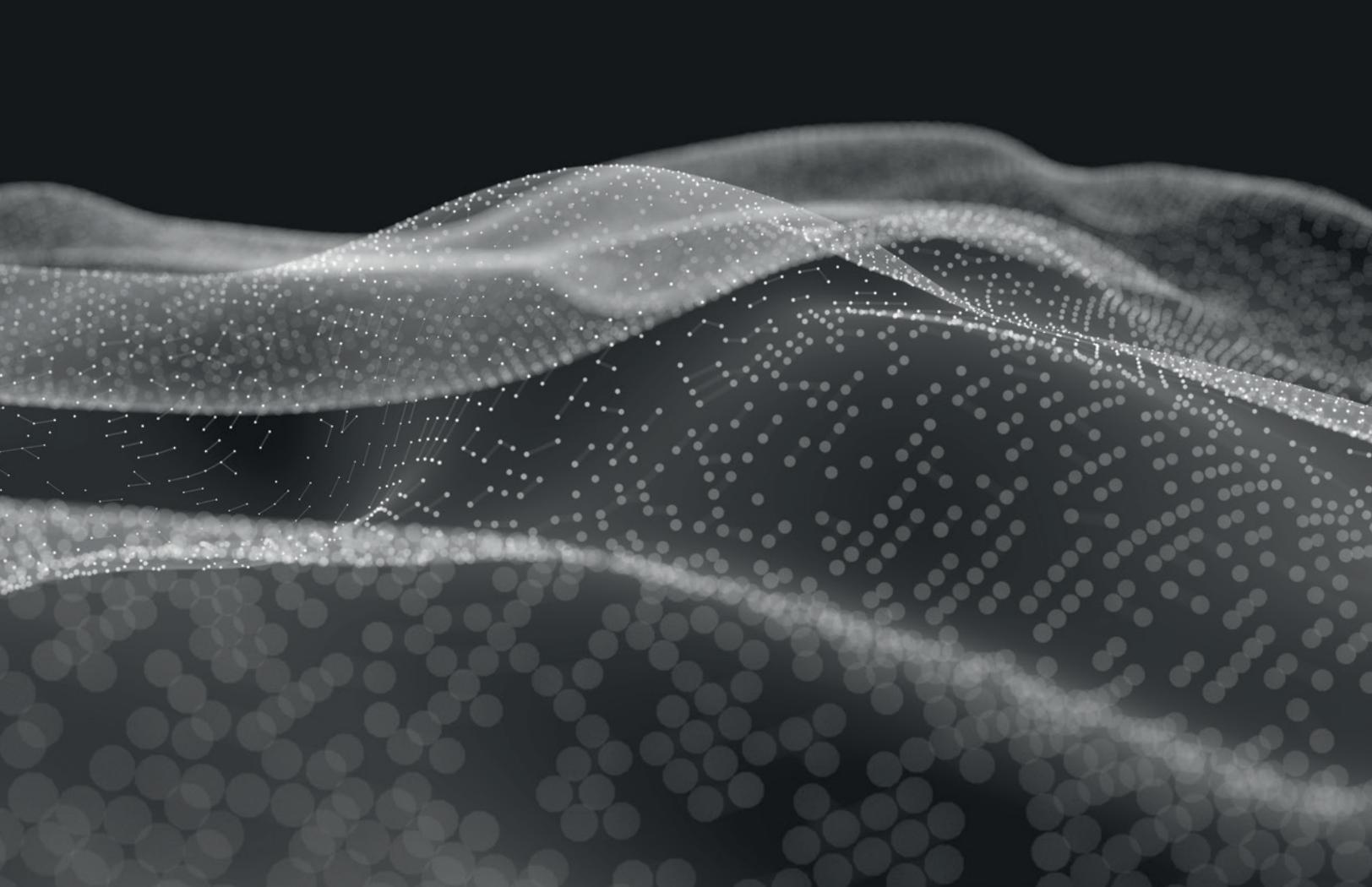


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IMPACT OF COVID-19 ON DATA AND ANALYTICS FOR LIFE INSURANCE INDUSTRY



INTRODUCTION

2020 is a turning point for the insurance industry. The COVID-19 pandemic will force many insurance providers to reimagine their business operations and customer experience. The unique and unparalleled nature of this crisis brought about challenging new circumstances with economic shutdowns and physical distancing. Increased claims, additional risk, and solvency challenges are only a few examples of the current issues facing the insurance providers.

Nevertheless, the industry is persevering. Insurance providers are accelerating investment in digitization and closing gaps in business continuity models. The integration of third-party data to mitigate risk is increasing in urgency. During this time, customers are reminded of how significant the role of insurance is in their lives. For example, health coverage assists with drug

and treatment plans for the ill; employment insurance helps those impacted by the economic turmoil, and business interruption coverage supports businesses unable to operate.

Companies must continue investing and enabling access for customers while ensuring underwriters are well-informed of upcoming risks.

Crises like COVID-19 highlight the need for insurers to seamlessly integrate reliable data sources, actionable insights, and responsive control measures to help navigate the uncertain landscape. By leveraging data and investing in digitization and analytics, insurers can navigate this challenging period and move the industry forward.

THE IMPACT

General Insurance

COVID-19's impact on general property and casualty insurance is mixed across lines of business and product types:

- Auto insurers are experiencing significant decreases in claim frequency due to government-imposed quarantines reducing drivers on the roads.¹ Some firms are offering temporary relief on premiums.² However, claim severity is rising due to racing
- Travel insurance providers covered medical losses for those on affected cruises and trip cancellation coverage to suddenly curtailed plans. As conditions extended, firms adjusted policies to include pre-existing condition provisions for COVID-19³
- Event cancellation insurance is covering losses from wedding cancellations to the Wimbledon Tennis Championship. Munich Re has already highlighted this as a key driver for COVID-19 related losses.⁴ Swiss Re CFO John Dacey confirmed a \$250 million exposure due for the 2020 Tokyo Olympic games⁵
- Isolation and quarantine requirements mean policyholders need access to advisors or improved digital offering to submit claims, policy changes and payments impacting health, group benefits, life, auto, home and business policies
- Commercial Insurance claims are anticipated to rise, with business interruption coverage being the biggest source. For example, Intact provisioned \$83 million exclusively for commercial claims in Canada in US during Q1 2020.⁶

Business interruption insurance, which usually excludes pandemics, is generating unprecedented interest. The National Association of Insurance Commissioners (NAIC) has communicated the industry's reluctance to accommodate anticipated surpluses in claims as exclusions in terms also mean

excluded from rating considerations.⁷ Nevertheless, regulators and politicians in the U.S. and U.K. are scrutinizing coverages as lawsuits emerge. Claimants argue vague wording or restrictive terms are limiting coverage. Some U.S. states are attempting to enact legislation; for example, Massachusetts tabled a bill in early April that "...require certain insurance companies in the commonwealth to provide business interruption insurance coverage to their insured in connection with the COVID-19 pandemic."⁸ Insurers must balance coverage provisions and ratings and continue working closely with governments. The cooperation ensures that the government takes the appropriate legislative measures to protect both providers and insureds.

Life and Health Insurance

Life and Health insurers face multiple impacts across their value chains, starting with significant exposure due to drops in equities and interest rates. Yield curves have sunk to historic lows in the U.S. and breached into negative value territory in the U.K. Such conditions create major solvency challenges for insurers. Additionally, COVID-19 life claims will potentially skew mortality results impacting the profitability of existing life contracts and payout expectations. Rising concerns regarding lingering health-related issues resulting from the infection will likely modify future mortality actuarial models. Early studies from Wuhan analyzing victims found evidence of long-term liver damage.⁹ Other tests identified evidence of cardiac injury¹⁰ and lung damage.¹¹

While it is uncertain to what material extent these factors will have on life and health insurers, data can act as early warning signals to inform tactical changes in underwriting and distribution. This can buy precious time until detailed medical data can be acquired and modeled appropriately by actuaries. Insurers positioned to proactively integrate new data and quickly derive and apply insights will outperform their competition.

OPEN SOURCE DATA GOES MAINSTREAM

The COVID-19 pandemic is accelerating data awareness within the general population, dashboards such as those from Johns Hopkins University¹² and the WHO¹³ have emerged as primary sources for media outlets and individuals. The citizen data scientist community has been given access to datasets through platforms ranging from Kaggle and Data World to AWS and GCP. Never has the world shown such a willingness to adopt data-driven approaches to solving a global problem.

Access to these datasets provides insurers with potential insights into the current crisis. They can also serve as templates for further data integration and future pandemic modeling. For example, we considered data across these five categories:

Health	Government	Demographic	Environment	Economic
<ul style="list-style-type: none"> • Johns Hopkins University CSSE • USAFacts COVID-19 Cases by U.S. County • WHO Global Research on Coronavirus Disease • COVID-19 Open Research Dataset • The COVID Tracking Project • Our World in Data – COVID-19 Testing • ECDC – COVID-19 • CDC – National Vital Statistics System, COVID-19 	<ul style="list-style-type: none"> • Definitive Healthcare: USA Hospital Beds • Harvard Global Health Institute – U.S. Hospital Capacity • UNESCO School Closures • ACAPS COVID-19: Government Measures Dataset • Oxford Coronavirus Response Tracker 	<ul style="list-style-type: none"> • Google – Social Determinants of Health 7 Datasets • Apple – Mobility Trends • Google – Mobility Reports • COVID-19 Twitter Dataset • USA Facts – Population & Demographics • Statscan – Population and Demography 	<ul style="list-style-type: none"> • AQICN – Worldwide COVID-19 Dataset • OECD Data – Environment • UNSD – Environmental Indicators • European Environment Agency – Data & Maps 	<ul style="list-style-type: none"> • Metabiota • World Bank – COVID-19 Related Datasets • Statscan – COVID-19: A Data Perspective • U.S. Census – COVID – 19 Demographic and Economic Resources

Health

Health datasets include those on the rate of infection used to monitor the disease and how it is spreading, and testing indicators of the ability to contain the disease. Research datasets containing medical studies related to the disease, often presented as a collection of text documents, can be mined using NLP techniques.

Insurers can benefit by applying innovative analytical techniques to this data. New health datasets provide classification variables used to train machine learning models. When combined with other types of datasets to identify new trends, variables can potentially identify upcoming pandemics or health crises. For example, Swiss Re is leveraging probabilistic modeling for pandemics.¹⁴

Preliminary data has limitations to consider. Fundamentally, data irregularities and inconsistencies are driving the definitions and reporting. For COVID-19 specifically, uncertainty exists regarding the transmission parameters such as the reproductive number and incubation period and recovery periods, currently assumed to be five days.

Despite these limitations, understanding early data may not be reliable enough for final mortality considerations, enhancing risk modeling helps protect long term profitability.

Government

As research teams identify conditions for infection rates, other teams and analysts try to assess differences in the severity of infection and survival rates. Government datasets about hospital capacity and preparedness of health institutions responding to the pandemic are being reviewed to explore why regions have different survival rates. Examples of datasets include definitive healthcare's analysis of hospital beds and Harvard's examination of U.S. hospital capacity. These can be used to identify better response plans and risk mitigation strategies.

New datasets related to other government topics include variables on everything, from enacting legislation to school closures and shutdown orders. This data is versatile and can be layered on

other health datasets to identify predictive signals in disease spread or containment. By extracting the key variables from the government dataset, it is possible to isolate certain measures that can influence positive or negative outcomes. Governments' ability to manage disaster responses directly impacts insurers' risk modeling.

Demographic

Along with traditional demographic data sources insurers leverage, COVID-19 has resulted in the creation of new sources. Apple and Google released mobility reports on their three billion combined users.¹⁵ While some jurisdictions can easily enforce participation, others with enacted privacy legislation may not be able to. Methods of contact tracing and data capture continue to evolve.

Studies already conclude certain demographic factors, such as age and underlying conditions, contribute to COVID-19 infection and mortality rates. New research shows gender may be linked to higher death rates.¹⁶ Many of these insights are being presupposed by the release of public datasets already reflecting these trends. Insurers leveraging the social determinants of health can cross-reference existing assumptions with newly released data to assess assumption accuracy.

While assumptions with contact tracing, age and gender help with early warning and detection, it is important to take caution when making too many assumptions. Datasets regarding age, gender and ethnicity may provide results with correlation but not causation linkages, while datasets such as Apple and Google, regulation and participation may cause variation in data without interventions like Taiwan and South Korea who forcibly enabled location tracking.¹⁷

Environment

Emerging studies indicate environmental factors contribute to COVID-19 mortality. One study highlights the connection between long-term pollution exposure and severe COVID-19 infections.¹⁸ Another study goes further to claim that air pollution can act as a catalyst for spreading the disease.¹⁹

The World Air Quality Index project compiles all official air pollution data from environmental agencies around the world in a single, convenient location. They have released an initial, official COVID-19 dataset, but their resources are valuable for ongoing analysis. Other environmental datasets related to COVID-19 are still emerging, such as water quality and greenhouse gas emissions, although correlations of these variables are still undefined.

Economic

Economic data has long been a health indicator, both physical and mental. Communities in declining economic circumstances often have higher rates of depression, suicide, and communicable diseases. Economic data provided by companies such as CoreLogic supply data focus on specific market elements, such as housing valuations and foreclosure rates. Data sets such as the World Bank's Global Health Dataset assimilates several international sources on health and economics, providing a good source to compare, contrast and benchmark economic conditions around the world.

Government census bureau data, in conjunction with other types of datasets, assist with risk modeling as well as morbidity and mortality calculations. Next-generation level insurtechs are generating creative models. Metabiota specializes in pandemic risk modeling based on inputs like this. Metabiota's database combines biological, socioeconomic, political and environmental data to visualize the frequency, severity and duration from over 100 years of human outbreak events.²⁰



DATA APPLICATIONS

Given the rapid evolution of external data sets, how might insurers use the data across their organizations?

Early Detection of Risks and Claims

With the increasing risk of losses due to wildfire risks, P&C insurers were eager to have access to greater data. Looking to the present day, insurers have access to a breadth of fire risk data from including fire danger, behavior and weather²¹. Using interactive maps, users can identify areas with higher wildfire risk and adjust their pricing, distribution strategies and risk management techniques associated with wildfire losses. In Canada, the Fort McMurray wildfire saw insurance payouts of more than \$3.7 billion²². Insurers leveraged data to identify claim damages, support clients with emergency living expenses and expedite claim processing.

Similarly, external data helps identify emerging risks and prevent anti-selection from skewing the performance of a book of business. Anti-selection is when a product is exploited – i.e., buying home insurance due to an oncoming storm skewing performance by the carrier's taking a higher proportion of at-risk policies than a standard distribution curve supports.

Dashboards, such as Johns Hopkins' COVID-19 results, help underwriters identify regions with high infection rates. Dashboards could be enhanced by layering on data such as Health Professional Shortage Area (HPSA) Scores from the U.S. Department of Health and Human Services (HHS), identifying areas experiencing infections and are underserved by healthcare implying higher risks. By enriching the insurer's data with the that from JHU and HHS, they can identify pockets of risk within their book of business and regions that present greater risk from a sales and distribution perspective.

External data can also inform cross-selling strategy. Sentiment indicators determine when reaching out to clients would be beneficial. For example, Metabiota's Pathogen Sentiment Index measures public fear and anxiety towards infectious diseases. As the sentiment towards a pathogen worsens, clients may be receptive to adding to or altering their coverage. Aligning the products and marketing to client needs generates effective sales closing rates and brand image (the carrier has 'products that are right for me.'). Balancing this with the previous use case ensures target marketing does not overlap anti-selection conditions.

Risk Scoring

Predictive risk scoring allows insurers, especially those with relatively small claims volume or risk counts, to assess risks more accurately than they could achieve using only internal data, leading to more effective policy pricing. For example, the Canadian Loss Experience Rating (CLEAR) system uses auto claims from multiple insurers, crash tests and repair estimates to give relative indices of the expected claims loss for private passenger vehicles. Scoring the data allows for a compilation of data points for benchmarking. Rare and popular models can be compared, and the indices are built directly into rating and underwriting models.

Life and health insurers could combine internal health questionnaire data and claims experience with external government and health sources to create risk indices that reflect the effects of local environmental conditions. For example, incorporating an air quality risk index would allow insurers to quantify the difference in risk between applicants based on the usual air quality in their respective locations. Like CLEAR, these indices would be even more meaningful if they could incorporate claims experience from all life and health insurers.

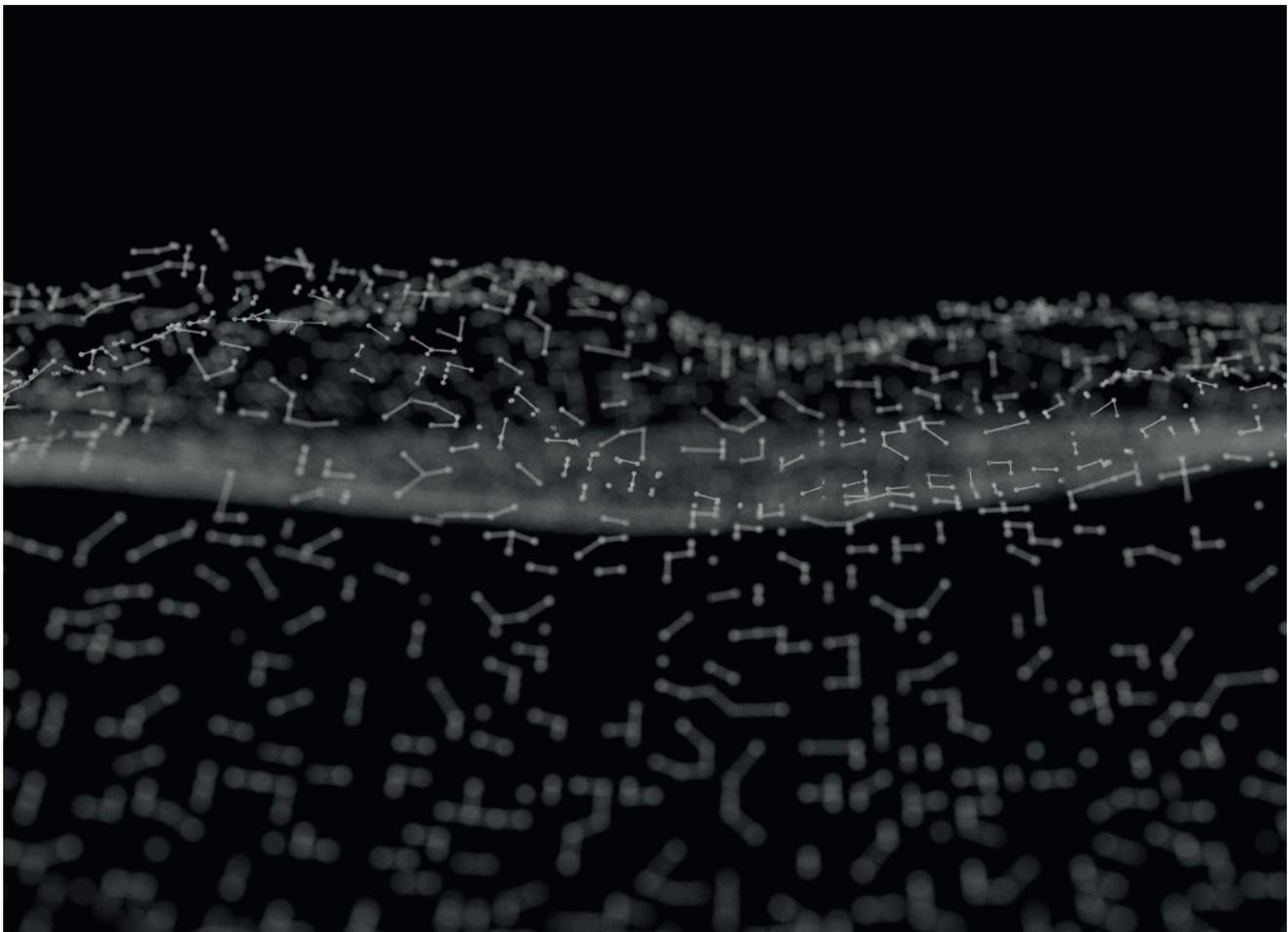
Market Analysis and Client Engagement

When choosing the allocation of marketing spend across regions, insurers can use the data sets to define low-risk regions or high target fit strategies. By controlling marketing this way, insurers can not only reduce potential anti-selection elements, but they also optimize profitable factors for growth campaigns with long term potential impacts on portfolios. Currently, many L&H organizations leave this to distribution level decisioning.

Data and risk scores can identify pockets of risk within the existing book of business and alert these policyholders. Imagine the user experience, as well as the potential portfolio results, if insurers used real-time leading data to interact with social media platforms or IOT devices, encouraging habits mitigating or

eradicating key loss exposures. Public Service Announcements, when strategic versus wide-spread marketing tactics, can create dynamic client engagement for the benefit of both parties. Areas with active Ebola outbreaks already encouraging hygiene habits such as hand-washing credit this with reduced COVID-19 spread²³.

Additionally, isolation and quarantine requirements exposed gaps where life and health insurers lag in supporting clients digitally. As insurers move to close these gaps, incorporating data inputs such as real-time interactive data such as fitness trackers, smartwatches, smartphone app data and social media interaction can generate response and interaction data along with claims and health data.



INSURANCE PANDEMIC CONTROLS

Insurance actuarial models quickly adopt tools, datasets and data modeling techniques into rating calculations as the data science field matures. In the heavily regulated P&C markets, data provide portfolio protection alongside rating and pricing. Life and health have been slower to adopt these techniques or leverage data for purposes beyond morbidity and mortality.

Preliminary reports showing high fluctuations in mortality rates over time across communities may indicate under-counting in COVID-19 infection rates. While insurance actuaries will adapt their tables with the appropriate modeling considerations, the preliminary data can still inform ongoing operational decisions:

Control #1 – Restrict Underwriting: Underwriters can pre-emptively filter out or modify risk-averse candidates, increase or decrease medical requirements and apply discretionary risk modifiers as deemed necessary leveraging data during the application process.

Control #2 – Re-evaluate Straight-through Processing: When carriers use accelerated underwriting processes, portfolios could see unintended growth in adverse markets. Early trend detections, both positive such as healthier habits and negative epidemic and pandemic data, influence the business processing rates. Business teams can monitor external data and internal policy flow to redirect the number of policies subject to quick approvals and re-route business as required through more thorough underwriting processes. At this time, it is clear that certain underwriting processes that involve medical testing of fluids may need to be suspended, which will require adjustments in processes.

Control #3 – Modify Distribution: Advisor compensation goals, marketing and product definitions can be aligned to preliminary data. Restrict the promotion and marketing of products in areas with known outbreaks. Encourage less risky or new products that are aligned to consumer sentiment with stable pricing.

Control #4 – Customer Communication: Leverage social media, marketing and public services advertising to engage with existing customers identified as potentially at risk to reduce risk exposure. Sharing relevant critical information helps clients and carriers by encouraging safe and healthy habits.

FUTURE CONSIDERATIONS

The COVID-19 pandemic has laid bare the reality of how life insurers are particularly vulnerable to pandemics. The crisis threatens life and health insurance profitability and stability well beyond the run of the pandemic itself. The final impact on actuarial pricing models won't be understood for years. Data scientists, epidemiologists, microbiologists, and other specialists will need to reverse engineer the data and results. Insurers critically need to continue making investments in digitization and data management for the future. By enabling a better online experience for customers, insurance companies can ensure viability in future crises and protect their clientele. With the introduction of mechanisms to consume and manage third-party data, life insurers can improve awareness and response times to mitigate risk.

Capitalizing on the necessity for change, insurers can use the COVID-19 to promote meaningful transformation across the industry.

Without knowing what the future may bring, positioning ourselves to respond, adapt and thrive is the only way to succeed.

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