Data-driven insurance:

A path to strategic advantage

CGI

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Executive summary

Data-driven insurance is an enterprise-wide business model that generates a strategic advantage in the insurance ecosystem. Using disruptive artificial intelligence (AI) to analyze data can lead to innovation in operational processes and in the development of new products and services.

AI and its associated technologies have had a disruptive influence on processes across the insurance value chain—from product development, to sales, to underwriting, to pricing, to claims. In addition, AI significantly transforms insurance products and services by impacting usage-based, spot and embedded insurance.

However, for data-driven insurance to be successfully implemented and sustained, top-down/bottom-up leadership is required. This approach helps to ensure strategic use of existing or newly acquired data, a scaled implementation of modern AI algorithms, and a well-planned transformation of the insurance business.

When introducing data-driven insurance, several best practices should be considered:

Vision: Develop a vision for the strategic opportunities made possible by AI and related technologies. Involve and engage stakeholders early in the development stage of this vision.

Feasibility study: Assess whether the vision can be translated to reality. Review the current data, technology stack and AI knowledge and experience within your organization.

AI portfolio: Based on the vision and the insights gained from the feasibility study, prioritize AI business cases according to their benefits, implementation complexity and potential to scale.

Quick successes: Start with quick successes and then strategically scale up the AI deployments.

Data acquisition strategy: Assess whether external data can be used to make better decisions, carefully evaluate privacy and legal requirements, and responsibly combine external and existing internal data to provide a wider context to AI algorithms.

Data ingestion strategy: Once data is acquired, set up pipelines to pre-process and maintain it for AI use.

AI architecture: Choose a scalable, robust and secure architecture that can manage big data, scale AI applications and balance tool/algorithm standards with flexibility.

IT strategy: Define capabilities for IT systems and processes. Continuously monitor procurement and markets for data, AI and data science personnel. Identify make-or-buy decisions and build an ecosystem.

Make-or-buy: Weigh the competitive advantage of building an exclusive internal AI solution against the advantages of commercially available third-party solutions.

Personnel: Use a two-pronged strategy to attract the right staff: Train internal AI promoters and recruit AI specialists. It also may be worthwhile to explore if Citizen Data Science is an option for your organization.

Organizational model: Organize a core function focused on building AI competencies and ensure its proximity to business departments.

Cultural change: Discuss the ethical use of AI and promote cultural change through vision communication, AI ambassadors and corporate events.

By transitioning to data-driven insurance, insurance companies can compete effectively with both established and non-industry insurance providers through process, product and service innovation. To become the first AI ambassador for your company, you can mobilize your team to pursue data-driven insurance and use new data as a strategic advantage against new disruptors.

This paper provides practical guidance on how to succeed in each of these areas.

Introduction

Insurance executives who are focused on achieving strategic advantage through data, making better operational decisions, and getting closer to customers have most likely considered the business model of data-driven insurance.

The main driver of this business model is the high volume of data generated by digitization, the advancement of AI and the exponential increase in computing power. AI technologies and growing IT capacities enable organizations to evaluate and process large amounts of data, and these new technologies are now mature enough to warrant investment (Chui & McCarthy, 2020). In fact, there are various options for using AI technologies to achieve a strategic advantage (Zarifis et al., 2021).

Option 1: Focusing and outsourcing

The insurer may realize that another company has more mature AI capabilities, for example, and be better positioned to exploit specific AI opportunities. Consequently, an insurer outsources part of its value chain to other organizations and focuses on its core competencies.

Option 2: Using AI across the value chain

Processes, products and services are automated with the support of AI, and new AI solutions are introduced, or existing insurance solutions are augmented with AI. Automation can be implemented centrally via a shared services approach, and business processes are redesigned using both AI and a data-centric approach. Because business processes are not outsourced, specific knowledge remains within the organization.

Option 3: Expanding the value chain

As their value chains expand, insurers can tap into new data sources and develop new processes, products, and services. Processes are introduced or revolutionized (vertical and horizontal expansion) and as searching for external data becomes routine, insurers analyze data and use the results to develop new products and services. A cross-industry example is the monitoring of containers and goods by Internet-of-Things (IoT) sensors within the transportation industry. Similarly, insurers can license IoT solutions to benefit their own businesses or resell generated data to third parties.

As these strategic options demonstrate, the implementation of data-driven insurance and AI impacts the entire insurance ecosystem, including employees, partners and customers. Therefore, the introduction of each as enablers is a top-level management task. If the implementation of data-driven insurance is viewed from a narrow technological perspective, however, it is likely that the transformational potential of AI will be overlooked (Ransbotham et al., 2019).

Outcomes of data-driven insurance

The disruptive impact of AI across the insurance value chain—from product development to sales, to underwriting, to pricing, to claims—can lead to innovative processes, products and services and a significant strategic advantage. Several examples are listed below:

Predict customer behavior: AI provides insight into customers' decision-making and behavioral patterns. For example, data insights can reveal when clients are most likely to buy or cancel policies, allowing a provider to proactively create products tailored to various customer segments.

Price quotes accurately: Individual product or bundled pricing strategies can be augmented using price sensitivity analysis via a combination of machine learning (ML) techniques and hypothesis testing.

Enable customer-centric interactions: Insurance companies rely heavily on conversational AI tools that use natural language processing (NLP), understanding that customer interactions facilitated by chatbots and virtual agents enable faster purchases, quicker grievance resolution and higher customer satisfaction.

Augment underwriting: The risk assessment and acceptance review process can be reduced to only a few seconds, as most risk evaluation is automated using a combination of ML and deep learning models which process large amounts of data in the background.

Automate claims handling: AI algorithms manage the initial processing and increase the efficiency and accuracy of subsequent processing. Further, IoT sensors and a range of data acquisition technologies, such as drones, can use computer vision to complement traditional methods of damage reporting.

Detect fraud: Well-built AI models can be helpful in detecting, understanding and tracking fraud patterns, freeing up more time for internal investigators and speeding up the overall fraud mitigation process.

AI technologies further disrupt insurance products and services by enabling a wider range of innovative offerings:

Usage-based insurance: Advanced analytics facilitates real-time data analysis of IoT devices for individual and continuous premium design in usage-based insurance products.

Spot insurance: When applied to situational and real-time data, AI techniques generate contextual intelligence (e.g., the location of an applicant, the time of day coverage is requested) and can be used for real-time risk assessment.

Embedded insurance: Embedded insurance integrates insurance into repetitive consumer processes. For example, when a consumer purchases a personal computer, an insurance option can be offered. Using AI, consumer behaviour can be evaluated in real time to assess risks and generate appropriate pricing.

Mitigating threats from new and evolving market participants

Both established insurers and new capital-intensive market participants can use AI to become more innovative providers of insurance coverage. New market participants can collect, secure, and evaluate data using AI to reach customers anywhere and anytime, creating new customer experiences that position them as leaders in insurance markets.

By prioritizing data-driven insurance and leveraging modern AI, it's possible to drive process, product, and service innovation and compete more effectively with both established insurers and new players in the market.

The next step is considering how to align your business with the data-driven insurance concept.

Aligning your business with the concept of data-driven insurance

To develop a business model for data-driven insurance, consider Figure 1.

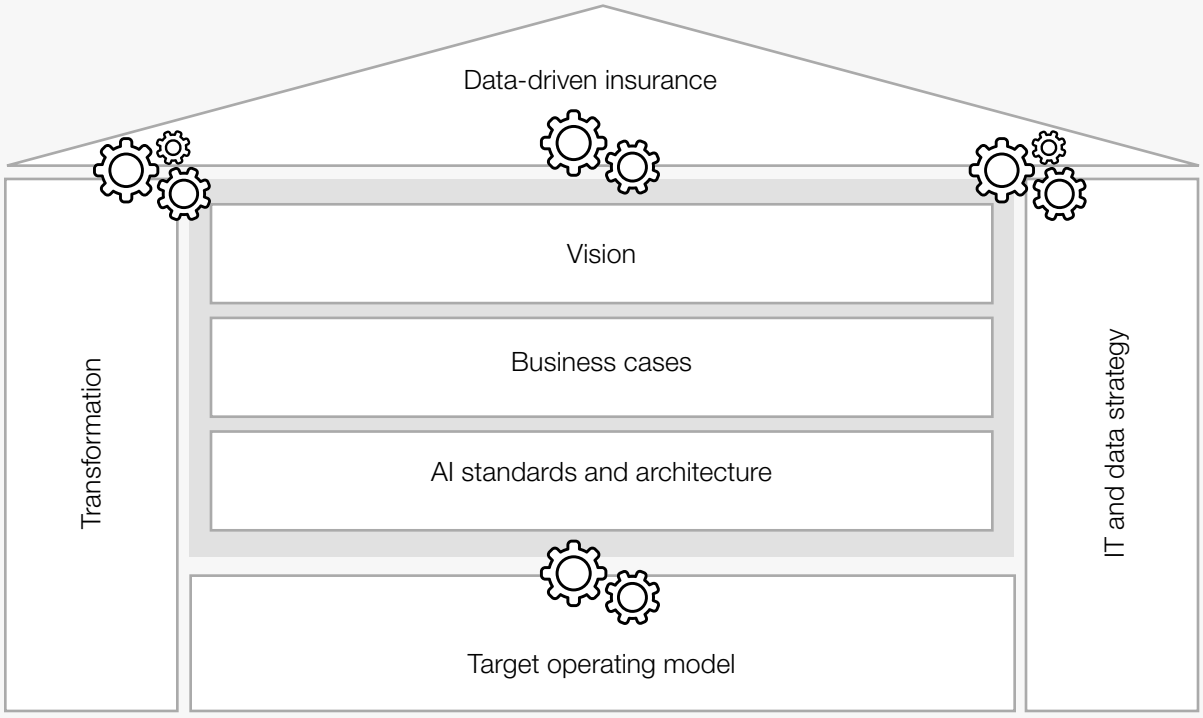

Figure 1: Agenda for data-driven insurance

When transitioning to data-driven insurance, the priority is to form a **powerful leadership coalition**. Therefore, the first consideration for top management is how far to integrate the business model of data-driven insurance into their business plans and operational systems.

Once established, this coalition can design a **vision** for data-driven insurance, which addresses the fundamental question of what opportunities and strategic advantages data-driven insurance offers.

Additional promoters are used to implement the vision and search for appropriate AI **business cases**, which are then evaluated, prioritized and planned to quickly achieve results.

The credibility and momentum achieved through these quick successes add new energy to the overall transformation of the business, which primarily involves **IT and data strategy, AI standards and architecture, the target operating model**, and an adequate **transformation model**.

Best practices for implementing a data-driven insurance strategy

Given the transformational nature of AI, assessing your data and environments and probing the use of AI for your organization is important. This analysis will help to identify key areas in which AI might be applied successfully. A CIO, for example, can use this analysis in advising the CEO and other top executives on AI opportunities. Following are some best practices:

1

Conduct a high-level assessment of the data available within your business, consider what technology stack or IT systems your teams use, and understand your strategic business objectives.

Moving to data-driven insurance can be challenging, especially with varied and disparate data sources spread across databases (i.e., on-premise or on-cloud storages and data lakes) and a variety of tools and technologies available to process that data. Starting a data and AI maturity assessment with an experienced consulting team can help prepare a roadmap for successful AI use.

2

Combine the strategic business objectives and assessment learnings to build a strategy.

Start small by choosing a use case in which AI can generate high business value and be implemented with little difficulty. The overall strategy should consider the following:

- Specific value creation steps (e.g., prioritizing a manageable use case with clear benefits)
- Use and reuse of AI across the value chain
- Expansion of the value chain with additional value steps (see section 2 above: Aligning your business with data-driven insurance)

Consensus among many top executives is a prerequisite for building a larger, more powerful leadership coalition with a shared commitment and sufficient influence to scale up the use of AI technologies across the insurance ecosystem.

3

Smartly define the objectives to be achieved with AI.

One pitfall is to develop a vision that fails to set a direction, is difficult to communicate, or is unattractive to customers, shareholders and employees. Stakeholders need to ask: What should be achieved with our use of AI? How can it help achieve strategic advantages?

Once the answers to these questions are clear, the next step is to set objectives that are specific, measurable, achievable, realistic and time bound. At the same time, communicating the vision regularly and addressing concerns as the project progresses will help keep stakeholders engaged and focused on achieving results.

This starting point leads to a strategic focus on the business areas where the highest value can be generated. Within these areas, use cases with high strategic relevance can be identified to form a continuous pipeline. The input is the insurance value chain, which serves as a process map that determines the scope of possibilities and can be used to narrow the focus.

Strategies for making better portfolio decisions

The most important business cases must be identified and prioritized based on the benefits and maturity of the technology.

Although the 10 most important business cases for AI can be identified in data-driven insurance, they cannot be implemented all at once (i.e., within the first increment). Figure 2 provides insight for prioritizing exemplary AI cases by maturity level and potential (net) benefit.

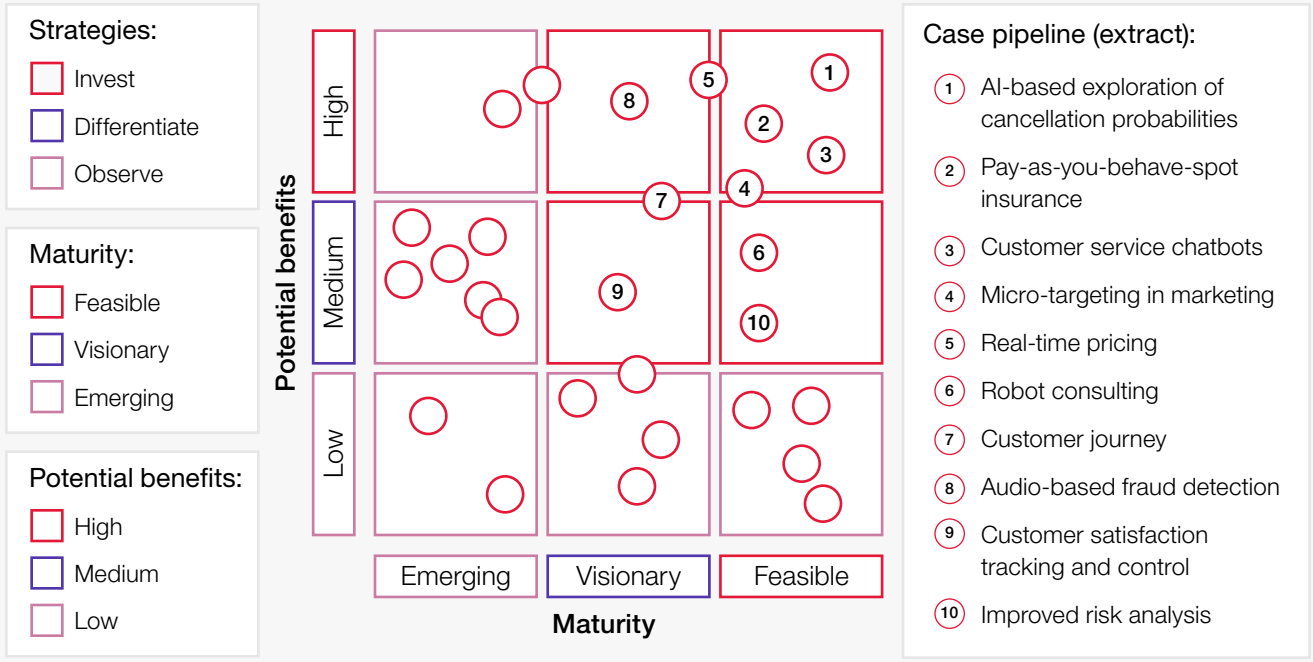

Figure 2: Prioritization of AI business cases by maturity and potential benefit

Based on this portfolio matrix, AI use cases should be prioritized in a portfolio backlog, which helps to support quick wins. The willingness to invest in AI cases also depends on an insurer's level of ambition. Identifying, assessing and prioritizing use cases should be done with close collaboration between IT and business (i.e., business AI technology experts, data scientists, AI engineers and domain experts).

Accumulations or reuse of identified AI applications in certain processes or insurance solutions indicate higher prioritization. The maturity level of the underlying AI technology for each business case also can be determined. For example, a ranking of all technologies used can be deployed or an index can be leveraged.

The (net) benefits depend heavily on the maturity of the insurance organization that wants to use AI and implement a business case. For example, does the organization have the appropriate experts, skills, processes, infrastructures and data to use the technology successfully? Is the maturity of its process model so advanced that the technology achieves the expected business value within a given budget? Is the company’s agility scalable? Answering these questions can help an organization analyze whether AI technology will yield the desired results in a particular business case.

Designing a data-driven insurance organization

The successful implementation of “quick wins” can be used to build credibility in the transition to data-driven insurance and to institutionalize successes. Transformation involves designing a suitable organizational structure and target operating model that includes new activities and specialists to lead and coordinate.

To implement data-driven insurance, multi-disciplinary teams of talented and focused AI specialists must be formed. These include portfolio managers, data scientists, AI engineers, AI solution designers, AI product owners, data engineers, software developers, process engineers, AI ambassadors, process executives, ethicists and privacy professionals, and experts in specialized fields. Specialists include divisional, sales and marketing specialists, underwriters, actuaries and claims experts.

Architecture and infrastructure specialists—in particular, AI architects, cloud architects, cloud solution specialists, and devOps experts—ensure the construction and operation of the necessary highly scalable architecture and infrastructure.

These multidisciplinary teams tap into new customer and data sources and systematically adapt the processes and IT solutions within the insurance ecosystem to AI. Figure 3 illustrates three main options for organizational design.

Option 1: AI project organization
When introducing data-driven insurance, many insurers will build an AI project organization that ideally incorporates all divisions, including sales and IT. AI resources are distributed throughout the business units in a decentralized pattern and their availability is guaranteed only by agreement. The role of this organizational structure is primarily coordination.

Option 2: AI center of excellence under a digital competence center
Pooling relevant skills in an AI center of excellence (CoE) is a way to scale AI successfully. To avoid interfering with or duplicating the work of an existing digital competence center, the AI CoE can be set up as a department in the initial phase. Dedicated product teams include experts in life insurance, health insurance, property and casualty insurance, sales and IT. This structure encourages the AI and digital competence centers to operate closely together, yet remain autonomous.

Option 3: AI center of excellence under an executive board
A centrally located AI CoE sits under the executive board level and consists primarily of AI product teams that include data scientists, engineers, data engineers, and software engineers, as well as host portfolio managers, AI solution designers, AI architects, AI product owners, and agile coaches. This clear structure strengthens the powers of the AI CoE and offers the benefits of high availability AI resources and better knowledge sharing. The remote nature of this new function is a consideration and requires close monitoring.

The structural design of a data-driven insurance organization should include an AI CoE that focuses on AI-driven tasks such as procuring new data sources and customers, centralizing data silos to facilitate AI implementation, and initiating activities related to open insurance and data governance.

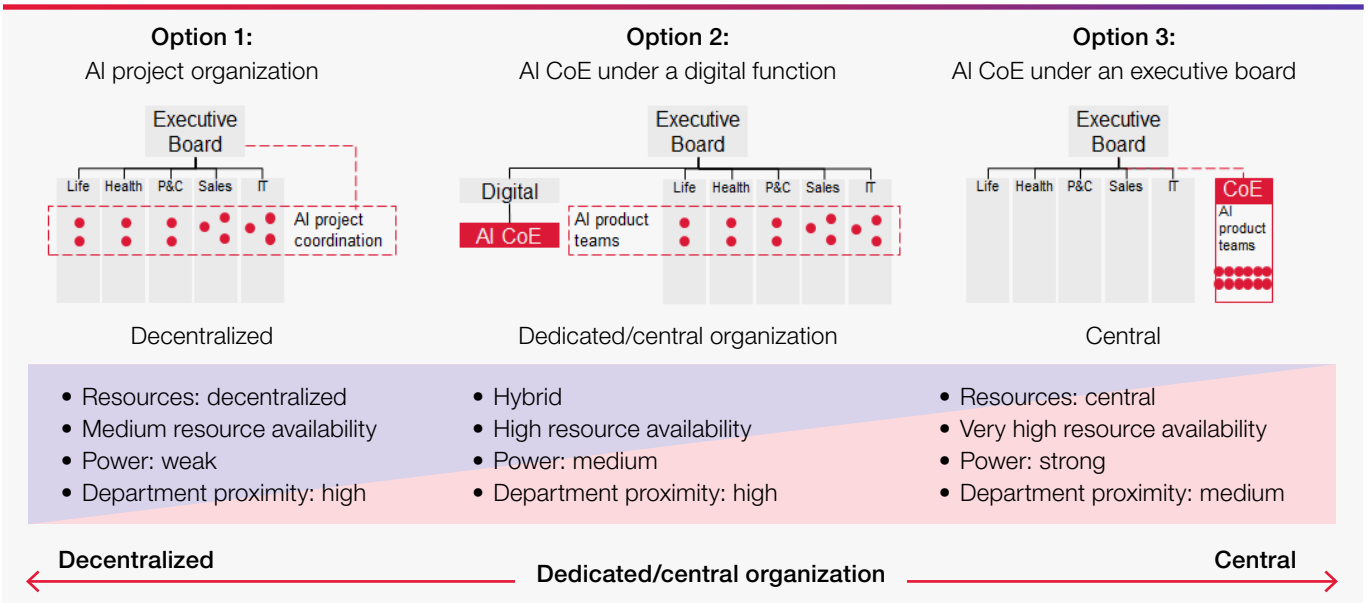

Figure 3: Options for AI organizational structure

Overall, the AI CoE has the mandate of organizing training and knowledge exchange for AI, observing trends in AI technology, and supporting AI implementation and cultural change.

Choosing the best IT and data strategy

A data-driven insurance business model requires defining and implementing an IT and data strategy that aligns with the business strategy. The chosen strategy should help in establishing a suitable technology and data backbone and demonstrate the strategic business potential. Examining whether and how strategic imperatives or basic criteria can be addressed with modern AI and associated technologies also is a possibility. Overall, the IT strategy is three-dimensional:.

I. Continuously observe the procurement market of modern AI and related technologies and identify potential ecosystem partners to develop customer, tool and data sources.

II. Balance standards with flexibility in terms of AI systems, tools and infrastructure architectures.

III. Identify and implement IT systems required to enable data-driven insurance.

Benefits of AI technology planning

Appropriate AI technology planning in the early stages of data-driven insurance saves time and costs. Although the insurer chooses specific platforms, products and solutions, failure to involve the right stakeholders early in the process will delay the transition of current models to new technologies and increase operating costs. To secure, store, extract and transfer data from existing business applications to new applications, the IT department must be involved, and technical feasibility must be assessed throughout the implementation process.

Procuring AI technologies

The procurement market for advanced AI technologies offers options for commercial or source code, including open software platforms (e.g., Azure ML), cross-vendor frameworks (e.g., ONNX) and cloud-based infrastructures (e.g., AWS, Google). Data providers (e.g., Shaip) specialize in providing access to data via open protocols (open insurance). Large technology providers (e.g., Alibaba, Tencent, Tesla, Uber) provide access to consumers, opportunities to place insurance in the purchase process (embedded insurance), or support through their AI system capabilities. Insurance companies should be prepared for a versatile procurement strategy that could include directly acquiring data inventory and providers, licensing data sources, and using data APIs and partnerships with data brokers.

Developing a software platform

To drive competitive differentiation, software platforms can be developed individually, as there is not yet a uniform AI reference architecture. In any case, the development environment should be flexible enough to leverage AI engineers' skills to eliminate the technological link to a single proprietary framework. The production environment, however, should allow many hundreds of network nodes to operate in a stable and scalable manner (i.e., separating the development and deployment environments).

Establishing an ecosystem

To bring together the right software providers, service providers and experts for AI, an appropriate ecosystem must be considered and established (Bughin & Hazan, 2017). Ecosystem partners can change depending on the AI implementation path. For example, if deep learning is to be used extensively for automation, the ecosystem partners must be chosen differently than when introducing robotic process automation.

Aligning the data and IT strategy

The IT strategy should be closely linked to the data strategy. Some insurers have neglected to use large amounts of data from sensors, shops and social networks. To avoid this oversight, it is key to ensure AI and data acquisition and ingestion strategies are closely linked.

Developing and implementing a data strategy

For insurers that opt for a data-driven insurance business model, the development and implementation of a data strategy is essential. To increase acceptance, the data strategy should be based on the needs of all stakeholders within the insurance ecosystem. Only after specific AI business cases have been selected can an approach be identified for extracting data from a variety of IT systems and external data sources. Consider the business value of the data as much as its protection, security and governance.

Once AI use cases are prioritized, modelling, development and delivery of AI-supported software changes can take place according to the definition of the data strategy. Development should be iterative, agile, and planned in increments. For this purpose, a minimum viable product (MVP) must be set up when defining the business case, which can go live within a planned time increment.

Figure 4: AI process model

Following the development of a data strategy, the AI process "modelling" step (Figure 4) will include exploratory data analysis and the execution of extensive queries on stored data. This is followed by training algorithms using ML. As with any type of software development, the development of services and a reliable and scaled delivery of the models is key. Using ML exploration will be balanced with exploitation of the ML models.

Choosing the best architecture

Data-driven insurance enables insurers to benefit from new data analyzed using innovative AI. New variants of business processes emerge, such as processes for acquiring data or workflows for analyzing IoT data. These processes must be integrated within the insurer's corporate architecture. The same applies to new processes that involve new insurance products and services, such as embedded insurance.

Due to the relative newness of data-driven insurance, existing application systems must be adapted to support AI and new AI-based application systems. Further, IT services must be developed, and new master data and data governance practices must be implemented. The aim is to reuse developed AI-based IT services, such as representational state transfer (REST) APIs across all channels or across multiple insurance lines.

In terms of AI architecture, implementing the right business and technology standards are important. Common AI platforms, workflows, APIs, infrastructures, hardware, and open protocols facilitate ecosystem-wide data exchange. Standards also have a positive effect on reuse and quality. However, they also can inhibit system development in the initial phases.

Understanding tool architecture

A “tool base” is extended through methods and models. This tool architecture can be derived from the AI experts’ tool knowledge. On the other hand, since there is no reference architecture to scale AI throughout its life cycle, insurers are advised to allow data scientists to decide which AI frameworks and tools they will use to conduct their experiments and implementations.

The core of a technology architecture for data-driven insurance—in addition to the tool architecture—is the AI platform embedded in the data inventory context. This can be a combined machine learning and deep learning platform, for example.

Without the right tool architecture, experimenting with data can become the biggest obstacle to large-scale ML solutions. An optimized experimental architecture allows data scientists to develop, test and evaluate ML models for a specific scenario, as well as capture "knowledge elements" that can be reused in future models. In any case, following AI architecture patterns and agile tools, as well as continuous integration and deployment (CI/CD) is recommended. Other important principles include:

– Master data management to improve data quality

– Versioning of data, models and algorithms

– Automation of model building and testing

– Decoupling of process model steps using MLOps

Ensuring architecture is secure, scalable and cost-efficient

The infrastructure fabric of a cloud-based AI platform must be secure, scalable and cost-efficient. When architecting storage and computing, there must be sufficient flexibility for the business to grow. Many modern cloud partners offer pre-created cognitive components or pre-trained models for tasks, such as speech-to-text or computer vision, that can be customized for the ML use cases, thus saving model training costs. By strategically leveraging the power of a well-designed AI architecture, the organization can constantly adapt to change and succeed with its data-driven decision-making.

Implementing the right transformation model

Data-driven insurance is an enterprise-wide business model for generating strategic advantages with modern AI and related technologies that collect, analyze, and use new data sources within the insurance ecosystem.

The scaled introduction of data-driven insurance, AI and related technologies is a long-term process with disruptive effects that develop in successive phases and iterations. A suitable transformation model (see Figure 5) is required for its implementation. The implementation of data-driven insurance is not to be regarded solely as a technology initiative. The following tactics will contribute to a successful implementation:

Form a leadership coalition

At the outset, a priority is to form a powerful leadership coalition responsible for designing and announcing a vision for data-driven insurance, which addresses the fundamental question of what opportunities and strategic advantages data-driven insurance offers. In the transformational program's public relations strategy this vision needs to be constantly communicated.

Create an AI roadmap

In a realistic AI roadmap, the actual AI-based pilots are prioritized, assigned and planned. A milestone plan that includes checkpoints allows the insurer to regularly review AI technology developments and adjust its planning accordingly. A cost-benefit analysis will usually clarify which AI use cases can generate quick wins.

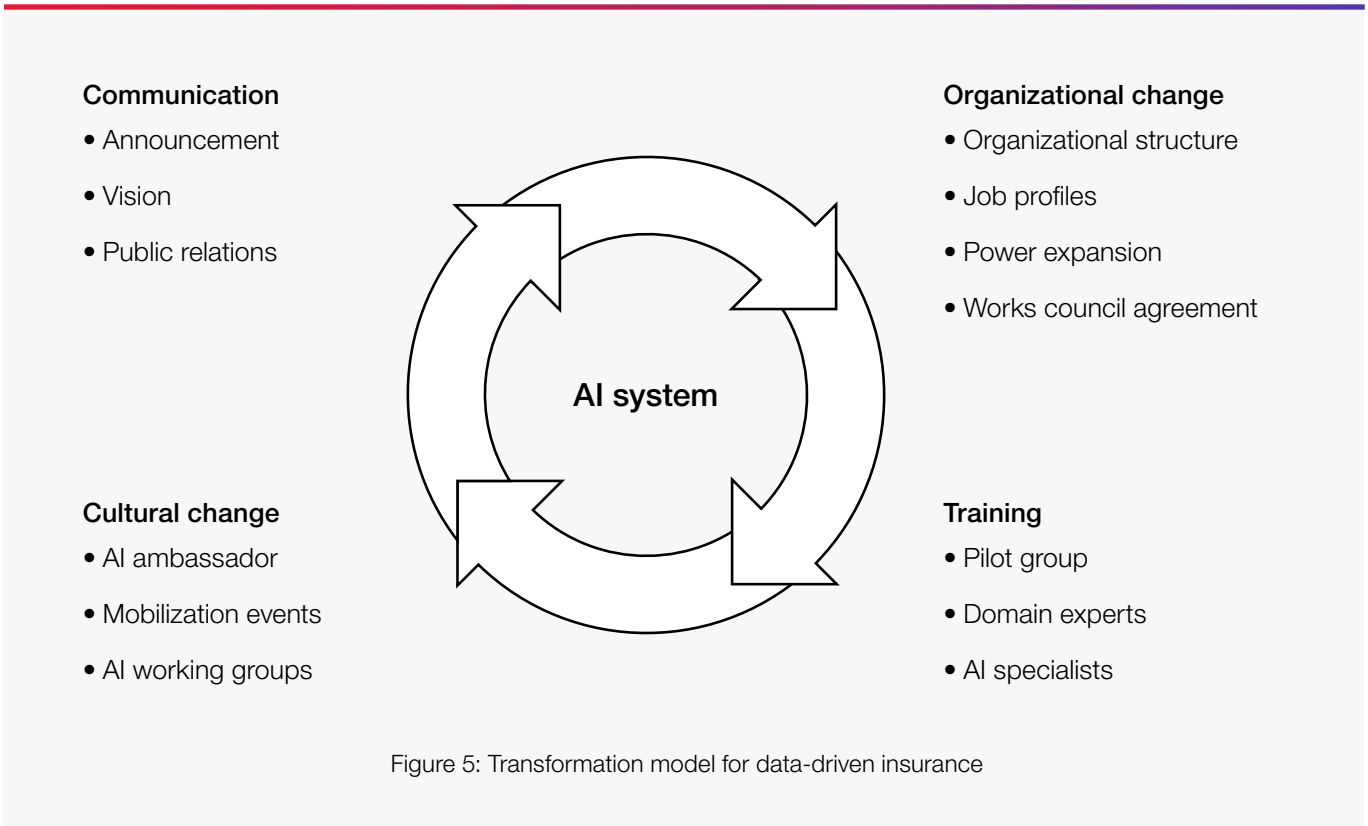

Figure 5: Transformation model for data-driven insurance

The entire roadmap should be divided into different time horizons to balance the scarce pool of AI talent between quick wins (which pay off within a few months) and long-term challenges (which tie up the talent). Upscaling to data-driven insurance is best done with strategic use cases and with a medium- to long-term implementation perspective. The roadmap identifies business priorities and opportunities and allow planning the right AI talent and IT systems at the right time. This roadmap envisions that promotors will be empowered to plan, design and implement the data-driven efficient organizational structure and desired operating model.

Designate AI ambassadors

Because mobilization activities serve to motivate and raise awareness of the need to move towards data-driven insurance, AI ambassadors can be placed as mobilizers for the strategic use of AI in various insurance divisions.

Conclusion

By transforming to data-driven insurance, companies can achieve a strategic advantage in an insurance ecosystem that's facing complex challenges. However, successful implementation relies on strong leadership to ensure strategic use of existing or newly acquired data, a scaled implementation of modern AI algorithms, and a well-planned transformation of the insurance business.

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