NTT DaTa

Trusted Global Innovator

Data across the insurance value chain

Thought Leadership

Data and AI at Scale: Generating Business Value for Insurance. The impact of artificial intelligence on transforming the Insurance industry.

David Pereira
Mayte Hidalgo

nttdata.com

Contents

Introduction

Applying artificial intelligence and smart data across the value chain consists of embedding intelligent insights within all business processes to make data-driven decisions (choose the right premium, perform a marketing campaign, claim process…) which optimize both customer experience and P&L. In many cases, even replacing human intervention by automatic machine learning based insights, with the subsequent efficiency.

This field has been described as "the new electricity" or as the "fourth industrial revolution" due to its potential to become a game changer never seen before. AI and smart data is already not only revolutionizing every industry that we know of, but also drastically transforming our society.

For instance, our workforce will change dramatically as current jobs will be highly automated but also new ones will be created. And this is just the tip of the iceberg; AI and smart data market is expected to grow to $36.8 billion by 2025 (1).

Even if insurance is historically one of the industries with more renowned experience in smartly leveraging data, especially for underwriting and risk management, it is nothing compared with the new paradigm recently unleashed. Artificial Intelligence was coined for the first time in the 1950s but it very quickly hit a number of different barriers, with the available computing power as the main obstacle.

So the insurance industry, as many others, has been forced to leverage less ambitious capabilities within this field for decades.

However, many factors have released AI tangible potential in the last few years, among others: era new era of computation democratization thanks to cloud computing and big data, the creation and availability of data, which has grown exponentially (IoT, public datasets, unstructured data, etc.), and the growing culture of open-source software that greatly facilitates the creation and improvement of more sophisticated models.
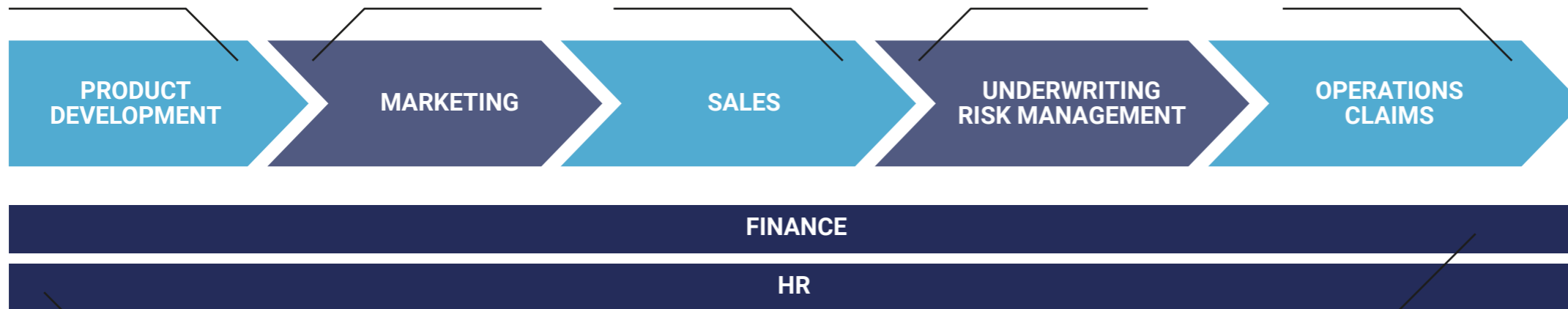
Additionally, Artificial Intelligence can be leveraged across the whole insurance value chain, from a customer 360 enhanced experience to data-driven claim management, including also pricing and underwriting sophistication, HR analytics, smart sales, finance powered by AI, etc. A potential impact of 3.2-7.1% over sales has been estimated if AI and smart data is fully applied to the insurance industry (2).

The aim of this paper is to outline the insurance market momentum, define the more relevant trends for the coming years and highlight NTT Data´s insights in this field.

(1) Source: https://www.tractica.com/wp-content/uploads/2016/08/MD-AIMF-3Q16-Executive-Summary.pdf
(2) https://www.mckinsey.com/featured-insights/artificial-intelligence/visualizing-the-uses-and-potential-impact-of-ai-and-other-analytics

Our AI, Analytics & Data vision

With AI and advanced analytics use cases in production along the whole value chain

- Telematic - Pay as you behave
- On-demand insurance
- Micro-insurance
- Transparent insurance
- Protection & life coach
- Third-party data Monetization

- 720º churn management
- Intelligent cross selling
- Data driven lead management
- Customer life time value
- Advanced customer segmentation
- Customer next best action
- Audience planner
- Online investment optimization
- Digital experience personalization
- Brand Image
- Anti-money laundering

- Agents performance boosting
- Personalized brokers strategy
- Distribution network optimization
- Distributor segmentation
- Intelligent commissions
- Distribution fraud
- Internal sales force optimization
- Distribution turnover optimization
- Give data back to distributors

- Internal insurance score
- External insurance score
- Fast quoting
- Aggregators insight
- Pricing sensitivity & elasticity
- Smart renewal pricing
- Transformation rate prediction
- Non-payment prediction
- Future fraud prediction
- Pricing 360º
- Dynamic pricing

- Visionary
- Claim leakage minimization
- Fraud detection
- Intelligent steering
- Providers network optimization
- Proactive recovery
- Data driven bodily injury claims
- AI digital claim assessment
- Process mining
- Process optimization with DS & AI
- Demand forecasting & management

PRODUCT DEVELOPMENT	MARKETING	SALES	UNDERWRITING RISK MANAGEMENT	OPERATIONS CLAIMS

FINANCE

HR

- Artificial intelligence based recruitment process
- Executive talent detection
- Employees turnover and retention management

- Workforce planning
- Labour environment tracking
- Process Optimizaation with DS & AI

- Payments leakage minimization
- Smart invoice management
- Process optimization with DS & AI

Market Momentum

Artificial Intelligence and smart data have become buzzwords in the insurance industry. There is no C-level committee where these concepts are not repeatedly mentioned. As an example, according to a survey by Gartner, leveraging AI across the insurance value chain is the top priority for industry CIOs. Having said that, even if the industry has made significant progress, it is still in the early days of adoption, with clear improvement areas to fully unleash its potentiality. It is fair to highlight that insurance is a traditional and highly regulated industry with a significant legacy, and this is one of the main reasons why insurance companies have been slower to embrace this disruption compared to other industries. It is still frequent to find manual, paper-based processes that require human intervention and are based on simple rules or expert beliefs instead of AI and data-driven approaches.

Over the last few years, almost all the main big players have made relevant decisions to position themselves as early adopters and set themselves apart from their competitors. The first decisions to begin the journey are usually to set-up a AI Labs, Centers of Excellence or hubs at corporate level, hire skilled and talented resources, launch first proofs of concept to learn by doing and finally, integrate (or build) the required data foundations.

Typically, once these organizational structures reach enough maturity, insurance companies carry on launching local teams, usually called a data office or business analytics area, in the more mature local markets, remaining the CoE to support small countries without economies of scale. These teams report to a wide variety of C-level executives (from the CEO to the COO, including CIO, CFO, etc.), depending on the company culture and

executives' sponsorship and leadership. Regarding use cases, the most typical ones to start the journey are related to claim management (fraud, providers' network optimization, optimal claim routing, etc.) and marketing and customer (data-driven churn or cross-selling management, customer next best action, audience planning, etc.).
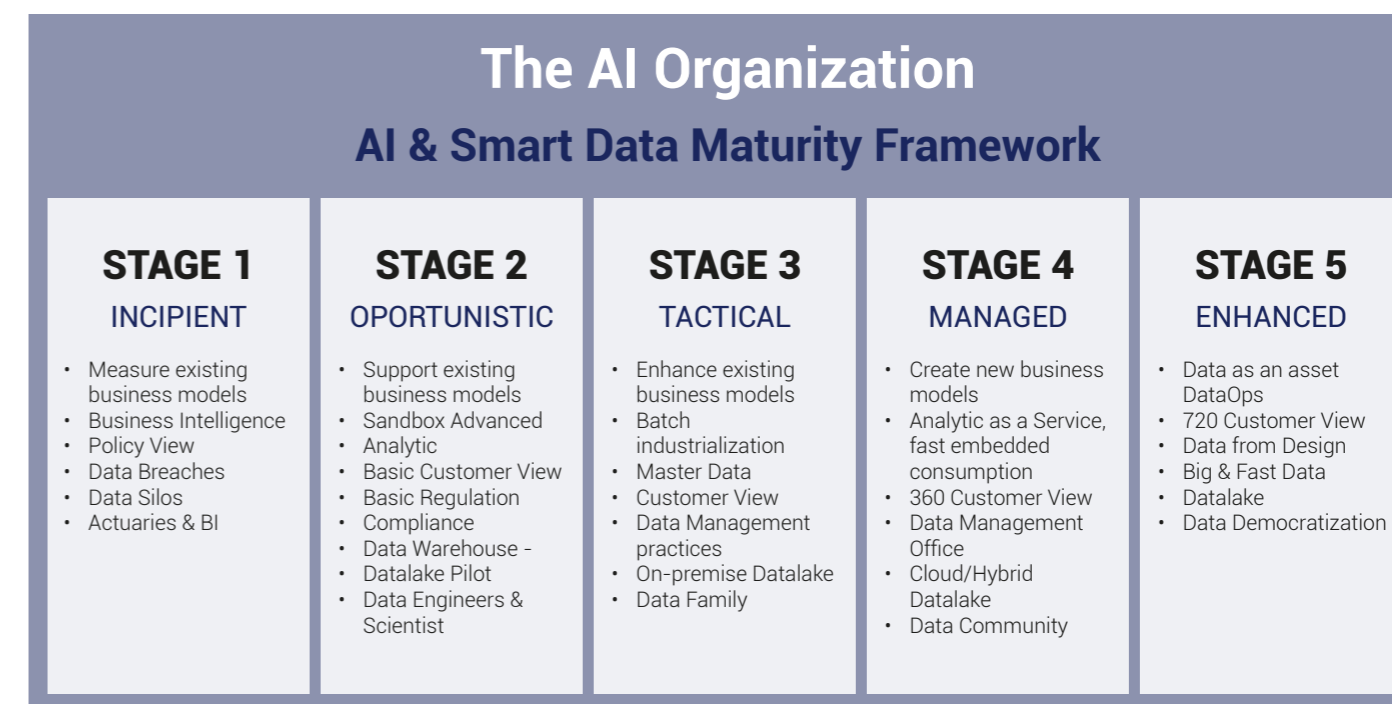
In the last few years, projects to automate processes leveraging together RPA and AI have also become very common, replacing human interventions with intelligent robots as much as possible. In these projects AI is still mainly used to automate document classification and features extraction and to define best processes routing. Surprisingly, projects related to pricing sophistication and risk management (fast quoting, dynamic pricing, 360 view pricing, telematics, etc.) are less frequent as this field is already covered by well-positioned actuarial teams.

In terms of technological foundations, the flagship project is building a data-lake to facilitate having a 360 view and boost AI models performance. This kind of platforms has been usually built using on-premise infrastructure and migration to cloud or hybrid environments. Other recent initiatives include incorporating enterprise streaming platforms to enable real-time decision-making processes.

The main problems that the industry are facing to successfully become data-driven are: talent attraction and retention competing in a cross-sectorial market, data integration and management in a very wide, diverse and traditional systems landscape and solutions industrialization beyond proofs of concept. Another relevant fact to highlight is the unstoppable rise of insurtech. Many insurtech

startups are raising very relevant funding either to directly compete with traditional insurance companies leveraging artificial intelligence and smart data as a key competitive advantage or to build out-of-the-box product to facilitate the insurance industry journey to become data-driven.

Regarding market momentum, NTTD has defined an AI and smart data maturity framework from stage 1 (incipient) to stage 5 (enhanced). Based on our market knowledge, the insurance sector reaches an average rate of 2.7 (getting closer to tactical stage) whereas others, especially tech-giants (4.6) but also banking (3.7) and the telecom industry (3.6), are significantly more advanced.

The AI Organization
AI & Smart Data Maturity Framework

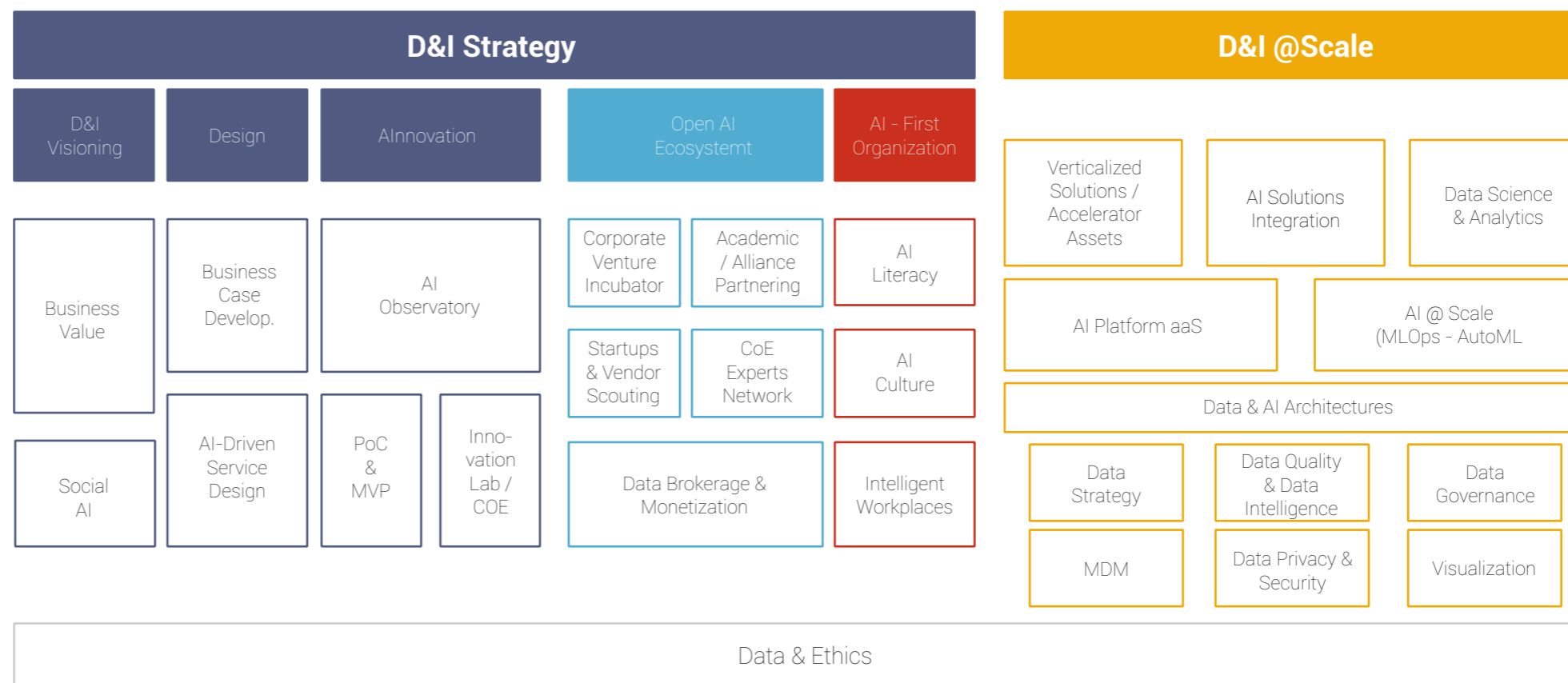| STAGE 1 INCIPIENT	STAGE 2 OPORTUNISTIC	STAGE 3 TACTICAL	STAGE 4 MANAGED	STAGE 5 ENHANCED
• Measure existing business models • Business Intelligence • Policy View • Data Breaches • Data Silos • Actuaries & BI	• Support existing business models • Sandbox Advanced • Analytic • Basic Customer View • Basic Regulation • Compliance • Data Warehouse - Datalake Pilot • Data Engineers & Scientist	• Enhance existing business models • Batch industrialization • Master Data • Customer View • Data Management practices • On-premise Datalake • Data Family	• Create new business models • Analytic as a Service, fast embedded consumption • 360 Customer View • Data Management Office • Cloud/Hybrid Datalake • Data Community	• Data as an asset DataOps • 720 Customer View • Data from Design • Big & Fast Data • Datalake • Data Democratization

End-to-end Vision for Data & Intelligence

A key challenge for organizations is orchestrating Data & Intelligence capabilities to generate Business Value. This implies conceiving technology as a core enabler for achieving corporate objectives, and leverage Data & AI on a cross-dimensional approach that roots on Strategy to lead AI initiatives at Scale.

Identifying the Business Value of AI across business domains and its strategic alignment with the organization is the foundation to start building a successful AI Strategy. Such vision requires fostering a new mindset where business and technology roles jointly collaborate on elaborating the most relevant roadmap of initiatives with an ROAI (return on investment of AI) approach as a shared objective.

The unbundling of the insurance market, with a myriad of new players coming from the startup ecosystem with a data-driven DNA and new value proposals, shapes a competitive context where tech innovation should translate into new business models, differential services and hyper-personalized client interactions and experiences. To define and design those new killer value proposals, organizations have understood the importance of creating hybrid teams where business, strategic design and data science join expertise.

As important as fostering internal cross-collaboration for the success of AI as a value generator, it is to take active participation on

the AI ecosystem. As no other technology, the transformative power and the accelerated speed of AI as a lever of differentiation stresses the opportunity on nurturing own capabilities with external partners, overall on the challenge to go at scale This is, as we will see, a shift already happening on the industry: from proofs of concept, insurance brands are heading towards operationaling AI.

D&I Strategy

D&I Visioning	Design	AInnovation	Open AI Ecosystemt	AI - First Organization

Business Value	Business Case Develop.	AI Observatory	Corporate Venture Incubator	Academic / Alliance Partnering	AI Literacy
			Startups & Vendor Scouting	CoE Experts Network	AI Culture
Social AI	AI-Driven Service Design	PoC & MVP	Inno-vation Lab / COE	Data Brokerage & Monetization	Intelligent Workplaces

D&I @Scale

Verticalized Solutions / Accelerator Assets	AI Solutions Integration	Data Science & Analytics
AI Platform aaS		AI @ Scale (MLOps - AutoML

Data & AI Architectures

Data Strategy	Data Quality & Data Intelligence	Data Governance
MDM	Data Privacy & Security	Visualization

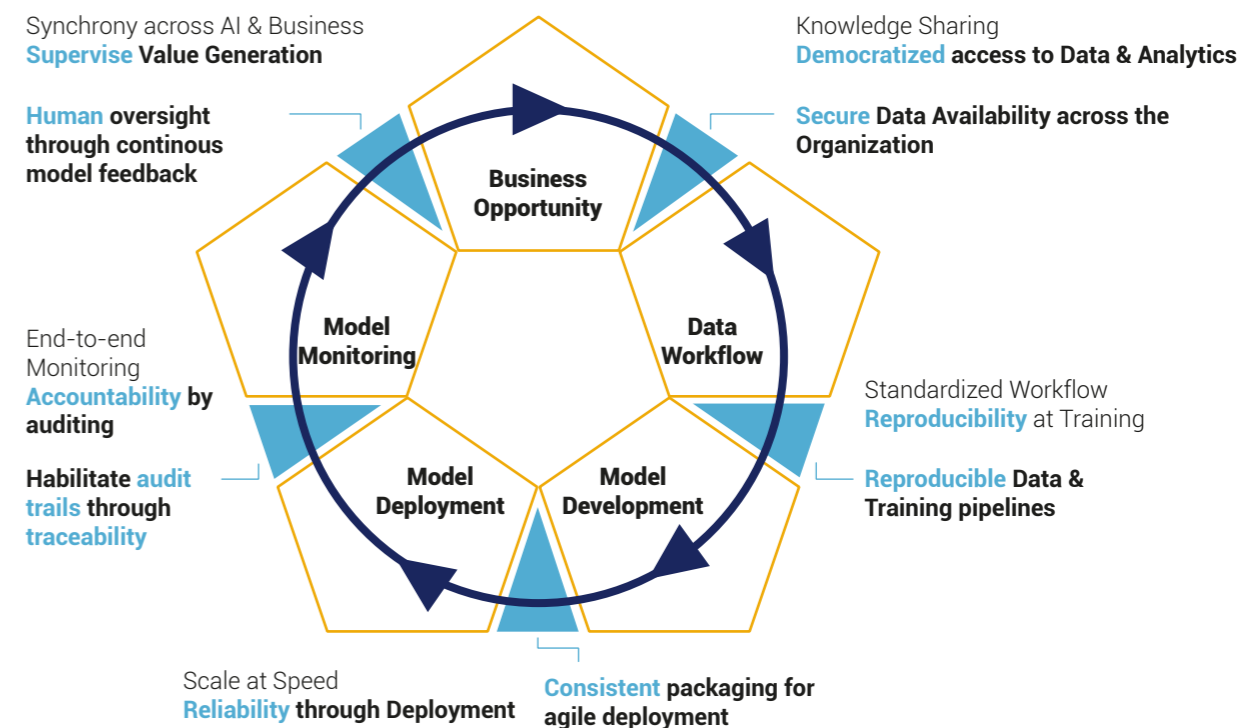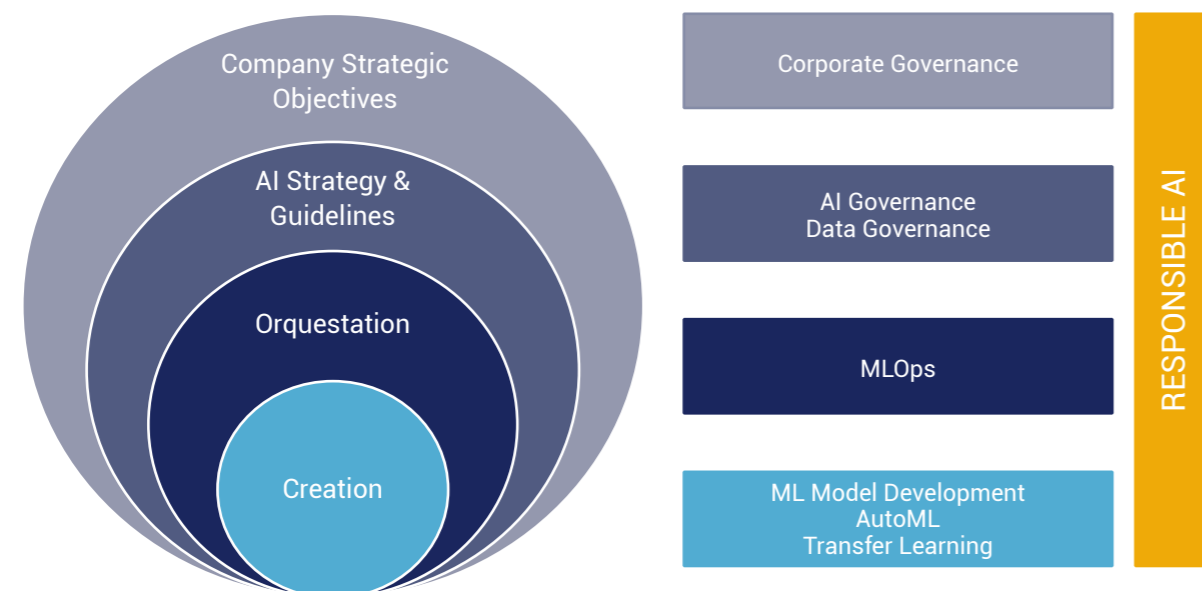| Data & Ethics |
|---|

End-to-end Vision for Data & Intelligence

Undoubtedly, insurance companies keep making a significant global push to both augment their AI and data foundations capabilities and deploy more and more sophisticated use cases.

After a first period that we could title: "learn by doing", with the subsequent mistakes in terms of technological investment, use cases prioritization, projects methodology,

etc., nowadays the market is going through a second phase focused on scalability and monetization.

Such purpose of leveraging AI at scale requires the organization frames the key pillars to become AI Driven in alignment with the Corporate Governance: Data & AI Governance that support AI Strategy and MLOps to become the orchestrator of the

From Creation to Company Strategic Objectives

Synchrony across AI & Business
Supervise Value Generation

Human oversight through continous model feedback

Knowledge Sharing
Democratized access to Data & Analytics

Secure Data Availability across the Organization

End-to-end Monitoring
Accountability by auditing

Habilitate **audit trails** through **traceability**

Standardized Workflow
Reproducibility at Training

Reproducible Data & Training pipelines

Scale at Speed
Reliability through Deployment

Consistent packaging for agile deployment

Business Opportunity · Data Workflow · Model Development · Model Deployment · Model Monitoring

Data and AI lifecycle, so that insurance companies holistically manage AI and data product lifecycles at scale to boost monetization.

In other words, how they move from siloed proofs of concept and tactical solutions to robust, efficient and optimized solutions in a production environment with direct impact on transactional systems and applications, even in real-time.

NTTD has defined its own MLOps framework as a Virtuous Cycle to build trust in AI systems and augment business value, scaling AI with agility and robust end-to-end governance. We have identified the key gaps to be assessed for defining optimal MLOps strategy and operations, considering the convergence of profiles and process involved across the algorithm lifecycle.

Where the industry is heading & future

Through MLOps, organizations overcome key gaps on managing the Data & AI lifecycle with a holistic vision that minimizes silos across the roles involved on each phase, from identifying the business opportunity to monitoring models on production.

As AI initiatives acquire a dimension for going to scale, this is paramount to jointly address the implications for business responsibles, data engineers, data scientists, architects and other roles involved on the development of AI-driven applications and services. This is key that automation guarantees quality and speed to market throughout the different phases for all of them.

In order to shape an at scale practice of AI, MLOps relies on a Continuous Business Value cycle supported continuous experimentation, for which democratizing the access to data & analytics becomes a core requirement. The objective of reproducible training is enabling faster responsiveness to changes on data reflecting new market trends and opportunities, through reusability of existing pipelines. Such agile mindset is also pursued through consistent deployment, while the whole cycle should keep the ability to be monitored and traced on an ongoing basis.

Secondly, main players, after some doubts due to data privacy and security issues, have eventually bet on embracing cloud capabilities for their AI and data architectures, either public cloud or hybrid approaches. Most of them are starting ambitious projects to

migrate their data and AI platforms to the cloud. It is not only due to time-to-market and scalability reasons, but also because of out-of-the-box capabilities offered such as auto-ml, pre-build and trained models served through APIs, etc.

Regarding AI and smart data capabilities, it seems that the combination of structured data and "traditional" machine learning is getting closer to be considered a commodity. Advanced functionalities such as natural language and speech processing, computer vision and reinforcement learning are starting to gain a significant momentum within the industry.

Natural language processing has made meaningful improvements during the last few months with new enhanced algorithms such as Bert and Transformers, and the insurance sector is full of textual data: policies, claims, invoices, emails, call transcripts, chats, etc. Regarding computer vision, images of the risks (vehicles, industrial units, etc.) can be assessed for both underwriting and claim management purposes, improving dramatically underwriting prediction power and both claim cycle time and quality of service.

Eventually, reinforcement learning is really useful when taking decisions sequentially and interacting with the environment is necessary. So it can bring meaningful value to different processes such as digital marketing, underwriting processes, interactions with

NTT DATA's insights

customers through chat-bots, etc.

Other significant topics to be covered over the following years are AI ethics, trust and security. Insurance is a top relevant actor on shaping both the economic and social context, for instance through underwriting and pricing strategy management. Together with Financial Services, Insurance is meant to be, not doubt, a key player to shape the future of Responsible AI. Both industries share a core dependency on big data to develop their existing and new value proposals.

Managing both personal and behavioral data on a high scale, insurers will need to deploy mechanisms meant to identify and mitigate data proxies and bias, and define a clear strategy to provide their stakeholders explainability of AI models on areas such as claims management or underwriting.
So the positive impact of Artificial Intelligence on generating new business value should balance with purposeful strategies to minimize creating any disadvantages, harm or discrimination in people's lives, for instance depriving them of the right risk protection level.

This field should include many aspects, from guaranteeing transparency, safety, robustness, privacy and fairness across the whole algorithms lifecycle, to proactively developing AI solutions for altruistic social good, for instance helping to mitigate the impact of natural catastrophes leveraging predictions powered by smart data.

Where the industry is heading & future

AI Ethics Framework

Governance
Human Oversight   Reporting

Accountability

Society
Inclusion   Diversity   Justice

Sustainability   Foresigth   Progress

Algorithm

Transparency
Explainability
Traceability
Communication

Safety & Robustness
Resilience
Accuracy
Reliability

Privacy
Data Integrity
Privacy protection

Fairness
Accesibility
Bias Migration

Organization
Ethic Leadership & Culture

Last but not least, insurance companies are aware of their limitations in terms of data scope in comparison with others industries such as tech giants, banks or telecom companies. That is why there is a growing trend to launch partnerships, joint-ventures or even acquire startups under a global data economy perspective, in order to dramatically boost their access to new and powerful data sources, key to maximize their models performance and therefore, the expected roI. Besides that, they are trusting more and more in external technology partners' assets related to cross-sectorial capabilities to speed up the time-to-market and maximize RoI versus a full in-house strategy.

NTT DATA's insights

The race to lead the insurance market in the near future through leveraging differential AI and smart data across the value chain has started. Additionally, insurance companies are not only competing with traditional players, but also with very challenging new ones, both startups and multinational companies interesting in insurance business (banks, tech giants, vehicle manufacturers, etc.). Applying the following best practices might make the difference between success and failure: The first one is to guarantee this transformation is managed holistically at a company level. There is every likelihood it will fail if the only decisions made are to appoint a guru as chief data and analytics officer and create a new team based on data scientists and engineers. If more transformational and ambitious actions are not made, these talented resources will leave the company sooner than later. A strategic, holistic and multiyear plan at company level with the highest sponsorship is mandatory. This plan has to cover all the axes:

1. Strategic topics such as organization charts, operating models, budget, change management, coexistence plans, governance, etc.

2. Data and AI architecture to set up a modern technological stack that enables the company to unleash the whole potential of this transformation.

3. Data management pillars (data modelling, data quality, metadata, data governance, etc.) to guarantee data is managed as an asset throughout its lifecycle.

4. AI and analytics modelling should be developed in order to build meaningful insights.

5. And last but not least, the business layer to guarantee these insights are successfully embedded within business decision models.

It is also extremely important to manage and challenge the status quo of a traditional insurance company. The typical insurer has gone through different mergers and acquisitions processes and now it is in the middle of an operational excellence transformation to significantly reduce its workforce in order to be more efficient and competitive. Additionally, there are many departments already in place with relevant impact on applying AI and data across the value chain: IT, actuarial teams, business intelligence teams, etc. So on one hand, the easy path is to create a small new team isolated from the others, just to be able to share with the market and the shareholders that the company really invests in this market trend. On the other hand, the right path is to establish a global, coordinated and ambitious (in terms of budget and number of resources) organization chart and operating model to guarantee the whole company is acting under a data-driven approach, leveraging all the synergies. Tech companies and startups

NTT DATA's insights

always have a higher rate of investment and resources and a simpler organization in AI and data than traditional companies because they don't have a previous status quo that influence them.

But if insurance companies want to compete with them, the only way is to make courageous decisions and overcome the current status quo.
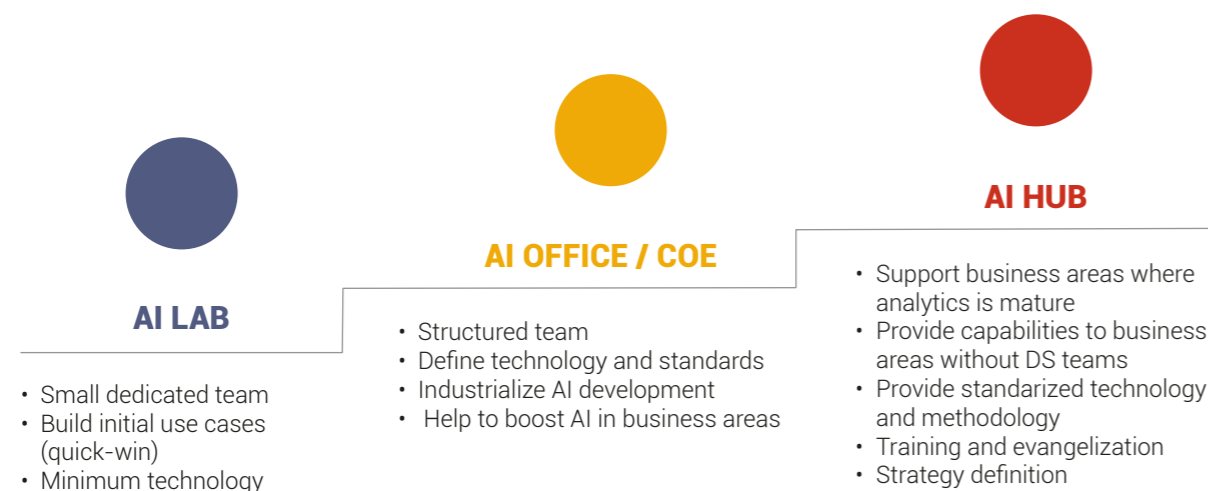
This does not necessarily mean to start big, quite the opposite. Each level of maturity will definitely required different organizational strategies around AI initiatives (e.g. AI Labs, CoEs and/or hub-and-spoke teams as mentioned before). While the organization evolves and matures, it is important to train and communicate at all levels, including both technical and business roles.

Another recommendation is to embrace new use cases powered by cutting-edge capabilities with a shorter time-to-market. The insurance sector tends to be a follower, replicating or adapting successful experiences with a significant lag. The insurance company that equates its innovation processes in this field with state-of-the-art tech companies will make sustainable and game-changing differences against its competitors. NTTD has recently launched leading AI and smart data driven assets to support companies in this goal. The following are some examples:

1. A cognitive contact center to significantly optimize interactions with customers.

2. A "phygital" approach to leverage AI and smart data in off-line stores to deliver personalized and sophisticated experiences to face-to-face customers.

3. A tool powered by biometrics to disrupt health and life underwriting or proof of life processes in policies with a life annuity.

4. A solution to transform any kind of physical document into business at scale by leveraging natural language processing and computer vision to classify them and extract key features.

5. And finally, an asset to leverage cutting-edge dynamic pricing based on reinforcement learning to maximize profits in competitive sales channels, such as aggregators or brokers.

AI ORGANIZATION STRATEGY

Define a path to build the capabilities in the organization

AI HUB

AI OFFICE / COE

AI LAB

- Small dedicated team
- Build initial use cases (quick-win)
- Minimum technology

- Structured team
- Define technology and standards
- Industrialize AI development
- Help to boost AI in business areas

- Support business areas where analytics is mature
- Provide capabilities to business areas without DS teams
- Provide standarized technology and methodology
- Training and evangelization
- Strategy definition

And the last best practice is to think out-of-the-box and the current value chain. Insurance companies tend to focus on how leveraging AI and smart data within their current business model and value chain, but the real transformation is about how the business model and the value chain have to be further evolved thanks to new AI capabilities. Not only will the product portfolio change due to new trends like IoT, autonomous vehicles, etc. powered by AI and smart data, but also the insurance business model itself should evolve from mere claims payer to a trustworthy partner that helps the customer to proactively protect their assets and loved ones leveraging AI as a differential capability.

Conclusion

To conclude, applying AI and smart data across the insurance value chain will continue being, without a doubt, one of the main strategic priorities for the industry in the coming years. The main reason is that there is no other transformational initiative with some numerous ways of making a relevant and tangible impact on both the P&L and customer experience. And on top of that, it is a sustainable competitive advantage with a high entry barrier as it requires both technology and talent.

In the past few years, there have been some prominent examples of insurers investing heavily in this field, but it is still in the early days of adoption. To sum-up, the main challenges to overcome are: implement a MLOps framework to move from sandbox and proofs of concept to AI at scale; complete the migration to cloud-based or hybrid architectures; unleash the potentiality of state-of-the-art fields like natural language processing, computer vision or reinforcement learning; implement a strategy based on ethics, trust and security and facilitate a global data economy with other partners to maximize the accessibility to meaningful data sources.

Besides that, it is extremely important how insurance companies face these challenges. It is highly recommended to manage this transformation holistically, without forgetting aspects such as data management or change management among others. Insurance companies have also to challenge the status quo and make courageous decisions in terms of the organigram, operating model, investment, etc. to really make things happen. Additionally, stop being a follower in comparison with other sectors and embrace new use cases powered by cutting-edge capabilities faster thanks to a more mature

innovation process. And finally, think out-of-the-box and the current value chain. The future insurance industry will be quite different to the current one, and AI and smart data will be one of the main levers for that. The clock is ticking and many players, inside and outside the traditional insurance market, are still starving for new business opportunities in insurance industry thanks to leverage AI differentially.

However, many factors have released AI tangible potential in the last few years, among others: era new era of computation democratization thanks to cloud computing and big data, the creation and availability of data, which has grown exponentially (IoT, public datasets, unstructured data, etc.), and the growing culture of open-source software that greatly facilitates the creation and improvement of more sophisticated models.

Additionally, Artificial Intelligence can be leveraged across the whole insurance value chain, from a customer 360 enhanced experience to data-driven claim management, including also pricing and underwriting sophistication, HR analytics, smart sales,

NTT DATA
Trusted Global Innovator

David Pereira
Head of Data & Intelligence at everis Europe |
Head of NTT DATA Artificial Intelligence CoE

Mayte Hidalgo
Evangelist, Head of AI Strategy & Ethics

NTT DATA – a part of NTT Group – is a trusted global innovator of IT and business services headquartered in Tokyo. We help clients transform through consulting, industry solutions, business process services, IT modernization and managed services. NTT DATA enables clients, as well as society, to move confidently into the digital future. We are committed to our clients' long-term success and combine global reach with local client attention to serve them in over 50 countries. Visit us at **nttdata.com**.