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Artificial Intelligence in the Insurance Sector

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Summary

Editors Board

The Consorcio de Compensación de Seguros digital magazine "Consorseguros" (CCS) is published every six months,
its content particularly addressing matters related to the Consorcio's activities in
various fields of insurance, reflecting on and analysing them.

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Summary

Editorial

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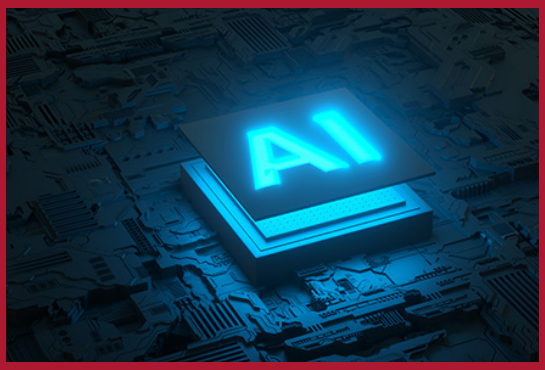
Having in mind the aim of adding the most panoramic possible view, we include a contribution of Lázaro Cuesta who, being part of the Spanish Insurers' Association, Unespa, writes from the viewpoint of insurance companies. Rubén Abadía Funes, from the motor car research institute Centro Zaragoza, reviews the possibilities of this technology in assessing motor car damages. Héctor González, from Tirea, adds deep knowledge from this technology company owned by the Spanish insurance sector. Marcos García and Iñaki Pérez del Notario, from the engineering consultancy company Tesicnor, write a contribution on the possible applications of AI in forecasting, warning and reducing disaster risks. And Pablo Yusta, from AI Consortium, adds a practical approach to integrating these technologies within the business procedures of an insurance company.



Only time will say if widespread AI application marks a turning point for both humankind and the insurance industry, if it ends up being a disrupting technology adding new capacities with serious repercussions on work processes, or if it is just another continuous advance in this increasingly hi-tech world.

Celedonio Villamayor, who during the past 7 years has been Director of Systems and Information Technologies at Consorcio de Compensación de Seguros (CCS), and that during the process of writing this issue has been appointed Director of Operations, contributes also reviewing the potentialities and repercussions of AI within the industry. Eva Valentí, Head of the CCS Actuarial Review Department, reviews Michael Woodridge's book "The Road to Conscious Machines: the Story of AI", perfectly timed to add context about this matter.

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Rounds up this issue a case law contribution from José Antonio Badillo, adviser at the DG of Insurance and Pension Funds, reviewing a judgement exploring the limits between the role of the insured's own conduct and the motor car third party liability covers.

Artificial Intelligence and the Insurance Industry: Regulatory and Market Perspectives

Lázaro Cuesta Barberá
State Insurance Inspector
General Counsel of UNESPA (Insurers' Association of Spain)

Both the economy and society as a whole are caught up in a pervasive digital transformation, and in recent years significant advances in using new technologies have been made in the financial sector and within that sector, the insurance subsector. These advances are here to stay.

The major insurance and InsurTech companies have started using cloud computing, currently employed by virtually all insurers operating in Spain. The same applies to artificial intelligence (AI), which has not yet reached the same level of market share but which we venture to predict will soon be a normal cog in operating procedures throughout the industry. This prediction does not require any special powers of foresight. The most recent data are already indicative of widespread use of AI by insurance companies.

Insurers have a certain advantage over companies in other sectors when it comes to jumping on the AI bandwagon, inasmuch as it is often said that data are the raw material of the insurance industry. Companies have extensive experience in designing, calibrating, and validating mathematical models, and that experience is especially valuable in getting the most out of new data handling technologies. That is why the vast majority of insurance companies have already begun using AI projects and those that have not yet done so have them in the development or planning stages for early implementation. More and more companies already have an AI strategy in place. They have already allocated annual budgets and have created designated teams or departments.

EIOPA published on 30 April 2024 the results of a recent survey of insurers throughout the EU dealing with the level of implementation of AI in the insurance sector in its Report on the digitalisation of the European insurance sector. According to the survey results, 50% of companies are already using AI in the non-life insurance lines and 24% in the life insurance lines, with a further 30% and 39% of the companies surveyed expecting to use AI in the non-life and life lines of business, respectively.

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Different approaches towards implementing AI projects are present in the marketplace. Insurance companies have internally developed any number of projects, normally in connection with the insurers' core activities, e.g., underwriting and pricing. Insurance companies ordinarily farm out other projects like digital marketing and chatbots to technology service providers. Lastly, there are many other projects that take a mixed approach in which the company engages in development on its own with basic support by InsurTech enterprises or other specialised vendors, e.g., for claims processing and fraud prevention.

The hiring of data scientists, applications developers, database administrators, and other big data and AI specialists is becoming more and more commonplace in the industry. This raises a challenge that is shared with other sectors of the economy, namely, the scarcity of qualified talent in new, specialised areas like machine learning and cognitive perception.

AI has multiple applications in the insurance sector spanning the entire value chain. In their March 2023 Report on the digitalisation of the insurance industry, UNESPA, Spain's Insurers Association, and AEFI, Spanish FinTech and InsurTech Association, noted that AI is probably the most disruptive technology for internal operations in the insurance industry, opening up a whole range of new opportunities for both insurance companies and consumers.

At the present time AI is most widely used in customer service, fraud detection, and claims processing. However, it is also making inroads in such other areas as underwriting, pricing, and insurance product sales.

Natural language processing (NLP) methodology has been driving the use of chatbots and virtual assistants for customer service, and insurers are using it to help customers browse their websites and to help in answering frequently asked questions.

In the field of fraud detection, AI is enabling companies to exponentially improve their ability to detect anomalous circumstances for better investigation. For instance, AI is more readily able to detect cases where the documents or images used in processing a claim have been manipulated. AI is also good at evaluating behaviour patterns and raising red flags about suspicious cases. This enhanced ability to identify fraud means not only sizeable savings for insurance companies but also lower premiums for the vast majority of honest policyholders.

Image analysis by AI systems is used in claims handling and helps insurers to assess losses. Systems of this kind find widespread use in the automobile line but are also used for home and business premises insurance. Some insurers are also using AI to classify claims by type and complexity and to automate invoice and indemnity payment verification, especially for smaller payments. These solutions enable insurers to reduce their processing costs, and customers benefit from shorter response times for claims.

AI is also employed in product design and development, in which it is used to process large volumes of data to enable insurers to offer new products and services to meet the needs and demands of consumers. It uses customer historical data, customer satisfaction survey data, and data collected from personal devices, from vehicle devices, and from connected homes. Combining AI with the Internet of Things (IoT) thus makes it possible to provide loss prevention and risk mitigation services, for instance programmes aimed at improving driving behaviour and providing recommendations and advice for living healthier lifestyles.

Processing enormous volumes of data using increasingly sophisticated AI systems is beneficial for pricing and underwriting by enabling insurance companies to be more efficient when underwriting risks and setting rates that are more in line with the various risks and the characteristics of each insured individual. This way consumers with lower risk profiles can benefit from lower net premiums, and some higher risk consumers that may have had trouble buying insurance could also find it easier to get coverage (for instance, young drivers who install black box devices in their cars and consumers with certain medical conditions who wear connected wristbands and share their data with their insurance companies). Obviously, on the consumers' side, there is also a risk that some insurers may engage in "price optimisation" practices and use various non-risk factors to estimate consumer price elasticity or willingness to switch insurance provider.

Insurers can also calculate technical provisions more precisely by using AI systems to estimate losses, especially for lines of business that have high rates of claim, for which a sufficiently large range of data points is available to train AI systems.

In terms of distribution and sales, digital marketing techniques may help insurers make personalised offers to attract consumers and drive sales through their websites, applications, and other digital distribution channels. They can also make it simpler for consumers to buy insurance.

With this broad range of uses, it comes as no surprise that the sector is investing heavily in AI. At the same time, however, insurers are fully aware that using AI and process automation can entail operational risks, calling for robust governance and risk management mechanisms. Insurance companies have therefore welcomed AI enthusiastically but also cautiously.

As a result, AI systems are being set up subject to a certain degree of human oversight. For instance, in sales, AI may suggest offering customers certain products or covers, but the final decision is up to the insurance agent. Or in claims processing, AI may provide a preliminary estimate of the amount of a loss, but a loss adjuster may need to review the matter to corroborate or change that amount.

The type of algorithm employed is also evidence of that caution. For now, what is mainly being used are simpler algorithms like decision trees, which are easy to understand, explain, and oversee. Usually, however, the more complex an algorithm, the more accurate it is, so as insurance companies gain more experience in using AI, more and more sophisticated algorithms, like neural networks or deep learning, can be expected to come into use.

Insurers are also aware of the risks to consumers and the need to foster trust in the industry's commitment to using AI ethically to ensure against potential misuse and prevent customers from being mistreated. Those concerns led the insurance industry in Spain to issue UNESPA's principles for ethical use of AI in the insurance sector back

in 2020. That publication set out the principles of fair treatment, proportionality, proactive accountability, security, transparency, training, assessment, and review. The following commitments are being promoted based on those principles:

- To avoid using AI-based applications that could cause certain people or groups to be discriminated against; to allow differential treatment only when it is in accordance with insurance practice and applicable legislation; and to set up review procedures to detect and minimise unconscious biases.

- To conduct impact assessments to ascertain suitable governance mechanisms for each type of AI used.

- To set up internal control procedures and include controls on AI use in the companies' risk management systems.

- To ensure that the AI-based applications insurance companies use are suitably robust throughout their service lives and that they provide maximum safeguards for the data they handle while in use. Insurance providers' hardware and software security policies are to encompass checking routines and vulnerability testing, and companies must take appropriate technical and organisational measures to ensure a level of security appropriate to the risk AI use poses to data subjects' rights and freedoms.

- To provide information on their use of AI on their websites, via their usual reporting channels, and in their written policies.

- To ensure that employees in charge of AI-based applications are equipped with knowledge sufficient for, specific to, and commensurate with their duties and responsibilities, including special training in the limitations of AI systems.

- To run regular self-assessments to check on the reliability of the AI solutions deployed.

These UNESPA principles are based on the guidelines issued by international organisations and institutions, namely, the European Commission's High-level expert group on artificial intelligence, the OECD's 2019 AI principles, and in particular the report released in 2021 by EIOPA's Consultative Expert Group on Digital Ethics in Insurance, Artificial intelligence governance principles: towards ethical and trustworthy AI in the European insurance sector.

The work by the EU experts recently came to fruition in December 2023, when agreement was reached on adopting the EU AI Act. This ground-breaking legislation, the first of its kind worldwide, is aimed at ensuring that AI systems used in the EU market are safe and consistent with fundamental rights and Union values. This horizontal legislation is intended to protect both citizens and enterprises, and it therefore envisages restricting AI use and lays down special requirements for cases where use is considered to pose high risks.

In the insurance field, an example of high-risk AI use is for risk assessment and pricing in relation to natural persons with respect to life and health insurance; Even agreeing that life and health insurance may entail higher risks because of the sensitive data they entail, the Act does not seem to have chosen the most appropriate wording. The reference is too broad and too vague. A better wording would have been the one put forward as the legislation was working its way through the European Parliament, which proposed including systems to be used for "decision-making or materially influencing decisions on the eligibility" of natural persons for life and health insurance on the list of high-risk systems. That wording would have been more specific and more consistent with the inclusion of systems used in profiling creditworthiness on the list of high-risk financial services systems and with lawmakers' ultimate concern of preventing financial exclusion.

A number of voices criticising including these uses of AI on the list of high-risk systems have been raised, EIOPA being one. In a letter addressed to the co-legislators (the Commission, the Council, and the European Parliament) in July 2022, EIOPA defended not classifying AI use by the insurance sector as high risk, because no comprehensive impact assessment had been carried out. In the supervisory authority's view, the Act should address the significance of AI use in the financial sector and more particularly the insurance sector, but implementation and specifics should be materialised in sector-specific legislation based on current governance, risk management, market conduct, and product oversight systems.

One of EIOPA's specific tasks in support of implementing the AI Act in the insurance sector in its 2024 work programme is delivering guidance to provide clarity to the market about the supervisory expectations and to address the benefits and risks arising from the use of AI in insurance, including potential unfair treatment of consumers or discriminatory practices.

Besides EU legislation, in Spain mention can be made of the Spanish Royal Decree 817/2023, of 8 November, on establishing a secure environment for testing compliance with the proposed harmonised EU AI Act. The purpose of that Act is to set up a controlled testing framework, or sandbox, with the involvement of a series of insurers chosen by means of a public selection procedure to test certain selected AI systems that could pose a risk to people's health, safety, and fundamental rights. The sandbox would provide an opportunity for insurance companies and the technology vendors supplying them with services to test their projects for using AI in insurance. The Act envisages taking part both in the AI sandbox and in another controlled testing framework being set up by another authority, namely, the controlled financial services regulator's sandbox being implemented by Spain's *Dirección General de Seguros y Fondos de Pensiones* (DGSFP) [General Directorate of Insurance and Pension Funds] and the other financial supervisors.

In the supervisory context, one of the DGSFP's main focuses for defining its strategic supervisory priorities for 2023-2025 is digital transformation of the insurance and pension fund sector and implementing and using AI in the different processes and in decision-making. Given the unstoppable trend towards AI, the supervisor has emphasised the need to assess the areas in which it is used, its degree of influence in decision-making, the factors taken into account, especially regarding sustainability, and how all that affects the quality of the services provided in order to ensure that AI adds value not just for industry companies but also for the insured and pension plan members.

In short, AI will unquestionably be called upon to play a decisive role in the digital transformation of the insurance sector, whose future will depend both on technical advances and on regulatory actions and steps taken by supervisors. At any rate, the industry's commitment to ethical use of AI and in particular its long experience in complying with the high standards of governance and risk management under Solvency II mean that insurance companies are well positioned to be able to comply with the new legal requirements concerning AI.

Artificial Intelligence, Driving Change in the Insurance Industry

Héctor González
Head of AI Initiatives, TIREA
Quant AI Developer, Instituto BME

Our everyday lives have grown full of items connected with artificial intelligence. Recalling their names may be difficult at first, but today they are used so often that they have become a part of our lives. Using terms like deep learning, neural networks, and generative AI has become commonplace nearly everywhere.

Artificial intelligence's mathematical underpinnings were laid down decades ago, and it is now expanding into every corner of today's society and giving rise to **sweeping changes** in the business sphere. Some may look at it as just a technology fad, but we would seem to be in the midst of something that runs much deeper, comparable to the impact made by the Internet and widespread use of email in their day.

There is not just one reason for this expansion; rather, there are a whole series of causes. As might be expected, insurance companies are one of the businesses involved, and they do not have the luxury of staying on the sidelines in the face of these changes. They have no choice but to jump onto this **new wave of transformation**. For one thing, there are businesses that are building cutting-edge computing technology unthinkable just a few years ago. For another, technology giants are making infrastructure to use these resources open to everyone at very reasonable cost. What is more, there are businesses at work on creating artificial intelligence models with extremely advanced and easy to use development tools. All this is at the disposal of insurance companies, which are eager to acquire these solutions and to use them to expand the range of products and services they can offer their customers, all with the highest quality performance in the most favourable terms.

Businesses have been caught up in a process of developing strategies at a reasonable pace to adapt to the new working environment that has emerged thanks to artificial intelligence. The main initiatives in the insurance sector chiefly focus on improving operational efficiency, supporting decision-making, personalising commercial offerings, enhancing interactions with customers and customer service, and including technology product development tools.

Artificial intelligence and insurance companies

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The units and departments concerned are mainly involved in the following projects:

- **Customer service departments:** Efforts in this area have concentrated on implementing virtual assistants to meet the growing volume of applications filed by users. Conversational AI models are also being used to help employees resolve customer enquiries and avoid potential mistakes from having to rely on memorising manuals, documents, and contracts. Other initiatives involve implementing artificial intelligence-driven recommendation engines to suggest personalised content, products, and services designed to meet user behaviour and preferences and enhance their platform experience.

- **Legal departments:** Reading documents that are often hard to understand takes up hours of work by legal departments. Using *generative artificial intelligence* to prepare summaries and synopses of documents of this type is one of the main initiatives to reduce this workload. Another area in which these models are coming into use is in implementing systems based on AI to manage and ensure compliance with the General Data Protection Regulation (GDPR).

- **Finance departments:** One of the goals that can be achieved through the use of artificial intelligence models is improving companies' financial planning. There are also a broad range of AI financial investing solutions. Environmental, social, and governance (ESG) initiatives usually have a direct impact on these departments and include implementing AI systems to optimise supply chains and promote sustainable practices, such as selecting ethical vendors and minimising carbon footprints.

- **Sales departments:** Artificial intelligence is providing solutions that sales departments can use to draw up personalised proposals. Simulating risk scenarios is another application that is used to assess proposals and take informed decisions. Furthermore, AI-based fraud detection models are useful in enabling sales departments to refine their customer and product portfolio management.

- **Technology development departments:** Many companies are already using coding assistants to help software developers and speed up the creation of applications. Another implementation of this kind, one of the main uses for these new tools, is generating synthetic data for testing and report preparation.

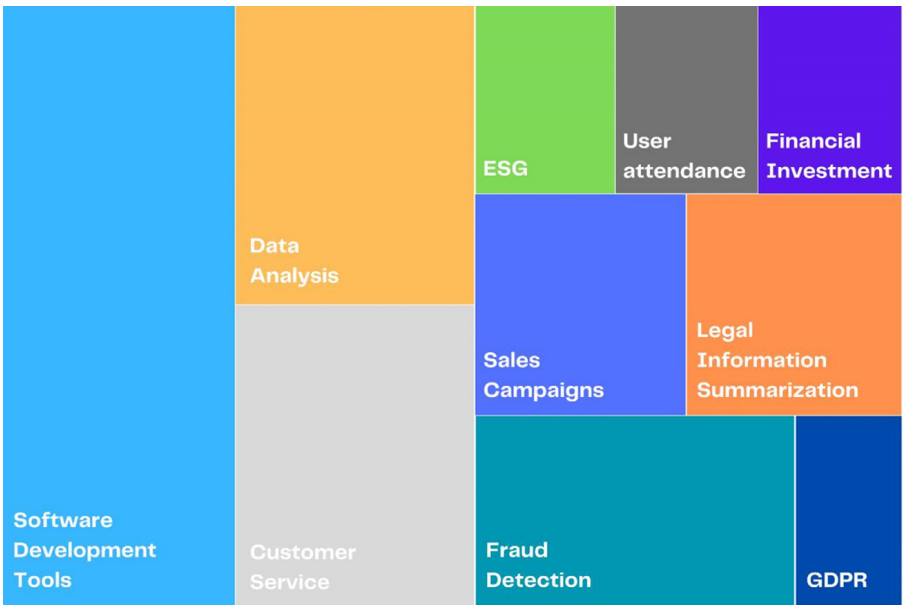

Figure 1. AI application areas in the insurance sector.
Source: own production.

Industry solutions for insurance companies

Artificial intelligence models are being used in initiatives that provide insurance companies with solutions to improve the services supplied by the sector and even launch new services. By way of example, an initial version of a tool that helps processors **handle medical claims** is in the early stages of development. This tool uses the data in the file to return indicators to help processors more confidently perform billing procedures if no deviation from the norm in these cases is found. Where the indicators suggest that there may be a problem, claims handlers need to review the file in more detail. In the initial stage this tool is designed to analyse structured data only, but it is planned that forthcoming versions will be capable of analysing and extracting data from all the documents connected with a case and even of processing images. These indicators are a source of greatly improved efficiency, because claims handlers only need to perform detailed reviews of cases with red flags, allowing other cases to be processed more quickly and shortening processing times. Claims handler feedback will enable this tool to improve its predictions over time using approaches that have already been tried in the health line and can be extrapolated to other lines of business.

There are plans to undertake a series of initiatives aimed first and foremost at **standardising data across the industry**. Completing that standardisation will open up enormous opportunities to develop artificial intelligence models. However, it is essential for high-quality data to be available for subsequent use. Several ideas have been floated concerning projections of future expenses, which will enable better financial planning by insurance companies and thus have a positive impact on the other companies involved in collection processes.

Improved **document handling** is a key strategic part of adjusting to this new environment. Automatically classifying and retrieving information from documents will expedite all management, handling, and payment procedures, not only for insurance companies but also for medical centres, repair shops, brokers, intermediaries, lawyers, and basically everyone else involved in the insurance sector. This will substantially improve the provision of services that are used on a daily basis.

Rates of successful data extraction for documents with general identifying details are very high, and these processes can therefore be completely automated. However, more specific types of documents require preparatory standardisation work to be able to attain reasonable rates of success that make **semiautomated processes** possible.

Claims processing is one example of an area in which artificial intelligence can clearly bring improvements, from image processing to loss-related information processing. There is no industry-wide project, but companies are implementing individual bespoke solutions to expedite handling of this kind.

Like the preceding example, the different companies are developing their own customised models for **automated policy recordal procedures** designed to meet their own individual needs.

Artificial intelligence at TIREA

It is only natural for TIREA's[1] current modernisation programme to include artificial intelligence initiatives. Many of its teams are involved in different projects, and some of those that have made the most progress are discussed below. A number of these projects involve **internal improvements** in the form of tasks that have up to now been carried out by hand but are capable of being entirely automated, while others are designed to **improve services** or specific applications.

In the past TIREA has developed a series of **fraud detection models** that have relied on automated processing. One of the company's first steps towards transformation was to update these machine learning models using more modern technologies and to upgrade the classifier employed, making it into one of the most powerful on the market. That model is currently in the stage of validation testing and comparing its results with the results produced by previous models. The changes made during the migration process have improved scoring precision.

The help indicator management project for **medical case file processing** is currently in the pilot phase and uses that same technology and the same classifier. Despite having an F1 score above 90%, this project is considering a subsequent stage using *generative artificial intelligence* to improve inferences based on the destructured data in the available medical files. The feasibility of implementation is being evaluated, and a legal framework for regulatory compliance during use is being drawn up to ensure that there is no non-compliance on the part of TIREA when the data are used.

One of the most advanced projects the company is working on is related to natural language processing (NLP), namely, the **personal data anonymisation** project. Because of the nature of its work, processing of personal data is a priority for TIREA. In various areas of its day-to-day activities these data are obfuscated manually, and this poses a substantial workload. Not only do these procedures entail excessive amounts of manual labour that brings little value, their effectiveness can also be limited, especially where large volumes of documents are involved. There is thus a need to improve those processes. NLP enables these tasks to be automated. Just a few days after roll-out, the additional workload has been reduced substantially. Bringing *generative artificial intelligence* to bear in this project has been considered as a means of improving the precision of the data obfuscation. Nevertheless, given the reasonable level of confidence in the current solution, the model has been left unchanged.

TIREA receives quite a large range of different billing documents. The company finds **semiautomated retrieval of data from invoices** to be extremely useful, so it has gone to great efforts to implement various deep learning models intended specifically for that purpose. Instead of using standard solutions, it has been decided to label cases manually and to train the models to make predictions. This process has been time and labour consuming but has been made possible through the work of various teams, and a model offering a high degree of confidence will shortly be available. The level of precision will improve still further when it goes into operation thanks to the additional training to be carried out. The model has already started to be used in two applications and there is a good chance it

[1] On 11 December 1997, TIREA, Tecnologías de la Información y Redes para las Entidades Aseguradoras S.A. (Information Technologies and Networks for Insurance Entities Co.), was set up with the support of the Spain's Insurers Association, UNESPA, and more than 165 insurance companies representing 80% of the sector's total turnover, with the aim of implementing sector services and solutions based on telecommunications and computing.

TIREA currently has 77 shareholders, almost all of which are insurance companies. Over the years, TIREA has managed to create a consolidated project that provides service, with high specialisation and a constant effort for security and technological innovation, to critical business processes for insurance companies.

TIREA's main mission is to help improve the business of insurance companies through technology. Its services aim to increase the insurance sector operational efficiency, reducing its administrative and management costs.

More information: https://www.tirea.es

will be used in other invoice handling tasks. With small tweaks and additional training, these applications could begin to see positive results in virtually no time.

Now that the ability to retrieve information from invoices has been validated, several initiatives have been launched to provide **data classification and retrieval** solutions for a broad range of documents. These include standard documents with personal identification details as well as with less structured data, like accident reports. There is reason to be optimistic, and bringing these *generative artificial intelligence* applications on stream in TIREA's normal work looks very promising.

One route involving virtual assistant solutions is being explored. Several projects along those lines are currently being developed, but it is still too early to be able to say that the **chatbots** in development are sufficiently advanced to enable them to be brought on line in actual applications. These assistants are still too general purpose in nature and are not yet addressing the specific problems for which they have been conceived.

The following chart sets out the status of some of the projects that are already in progress, and the company is assessing numerous other proposals.

Figure 2. TIREA projects status (orange: analysis phase; gray: blocked; blue: development phase; purple: production phase).
Source: own production.

An unlimited future?

Uses of artificial intelligence are virtually infinite in scope. As an information technology company, it is imperative for TIREA to stay at the forefront in the development of these technologies. However, it is still being quite cautious about bringing *generative artificial intelligence* on stream in all the initiatives in which it could make sense to do so. The company takes the position that solutions must be developed in an environment that is both technically and legally secure. For that reason, the organisation is focused on bringing these applications on line in a structured manner. This is not to say that new solutions are not going to be put forward, just that this will be done gradually. TIREA is in constant flux, but it has no pretension of being a startup, which means that it is able to adapt to these changes at a suitable pace. All the initiatives being developed by the company are classified as general-purpose solutions

under the recent **European Artificial Intelligence Act**, none of them would be considered high-risk or prohibited systems.

Implementing *neural network* models requires high computing power and large amounts of storage. For that reason, deploying these models in on-premise environments can be constraining. As a result, a range of options are being explored to operate solutions in powerful cloud environments that can provide the resources the applications require at reasonable cost. This can appreciably improve the time to market, though never losing sight of the legal regulations needed to be able to implement responsible policies for their use. The guidelines issued by **EIOPA** (European Insurance and Occupational Pensions Authority) are accordingly adhered to very closely.

In addition, new disruptive paradigms involving **quantum computing** are constantly emerging, and the company is therefore exploring how these technologies might improve artificial intelligence algorithms to be able to process mass data sets faster and more efficiently. This could entail developing quantum algorithms specifically for such AI tasks as machine learning and optimisation. Even though this field is still in development, the company is staying abreast of the advances being made in this area and needs to consider how **intellectual property protection** for quantum computing-based AI algorithms and patent and copyright protection of the specific quantum technologies used by AI applications might limit their use.

One way or another, TIREA is establishing a solid groundwork so that it will be ready and able to suitably adapt to the future breakthroughs that are still to come. This is embodied by its ongoing quest for innovation and its ability to get the jump on market changes. By exploring emerging technologies the company shows that it is committed to continuous improvement and is ready and able to embrace change. By **investing in modernisation**, TIREA is positioning itself to try to fully leverage the opportunities that arise in a technical setting that is in a constant state of flux. Furthermore, its focus on adapting to new trends and its ability to remain receptive to advances in technology enable the company to keep up its activities in the industry and to continue to offer its customers innovative and efficient solutions. The upshot is that TIREA is actively preparing for the future to ensure its position in a world of continuous technological change.

Anatomy of Artificial Intelligence in the Insurance Value Chain

Celedonio Villamayor Pozo
Director of Operations
(Director of IT Technology and Systems until March 2024)

Introduction

Artificial intelligence (AI) is revolutionising the insurance industry's value chain in a number of different ways by improving efficiency, accuracy, and the customer experience. The main practical applications and the impact of AI on different stages of the value chain are briefly discussed below:

This article uses the definition given by the OECD: "An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment".

1. **Product development and pricing**

   - **Personalisation**: AI enables insurers to offer personalised products based on the behaviour and needs of individual customers.
   - **Dynamic pricing**: insurers can use advanced algorithms and continuously updated data to set prices in real time.

2. **Marketing and distribution**

   - **Customer segmentation**: AI uses data analysis to identify customer segments and direct marketing efforts most effectively.
   - **Intelligent sales channels**: chatbots and virtual assistants enhance interaction with customers and boost policy sales.

3. **Risk assessment and underwriting**

   - **Underwriting automation**: AI can quickly process large volumes of data to assess risks and take underwriting decisions.
   - **Enhanced risk selection**: predictive algorithms and deep machine learning models can identify patterns and correlations for enhanced risk assessment.

4. **Services and operations**

   - **Internal processes**: AI is used to computerise such low-risk internal processes as customer analysis and back-office operations.
   - **Operational efficiency**: AI improves operational efficiency in performing repetitive tasks and data processing.

5. **Claims management**

   - **Claims process automation**: AI expedites the claims handling process from initial submission to final settlement.
   - **Fraud detection**: AI systems analyse patterns to prevent and detect fraudulent claims.

6. **Customer service**

   - **24/7 support**: virtual assistants provide continuous personalised customer support.
   - **Feedback and continuous improvement:** AI compiles and analyses feedback to continuously improve services.

7. **Risk management and compliance**

   - **Risk assessment**: AI improves the accuracy of risk assessment and portfolio management.
   - **Regulatory compliance**: AI performs data analysis and report generation to help insurers comply with complex regulations.

8. **Cybersecurity and data privacy**

   - **Data protection**: AI improves cybersecurity by monitoring and detecting threats.
   - **Data governance**: insurers use AI governance models to manage data privacy and security.

In short, AI is transforming every aspect of the insurance industry value chain from product personalisation to claims handling and customer service. As the technology advances, it is expected that it will be integrated further and deeper within the insurance sector, resulting in heightened efficiency and enhanced results for insurance companies and their customers.

This article presents the results of a study[1] analysing more than 500 use cases from insurers and reinsurers around the world, considering three different aspects: the technologies employed, the intended purposes, and the business processes concerned. Relying on more than one technology, for more than one purpose, impacting more than one business process is a feature common to two-thirds of the 585 use cases reviewed.

[1] 2023 Gartner CIO and Technology Executive Survey.

Artificial intelligence applied to the use cases considered

Artificial intelligence has worked its way into the lives of organisations and of nearly all people and has entered into our day-to-day conversations. If we were to ask anyone what he or she thinks AI is, we would most likely get a different answer from everyone we asked.

This article uses the definition given by the OECD: "An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment".

The subject matter normally falling within the scope of the term "AI" includes technical categories like machine learning and knowledge-based approaches and application areas such as computer vision, natural language processing, speech and voice recognition, intelligent decision-making support systems, intelligent robotic systems, and novel applications of these tools in a variety of domains. AI technologies are developing at a rapid pace, and more techniques and applications are likely to emerge in the future. The OECD definition tries to be flexible and is based on a broad understanding of what AI is, and people using this definition are encouraged to assess the relevant scope depending on the context involved.

The use cases considered here are public and cover companies of all kinds in geographic areas spanning all continents for the years 2015 to 2023 (both included).

Globally, non-life insurers account for nearly 69% of the cases and life insurers 28%, the remaining 3% are reinsurers use cases. However, the following table shows that this distribution changes appreciably when broken down into the three different geographic regions in which these use cases fall.

AREA	NON-LIFE	LIFE	REINSURANCE
AMERICAS	81.4%	17.5%	1.1%
APAC	47.0%	51.4%	1.7%
EMEA	47.0%	20.5%	7.9%
Overall	**68.8%**	**28.0%**	**3.3%**

Table 1.
Source: 2023 Gartner CIO and Technology Executive Survey.

Non-life insurers are more active in the Americas and EMEA[2] regions, whereas life insurers are slightly more active in the Asia Pacific region (APAC).

[2] Europe, Middle East and Africa.

Technologies in use

As mentioned above, the definition of AI covers a broad range of very different technologies used for a wide variety of purposes. The technologies used in the cases considered here are discussed below, briefly describing each technology and outlining how they are used. A chart showing the intended purposes and the business processes concerned is included for each of the use cases.

A. Chatbot

A chatbot is computer software that uses artificial intelligence to simulate conversations with users. Responses can be automated and customers guided through, e.g., sales, reservation, claims, and product return procedures. Chatbots can learn and can adapt to the context and to user needs, making it easier to search information without human involvement. Using this technology optimises communication, enhances the customer experience, and helps insurers provide more efficient services by providing:

1. **Efficient communication**: chatbots enable customers to complete insurance procedures quickly and securely. They can also serve as a channel for collecting data on customer behaviour, preferences, and needs.

2. **Cost reduction**: by being able to connect with multiple customers at once, insurers can lower marketing costs and achieve more effective results.

3. **Support services for the insured**: chatbots can provide entry-level support for such questions and incidents as finding a loss adjuster, obtaining information about renewals or expiry dates, and contacting brokers.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

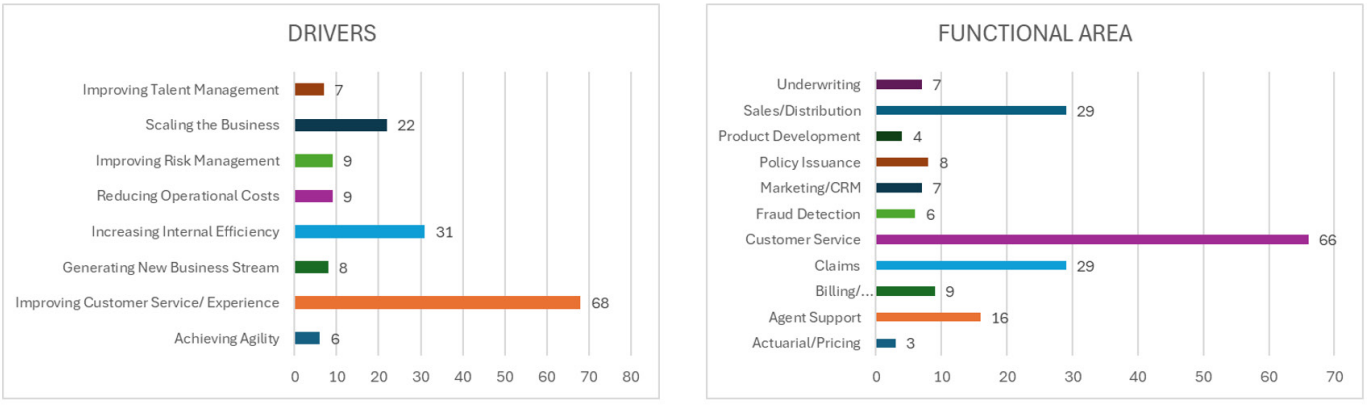

Figure 1.
Source: 2023 Gartner CIO and Technology Executive Survey.

B. Deep neural networks

Deep neural networks are computational models patterned on the neural structure of the human brain. They consist of layers of interconnected artificial neurons designed for distributed hierarchical data processing. In other words, these networks use a series of layers to learn and extract increasingly complex abstract characteristics as we move

deeper into the network. They can be used for applications ranging from fraud detection in the insurance sector to computerising tasks that are otherwise hard to do using conventional programming.

Deep neural networks have become a valuable tool within the insurance industry. Some of their applications are:

1. **Fraud detection**: identifying unusual transaction patterns and detecting fraudulent claims. These networks analyse historical data such as the details of incident reports and pay-outs to prevent fraud before any monies are paid.

2. **Contract migration**: modernising conventional systems is critical to insurers. Deep neural networks can help automate the migration of millions of insurance contracts from the source systems to a target system, including actuarial functions for contract management.

3. **Accuracy and explainability**: accuracy needs to be high, but explainability is also required. Neural networks can generate black box models, making it difficult to understand how they achieve their results. This is critical for purposes of complying with industry regulations.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

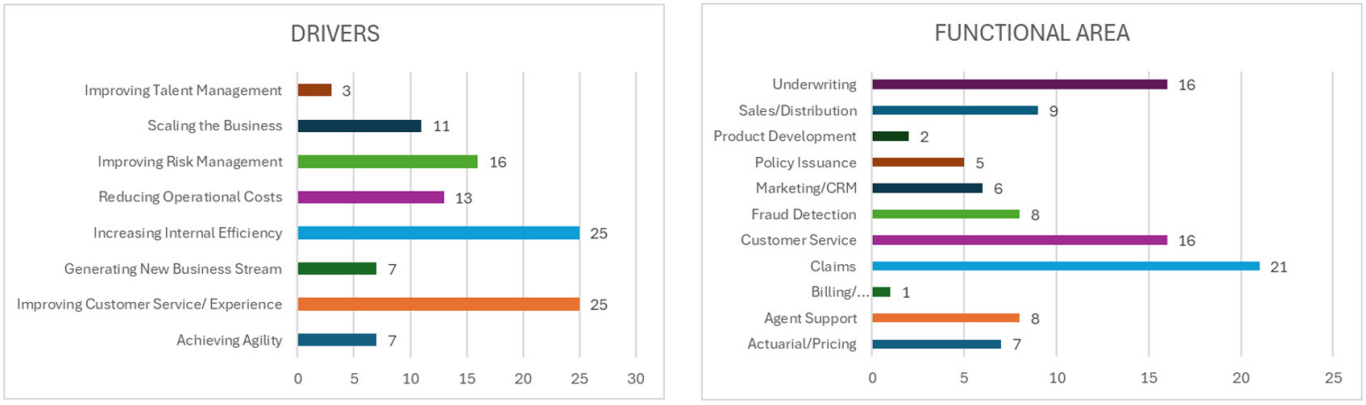

Figure 2.
Source: 2023 Gartner CIO and Technology Executive Survey.

C. Machine learning

Machine learning (ML) is a branch of artificial intelligence that deals with developing algorithms and statistical models that enable computers to perform tasks without being explicitly instructed and instead using patterns and inferences.

ML has turned into a valuable tool within the insurance industry. Its applications include:

1. **Customer advice and policy sales**: insurance companies can use conversational AI to interact with people and provide personalised advice. Cognitive virtual assistants (CVAs) help customers navigate the different coverage options, answer customer questions, and make recommendations based on customer needs and budgets. Policies can even be purchased through a chatbot without having to talk to an employee, speeding up the process and making it easier.

2. **Claims automation**: automating the claims and reimbursement settlement process is another interesting application of conversational AI in the insurance industry. CVAs can collect information about a claim, evaluate whether it is eligible, and provide status updates. This not only reduces the cost of processing claims but also improves productivity and customer satisfaction.

3. **Data analysis and risk prediction**: ML enables insurers to analyse large volumes of data to predict risks and set pricing more precisely. This helps optimise policies and take informed decisions.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

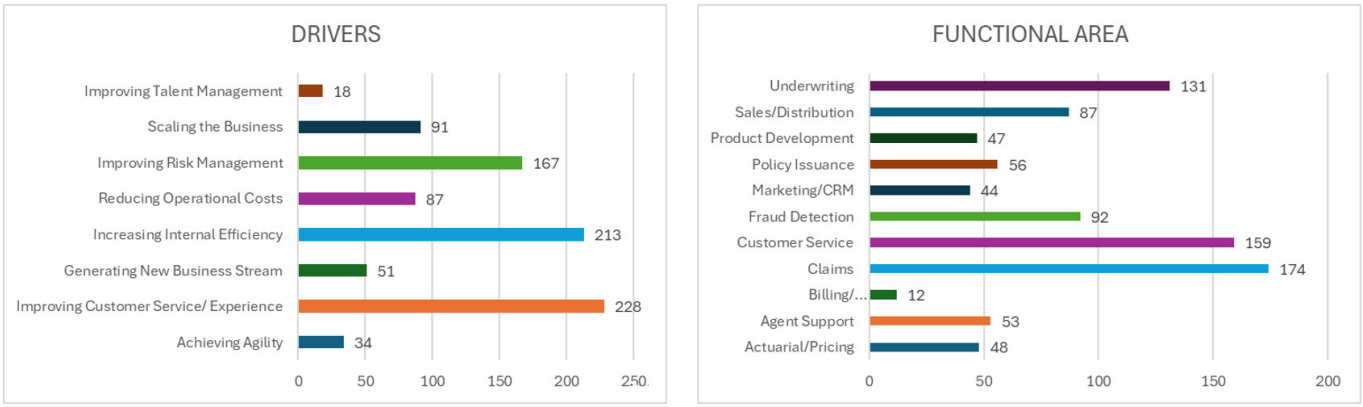

Figure 3.
Source: 2023 Gartner CIO and Technology Executive Survey.

D. Natural language processing

Natural language processing (NLP) is a branch of AI that is at the core of applications and devices capable of:

1. Translating text from one language to another.
2. Responding to spoken and written orders.
3. Recognising or authenticating users by their voice.
4. Summarising large volumes of text.
5. Evaluating intent or sentiment in a text or speech.
6. Generating graphic or text content on demand, often in real time.

In short, NLP enables computers to understand and generate text and speech and has applications from voice-operated GPS systems to customer attention chatbots and business solutions to automate operations and simplify critical processes.

NLP has been transforming the insurance industry for years by being used in:

1. **Claims management**: AI platforms and NLP expedite claims processing by increasing accuracy and coherence. For example, after implementing an AI system, Zurich Seguros decreased the time spent on reviewing claims by 58%.

2. **Input processing**: insurers evaluate a broad spectrum of information daily (medical reports, emails, etc.). NLP enables these documents to be organised automatically, saving time and improving coherence. Generali uses NLP to read, interpret, and distribute over a million emails a year.

3. **Policy review**: NLP helps ensure that policies are suitable and limits exposure to risks ahead of underwriting. Its use in automation improves efficiency and consistency.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

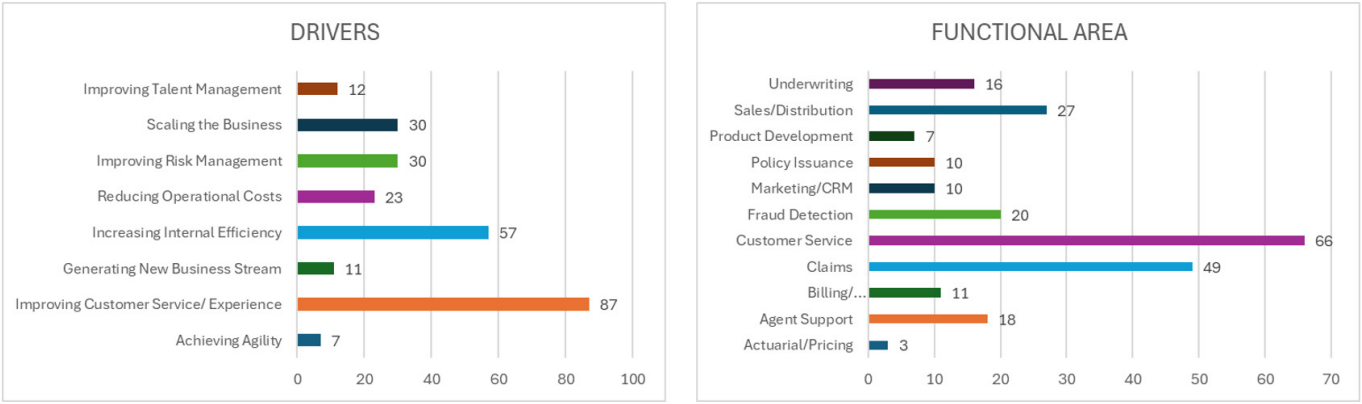

Figure 4.
Source: 2023 Gartner CIO and Technology Executive Survey.

E. Robotic process automation

Robotic process automation (RPA) is a software technology for building, implementing, and managing virtual robots that emulate human actions when interacting with software and digital systems. These "robots" can carry out repetitive tasks like extracting data, filling out forms, moving files, etc. Unlike people, robots do not need to take breaks and can perform tasks quickly and consistently.

Some of the main use cases are:

1. Claims processing: expediting claims processing by decreasing times and reducing manual handling. Claims can be processed 75% faster than by hand.
2. Underwriting: automating risk assessment and policy approval.
3. Regulatory compliance: contributing to regulatory and legal compliance by computerising such tasks as document verification and monitoring changes in the law.
4. Sales and distribution: automating the processes of providing quotes, issuing policies, and effecting renewals.
5. Finance and billing: managing accounts receivable, accounting sources, ledgers, and account closure.
6. Policy management: automating the management of changes to policies and data updates.
7. Business and process analysis: helping with identifying areas for improvement and optimisation.
8. Legacy applications: integrating former systems and eliminating organisational silos.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

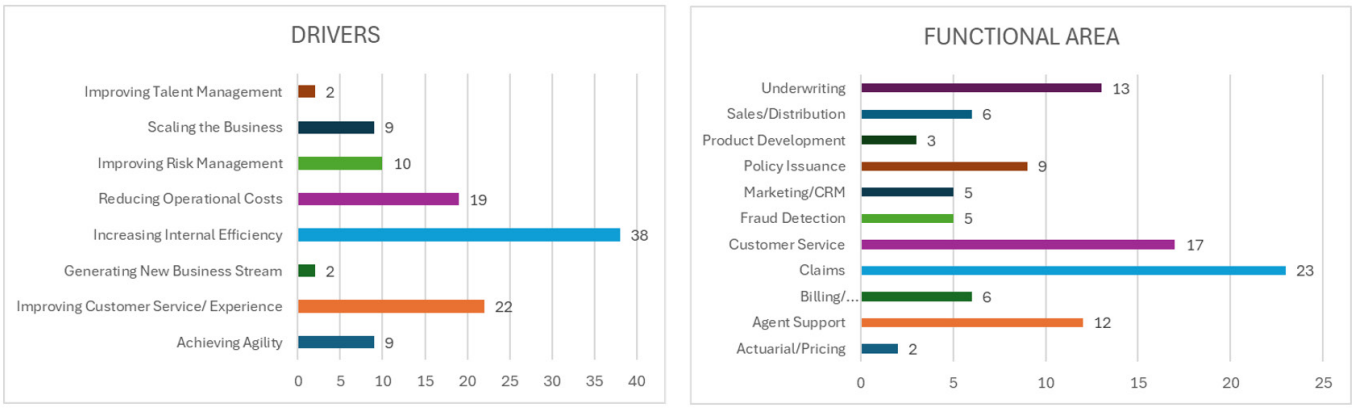

Figure 5.
Source: 2023 Gartner CIO and Technology Executive Survey.

F. Speech recognition and cognitive virtual assistants

Speech recognition technology enables computers and other devices to identify and process spoken human language and convert it to text. It uses computational linguistic methods, computer science, electrical engineering, and similar disciplines to develop systems capable of understanding and translating words and phrases.

There are a series of operational steps:

1. **Word detection**: the system identifies spoken words.

2. **Hypothesis and testing**: different hypotheses about what has been said are generated and compared to a language model to check their consistency.

3. **Text processing**: speech is converted to written text, including such elements as numbers and punctuation marks.

Over time this technology has advanced considerably from the early systems that recognised numbers and simple words to today's systems that understand natural speech and can be trained to recognise individual voices, thus improving their accuracy.

Cognitive virtual assistants (CVAs) are advanced artificial intelligence systems designed to interact naturally with users either in text or spoken form. They use natural language processing algorithms and machine learning to understand and answer user queries and offer customers an efficient, personalised customer service experience.

Some of the main uses of CVAs are:

- **Omnichannel interaction:** they operate across multiple platforms and channels such as email, SMS, WhatsApp Business, social media, and others, enabling users to communicate with them using their medium of choice.

- **24/7 availability**: they are available around the clock, so companies can offer their customers continuous support.

- **Personalisation**: they can be trained and aligned with the company's identity using corporate colours and personalised avatars.

- **Integration with transaction services**: they allow secure integration with customer transaction services, accessing private data when necessary.

- **Data analysis and storage**: they keep a record of interactions, enabling companies to analyse and improve service quality on an ongoing basis.

The upshot is that CVAs are a valuable tool for companies looking to implement artificial intelligence solutions to enhance the customer experience and optimise their service processes.

In several use cases CVA and speech recognition technologies have been combined. For instance:

1. **Customer advice and policy sales**: conversational artificial intelligence can be used to interact with people and provide personalised service. Cognitive virtual assistants (CVAs) help customers navigate the different coverage options, answer customer questions, and make recommendations based on customer needs and budgets.

2. **Claims automation**: automating the claims and reimbursement settlement process is another interesting application. CVAs can collect information about a claim, evaluate whether it is eligible, and provide status updates.

3. **24/7 customer service**: CVAs provide non-stop support, answer questions, and provide clear information every step of the way to guide customers through the various procedures.

4. **Risk assessment**: conversational AI can help assess the risks attaching to insurance policies, improving the process's efficiency and accuracy.

5. **Fraud detection**: speech recognition systems are capable of analysing conversation patterns and detecting words and phrases commonly used in frauds. In addition, AI can even use voice recognition to verify customer identity so as to prevent identity theft.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

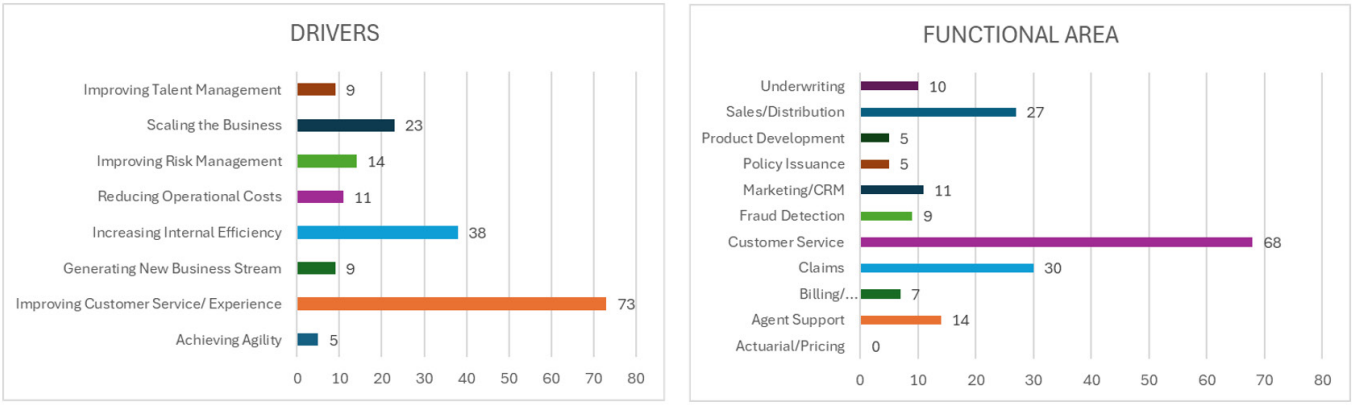

Figure 6.
Source: 2023 Gartner CIO and Technology Executive Survey.

G. Generative AI

Generative artificial intelligence is a technology that creates new content based on deep learning models that have been trained on massive datasets. These models differ from discriminative AI models, which are used to classify data based on their differences.

It has three main phases of operation:

1. **Training**: a foundation model that can be used as a basis for a variety of generative AI applications is created..
2. **Tuning**: the foundation model is tailored to a specific generative AI application.
3. **Generation, evaluation, and retuning**: the generative AI application's output is evaluated and its quality and accuracy are continuously improved.

Generative AI is used to generate texts, images, code, and much more and has practical applications in chatbots, in image creation and editing, in writing software code, and in scientific research. It is also used in professional settings for fast creative idea visualisation and efficient execution of monotonous, time-consuming tasks.

Some of the best-known generative AI applications are OpenAI's ChatGPT and DALL-E, GitHub CoPilot, Bing, Microsoft Chat, Google Bard, Midjourney, Stable Diffusion, and Adobe Firefly. These tools are revolutionising how we interact with technology and how routine tasks are automated.

Generative AI has found numerous applications in the insurance sector and is transforming how companies operate and relate to their customers. Some use cases include:

1. **Process automation**: generative AI can automate repetitive tasks like analysing and writing summaries of documents, enabling insurers to process claims and policies more efficiently.
2. **Analysing large quantities of data**: with its ability to analyse large volumes of data, generative AI can help insurers gain valuable insights about customers and markets.
3. **Customer support automation**: chatbots powered by generative AI can interact with customers, answer their questions, and guide them through complicated procedures, enhancing the customer experience.
4. **Managing and reading customer emails:** generative AI can be used to manage and read emails to identify customer needs and generate personalised responses.
5. **Damage detection through vehicle image analysis**: when insurance is being purchased, generative AI can analyse images of vehicles to detect damage, thereby aiding in risk assessment.
6. **Automated content creation**: this technology can generate content for digital platforms, such as social media articles and texts, helping to improve search engine positioning and interaction with users.
7. **Claims management optimisation**: generative AI can automate claims processing from the initial evaluation to final decision-making, speeding up the process and lowering operating costs.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

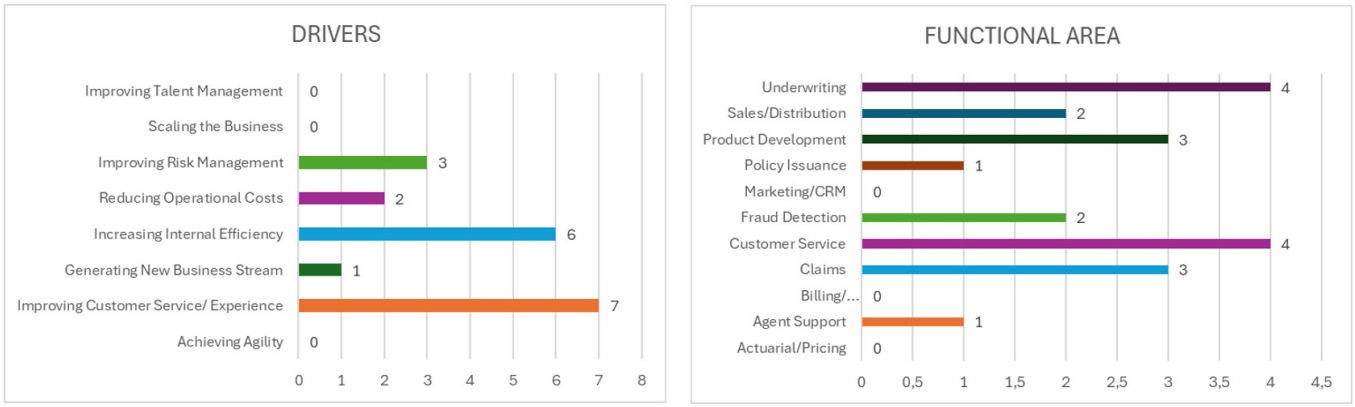

Figure 7.
Source: 2023 Gartner CIO and Technology Executive Survey.

H. Face and image recognition

Face recognition is a biometric technology used to identify or verify the identity of an individual from the face. It is used to recognise people in photographs, videos, or even in real time. It includes:

1. **Face detection**: the camera detects and locates the image of a face, either alone or in a crowd.

2. **Face analysis**: the image of the face is captured and analysed. Most face recognition technologies are based on 2D images, which can be more readily compared to public photographs or photographs in databases.

3. **Image to data conversion**: the captured face is converted to a digital dataset based on the individual's facial features. This numeric code is called the facial footprint and is unique to each individual, like fingerprints.

Image recognition is a broader technology that is not restricted to the human face. It uses computer vision algorithms to detect, process, and classify data gleaned from images. It can identify objects, places, individuals, writing, and actions in images and videos.

There are several use cases of face and image recognition by the insurance industry. It can improve security and efficiency considerably:

1. **Identity verification**: face recognition can be used to verify the identity of customers during the policy application or claim submission process to prevent fraud.

2. **Claims processing**: image recognition can be used to computerise the review of visual documents like photographs of automobile accidents. This speeds up the claims process and lessens the chance of human error.

3. **Risk assessment**: image recognition can help assess risk by analysing images of properties or vehicles to detect features that could indicate a higher risk of loss.

4. **Personalised services**: by using image recognition insurers can offer personalised services based on customer preferences and behaviour detected by means of image analysis.

The following chart presents a summary of the intended goals of insurers and the internal processes involved for the use cases considered.

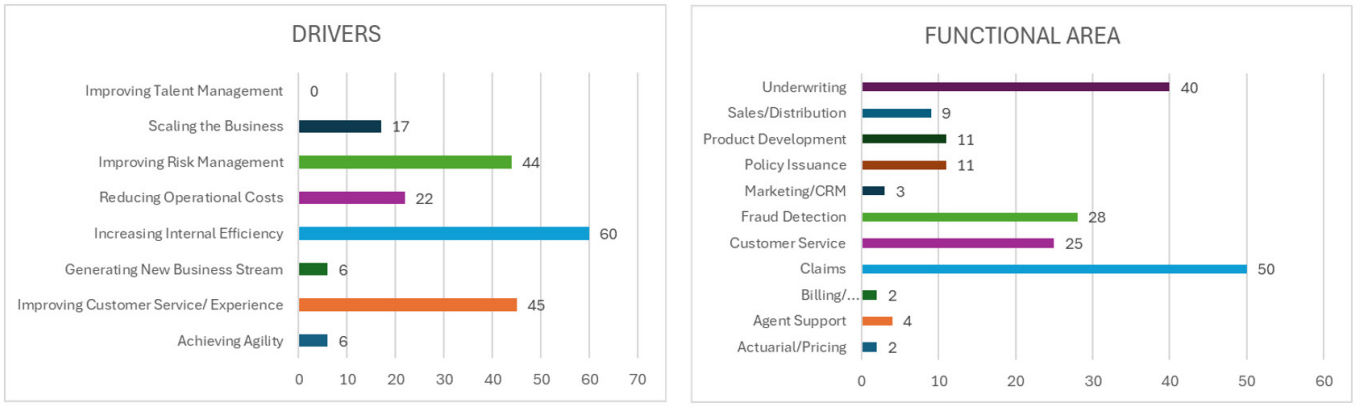

Figure 8.
Source: 2023 Gartner CIO and Technology Executive Survey.

Not Everything Fits into an Algorithm

Rubén Abadía Funes
Engineering Area
Centro Zaragoza[1]

The field of artificial intelligence (AI) has been in a state of constant flux all through its decades of research and development. Since its inception in the 1950s, when pioneers like Alan Turing and John McCarthy laid the theoretical foundations for artificial intelligence, to its practical implementation today, AI has been on a journey that has redefined multiple facets of our lives.

This has become the guiding principle driving transformation in numerous industries, like the insurance sector, in which AI has emerged as a factor to be reckoned with, redefining how procedures involving loss adjusters can be managed.

The demand for speed by the insurance industry in responding is exerting great pressure on companies to adapt and offer faster, more accessible services. Customers expect quick answers to their enquiries, whether they are seeking a quote, filing a claim, or calling for assistance. As a result, insurers are turning to innovative technologies to speed up processes and provide their customers with immediate responses. They are also implementing automation and using artificial intelligence to improve their efficiency and response capabilities to enable insurance companies to satisfy demand in an ever more demanding and competitive marketplace.

Tackling a challenge

In the digital information age society has undergone a significant cultural shift towards immediate responses. Prompted by technology, individuals look for fast answers to their questions and needs. This need for immediate response has transformed the way we interact with the world, from how we consume news and entertainment to how we communicate with others. We are no longer predisposed to wait, and this demand for an instant response is moulding how we live, work, and interrelate.

The demand for speed by the insurance industry in responding is exerting great pressure on companies to adapt and offer faster, more accessible services. Customers expect quick answers to their enquiries, whether they are seeking a quote, filing a claim, or calling for assistance. As a result, insurers are turning to innovative technologies to speed up processes and provide their customers with immediate responses. They are also implementing automation and using artificial intelligence to improve their efficiency and response capabilities to enable insurance companies to satisfy demand in an ever more demanding and competitive marketplace.

[1] Centro Zaragoza is the vehicle research centre participated by 17 insurance companies, which aims to improve road safety and car reparability.

Figure 1. Depiction of an automobile being analysed by AI.
Source: AI-generated image.

Assessing damage to vehicles both for losses and for underwriting has long been one of the most important challenges facing insurers. Evaluating the extent and severity of damage to vehicles can be complicated and tedious. It can be slow, subject to mistakes, and prone to bias and is highly dependent on the experience of the human component.

The brains behind the machine

AI, with is ability to analyse large quantities of data, spot patterns, and take decisions based on precise, objective information, holds out the prospect of revolutionising damage assessment. From machine learning algorithms to convolutional neural networks, AI brings a completely new approach to tackling this complex challenge.

Let's take a look at how AI actually works when assessing damage.

First, it compiles large volumes of visual data in the form of images of damaged vehicles that can be taken from a range of different sources, the most common being pictures taken for companies by loss adjusters and automobile repair shops.

Before AI can analyse the images, the data have to be preprocessed so that they are suitable for input into the AI model. This can include resizing the image, normalising pixel values, and removing image noise or distractors that could affect the precision of the analysis.

After the data have been preprocessed, AI uses machine learning algorithms to extract relevant features from the images. Some of these features might be edge detection, image segmentation, and analysing shapes, outlines, colours, textures, and other relevant visual attributes.

The features extracted are used to train an AI model, which learns to associate specific visual patterns with damage assessment based on data previously labelled by humans, e.g., vehicle damage type and severity.

After the model has been trained, it can be used to assess new images of damaged vehicles. The model analyses the visual features of the images and compares them with the patterns learned during training to estimate the extent and severity of damage.

Neural networks are patterned after the structure of the human brain and enable AI to "see and understand" the visual content of the images, identify damaged areas, estimate the cost of repair, and provide a detailed assessment in real time.

Implementation in the insurance sector

Artificial intelligence can help perform a range of different tasks in the insurance sector. From risk verification to network audits, AI can be a versatile tool fostering efficiency.

Risk verification. When using vehicle images for risk verification at the time of contracting the coverage, AI can play a critical role in taking decisions about insurance covers. Based on the analysis of images and other relevant data, AI can suggest whether to accept or refuse coverage for a given vehicle and can propose potential deductibles or excesses covering existing damage to the vehicle, all in just a few minutes.

Loss adjustment. AI can very quickly analyse images of vehicles, identify areas that have been damaged, assess repair costs, and furnish a detailed breakdown of the action that needs to be taken. This ability can improve claim handling efficiency and for certain types of losses ensure reliable, objective assessment of the damage, and the speed of response raises customer satisfaction.

Triage. AI can use its ability to analyse and classify losses reported to identify claims that require immediate attention and prioritise them based on their severity and urgency. This allows insurers to allocate resources more effectively, automatically adjust technical reserves from first notice of loss (FNOL), and ensure that more critical losses will be handled appropriately, improving the customer experience and enhancing the company's reputation.

Network audits. Another area in which AI could be helpful is network audits, by analysing large volumes of case files compiled from different repair shops and loss adjusters to identify patterns, trends, and anomalies. This can help insurance companies spot areas that need improvement, detect potential fraud and inappropriate practices, and make informed decisions based on specific data.

Exploring artificial intelligence in the insurance field

Use of artificial intelligence by the insurance industry to assess damage marks a milestone in technological progress by the sector. Through the power of machine learning and advanced data analysis, AI offers transformational potential that can be converted into competitive advantages with a number of benefits. Here are some of the main ones:

- **Speed** is its greatest virtue. AI can process large volumes of data and carry out complex analyses in next to no time. This makes it possible to respond quickly to customer enquiries and to give priority attention to the most critical cases, thereby enhancing the customer experience by shortening waiting times and making it possible to provide faster service.

- **Efficiency** is another obvious advantage, stemming from AI's ability to automate routine tasks and reduce human error, thus optimising resources. By minimising manual processing, AI can increase productivity and precision of the results, enabling resources to be allocated more efficiently.

- Payroll cost and loss adjuster fee **savings** by automating adjustment and pricing and reducing the number of people involved. The savings obtained by using AI in insurance can help lower insurance companies' combined ratios, lately of such concern in the automobile insurance line.

- The **objectivity** of the assessments produced demonstrate AI's ability to provide impartial, data-based assessment uninfluenced by personal prejudice or human bias. This ensures more consistent assessments and decision-making, resulting in fairer and more transparent indemnity proposals and coverage decisions.

- **Fraud reduction** is another ostensible advantage, since AI can detect patterns and anomalies that could be indicative of fraudulent activities. By analysing and spotting suspicious behaviour, AI can alert insurers to cases of possible fraud, such as bogus or padded claims. This enables insurers to protect the interests of all law-abiding insured parties and translates into more competitive premiums.

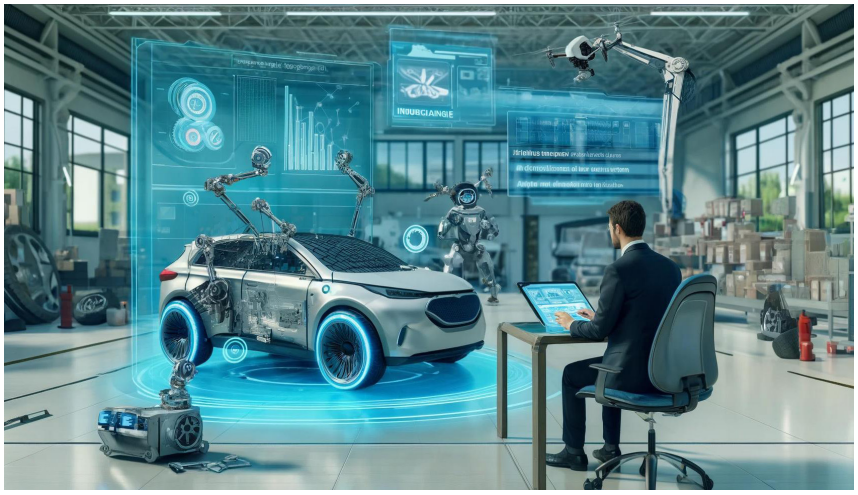

Figure 2. Future AI-assisted automobile inspection centre.
Source: AI-generated image.

Artificial intelligence holds out the potential to revolutionise many aspects of the insurance industry, but at the same time implementing it gives rise to challenges and shortcomings that must not be overlooked.

Proper **vehicle and parts identification** is a critical component of automobile damage assessments and could be a potential drawback to using artificial intelligence. While AI can be quite precise in recognising vehicle models and analysing their component parts, there is a risk that it could make mistakes or misinterpret certain vehicle attributes. For instance, it can be hard for AI to recognise specific vehicle parts and hidden damage not measurable by visual inspection. This could cause inaccuracies when damage is assessed and hence mistakes in allocating repair costs or deciding on the feasibility of repair as opposed to declaring a total loss.

More fraud is another potential risk of using artificial intelligence for these procedures. As technology grows more advanced and widely used in the insurance sector, insurance scammers will try to take advantage of gaps in or the limitations of AI systems to commit more sophisticated, harder-to-detect frauds. For instance, scammers could try to fool AI algorithms by manipulating data or submitting false claims designed specifically to evade automated fraud detection. AI might also miss certain indicators of fraud discernible only to humans. It will be important to achieve a balance between the operational efficiencies that can be obtained using AI and the human oversight needed to ensure effective fraud detection. For that reason, the purported savings in loss adjusters' fees and salary costs mentioned above as a benefit could come with increased claim costs as a downside.

Furthermore, the datasets used to train algorithms could contain inherent bias, e.g., racial, gender, or socioeconomic bias. Failing to address these biases suitably during the AI training process entails the risk that algorithms could reproduce and intensify those biases in its decision-making, which could result in **unfair discrimination** of certain groups of people.

The absence of **human interpretation** is a potential risk in situations that require emotional comprehension, subjective judgement, or contextual evaluation extending beyond the objective data. Unlike humans, who can understand the context, intent, and subtleties of a situation, AI systems operate mainly based on patterns and correlations in the data. This means that it can be difficult for them to interpret complex nuance or ambiguous circumstances that require subjective judgement or insight. For example, when assessing vehicle damage, AI may be effective at identifying and quantifying physical damage visible in images but may not be able to consider such contextual factors as vehicle history or the specific circumstances of the accident. This could result in assessments that fail to take into account all relevant aspects of the situation.

This means that while a loss adjuster can not only assess the vehicle damage but also the cost of the repairs proposed by the repair shop, discuss and negotiate the terms of services, and consider additional factors like the quality of workmanship and repair time, AI systems could well lack this **capacity for negotiation and ability to adapt** to the special circumstances of each case. Vehicle repairs can often require negotiations between the insurer and the repair shop concerning costs, methods of repair, and completion times. The loss adjuster's experience and negotiating skills are basic to reaching fair agreements satisfactory to both the insurer and the shop and to settling disputes or discrepancies that may arise during repairs. This could lead to agreements unfavourable to one of the parties or to an inability to adapt to the changing needs of the shop or the insured party. Consequently, supervision and involvement by humans will be necessary in complicated cases or in disputes that call for a more flexible and adaptable approach.

Figure 3. Vehicle repairs can require negotiations between the insurer and the repair shop concerning costs, methods of repair, and completion times.
Source: Centro Zaragoza.

Beyond the machine. The human factor

It is essential to stop and think about the ethical implications of this technology when delving into this field. It is true that AI brings a series of benefits, but it also poses challenges that need to be tackled thoughtfully and carefully.

One of the main ethical concerns in relation to artificial intelligence is the issue of **empathy and emotional understanding**. Philip K. Dick's novel *Do Androids Dream of Electric Sheep?*, later adapted to the big screen by Ridley Scott's *Blade Runner*, presents the Voight-Kampff test, designed to establish whether an individual is a human or an android. In today's world we do not have to deal with androids, but the fundamental issue of how AI perceives and responds to human emotions is still relevant.

Let us imagine a scenario in which an insured party has a traffic accident. Can AI, with its ability to analyse data and recognise patterns, truly understand the anxiety felt by the insured? Can it offer the same degree of empathy and support as a human being? These questions force us to think about the intersection between technology and humankind.

Besides the question of empathy, other essential issues in developing and using this technology are **transparency** and responsibility. AI algorithms can be opaque, making it hard to understand how they arrive at decisions and what data they use to reach them. This raises concerns about fairness and neutrality, especially as regards insurance companies' indemnity proposals.

Data privacy and security are other relevant risks when artificial intelligence is used, especially where confidential and personal data like loss histories, financial details, or location data are used in the corpus employed to train AI models without proper consent by the individuals concerned or where data confidentiality has not been safeguarded. This can lead to concerns about improper use of personal data or the possibility that data will be compromised or stolen by third parties.

Finally, one of the most troubling dilemmas in today's society is that as this technology grows more advanced and sophisticated, certain tasks and functions traditionally performed by people will be completely automated, and this can produce apprehension about the future role of employees. **This job uncertainty** can in turn lead to social and economic concerns and a need for job retraining for the employees involved.

A new horizon

"The real danger is not that computers will begin to think like men, but that men will begin to think like computers". This quote by Sydney Harris warns of the risk that humans will reduce their thinking to simplistic rational and logical processes instead of appreciating the inherent ingenuity, intuitiveness, and complexity of the human mind. Whenever we are interacting with technology and artificial intelligence, we need to be sure not to lose our humanity, our emotional understanding, our critical judgement, and our imagination, basic to our existence and to our growth as individuals.

Abilities like the intuition based on experience, the human capacity to understand context, adaptability to complex situations, and ethical decision-making based on principles and values are hard to quantify and code into algorithms.

It is therefore essential to find a balance between AI and the human involvement needed to tackle the subjective, contextual, and ethical aspects of every situation. Successfully integrating AI into the insurance industry will require amicable cooperation between people and machines so that we can recognise the capabilities and limits of each and in that way take full advantage of the potential of both to drive innovation, improve the customer experience, and ensure fair decision-making.

In a world where technology and humankind come together, artificial intelligence is a powerful tool people can use to work more efficiently.

When all is said and done, not everything fits into an algorithm.

Artificial Intelligence in Preventing Natural Perils

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Introduction

Natural disasters have occurred throughout history and have forced societies to adapt, prepare, and evolve, carrying mankind to its current level of safety and development. While development has brought us greater protection from hazards, it seems that society often forgets that events like these even exist and are a real possibility. They only come to mind when they actually occur.

At the same time, technological progress has also driven human development, from the invention of the wheel to the recent advent of artificial intelligence. These technological advances have led humankind to become a highly interconnected technological society with unlimited potential to innovate and solve complex problems.

At first glance it may appear that these paths run parallel, but the two branches converge at a number of points. At Tesicnor's Disaster Risk Reduction (DRR) Department our vision is to put the most innovative commercially available technologies to use for protection and risk mitigation, and advancing personal safety is our cornerstone. This contribution discusses the research and development work currently under way, basically on artificial intelligence (AI), and how we think these advances will help reduce the impact of natural disasters on the population and the natural environment.

Tesicnor's application makes it possible to digitise and speed up implementation of municipal disaster planning. In case of an emergency, the system provides real-time directions concerning the prevention tasks that need to be carried out and their status (not started, in progress, completed). Since it is a dynamic tool, the contact telephone numbers of the people in charge can be quickly and easily updated and new functionalities, such as sending automated SMS alerts and early flood warnings out to the public using AI, can be added.

Natural Disasters

Formal definition of a natural disaster

Natural disasters are destructive phenomena that cause severe impacts within a short span of time. Some examples of natural disasters are floods, the spread of wildfires due to combustion reactions, cyclones and tornadoes, earthquakes, and so on.

Natural disasters in Spain

In environmental terms, floods and wildfires are the most frequent and most damaging natural disasters in Spain. Other events like earthquakes and cyclones are much less common compared to other countries.

With regard to wildfires, Spain is one of the countries with the largest expanse of forested land in the European Union and carefully addressing this risk is therefore critical.

From an insurance industry perspective, flooding is the most frequent and problematical natural disaster. Earthquakes and cyclones, though as a rule less common, are capable of causing great damage unexpectedly.

Consequences

Natural disasters are a source of damage both to inhabited areas and to ecosystems. Their economic impact is high, and recovery is slow and takes a lot of work.

Investing resources in reducing or preventing the repercussions of these events translates into major economic savings in the long term. This is a premise that is readily understandable in theory, yet in practice it is hard to drive this point home to people and to the authorities unless these events occur often enough to impact them directly, as is the case, for instance, of earthquakes in countries like Japan.

AI basics

Today the field of artificial intelligence has myriad applications and is much in vogue. One way AI can be used is to mitigate the consequences of natural disasters through early warnings. There is much talk about AI technology right now, often without much basis and with considerable fearmongering or overdramatisation. Let us therefore provide a formal definition of artificial intelligence and consider its benefits in the world of natural disaster risk reduction.

Definition of AI

Our underlying assumption is that the internal functioning of machines is extremely simple and that they are only capable of performing simple mathematical operations like adding and subtracting. Artificial intelligence is a field in computing and mathematics whose aim is to make a machine able to perform tasks that require a certain degree of human intelligence. Some examples are recognising objects in photographs, detecting faulty products in production chains, identifying email spam, predicting how a company's shares will perform on the stock market, etc.

Data are AI's source of learning. It might intuitively seem that training a machine to write first requires providing it with an explanation of the grammatical rules of language and word meanings in great detail. What is actually done, however, is to expose the machine to large numbers of texts so that it learns the context of words and language grammar rules itself through trial and error. In AI, this process is termed "machine learning".

The process of making a machine capable of learning is carried out through systems of mathematical equations termed "AI models". What the concept of training means is that the machine tries to fit the model's mathematical equations to minimise an error function. For instance, the error in an AI model designed to predict car prices based on vehicle characteristics would be the difference between the actual price and the prediction made by the model.

The main advantage of AI over other alternatives is that once a machine has learned to perform a task, it can be put to work 24 hours a day and used to simplify tasks that would otherwise be tiresome and require human involvement.

Neural networks

AI models based on neural networks are the most successful models at the present time. Their logic is based on how neurons work in the brain.

Biologically speaking, neurons in the brain are structures made up of interconnected cells that use electrical impulses to communicate with each other. A neuron receives impulses from multiple other neurons through its dendrites, interprets them, and transmits another impulse through the axon to other neurons. Neurons have rather complex internal learning mechanisms and all together make up a system that has enabled us to reach quite a high level of advanced intelligence. Trivial abilities like communicating, distinguishing objects that we see, interpreting sounds, taking decisions, etc. all have a very high degree of both sensory and learning complexity.

The notion of an artificial neuron is a much simplified model of a biological neuron. It can be considered a node interconnected to other nodes using input and output connections. The node receives numerical values output by other nodes through each of its input connections. These values are used internally to calculate the result of a simple mathematical equation learned individually by each of the nodes. The result of the equation is then transmitted to other nodes through its output connections.

This simple concept is the basis for creating more complex neural structures by interconnecting large numbers of nodes. The learning ability of artificial neural networks is what enables AI models to learn. These models can be used in a wide range of applications, such as text and image recognition and generation, biometrics, help in medical decision-making, protein folding, etc.

Comparison of AI and physical models

Forecasting in meteorology and hydrology entails making predictions by running numerical simulations using physical equations to try to estimate future changes in certain variables by simulating interactions between the variables over time. One example of this is the Harmonie-Arome weather forecasting model that meteorological services like Spain's National Meteorological Agency (Spanish abbreviation: AEMET) use to make weather forecasts. These models provide large quantities of information for decision-making in a slew of different areas. The drawback attached to these models is that they require large amounts of computing power to be able to make forecasts within a reasonable time frame.

Applying AI to this field enables learning by systems of simpler equations that can be run in just a short time while maintaining reasonable levels of accuracy. This in turn allows forecasts to be updated continuously based on the most recent data, yielding highly detailed short-term forecasts (0-6 hours).

Ease of specialisation is another advantage: if we want to use AI specifically to detect adverse weather phenomena, a specialised model can be trained to learn patterns that give rise to events of that kind, even though this means that the model may be worse at general purpose modelling.

Digitisation – The NOE Tool

Digitisation of municipal disaster planning

Natural risks, floods in particular, require careful planning to minimise damage and coordinate effective responses. Current legislation requires cities and towns to draw up and implement action plans to combat flooding. Nevertheless, the complexity and length of these plans can make it hard to actually put them into practice quickly in the face of an emergency.

Tesicnor's NOE application makes it possible to digitise and speed up implementation of municipal disaster planning. In case of an emergency, the system provides real-time directions concerning the prevention tasks that need to be carried out and their status (not started, in progress, completed). Since it is a dynamic tool, the contact telephone numbers of the people in charge can be quickly and easily updated and new functionalities, such as sending automated SMS alerts and early flood warnings out to the public using AI, can be added.

Figure 1. NOE tool flood management and alert functionality chart.
Source: Prepared by the authors.

Real-time data collection and AI-based early warning

The most novel of NOE's various functionalities is the inclusion of an early warning system for floods that works by collecting meteorological and hydrological data from river stations in real time and implementing an AI model to predict changes in the river in the next 6-12 hours. If the model detects a flood threat, NOE automatically notifies the people in charge in the urban areas concerned and in the worst case Spain's emergency services number, 112. Ultimately, it will be those people who decide whether or not to declare an emergency.

There are plans to enhance and expand this function by adding early warnings for disasters of other kinds and improving existing levels of reliability.

Early flood warning by applied AI

Floods are a type of natural disaster that involves an excessive accumulation of water in typically dry areas. We are referring chiefly to places where human activity is commonplace, e.g., cities, towns, farmland, roads, campgrounds, and so forth. The two main causes of floods are rivers overflowing their banks (fluvial flooding) and localised heavy rainfall (pluvial flooding). Tsunamis, storm surges, and dam failures are other less frequent causes.

Effects of climate change

Climate change acts to increase the frequency and intensity of extreme weather events, such as the intensity of precipitation, rising sea levels, and abrupt changes in temperature that contribute to the accumulation and melting of snow in mountainous areas, leading to sudden surges in river water levels.

Fluvial flooding (predicting river flow volumes)

River floods are a type of flooding that occurs when river water levels rise until they spill over into anthropized areas along a river's course. They can be caused by protracted heavy rainfall that ends up saturating the ground's capacity to absorb the water or by sudden melting of large masses of snow in the mountains. They tend to be frequent in the winter months and can be predicted with relative ease compared to pluvial floods.

Early warnings focus on predicting when a flood is going to occur in an urban area so that the inhabitants can be alerted. Hydrological models like those employed by basin management authorities have traditionally been used, but AI is producing more accurate short-term predictions (0-12 hours, depending on the river) that can be updated in real time.

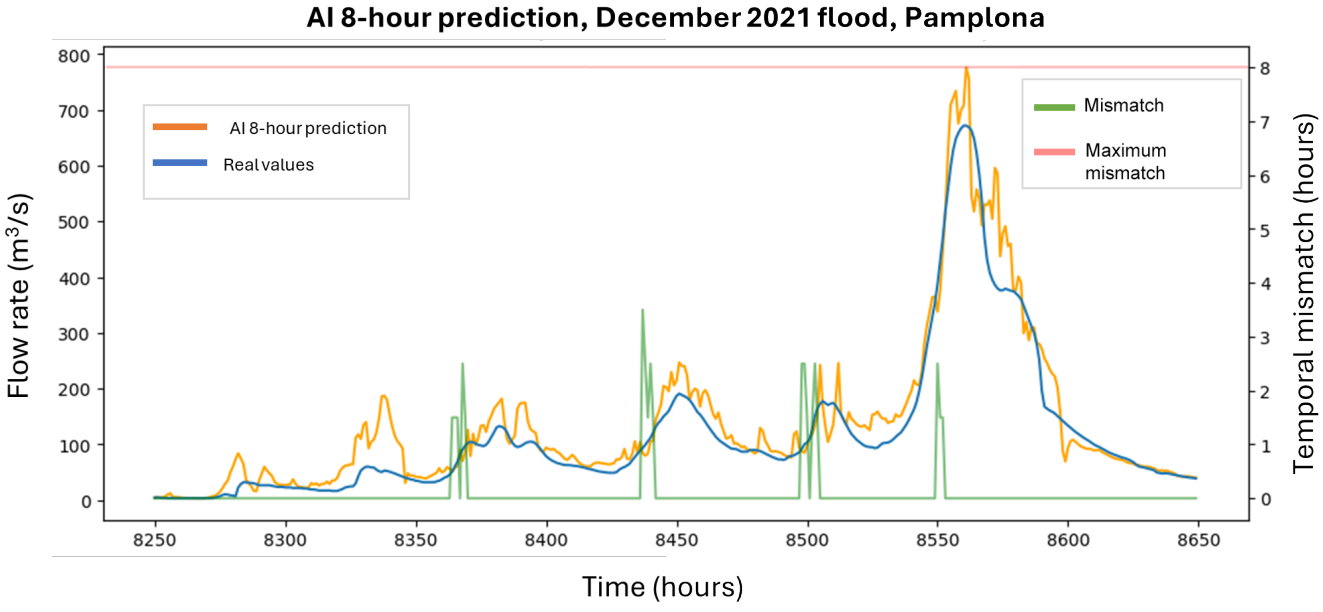

Figure 2. Plot of AI model Arga River flow rate predictions.
Source: Prepared by the authors.

The NOE tool provides AI-based warnings for urban areas at risk of flooding.

Pluvial flooding (radar prediction)

Pluvial floods are another type of flooding caused by very heavy rainfall in a very short time, when the volume of water that falls is so high that it cannot be absorbed, not even by dry ground. This type of rainfall event is frequent in the summertime, and predictability tends to be a complicated affair. The goal of early warnings is to detect the occurrence of heavy rains potentially capable of causing flooding in an urban area.

Thanks to its high computational efficiency, implementing an AI approach can improve short-term predictions (0-6 hours) of heavy storms, enabling forecasts to be made within very short time frames using the most up-to-date data.

Research on several different techniques is under way in order to predict the behaviour of intense rainfall, e.g., seeking to replicate how physical models work by replacing physical equations with other more efficient equations optimised by AI. However, one of the methods that is working the best is using neural networks to predict motion in radar images.

An example of radar forecast using AI, 4 July 2016

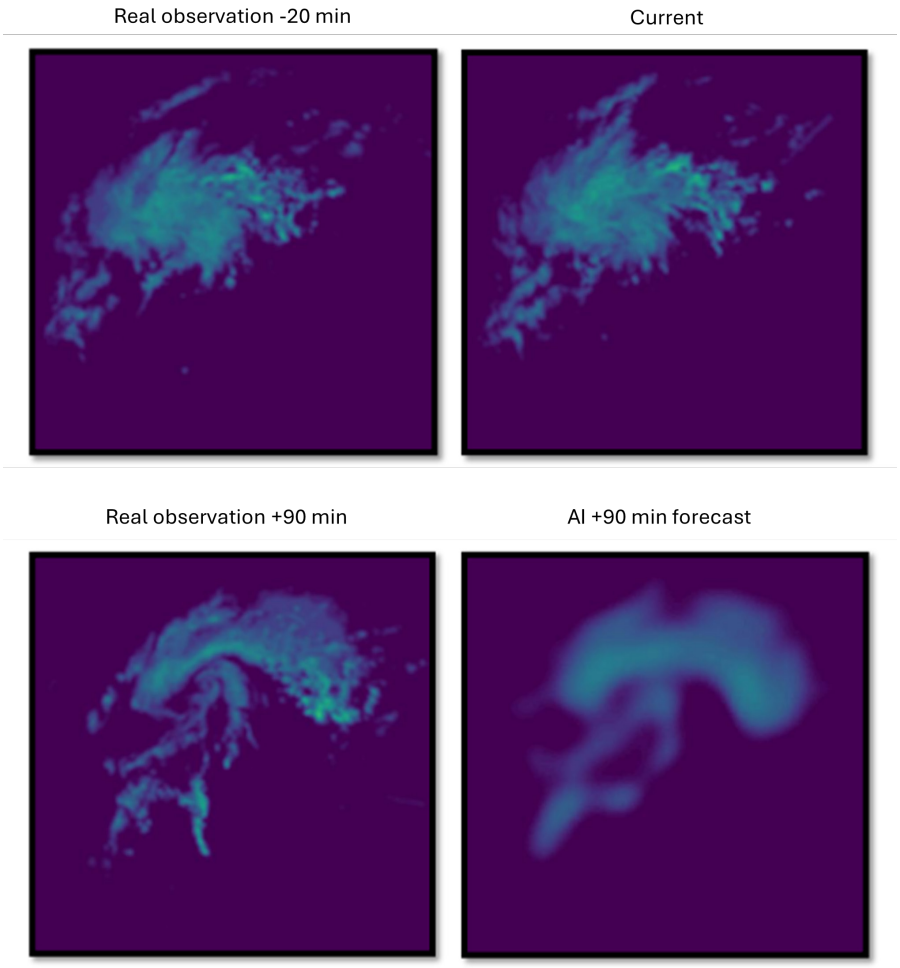

Figure 3. Example of radar image-based nowcasting using an AI model.
Source: Prepared by the authors.

Radar images provide very high spatial and temporal resolution (1 km^2 per pixel every 10 minutes), so they contain quite a high level of detail. However, they also have a drawback, namely, the signal scatters with distance from the radar, which can give rise to false echoes from flocks of birds and other sorts of interference.

To address this problem, AI models can be trained to try to identify false echoes and to act as a filter for the images themselves. To overcome the problem of scattering in areas at a distance from the radar, AEMET uses image interpolation methods to combine readings taken by different radars and in that way to some extent correct for the problem posed by scattering.

The AI model is fed a sequence of past images and uses them to generate another sequence of images and forecast images to follow. Thanks to the research in progress on AI image generation, advances are constantly being made in this field.

Drones

Drones are another emerging technology that can be used in flood damage prevention and assessment. These unmanned aerial vehicles are an alternative means of reconnoitring affected areas without the high costs and risks associated with helicopter flights. Using automated drones allows safer, more economical surveillance and eliminates the need for specialised personnel on the ground. This technology affords a broader, more detailed view of the event that would be hard to obtain from the ground alone.

Figure 4. Maintenance flight over the Cidacos River (Tafalla, Spain).
Source: EMERAL Project.

Using drones during emergencies would be optimal, but there are numerous legal restrictions preventing this from taking place. Hopefully, the legislation will grow more permissive for situations in which drones are being used not for recreation but to help mitigate the impact of natural disasters.

Wildfires

Wildfires are a type of natural disaster in which fire burns out of control over large swathes of woodland, causing damage to the flora and the fauna, and recovery can take decades.

They can originate from natural causes, like lightning strikes, or from human-made causes, like negligence or being set intentionally. Most are caused by human activities, so making predictions is particularly problematical compared with other causes, such as lightning strikes. Although lightning strikes are a less common cause, it is important not to overlook them, because they are capable of starting fires in hard-to-reach, uninhabited areas, where the fires can be hard to put out.

When trying to prevent these events, it needs to be borne in mind that the place where a fire is going to break out is not foreseeable in advance, making early warnings more complicated than for floods. The approach taken is to help prioritise fire surveillance in locations that are particularly vulnerable on account of weather and land conditions and to create firebreaks or other land features to help prevent potential fires from spreading.

Effects of climate change and rural depopulation

The effects of climate change increase the frequency and intensity of droughts, making the land drier and more likely to catch fire.

The depopulation of rural areas is another of the main causes of heightened risk of fire. With fewer people working the land, important maintenance tasks like clearing away overgrowth that can feed wildfires and creating firebreaks to keep fires from spreading are neglected.

Three different approaches are used when applying artificial intelligence to reduce the risk of wildfires:

1. Predicting areas at risk.
2. Using computer vision to detect fires that have just broken out.
3. Predicting how a fire that has already started will spread.

The first approach involves using extremely high resolution to estimate the level of fire risk in a geographic area in real time on the basis of weather and terrain conditions. This makes it possible to prioritise fire watching and to take preventive measures in especially vulnerable locations. In these cases AI uses historical data on past events as a basis for learning. These data can also include data on proximity to inhabited areas and the degree of forest use, since human activities tend to be the cause of most wildfires.

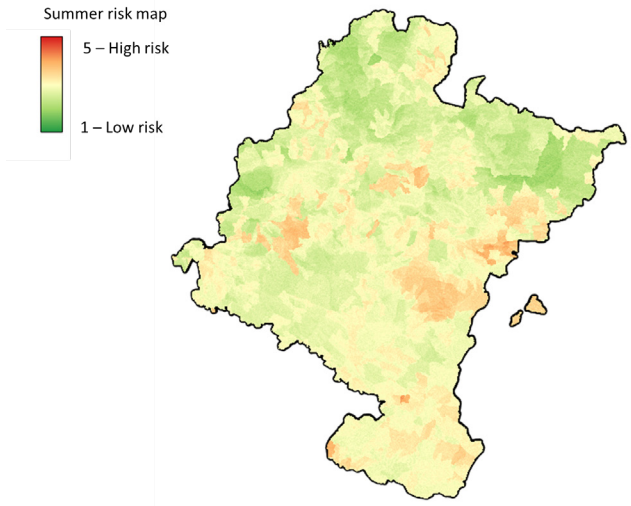

Figure 5. Example of a map of Navarre showing the risk of wildfires in summer.
Source: Fire-Alert Project.

The second approach involves dynamically monitoring the condition of the countryside to detect fires that break out as soon as possible. One widely used method entails installing camera systems at elevation to monitor the countryside and using automated computer vision systems to detect smoke clouds that could come from fires that have recently started. Thus, surveillance is kept up 24 hours a day, improving the response by emergency services and reducing the chance that a fire will burn out of control. This method is now being used in California, in the United States of America, to good effect, although responding to fires can encounter serious difficulties because of densely overgrown vegetation.

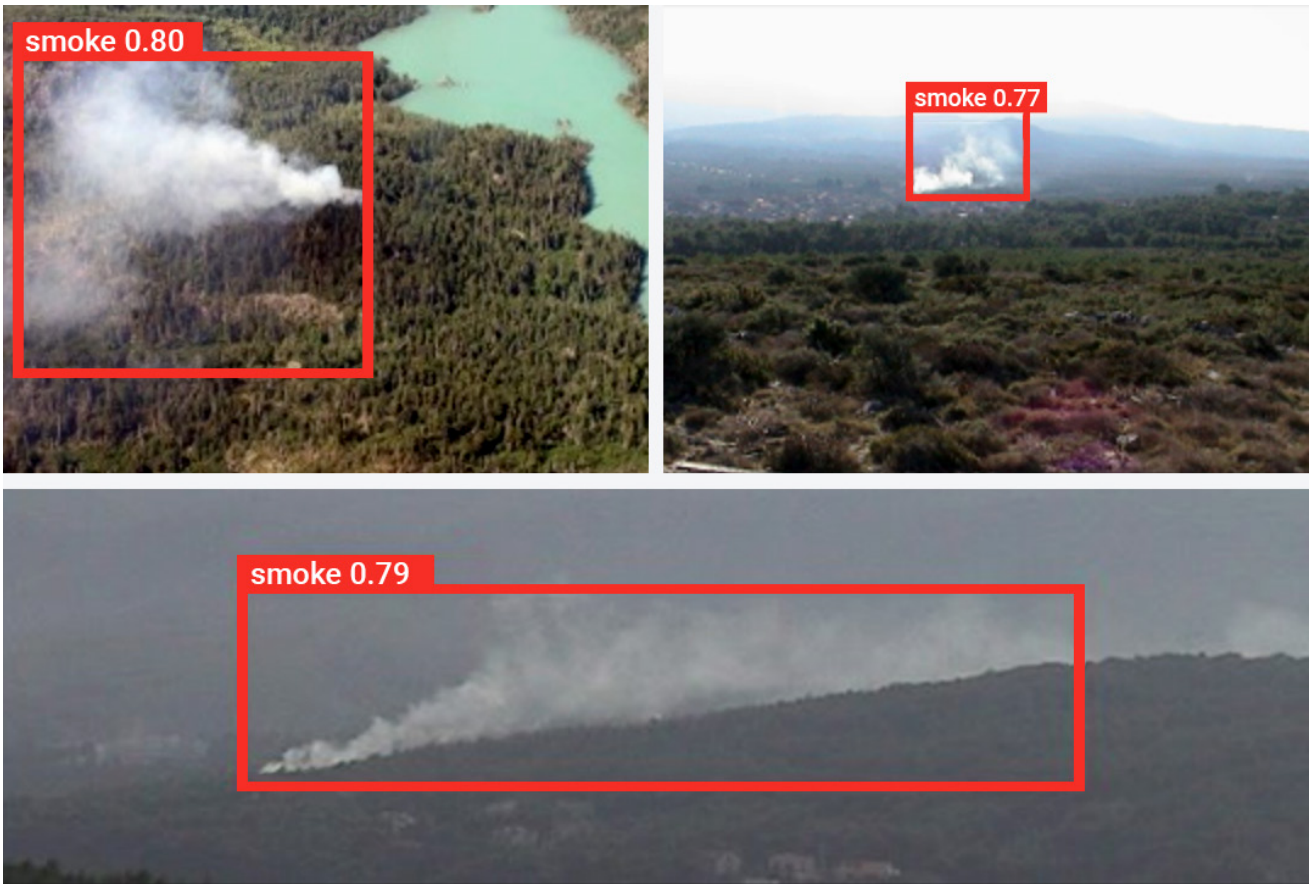

Figure 6. Smoke recognition by computer vision.
Source: results of smoke detection by a proprietary Tesicnor model from images in a dataset compiled by the Center For Wildfire Research, University of Split, Croatia

The third approach involves developing tools to help put out fires. The most widely used method is to employ simulators to estimate where the fire is likely to spread to assist in taking strategic fire-fighting decisions. Some researchers are studying the use of AI-controlled drones in operational fire-fighting to reconnoitre affected areas and even using drones equipped with water hoses to help extinguish fires from above. The main benefits of these drones are that they can get up close to the fire without putting anyone's life at risk while being much less expensive than operating a helicopter.

Conclusions

The field of disaster risk reduction is becoming more and more important to society because of the increased likelihood of adverse weather events as a result of climate change and the depopulation of rural areas.

AI technology development, research, and applications are experiencing exponential growth in industry, enabling many processes to be automated and at the same time tackling problems that could not be dealt with otherwise. Its implementation in disaster risk reduction is improving the precision and scope of systems for giving the public early warnings, enhancing surveillance in areas at risk, and helping in digitising emergency procedures.

The development of AI in this field holds out great promise. In the future the techniques discussed in this article will be refined, and new approaches with solutions for as yet unsolved problems will emerge.

Leverage This Moment to Integrate Artificial Intelligence into Your Business

Pablo Yusta
CEO
AI Consortium

Introduction

In a context where Artificial Intelligence (AI) no longer needs evangelists and even the Government of Spain has decided to invest massively in this technology, there arises both an opportunity and a simultaneous challenge for businesses and public administrations in the country. The opportunity lies in the potential to exponentially improve productivity, while the challenge focuses on how to adopt this technology effectively before the competition capitalizes on its potential.

Foundational AI models, such as GPT, Gemini, and ALIA, are prominent examples of what can be achieved with substantial investments and intensive training. These models have been trained on vast datasets to develop advanced capabilities in analysis and natural language processing, positioning them at the forefront of AI technology. However, transitioning these capabilities from theoretical models to practical applications is not trivial, and integrating these models into the daily operations of companies and governmental entities faces significant obstacles.

As Peter Drucker aptly pointed out, "There is nothing so useless as doing efficiently that which should not be done at all." Limiting the unlimited potential of AI to the confines of traditional business software is a task doomed to failure, as these platforms were not conceived to fully leverage the capabilities of this revolutionary technology.

The main issue is not the capability of these models but the accessibility and utility of these systems in real business or administrative environments. The standard chat interface, similar to what ChatGPT uses, although useful in general consumer contexts, fails to unlock the full potential of these models for specific business or governmental applications. Organizations need solutions that integrate seamlessly into their existing systems and are capable of adapting to the specific needs of each department or service.

Imprisoning AI in our business software is not the solution

We have all experienced the challenge of implementing an ERP (enterprise resource planning) or other business software in our organizations. We know it is a tedious process, and no matter how hard we try, in the end, many of our business processes have to adapt to the software rather than the software adapting to us.

One of the proposed solutions to transfer the potential of foundational AI models to specific business processes has been through these business software systems, by installing AI "copilots" that "assist" us in interacting with them. While this approach has some logic, since AI models are technologies with outstanding capabilities and business software are solutions designed to help employees work faster and with fewer errors, it suffers from a serious flaw: the capabilities of AI far exceed what can be achieved by confining it within a rigid system like business software.

As Peter Drucker aptly pointed out, "There is nothing so useless as doing efficiently that which should not be done at all." Limiting the unlimited potential of AI to the confines of traditional business software is a task doomed to failure, as these platforms were not conceived to fully leverage the capabilities of this revolutionary technology.

Figure 1. Smart robot with outstanding capabilities tasked with organizing an overflowing file, illustrating the futility of efficiently performing unnecessary tasks.
Source: image generated with Dall-E 3.

Unleash AI in your company

Think of AI as your personal oracle or an all-knowing advisor, expert even in the most obscure processes of your business. Your initial encounters with this technology may not have been entirely satisfactory, and you might not fully trust it yet. However, AI has the gift of learning quickly, very quickly. It learns exponentially. Therefore, I suggest you give it a chance.

If you could see AI as an oracle, wouldn't you use it to thoroughly understand every corner of your business? To evaluate the efficiency levels of processes? Wouldn't you be interested in improving decision-making with its help?

Foundational AI models know very little about your specific company. They are trained with some publicly available information from the internet, but nothing more. With that limited "dataset", AI will not be able to unlock its potential within your organization. It might make some generic tasks more efficient or integrate with your business software, but certainly, it will not be able to unleash its true transformative power.

For this reason, it is necessary to train the foundational model with relevant data from your company. It is important that this "training" be carried out by an expert you trust, as there are multiple techniques and the outcome can vary drastically. If you have tried to train an AI model with your data before and the results were unsatisfactory, it is highly likely that the training was not done properly.

Once you have a foundational model trained and connected with your data, you will be able to "converse" with your company. How is the marketing campaign for product X going? What is the absenteeism rate? Could you project the business figures until the end of the year? The possibilities are endless.

As a final piece of advice, I recommend having a long-term vision and patience. AI will surprise you, but needs time to learn. It is and will be important to invest in it.

Democratize access to AI in your organization

Share the power of AI with your employees. It is the most advisable way to leverage the potential increase in performance. Having multiple human minds using AI daily will bring continuous positive synergies to your company.

The key question is: how do I do it? Some might say it should be done through training courses or similar. But in my opinion, the best way to learn how to use AI is... by using it! For this reason, I suggest you provide your employees with direct access to that AI model customized for your company.

But, will they know how to use it? Will they know what questions to ask? Will they know how to get the most out of it? Certainly, if we do not guide them, it will be difficult. The optimal way for your employees to take advantage of AI is to customize the use cases to their specific roles and job positions. For example: a worker in the marketing department will have Generative AI tools related to copywriting, advertising, social media content, etc.; a worker in the compliance department will have tools to draft contracts, interpret laws, validate operations, etc.; a worker in human resources will have tools to draft job offers, review resumes, organize team-building activities, etc.

It is very important to commit to the employees that their generative AI tools are fully customized to their specific use cases. Generative AI has exceptional and outstanding capabilities. Therefore, it makes no sense not to take full advantage of them and opt not to customize AI to the highest level of detail. In this way, even two workers within the same department will have their AI tools customized according to their unique needs.

And the million-dollar question: is this very costly? The answer is no. If the AI platform is well-designed, creating a customized tool should be accessible for anyone, even those without programming knowledge. In less than 5 minutes, a new AI tool should be ready to be used by employees.

Data... beware of your data!

The data of your company should always remain under your strict control. It is a common practice for foundational AI models to "learn" from the data shared with them to become increasingly intelligent. In fact, if we read the fine print of the free versions of ChatGPT and similar tools, we will find the message that your data will be used to train the model.

When you go to implement any solution that involves an AI model, whatever it may be, ask to be explained and guaranteed what will happen with your company's data. It is essential that the data does not go outside without your supervision and consent.

It is also crucial to have control of the data within the company. For example, if you have trained an AI model with your company's salary database, employees in the human resources department should be able to interact with this information, but the rest of the workers should not.

Ensuring all this is controlled is not technically complex, but it requires establishing very clear guidelines from business management to your AI solutions provider.

Key points summary

The generic foundational AI models currently available are not the optimal solution for your business. While technically impressive, their value will be limited by not being customized to your specific organization.

Confining AI within your current business software is a mistake that restricts its true potential. These traditional systems were not designed to fully leverage AI capabilities, and keeping AI captive within them would be like trying to fit a giant into a box that is too small.

Instead, invest in training a customized foundational AI model with your organization's relevant data. This involves a careful process of selecting and preparing the most valuable data sets, then feeding this vital information to the AI. In this way, the model will learn to deeply understand the complexities and specifics of your business.

However, as you open the doors of your company to AI, it is crucial to protect and strictly control the access and use of your corporate data. Data is the most valuable asset of any organization and must be treated with the utmost care and respect for privacy and security. Establishing strong policies and controls is essential to ensure that information is not leaked, shared inappropriately, or used without your explicit consent.

Finally, it is crucial to have patience and a long-term vision. The effective integration of Generative AI into your business is not an instant process, but a journey that requires time, perseverance, and sustained focus. However, as you progress on this path, you will benefit from two powerful converging trends. The first is that, as the AI learns and draws from more of your organization's data, the understanding of your company and its processes will become increasingly deep and precise. The second trend is that the foundational AI models themselves will continue to evolve and enhance their capabilities exponentially.

There will come a point where complex instructions like "calculate and send the Model of the Corporate Tax to the Tax Authority" will become routine and simple tasks for your customized AI system. That will be the moment when traditional business software becomes obsolete, ushering in a new era where Generative AI, fueled by your data and tailored to your specific processes, becomes the engine driving efficiency and innovation in your organization.

Figure 2. Business person analyzing and making decisions in their company with the invaluable assistance of an AI acting as their assistant.
Source: image generated with Dall-E 3.

And how much should I pay

The budget dedicated to integrating generative AI will depend on many factors specific to your business, to which I do not have full access and would not dare to answer generically. The more advanced your technological requirements are, the higher the associated cost will be. However, some indicative ranges can be provided.

The cost of training an AI model with your company's data and deploying a platform for both management and employees to use it appropriately would range from €10,000 for smaller companies to over €100,000 for larger and more complex organizations.

It is important to highlight that the Government of Spain, through European Funds, is investing in various programs to facilitate the integration of AI into operations for small and medium-sized enterprises (SMEs). Here is an indicative list of the aid they can access:

- Companies with 10 to 50 employees: up to €24,000 in aid.
- Companies with 50 to 100 employees: up to €43,000 in aid.
- Companies with 100 to 250 employees: up to €53,000 in aid.

These aids are very interesting, as, in most cases, they allow SMEs to take their first steps in integrating AI either for free or at a very reduced cost, greatly facilitating the process.

While these aids are a valuable opportunity, it is crucial that all companies, regardless of size, allocate a portion of their budget to adapting AI. In the near future, all companies will be AI companies.

Conclusion

The emergence of foundational AI models, like GPT, Gemini, or Claude, has marked an unprecedented revolution in the world of technology. We are faced with a tool of outstanding capabilities and constant evolution, whose potential we still do not fully understand.

However, there is a substantial gap between the possibilities these models offer and the actual ability of organizations and their employees to fully leverage them. To bridge this gap, the most effective solution consists of two fundamental steps:

1. Train a foundational model with your company's relevant data so that its responses and capabilities are tailored to the specific realities of your business.

2. Provide your organization's staff with a simple and effective platform to interact with this customized model, by creating tools with specific use cases that they can utilize in their daily work.

Other attempted solutions, such as chat interfaces with generic AI models or the integration of AI copilots into existing ERP systems, have proven to be insufficient and limited. The method described above is not only superior at present but will also be in the future. As the model becomes more familiar with your company and as AI itself continues to enhance its capabilities, there will come a time when this AI deployed in your organization will be able to autonomously perform any type of complex task.

Third-Party Liability Motor Vehicle Insurance Does Not Cover the Insured Driver against the Death of Family Members Caused by the Driver's Own Action

Judgment by the First Chamber of the Spanish Supreme Court of 2 April 2024

José Antonio Badillo Arias
Adviser
Dirección General de Seguros y Fondos de Pensiones (General Directorate of Insurance and Pension Funds)

1. Introduction

Civil liability always entails harm to another. This is specified in section 1902 of the Spanish Civil Code: "whoever causes harm to another...". Therefore, no civil liability arises when someone causes harm to oneself.

Civil liability and insurance are two different concepts that need to be considered separately, even though they both come together in third-party liability insurance. The first issue that needs to be assessed is whether the insured party bears civil liability. If so, the insurance coverage then needs to be assessed. Thus, where not all requirements are satisfied and no civil liability arises, third-party liability insurance will not come into play, because as senior judge Fernández Entralgo put it, if there is no rain (civil liability), there is no call to open the umbrella (third-party liability insurance) to stay dry.

When discussing civil liability, it is common to speak of action and omission, harm, causation, unlawfulness, and fault. However, no special emphasis tends to be placed on the requirement of otherness, of injury to another, most likely because it is taken for granted. Civil liability always entails harm to another. This is specified in section 1902 of the Spanish Civil Code: "whoever causes harm to another...". Therefore, no civil liability arises when someone causes harm to oneself .

The principle of *alterum non laedere* [no injury to another] has come down to us from Roman law. It is enshrined in section 1902 of the Spanish Civil Code (CC) and is inseparable from otherness, or harm to another. The existence of harm to another is an essential requirement for civil liability to arise. Consequently, in the case of harm caused to oneself, e.g., by suicide or when the injured party causes the harm, no civil liability comes into being, because the requirement of injury to another is absent.

This brings to mind the legal rule by Pomponius in the Digest: *Quod quis ex culpa sua damnum sentit, non intelligitur damnum sentire*, that is, who suffers harm by their own fault has no right to complain, although under our positive law this could be settled pursuant to section 1 (1) of the Spanish *Ley de responsabilidad civil en la circulación de vehículos a motor* (LRCSCVM) [Motor Vehicle Civil Liability Insurance Act] or the above-mentioned section 1902 of the CC.

Naturally, in the case of third-party liability insurance, the insurance company must share the fate of the insured. This means that if the insured bears no civil liability, the insurance will not have effect, even if the injured party is entitled to act directly against the insurer pursuant to section 76 of the Spanish *Ley de contrato de seguro* [Insurance Contract Act]. Therefore, in these cases, before examining whether or not insurance coverage exists, as sometimes tends to be the case, what needs to be examined is whether the insured bears civil liability. Thus, we need to consider all the elements of civil liability having in mind the insured's actions, one of those elements being the requirement of otherness, of injury to another. When that has been examined, if civil liability is deemed to exist, it is then appropriate to examine whether or not the insurance provides coverage.

It is not uncommon to encounter traffic accidents where the driver of a vehicle fails to activate one of the safety devices (engaging the hand brake or leaving the car in gear) and is run over by their own car, or, as in the case that concerns us here, one of the passengers riding in the car is killed as a result of distraction by the driver, who is the spouse or mother, giving rise to the circumstance in which the driver is both the cause of the accident and a party injured by its effects.

It is obvious that the vehicle's compulsory third-party liability insurance (compulsory motor vehicle insurance, SOA, for its Spanish initials) does not apply, because the insured bears no civil liability in that the requirement of otherness, of injury to another, is not fulfilled. What sometimes happens is that insurance coverage is assessed without considering whether or not civil liability has arisen. For example, the passengers riding in the car, who have been killed, are held to have been covered by the compulsory motor vehicle insurance, which is correct, and the driver, the parent or spouse of the deceased passengers, to be an injured party, which is also correct. However, in these cases, it is overlooked that before ascertaining the insurance coverage, what needs to be determined is whether civil liability on the part of the insured actually arises, because if not, there is no point in talking about the insurance.

By contrast, these cases in which the requirement of injury to a third party is not satisfied could be covered by personal accident insurance. It should be noted that this type of insurance is an accident policy and consequently that coverage is not subject to civil liability by the insured except in cases of wilful misconduct, which are excluded under the Spanish *Ley de contrato de seguro* (section 19) and the policy itself. The legal status of accident insurance is not the same as that of third-party liability insurance, compulsory motor vehicle insurance being one of the latter, and coverage does not depend on civil liability by the insured.

2. Distinction between victim and injured party

To look into these issues in somewhat more depth, a distinction must be drawn between the victim and the injured party, because though these two concepts are in most cases overlapping, this is not true when an accident victim dies. In these cases, the victim is not the same as the injured party. In the case considered in this judgment, the Provincial Court of Appeals held the party aggrieved by the death of her spouse to be the victim of the accident.

The victim is the person who directly suffers the harmful consequences of the accident by being involved in it, which can be consistent with being involved in causing it. When that party survives after being hurt, it will also be a party injured by the events that have taken place. In that case victim and injured party are one and the same.

However, when the victim in an accident dies, the parties injured by that death who suffer non-material harm and possibly material harm as well are persons who are not the victim, and because of their family ties or life partner relationship with the victim, they are considered injured by the victim's death and as such entitled to compensation. In that case the victim and the injured party are not the same, and therefore for purposes of grounds for being cleared of fault, it would not be proper to speak of "sole fault of the injured party" as section 1(1) of the Spanish LRCSCVM

does when that party has not played any role in commission of the accident. It would therefore be necessary to speak of "sole fault of the victim" rather than fault of the injured party as grounds for clearing the car driver from fault.

It may happen, as in the judgment under discussion, that the victim is killed through the fault of the injured party. In that case the injured party's fault would prevent them from being compensated, because they caused the harm to oneself.

In any event, what should be understood is that the party injured by the death of another person is injured *ex jure propio*. This means it is a person's own right recognised by law that arises after the death of the victim of the accident and is not part of the decedent's estate. Therefore, in these cases the deceased family member or relative is the victim, and the injured party suffers non-material harm or possibly material harm as a result of the victim's death.

3. The events in the judgment

The events that gave rise to this judgment are summarised below. On 23 July 2012 Estefanía was driving her car in Aguilar de Campoo and crashed into the columns of a building. As a consequence of that crash, her husband, who was riding with her, suffered traumatic injuries that caused his death barely three months later.

Estefanía was responsible for the accident, and that fact was not disputed. The car in question was covered by compulsory motor vehicle insurance that covered the driver's liability vis-à-vis third parties.

The aspect of interest to us here is that the driver of the car put in a claim, as the injured party, for the corresponding indemnity for the death of her spouse.

4. The lower courts' rulings

Both the trial court and the Provincial Court of Appeals of Palencia ruled that the wife, who had caused the accident, was to be compensated for the death of her spouse, who was a passenger riding in the car.

The judgment of the Provincial Court of Appeals "finds that the wife-driver of the decedent does not lose her status as victim". Thus, the Court found that "the exclusion of the driver at fault is only in respect of 'bodily injury' (section 5 of the Spanish LRCSCVM). This means that the driver at fault does not cease to have the status of victim in respect of the non-material harm suffered due to the loss of a family member as a result of the accident, even though she was responsible for the accident. This was the finding of the Provincial Court of Appeals of Castellón dated 18 March 2013 in the case of the death of a child whose father was the driver at fault".

We can see that there is some confusion between the victim and the injured party. In particular, as already noted in the introduction, the Court made reference to the insurance (section 5 of the LRCSCVM), not to the existence of civil liability, even though in its appeal the insurer had argued that the requirement of harm to another had not been fulfilled: The appellant had argued that "the injured party caused the harm to herself". To add to the confusion, the judgment stated that "fault for the accident is one thing, and the circumstances for assigning fault to be taken into account when setting guidelines for assessing the harm are another...". This separates the assessment of harm from the assignment of civil liability, implying, as was stated in the operative part of the judgment, that harm can be assessed and compensated without demonstrating civil liability on the part of the party responsible.

5. The Supreme Court's reasoning

As it had done in its judgment of 2 March 2020 in a similar case, the Supreme Court has settled the issue and in a manner of speaking has set things straight.

As it had done previously, the insurer that filed the appeal based its arguments on breach of section 1(1) of the Spanish LRCSCVM on grounds that the requirement of injury to another had not been fulfilled and on breach of section 5(1) of that same Act, which provides that "Compulsory motor vehicle insurance does not cover harm or losses from injury or death of the driver of the vehicle that has caused the accident".

5.1 Interpretation of section 5(1) of the Spanish LRCSCVM

The Supreme Court accepted the insurer's appeal and ruled in its favour in respect of section 5(1) of the Spanish LRCSCVM. It made reference to its judgment of 2 March 2020 and held that the reason for the new wording of the provision in question was to settle the issue of whether the relatives of a driver who had died in a traffic accident for which the driver was known to be solely and exclusively at fault were entitled to compensation for non-material and material harm resulting from the driver's death to be paid by the insurer that had underwritten the driver's compulsory motor vehicle insurance policy.

The judgment ruled that section 5(1) of the Spanish LRCSCVM was to be construed to mean that the coverage exclusion also referred to indirect or ricochet harm or loss ensuing from bodily injury to the driver of the insured vehicle that was solely and exclusively responsible for causing the accident. Accordingly, the rewording of that provision in the Spanish Act 21/2007, of 11 July has cleared away the uncertainty that had existed before. That is, allowing entitlement to compensation for the death of relatives of the deceased driver solely at fault for an accident was the same as making a form of insurance designed and prescribed to be a third-party liability insurance equivalent to personal accident insurance without any legal basis for doing so. Reasons that might make it advisable to protect the victims of traffic accidents that are grounded in social considerations are to be taken into account only in legislation, and provisions of law are not to be interpreted in a manner contrary to the inferences drawn from a logical and systematic review.

5.2 Requirement of otherness, of injury to another

The other issue considered in the matter dealt with in the judgment concerned determining whether the claimant, as the cause of the unfortunate accident in which her spouse was killed, can be considered to be entitled to compensation for harm suffered as a result of that traffic accident.

The Supreme Court held that third-party liability insurance covered harm for which the insured was liable but that the harm that she herself suffered was not covered by that type of insurance, not even, the Court added, non-material harm from the loss of family members. This was a direct result of the intrinsic nature of third-party liability insurance itself. The finding made in the judgment of 3 November 2008 should also be noted in this respect: "Compulsory insurance covers third-party liability that may be incurred by motor vehicle drivers for harm caused to people or property in road traffic, within the established limits (sections 1 and 2 of the Spanish *Ley sobre Responsabilidad Civil y Seguro en la Circulación de Vehículos a Motor* [Act relating to Insurance against Civil Liability in respect of the Use of Motor Vehicles]".

The judgment drew on the decision of 7 September 2017 by the Court of Justice of the European Union (CJEU), Sixth Chamber, Case C-506/2016, referring to the European Court for a preliminary ruling a question similar to the issue settled by the Supreme Court under discussion here in which the spouse of the driver responsible was a passenger in the vehicle and had been killed.

The CJEU held that the Community Directives on third-party liability insurance in respect of the use of motor vehicles did not preclude national law from excluding the right of the driver of a motor vehicle who is responsible, by their own fault, for a traffic accident as a result of which their spouse, a passenger in that vehicle, has died to receive compensation for the material harm which they have suffered as a result of that death.

Conclusion

Even though the judgment ruled that the driver of the vehicle was excluded from coverage under section 5(1) of the Spanish LRCSCVM, it does not appear to me that the case at hand concerns an insurance interpretation issue but rather an issue of what should be understood as civil liability and whether the requisite elements for that liability have been satisfied pursuant to section 1902 of the Spanish CC and section 1(1) of the Spanish LRCSCVM. The reason is that, as mentioned above, what needs to be determined first is whether or not the requirements proving the existence of civil liability have been met, not the coverage of the insurance. If a person causes harm to oneself, that is, or she is both the party at fault and the injured party, no civil liability arises; and in the absence of liability all the rest, namely, the coverage by the insurer, is moot.

Book review: *The Road to Conscious Machines. The Story of AI*

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Pelican Books. Penguin Random House

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It is not uncommon for the media, cinema, and social media to spread ideas like:

1. Artificial intelligence (AI) will take away all our jobs in the near future. It will do anything we can do better than we can and will not have to be paid a salary.

2. Governments and certain powers that be will be able to manipulate the people easily through fake news made from AI-generated images and audio.

3. Superintelligent machines capable of rapid self-improvement will soon be here. They will evolve on their own and escape from our control.

Ideas like these are repeated so often that many people have ended up taking them as true, even though there is no actual technical basis for them.

Other times, instead of predicting terrible catastrophes, there is an overblown confidence in the capabilities of AI. For instance, as it applies to the insurance sector:

AI seeks to build machines that can "mimic" human behaviour so closely that they will ultimately be indistinguishable from ourselves. Machines that have the same range of abilities human intelligence has, known as **artificial general intelligence**, i.e., autonomous, self-aware intelligence capable of planning, reasoning, conversing, understanding jokes, telling stories, and so forth. This has not yet been achieved.

"Implementing AI tools will revolutionise the insurance industry. They will very shortly enhance the customer experience, sales efficiency, and claims processing. Insurance companies will undergo unprecedented growth."

Michael Wooldridge, the author, describes himself as *belonging to the first generation of humans that fooled around with computers as a teenager* and thinks that AI is neither as powerful or as advanced as one might be led to believe.

He has written this book to try to set the record straight and give a more realistic account of what AI is and is not, the technical successes that have been built up since its inception in the 1950s, and where things stand today.

Without shying away from the technical details but in a highly readable manner with lots of examples that are easy to understand, he sets out the basic concepts of AI and explains how it has grown into the powerful field we know today.

We know that computers excel at performing specific tasks, which they can do error-free at breakneck speed. A desktop computer can do in one second what it would take one person, working non-stop without slip-ups, 3,700 days to do.

Within the next ten years we will see completely autonomous cars, high-quality simultaneous interpreters, and software capable of detecting minute differences in the pixels on radiological scans and discerning tumours much better than any doctor can. There will even be mobile phone apps that can detect symptoms of dementia from how the user operates them.

All of this will improve our lives immensely. But that is not AI's final goal.

AI seeks to build machines that can "mimic" human behaviour so closely that they will ultimately be indistinguishable from ourselves. Machines that have the same range of abilities human intelligence has, known as **artificial general intelligence**, i.e., autonomous, self-aware intelligence capable of planning, reasoning, conversing, understanding jokes, telling stories, and so forth. This has not yet been achieved.

Scientists have gone down many a blind alley before realising that they need to retrace their steps and start over again down another path. They don't yet know if artificial general intelligence is feasible, and there is also no consensus as to whether it is even desirable.

The first part of the book tells the story.

As you might have guessed, it all started with Alan Turing and the "decision problem", the *Entscheidungsproblem* in German, the first step toward developing AI when it did not yet even have a name and there was no scientific community working on it.

Decision problems are mathematical problems with a yes or no answer, for instance: is 2+2=4? A decision problem is decidable if it can be answered following some finite steps (a rulebook); that is, a computer could solve it within a finite time. The question is, are all decision problems decidable or are some unsolvable by finite steps? That is, would a computer, no matter how fast it executed instructions, take an infinite amount of time to solve it? To answer that question, Alan Turing built the "Turing machine".

In this early period, between 1956 and 1974, known as the Golden Years, everything seemed possible. It was a time of unbridled optimism. The systems developed were given extravagant names. Scientists had to work at night because during normal working hours computers were used for more productive tasks. The idea was to build robots that could engage in something similar to a conversation or perform practical tasks like arranging a storeroom. But by the mid-1970s, after twenty years of research, only very basic progress had been made, and a portion of the scientific community began to think AI was a pseudoscience.

AI then fell into a dark, stagnant period until research changed course and began to develop the first **expert systems**. Building an expert system involved giving a computer the knowledge needed to perform specific tasks, knowledge that people who are experts in those tasks gain only after extensive training, and the computer could do them much better than a human. For the first time there seemed to be a glimmer that AI would be able to be economically profitable.

So at the end of the 1970s a new period of enthusiasm emerged. But by the end of the 1980s no notable advances had been made. It turned out that it was not so easy to transfer human experience into coded instructions that a computer could execute. Scientists working on AI were again accused of selling smoke and mirrors, promising much and of not achieving any concrete results.

The direction of AI research shifted once again and would keep scientists busy for the next 10 years from 1985 to 1995. It was concluded that progress could be made only if systems gained information directly from the actual environment in which they were located. The idea was to set the behaviour the system should manifest in a given situation, organised into hierarchical levels, with one or another taking precedence – **behavioural AI**. The next step was to develop **agents**, self-contained AI systems that were autonomous and capable of holistically performing the tasks assigned by users.

In the meantime, since AI's inception, research had been moving forward down another revolutionary path: building machines that could learn.

The goal of building computers capable of learning is to design programs that achieve results starting from some input data, even though the software does not explicitly include a "rulebook" showing how to get there.

For that, the software has to be "trained". There are two types of training. The first is **supervised training**, achieved by feeding the machine a wide-ranging array of possible situations. This raises one of the ethical problems facing AI: if the dataset input for training is biased, the decisions taken by the computer will replicate that bias, giving rise to unfair outcomes.

For instance, a bank uses software to identify each customer's risk when granting bank loans. Software of this type is ordinarily trained using a set of records on previous customers labelled according to a risk classification of high or low. However, if the volume of data used for each customer is too large, training takes too long. So, what data can be omitted if we do not know which items are relevant for determining risk? For example, if the sole data item input for training is the customer's address, this could cause the software to discriminate against people living in certain neighbourhoods and prevent potentially good customers from obtaining loans.

The second type of training is **reinforcement learning**. The software is not fed explicit data but is allowed to take random decisions and is given negative or positive feedback according to whether the decisions are good or bad. The software takes that feedback into account when making its next decision.

One of the current challenges is to avoid bias within algorithms, because we do not know what path the algorithm takes to reach the decisions it makes.

So for the machine to take decisions, it only has to be told what it should do, and the machine itself will modify its behaviour, it will learn.

Then the question is, how does a program learn? The method of learning – deep learning – consists of giving the computer a **neural network** architecture capable of being trained. That structure is based on the nervous systems of animals in which nerve impulses are transmitted from one neuron to the next, which are triggered or not triggered by neurotransmitters released at the synapse. In the computer those chemical neurotransmitters are replaced by two numeric values, the **weight and the firing threshold**. The next neuron in the network fires or does not fire depending on the combination of those values.

The end of the book reviews AI's present and future.

It considers two achievements attained by AI that are already a reality, self-driving cars and AI applications in health monitoring.

Two chapters ironically headed *What we think might go wrong and Things that really could go wrong* poke fun at our fear of "the new" and what we are sure about without any reason to be and pick apart the risks AI actually poses that we would do well to bear in mind. There are thoughts on the future of work and human rights that go beyond the old cliché of disgruntled workers managed by an algorithm. The author puts forward interesting speculations on the changes AI will bring about in the work-driven society we know today. He also considers the problem of fake news and the moral dilemma of autonomous weapons systems guided by AI that makes its own decisions.

To conclude, the author amuses himself by fantasising about what a machine that we really could not tell apart from a human being would be like. What is consciousness? If a machine really was self-aware, would we even know it?

And what if artificial general intelligence just isn't possible?

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