Deep Science Publishing
https://doi.org/10.70593/978-93-49910-74-4_12

DeepScience
Open Access Books

Chapter 12: Future trends: Personalization, automation, and agentic artificial intelligence in insurance

12.1. Introduction to Future Trends in Insurance

The insurance industry has long been viewed as devising limited product-market strategies, making incremental refinements to existing products, processes, and systems. While the insurance industry has relied heavily on continuous improvement trends in many areas, recent innovations in information technology and risk modeling have brought disruption and new opportunities that many insurance executives never anticipated. As insurance has become a less expensive and less essential component of the risk management process for businesses, many companies are considering new revenue and profitability opportunities in advising and consulting. At the same time, others are exiting the insurance industry altogether, highlighting the question of how necessary the infrastructure and knowledge transfer of the insurance industry is for the management of increasingly global risks (Ghosh & Gupta, 2020; Kelly, 2019; Chien & Chiu, 2021). While these shifts brim with opportunities and challenges, they also bring great ambiguity. New questions arise: Who will regulate the insurance industry? Who will train the personnel capable of helping businesses deal with the big issues of risk—such as the consequences of increasingly severe weather, terrorism, labor disputes, and globalized supply chains? What role will e-business, business-to-business exchanges, and niche marketing play? Will insurance companies position their customers and share financial information with them through the use of predictive analytics? What will risk communication look like in an evolved insurance industry? How will the industry deal with issues of social responsibility in providing coverage for disasters? What will be the future for captives in reducing risk management costs? What role will the Big Five play? What are the future needs in the areas of insurance education and consulting? What technological advances will be on the cutting edge? What will be the future of

international insurance? What will be the requirements for successful insurance operations in the future?

12.1.1. Navigating the Future of Insurance: Trends and Innovations

The evolution of insurance features the development of increasingly effective and technology-driven methods of risk management within a novel context characterized by intense social and economic volatility associated with new globalization, demographic change, and technological transformation. Aging populations; rising inequality; new forms of conflict and violence; the promotion of sustainability; increasing migration; the digital transformation of the economy; new forms of work and economic organization; the evolution of and new sensitivities about privacy and ethical behavior; and an innovation ecosystem driven by digitization, automation, connectivity, and more that create powerful new technologies all contribute to volatility, uncertainty, complexity, and ambiguity (Martínez-García et al., 2020; O'Leary, 2020).

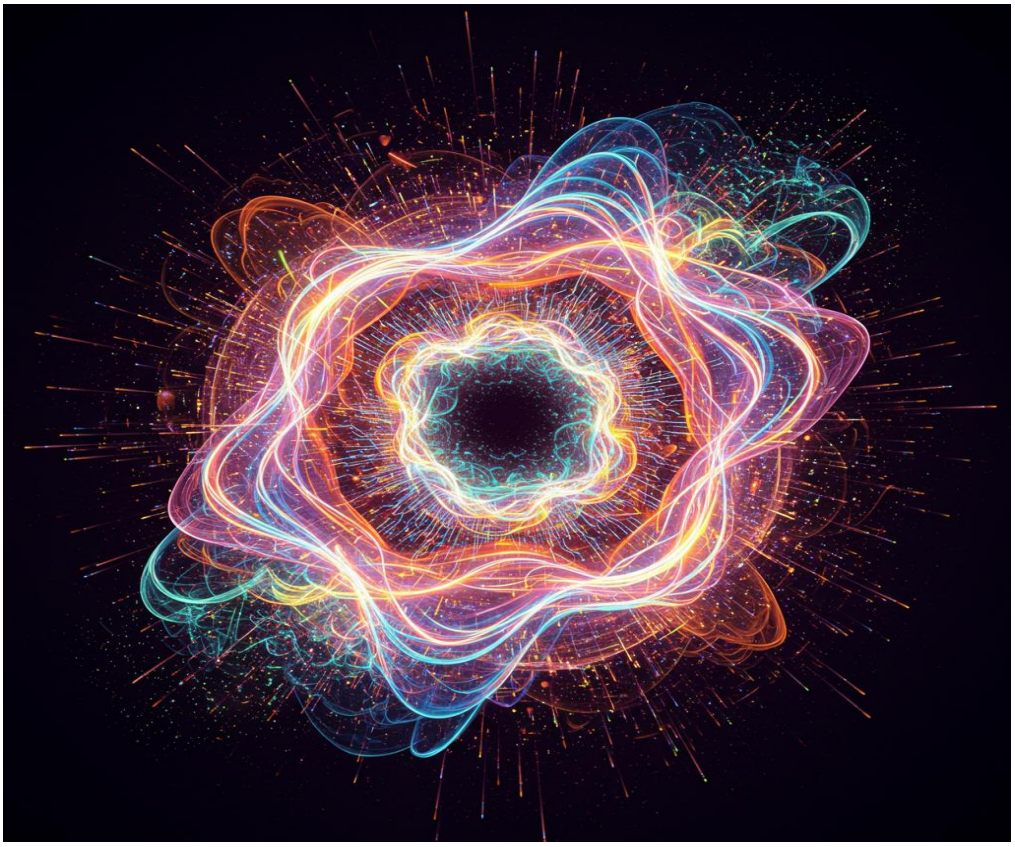

Fig 12 . 1 : Agentic AI In Insurance: Transforming Risk

As technological innovations and the growing uses of big data proliferate across the economy and society, they reshape consumer expectations, supply and demand dynamics, and market structures. At the same time, the insurance industry finds itself navigating emerging geopolitical dislocations and uncertainty; changes in the financial system and its relation to the real economy; evolving expectations about corporate governance, behavior, and purposes; and shifting relationships with other financial sectors, regulators, and distribution partners. Within that one-of-a-kind environment, insurance, and commercial and personal lines, in particular, are fast approaching a much more personalized, digitally enabled, and consumer-controlled future. That future features an unprecedented combination of growing insurance penetration and new approaches to risk management amid evolving external risks and changing sensitivity and concern about exposure to a variety of risk personas. Within that environment, innovation and the deployment of newly emerging technologies enable important innovations in offerings, capabilities, and cost structure, all contributing to an exciting and powerful combination of improvements in customer experiences and insurance accessibility within the context of an ethical, consumer-informed, and well-regarded industry.

12.2. Understanding Personalization in Insurance

Personalization is rapidly becoming a priority for the insurance industry, particularly in how insurers relate to customers. However, what is personalization? Personalization has been defined as creating meaningful customer experiences with marketing at an individual level that recognizes their unique interests and needs. This can broadly include customized products and customer journeys, as well as unique interactions along the journey. We propose to adopt a broad definition of personalization, as enhancing customer interactions and journeys, perhaps delivering a more relevant and timely customer experience.

Attracting and retaining customers is a core objective for insurance companies, akin to businesses in other sectors. Increased competition and the entrance of insurtechs and digital-native companies into the market, combined with changing customer expectations, is driving demand for a more personalized, less transactional relationship. Hyper-personalization is cited as a way for traditional insurers to compete effectively in the changing insurance landscape. As the traditional sales and distribution model based on agents or brokers disappears increasingly, the focus of insurance companies will shift to delivering seamless customer experiences throughout the insurance life cycle. Among the potential benefits arising from improved personalization across the online experience are greater customer satisfaction, engagement, retention, and loyalty.

However, developing hyper-personalization is not without risks and challenges. Sensitive customer data and price discrimination, while usually part and parcel of any insurance relationship, could become exacerbated through different pricing at renewal, or on the same risk, based on data-driven insights. Such concerns can reinforce negative customer sentiment against personalization efforts, particularly if data collection is done in a draconian or non-consensual way. Personal data breaches can lead to customer data loss and with it loss of trust. There are concerns that a heavy-handed approach might backfire, and increase churn as companies intrude too much into the customer's journey. Insurers will need to ensure that their utilization of AI and data analytics is underpinned by ethical principles of fairness, inclusivity, privacy, transparency, and accountability, to protect customer interests.

12.2.1. Defining Personalization

Brands across industries are rushing to maximize personalization capacity under the impression that having personalized offers is a business necessity. In the insurance space, accelerating digital transformation efforts alongside the increasingly competitive market are accelerating the need for a personalized approach. In an insurance context, a personalized offering suggests that an insurer deserves a consumer's business, if it recognizes consumers as unique yet relatable individuals, not merely underwriters exposing consumer data for the sake of value realization. Personalization can take various forms, spanning traditional risk segmentation to build unique nonlinear variable models for each insured, to having collaborative and engaging real-time experiences with insureds. The simplest representations of personalization emphasize the notion of "customization". This perspective has many practical realizations in insurance including providing personal lines policyholders with "made to order" services or products, one-off or flexible coverage offerings during the lifecycle, or precisely tailored lines of cover in specialty insurance areas. In many ways, the insurance purchasing process suffers from the worst type of personalization outcomes. Data science enables insurers to analyze vast troves of consumer data, creating detailed composite representations of idealized customer segments. Technological advancement permits insurers to quickly substitute off-the-shelf quotes for bespoke pricing by sidestepping traditional underwriting hurdles. Yet, throughout the process, "talking" to consumers is neither conversation nor serendipity. Instead, the purchasing experience deploys personalized interactions only for cross-selling related purchases such as annuities in the life and health insurance sector. Insurers unconsciously assume that providing agreeable "front" offerings enables them to step out from behind the curtain. When signing up, consumers are ensconced within a sanctum of personalization. No two lives are the same, but life insurers offer the same vanilla product ranges and limited products at different phases of

life. Insurers invariably neglect to rejoin consumers for contract review and discussion throughout their lives.

12.2.2. Benefits of Personalization

The primary reason to personalize insurance products is the desire to make products that more accurately reflect customers' needs and that create as much value as possible for both parties. Given the inherent randomness of risk assessment, providers must create and manage a large number of insurance contracts to be certain that each contract is statistically fair – because while, on average, each contract must be priced to ensure the profitability of the overall book, the probability of loss associated with a particular policyholder will differ from the average policyholder by a substantial margin. This is what personalized pricing is. Traditional, as well as recent, behaviors in data collection and predictive analytics, implementation of AI and tech capabilities, have focused on predictive accuracy in risk assessment. And huge databases of behavioral data have indeed improved the accuracy of risk prediction.

Advocates may argue that more accurate predictions of risk simply lead to fairer pricing of average risk contracts, therefore maximizing benefits for both the consumer and the insurer. However, a variety of perspectives have argued that personalized pricing goes beyond improving fairness to the average risk consumers. It must be evaluated in terms of its effectiveness at distributing overall losses. If customers can choose their prices, realistically they will pick the prices that minimize their costs. As a result, carriers will be left with the riskiest customers, who incur the most significant losses. These customers will be those who have needed insurance protection in the past and who have the greatest probability of incurring losses in the future.

This could mean that developing systems to create truly personalized products across all domains – health, life, auto, travel – would be far more valuable to the individual consumers for whom these products were built than systems that merely enable alternative pricing options to be developed based on insurers' estimates of an individual consumer's probability of being honest with the insurer.

12.2.3. Challenges in Implementing Personalization

Many regulatory restrictions limit the flexibility that insurers enjoy regarding how policies are underwritten, sold, and serviced. Personalization of policy terms, price, or service may have to be approved in advance by regulators, who may not be open to innovations driven by technology. Rules about whether insurance payments or premiums can be variable based on the profile of risk within an insured category, how policies must

be written, how the price is calculated, or what customer-service channels must be available pose various difficulties. Generating real-time personalized policies to be enforced through effective pricing at different times or attractive payment perks or low interactions may not be permitted. These constraints are more stringent in lines such as travel-related insurance that are sensitive to time than in most other lines that are more continuous throughout a policy period. Penalty clauses related to payment delays or communication between two parties may not be permissible by regulators, especially in health insurance.

Many consumers are hesitant. Despite evident consumer demand, large parts of the buying population are disinclined to engage fully in a two-way, dynamic, relationship-based process when negotiating. Consumers are particularly resistant to substances that are vulnerable to adverse selection. Insurers need to invest in systematically convincing consumers of the benefits of personalization and improving trust. There is a need for efforts at improving the transparency of product offerings at various levels of personalization and trust in data security and in pricing offerings legitimately. The implementation task itself is difficult. Some consumers may be unwilling to pay either more or less when they can hide in the crowd for the current norm that price insurers found themselves constrained to offer in the past.

12.3. The Role of Automation in Insurance

The recent acceleration of AI development in the financial sector now allows insurance companies to develop real solutions for long-standing customer pain points. The democratization of user-friendly AI tools greatly reduces the initial development times and implementation costs, allowing insurers to focus on fine-tuning the offering to maximize its value. The technologies that insurers will be able to leverage to optimize their operations and create new value-added products are natural language processing, optical character recognition, machine learning, and process automation.

Global investment in insurance technology companies has accelerated, doubling from USD 7 billion in 2020 to USD 15 billion in 2021, and is set to increase even further. Investments are being made to focus primarily on the use of new technologies such as artificial intelligence, machine learning, big data, and blockchain to streamline the insurance process, optimize claims management, and detect fraud. Global insurance funding has drawn considerable interest and momentum during a historically challenging and unprecedented period. The international economic downturn triggered a surge in demand for insurance technology solutions. Insurers, brokers, and consumers alike all pivoted to new ways of doing business to adapt to a "new normal". Insurers began outsourcing various elements of the insurance value chain, such as claims management, underwriting, and policy issuance, to technology-first insurance companies.

Emerging markets — especially Asia, Latin America, and Eastern Europe — are reshaping the insurance landscape. Economic growth and development, rising middle-class incomes, changing customer needs and demographics are all pressuring local and foreign players to innovate and collaborate to get market share. The continued adoption of automation, process distribution, and digitalization by small and large insurers is already paying dividends by reducing claims, and expense ratios, and increasing customer service levels and profitability ratios.

12.3.1. Overview of Automation Technologies

Automation describes a concept that encompasses several technologies and applications. It integrates tools that, when connected, work together to drive the automation process through a workflow. This set of tools can be physical robots or software performing simple actions such as moving, clicking, or switching inputs and outputs. It can also communicate through an API with applications responsible for managing specific business processes. This combination of technologies and tools has evolved as a product of the industry's progress in recent decades.

More recently, the advent of more advanced technologies and the continuous investment in AI and ML allowed the creation of agentic systems able to perform several previously human-attended tasks. These innovations created opportunities for replacing human attention in repeating and high-volume processes, optimizing business productivity by freeing up employee time to add value to more complex tasks. The wide variety of automation technologies may give the impression that investment in automation will necessarily return to the company additional efficiency gains. Analyses found that only 53% of companies investing in automation-related technology significantly improved their productivity.

Less than 50% of work activities can theoretically be automated, because of the many functions considered too complex and that require a high degree of human and interpersonal interaction. Moreover, productivity gains from AI-powered adaptable systems are only observed in organizations that have invested in improving their processes before investing in automation. Companies are expected to continue investing in automating routine work in existing activities, actions that consume too much time of executives and are considered non-value added. The combination of RPA’s lower costs, quicker implementation, and ease of use are major elements in its fast uptake.

12.3.2. Impact of Automation on Operational Efficiency

Across industries, automation technologies are powerful enhancers of operational effectiveness and efficiency. For example, a global survey reports that 88% of companies implementing automation technologies report some access operational improvements, and companies using AI are six times as likely to see growth, and 1.5 times more likely to unlock cost savings. For the insurance industry, recent research suggests that it can see similar upsides from automation, with reports indicating that automation can boost the bottom-line profit of insurance players by as much as 30%. The benefits of automation go beyond cost savings, with gains also stemming from improvements in productivity and shadow expenses, but not reflected in financial statements, as well as throughput, compliance, and turnaround times.

In the insurance industry, many of the operational challenges are labor-driven, as the legacy systems in place at many companies depend on a large amount of manual review and handling. Claims processing, underwriting assessment, and policy servicing and management, for example, are all tasks in which human workers are involved, and as a result, take on disproportionate levels of costs. Even before the impacts of COVID became clear, many industry observers had been predicting labor shortages, as larger numbers of older industry workers near retirement. In addition to cost and labor challenges, many of the core insurance activities also exhibit significant operational inefficiencies. Labor inputs are often overwhelmingly high for underlying processing volume, and as a result, demonstrate significant unit costs, as highlighted by complaints that processing a claim can be more expensive than the payout. Insurers also experience significant losses from fraud and waste activities. Automated insurance processes can lead to improved operational efficiency both by substituting for labor, and by enabling better, richer, and more accessible data models and analytic capabilities.

12.3.3. Customer Experience and Automation

Research into the use of chatbots for insurance customer experience has largely extolled the benefits of automation. Fraud detection, underwriting, and post-purchase customer service tools can handle a wide range of tasks quickly, simply, and efficiently, allowing customers to sidestep waiting hours on hold for human agents to assist or, crucially, assistance unavailable out-of-hours. Empowered by Natural Language Processing, customers can ask questions in their vernacular about the terms, conditions, and rules governing the policies they are purchasing. Transactional queries are just some of the types of queries supported by enterprise automation vendors.

Yet vendors that make automation tools for first-level interactions are coming under increasing scrutiny as low-cost installations of chatbots are causing enormous frustration

to consumers who are unable to speak to someone and are unwilling to submit their queries to poorly trained algorithms. When customers take time out of their day to submit a support request, in any channel, they are already in a vulnerable emotional state; when solutions are simply "not found" by an automated channel, this causes further annoyance and can often lead to lost business. Many vendors have responded to this need for a delicate balance between automated and human interaction mechanisms by promoting "hybrid" solutions whereby agents work alongside automated systems, providing human empathy and critical-thinking skills while allowing these tools to handle transactional activities like data entry and knowledge access. It is only through this careful orchestration that we will see truly enhanced experiences throughout the customer journey. Indeed, the outcome of an average quote-requesting customer journey is likely to be dictated by the quality of the service provided by the insurer's partners rather than the insurance company itself. Insurers should explore how partners are utilizing process automation tools, to help them maximize fulfillment speeds through the use of modern technology.

12.4. Exploring Agentic AI in the Insurance Sector

What is Agentic AI? Generative AI systems can create novel and unexpected outputs based on the context of a prompt. These systems achieve this using a combination of techniques drawing from machine learning, computational linguistics, and data mining. They are trained on passively collected datasets obtained at a massive scale from the internet. The emergence of this class of AI systems has the potential to radically change large swathes of the economy, and their transformative potential has sparked wide discussion in both industry and society. Despite the popularity of these systems, questions remain regarding their fundamental properties. One of the key elements of these systems is that they exhibit a sense of agency, the ability to act and affect the world around them. Because of this, discussions call these systems 'agentic AI.' The use of the adjective 'agentic' draws attention to a special kind of agency exhibited in humans and animals driven by a sense of self, motivated by goals, internally directed, and reflective. However, the current generation of AI systems is still far from exhibiting a true sense of agency, as they lack a variety of different forms of self-awareness. Among these are, first, a simple factual knowledge about the self; second, metacognition, or knowledge about one's cognitive processes; and third, self-reflective consciousness, or awareness of oneself as a conscious being. 4.2. Applications of Agentic AI in Insurance The insurance sector is well-suited to benefit from agentic AI systems as they have the potential to automate parts learned jobs while also augmenting knowledge workers such as actuaries and underwriters. By retraining the existing labor force and embedding agentic AI tools as co-pilots where they can easily improve the productivity of higher-skilled workers, it may be possible to reduce the friction usually involved in

technological change while also generating new sources of value and wealth. The insurance sector already has many forms of automatable work, such as assembling applications, doing basic underwriting, assessing some types of loss, programming insurance bots, and selecting agents and other vendors. According to estimations, between 54% to 70% of all jobs in the insurance sector could have some activities potentially affected by automation and augmentation efforts using AI.

12.4.1. What is Agentic AI?

Artificial intelligence (AI) is increasingly part of the fabric of our daily lives, from helping us search for things to automating responses to messages. For years it has been one of the main driving forces of the Fourth Industrial Revolution that has wrought fundamental changes, particularly in the development, adoption, and diffusion of technologies. However, while many view AI as doing things on our behalf, or augmenting and enhancing our capabilities, the idea of agentic AI provokes an assumption that AI is acting with or instead of us. There is an inherent duality being suggested — on the one hand these agentic AIs are extensions of ourselves, while on the other, they can act for our benefit or potentially without oversight or accountability.

But just what is this agentic AI? In this context, agentic AI refers to a narrow subset of AIs defined as highly autonomous systems that act in the world, while intelligence augmentation refers to systems that enhance or complement human performance rather than automating. For example, systems are capable of providing comments and critiques on human-generated actions and outputs. More generally, the stark distinction between intelligence augmentation and agentic AI relates to the capacity of an AI to act independently in the world. This act independently is what agentic means in this context, and hence the distinction with more common uses of the term "autonomous" in the case of self-driving cars or drones is that in those examples, the human digital workers or humans more generally still retain a supervisory or oversight role.

12.4.2. Applications of Agentic AI in Insurance

Agentic AI, essentially digital agents capable of autonomous decision-making and action, brings transformation to several important functions of the insurance industry. This transformation includes service automation utilizing sophisticated natural language neural models, risk assessment and pricing leveraging predictive capabilities, fraud detection, and prevention through behavioral analytics, claims settlement enabled by automatic document validation, cyber insurance paired with cybersecurity technology, underwriting enhancement utilizing intelligent document processors, new product development via visibility in dynamic niche markets, and empowerment of insurance

agents. The core activities of each function above are mundane but essential to the business of insurance. Individual insurance companies may not have a sufficient volume of data for each of the activities to train machine learning models to the required level of accuracy, reliability, and interpretability, making it challenging for them to apply AI to automate these activities. Collaboration platforms founded on federated learning may help scale the application of AI to these mundane activities. Data owners can retain data privacy while training industry-specific machine learning models to provide decided efficiency and accuracy improvements to mundane activities across insurance companies. The resulting gains can offset the cost of automation and generate the upside from venture-like collaboration across insurance companies.

12.4.3. Ethical Considerations of Agentic AI

These questions about the ethical implications of agency are underscored by a growing interest in the intersection of AI and ethics at the global level, through various bodies. These organizations are designing frameworks, rule of law recommendations, and technical standards to account for questions about the value-laden nature of AI, and specifically how particular AI systems designed to optimize certain capacity efficiencies can undermine society's core democratic commitments and fundamental values. For example, one proposed framework suggests that "States and public authorities must ensure that AI systems are designed and operated to give effect to, and respect, human rights," but these questions will be increasingly difficult to answer as AI systems don't just protect, or include human decision-making, but increasingly can make decisions on behalf of human beings.

Organizations across sectors are hiring AI ethicists. However, these efforts may be hampered when dealing with agentic AIs that are effectively "plugged into" companies and organizations. Agentic AIs can be designed to optimize a range of tasks that traditionally serve a particular corporate function, for example, customer service or risk assessment, or provide a center of intelligence. This "plugged into" dynamic may strain or displace ethic review boards who are tasked with questioning the safety of a technology-enabled decision when the decision is not expressed as a direct choice about a tangible outcome.

Ethical impact evaluators modeled on traditional corporate governance or social corporate responsibility roles may experience role strain in their accountability relationship the more power they give AIs to make decisions on their behalf or act as the primary actor. Ethical review boards may have a difficult time determining not just whether the agentic AI modeled for a company reflects ethical inputs and goals, but whether the very act of using an agentic AI – to delegate these tasks and decisions – fits into an ethical framework.

12.5. Personalization Strategies in Insurance

Considerable effort is being dedicated to advancing personalization in insurance because it leads to better gradients and consumers who are more receptive to dynamic pricing and individual risk quantification. Personalization strategies range from experiences that are finely tuned to individual needs and desires to services and solutions that are relevant for a particular group of consumers but much less tailored to specific customers. Insurers have long used mass marketing techniques like life cycle marketing that seek to enter the lives of consumers when they are most in need of a particular insurance product. They also have segmented the consumer market for automobile insurance by demographic and geographic characteristics like age, gender, and the presence of other automobile policies in the household. The latter is widely thought to be a relatively poor predictor of risk exposure and is therefore deemed inadequate for risk-based pricing of auto insurance premiums. Data availability has opened the door to data-driven prediction of the demand for insurance protection, individual exposures to risk, and the consequences if a loss materializes.

This data-driven approach leads to vastly better gradients and produces more accurate estimates of individual as well as group-level common shocks from jumps, spikes, and larger latent variables about natural catastrophes or economic cycles. An area of research is using statistical machine learning or econometric predictor estimation techniques for semi-parametric demand models, risk assessment, and loss estimation. Some of these approaches are closer to pure uncertainty quantification and regularization whereas others employ equilibrium behavioral primitives like utility functions or save and consume life cycle behavioral functions. Refinement of ultra-granular market segments that feature clustering around very narrow policy characteristics is consistent with the use of signals from behavioral modeling to enhance creditors' credibility and wealth.

12.5.1. Data-Driven Personalization

Fascinatingly, nearly everything humans do nowadays generates data, and while macro-level trends such as demographics remain relevant for some personalization strategies, insurance companies nowadays rely heavily on a micro-level to mobilization on data. But when talking about data-driven personalization, yes, data from existing customers is the richest and most valuable in the sense of understanding what insurance products are relevant to individual customers. Nonetheless, customer behavior outside the company’s systems also offers valuable signals of changing needs and opportunities. Data is a crucial resource for many companies, especially in their efforts to understand and anticipate the needs of their customer base. Insurers analyze anonymized data from social networks, e-commerce platforms, and other sources to spot patterns of behavior that can signify underlying changes. Data scientists have analyzed high-frequency, high-

volume datasets to understand how habits shift after a claim. For example, when investigating the spread of a virus using anonymized telecom data in conjunction with mobility data, it was found that there was a drop of only 5 to 10 % of people commuting to work, in less than three weeks. Data-driven personalization is then the process by which companies offer relevant insurance products or services tailored to their customer's unique preferences or needs. Personalization efforts can emerge in different contexts, such as product design, pricing and underwriting, marketing communication, sales and distribution, service, and claims. A bank may send a parenting newsletter to a demographic segment of millennials with young kids and recommend they add child savings accounts.

Overall, data-driven personalization can have many different objectives. Many companies want to increase product and service engagement among their customers. An insurance company might want to enhance its risk prevention services to households with young children. Tech companies catering to a broad customer base have the most advanced forms of product/service personalization engines. Streamed video and music providers have spent years refining techniques for recommending content to consumers. Insurers are only beginning to explore these recommendation engines.

12.5.2. Customer Segmentation Techniques

Diverse personalization strategies leverage customer data in various ways according to their available capacities, technologies, and business strategies. However, to increase and optimize services cost-effectively, the first step statement of any personalization effort is a customer segmentation approach, which is a classification of customers into homogenous subgroups based on similar preferences. Thus, defining and applying an appropriate customer segmentation technique allows businesses to create tailored offerings, resulting in competitive advantages. Segmentation unlocks many advantages in marketing, sales, or customer service; it increases the development of marketing actions adapted to each segment, identifies attractiveness and reflects value differences between segments, to flexibly implement competitive market-entry strategies and go-to-market planning, enhances identification and selection of customer service channels by segment, allows adequate employee resource allocation by segment, and boosts customer loyalty by addressing and anticipating preferences for products and services desired by each specific segment.

In general, two major categories of segmentation techniques can be distinguished. The first category, descriptive segmentation approaches, has the advantage of simplicity and requires less data compared to the second category of predictive segmentation techniques. The second category creates clusters of customers in a higher-dimensional space consisting of multiple variables for which more information is available than for

the first approach; here, the computed goodness-of-fit becomes key for defining the utility of each group. Beyond that boundary, however, several variations can also be distinguished regarding which data should be used, how clusters should be created, what criteria should be applied, and how cluster membership should be used for decision-making. Consequently, the space of possible approaches is especially large in the case of descriptive segmentation.

Fig 12 . 2 : Streamlining Customer Segmentation with Agentic AI

12.5.3. Real-time Personalization Approaches

Personalized recommendations have only started to be adopted in insurance. A study explored how personalized advertising can improve customer response through two case studies in life insurance advertising, while another favored websites as support for visa purposes. A recommendation system for home insurance products was created based on clustering, using a combination of goals: the promotion of new insurance products and the improvement of customer loyalty. Another study focused on the travel and life industries by analyzing customer profile data and competitor offerings to improve the effectiveness of cross-industry and targeted marketing campaigns.

Combining price and convenience, a recommender system was proposed to help customers choose insurance policies from multiple suppliers according to their

preferences while minimizing the costs incurred by insurers. The cross-selling of life insurance was considered a multi-agent collaborative task for two different agents, which led to the creation of an insurance cross-selling strategy. It was highlighted that the major obstacle to data-driven approaches is the limited amount of life insurance purchase history since it is rarely used as the only data source. The inclusion of social media was suggested, focusing on a recommendation system model that suggested risk covers for SMEs based on microblogging data. General insurance product sales were predicted from web traffic data by applying statistical models and forecasting methods in conjunction with only four considerations. A recommender system was proposed that combines a hybrid content and collaborative filtering technique, aiming to create productive suggestions of domains or applications to be reused, adapting users' decision-making.

12.6. Automation Strategies for Insurers

Insurers are rapidly adopting these technologies to increase productivity and reduce costs, to automate what are now labor-intensive processes. The insurance landscape is proving rich territory for enterprise automation. While insurance investing is not as attractive as fintech, the actual processes of underwriting and claims management are ripe for automation, allowing human talent to be diverted to the analysis of edge cases and ensuring good customer service, rather than grinding through commodity repetitive tasks. Robotic process automation, the first wave of enterprise automation, is widely used in processing commercial lines and workers' compensation claims. With the next wave of technology – AI and machine learning – being applied in consumer lines, automate the first notice of loss, but in both cases as assistant to, rather than replacement of, the traditional human claims adjuster.

Robotic Process Automation (RPA). The simplest task example of enterprise automation is RPA, where decisions are not made, just rules applied, across front, middle, and back office processes in insurance. These could be moving data from one place to another regularly, moving files, generating reports, and so on. Regulatory requirements are significant for insurance companies, and compliance-related work is time-consuming. By utilizing RPA tools, these rule-based tasks assigned to staff can be automated to improve efficiency. Claim adjusters typically utilize multiple systems to collect information for a claim from multiple data sources. Implementing RPA can simplify the task of adjusters and others involved in the process by pulling this data together into a single system. RPA can also improve customer satisfaction. In the initial phases of a claim through the claim handling process, RPA can be used to keep customers updated automatically about the status of their claim.

AI and Machine Learning in Claims Processing. Unlike the most mundane repetitive tasks, claims processing requires a more intelligent system. AI and machine learning tools have a wider application in claims adjusting than RPA tools, enabling claims departments to eliminate a higher proportion of manual tasks. For the most common "low-complexity" claims, such as auto damage claims for cars entirely covered by a single insurer, AI can make the adjuster completely redundant. AI and other technologies can be used to automate the FNOL process. Several companies are already using these technologies to carry out fraud prevention and prediction analyses. AI-based solutions are being used by insurers to speed up the underwriting process of life expectancy risk assessments.

12.6.1. Robotic Process Automation (RPA)

Robotic Process Automation (RPA) technology continues to be a key component of the insurance industry's digital transformation strategy as it helps insurers optimize performance by automating high-volume repetitive manual processes. Over time, RPA is moving from automating simple rule-based tasks to more complex unstructured and cognitive tasks in Claims Management including underwriting and pricing support. With RPA, insurers expect workflow acceleration and cost savings, improved accuracy and quality, and enhanced employee and customer experience. RPA today can automate the processing of insurance forms and documents including underwriting applications, Proof of Loss forms, Claim Payment and Reimbursement Requests, attachments to claims, and extensive financial documents and medical records. Automating the above documents for policy or claims filing, review, and processing, benefits insurers considerably as many of these files are lengthy, contain free-form answers, and are created by non-standardized processes. Moreover, given the high volume of Acts of God and mass-casualty Events due to climate change occurring today, digital transformation is especially critical for the P&C sector.

Today, RPA is one of the most important enablers for a digitally transformed insurance enterprise of the future. The low-hanging benefits of RPA such as the ability to accelerate business, combat workforce shortages, enhance customer service, reduce processing costs, optimize labor arbitrage, and eliminate errors, while freeing employees from tedious repetitive tasks to focus on more productive, moderated risk-taking work, are enough to spur strong demand for these services from enterprises. RPA technology in the insurance market will grow at a CAGR of 29 percent, reaching a market size of around USD 2 billion by 2027.

12.6.2. AI and Machine Learning in Claims Processing

The buzzwords "AI" and "ML" have taken hold throughout the business world, and insurance is no exception. Given the complexities of trying to assess when an event has occurred, what the facts are, who is at fault, what the financial impact of the event will be, and who should be paid — not to mention the fact that people have an inherent tendency to try and game the system — it is no wonder that the claims process has been a rich one for the application of AI/ML. Initially, such technology has been applied to automate some of the more mundane tasks across different claims functions, from damage assessment and fraud detection to providing customer feedback and enhancing the customer support experience. The further automation of each of these processes, through a more sophisticated use of AI and ML, is the next step in the evolution of the claims function.

Of course, as insurers have discovered, no one wants to be at the receiving end of a facial recognition algorithm that denies them a claim when they are genuinely crying over their wrecked car or have a mortgage payment due on their tornado's house. AI/ML have made a strong contribution to claims since they were first introduced to the industry — just ask the P&C underwriters, who cannot function without modeling systems — but their future promises much richer analysis, and therefore, the ability of a subset of claims adjusters to approve claims more quickly. Whether this added functionality will accelerate without doing greater harm than the previous generation of fraud models — based largely on "business rules" that told the adjuster which customers to give extra scrutiny — remains to be seen.

12.6.3. Chatbots and Virtual Assistants

In addition to RPA, AI continues to revolutionize the customer experience. Chatbots are the first AI applications many insurance customers experience. Chatbots are online virtual assistants that answer simple questions. Chatbots provide both pre-made answers to commonly asked questions and answers to unique questions based on natural language processing powered by machine learning and large language models. Chatbots are available 24/7 and solve straightforward problems nearly instantly. Insurers have implemented chatbots to answer simple policyholder questions about claims status or coverage questions vacationing policyholders ask when they discover they are having a home repair emergency. When chatbots work effectively, these functions increase customer satisfaction and save costs by effectively dealing with questions policyholders would otherwise direct to a service agent.

Research shows many insurance customers prefer to consult humans, particularly when communicating about sensitive issues such as loss or damage to a family member or

loved one, or financial distress from loss of income due to standard insurance events like serious illness. As a result, chatbots are typically deployed in concert with virtual contact assistants powered by AI. Virtual assistants manage policyholder conversations, directing simple questions to chatbots for resolution while passing complex questions to human agents more qualified to help with sensitive issues. Small questions can be handled exclusively by chatbots, while more complex customer questions are moved to human specialists. Agents can also answer more complex policyholder questions smarter and faster, aided by predictive AI tools. Rules-based chatbots no longer work effectively, leading to poor user experiences. Virtual contact assistants are a better solution leading to better experiences for both customers and service agents.

12.7. Agentic AI and Risk Assessment

Qualitative risk assessment performed by human experts has been gradually replaced by quantitative risk assessment made possible by predictive analytics applied to large datasets. In this framework, AI has become a go-to tool in the insurance industry to create models for risk assessment in such diverse areas as self-driving cars, estimating the lifetime expectancy of insurance applicants, detecting infectious diseases, or predicting the risk of catastrophic climate events. The insurance industry has embraced the phenomenal growth of data-driven predictive analytics. In life and health insurance, predictive analytics is used to guide decisions ranging from agent appointments, geographic expansion, and direct marketing programs, to lifetime value estimation, underwriting risk assessment, claims trend tracking, and claims assessment fraud detection. This increasing popularity has been driven by improved accuracy of predictions, return on investment, and speed in delivering predictions, as compared to the traditional risk assessment processes.

The underwriting of insurance policies has so far relied on several discrete processes. An applicant for insurance submits a form with their information. Initial review of these underwriting submissions is done in part by an insurance agent, who also engages with the client for any additional information required, and in part by an underwriter who prepares advice for the agent. The actual process of assessing the policy application or renewal is performed by the insurance company, followed by risk performance monitoring. In life insurance, this process may take several weeks before the company issues the final policy document. AI-based underwriting is on the brink of transforming this entry point for insurers to a real-time and much more accurate assessment. By allowing for the autonomous closing of some of the most straightforward underwriting cases, AI systems may enable underwriters to focus on the more troublesome and complex policies that cannot be automated. AI is beginning to support autonomous claim

processing in auto insurance, with systems assessing minor claims from collision or damage reports and instructing the pay-outs of claims that are machine-approved.

12.7.1. Predictive Analytics in Risk Management

Insurers have dealt with risk selection since their inception. Since the establishment of the original Pool and Share system in the Middle Ages in England, insurers always worried about selecting the best risks to insure, the selection becoming more and more complicated with society's evolution. So the use of statistics to determine and mitigate the risk selection process is older than computers. In the last century, the introduction of computers allowed insurers to develop risk selection models in a much more efficient way, moving part of the decision-making of underwriters to computer systems.

The Decision Raincloud Risk Model Application was probably one of the first external parametric solutions developed, and it allowed the underwriters to provide more consistent results to their clients based on which parameters should indicate the risk profile and the probability of claims to occur in the future. The introduction of AI and machine learning to predictive and descriptive analytics has taken such models to a different level. These models use optimization algorithms to address the under-processing of deep learning models and combine the various aspects available in the data sources that are created over time. These complexities and the almost unlimited external information available allow the fuzziness of the predictions to be estimated and the model to adjust accordingly, making them much more robust than the early models. It puts the core of the underwriting decision back on the underwriters, who know their segments better than anyone else and should be responsible for the final risk acceptance or rejection, rather than just working as data processing teams.

12.7.2. AI-Driven Underwriting Processes

A key insurance function that will benefit from more AI-enabled operations is underwriting. Insurers are increasingly using predictive models to assess the potential for future claims loss, which is a core underwriting function. These predictive models are based on machine-learning optimization of large datasets to identify complex interrelationships among independent factors that contribute to loss risk, as well as the relative influence of each factor. Such predictive models can be used to inform and enhance any phase of underwriting from the initial quote request through policy issuance to ongoing policy monitoring and review of loss experience.

Machine-learned predictive analytics can enhance risk classification, the core task of underwriting, by going beyond the loss analysis and simple rating factors used in

conventional class-based underwriting by enabling the automatic identification of patterns in much larger pooled samples. Its effect will be to reduce the cost of underwriting and, simultaneously, improve the accuracy of assessments of loss potential. AI predictive models take the data that insurers have been using for years as the sole basis for underwriting decisions and improve on those earlier methods: by providing assessments much faster, and by providing a wider-angle view of the risk. The regulatory implications for underwriting would thus be restricted to the use of autonomous AI in sensitive areas of life and safety, such as insurance for health, life, and disability. However, given the pervasive and quasi-automatic role of AI in the underwriting process, the underwriting regulatory framework may well provide financial regulatory agencies with an opportunity to include insurance risk in a forthcoming international accord on risk management for systemic financial markets.

12.7.3. Fraud Detection with Agentic AI

The insurance industry has long relied on model-driven AI solutions such as basic rule-based systems to combat fraud. Static infrastructures with analytic solutions often miss out on successfully addressing the new types of crime that emerge in an environment of rapid technological changes. However, agentic AI's unparalleled ability to function within complex, dynamic data environments opens up effective avenues for tackling fraud in the insurance industry. By enabling data-driven, proactive, and autonomous data-sharing and interaction with external agents and connecting unrelated partners such as hospitals, educational institutions, and governmental institutions, agentic AI can help identify increasingly new forms of fraud and theft by encouraging information sharing and implementing trust between different agents. Fraud detection using agentic AI not only creates a massive shift in how various actors in the insurance industry ecosystem interact but also opens up new avenues for fraud detection using passive and active probing of the external environment for data. By leveraging the unique capabilities of the technology, insurers would be able to reliably detect signal patterns of fraud in all areas of insurance from all actors in the transactions: applicants, underwriters, customers, and all actors in the medical ecosystem. These solutions would use continual multi-modal data fusion of many sources formed from intelligent transaction monitoring and other external information sources—from existing partners and new partners in the ecosystem. All of these would be enabled using data on interactions within communities generated through network analytics on the intelligently found connections made by probing and trusted external agents and their interactions.

12.8. Consumer Perspectives on Personalization and Automation

Exploring consumer perspectives on automation and personalization in the insurance sector gives additional context to our prior discussion. People appreciate the improved efficiency and customer service that intelligent automated solutions provide. Consumers click on targeted advertisement campaigns; however, overly personalized experiences are off-putting and raise privacy concerns. Ultimately, consumers expect to be partners in the co-creation of the relationships they share with insurance agents and companies, calling for increased transparency about how data are collected and used. Section eight proceeds as follows: Section 8.1 discusses consumer acceptance of automated solutions, section 8.2 unpacks privacy concerns with personalization, and Section 8.3 reflects upon the demand for transparency.

Our discussion so far points to the imminent adoption of highly intelligent automated solutions by insurers, insurance agents, and customers alike. We would like to contextualize this idea of personalization and automation in the insurance sector by adding consumer perspectives on these trends. The main perspective consumer scholars capture is the act of self-service. It provides consumers with empathy, efficiency, control, and convenience, resulting in satisfaction. Human service is limited to retaining scarce resources, occasions with high service failure risk, no experience benefits, and no resource beyond hit-and-miss recommendations. Automating the self-service response to consumer contact allows companies to establish new ground rules for the omnichannel environment. It is argued that consumers will prefer AI-enhanced service encounters, valuing productivity and cost savings over less-than-human empathy and social connection. However, for the omnichannel experience to shine, assistance and understanding in support of positive relational responses should occur before and after the AI phase.

12.8.1. Consumer Acceptance of Automated Solutions

Digitalization has made automated solutions ever more accessible to consumers—many people now value, expect, and use them regularly. From chatbots and automated online quizzes to robotic process automation and algorithm-driven portfolio management tools, technology can lighten the load for consumers by offering cost-efficient 24/7 and quicker services. Dissatisfied with human interactions that can leave them no more informed or supported than before, consumers are increasingly receptive to ADBMS solutions. Many consumers welcome AI-driven insurance solutions, from buying insurance through a chatbot to using automated underwriting for claims decisions. Potential use cases may span the entire customer lifecycle, from sales and underwriting to claims processing and customer care. Enhanced data-driven decision-making can help insurers offer better

pricing and broader access to coverage, while also improving claims efficiency and fraud detection.

However, while many consumers are passive supporters of AI, few are active endorsers. AI has yet to gain the same level of consumer acceptance as other digital services and platforms. Skepticism often exists toward digital assistants and systems making crucial decisions. More than two-thirds of consumers express little interest in having their insurance claims managed by AI. Concerns with the use of AI in service delivery remain wide-reaching. Along with worries that AI assistance will lack empathy, consumers have mixed feelings about sharing sensitive information with automation-based services. Many consumers are uncertain if these solutions will be able to protect their accounts and personally identifiable information better than agents can. Concerns still linger about the accuracy and performance behind ADBMS solutions, with the potential for bias in automated underwriting decisions frequently raised. As the insurance value chain undergoes further changes, some consumers demonstrate readiness to embrace AI-driven models, yet others remain much more cautious and hesitant, expressing a desire to keep a human layer in their insurance experience.

12.8.2. Privacy Concerns with Personalization

While consumers are generally in favor of product personalization, it is also clear that tailored solutions can lead to privacy concerns. In particular, insurance product design is probably not the most intuitive information domain for most consumers, and this might lead them to be less accepting of data-driven solutions that they do not understand. Thus, despite voiced demands for innovative insurance, there could be a limit to how far and deep personalization can go, and the industry should be careful to remain within the acceptable boundaries defined by customers. Furthermore, content-aware personalization approaches make use of digital traces and other information out there in the public domain, for example, on social media, which is sensibly available and seemingly 'fair' to use in the sense that users volunteered the data. However, it is also evident that this data usage could cause friction between the customer and the insurer. This friction could be expressed by consumers objecting to a particular recommendation, or more generally discussing the topic of perceived intrusiveness, or higher friction in the entire process. Behavioral economics offers explanations for such potential friction: some of the habitual barriers to change, such as inertia or status quo bias, would suggest that the consumer prefers the current state of affairs, and therefore any recommendation or intrusion is badly received. Additionally, if the consumer feels that using data about him or her to recommend products is a 'risky' decision for the insurer, the insurer would have to act more conservatively in nudging or recommending products. Going by social values or views about what is 'right', you would expect that recommendations or nudges

are only beneficial if their 'right' factor is above a threshold level. Such thresholds could be higher for the taboo or 'high stakes' areas, and therefore nudging is less likely to be successful.

12.8.3. The Demand for Transparency

People have become skeptical about automated solutions. A large number of fabricated, or at least turned benign, accounts on social media is an indication of the fact that platforms visibly struggle with catching biased but data-driven computer-generated tampering and manipulation. People are aware of the fact that human beings are likely to be more aware and aligned with their motivations, sensitive to their needs and intentions, and careful and more accurate about implementing the changes and assisting with the solutions related to their lives than artificial intelligence-enhanced automatons, capable of processing huge amounts of information. Automation can thus hardly guarantee that a solution to a problem is going to be false-positive-free or false-negative-free, which means, that implementing AI-enhanced solutions makes it even more important that humans who understand the personal variables are involved in the final decision and solution.

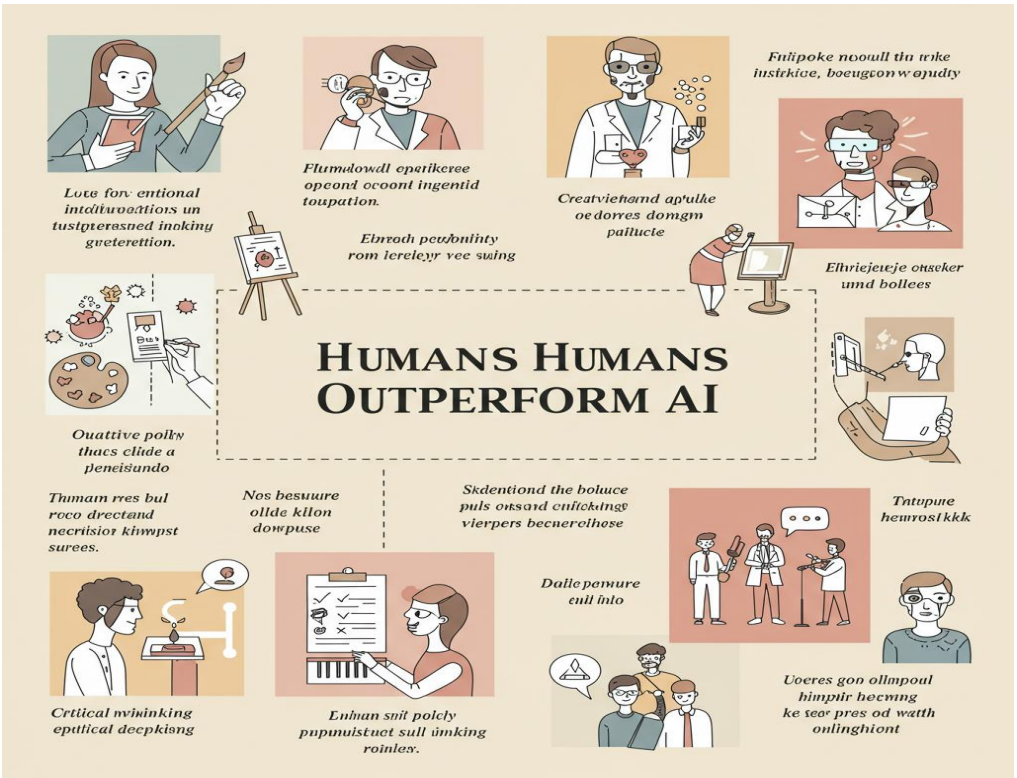

Fig 12 . 3 : Where Humans Outperform AI

Positive transformative impacts on people's lives are not only theoretical constructs or values; they need to be granularly demonstrated by companies developing and utilizing algorithm-based solutions. To minimize uncertainty, companies need to proactively account for the data, full logic of modifications and decisions, options available, and possible consequences. This can only be done by investing in data transparency. Data transparency entails sharing data, mathematical models, and the rationale and psyches designing decision heuristics. High levels of data transparency minimize the perceived risk of getting harmed by an algorithm-based decision. Data, model, and decision transparency demand a lot of effort and resources; nevertheless, it leads to improved accuracy of achieved results, followed by the creation of a good reputation for the company, which eventually allows them to stop investing in maintenance and sponsoring the process of getting what they need in the specified time frame. In addition, proactive investment in data transparency can help people build an understanding of the white spots regarding the design of predetermined automated solutions.

12.9. Conclusion

In concert with existing industry reports, we argue that the insurance of the near future will be characterized by enhanced personalization of coverage, augmented by a comprehensive combination of automated processing of insurance clauses combined with machine- and large language model-augmented brokers and agents. Insurers have largely undergone digital transformation, which will continue as generative AI technologies are further integrated into practices, routines, and systems. The use of technologies by insurance firms will remain oriented to efficient assistance and enhancing the customer journey. Increasingly available queries on insurers and other insurance-ecosystem players will continue to alter how consumers think about insurance. The existential crises facing other industries will have less impact on insurance, as trust remains crucial for consumer decisions, and 'empathy' is needed as companies grapple with new developments and navigate regulatory requirements. However, doing so and adhering to corporate codes of conduct and ethics will become more readily observed as these become available for public scrutiny. The second part of this study has explored the far-future vision of human-centered insurance with Agentic AI. If firms can realize the foresight involved, the consequences are vast. Consumers, businesses, and society can substitute cointegration for risk absorption, and the agency of humanoid systems will be enhanced, supported by contractual arrangements put in place by the parties involved. Insurers will continue to operate on behalf of clients. These innovations come as increasingly complex developments demand new support surrounding the transactions taking place. Ultimately, customers will be able to manage the complexity automatically, efficiently, and cost-effectively, facilitating the evolution to a consumer-

centric world. The human agency will not decline. Rather, it will grow, and insurance will be pivotal in making it possible.

12.9.1. Final Insights on the Evolution of Insurance Practices

Digital technologies are reshaping any business, including insurance. Future enhancements will come from new and highly efficient techniques of information processing thanks to AI-enabled systems. Today's successful insurers must speak the consumer language, listen to their needs, and proactively help them in times of need with co-investment. Once technology silently collects the required data, helps optimize the right level of coverage for each risk category, and allows for handling claims automatically, insurance will be indistinguishable from preemptive customer assistance.

This contribution summarized the present status of the insurance industry and its future evolution, emphasizing very concretely that the most successful insurance companies will be radically different from those we know. By assisting their clients proactively in avoiding severe risks, they will be able to reduce risk coverage and may depend on a data-driven approach that covers many activities in the user's environment. Their success will be not only due to providing the best possible service based on reliable observed data but also to the automated detection of anomalies that may indicate the appearance of new latent needs. Through the automated collection of data from varying sources, analysis for detecting anomalies, and the informed use of chatbot technology, they will also be able to cover large parts of the trust-building activities that are now implemented through direct human interaction.

The remaining limiting factor to the profitability of insurance companies will be the rare occurrences of the covered risks. What I have called the crypto-economy is not necessarily a complementary economy but may anyhow lead to limiting strategies the insurance industry may follow. This possible duality of creating complementary markets and insurable risks that remain rare will be a crucial aspect of the future dialogue between insurance companies, platforms, and markets.

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