Digital Disruption Through Data Science: Embracing Digital Innovation In Insurance Business

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Development of new age technological solutions along with major shift in the customer expectations, increasing volume of data, higher computing power, memory capacity, cloud computing, big data technologies, global connectivity and Internet of Things, etc., have stressed the need for adopting the various innovative technological applications in the insurance business. Insurers are investing heavily in technology startups and working to develop innovative product solutions and platforms internally. This article discusses the applications of these new age technologies like Block Chain Technology, Big data & Internet of things, Telematics, and Artificial Intelligence including Machine Learning, Deep Learning, Computer Vision, RPA, and Virtual Reality, etc., in insurance business. Further it also discusses how these technologies enable insurers to develop innovative products and solutions and what challenges that insurers would encounter while implementing these applications and what regulatory changes are required in view of this digital disruption in insurance industry.

Keywords: Digital Disruption, Block Chain, Artificial Intelligence, RPA and Big Data

In the era of digital revolution, the increasing number of new and emerging technologies - Telematics, Internet of Things (IoT), Block-chain, Digital Platforms and Artificial Intelligence - is set to revolutionize the Financial Services and the Insurance Industry. The rise in accessible data, increased computing capabilities and changing customer expectations has led to a strong acceleration of AI development that is driving the Industry 4.0. While Artificial Intelligence is transforming the organizations across all industries, the insurance industry is also now embracing this technological innovation in a big way. These breakthrough technologies are reshaping the insurance industry by providing innovative ways to measure, control and price the new and emerging risks, engage with customers, reduce cost, improve efficiency, expand insurability and create new products and business models.

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Digital Revolution:

India has disrupted the current insurance business models as companies are embedding digital innovations to differentiate their product offerings and record customer experiences.

Increasing Internet Penetration:

The number of users in India, expected to rise from 504 million in 2020 to 907 million by 2023, at the rate of 20%, will continue to influence the insurance business as well as other industries (CISCO, 2020).

Big Data and Internet of Things (IoT):

As per the Oliver Wyman study, there are 50 to 100 billion network devices that are expected to be connected worldwide and many of these would be smart devices (AI-apps, GPS, Radar Sensors, Robotics, AI Cloud, Routers, etc). Further, most of the high-end vehicles, now fitted with Telematics and AI-assistance, and fully automated cars, being tested, smart homes, etc., would generate huge volumes of data. It is estimated that nearly 4 terabytes of data would be generated by such automated devices.

Increasing Customer Expectations:

Millennial customers' expectations in particular, are rising exponentially, based on their experience with digital companies like Google, Amazon, Lemonade, Apple, IBM, etc., that offer convenience and simplicity, leaving these customers frustrated that their insurance experience doesn't match their lifestyles and needs.

Social Media:

Currently one of the most accessed media by everyone is loaded with billions of data. Using AI and ML algorithm to analyze the millions or terabytes of social data offers huge opportunities to the insurers and reinsurers to design innovative products and service solutions and also improve their distribution networks exponentially enabling the taping of the young and millennial customers.

Block Chain Technology:

Decentralized ledger technology helps in bringing all parties on one common platform while simplifying the quote and claim processes. Block-chain can disrupt the existing business models in several ways - right from enabling the insurers to develop innovative insurance solutions, smart contracts to automating their simple claims settlement process, reducing the insurance frauds, along with efficient underwriting and meeting superior customer experiences and so on.

Data Privacy and Security:

Emerging technologies usually deal in customer data which can be used to drive insights related to historical health issues and behavioural patterns of customers. Increasing regulations related to customer personal data around the globe and in India will continue to pose further challenges.

In order to keep in touch with the technological changes, insurers need to understand how they can **leverage InsurTechs** as enablers and enthuse them to enhance the customer offerings, increase their customer base and drive operational efficiencies.

With the increasing technological integration, the dependency on these new and emerging technologies has been growing. Simultaneously, the Cyber Risk Exposure is also rising. Envisaging the emerging digital disruption, all the key stakeholders of the insurance industry – Regulators, Insurers, Reinsurers, Risk Managers and Brokers, etc. - need to realign, innovate and develop appropriate business solutions.

The paper presents the following sections:

1. Technological developments, particularly the New-age or emerging technologies like Block-chain technology, Internet of Things (IoT), Telematics, etc., in the insurance business sector;

2. Applications of Big Data and Artificial Intelligence in Insurance business;

3. Adoption by insurance companies of these digital innovations in the insurance and reinsurance business and also the challenges in implementing them; and

4. Finally, regulatory implications arising out of use of new age technologies, personal data protection, and cyber security.

1. Emerging Technological Trends and Implications on Insurance Business

The recent nation-wide proliferation of internet connections, availability of large volumes of data, introduction of new-age technologies; Block-chain Technology, Internet of Things (IoT), Artificial Intelligence, Robotic Process Automation (RPA) connected cars, Smart Homes and Smart Devices, etc., have enabled the development of innovative technological solutions. This has also led to the introduction of innovative insurance products and services to provide exemplary service experiences to the customers. InsurTech's facilitating insurance operations are paving the way for greater competition and creating "digital disruption" in the insurance and reinsurance business as well. This section discusses the new-age developments and the emerging technologies, particularly their impact on the insurance operations.

- Applications of Block-chain Technology in Insurance Business
- Use of Internet of Things (IoT), Digital Platforms, RPA and Telematics for better Underwriting and Claims settlement.

- Aligning with the changing market place, customers and the society of tomorrow
- Changing Regulations (Sandbox) fostering technological innovations

Applications of Block-chain Technology in Insurance Business

Block-chain technology significantly reduces the probability of fraudulent transactions. including the chances of data theft as it ensures the secured digital transactions through encrypted documentation validating the authenticity of every transaction done in digital ledger. Further, it also helps in automation of the existing redundant and time-consuming processes into simpler and faster systems which help in reducing the transaction cost significantly. Secondly, it also helps in providing faster and better customer service experience.

More importantly, as block-chain technology enables insurers to get connected to all the service providers and/or vendors related to every line of business, it ensures providing faster claim settlements to the customers with better and/or unique service experiences. For instance, one of the new-age insurance companies provides instant settlement of claims to the customers in the case of flight delay with the help of block chain technology, which automatically connects the insurer's system with the airport communication system as well as the airliner.

Further, this technology enables insurers to develop innovative products and customized insurance solutions by authenticating transactions, policies, and, customers using smart contract technology.

Block-chain is based on distributed digital ledger. This allows all the data owners-insurers, financial institutions, transport authorities, TPA, hospitals, government agencies, etc., to access it and the connected party can assess the historical data pertaining to his contract. Each of these data is encrypted and automatically stored in the block-chain as and when the transaction is completed. This helps the interested parties – insurers, brokers, reinsurers, banks – to have easy access to the required information from one master data base, which also provides greater transparency. This enables each of the involved parties to complete his/her transactions faster and each of the transactions is fully secured (encrypted) and irreversible. Any time a particular transaction history can be retrieved. For example, when the insurer issues a smart contract using block-chain, it automatically executes the required transactions of every party connected to the smart contract by automatically authenticating each transaction. Thus, the block-chain technology could be useful to insurance business in variety of ways.

Since the block-chain technology uses multiple data sources, i. e. transport, hospital, regulators and the relevant department data bases, claims settlement process can be completely automated which can significantly reduce the transaction time and cost of the insurers.

Figure-1. Product Innovations enabled by AI & Block-chain Technology:

Product Innovations

- ◆ Parametric Covers - Flight Delay - Flood Claims.
- ◆ Weather Insurance.
- ◆ ART Covers
- ◆ OEM - Automated Vehicle Cover, Pay as you drive.
- ◆ Smarter Risk Selection - Stratify the Risk (High/Med/Low)
    - ◆ Risk profiling, Risk Based Pricing, etc
- ◆ Long Terms Care - Prevention Care, Disease Management

Secondly the block-chain facility enables the insurers to design parametric covers for crop and livestock insurance by using weather data and satellite as well as drone images. Similarly, it would also enable insurers to have the parametric insurance for climate and disaster risks. (Refer: Figure-1). Swiss Re & AXA have developed parametric flight delay insurance solutions using smart contract, wherein the claim payouts are automatically triggered to the customers when there is a delayed (More than 2 hours) landing of their flights (Dirk Schmidt Gallas).

As the block-chain is well-integrated with all the relevant data sources, it can help in preventing fraudulent claims by cross-verifying claims information with the purchase transaction, police records and policy data. Even today, it is a very common practice in motor and health insurance, where the drivers or the clients (patients) may knowingly cause an accident or get admitted in a hospital just to lodge a claim with the sole intention of making a gain or benefit out of the fraudulent or exaggerated claims. Such cases will get easily detected with the use of the block-chain. In such cases, the smart contract in the block-chain would ensure that only genuine and valid claims are paid. And any kind of such soft frauds or even hard frauds, like submitting multiple claims to different insurance companies would get easily detected as the network in the block-chain can identify whether any such claim has already been paid or has been rejected due to such fraudulent reasons.

However, there are certain limitations to the block-chain technology while issuing complex policies like project insurance, cargo and liability insurance, etc., as it does not allow any changes to the original transactions previously programmed in. But the block-chain is highly suitable for simple insurance policies like motor, health, travel, etc.

Another drawback about the use of the block-chain is that the legality of the contract is highly questionable as the current laws and regulations about the block-chain are yet to be approved as a

legal contract. Secondly, the transactions or the policy issued under block-chain are generally encrypted in the code of the block-chain. Detailed regulatory guidelines need to be developed in order to convert it into a legal document in order for it to be recognized as a valid contract.

Chat-bots and Robo Advisors

Most of the customers currently access a web aggregator's website or portal for any insurance-related information. These web portals offer product and price comparisons, suggest lower premium rates, issue quotes and facilitate the purchase of simple insurance policies like motor, health, and travel insurance. These web portals are now being assisted by chat-bots, robo advisors, etc. Robo-advisors have also the capabilities to perform multiple tasks. Some of them are listed below (Accenture, 2015).

Robo-advisors can understand the client's needs:

They can collect the required information from multiple data sources, can identify the needs and preference of the customers, perform need-analysis, assess the risk perceptions - identify whether the clients are highly risk- oriented or risk-averse; they can also assist the intermediaries for better sales presentations.

Simple underwriting:

As robo advisors can access the customer and policy data, they can also do basic underwriting like need-analysis, suggest a suitable policy, issue a quote, collect the premium and issue the policy to the client's account directly.

Review and monitoring of sales performance:

Robo-advisor can undertake periodical review of the sales performance of the intermediaries and operating offices; it can develop key performance indicators and sales or risk dashboards for quick monitoring of the performance. Though chat-bots and robo-advisors can perform multiple tasks, executing them requires appropriate machine learning codes and have algorithms developed. If there is any error in the coding or the execution of the algorithms and the robo-advisor makes any mistakes, suggests wrong policies, causes data errors, allows usage of wrong data sources, the result would be such that customers would incur financial loss due to such errors or render wrong advice. Then, who is to be held liable - InsurTech firms, insurers or customers? And what are the regulatory guidelines required to protect customers' interests. These are the areas that need to be debated and decided upon.

Augmented Reality (AR)

Augmented Reality is a wireless device linked to a cloud data base and mobile applications which
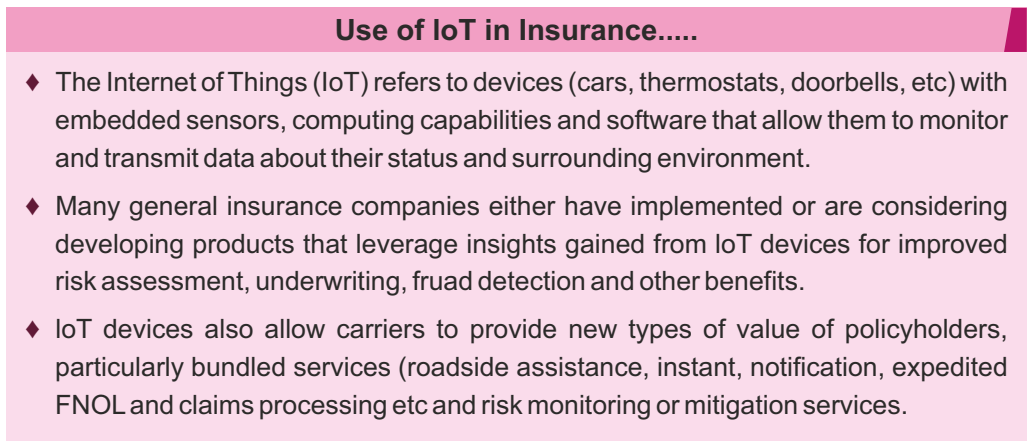
use high definition stereoscopic visual displays, voice and gesture activated controls. Hence, it is a virtual device fitted with 3D smart-glass technology that can display the magnified images of the pictures, photos and videos taken from a distant location on real-time basis. AR can enable the field staff, employees, technicians and professionals to perform their technical tasks with much more efficiency, safety and speed and can improve their productivity significantly.

AR can be used in banking, insurance and medical sectors as well as in manufacturing, logistics, automotive, energy, transportation and high-tech areas. Use of AR in the insurance business has been growing as it has a tremendous scope in the areas of underwriting, loss assessment, survey, risk inspection, health insurance and risk management. It can help insurers in improved underwriting, faster claim settlement and better loss assessment as it enables the surveyors, field workers and professionals to communicate with the underwriters and claims officers directly through the AR devices.

One of the reasons for the slowness in settlement of complex claims is the delay in accurate loss assessment and delayed receipt of survey reports. With the help of AR technology, the technician or the field staff can visit or use AR device fitted with drones to arrive at the loss assessment and survey the incident easily and send instant images, texts, videos, etc., on real time basis to the insurers or senior surveyors for their interpretation and report preparation. Even it allows the insurer and the surveyors to instruct the drone or any one on the field to do the assessment as per their requirement. Similarly, AR can also help doctors carry out more accurate and quick surgeries with the help of the senior surgeon or experts as it allows the doctors share the live-videos of the surgery, X-ray, CT scan images with the experts. They can instruct and or guide the operating team or give their opinions on real-time basis. This would improve the accuracy and success rate of the surgery. Thus, AR technology could help in reducing the claims cost impact, detect fraudulent claims, faster claim settlement, improve underwriting and risk management in the insurance sector.

Big Data, Internet of Things (IoT) and Telematics

The Internet of Things (IoT), Hand-held devices, Telematics and applications generate quintillion bytes of data every day. Social media and wearable devices like Fit bit and Apple are on the watch do generate huge amounts of personal activity data including health condition at granular level.

Figure-2. Use of Internet of Things (IoT) in Insurance:

Use of IoT in Insurance.....

♦ The Internet of Things (IoT) refers to devices (cars, thermostats, doorbells, etc) with embedded sensors, computing capabilities and software that allow them to monitor and transmit data about their status and surrounding environment.

♦ Many general insurance companies either have implemented or are considering developing products that leverage insights gained from IoT devices for improved risk assessment, underwriting, fruad detection and other benefits.

♦ IoT devices also allow carriers to provide new types of value of policyholders, particularly bundled services (roadside assistance, instant, notification, expedited FNOL and claims processing etc and risk monitoring or mitigation services.

With the help of IoT data, insurers are able to develop innovative products like Wellness Insurance, Disease Management, Vacation Insurance, Peer-to-Peer Insurance, etc. Based on the fitness level or improvement in health condition of the customers, insurers can now offer discounts in their premium or enable enhancement of the sum assured at the time of renewal.

Similarly, auto insurers can use telematics data to offer risk-based premium rates based on the driving behavior patterns of their customers. They could offer discounts to good drivers and penalize the bad drivers. Similarly, CIBIL Credit scores can also be used to understand the customer behavior. A recent study done in the US, indicates that the customers, who have good credit scores, are also found to be good policyholders in terms of lesser claim experience. Based on these data, some of the insurers in the US now offer lower premium rates to their customers whose credit scores are rated as good.

Most of developed markets, like the US, the UK, and Europe have "open data" websites which offer historical data of important government departments, i.e. transport, health, education, infrastructure, worker-safety, energy data and so on.

Insurers can collaborate with these departments by integrating their system with the database of their own departments. Insurers can use AI & ML algorithms to derive their underwriting factors. For example, Face-recognition technology can be used to predict the required underwriting factors, such as age, gender, smoking habit and body mass index (BMI). Further, correlating these data with the data from the wearable devices such a Fit Bit or physical activity tracker on a mobile phone, the present health status and expected life expectancy of the customers can be predicted. Importantly, such data insights can help the insurers customize their products and service offerings. (CIPR, 2017).

Telematics is the device of IoT which is being used by the auto insurers globally. This helps insurers in monitoring the driving behavior of the policyholders and also in minimizing the motor claims. For example, the Italian Insurance Association highlights that telematics have now been installed in over 2 million cars in Italy, which enables insurers to design telematics- based insurance or Usage Based Insurance (UBI). The telematics device, which is fitted in the car, tracks the driver's behavior like the average speed, frequency of acceleration, speed, tailgating, signal jumping, etc. The device continuously transmits these data through GPS to the insurer's system. With the help of these data coupled with the policy terms and claims data, the insurers are able to analyze the data and predict the likelihood of claims during the policy period. This helps insurers develop a usage-based insurance like Pay as you drive, Pay as per the mileage driven, Vacation Insurance, etc.

Thus, the usage of telematics is expected to reduce the motor claims outgo drastically and also minimize the claims processing time as well the fraudulent claims significantly. The Zurich Fleet Intelligence Report (2016) indicates that telematics could reduce claims cost by 20%, operating costs by 10%, and fuel consumption between 8% to 11% approximately. The study by IHS Markit projects that the number of customers who are likely to subscribe to telematics is expected to grow to 142 million globally by 2023.

2. Big Data and Aritifical Intelligence Drive The Digital Revolution In Insurance

This section deals with (i) the applications of Big Data and Artificial Intelligence, (ii) how these technologies drive digital revolution in insurance and reinsurance business, and (iii) the challenges and opportunities in adopting them in the insurance sector.

Major points discussed in this section are:

- Challenges and Opportunities of Big Data in Insurance Business
- Applications of AI-Machine Learning tools in (Re)Insurance Business
- Impact of Deep Learning - NLP, Pixel Mapping and Virtual/Augmented Reality for Better Underwriting, Risk Management and Claims Settlement.
- Use of GIS-Enabled Technologies to Mitigate Catastrophe Risks

Challenges and Opportunities of Big Data in Insurance Business

Today, with the exponential rise of internet users, connected devices and Internet of Things (IoT), use of telematics, social media, wearables and sensors, etc., huge volume of data, both structured as well as unstructured (textual, mails, social media data, pictures, video) are getting generated. Analyzing such volume of unstructured data and translating them into meaningful intelligence

for instant decision making has been one of the major challenges of Big Data. More so in the insurance business. Most of the data that comes from the clients, surveyors, TPAs and intermediaries are mostly unstructured and also in different formats - emails, WhatsApp messages, telephone calls, PDF, images and pictures. Making sense out of these data is really a challenge. Secondly, it is difficult to capture these data through the legacy IT systems into a usable format. Besides, a considerable volume of data is not received digitally. Deep Learning Algorithm, which uses pixel images, is being used today to process simple motor accident claims, and, the payment is credited directly into customer's accounts instantly.

Figure-3. Importance of Artificial Intelligence:

Artificial Intelligence

♦ Increase in Data Volume - 2.5 Quintillion Bytes of Data every day.

♦ Internet of Things (IoT) - 18 billion by 2022

♦ Huge Unstructured Data - Emails, PDF, Doc, Images, etc.

♦ AI in every phase of Life - Smart Home, Smart Contract, NLP - Alexa, Consumer Durables, FI & Insurance, etc.

♦ IBM, Apple, Google, Amazon, Lemonade, Progressive, AVA.

(Source: Katia Dwyer, Risk and Insurance.com)

Artificial Intelligence and Machine Learning can help in translating these data into meaningful insights. NLP-based devices, like Alexa, Siri, Google, etc., convert these unstructured data into easily communicable Natural Linguistic form with the humans. Most of the AI-Algorithms are programmed to understand, comprehend, process these data into smarter sensible intelligence that the executives need today. These insights can be used by the insurers to understand the customer needs and generate customized policies or specific and need-based service solutions to be provided to the customers, thus enhancing their experience into more satisfying and enduring relationships with the insurer.
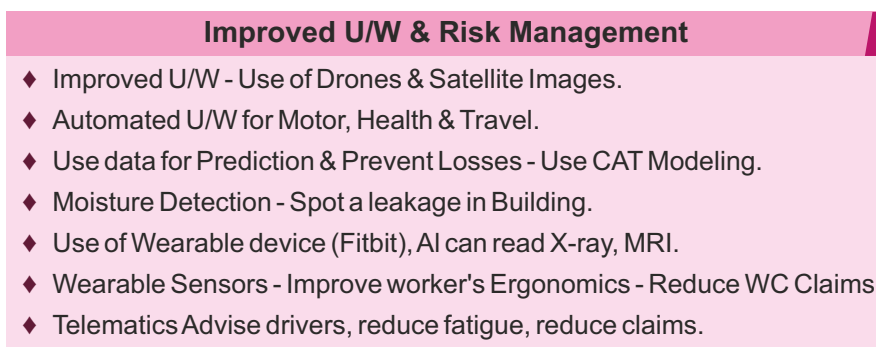
Applications of Artificial Intelligence in Insurance and Reinsurance Business

Artificial Intelligence and Machine Learning models are rapidly evolving and transforming the insurance business significantly. Many of the global companies, like IBM, Google, Apple, Facebook and Amazon, are leveraging the AI-Algorithms and models into actionable insights. Further, a large number of InsurTech companies are involved in processing the unstructured data and analyzing the complex insurance data into actionable intelligence outputs, simplifying their operations and process flows, building more sensible and scalable IT infrastructure to support the insurance companies.

Artificial Intelligence and Machine Learning Algorithms are now being used by the insurers globally. According to a recent research by Novarica, about 30% of the insurers have either fully implemented AI or ML Algorithms or piloted them, and, nearly 50% of them are planning to implement these technologies in the next 2 to 3 years. AI and ML techniques are expected to yield numerous benefits to the insurers. Some of the important applications are: Improved Underwriting and Risk Management, Innovative Products, Faster Claims Settlement, Simplification of Business Processes and Operations, Better Fraud Detection and Control, Development and Validation of Risk Models, Customization of Products and Service Solutions, Better Customer Satisfaction Experiences.

Machine Learning and Deep Learning techniques use a huge volume of data and the machines learn the historical risk patterns quickly from the past data and can suggest appropriate risk solutions to the underwriters. The algorithm builds risk models and validates them using the past data, and, more importantly, the process can predict the expected claim payouts and likely loss amounts as well.

Figure-4. Improved Underwriting and Risk Management:

Improved U/W & Risk Management

♦ Improved U/W - Use of Drones & Satellite Images.
♦ Automated U/W for Motor, Health & Travel.
♦ Use data for Prediction & Prevent Losses - Use CAT Modeling.
♦ Moisture Detection - Spot a leakage in Building.
♦ Use of Wearable device (Fitbit), AI can read X-ray, MRI.
♦ Wearable Sensors - Improve worker's Ergonomics - Reduce WC Claims
♦ Telematics Advise drivers, reduce fatigue, reduce claims.

These predictive models can help in determining the appropriate premium rates for different customer segments and/or risk profiles with better accuracy. This kind of differential premium rates or risk-based premium would enable insurers to adequately price their products in accordance with the risk profile of the customer. It helps insurers to minimize the impact of moral hazard and ante selection.

Moreover, Machine learning can automate basic and simple underwriting process for the portfolios like Motor OD and Health, PA, Travel Insurance, etc. For instance, the underwriter requires certain important risk factors, like the age of the person, gender, pre-existing diseases, if any, family-health history and life-style data, in order to approve the health underwriting. Block Chain and AI can automatically verify the required personal details of the customer from other relevant sources, like hospital records, previous claims' history, family physician system,

laboratories on real time basis. Thus the insurer would be able to issue policies instantly. Similarly, AI-algorithm can track the customer's personal data from the wearable devices like Fit bit; provide the fitness level of the customers to the insurers on real-time basis.

Further, AI can help in verifying the accuracy of the customer-data quickly at the time of underwriting, by instantly cross verifying with multiple sources, like hospital, industry statistics, social media, news media and government reports, if the need arises.

AI and ML algorithms are now being used to analyze the images from X-ray, MRI and CT Scans and provide interpretations to the doctors. There are quite a few health start-up companies that are currently using them in India.

Figure-5. Applications of AI & ML in Claims Management:

Claims Management

♦ Use of ML - Learns faster and Predict possible Claims.

♦ Accurate Loss Assessment - Drones & Satellite Images

♦ Faster Claims Settlement - 3 Minutes, Lemonade, AVA - 3 Seconds (Theft Claims).

♦ Simplifying Claims Process - Automation

♦ Accurate Claims Reserving

♦ Requires Cultural Changes.

♦ Transparency - Regulators, Customers, Shareholders.

AI-Techniques are really transforming the claims settlement process as the machines can be programmed with the historical data of claims, including photos and images. It enables either the bots or the mobile application instantly assess the claims and settle them. Metromile and progressive auto insurers have introduced AI-assisted claims settlement process (automated claims processing system) which can process and settle the claims on real-time basis. The system uses the deep learning algorithm to determine the cost of claims payable on a motor accident claim depending upon the extend of damage which is ascertained based on the pixel analysis of the photos of the accident.
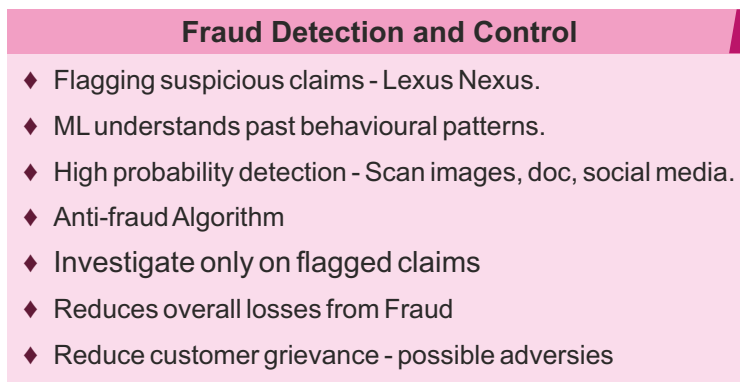
Zurich Insuracne Company has also introduced the AI-powered claims assistant with automation of claims processing to personal accident claims, which has helped the company in saving nearly 40,000 work hours and reduced the claim processing time to 5 seconds.

In 2017, Lemonade, a peer-to-peer insurer had implemented AI Claims Bot which settled the claim in a record time of 3 seconds (O' Donnell. A 2017). As soon as the claims Bot received a theft claim from the customer, it reviewed it in a second by running 18 anti-fraud checks and

validated it with the policy conditions. Then, it approved the claim and instructed the bank to wire-transfer the amount of the claim to customer's account. Simultaneously, it also informed the customer about the settlement of the the claim.
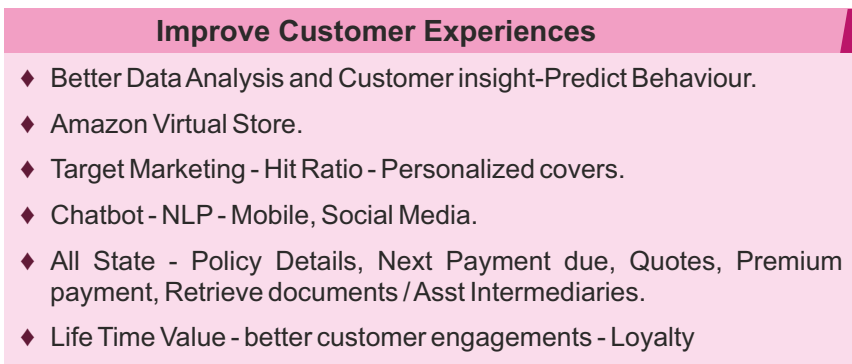
Similarly, in the case of crop insurance claims also, the claims or the extend of the crop loss can be determined, based on the pixel analysis of the sattelite or drone images. The farmer has to just upload the photos of the crop damage on a given application format, thereafter the AI or ML can take over and help in determing the extend of the damage and the claim amount payable instantly.

Figure-6. Applications of AI & ML in Fraud Detection and Control:

Fraud Detection and Control

♦ Flagging suspicious claims - Lexus Nexus.

♦ ML understands past behavioural patterns.

♦ High probability detection - Scan images, doc, social media.

♦ Anti-fraud Algorithm

♦ Investigate only on flagged claims

♦ Reduces overall losses from Fraud

♦ Reduce customer grievance - possible adversies

The Insurance industry incurs a considerable amount of losses annually by way of fraudulent claims, which is estimated to constitute around 25 to 30% of the total claims. Machine learning algorithm uses predictive modeling, based on the historical data, and the computer programme continuously learns and updates itself every time a different type of fraud is reported. It is enabled to cross-verify the incident from various sources of structured and unstructured data. These may include policy copy, surveyors' report, bill estimates, and statistics from OEM, pictures, images, video, etc., to detect and signal the fraudulent claims.

AI and ML algorithms are quite useful in detecting the fraudulent claims instantly by red flagging the suspicious items and cross validating them from multiple data sources. For instance, the algorithm can easily detect the fraudulent claims in health insurance, through cross-verification of various medical records from insurers, hospitals, diagnostic centers, laboratories and the social media.

Figure-7. Improved Customer Experiences:

Improve Customer Experiences
♦ Better Data Analysis and Customer insight-Predict Behaviour.
♦ Amazon Virtual Store.
♦ Target Marketing - Hit Ratio - Personalized covers.
♦ Chatbot - NLP - Mobile, Social Media.
♦ All State - Policy Details, Next Payment due, Quotes, Premium payment, Retrieve documents / Asst Intermediaries.
♦ Life Time Value - better customer engagements - Loyalty

AI can make the on-line platform and the system to communicate with customers through various modes of communication, viz. chat bot, claim assistants, e-mails, telephone calls, social media, etc. Most insurers today use claims bot or claims assistants enabling the customers to interact with them and these intelligent bots can communicate with the customers in their own languages, understand the nature of the incidents, and auto-fill the claim's form and forward it to the claims officers for quick action. This instantaneous system of automated claims processing saves valuable time for the insurers as well as customers thereby providing the customers unique and more satisfying experiences.

All State Insurance company uses AI-powered intelligent chat bot which can provide quick premium quotes, policy status, inform customers about their next premium due dates, and enables customers to remit their premium in multiple ways. It can also help intermediaries and brokers provide the required information quickly and enables complete sales presentations.

A research report from Deloitte (2017) indicates that in the next 3 to 5 years, more than 80% of customers' interactions are expected to occur through on-line platform or on AI-driven chat bots. As AI and Machine learning is really transforming the customer experiences through highly personalized and faster services, these tools can help insurers improve customer satisfaction and retain loyalty to a great extent. AI-powered algorithm can provide large volume of customer data which would enable insurers understand the exact customer requirements and customize their products and services. The customer's personal data, clubbed with their past transaction details, behavior and attitude can help insurers predict the likelihood of the customer staying on with the company along with their life-time value which can help in developing a tailor-made or targeted marketing and customer loyalty programmes to retain them for longer time.

3. Embracing the Digital Innovation in Insurance Business

Innovation through new technologies is a key driver of change in the insurance industry today as this has led to immeasurable efficiency gains, i.e. development of innovative products, improved underwriting, faster claim settlements, improved policy servicing, and reduced cost of operations, thus enabling customized and unique customer experiences with improved operational efficiency.

The recent proliferation of internet connections - Internet of Things (IoT), Artificial Intelligence, Block-chain Technology, Connected Cars, Smart Homes and Smart Devices - have enabled the development of innovative technological solutions. This has also led to the possibility of lowering the barrier for market entry, paving the way for greater competition or "disruption" of the insurance industry.

More importantly, development of such innovative technologies enables insures examine the possibilities of new methods of service provision as well as greater opportunities for data collection that can lead to better risk identification and mitigation measures. Secondly, as insurance products and services deal in intangible items, it is better suited for technological innovation leading to lower transaction costs and expediting delivery of services.

Innovation is generally regarded as a positive development, delivering convenience and efficiency. For example, the installing of cash points (ATMs) has assisted people to gain access to cash even before or beyond business hours and lowered operational costs for banks. Improvements in communication networks and processing capacity have led to faster payment processes. Insurance claims can be processed via online platforms, within a shorter time.

Hence, we can certainly conclude that digital innovation in the insurance business has already led or would definitely lead the potential digital disruption in the following areas:

- Reinventing insurance to develop new-age products for emerging risks.
- Enhancing insurance value chain - intelligent underwriting to faster settlement of claims.
- Leveraging digital innovation to accelerate the growth.
- Enhancing the engagement with customers - deploying high value-add AI models to provide customers with valuable risk insights

Further, insurers and the re-insurers need to collaborate with AI partners/insuretechs to build an effective and efficient data ecosystem to support AI/advanced analytics application across the organization. Though digital disruption through these new-age technologies has already been underway, and, it is expected to progress at much faster rate in the coming years. Therefore, there is strong need for digital-friendly regulatory guidelines at the same time to restrict the misusage of the data and the technology to protect the interest of all the players in the insurance arena – stakeholders and more importantly the policyholders.

Regulatory Implications and Challenges

Implementation of new-age technologies, like block-chain technology, IoT, Robo Advisors, Telematics and AI-driven Machine Learning tools, etc., offer manifold benefits to the insurers and customers. The insurance industry is now in the process of adopting them and some have already implemented them into their systems and processes. As the market is also maturing, it is very important for the regulators to review the existing regulations and introduce relevant regulatory changes in the light of these data and AI-powered machine-learning tools that are being adopted by the insurers, re-insurers, risk managers and intermediaries-brokers.

Some of the important regulatory implications are highlighted below:

- As the block-chain technology is a distributed digital ledger which uses data from multiple sources and many external systems, vendors and third-party agencies are expected to be involved. This would bring major regulatory changes as it requires the consent of different players and regulators like the SEBI, RBI and IRDAI, to approve the transactions generated through block chain.

- As the legality of the block-chain contract is as yet unclear, its enforceability could be compromised. Secondly, as the smart contracts or policies generated by the block chain would have encrypted codes; there are certain regulatory guidelines necessary to get the legal recognition for the contract.

- Since India does not have a 'sole regulator' for all the three financial market segments (Banking, Finance and Insurance), like the FSA in the UK, would it be feasible to adopt the block-chain technology in the insurance sector?

- Currently, when Robo Advisors and/or chat bots are being used extensively in the financial sector - both in banking and insurance sector, it is imperative to discuss the regulatory implications, in case a wrong advice or policy is suggested by the bots and the customer incurs a financial loss.

- Machine-learning algorithm and other models use multiple data sources and types. Then how can the authenticity of these data sources be verified/justified? Regulatory guidelines should therefore be issued to prescribe insurers to certify the authenticity of the data sources.

- Machine-learning tools use complex statistical models like neural networks and fuzzy logic techniques to derive data insights. Sometimes, it may be difficult for the insurers and intermediaries to understand what data inputs are used and what are the logic behind the functioning of these algorithm. If these technologies are not used appropriately or supervised, it can create a serious situation in the market. Hence, the regulators should make adequate training necessary for the InsurTech companies and/or insurers who are using their outputs to have better understanding of the functioning of this algorithm.

- AI and ML tools use micro level and more granular data to predict risk behaviors. It also enables insurers to estimate the appropriate premium rate in accordance with the risk profile of the customers. Though it may benefit insurers ensuring them better premium rates and premium adequacy, it does not ensure fairness and equitability among the customers. Though it benefits the customer segments with low-risk profile, but it may discriminate the high-risk customers and adversely affect them, thus making insurance unaffordable.

- Most of these new-age technologies, like AI, ML, IoT, Big Data, and Telematics use large volume of customer's personal data. With the introduction of GDPR and Data Protection Bill, the insurers and InsurTech companies need to be made aware about the importance of protecting customer privacy and rights. More importantly, regulatory guidelines are required to sensitize the stakeholders and users of the customer's data and ensure that the personal data protection guidelines are not violated.

- There is a strong need for drawing up a 'code of ethics' for the data users and insurtech companies to safeguard and take precautions while dealing with the customer's personal data.

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