LIMINAL
martech & business experts



THE ESSENTIAL GUIDE TO

# ARTIFICIAL INTELLIGENCE IN BUSINESS

# INDEX

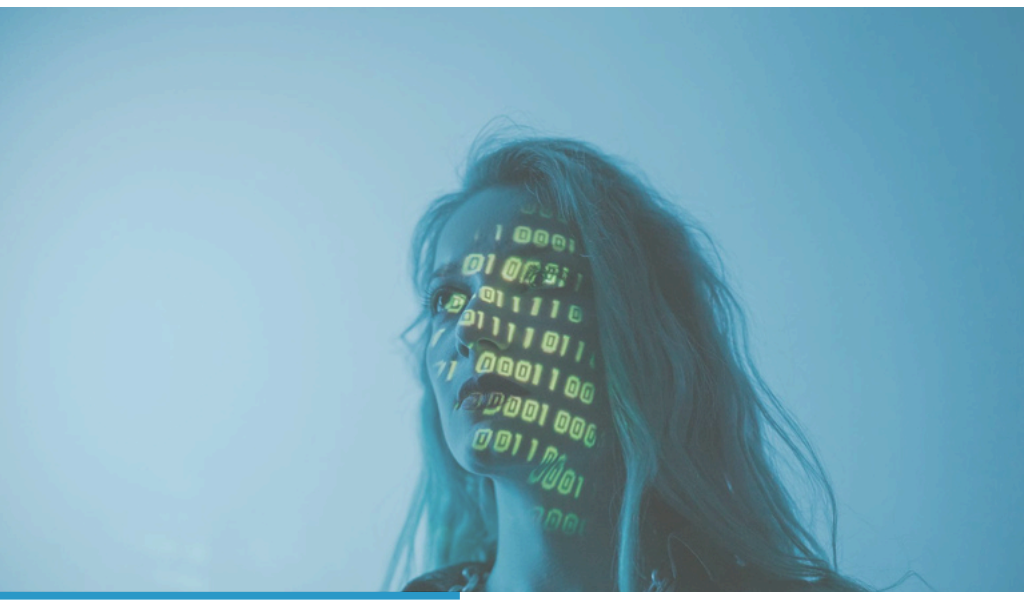

| | |
|---|---|
| INTRODUCTION | 1 |
| ARTIFICIAL INTELLIGENCE IN MARKETING | 2 |
| WHAT IS ARTIFICIAL INTELLIGENCE AND HOW TO USE IT? | 4 |
| MACHINE LEARNING AND AI | 5 |
| TYPES OF LEARNING | 6 |
| GENERATIVE ARTIFICIAL INTELLIGENCE | 8 |
| HOW TO BRING AI TO MY BUSINESS? | 12 |
| THE IMPORTANCE OF MARTECH CONSULTANTS | 16 |
| CONCLUSION | 17 |
| ABOUT LIMINAL | 18 |

# INTRODUCTION

Artificial Intelligence (AI) and Machine Learning (ML) are no longer concepts restricted to academic research or cutting-edge technology companies. Today, they are fundamental drivers of innovation in virtually every industry, transforming the way organizations operate, communicate, and create value.

This eBook is designed to provide a clear and practical overview of the fundamental concepts of AI and ML, exploring not only the theory but also their concrete applications in the business context. Throughout the pages, you'll find examples of how these technologies are already being used in marketing, sales, customer management, and operations, demonstrating that adopting AI is not just a competitive advantage—it's an inevitable path to sustainability and growth in the digital future.

The goal is not just to explain how algorithms work or what categories of machine learning fall into, but to show how every organization can leverage these tools to increase efficiency, improve the customer experience, and open up new business opportunities.





# ARTIFICIAL INTELLIGENCE IN MARKETING

Marketing automation centered on email marketing, landing page creation, customer segmentation, lead generation, scoring, and manually programmed workflows based on logical conditions, has been one of the main focuses of the software industry applied to marketing. It is important to highlight other areas where marketing automation is producing major changes, intensively using machine learning algorithms, to eliminate the need for human intervention and accelerate analysis, decision-making and action.

Thomas Davenport (et al, 2016) summarizes the remaining areas of marketing that are being automated with the support of artificial intelligence (AI) as follows:

- **Digital advertising/programmatic buying** – allows you to automatically define the placement of a brand's digital ads in fractions of seconds, while determining the price to be paid and the target audience.
- **Social media** – automation of planning activities, content development, purchase of spaces, execution of actions.Sentiment analysis in social media – the ability to characterize comments and discussions about a brand as positive, negative or neutral.
- **Television advertisement placement** – the ability to place television ads that appeal to small audiences, based on their preferences and television consumption habits, in the same way as with digital ad placement via programmatic buying.
- **Inbound call analysis and direction** – the ability to direct a particular customer to the contact agent who is most likely to successfully address the customer's needs, as well as analyze the customer's speech and mood to predict likelihood of achieving up-sell and cross-sell goals.
- **Customer-targeted recommendations for products and services** – the ability to analyze the content accessed in the past by the customer, details of the products consulted, correlations between products and customers, to deliver product or service recommendations to each user of the website.
- **Conversion optimization** – optimization of digital experiences with a view to increasing conversion, using different user experience formulas to permanently deliver the formula that most accelerates the decision and conversion process of each user of a website.



Artificial intelligence (AI) has the potential to automate repetitive and routine tasks, freeing up time for professionals to focus on more strategic and creative activities. In addition, AI can assist professionals in various areas, such as marketing, design, customer service, and more. AI is transforming the world of work and with the continuous advancement of Generative AI technology, it will play an increasingly important role in optimizing and efficient marketing activities.

According to INE (National Institute of Statistics, 2023), close to 8% of Portuguese companies already use AI in their day-to-day lives, whether to identify objects, automate workflows or allow the movement of machines. According to other data (The Social Shepherd, 2024), more than 80% of companies have jumped on the AI bandwagon in some way. For 83% of these companies, AI ranks first in their business strategy. The IBM Global AI Adoption Index (2022) revealed that 35% of companies already use AI, while another 42% are exploring its potential. In a McKinsey survey in 2021, it was reported that 56% of respondents have already adopted artificial intelligence in at least one role in their company. Domino Data Lab's REVelate (2023) highlights that about half of respondents expect double-digit growth in their income as a result of the impact of AI on revenue generation. Fast forward to 2025, and 80% of businesses plan to adopt intelligent automation, the fantastic combination of AI and automation.

These numbers reflect the recognition of AI as a tool that drives the evolution and competitiveness of companies. Although there is still no perfect correlation between artificial intelligence and a company's turnover, its value lies in its ability to increase business effectiveness, which leads to greater profitability.

However, before understanding how artificial intelligence is determining the future of marketing automation and CRM systems, it is necessary to understand the foundations of this new technological reality and how they can be applied to marketing.

# WHAT IS ARTIFICIAL INTELLIGENCE AND HOW TO USE IT?

Concepts such as Artificial General Intelligence (AGI) or Artificial Super Intelligence (ASI), which designate the capabilities of a strong Artificial Intelligence (Strong AI), capable of executing and even surpassing any human intellectual activity or revealing some level of self-awareness, for now are just science fiction terrain. It is therefore important to understand, beyond the inflated expectations that fiction has created, that Artificial Intelligence is nothing more than the replication of the cognitive capacity of the human being made by machines, that is, by computer systems. Called Artificial Narrow Intelligence (ANI), or Weak AI, it is currently still limited only to the execution of very specific tasks such as playing chess, recognizing images, making predictions about sales results or producing artifacts such as text and video, for example.

Artificial intelligence (AI) can be used to:

1. **Assist humans in doing certain repetitive tasks faster and better**, such as automatic translation and subtitling software or RPA (Robotic Process Automation) – Assisted AI.
2. **Increase the capabilities of human beings**, such as customer churn prediction systems, chat bots or even autonomous driving in its current state – Augmented AI.
3. **Make decisions independent of the human being**, such as adaptive testing systems (multivariate) for website optimization, product and content recommendation engines (Amazon, Spotify), or autonomous trading systems on the stock exchange – Autonomous AI.

As with human beings, the process of intelligence begins by capturing information, stimuli, data from the real world, through the various senses, which are then processed in the brain in order to identify patterns, create automatic models, heuristics, which allow us to understand reality and predict the probability of future events, in order to make decisions based on these calculations.

Recalling a quote attributed to Einstein, "intelligence is the ability to adapt to change", AI is, therefore, the study of computational devices that can perceive the environment and make decisions that increase the chances of successfully achieving the defined goals.

# MACHINE LEARNING AND AI

When talking about artificial intelligence, we have to understand that it is above all a very broad concept that seeks to encapsulate all the activities done by machines, but which imitate, that is, mimic human behavior. For these artificial intelligence use cases to work, there is a set of Machine Learning (ML) algorithms capable of processing, deciding, and learning from the analysis of large data sets, big data.

Unlike programming based on logical rules predefined by humans, machine learning algorithms can automatically:

1. **Discover** – detect which attributes have the greatest predictive power on a given outcome.
2. **Decide** – infer rules from the data, balance attributes, and suggest the best set of actions to take.
3. **Review** – change the existing rules about attributes and their relative weights.

In general, we can subdivide the various Machine Learning approaches according to the objectives you want to achieve and the methods used to make it happen.



# TYPES OF LEARNING

We are dealing with Supervised Learning, when we have a clearly defined objective or task and we want, in general:

- Make predictions of a certain outcome such as sales volume, prices, demand, etc., using linear or logistic regressions, for example;
- Make binary predictions that indicate the probability of someone being sick or not, of an email being spam or not, of a customer defaulting, of ceasing to be a customer or not, etc., using classification algorithms.

Unsupervised learning happens when we don't have a specific goal, or a clear variable to work with and we want to explore the data, in order to:

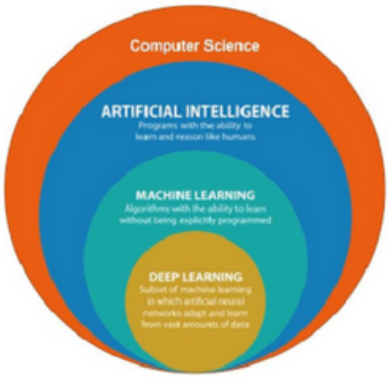
- To identify datasets that have similar characteristics (clustering) for segmentation of customers and potential customers, for example;
- Or in order to process a huge set of data very quickly and in real time, to be able to get movie recommendations on Netflix, or to do sentiment analysis on social networks, for example, using dimensionality reduction techniques.



Reinforcement learning happens when we give the machine a goal to achieve and it makes changes that improve the ability to achieve that goal, learning from the responses it gets in real time from the external environment. Examples of these types of goals could be to improve the writing of an email headline or optimize the audience of a Facebook ad to increase conversions.

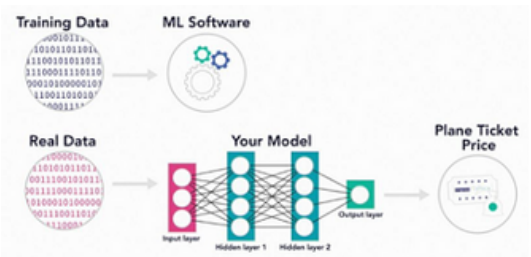
In addition to these large groups, the ML category that has been having a growing preponderance in the evolution of AI, due to the accelerated impact and accuracy of the results that can be obtained, is Deep Learning.

This type of ML mainly uses neural networks, which use mechanisms similar to those of the human brain, successively constructing abstract representations of a set of data, separating these same data into different layers of abstraction or transformation, to then look for patterns and develop an understanding of a given issue or produce the expected results.




*Domains of knowledge around AI.*

Autonomous lead scoring or pricing mechanisms for a product or service, such as air travel tickets, are good examples of Deep Learning use cases. The adjective "deep" refers to the multiple layers in which these networks work, which make it very difficult in practice to explain the results obtained through these techniques, which is why they are called black boxes.




*Simplified schematic of how deep learning algorithms work.*

# GENERATIVE ARTIFICIAL INTELLIGENCE

Generative artificial intelligence (GenAI) is a subcategory of artificial intelligence that focuses on training models to generate text, images, videos, and other artifacts that resemble what a human would produce. This technology uses advanced deep learning and natural language processing algorithms to understand and reproduce patterns and structures of language and other types of data.

Generative AI harnesses the power of foundation models and LLMs, along with advanced techniques such as transformers, diffusion models, and human reinforcement learning, to create new and original artifacts that bear a resemblance to training data, extending the capabilities of automated content creation and interaction.

Clarifying fundamental concepts to understand what generative artificial intelligence is:

- **Transformers** are a type of neural network that uses a technique called "self-attention" to identify which parts of an input are most essential. This allows the model to pay attention to specific parts of the data when generating outputs, making it extremely effective for natural language tasks.
- **Diffusion Models:** Diffusion models gradually transform an initial image of random noise into a target image through a series of small, random steps. This process is repeated until the desired final image is obtained, allowing the generation of high-quality images from noise.
- **Reinforcement Learning from Human Feedback (RLHF):** This approach uses signals from human evaluators (such as upvotes or downvotes) to improve the performance of an AI model. Human feedback is incorporated to refine and adjust the models, ensuring that their outputs align with human expectations and preferences.
- **Foundation Models:** Foundation models are large machine learning models trained with a massive amount of unlabeled data using transformer algorithms. These models are adjusted through adaptation mechanisms, resulting in versatile models that can be applied to a wide range of tasks.
- **Large-Scale Language Models (LLM):** A specific subcategory of foundation models is Large-Scale Language Models (LLM), which are focused specifically on natural language. These LLMs are able to understand and generate text in a sophisticated way, facilitating applications such as chatbots and virtual assistants. For example, ChatGPT is a conversational application built on top of an LLM (in this case, OpenAI's GPT model), which uses the LLM's ability to understand and generate natural text, offering responses that mimic human conversation.

Generative AI offers a robust set of tools that can significantly transform the day-to-day lives of marketers. Below are some of the key advantages and practical applications of these technologies in the field of marketing:

**1. Streamlining Searches** – The need to find information quickly and efficiently is crucial for any marketer. Generative AI tools can mine vast amounts of data on the internet and summarize articles, research papers, and blog posts in seconds. This not only saves time but also provides valuable insights that can inform marketing strategies and decision-making.

**2. Market Analytics** - Generative AI tools can automate the collection and conversational analysis of large volumes of market data, providing detailed and real-time insights into trends, consumer behaviors, and competitor activities. This allows marketers to make informed, data-driven decisions, increasing the effectiveness of their strategies.

**3. Creative Idea Generation** - In times of writer's block, generative AI tools can be invaluable. By providing a brief or initial content, these tools can generate a plethora of creative ideas and suggestions, boosting brainstorming and helping to develop innovative campaigns. This broadens the creative capabilities of marketing teams, allowing them to explore new approaches and formats.

**4. Personalized Content Creation** - Personalization is critical to the success of modern marketing. Generative AI tools can create highly personalized content, such as emails, blog articles, and social media posts, tailored to consumers' individual interests and preferences. This improves customer engagement and satisfaction.

**5. Copywriting Automation** - Writing compelling and persuasive ads can be challenging and time-consuming. Generative AI can generate ad copy that is optimized for different platforms, such as Google Ads, Facebook, and Instagram, helping to maximize the return on investment (ROI) of ad campaigns.

**6. Creative Campaign Development** - Creativity is essential in marketing, and generative AI tools can act as creative assistants. They can suggest ideas for campaigns, sketch visual concepts, and even create storyboards, making it easier to develop innovative and impactful campaigns.

**7. Creating Visuals and Graphic Design** - Generative AI can create visual elements, such as banners, logos, and infographics, based on simple briefs. This allows marketing teams to produce high-quality visual materials quickly and efficiently, without the need for advanced graphic design skills.

**8. SEO Analysis and Optimization** - Search engine optimization (SEO) is crucial for increasing online visibility. Generative AI tools can analyze keywords, generate meta descriptions, and create SEO-optimized content, improving the positioning of websites in search results and attracting more organic traffic.

**9. Customer Service Automation** - Generative AI-based chatbots and virtual assistants can provide 24/7 customer support, answering frequently asked questions, resolving common issues, and escalating more complex issues to human agents. This improves the customer experience and frees up the service team to focus on more complex tasks.

**10. Programming Automation** - Creating code can be a complex and time-consuming task. With generative AI tools, it is possible to generate blocks of code in seconds, making it easier to automate digital marketing tasks, such as personalizing landing pages and analyzing data. This allows marketing teams to focus on more strategic and creative activities.



When we think about generative artificial intelligence applied to marketing, we tend to associate this technology with the abrupt transformation that is happening in terms of communication with consumers. However, there is another revolution to redefine the distribution variable in the marketing mix.

Far beyond the creation of personalized content and highly targeted communication campaigns, GenAI is emerging as a crucial tool in optimizing product distribution, enabling accurate demand forecasting, even for new products without historical data.

Unlike traditional methods that rely on historical time series, GenAI can:

- Analyze unstructured data from market trends, consumer sentiment, and external factors to predict new product demand.
- Optimize distribution routes in real time, considering multiple variables such as weather, traffic, and buying patterns.
- Create predictive models that anticipate changes in consumer preferences, allowing for proactive adjustments in distribution.

Amazon, for example, uses IAG to predict demand, optimize the supply chain, organize routes and drivers more efficiently, develop robots for handling packages. As a result, it has been able to increase the speed of deliveries, by ensuring that they have the right products in the right place and time.

Amazon also uses generative artificial intelligence to improve the customer experience, with a conversational shopping assistant that helps customers more easily find the products they're looking for.

To stay competitive, companies need to integrate GenAI not only into communication strategies, but across the entire marketing value chain.

GenAI-powered smart distribution isn't just a competitive advantage – it's the future of strategic marketing.

While generative AI tools offer numerous benefits, it is essential to use them responsibly and ethically. Companies providing these tools often establish clear guidelines to ensure appropriate use. Furthermore, despite being highly advanced, these tools can occasionally produce inaccurate or irrelevant answers. Therefore, it is crucial to validate the information generated and apply human judgment to ensure the accuracy and relevance of the contents.

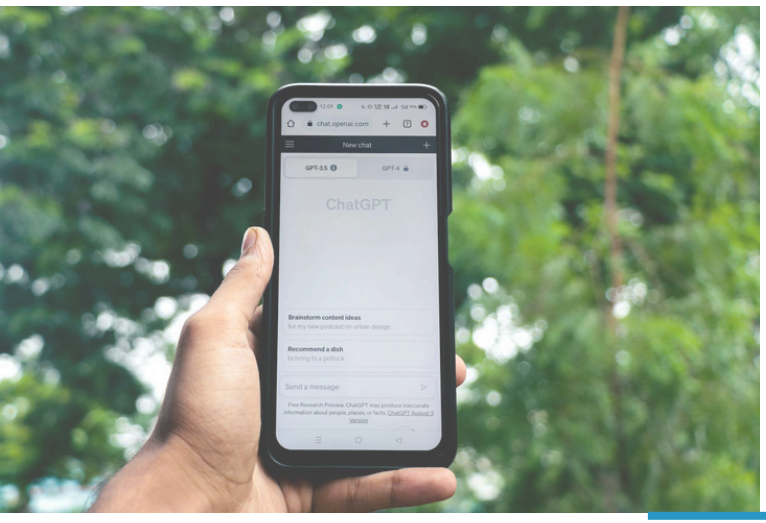
In conclusion, generative AI tools open up a wide range of possibilities for marketers who want to increase their productivity and efficiency. By adopting these technologies, businesses can significantly improve marketing strategies, continuously innovate, and stay ahead of the competition.

# HOW TO BRING ARTIFICIAL INTELLIGENCE TO MY BUSINESS?

Every day we use a lot of AI applications without us realizing it, Google finishes our sentences, Facebook determines what our newsfeed is, Amazon predicts our next purchase, Spotify learns what song we like, Google Maps guides us to our destination, Alexa and Siri answer our questions, we unlock PCs and iPhones with a scan of our face. As consumers we don't want to know what technology is behind this, but we value the convenience and personalization it provides.

In marketing, artificial intelligence has been making it possible to predict demand and revenue, optimize supply chains, optimize the arrangement of products in stores, execute dynamic pricing, upsell and cross sell strategies, offer personalized recommendations, as well as segment customers in real time in a dynamic way.

As business people, we have to be aware that these Artificial Intelligence technologies are accelerating marketing towards a future of intelligent automation. Artificial Intelligence has the power to transform our careers and companies, but many managers still don't know how to translate business strategy into AI implementation opportunities and many marketers don't know where to start or are afraid of the unknown.






That is why it is important to realize that the return on an investment in AI can be calculated through "hard ROI" measures such as:

- **Cost reduction** – which comes from the reduction of downtime, fraud, operational risks or transaction costs.
- **Productivity increases** – with improved human decision-making capacity and faster execution of repetitive tasks.
- **Increased revenues** – with the creation of new products and services and the ability to sell more and better.

There are also other return factors ("soft ROI") that can be as important or more important than these, such as customer and employee satisfaction and retention, training and improvement of the workforce's technological skills, increasing brand value and the company's own value evaluation.

But in order to obtain these results, it is necessary to know where to start. What then are the criteria that should govern the selection of investment projects in AI?

Projects have to be evaluated according to their potential for return and their technical complexity. Projects with high impact and low implementation difficulty should be prioritised. On the other hand, if an AI project has a great deal of complexity and a small return, then it should not be part of a company's first efforts towards implementing artificial intelligence.

The ideal, therefore, is to focus efforts on solving small problems that can generate value quickly, such as repetitive tasks that do not pay to continue to be done by a human and whose risk of failures and errors due to their manual execution can have serious consequences.

**Define data governance policies**
It is here that we can understand what data we have access to, what is the quality of that data, who and how it can be used, what are the levels of privacy and security, what is the model of data collection and processing.

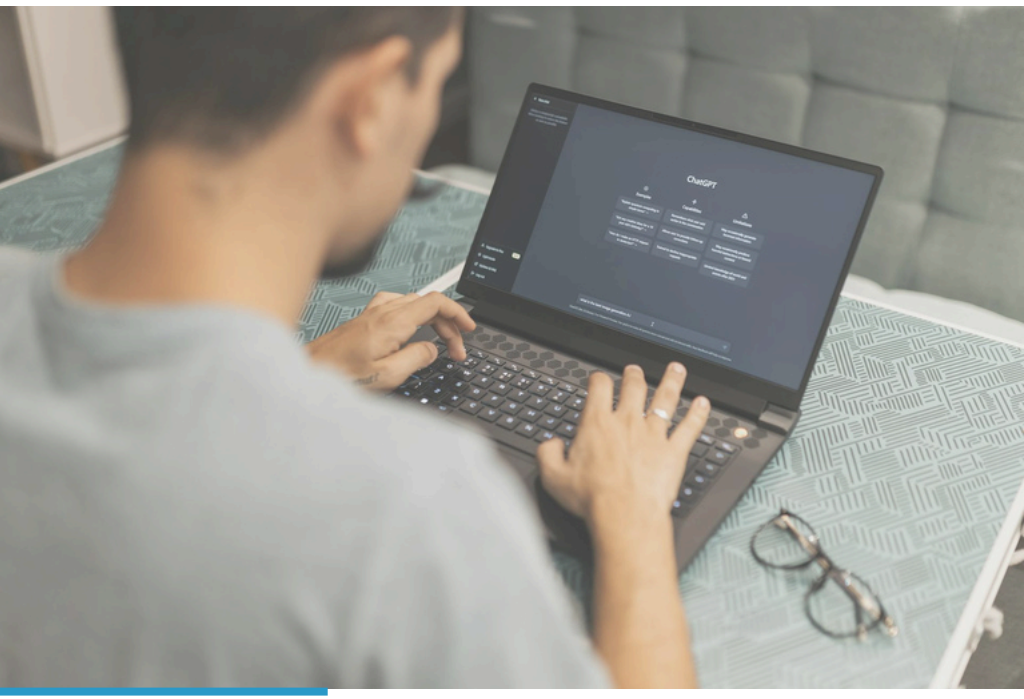
**Integrate the various data sources (ERP, CRM, CMS, etc.)**
and create a normalized ecosystem of data, which defines standards, allows for the ability to be interoperable – what is technically often referred to as a data lake.

**Assess human capital capabilities and competencies**
that we have in our organization, invest in the upskill of some people, invest in hiring services and specialists that help us successfully execute data-driven projects.

**Develop a culture of rapid experimentation,**
that embraces error as a fundamental form of learning, that is customer-centric and uses data to inform strategic decisions and build solutions that improve the value proposition and continuously transform the business model.

Managing an AI system is quite different from managing any other software purchased from a specialized vendor or created from scratch through logic programming customized by humans.

Given that AI-based systems operate in the field of probabilities, they should be continuously trained, monitored and evaluated with regard to their performance. In this way, organizations that implement AI-based systems can protect themselves against the harms associated with deprecation, bias, and divergence from the original objectives, which will naturally affect any AI model. It is necessary to maintain the performance, predictability and accuracy of the models, otherwise they will face harmful consequences for the business and society. Therefore, organizations must permanently audit their capabilities to create, own, and operate advanced AI systems.





## SOURCES


Davenport, T. H., & Phillips, J. (2016). The future of marketing automation. Applied Marketing Analytics, 2(3), 213-224.

Algonomy. Customer Engagement & Experience Solutions.

Davenport, T. H., & Phillips, J. (2016). The future of marketing automation. Applied Marketing Analytics, 2(3), 213-224.

Domino Data Lab's REVelate. (2023). AI's impact on revenue generation.

Gartner. (2023). The AI Impact on B2B Sales. Recuperado de Gartner.

CNBC (2024). How Amazon Is Delivering Packages Faster With The Help Of Generative AI. https://www.youtube.com/watch?v=7HgT-CBmKyE

HubSpot. (2022). The State of Marketing Automation in 2022. The HubSpot Blog Research.

IBM Global AI Adoption Index. (2022). Study on the adoption of AI in companies.

National Institute of Statistics (INE). (2023). Data on the use of AI in Portuguese companies.

MarTech. (2023). Automation and AI: The Power to Build True Digital Experiences.

MarTech. (2023). Looking at AI's Rapid Infusion into Marketing Automation Platforms.

McKinsey & Company. (2021). The state of AI in 2021. Retrieved from McKinsey & Company.

The Social Shepherd. (2024). Report on the adoption of AI in companies. Retrieved from The Social Shepherd.



# THE IMPORTANCE OF MARTECH CONSULTANTS

The speed at which Gen AI is evolving makes it nearly impossible for internal teams to keep up with all the trends, evaluate tools, and integrate technologies without expert support. This is where MarTech consultants — like Liminal — make a difference.

The role of the consultant is not only technical. More than mastering tools, it is necessary to understand the business, teams, objectives and existing work processes. This is the only way to ensure that the adoption of Gen AI no longer creates a technological silo, but rather a real lever of value.

In practice, consultants help to:

- Diagnose the company's degree of digital maturity and its readiness for Gen AI;
- Identify the use cases with the greatest potential impact and least implementation complexity;
- Select the most appropriate tools for the context and budget of the organization;
- Integrate these tools with existing systems (CRM, automation, BI, eCommerce, etc.);
- Train teams and establish adoption and continuous improvement processes.

Most importantly, the consultant offers an unbiased and strategic view, free from commercial software pressures, and focused on the results the client wants to achieve.



# CONCLUSION

We are living in a turning point in which Artificial Intelligence is no longer a promise to become a transformative reality. Companies that understand and know how to apply these technologies will not only gain productivity and efficiency, but also the ability to innovate continuously, creating differentiated value propositions in the market.

However, the adoption of AI and ML requires more than implementing tools: it requires strategic vision, a culture of experimentation, solid data management policies, and a smooth integration with existing business processes.

With the right support – either through expert consultants or by developing digital skills in-house – organizations can turn the potential of AI into tangible results. The future of business will inevitably be intelligent and data-driven. The question is no longer whether to invest in AI, but when and how to take the first steps.

START WITH LIMINAL



# ABOUT LIMINAL

As specialists in martech (Marketing Technologies), Liminal has been able to improve marketing resultsand sales of several companies, ensuring the conditions for the success of marketing automation programs.

With Liminal, you will have access to experts who will analyze, design and implement marketing and sales strategies and operations, supported by technological systems, such as Automation ofMarketing, which guarantee the growth of your business. Schedule a free diagnosis with a Liminal specialist now.

1

**Strategy & Design**
Diagnosis of your company's digital maturity and marketing and sales performance, to design a strategy for growth and transformation, involving people, processes, and technologies.

2

**Roll-Out**
We customize low-code/no-code software for Artificial Intelligence, CRM, Automation and Analytics, to support strategies, operations, repeatable and scalable Sales Outreach, Go-to-Market, Nurturing processes and RevOps.

3

**Continuous Improvement**
Monitoring, optimization and continuous improvement of processes and systems, ensuring that MarTech actively contributes to business growth and success.

LET'S TALK




# WHERE MARTECH MEETS BUSINESS

IPN – Incubadora, Rua Pedro Nunes, 3030 – 199 Coimbra | hello@liminal.pt | https://liminal.pt