



Analytics in Insurance

**Conquering the Challenges Posed By Data
Integration, Technology Infrastructure, and Right
Talent to Operationalize Analytics in Insurance**

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Benefits

- Better understanding of consumer behaviour, and responding to changes quicker
- Meeting regulatory requirements
- Improved product design and overall product portfolio profitability

Keys to operationalize analytics in insurance

- Setting up of required data and technology infrastructure
- Breaking down internal silos
- Internalizing analytics-driven decision making
- Leveraging third-party providers

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Executive Summary

Analytics is emerging as a game changer for the P&C insurance industry facing significant profitability and growth challenges. While basic reporting and descriptive analytics continue to be a must-have for insurers, advanced predictive and prescriptive analytics are enabling P&C insurers to build a sustainable competitive advantage.

Actuarial and underwriting analytics are helping insurers -in more accurate risk pricing, overall reserve estimates, and identification of key drivers behind changes in loss ratios. Analytics solutions also help in understanding customer retention opportunities by comparing costs, risks, pricing, and variability. Claims analytics, by analyzing both structured and unstructured data, is cutting down decision-making time as well as reducing errors in decisions. P&C insurers report better visibility and predictability of losses and operating expenses as a result of leveraging claims analytics. Improved decision-making insight in larger percentage of claims, enabling improvements in LAE¹, and improved turnaround time leading to better compliance and customer satisfaction are some of the other benefits being enjoyed by them. Sophisticated fraud analytics solutions (such as text mining, social network analytics, loss-padding analytics, and geospatial analytics) are helping insurers cut costs, boost margins, increase customer satisfaction, and lower litigation costs.

While the initial push into analytics started with insurance companies building capabilities to do these activities in-house, the need to expand these capabilities at a rapid pace and reduce cost, required insurers to start tapping third-party service providers for help. The third-party service providers helped by bringing global sourcing leverage to the table, thereby providing access to newer talent pools at reduced cost. As a result, adoption of third-party analytics business services in insurance is growing rapidly, and is expected to quadruple its current size by 2020.

However, the overall penetration of analytics services in P&C insurance is still in a pioneer stage and penetration levels are in low single digits, implying significant untapped value creation potential. Multiple competing priorities, functional silos, talent crunch, and inadequate data and systems infrastructure are key challenges in effectively operationalizing analytics within insurance.

This paper describes the “art of the possible” in analytics and within the context of how it adds value to the P&C insurance industry. The paper focuses on:

- P&C insurance industry challenges and opportunities where analytics plays a role
- Range of analytics leveraged in P&C insurance and examples of how analytics creates value for the business
- Critical challenges and emerging best practices in operationalizing analytics in insurance

¹ Loss Adjustment Expenses (LAE)

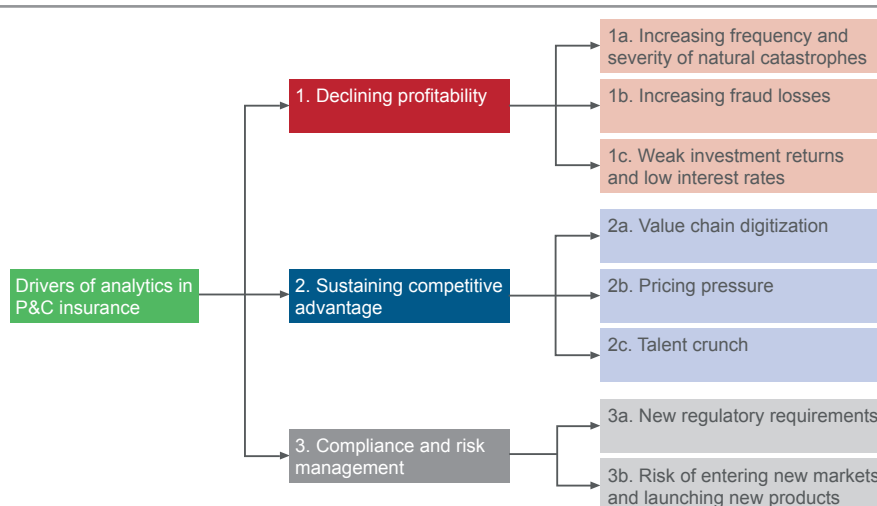
P&C Insurance Industry Challenges Requiring Greater Insight

P&C insurance losses due to natural catastrophes have increased significantly over the last three decades. Along with rising losses, the P&C insurance industry also faces a volatile economic environment with weak investment returns and low interest rates. Rising insurance fraud further cuts profits for insurers. Along with profitability challenges, driving top-line growth is also difficult. Insurers cannot continue to increase premiums, given the increasing competitive intensity. At the same time, technology advancements are replacing the traditional insurance agent with other interaction channels. Most of the growth in the P&C industry today manifests in new risks – either by entering new growth markets (such as South America or Asia) or by targeting new insurable products. At the same time, new regulatory requirements are driving up reserve requirements.

Faced with such top-line and bottom-line challenges in an uncertain and risky environment, P&C insurers are looking at sophisticated analytics to provide answers (see **Exhibit 1**).

EXHIBIT 1

Drivers of analytics in insurance



1. Declining profitability

Frequency and severity of natural catastrophes has increased significantly over the last three decades. Most scientists across the globe believe that this trend will continue. Rising insurance fraud further cuts profits for insurers. It limits their ability to offer competitive premiums to their customers and worsens their loss and combined ratios. The policyholders also suffer due to higher premiums.

Along with rising losses, the P&C insurance industry also faces a volatile economic environment with weak investment returns and low interest rates. Given these dual challenges with underwriting income and investment income, profitability is a serious concern for the industry. Declining profitability for P&C insurers is forcing them to not only relook at their operations, but also product design and answer the fundamental question “Should I be pricing this risk at all? If yes, then what should be that price?”

Rising incidence of natural catastrophes

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Average number of natural catastrophes in the United States increased from ~50 events in 1983-1987 to ~200 events in 2008-2012.

– Munich RE NatCatSERVICE
(January 2013)

”

Underwriting losses are much more common than underwriting income

“ Between 1980 and 2013, underwriting income for the U.S. P&C industry has been net positive in only five years.
– www.iii.org ”

Insurance talent crunch

“ The need for actuaries in the U.S. insurance industry has been growing at more than 25% every year.
– U.S. Bureau of Labor Statistics ”

Solvency II will increase actuaries' responsibilities

“ Responsibilities of actuarial function in an insurance firm: Technical provisions, underwriting, reinsurance, and risk management system.
– Article 48 of Solvency II ”

2. Sustaining competitive advantage

Faced with increasing loss ratios, insurers need to increase premiums. However, insurers cannot continue to increase premiums, given the increasing competitive intensity and challenging growth within existing clients. Need for “accurate pricing” of insurance is more intense than ever to ensure a sustainable competitive advantage. To add more complexity to the situation, actuaries are expensive, difficult to hire, and retain.

Conventional ways of doing business no longer work. Technological evolution has started replacing the traditional insurance agent with other interaction channels – phone, online self-service, and chats. Need for speed is also high as insurers cannot afford slow underwriting cycles in an intensely competitive market.

3. Compliance and risk management

Most of the growth in the P&C industry, today, is driven by insurers taking new risks – either by entering new growth markets (such as South America or Asia) or by targeting new insurable products.

Moreover, regulatory changes, such as Solvency II and NAIC's¹ SMI² and ORSA³, require insurers to make investments in order to enhance risk management.

Emerging regulations are also changing and challenging the boundaries of P&C insurance. For instance, TRIA⁴ will require insurers to underwrite terror risk (typically considered un-insurable), while new HUD⁵ rulings prevent insurers to underwrite on basis of race, color, sex, religion, disability, family status, or national origin.

¹ National Association of Insurance Commissioners (NAIC)

² Solvency Modernization Initiative (SMI)

³ Own Risk Solvency Assessment (ORSA)

⁴ Terrorism Risk Assessment Program (TRIA)

⁵ U.S. Department of Housing and Urban Development (HUD)

The Role and Impact of Analytics in P&C Insurance

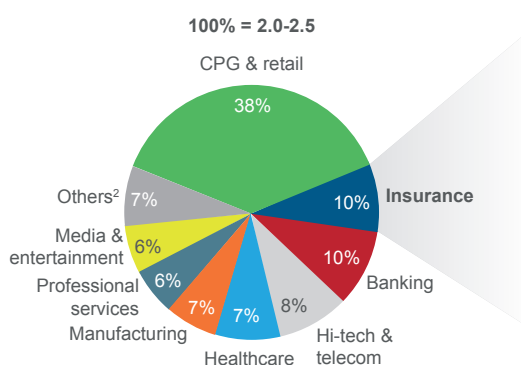
Analytics is helping P&C insurers take smarter decisions while managing the myriad challenges they face. As insurers start leveraging analytics even more, they turn to third-party service providers to help them scale up quickly, while also keeping costs in check. Consequently, adoption of third-party analytics business services is growing rapidly and is expected to quadruple by 2020 (see **Exhibit 2**). The overall penetration of analytics services in P&C insurance is still in a pioneer stage and penetration levels are in low single digits, implying significant untapped value creation potential.

EXHIBIT 2

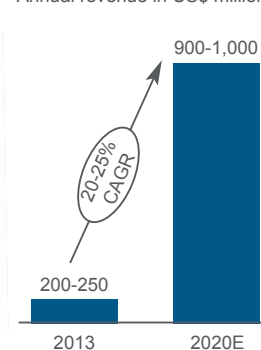
Size and growth of analytics BPS in insurance

Source: Everest Group

Analytics BPS¹ adoption by industry
2013; Revenue in US\$ billion



Analytics BPS¹ industry size and growth in insurance
Annual revenue in US\$ million



¹ Analytics Business Process Services (BPS) represents third-party services of the analytics industry and does not include size of internal analytics initiatives and/or revenue of analytics products from companies such as SAS, Oracle, SAP, and Microsoft

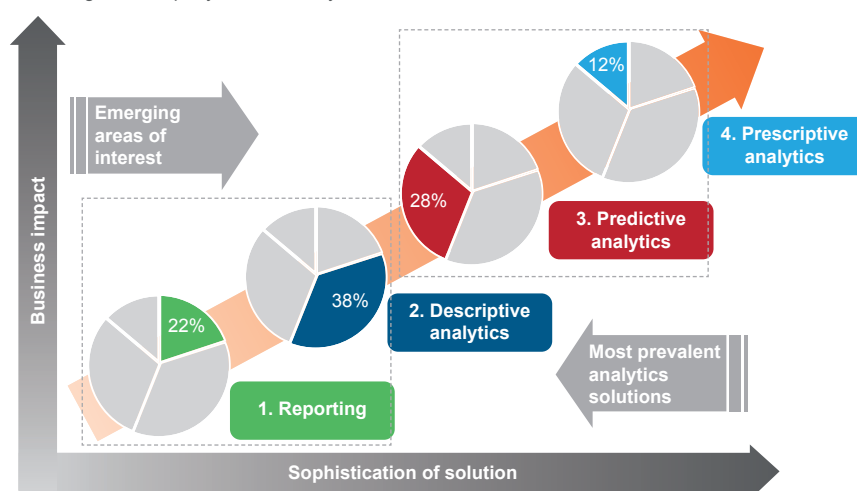
² Includes public sector, travel & logistics, and energy & utilities

Analytical solutions have grown tremendously over the last decade in terms of their sophistication and the resulting business impact they create. There is a range of analytics that P&C insurers are deploying today (see **Exhibit 3**). While basic reporting continues to be a must-have, advanced predictive and prescriptive analytics are now starting to generate powerful insights.

EXHIBIT 3

Range of analytics leveraged in insurance

Relative maturity of analytics solutions
Percentage of third-party offshore analytics FTEs



1. **Reporting.** Basic version of analytics solutions that focus on building data repositories and reporting the current situation using simple and uni- or bi-variate data. Typical examples of this in P&C insurance include FNOL alert reporting and actuarial reserve reports
2. **Descriptive analytics.** Generating actionable insights on the current situation using complex and multi-variate data. Typical examples in P&C insurance include claims history dashboard and claims satisfaction dashboards
3. **Predictive analytics.** Predicting the likely future outcome of events often leveraging structured and unstructured data from a variety of sources. Typical examples in P&C insurance are claims severity projections, geospatial analytics, and litigation propensity prediction models
4. **Prescriptive analytics.** Prescribing action items required to deal with predicted future events using big data from a variety of sources, often associated with simulations in various business scenarios. Typical examples in P&C insurance include stress-testing portfolios, catastrophe modeling, “outlier” claims modeling, social network analytics, and behavior profiling

Increasingly, P&C insurers are looking at the trio of 1) Actuarial and underwriting analytics, 2) Claims analytics, and 3) Fraud analytics, to deal with the challenges of profitability, growth, and compliance. Typical analytics in each of these areas is summarized in **Exhibit 4** below.

EXHIBIT 4

Types of analytics in insurance

P&C insurance segments with significant use of analytics			
	Actuarial and underwriting	Claims	Fraud
Reporting and descriptive analytics	<ul style="list-style-type: none"> Premium principles and risk measurement dashboard Annual/semi-annual / quarterly reserve analysis Actuarial reserve report, incorporating individual case reserve adequacy drilldowns Product price optimization Confidence level analysis 	<ul style="list-style-type: none"> FNOL alert reporting Claims dashboards Claims satisfaction dashboards Litigation management 	<ul style="list-style-type: none"> Business rules to detect fraudulent claims Activity pattern-based claims dashboard Claims history dashboards with drilldown by frequency/type/amount Billing analytics
Predictive and prescriptive analytics	<ul style="list-style-type: none"> Dynamic solvency testing Stress-testing insurance product portfolios Capital modeling Loss distribution modeling Algorithm-based actuary modeling Long-term horizon models Monte Carlo Simulation runs Stochastic models Catastrophe modeling 	<ul style="list-style-type: none"> Severity scoring model for claims Subrogation model Litigation propensity prediction model Claim severity projections Modelling reserve requirements “Outlier” claims modeling 	<ul style="list-style-type: none"> Claims origination analytics FNOL-based analytics Loss-padding analytics Cluster analytics on claims to identify outliers Text mining solutions Geospatial analytics Social network analytics Behavior profiling Claims scoring models

Examples of actuarial and underwriting analytics' impact

- Zurich cut the time to quote a 110-vehicle fleet from 8 hours to 15 minutes
- Aviva PLC announced 108% increase in commercial underwriting result in Canada in 2013

1. **Actuarial and underwriting analytics.** Actuaries need to understand the probability and extent of losses and underwriters need to price the risk appropriately. Traditionally, the P&C insurance industry has leveraged uni-variate analysis based on historical data to understand and price risk. But with the advent of analytics, actuaries can now not only use multi-variate analysis, but can also combine it with future scenario models to arrive at better answers. For instance, sophisticated catastrophe models are now

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An underpriced risk is the only bad risk! And sending underpriced risks to our competitors is a good way for us to secure a competitive advantage. Actuarial analytics allows us to do just that.

– VP – Product Pricing, Top 5 U.S. P&C insurer

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Examples of claims analytics impact

- UK-based insurer saved ~£2 million annually, by implementing claims analytics for auto claims
- Top global insurer saved US\$3 million annually utilizing predictive models for subrogations
- Swiss insurer reduced risk of penalties from non-compliance to <1%
- A car insurer increased claims within FNOL from 4% to 25%, enabling sharp improvement in LAE

Examples of fraud analytics impact

- Reduce false positive detection rate by 17%
- Improve potential cases detected for fraud from ~3.5% to ~8%
- Reduce time required to refer questionable claims for investigation by 95%
- Increase subrogation recovery by US\$12 million in six months
- Prioritize claims and assign them to the appropriate handlers after big hurricane to increase overall company brand value

available that can generate multiple scenarios based on geographic and historic data to predict the probability of losses occurring due to natural catastrophes. Advanced underwriting analytics is allowing insurers to take a forward looking view on customers and risk. Actuarial and underwriting analytics are helping insurers with more accurate risk pricing, determining overall reserve estimates, and need for reinsurance, and also identifying key drivers behind changes in loss ratios at the same time. Speed and consistency of decision making has also improved significantly with incorporation of advanced analytics solutions that help in improving both compliance requirements and customer satisfaction

2. **Claims analytics.** Claims represent the biggest spend for a P&C insurance company. About 80% of the earned premium is spent on pay-out and other related expenses. Claims processing is time-consuming and labor-intensive, involving a plethora of systems (many of them legacy IT systems) and multiple business units (many of them spread throughout the length and breadth of the company). This often results in delays, resulting in further expense and effort on the part of the company. Claims analytics aims to analyze data (both structured and unstructured) at as many stages of the cycle as possible to cut down decision-making time as well as reduce errors in decisions. Analytics helps uncover similar cases in the past from the company's data, and thus quicken the pace of understanding the individual claim, and eventually settling it. Benefits include better visibility and predictability of losses and operating expenses, and improved turnaround time leading to improved compliance and higher customer satisfaction levels. While insurance companies have been able to make significant inroads into developing and utilizing predictive models in pricing and underwriting, claims modelling has only recently started seeing traction
3. **Fraud analytics.** According to NICB¹, nearly 10% of P&C claims are fraudulent. Questionable P&C claims in the United States have increased by 27% in 2012 over 2010. Beyond opportunistic fraud, growing prowess of “fraud rings”, helped in no small measure by the Internet, is a major reason for rising number of organized scams. With insurers facing declining profitability, the need to plug the hole created by fraud claims has never been more acute. Common insurance fraud schemes include embezzlement of insurance premiums, fee churning, asset diversion, and false or exaggerated claims. Traditionally, P&C insurers have relied on manual fraud detection, often using sampling techniques. This is not only costly, but also results in several undetected fraud instances. Moreover, it primarily detects historic or common fraud schemes and newer insurance frauds often go undetected. They also suffer from long lead times from identification to action. Today, a number of sophisticated fraud analytics solutions are emerging (such as text mining, social network analytics, loss-padding analytics, and geospatial analytics) that help overcome challenges with traditional fraud detection and prevention techniques. An effective and efficient fraud analytics solution is the key for insurers to cut costs, boost margins, increase customer satisfaction, and lower litigation costs

¹ National Insurance Crime Bureau (NICB)

Operationalizing Analytics in P&C Insurance – Challenges and Emerging Best Practices

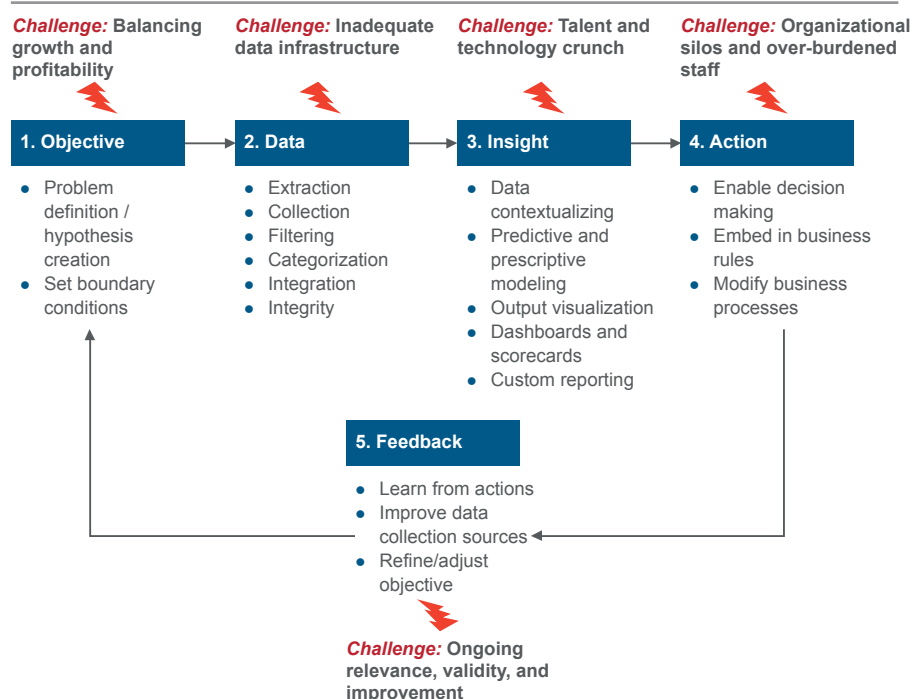
Analytics in P&C insurance promises significant value creation potential if operationalized keeping the following three success factors in mind:

1. Business insights are created using data
2. Insights are used to take decisive actions
3. Results from business decisions are fed back to improve data and analytics

This “data-insight-action” loop is summarized in Exhibit 5 below.

EXHIBIT 5

Typical challenges across the “Data-Insight-Action” loop in insurance



Operationalizing analytics in P&C insurance requires significant investments of time and money across people, process, organization, and technology. This section summarizes key challenges that insurers face across each element of the “data-insight-action” loop as well as describes some of the emerging best practices.

Phase of “Data-Insight-Action” loop

1. Objective

Critical challenge in operationalizing analytics

Balancing growth and profitability

Growth and profitability pressures pull P&C insurers in different directions. Premiums need to increase, given the rising losses and low investment yields. However, insurers cannot continue to increase premiums with rising competitive intensity and challenging growth within existing clients. Setting objectives and boundaries for analytics requires insurers to walk the tightrope between multiple forces.

The emerging best practice. P&C insurers need to build an analytics vision that integrates underwriting, claims, and fraud analytics. This enables enterprise-wide visibility and allows different groups to learn from each other. An integrated approach to analytics is required to balance the opposing top-line and bottom-line drivers.

Phase of “Data-Insight-Action” loop

2. Data

Critical challenge in operationalizing analytics

Inadequate data infrastructure

Accuracy of sophisticated and advanced modeling and simulation, such as actuarial and catastrophe analysis, depends heavily on the underlying data quality.

Access to enterprise level historical data itself is a challenge, given data silos due to fragmented and legacy systems landscape and multiple business units. Reliability of historic data is often suspect. For instance, extensive data logging around natural catastrophes began only in the last century or so, any historic data before that is usually suspect.

Unstructured data (such as handwritten notes from insurance adjusters) can be a significant enabler to predict and prevent fraud. However, most insurers are not geared to handle unstructured data.

Leveraging external data also presents a significant challenge as different data sources are not typically designed to talk to each other. Also, rigorous data scrubbing protocols are necessary to ensure soundness of external data. Creating such a clean and reliable data feed in an era where velocity, volume, and variety of information is increasing exponentially is a significant challenge.

The emerging best practice

- *Integrating internal and external data sources.* Advanced analytics requires internal data (such as demographic profile and relationship history) in combination with external data (such as credit scores and economic conditions) to produce meaningful outcomes. For instance, insurers are integrating historic customer data with social media information and other digital tell-tales to form models that can predict future consumer behavior
- *Internal layer of data cleansing.* P&C insurers are putting in place robust data management techniques (incorporating elements of governance and quality assurance) to enable successful change of historical data into useful assets that can be used with analytic algorithms, generating actionable insights
- *Leveraging offshore delivery for data management.* Increasingly, insurers are leveraging offshore resources (GIC and/or third-party outsourcing) for data integration and data cleansing. Beyond cost arbitrage, offshoring offers access to new talent pools, ability to leverage different time zones, and manage volume fluctuations for data management

Phase of “Data-Insight-Action”
loop

3. Insight

Critical challenge in operationalizing
analytics

Talent and technology crunch

Predictive and prescriptive analytics is not just about hiring statisticians with advanced degrees, but those who also understand business context and demographic behavior trends, amongst others. Such talent is scarce and expensive, and can present retention challenges. For instance, catastrophe modeling requires specific domain knowledge of interpreting natural catastrophe data, and in-depth understanding of P&C insurance in addition to high degree of statistical knowledge. Similarly qualified people with the acumen to investigate fraud are hard to find. When insurance carriers lose bad-faith lawsuits involving the SIU¹ and fraud, typical reasons are lack of training, unqualified people, and bad decisions. Actuarial resources are expensive, and with the talent pool aging, are increasingly become difficult to find for insurers.

Advanced analytics solutions can be, and often are computing power-hungry applications that require sophisticated, and powerful IT infrastructure to run. The challenge is further compounded by the nature of data handling solutions required for different types of data. While historical data analysis poses the challenge of fast access and processing of data, predictive models demand computing horsepower to run numerous statistical scenarios in a short span of time. This translates into investments in systems, which can be a hard decision in an environment riddled with profitability and growth challenges, especially for mid-sized insurers.

Leveraging global talent pool for
analytics

“

With a combination of analysts here and offsite, I can staff a team at roughly 40% of my loaded cost, and what I'm getting is the crème de la crème of what India has to offer.

– VP, Farmers Group's Insight & Innovation (I&I) group

”

The emerging best practices

- *Leveraging the global talent pool.* Beyond cost arbitrage, third-party BPO providers and/or offshore Global In-house Centers (GICs) provide access to global talent pools and offer another mode to further consolidate and centralize fraud analytics resources
- *Investments in training.* Advanced analytics modeling requires familiarity with advanced statistics, along with economics, and the insurance industry – a rare combination. Insurers are today hiring talent with advanced understanding of statistics, and then training them on the insurance domain
- *Pooling resources between insurers.* Insurers are realizing that several analytical problems such as fraud and catastrophe can be better solved by collaborating with peers. Since a large portion of catastrophe modeling follows similar patterns, it can be immensely helpful for insurers to pool their resources for such efforts. In view of high demands of money, time, and effort required for such initiatives, many insurers are now pooling resources to come up with these models

¹ Special Investigative Unit (SIU)

Phase of “Data-Insight-Action”
loop

4. Action

Critical challenge in operationalizing
analytics

Organizational silos and over-burdened staff

P&C insurers offer a variety of products but are poorly integrated internally from an organization and systems perspective. An end-to-end process view is hard to build, as back-, mid-, and front-office processes are disjointed. This often delays flow of information required to make decisions based on smart analytics. Moreover, it delays the response time when warning signals are generated.

Moreover, insurance SIUs, actuarial functions, and underwriters are over-burdened, under immense pressure, and are often unable to handle the volume of work efficiently and effectively.

The emerging best practices

- *Advanced analytics.* Actuaries can now utilize some of the most advanced statistical modeling and simulation tools to deliver even more precise and accurate results. Catastrophe models of today have rapidly evolved from when they started to employ a host of advanced statistical techniques such as stochastic and markov chains analysis. Predictive models available today can attach fraud propensity scores to each insurance claim. Social networks offer insurers the power to model relationships between various entities involved in a claim
- *Learning from other industries.* Customer behavior in insurance claims often follows similar patterns as customer behavior in retail banking, hospitality and travel industries, amongst others. Insurers are starting to take advantage of this to create teams of resources having exposure and experience of multiple industries to create and exploit non-linear learning curves
- *Automating simple risks.* Many insurers are now setting up two-tier systems for underwriting solutions. Simple risks are being evaluated in an automated manner, with minimal human intervention

Phase of “Data-Insight-Action”
loop

5. Feedback

Critical challenge in operationalizing
analytics

Ongoing relevance, validity, and improvement

Actuarial models, as the name suggests, need to be true to “actual” results. This implies, that the models remain under a constant stream of validation processes to ensure that their predictions are in close proximity to results seen in the real world. As a follow-on activity, this also means that the models need to be kept updated as and when variances are detected outside the prescribed limits.

For effective modeling of claims, it is imperative that the models are continuously refined, and kept updated with the latest data (both internal as well as external). The analytical model must also predict results closely mirroring real-life behavior. This needs to be periodically checked and affirmed.

The emerging best practices

- *Self-learning and flexible solutions.* Analytical and simulation models need to be designed keeping in mind that they will be adjusted and refined over time. For instance, sophisticated fraud models are emerging that can learn from the positive identifications they make, in order to evolve and strengthen their functioning, reduce false alerts over time, and help insurers stay ahead of fraudsters. Also, enabling sharing of results between algorithms helps in triangulation of results
- Offshore third-party service providers can also be utilized for testing and ongoing maintenance of models. This enables insurers to keep model development and validation separate, at the same time helps to improve scalability and speed to market

Conclusion

Sophisticated predictive and prescriptive analytics exist today that improve an insurer's probability of top-line and bottom-line growth, as well as manage risks and compliance. However, institutionalizing and operationalizing analytics to take smart business decisions is a challenge given functional silos, talent crunch, competing priorities, and outdated data/system infrastructure. The critical question today is not "why analytics?" or "which analytics?" but "how to operationalize analytics?"

There is no other value creation lever available today for the P&C insurance industry that is as powerful as analytics. But it needs to be elevated from an IT- or LoB-level discussion to a C-level strategic agenda to really unleash its potential power.

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About Everest Group

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