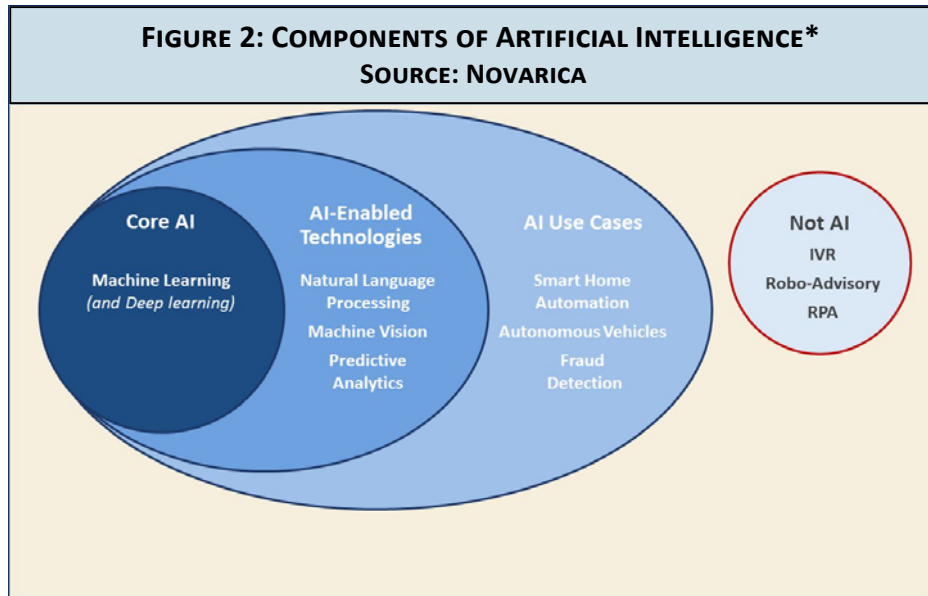
More than 60 years after Turing published his paper, machines that think like humans have not yet arrived, but there are now machines approaching having intelligence to the extent suggested by Turing. AI technology has progressed immensely and continues to develop and improve all the time (Figure 1). It has become increasingly proficient at performing tasks historically difficult for computers to execute, including recognizing images, identifying spoken words and using unstructured data.

It is important to note AI is not a monolithic subject area. It comprises a number of mechanisms adding to the notion of what it means to be intelligent. Machine learning, deep learning and natural language processing (NLP) are all examples of terms relating to the collection of technologies

known as AI (Figure 2 on the following page). They are often used to describe AI in more detail, alongside the term AI, or independently. An example of their definition and scope is as follows:

- **Machine learning** is a subfield of AI based around the science and engineering of making machines "learn" for themselves. At its most basic, machine learning is the practice of using algorithms to parse data, learn from it, understand it, and then make a determination or prediction.
- **Deep learning** is a type of machine learning using multi-layered neural networks to learn and improve upon itself for next time, just as humans would. It is about designing highly complex algorithms that can make robots intelligent, such as face recognition techniques used in drones to detect and target terrorists, or pattern recognition/computer vision algorithms to automatically pilot a plane, a train, a boat or a car. Deep learning is used by Google in its voice and image recognition algorithms and by Netflix and Amazon to decide what you want to watch or buy next.

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* IVR denotes interactive voice response and RPA denotes robotic process automations.

- NLP is another important component of AI. NLP involves intelligent analysis of written language. NLP applications attempt to understand natural human communication, either written or spoken, and communicate in return using similar, natural language. NLP is the technology making it possible for Alexis, Siri, Cortana and other virtual assistants do their magic.

The recent acceleration in AI is being driven by exceptional technological advances along with a major shift in customer expectations. Higher computer power, memory capacity, cloud computing, big data technologies, and global connectivity of both people and machines have enabled machines to run complex algorithms faster than humans and handle more input data than a human could. Consequently, AI systems are now able to perform tasks previously requiring human intelligence, such as visual and speech processing, decision-making and language translation.

The successes of AI are also being facilitated by the massive amounts of data we have today. The wealth of data we now create is astonishing, and the speed at which data is generated has only made data management tools like AI all the more important. Whether it is structured or unstructured data (e.g., social media, wearables, telematics, sensors, news, weather and traffic reports), AI is helping organizations make sense of big data. As AI is able to execute complex analyses and computations at a speed impossible for humans, it generates faster insights. Driverless cars create roughly 4 terabytes a day of data. Statistical models cannot handle that amount of data.

◆ **AI'S IMPACT ON THE INSURANCE INDUSTRY**

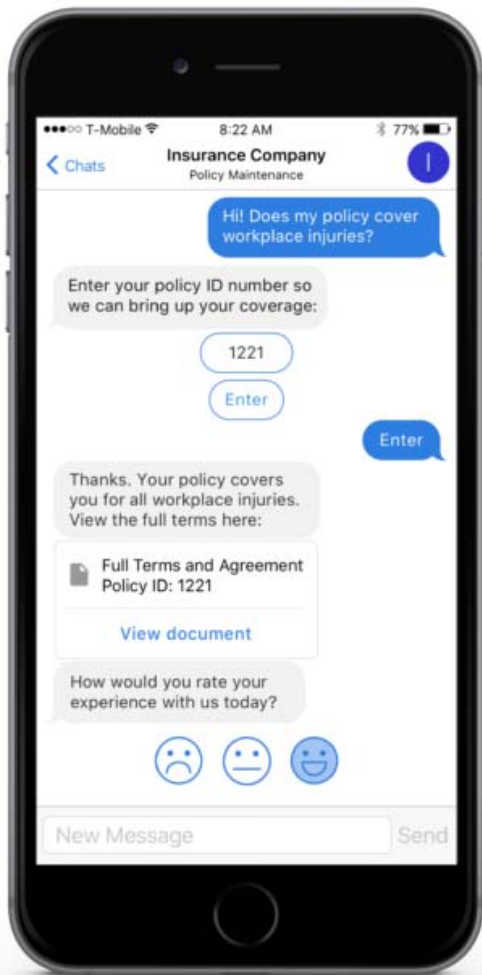
AI has slowly ingrained itself into our everyday lives, from taking full responsibility (as is the case of driverless vehicles) and in some cases intimately listening to our every move (i.e., in the home, with Amazon's Echo). At Amazon Go, Amazon's prototype grocery store, customers can walk in, grab the items they want, and walk out without paying or waiting in a checkout line. Amazon will automatically charge the customer's account and send a receipt. Run out of cereal? No problem. Amazon Prime customers can place an order from their phone and get same-day delivery. Consumers have come to expect these easy, hassle-free experiences—and AI is powering many of them.

Shaped by their experiences with other industries, insurance customers, particularly millennials, now expect quick on-demand services. However, unlike Amazon and many other product and service providers, insurance is an industry with low customer engagement. Traditionally an insurer has just two touch-points to interact with customers: the first is when it sells a product and the second is during the claims process. A 2014 Morgan Stanley Research and Boston Consulting Group study found consumers interacted less with insurers than with any other industry, so the consumer experience with insurers tends to lag behind others.

As such, AI has the potential to affect the insurance industry in multiple ways. The most obvious areas it can be used include claims processing, underwriting, fraud detection and

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**FIGURE 3: FILING A CLAIM USING A CHATBOT
EXAMPLE FROM PYPESTREAM**



customer service. The Accenture Report notes insurers have begun to use AI technologies as a tool to help improve overall customer experience, with the technology enhancing the way sales and services are executed, facilitating faster claims processing, and enabling more accurate individual risk-based underwriting processes.

Moreover, insurers are sitting on a treasure-trove of big data, the main ingredient AI requires to be successful. When asked about the benefits of embedding AI into their interfaces, more than half of the insurance executives surveyed in the Accenture Report cited better data analysis and insight. The abundance of data fused with unstructured data can be leveraged to increase customer engagement, create more personalized service and more meaningful marketing messages, sell the right product to customers and actually target the right customer.

Customer Service and Marketing

To improve customer experience, many insurers are investing in virtual assistants like chatbots. A chatbot is a digital service capable of holding natural sounding conversations with human beings with the aim of accomplishing particular tasks, such as answering questions. Two-thirds of the insurance executives surveyed in the Accenture Report said they now use some sort of chatbot in at least one business area to create better customer interactions.

Chatbots are powered by NLP to converse with customers using mobile apps and messaging platforms such as WhatsApp and Facebook Messenger. They answer questions, give basic advice, and address common inquiries and transactions—freeing up human reps to handle the more complicated situations and saving consumers time from having to navigate their way around complicated websites or time-consuming contact centers (Figure 3). Moreover, chatbots are accessible around the clock with no hold times.

One example is Geico’s virtual assistant “Kate,” which launched earlier this year. Kate answers basic policy and billing questions within the app like, “Do you want to know the current balance on your auto insurance policy?,” or, “What about the date of your next payment?” Another example is Allstate’s chatbot, the Allstate Business Insurance Expert (or Able). Able walks customers through the quoting process and retrieves documents for agents.

Claims Management and Fraud Detection

AI is also changing the way claims are processed. By leveraging AI technology to help manage claims, insurers are looking to reduce the time it takes for a claim to be processed, and, in turn, reduce the handling costs, while improving customer experience. Claims management can be augmented using machine learning techniques in different stages of the claim handling process. For example, machine learning models can help automatically assess the severity of damages and predict the repair costs from historical data, sensors and images.

Metromile, a pay-per-mile car insurer, recently launched an automated claims system designed to speed up the process of verifying and paying out claims. Its new AI-powered claims assistant, AVA, promises to verify and resolve claims in seconds. AVA will also soon be able to issue instant payments and assist with scheduling repairs. Another example is Zurich Insurance, which is deploying AI in deciding personal injury claims. Its chairman recently noted “We recently introduced AI claims handling ... and saved 40,000

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work hours, while speeding up the claim processing time to five seconds.”

Earlier this year, peer-to-peer insurer Lemonade reported a claim handling world record—3 seconds and no paperwork. According to Lemonade, a policyholder submitted a theft claim for a \$979 Canada Goose Langford Parka on Dec 23, 2016. Within seconds, AI Jim, Lemonade’s AI claims bot, reviewed the claim, cross referenced it with the policy, ran 18 anti-fraud algorithms on it, approved it and sent wiring instructions to the bank, informing the policyholder the claim was paid at replacement cost and closed. However, it is important to note the claims process is highly complex and is seldom as simple as this example.

In addition, AI is expected to reduce the instance of insurance fraud by flagging suspicious claims. One of the biggest sources of frustration for insurance agents lies in trying to identify fraudulent claims. Insurers can leverage AI using intelligent automations, self-learning and analyzing patterns to help identify fraudulent claims. AI can help to match information from the claim to the policy and checks for red flags alongside the agent. In addition, AI understands previous behavioral patterns of a customer and can detect patterns or activities with a high probability to be fraudulent otherwise invisible to the human eye.

Underwriting

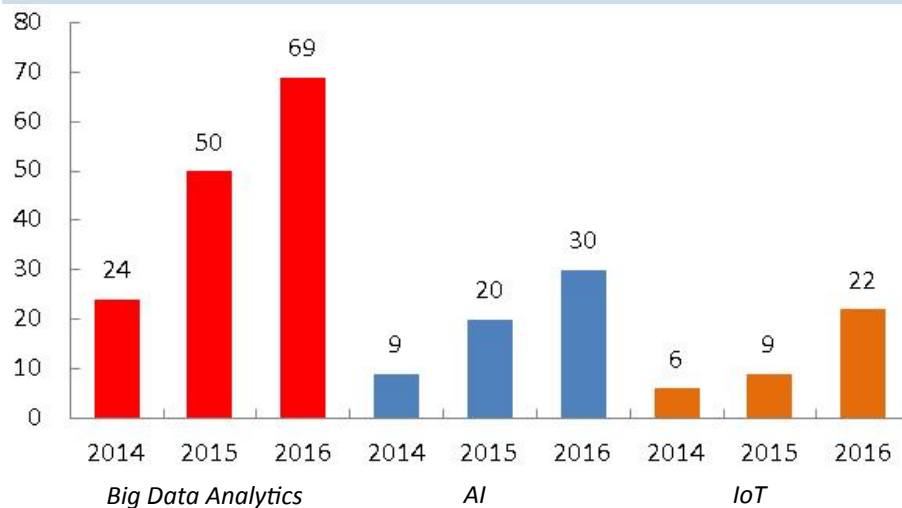
Underwriting is fundamental for every kind of insurance policy. An insurer’s capacity to underwrite risk effectively, that is to assess all risk factors present in a given policy and to price accordingly, is crucial. Factors like health history, age, gender and lifestyle are all critical components of an underwriting assessment. AI can help move underwriting from a manual process predicated on historical data to an automated process using real-time data from thousands of sources to help insurers build a fuller picture of their customers.

In health insurance, for example, data from wearable devices such as Fitbit can track a customer’s activity. AI technologies can analyze this wealth of information quickly and accurately. However, while AI can help improve and speed up underwriting, most agree it can not replace expert human insight and should be viewed as a means to augment human capabilities.

These areas of AI are all just the beginning. AI technology is self-learning. This means over time the systems can adapt, capture data and improve their own analysis capabilities. Moreover, advances in AI extend far beyond cool social apps. Thanks to great progress in deep learning, AI is making inroads in fields of computer vision (e.g., where computers understand the content and context of images). For example, medical startups claim they will soon be able to use

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FIGURE 4: THE NUMBER OF INSURTECH FIRMS FOCUSED ON AI, BIG DATA AND IOT HAS INCREASED SIGNIFICANTLY



Source: Accenture.

computers to read X-rays, MRIs, and CT scans more rapidly and accurately than radiologists. Better image recognition is also crucial to unleashing improvements in robotics, autonomous drones, and self-driving cars.

◆ CONCLUSION

Over the years, we have seen entire industries transformed due to new technologies—from music to banking, publishing, travel and even taxis. Insurance is now grappling with the risks and opportunities of new technologies. The emergence of AI is a powerful form of technology with the potential to disrupt the entire insurance value chain. So far, the impact of AI in insurance has been minimal. However, the adoption of AI within insurance is gaining momentum and has been an important catalyst for insurers to improve their services to remain competitive.

AI was one of the most popular themes in InsurTech startups last year. According to CB Insights, total funding to InsurTech startups in 2016 hit \$1.7 billion. Big data/analytics, AI and the IoT collectively accounted for 70% of the total value invested. In addition, analysis of data on 450 Insurtech deals over the last three years found deals based on AI and IoT rose by 79% last year (Figure 4 on the previous page). It will be essential for state insurance regulators to engage with InsurTechs to understand the future direction of the industry, as well as the kind of improvements AI is having in the Insurtech space.

While AI provides opportunities for traditional insurers to modernize themselves, a number of obstacles to its adoption in the insurance industry remain. Implementing AI is not straightforward. Insurers face challenges integrating AI into their existing technology due to issues such as data quality, privacy and infrastructure compatibility, according to the Accenture Report. Regulation is also an important factor. Machine learning algorithms can parse through massive amounts of data, generate predictions and make decisions without the ability to explain to humans what it is doing. Transparency will be needed as insurers will have to explain the pricing policies to their customers. “The computer said so” is not an acceptable answer.

In the short-term, AI can help insurers automate some of the routine administrative processes done manually and could help with underwriting, fraud and claims processing. In the long-term, as AI technology evolves, insurers may need to not only address data quality and privacy concerns, but also revamp their IT architectures to support AI features and technical dependences. They will need to identify partners, hire or train for new skill sets, and put new development processes and infrastructure in place.

ABOUT THE AUTHOR



Shanique (Nikki) Hall is the manager of the NAIC Center for Insurance Policy and Research (CIPR). She joined the NAIC in 2000 and currently oversees the CIPR's primary work streams, including the CIPR Newsletter; studies; events; webinars and website. Ms. Hall has extensive capital markets and insurance expertise and has authored copious articles on major insurance regulatory and public policy matters. She began her career at J.P. Morgan Securities as a research analyst in the Global Economic Research Division. At J.P. Morgan, Ms. Hall analyzed regional economic conditions and worked closely with the chief economist to publish research on the principal forces shaping the economy and financial markets. Ms. Hall has a bachelor's degree in economics from Albany State University and an MBA in financial services from St. John's University. She also studied abroad at the London School of Economics.

Bibliography:

- Accenture's Technology Vision for Insurance 2017. April 2017. Retrieved from: <https://s3.amazonaws.com/assets.accenture.com/PDF/Accenture-Tech-VisionReport-2017.PDF>.
- Ahmadi, Babak. "How Artificial Intelligence is Change the Insurance Business." Feb. 13, 2017. Retrieved from www.medium.com.
- Barton, David. "Why the Insurance Industry is turning to Machine Learning." *Innovation Enterprise*. Retrieved from: <https://channels.theinnovationenterprise.com/articles/why-the-insurance-industry-is-turning-to-machine-learning>.
- Copeland, Jack. "What is Artificial Intelligence." AlanTuring.net. Retrieved from: www.alanturing.net/turing_archive/pages/reference%20articles/what%20is%20ai.html.
- Corea, Francesco. "Why AI Will Transform Insurance." Insurance Thought Leadership. Jan. 1, 2017. Retrieved from: <http://insurancethoughtleadership.com/why-ai-will-transform-insurance/>.
- "How Insurers Can Harness Artificial Intelligence." Cognizant. July 2016. Retrieved from: www.cognizant.com/whitepapers/how-insurers-can-harness-artificial-intelligence-codex2131.pdf.
- Hughes Neghaiwi, Brenna. "Zurich Insurance starts using robots to decide personal injury claims." Reuters. May 18, 2017.
- "Insurance and Technology: Evolution and Revolution in a Digital World." Morgan Stanley. September 8, 2014.
- Noto, Grace. "The Future of InsurTech? AI and IoT, Says Accenture." Bank Innovation. Retrieved from: <http://bankinnovation.net/2017/03/the-future-of-insurtech-ai-and-the-iot-says-accenture/>
- Novarica Research Quarterly. Q4 2016. Retrieved from: <https://novarica.com/ai-in-insurance/>.
- Sun, Alex. "How chatbots can settle an insurance claim in 3 seconds." VentureBeat. May 2017. Retrieved from: <https://venturebeat.com/2017/05/27/how-chatbots-can-settle-an-insurance-claim-in-3-seconds/>
- TALLT InsurTech Disruption Trends 2017. Retrieved from: www.tallt.ventures/wp-content/uploads/2017/05/Insurtech-Disruption-Trends-2017_vFINAL.pdf.
- "Why the Insurance Industry Can't Risk Overlooking Artificial Intelligence." Harvard Business Review. Nov. 22, 2016.



NAIC Central Office
Center for Insurance Policy and Research
1100 Walnut Street, Suite 1500
Kansas City, MO 64106-2197
Phone: 816-842-3600
Fax: 816-783-8175

<http://www.naic.org>

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