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SEPE
FEDERATION OF HELLENIC ICT ENTERPRISES
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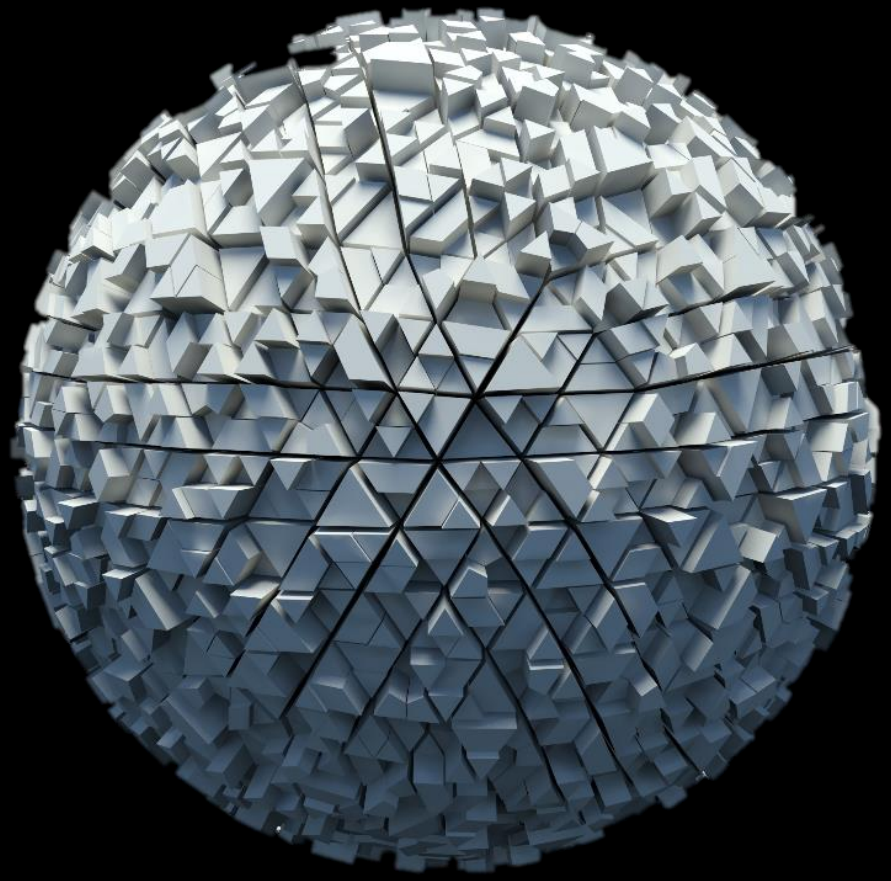

Federation of Hellenic ICT Enterprises (SEPE)

Gen AI - opportunities and prospects for the Greek economy

December 2023

MAKING AN IMPACT THAT MATTERS since 1845

Consulting

Executive Summary

Introduction

In the era of digital transformation both internationally and in our Greece, the Information and Communication Technologies (ICT) sector has experienced significant growth in recent years.

This trend is expected to intensify even further in the coming years, with the proliferation of Generative Artificial Intelligence (Gen AI), which as a branch of Artificial Intelligence has the ability to generate original content (such as code, images, video, audio, text and 3D models) using big data processing.

Under certain circumstances and conditions, the benefits that can be achieved for businesses by adopting Gen AI solutions are multi-level and relate to both the internal operations of corporations (e.g. better decision making, cost savings, higher productivity) and extroverted service provision (e.g. improved customer experience).

In particular, Gen AI solutions can be deployed across the entire spectrum of a company's operations, with main categories of use cases identified relating to customer / public-facing services, content generation, code management, knowledge assistance and the extraction of insights from unstructured data.

Objective and Results of the present study

In the above context SEPE, in cooperation with the global consulting firm Deloitte, conducted the present study, with the main objective of exploring the opportunities and prospects of Gen AI in Greece while in particular it focuses on Greek entrepreneurship (examples of use cases as well as a primary survey), but also on the expected impact of this new technology on the Greek economy and the employment of ICT specialists.

In the context of the study, Deloitte, on behalf of SEPE and with the support of the National Documentation Center (NDC), conducted a survey in the private sector, in which a large number of companies from both the ICT sector and from other sectors of the economy participated, in order to record their views regarding, on the one hand, the use of Gen AI technologies/solutions and, on the other hand, their strategic/immediate plans regarding the adoption of this new technology.

As the survey shows, the adoption of Gen AI at Greek enterprises of all sectors of the economy, is still in early stages, although the majority of businesses believe that adopting Gen AI solutions can improve efficiency and boost their growth. In addition, it was highlighted that both the majority of companies in the ICT sector have not yet adapted their strategy for the integration of Gen AI solutions.

Alongside the survey, Deloitte assessed the degree of the impact of Gen AI on the Greek economy and the employment of ICT specialists.

More specifically, with regard to the projected impact of Gen AI on the country's GDP, the analysis concluded that its impact is projected to be very significant, with its cumulative impact being estimated at +5,5% of the country's GDP by 2030 (i.e. €10,7 billion), which under certain conditions can even reach +9,8%. It is noteworthy that around 50% of this impact is estimated to be contributed by 5 sectors of the economy: Financial & Insurance Services, Wholesale Trade, Manufacturing, Services and Information & Communication Services.

As for the impact of Gen AI on the ICT-specialists gap, it is also expected to be significant, with the projected gap between supply and demand to increase by ~25.500 specialists, reaching a cumulative total of ~83.000 gap in specialists by 2030* . The implementation of policy measures to reduce the ICT skills gap is becoming imperative, with particular importance now being given to focused and fast-track skills development programs for STEM graduates as well as other academic backgrounds leading to certifications sought by the labor market.

** The ~83.000 positions are the new estimate of the cumulative ICT specialist gap until 2030, following last year's study by Deloitte for SEPE, whereby the gap was estimated at ~57.500 specialists*

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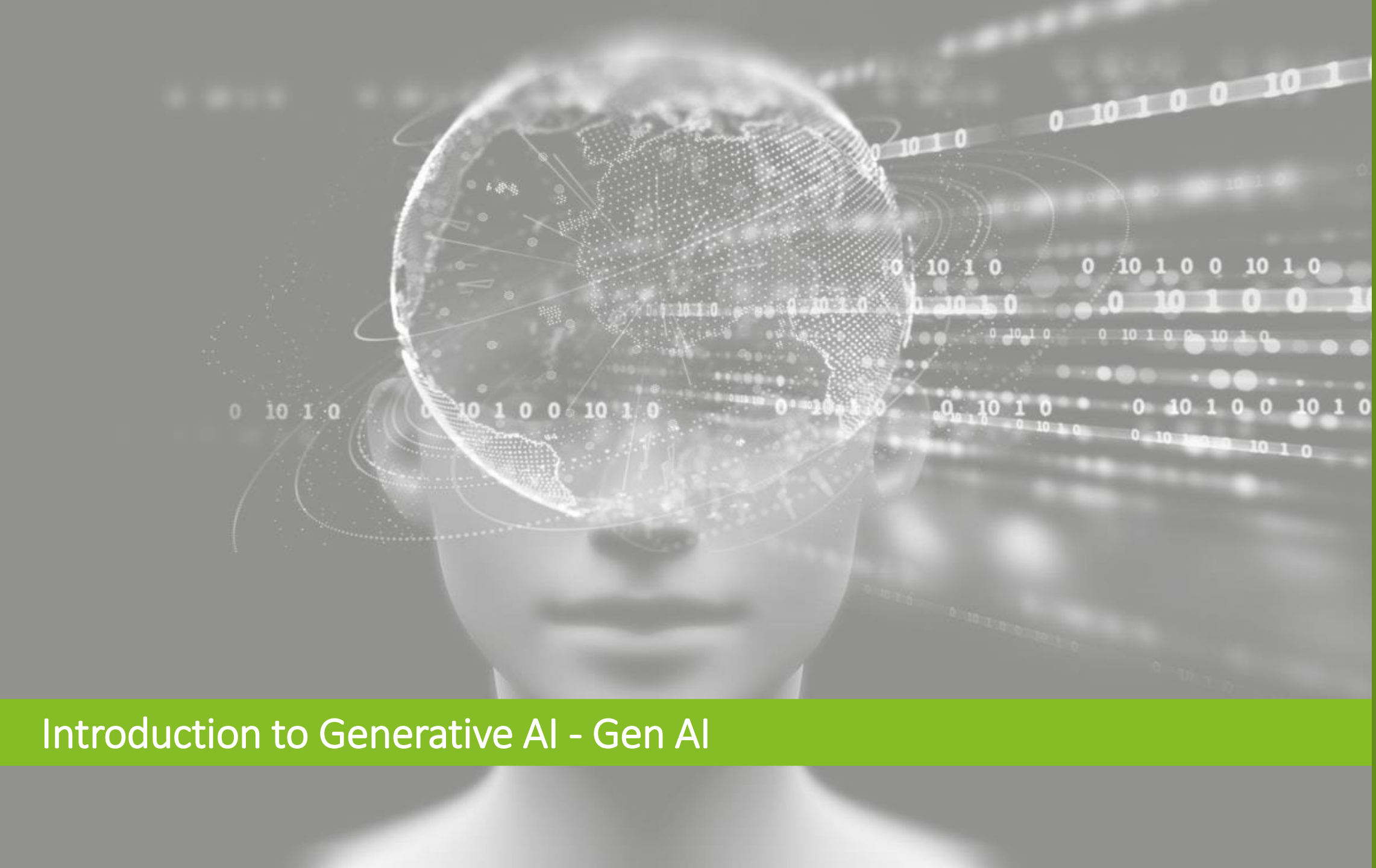


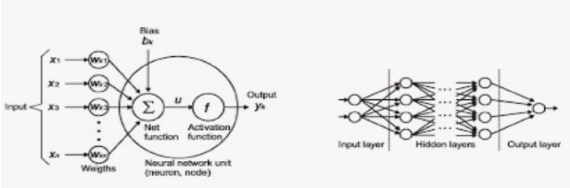
Introduction to Generative AI - Gen AI

Generative Artificial Intelligence (Gen AI) | Historical Review

The beginnings of Generative Artificial Intelligence can be traced back to 1943. This technological field developed further at the beginning of the 21st century, and since 2018 has seen exponential growth, with the largest technology companies entering the field dynamically

First Steps (mid-20th century)

1943 : Development mathematical model of neural networks, basis for modern neural networks, by Warren McCulloch and Walter Pitts



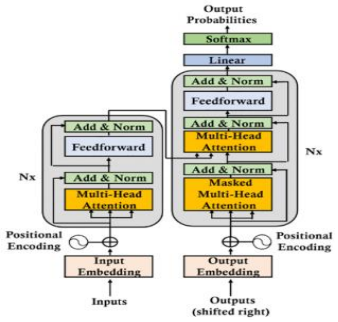
1973: Development of a series of programs known as "AARON" focusing on autonomous art production, by Harold Cohen

Development (early 21st century)

2003: Development intelligent voice assistants on mobile phones

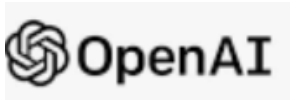
2012-2014: A computer cluster Google Brain is trained to recognize a cat from millions of images, using the large-scale CNNs technique. At the same time, research is published on new image recognition technique and introduction to Generative Adversial Networks (GANs)

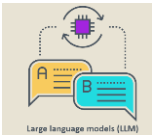
2017: Google releases the first model Transformer, the foundation of many popular AI generation tools today, such as "Chat GPT"



Acceleration (2018 - today)

2018-2019: Open AI releases "GPT-1", a groundbreaking advancement for large language models (LLM)





2021-2022: DALL-E develops a creation tool image of 12 billion parameters that uses only one sentence to create an image and the Stable Diffusion launches an open source model for image creation

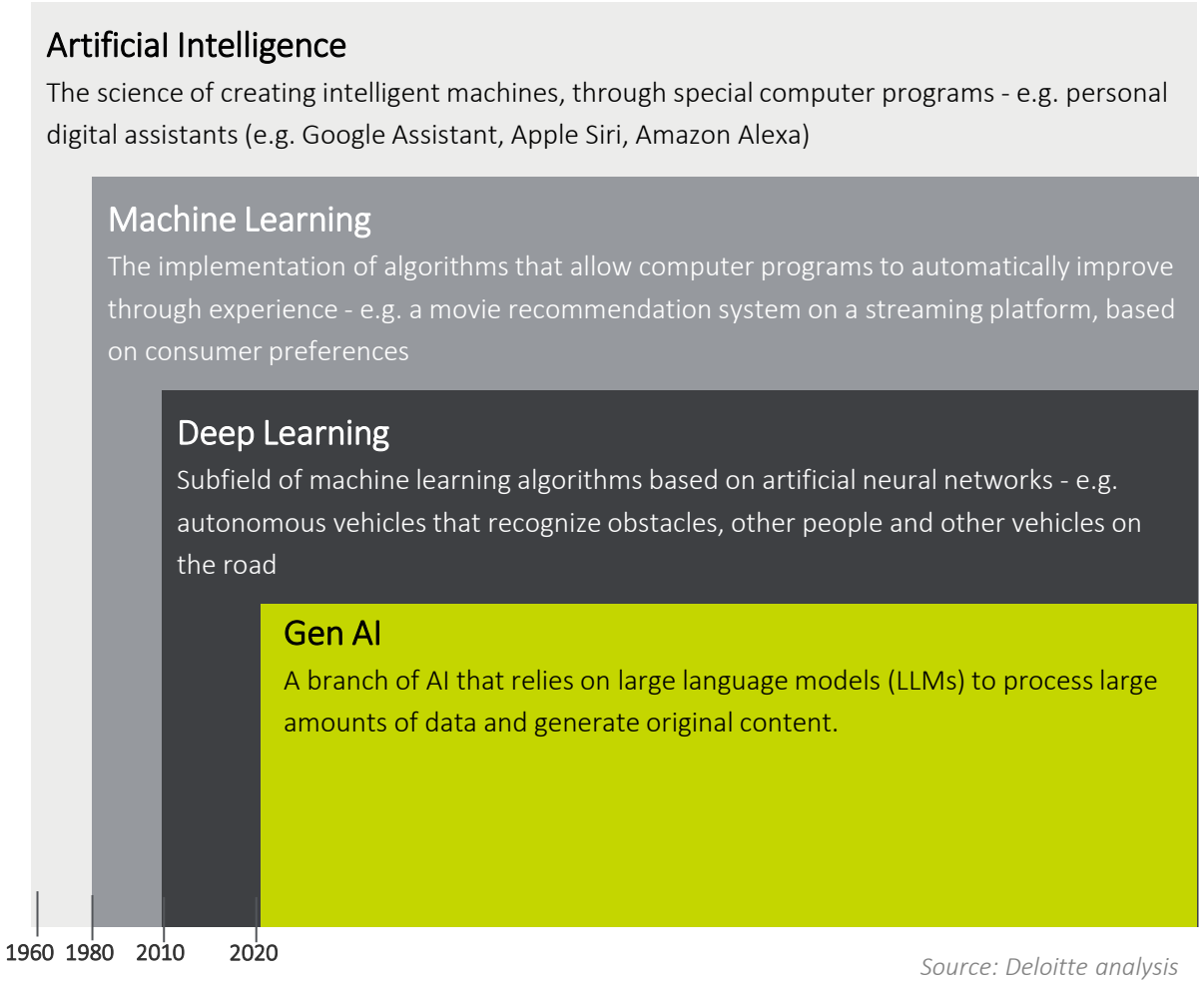
2023: Major technology companies are turning their attention to Generative AI, such as Adobe through Firefly, OpenAI through ChatGTP-4, Meta through LLaMA and Google freeing up public access to Bard, an AI chatbot

Source: Deloitte Report "Dichotomies"

Generative Artificial Intelligence (Gen AI) | Definitions and main use

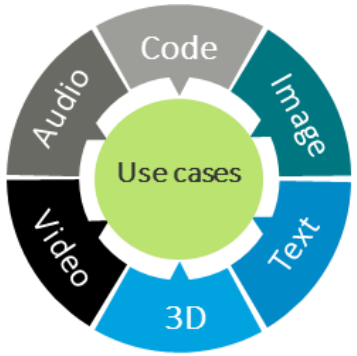
Generative AI is a branch of AI capable of generating original content by performing a learning process, unlike traditional AI, which does not allow the development of original content

Definition of Generative AI



Source: Deloitte analysis

Generative AI (Gen AI) is a branch of AI that can generate original content, such as: *code, images, video, audio, text and 3D models.*



The above is illustrated in the adjacent "wheel", which categorizes the generated “output” into individual use cases of Gen AI. Until now, the creation of this type of content has been carried out exclusively with human intervention.

Generative AI has redesigned the way we communicate, work and innovate, with its adoption expected to open myriad of possibilities that previously seemed unlikely, ushering in a new stage of creativity, efficiency and progress.

The diffusion of this technology is extremely fast if we consider that *ChatGPT* has recorded *1 million users in* 5 days from the day it was made available to the public (November 2022), and according to the latest statistics for November 2023, it has more than *180 million registered users.*

Generative Artificial Intelligence (Gen AI) | Differentiation from Traditional AI

Generative AI is a branch of AI, which however presents important differences from the latter

Traditional Artificial Intelligence (AI) replicates human cognitive functions *(learning, design, creativity*) and focuses on identifying and processing available and appropriate information in order to extract the relevant required "knowledge" from their composition.

Generative Artificial Intelligence (Gen AI) performs **deep learning, mimics brain function** when processing data and making decisions. Gen AI is based on machines or algorithms that have the ability to create **primary content**, e.g. text, images, audio, video.

Main features of traditional AI:

- It does not develop primary content
- Handles certain problems well, for specific business functions
- Solves problems defined on the basis of specific rules
- Human supervision and assistance in the learning process is necessary
- Interprets the information for pattern recognition
- Enhances predictability in decision-making

Main features of Gen AI:

- Develops / Generates primary content
- Solves open-ended problems by performing intelligent, human action
- Supports the increase of creativity and the improvement of the quality of primary ideas
- Requires limited human supervision and has autonomous learning potential
- Performs a learning process on the basis of existing information

Source: Deloitte analysis

Generative Artificial Intelligence (Gen AI) | Benefits for businesses

The adoption of Generative AI can bring users multiple benefits such as better decision making, improved customer experience, higher productivity, cost savings and improved creativity / innovation

Better decision making

Generative Artificial Intelligence (Gen AI) makes recommendations through big data analysis, facilitating multi-scenario simulations and exploration of alternative strategies, enhancing and accelerating the complex decision-making process

Improved customer experience

Generative Artificial Intelligence (Gen AI) helps improve customer loyalty through personalized service and support

Higher productivity

Through **Generative Artificial Intelligence (Gen AI)**, routine operations (that may make up to 70% of human resources time) are automated, allowing focus on more complex and higher value-added tasks

Cost savings

Generative Artificial Intelligence (Gen AI) leads to cost and money savings (≥30%), through the automation of often repetitive tasks, thus freeing up human labor, while ensuring high quality

Improved creativity and innovation

Generative Artificial Intelligence (Gen AI), through the analysis of multiple data, can present alternatives, offering inspiration to boost creativity and help increase the pace of development of new products or services and bring them to market faster

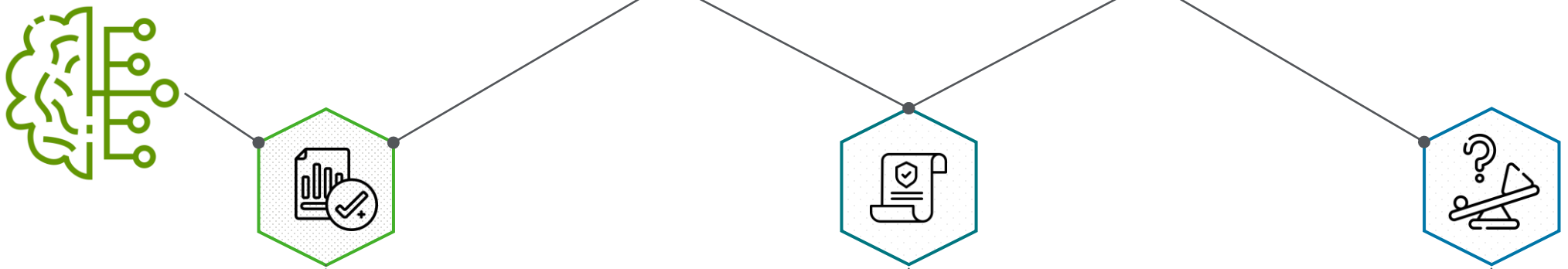
Source: Deloitte analysis

Generative Artificial Intelligence (Gen AI) | Critical success factors for adoption

The critical success factors for the integration of Gen AI relate both to how the relevant systems are developed and operated, and how they are used by the human resources involved

The architecture of the systems that support Gen AI initiatives is crucial to the outcome and must be chosen with great care so that the algorithms, models and computing infrastructure are appropriate and contribute to the efficient operation of the whole system.

The training of human resources in Generative AI and, by extension, in the development and use of these models is a prerequisite for the proper integration of this technology in business operations. This training should be given to all staff and should be followed by assessments of staff readiness

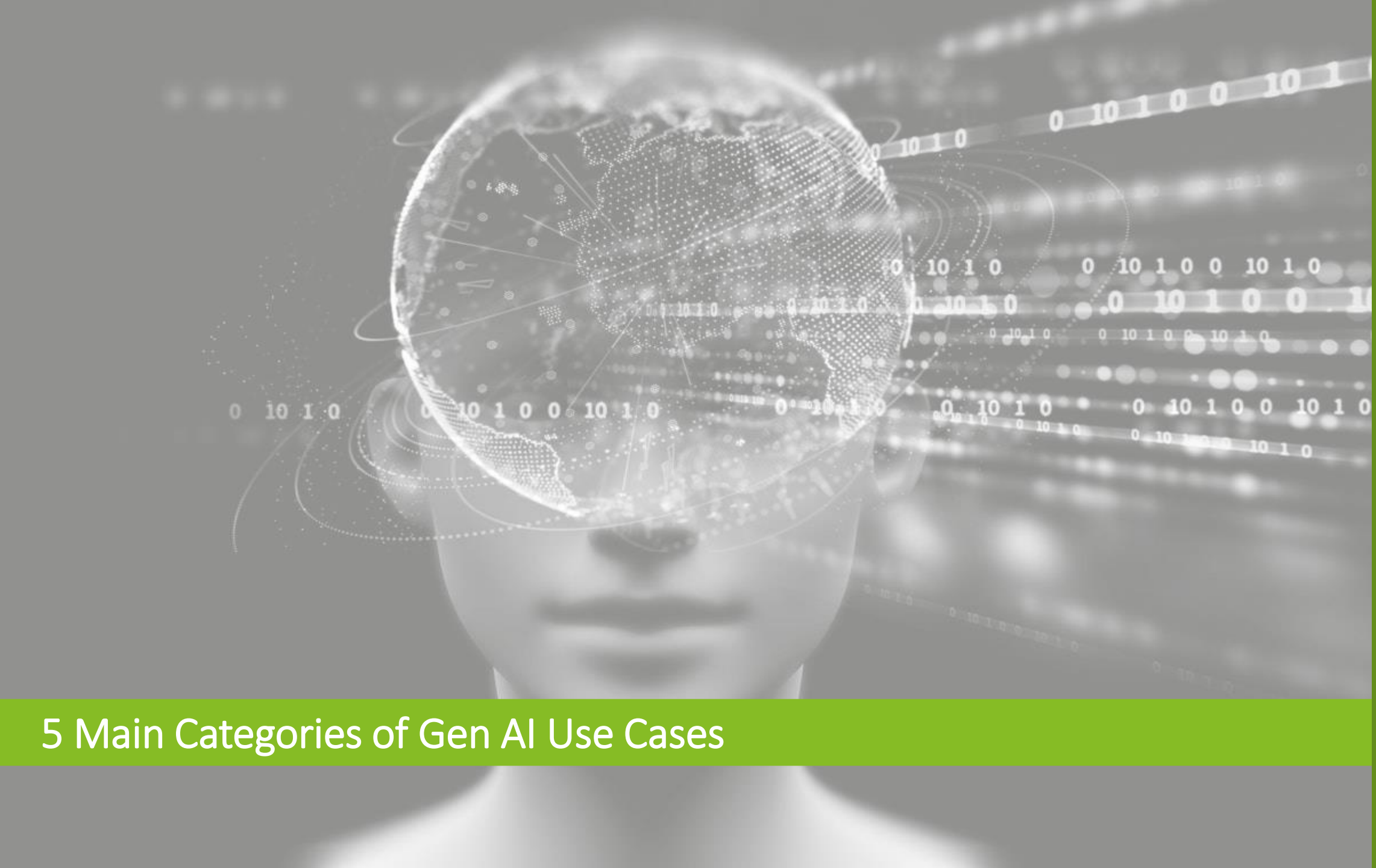


The datasets that Gen AI relies on to create content must be of high quality, multiple, extensive and up-to-date, as they are critical to the quality of the “products” generated, while it is important to ensure the absence of "biases"

Formulating a well-defined Gen AI policy based on the principles of fairness, transparency, accountability and data protection and subsequent compliance with all necessary legislative frameworks should be a priority for businesses.

In the context of ensuring all of the above, it is particularly useful for the appropriate preparation of each company, through horizontal actions, such as: conducting a relevant feasibility study per use case and corresponding prioritization of solutions of strategic importance, development of "proofs of concept" for the technical testing of Gen AI solutions and gradual adaptation of the models adopted to larger data sets (scaling).

Source: Deloitte analysis



5 Main Categories of Gen AI Use Cases

5 main categories of use cases | Overview

Gen AI can contribute significantly to the development of 5 main categories of use cases that are of major importance for improving the efficiency of many business processes

Public-facing services
More direct / more effective interaction with target audiences | more personalized user experience by providing customized responses

Content generation
Creating original texts, images, products, etc. Allows businesses to create content quickly and efficiently

Code management
Speed up and improve the code development process, saving time and eliminating human error

Knowledge assistance
Automation of processes for the capture and maintenance of knowledge. Easier navigation of users through the enterprise's data and knowledge repositories

Extracting insights from unstructured data
Exploitation of information from unstructured data, achieving optimal understanding and utilization of the information contained therein (e.g. image and sound analysis)

Source: Deloitte analysis

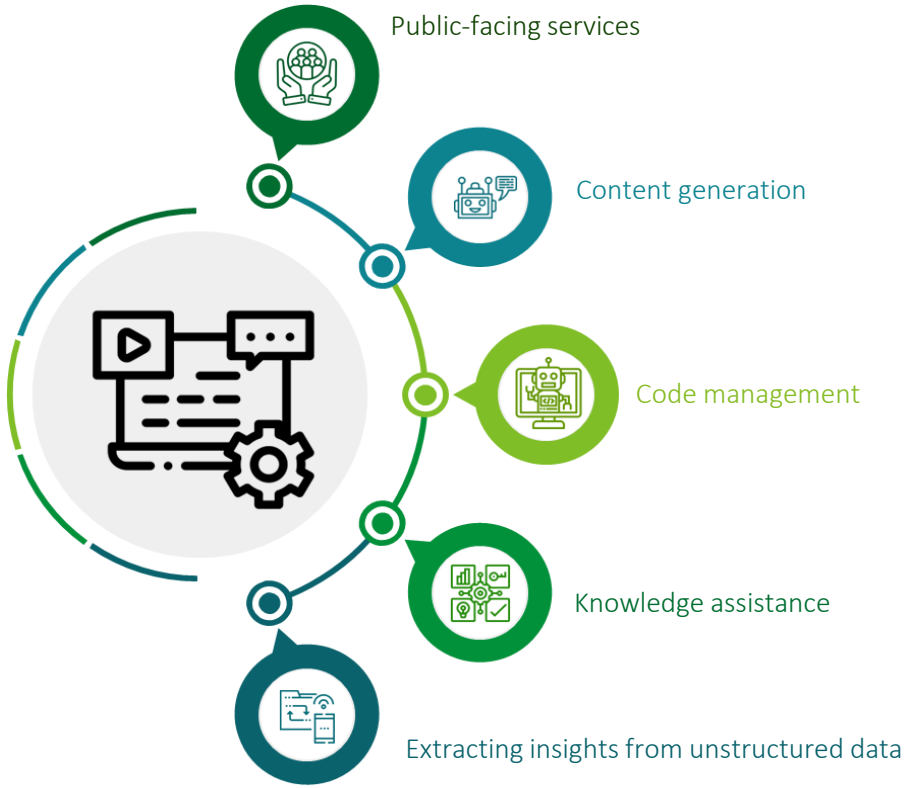
5 main categories of use cases | Benefits

Gen AI entails a number of benefits stemming from the 5 main categories of use cases that Gen AI supports

	Public-facing services	Content generation	Code management	Knowledge assistance	Extracting information from unstructured data
Better decision making	Gen AI-powered analysis of data from customer interactions can contribute to better commercial decision making	Gen AI can be used to create content with a more targeted focus, which helps better decision making	Gen AI as a code management tool can be leveraged when creating multidimensional scenarios for decision making	Gen AI helps draw conclusions from "complex" information, helping to analyze data for better decision making	Gen AI's processing of unstructured data allows companies to make decisions based on more complete information bases
Improved customer experience	Gen AI can contribute to the delivery of personalized services and therefore an improved customer experience	Gen AI allows the creation of original / customized content, adapted to the needs of each client	Gen AI helps identify bugs in the code and provides suggestions for fixes, contributing to a high quality "final" output	Gen AI interacts with its users through natural language dialogues and can accurately identify the requested information	Gen AI can analyze unstructured data such as customer reviews and extract valuable insights to understand their preferences
Higher productivity	With the help of Gen AI more customer requests can be supported/processed end-to-end	Gen AI can help increase productivity through faster content development, enabling more customers to be served at the same time	Gen AI provides insights and supports the creative software development process, leading to higher productivity of ICT specialists	Gen AI makes knowledge management easier and faster, helping to improve the productivity of a company's employees	Analyses from unstructured data can reveal ways to improve business processes, helping to increase productivity
Cost savings	The use of Gen AI for public-facing service helps to automate tasks and therefore, to save costs	Gen AI enables businesses to create content quickly and efficiently, with less human intervention	Gen AI helps programmers reduce the time they spend on certain activities such as code correction	Gen AI has the ability to analyze large amounts of information and synthesize it automatically and very quickly	Gen AI enables automatic understanding and organization of unstructured data, saving time and human resources
Improved creativity / innovation	Gen AI can analyze the profile of the recipients and suggest more creative ways of approaching / communicating	Content creation helps to quickly generate a wide range of ideas - vital for innovation	Gen AI can support the exploration of different, innovative approaches to code development	Gen AI helps draw conclusions from complex information, helping to create innovative ideas and solutions	Gen AI can discover new trends from unstructured data, supporting the creation of new innovative products

5 main categories of use cases | Template for the Analysis

For a better understanding and deeper insight into the main categories of Gen AI use cases, for each of them an analysis is carried out in 6 dimensions: trends, type of extracted original content, points of differentiation from corresponding traditional AI solutions, potential benefits, main sectors of the economy for application and indicative examples of use cases



For each of the five main categories of use cases, the following pages provide an overview of the following:

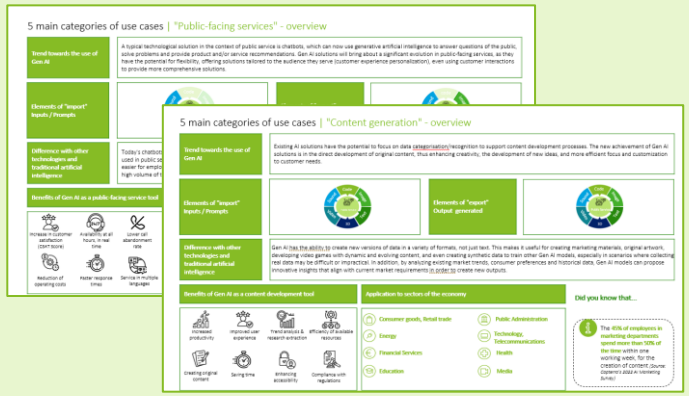
the trend towards the use of Gen AI

the possible forms of original content that can be extracted (e.g. image, sound, code, etc.)

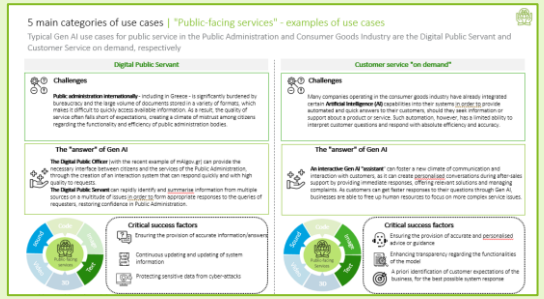
the main points of differentiation from corresponding traditional AI solutions

the potential benefits that can be achieved

indicative examples of the most important sectors that are expected to be most applicable



Finally, for each use case category, examples of use cases are provided



5 main categories of use cases | "Public-facing services" - overview

Trend towards the use of Gen AI

A typical technological solution in the context of public service is chatbots, which can now use generative artificial intelligence to answer questions of the public, solve problems and provide product and/or service recommendations. Gen AI solutions will bring about a significant evolution in public-facing services, as they have the potential for flexibility, offering solutions tailored to the audience they serve (customer experience personalization), even using customer interactions to provide more comprehensive solutions.

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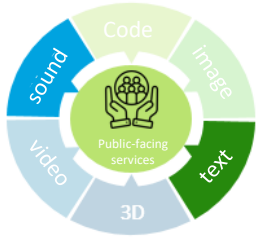

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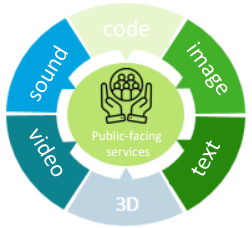


Difference with other technologies and traditional artificial intelligence

Today's chatbots have limited service capabilities, as they are based on traditional artificial intelligence (AI) systems and therefore on predefined dialogues. AI is used in public services mainly for automating tasks. The more sophisticated Gen AI can analyze data from customer interactions to suggest solutions, making it easier for employees in customer support positions to perform their tasks. The high value of such solutions lies in their capabilities to respond to and service a high volume of transactions, at high rates and by eliminating waiting times.

Benefits of Gen AI as a public-facing service tool

- Increase in customer satisfaction (CSAT Score)
- Availability at all hours, in real time
- Lower call abandonment rate
- Strengthening personalized service
- Reduction of operating costs
- Faster response times
- Service in multiple languages
- Scalability

Application to sectors of the economy

- Consumer goods, Retail trade
- Energy
- Financial Services
- Education
- Public Administration
- Technology, Telecommunications
- Health
- Media

Did you know that...

85% of executives say that Generative AI will interact directly with customers in the next two years without any human intervention (Source: IBM)

5 main categories of use cases | "Public-facing services" - examples of use cases

Typical Gen AI use cases for public service in the Public Administration and Consumer Goods Industry are the Digital Public Servant and Customer Service on demand, respectively

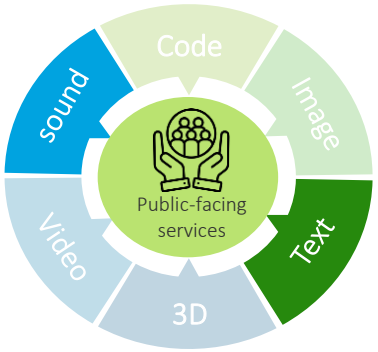
Digital Public Servant

Challenges

Public administration internationally - including in Greece - is significantly burdened by bureaucracy and the large volume of documents stored in a variety of formats, which makes it difficult to quickly access available information. As a result, the quality of service often falls short of expectations, creating a climate of mistrust among citizens regarding the functionality and efficiency of public administration bodies.

The "answer" of Gen AI

The Digital Public Officer (with the recent example of mAIgov.gr) can provide the necessary interface between citizens and the services of the Public Administration, through the creation of an interaction system that can respond quickly and with high quality to requests.
The Digital Public Servant can rapidly identify and summarize information from multiple sources on a multitude of issues in order to form appropriate responses to the queries of requesters, restoring confidence in Public Administration.



Critical success factors

- Ensuring the provision of accurate information/answers
- Continuous updating and updating of system information
- Protecting sensitive data from cyber-attacks

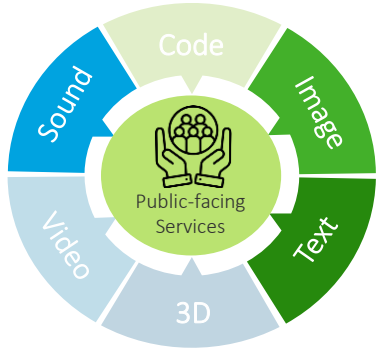
Customer service "on demand"

Challenges

Many companies operating in the consumer goods industry have already integrated certain **Artificial Intelligence (AI)** capabilities into their systems in order to provide automated and quick answers to their customers, should they seek information or support about a product or service. Such automation, however, has a limited ability to interpret customer questions and respond with absolute efficiency and accuracy.

The "answer" of Gen AI

An interactive Gen AI "assistant" can foster a new climate of communication and interaction with customers, as it can create personalized conversations during after-sales support by providing immediate responses, offering relevant solutions and managing complaints. As customers can get faster responses to their questions through Gen AI, businesses are able to free up human resources to focus on more complex service issues.



Critical success factors

- Ensuring the provision of accurate and personalized advice or guidance
- Enhancing transparency regarding the functionalities of the model
- A priori identification of customer expectations of the business, for the best possible system response

5 main categories of use cases | "Content generation" - overview

Trend towards the use of Gen AI

Existing AI solutions have the potential to focus on data categorization/recognition to support content development processes. The new achievement of Gen AI solutions is in the direct development of original content, thus enhancing creativity, the development of new ideas, and more efficient focus and customization to customer needs.

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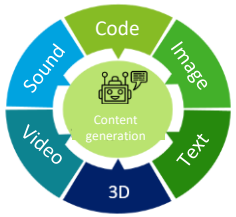

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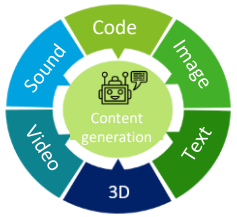


Difference with other technologies and traditional artificial intelligence

Gen AI has the ability to create new versions of data in a variety of formats, not just text. This makes it useful for creating marketing materials, original artwork, developing video games with dynamic and evolving content, and even creating synthetic data to train other Gen AI models, especially in scenarios where collecting real data may be difficult or impractical. In addition, by analyzing existing market trends, consumer preferences and historical data, Gen AI models can propose innovative insights that align with current market requirements in order to create new outputs.

Benefits of Gen AI as a content generation tool

- Increased productivity
- Improved user experience
- Trend analysis & research extraction
- Efficiency of available resources
- Creating original content
- Saving time
- Enhancing accessibility
- Compliance with regulations

Application to sectors of the economy

- Consumer goods, Retail trade
- Energy
- Financial Services
- Education
- Public Administration
- Technology, Telecommunications
- Health
- Media

Did you know that...

The 45% of employees in marketing departments spend more than 50% of the time within one working week, for the creation of content *(Source: Capterra's 2022 AI Marketing Survey)*

5 main categories of use cases | "Content generation" - examples of use cases

Gen AI technology can be applied to many industries, contributing significantly to the creation of content and products that respond to the needs of each business customer/user

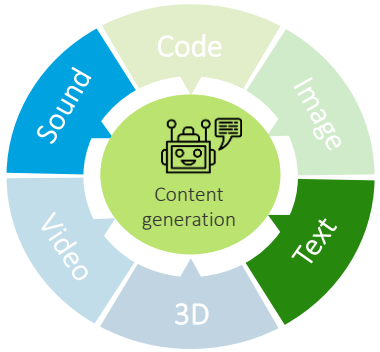
Marketing content assistant

Challenges

Businesses face a number of challenges when it comes to managing and optimizing marketing content. With a large number of websites for their product portfolios, businesses spend a lot of time and resources creating product descriptions for specific customer groups, images, videos, etc. A major issue, too, is achieving consistency in descriptions, iconography, ads and other media. It is therefore imperative to deliver personalized customer experiences quickly and in an automated manner, across a multitude of ecosystems and touchpoints.

The "answer" of Gen AI

Gen AI technology can therefore be used to generate dynamic content (product descriptions, images, videos) based on user data. This dynamic content can be used to create personalized ads / experiences and product recommendations, thus helping to increase business revenue / sales, but also to enhance customer / user engagement. Creating targeted content for specific user segments also helps save time and costs.



Critical success factors

- Ensuring accuracy and relevance of content produced
- Ensuring diversity and representativeness to avoid bias in the content produced
- Establish strong ethical guidelines regarding the use of sensitive data

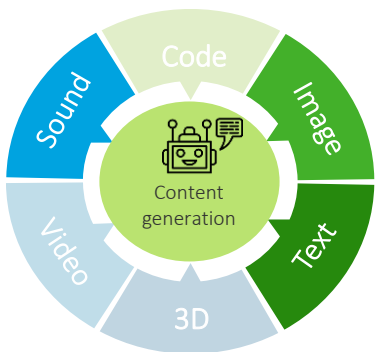
Product design assistant

Challenges

Product development is a time-consuming and demanding process for businesses. The need to fully understand customers' needs and preferences can be difficult and often requires extensive research. Moreover, in an environment where competition is fierce, creating products that stand out and offer something unique can be challenging. In addition, market needs can change rapidly, and businesses must adapt quickly to remain competitive by creating innovative products.

The "answer" of Gen AI

Gen AI can be applied to a multitude of industries, allowing businesses to innovate and offer products that meet modern market needs. Machine learning algorithms can analyze large data sets to discover trends, patterns and insights that can help create products that meet consumer needs. The use of machine learning algorithms, therefore, can help to optimize internal production processes, reduce costs or improve efficiency.



Critical success factors

- Design innovative products that can be manufactured and comply with the regulatory framework
- Protecting intellectual property rights when using Gen AI in the creative process

5 main categories of use cases | "Code management" - overview

Trend towards leveraging Gen AI

Generative AI can be used in many aspects of software engineering such as managing, developing, completing, debugging, documenting and restructuring of code. Images, sounds, texts and code can be fed into the Gen AI model from which, depending on the user's choice, a **new form** of code is produced in programming languages such as Python, JavaScript, Java, Verilog, C, C++, TypeScript and more.

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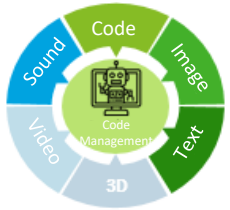

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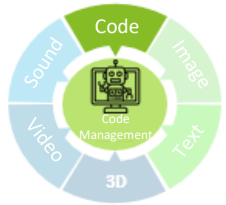


Difference with other technologies and traditional artificial intelligence

A key difference in relation to other technologies such as traditional artificial intelligence (AI) is the possibility of **developing new code** after the descriptive capture of the request. Artificial intelligence is mainly based on "deterministic systems" ("if-then" conditions), which use a set of rules that lead to predetermined results and are now suitable for generating code for repetitive tasks (e.g. GitHub Copilot, Amazon CodeWhisperer, etc). Therefore, the use of generative artificial intelligence is suitable for applications where the main prompt is descriptions in natural language.

Benefits of Gen AI as a Code Management tool

- Increased productivity
- Error detection and prevention
- Apply code standards
- Efficiency of time and resources
- Flexible decision making
- Documentation
- Cost management
- Data reliability

Application to sectors of the economy

- Consumer Goods, Retail
- Energy
- Financial services
- Education
- Public Administration
- Technology, Telecommunications
- Health
- Media

Did you know that...

Developers spend **~25-50% of their time per year** debugging. Gen AI greatly improves this issue, creating time for more creative tasks
(Source: Undo.io)

5 main categories of use cases | "Code management" - use case examples

Gen AI can significantly support the overall process of code development by performing functions such as pattern synthesis, testing, and documentation

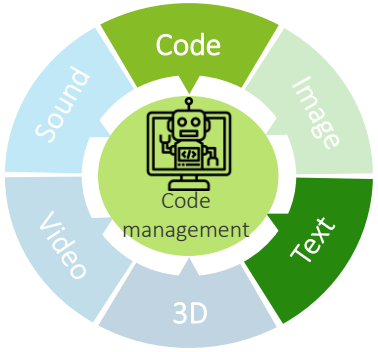
Code Support for Developers

Challenges

Code development is a complex process, involving a number of challenges. It requires specialized staff and its lack of consistency or inadequacy leads to slow applications and increased resource usage. The large amount of information and functions present significant problems for code review and testing to identify and correct errors. Additional code maintenance issues are related to compatibility with other systems, lack of security, and lack of documentation.

The "answer" of Gen AI

Using Gen AI to support code serves to offload ICT manpower and focus them on more complex and higher-value digital transformation tasks.
By using **Generative Artificial Intelligence** (Gen AI) faster completion of repetitive tasks is achieved, such as: *developing, maintaining, documenting and checking code, adapting functional code to different environments, data transformation, abstractions, etc.*



Critical success factors

- Ensuring accuracy and lack of errors
- Ensure transparency and explainability of documentation variables and comments
- Protection from cyber security risks

What do Gen AI applications bring to code development?

Through Gen AI, code development as a whole is done without the need for human intervention, as was required until now. Developer teams provide the system with descriptions or specifications, with Gen AI developing or suggesting code that meets the requested functionality. In this way, human resources are focused on processes to achieve maximum quality and reliability of the models, while minimizing the possibility of human error.

The testing process, due to the large amount of data that requires testing, has until now required significant human effort. Gen AI can automatically detect bugs or predict where they might occur, discover opportunities for optimization, and suggest code restructuring points to upgrade its quality, allowing developers to engage in the strategic decision-making and solutions they want to "build".

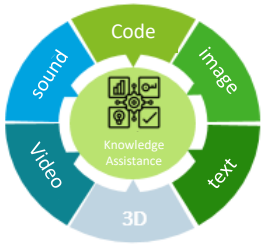
Code documentation is a defining process of the overall process, which until now has been mostly done manually. Gen AI can generate, without human intervention, comments / explanations / documentation summaries for specific functions or even entire user manuals in order to make the code understandable to others. Also, this technology has the ability to translate code into other programming languages, if there is a need to change or adopt the code in another environment.

5 main categories of use cases | "Knowledge assistance" - overview

Trend towards leveraging Gen AI

Gen AI models have access to a range of both structured and unstructured data which they can equally well read, understand, synthesize and extract useful information to the user. Creative artificial intelligence can emerge as a key tool capable of improving business agility, efficiency, productivity, operating costs and data security.

Elements of "import" Inputs / Prompts



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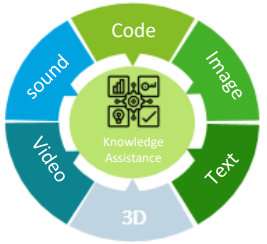


Difference with other technologies and traditional artificial intelligence

A key difference of Generative AI compared to traditional AI is the **ability to understand** a wide range of data in different formats - both structured and unstructured. Traditional artificial intelligence, due to its nature of being based on rule-based systems, does not handle data as efficiently, especially when it comes to understanding the content of primary sources as it mainly operates on the basis of available metadata. Traditional AI is at a disadvantage in extracting targeted information and especially using natural language in relation to the possibilities provided by Gen AI.

Gen AI benefits as a Knowledge assistance tool

- Increased productivity
- Access & analyze range of information
- Automation
- Efficiency of time and resources
- Enhanced decision making
- Efficient information retrieval
- Cost management
- Creativity and ingenuity

Application to sectors of the economy

- Consumer Goods, Retail
- Energy
- Financial services
- Education
- Public Administration
- Technology, Telecommunications
- Health
- Media

Did you know that...

The adoption of Gen AI solutions by businesses, in the field of knowledge management rose in 2022 to 32%, compared to 2020, where this percentage reached 5%. *(Source: KMWorld)*

5 main categories of use cases | "Knowledge assistance" - use case examples

Gen AI can contribute to more effective knowledge management, both in the internal processes of a business, as well as in processes related to the provision of on-site services / support tasks

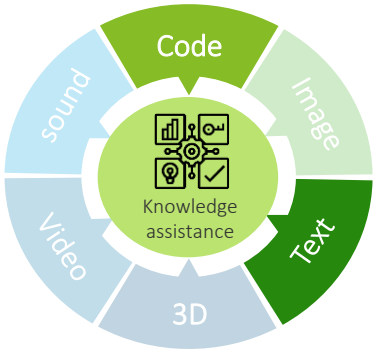
Repositories of Knowledge at your "fingertips".

Challenges

Businesses have a **large volume of files** necessary for their operations, which they store in a multitude of isolated "locations" - from local hard drives to the cloud - with existing interfaces only able to answer pre-defined questions. This makes it difficult to efficiently and quickly retrieve information and, by extension, can lead to the collection of incomplete or incomplete information and subsequent customer dissatisfaction, or inefficient work performance

The "answer" of Gen AI

Gen AI can be the **interface** between different layers and databases, allowing business personnel to more easily gather the available information on whatever topic they are looking for using “natural” rather than just technical language.
This reduces the time to retrieve combined information and increases the accessibility of the entire workforce to an enterprise's knowledge repositories.



Critical success factors

- Ensuring valid information/answers are provided
- Ensuring adequate interpretation of the information retrieved by the search
- Protection of sensitive data and information confidentiality

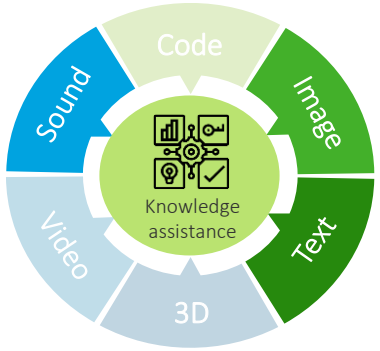
Support in the field

Challenges

There are many circumstances, such as in the case of telecommuting or working in remote areas, where human resources are faced with a lack of adequate information. The lack of information may be related to the absence of manuals for the efficient execution of an activity. As a result, significant delays and obstacles are created in the smooth execution of the required tasks.

The "answer" of Gen AI

An interactive Gen AI “assistant” in the field can act as a point of reference and provide human resources with easy access to a vast amount of technical information. In addition, the AI virtual "assistant" can be a catalyst in solving problems, allowing the user to ask questions in natural language, returning appropriate answers to identify causes or providing step-by-step instructions for resolution. Finally, Gen AI can clarify upon request concepts and principles critical to the activity at hand.



Critical success factors

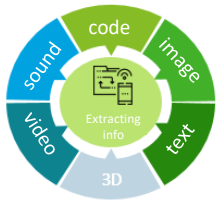
- Ensuring that up-to-date information is provided to derive correct results
- Critical evaluation of Gen AI results
- Formulate "guidelines" and procedures to deal with cases of operational failure

5 main categories of use cases | "Extracting information from unstructured data" - overview

Trend towards leveraging Gen AI

A core capability of generative AI is **extracting/returning structured information** from a range of structured and unstructured data, on which the Gen AI model is trained. A typical example is the automated reading and understanding of multiple and distinct forms of information, for the extraction and synthesis of structured and personalized information based on the requested description (prompt) entered into the model.

Elements of "import" Inputs / Prompts



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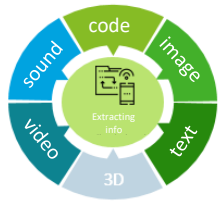


Difference with other technologies and traditional artificial intelligence

The main distinguishing difference between generative and traditional artificial intelligence is the ability of the former to understand texts that are not accompanied by relevant meta-data and, subsequently, to locate within them the requested information. In this context, Gen AI solutions have the ability to not simply return the entire text where the relevant information is found, but to isolate it in a structured format. In contrast, traditional artificial intelligence focuses on recognizing recurring patterns, while struggling to combine multiple sources of unstructured information to extract information.

Gen AI benefits as tool for extracting information from unstructured data

- Create custom solutions
- Improved user experience
- Structured information extraction
- Efficiency of time and resources
- Data-driven decision making
- Efficient information retrieval
- Access & analyze range of information
- Data reliability

Application to sectors of the economy

- Consumer Goods, Retail
- Public Administration
- Energy
- Technology, Telecommunications
- Financial services
- Health
- Education
- Media

Did you know that...

By 2025, it is predicted that the global data set will be in the order of 175 Zettabytes, with 80% of this being unstructured data – while 90% of unstructured data is not analyzed
(Source: IDC)

5 main categories of use cases | "Extracting information from unstructured data" - example use cases

Gen AI can be leveraged to extract information from unstructured data, among other things, in processes related to interacting with a company's customers to deliver critical services

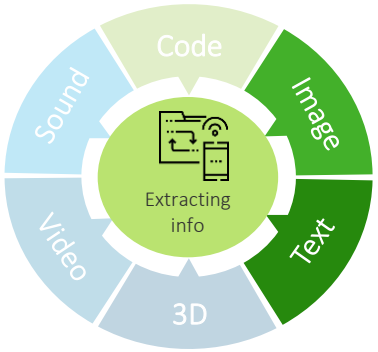
Automated claims reporting

Challenges

When processing claims for property and casualty insurance, employees must **decide whether the events merit compensation**. If this is the case, employees must identify the extent and cost of the damage. This process is complex and can be time-consuming. In addition, employees have few tools at their disposal to support decision making.

The "answer" of Gen AI

Generative AI can be used to help **visualize the damage** by converting the request from text to image. The basis for visualization can be customer conversations, claims documents, photographs, official reports and other relevant media. In this way, by visualizing the data, employees enhance their abilities to make better decisions when assessing the extent and cost of damage.



Critical success factors

- Ensuring the correct visualization of items and avoiding misleading information
- Ensuring adequate interpretation of the information retrieved by the search
- Protection of sensitive data and information confidentiality

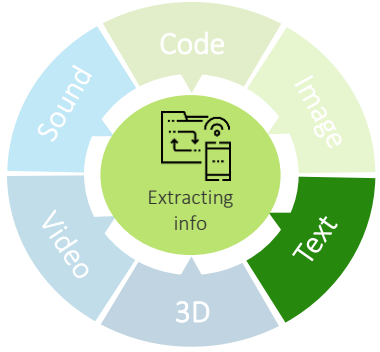
Automation of AML processes

Challenges

Attracting new customers is an important source of business growth, but especially in the financial industry the necessary **Anti-Money Laundering (AML) checks** of new customers can be an extremely time-consuming process. Financial institutions are required to develop transactional financial profile reports for new customers based on a variety of financial and non-financial criteria. These are tasks that require high human intervention, with the associated desk research consuming valuable time and resources.

The "answer" of Gen AI

Gen AI can be used to **summarize and filter results / findings** from a variety of search engines and automate the development of transactional financial profile reports, as well as generate more concise reports for CRM departments, potentially speeding up the process of onboarding of new clientele.



Critical success factors

- Ensuring consideration of all relevant required information
- Protection of sensitive data and information confidentiality

Presentation of results of the SEPE / NDC / Deloitte survey on Gen AI

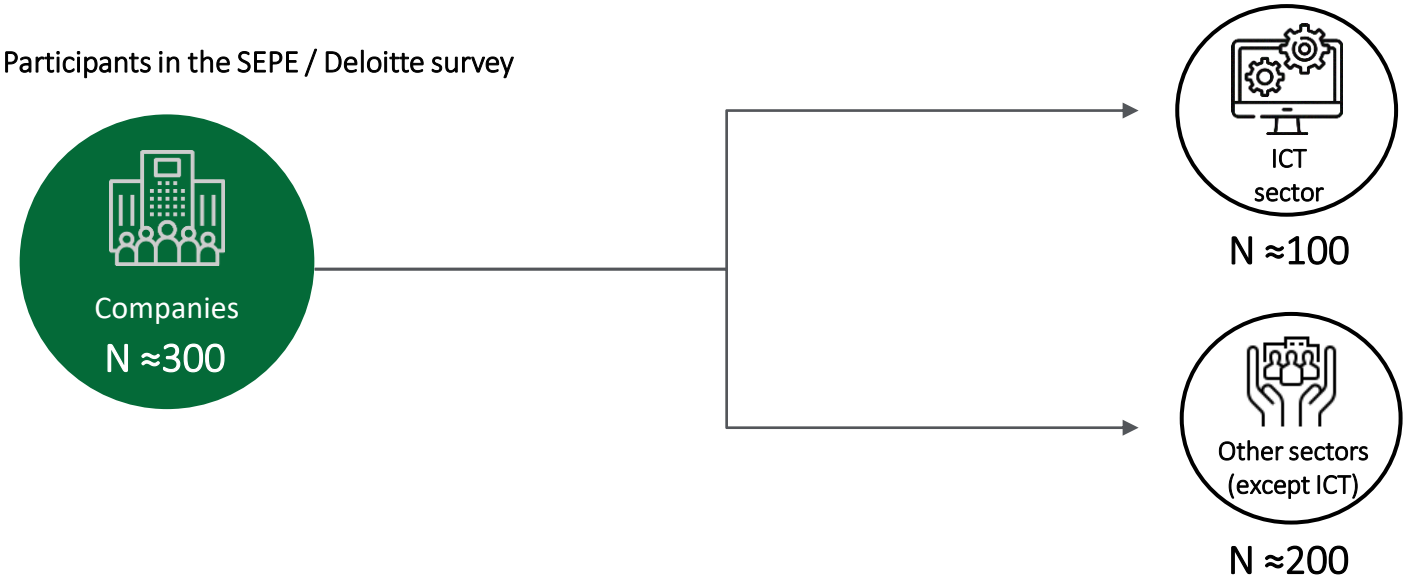
SEPE / Deloitte Survey on GEN AI | The characteristics of the survey

The aim of the survey was to investigate the degree of adoption of Gen AI technologies and solutions in the daily operation of Greek businesses, both in the ICT sector and in other sectors of the economy.

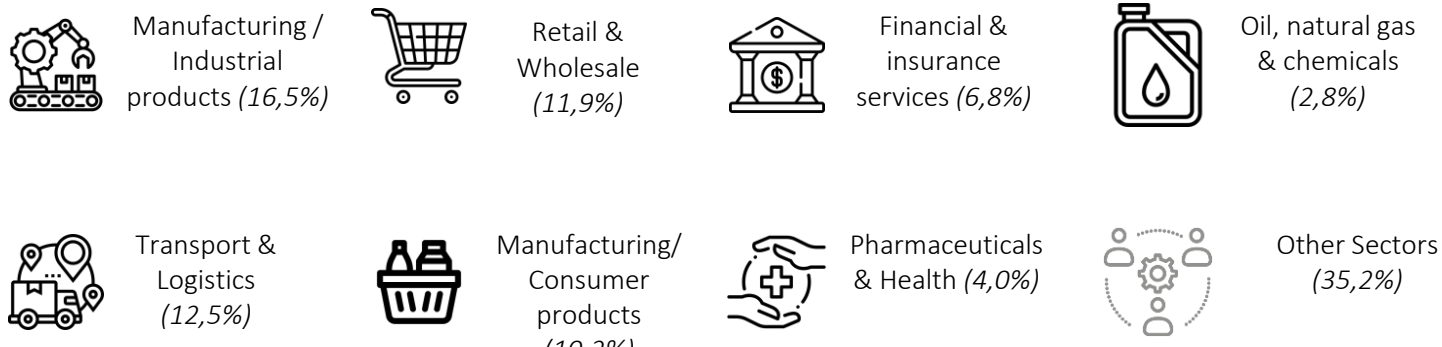
- A primary and anonymous survey
- Conducted by SEPE, in collaboration with Deloitte, and with the support of the National Documentation Centre (NDC)
- ICT companies (members SEPE Federation)
- Selected sample of enterprises in other sectors*
- Survey ran during the period 16.10 - 3.11.2023

**The questionnaire was sent by the NDC to ~2.000 businesses that in a previous NDC survey had characterized artificial intelligence as "important" or "very important" for their digital transformation*

Number of Participants in the SEPE / Deloitte survey



Sectors of survey participants (excluding ICT) - % participation

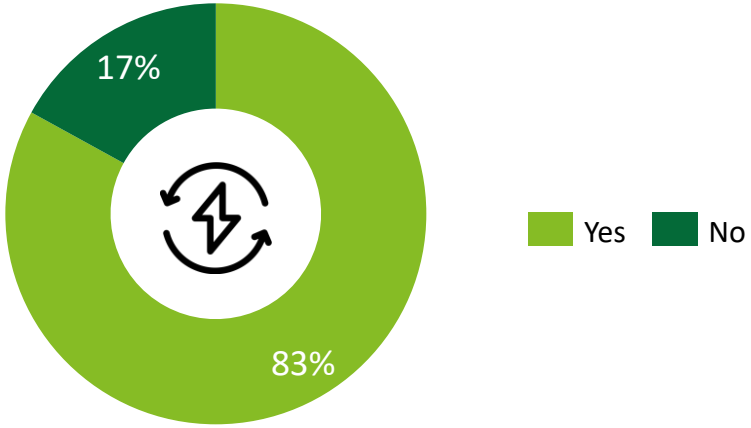


Source: Primary survey by SEPE / NDC / Deloitte, 2023

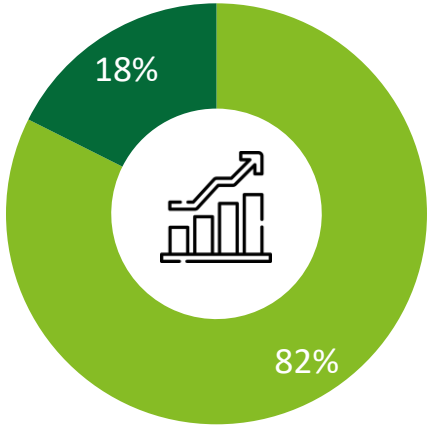
Analysis of survey results - Non-ICT Sectors | Productivity and Growth

More than 82% of businesses - excluding ICT - claim that Gen AI solutions can boost the productivity/growth of their companies, yet only 9% of them have already adjusted their strategy

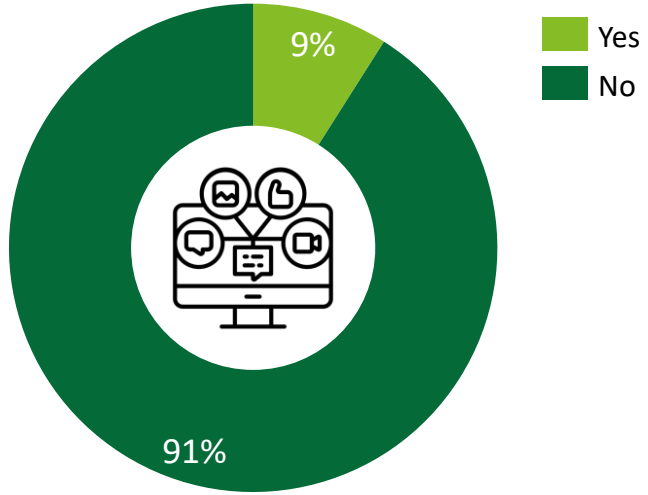
Can Gen AI solutions improve the productivity of your business?



Can Gen AI solutions improve your business growth?



Have you adjusted your strategy for integrating Gen AI solutions?



The highest percentages of positive responses come from businesses in the following 2 sectors:

- Financial & insurance services (92%)
- Transport & logistics (91%)

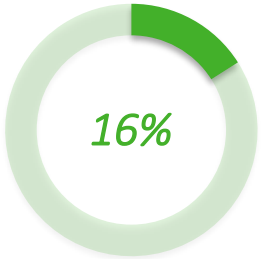
Source: Primary survey by SEPE / NDC / Deloitte, 2023

Analysis of survey results - Non-ICT Sectors | Current stage of Gen AI maturity

Among companies in other sectors (excluding ICT), 69% have not yet engaged with Gen AI solutions, 16% are evaluating such solutions, while only 15% are currently at a stage where they are experimenting with them

At what stage of maturity is your business today in terms of leveraging Gen AI solutions?

experimenting with the use of Gen AI solutions



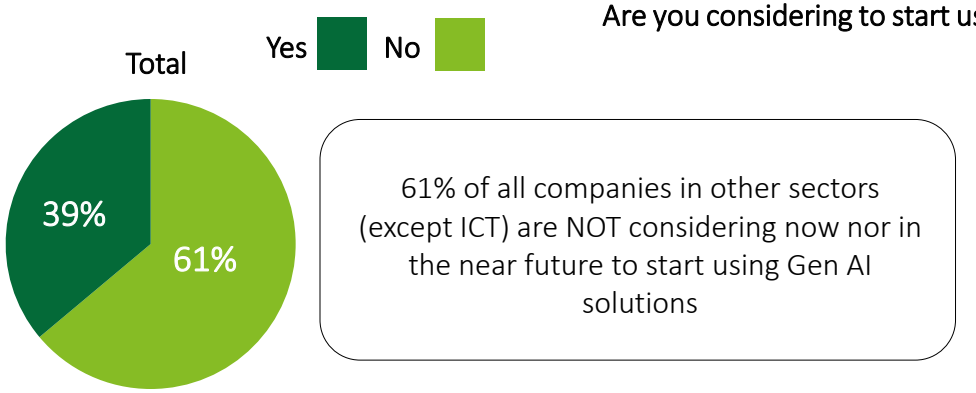
evaluating Gen AI solutions

Have NOT yet addressed the use of Gen AI solutions

Source: Primary survey by SEPE / NDC / Deloitte, 2023

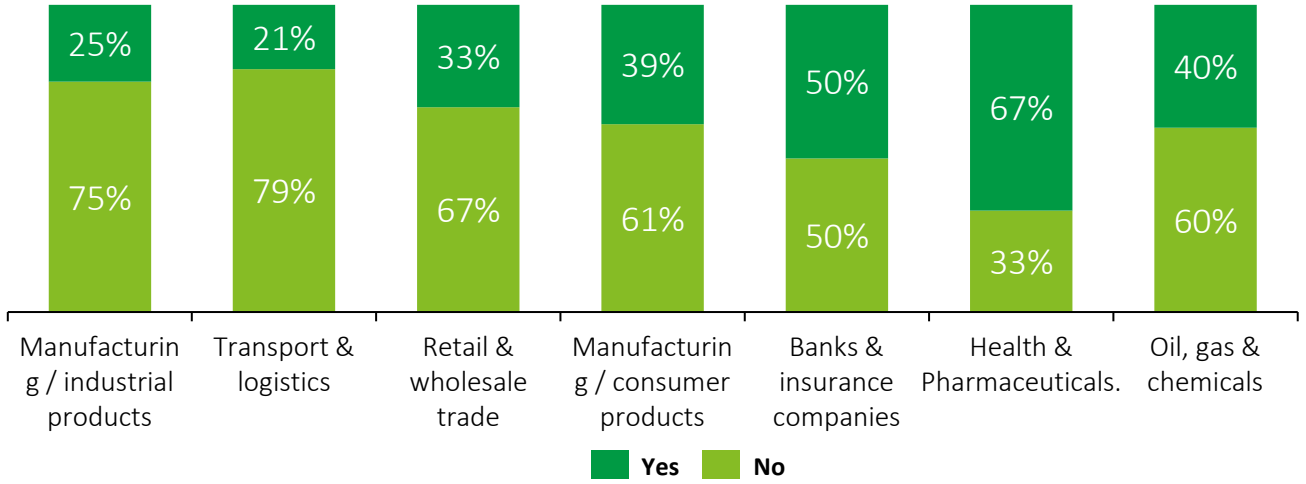
Analysis of survey results - Non-ICT sectors | Exploiting Gen AI solutions in the future

The majority of businesses (outside of ICT) do not intend to integrate such solutions into their operations in the foreseeable future. However, companies that have such plans with the main use cases being customer service, IT support and marketing



61% of all companies in other sectors (except ICT) are NOT considering now nor in the near future to start using Gen AI solutions

Are you considering to start using Gen AI solutions in your business?*



** The graph shows the responses of the sectors most represented in the sample*

Top-3 use cases among companies that have relative plans to integrate Gen AI solutions

- Service / customer experience
- IT support
- Marketing / Promotion

The highest percentages of positive responses come from businesses in the following 2 sectors:

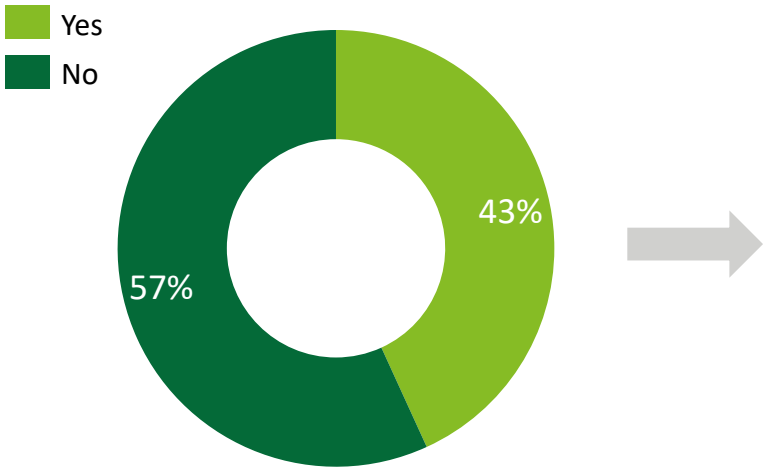
- **Health & Pharmaceuticals (67%)**
- **Financial & Insurance Services (50%)**

Source: Primary survey by SEPE / NDC / Deloitte, 2023

Analysis of survey results - Non-ICT sectors | Intentions to use Gen AI solutions

Through the survey, it was revealed that most Greek companies have no concerns about using Gen AI solutions. However, where they do exist, they are mainly related to the regulatory framework and security issues

Do you have concerns about using Gen AI in your business?



Areas of concern

- 31% Unclear regulatory framework
- 12% Projection against bias in the material produced
- 28% Leaks of confidential information
- 11% Lack of transparency
- 15% Copyright infringement
- 3% Other

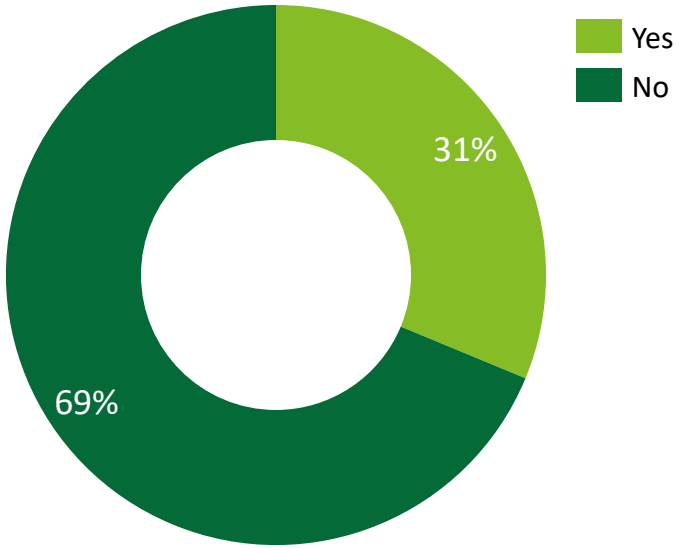
The majority of businesses in sectors other than ICT (57%) have no reservations about using Gen AI, which is positive for the prospect of integrating such technologies within Greek businesses in the future.

Source: Primary survey by SEPE / NDC / Deloitte, 2023

Analysis of survey results - Non-ICT sectors | Barriers to adoption of Gen AI solutions

Most Greek companies do not seem to face significant barriers to using Gen AI. However, where they do occur, these mainly stem from the lack of relevant knowledge/skills

Do you have barriers towards using Gen AI in your business?



Obstacles identified

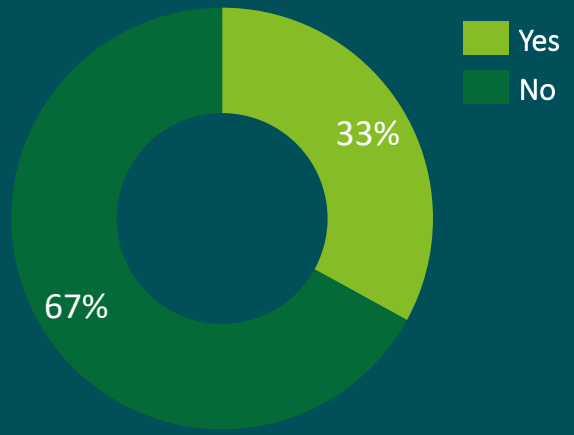
- 29% Lack of internal skills
- 29% Lack of knowledge around potential applications / use cases
- 21% Lack of appropriate partnerships with third parties
- 18% Risk-averse corporate culture
- 3% Other

Source: Primary survey by SEPE / NDC / Deloitte, 2023

Analysis of survey results - ICT sector | Customer support through Gen AI solutions

67% of ICT companies have not adjusted their strategy towards Gen AI. Customer service is a top priority use case, both for the customer base of ICT companies and for the ICT companies themselves

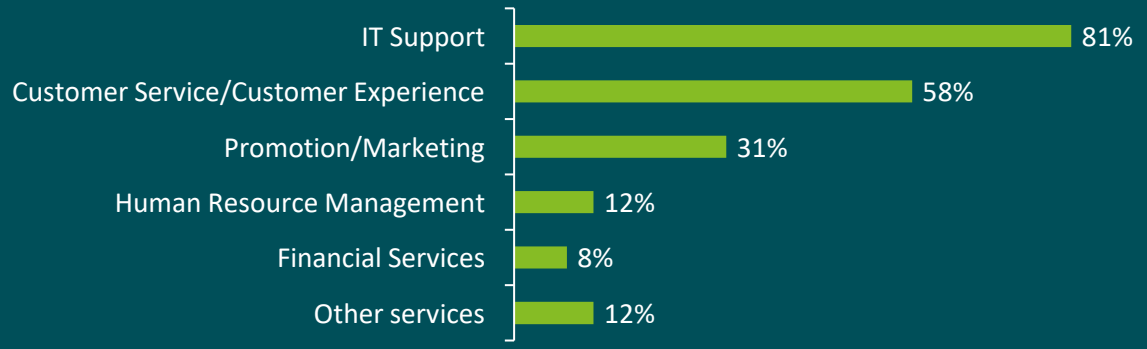
Have you adjusted your strategy for integrating Gen AI solutions?



2 out of 3

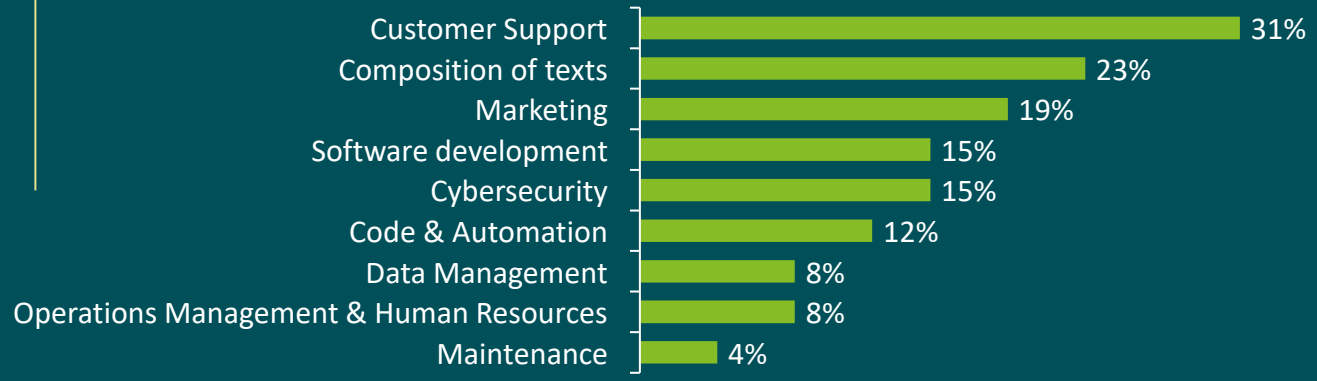
ICT companies say they have not adjusted their strategy to integrate Gen AI solutions

Gen AI Use Cases that ICT companies are expected to offer to their clients *



*Question where multiple answers were possible

Gen AI Use cases that you are thinking of using yourself in the internal operation of your company?*



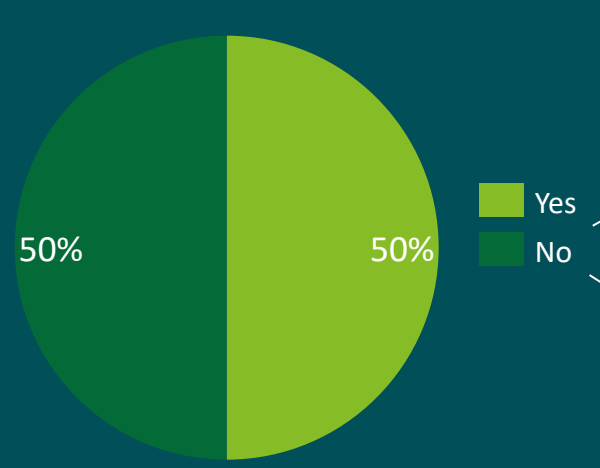
*Not compulsory - open question /This question allows multiple answers

Source: Primary survey by SEPE / NDC / Deloitte, 2023

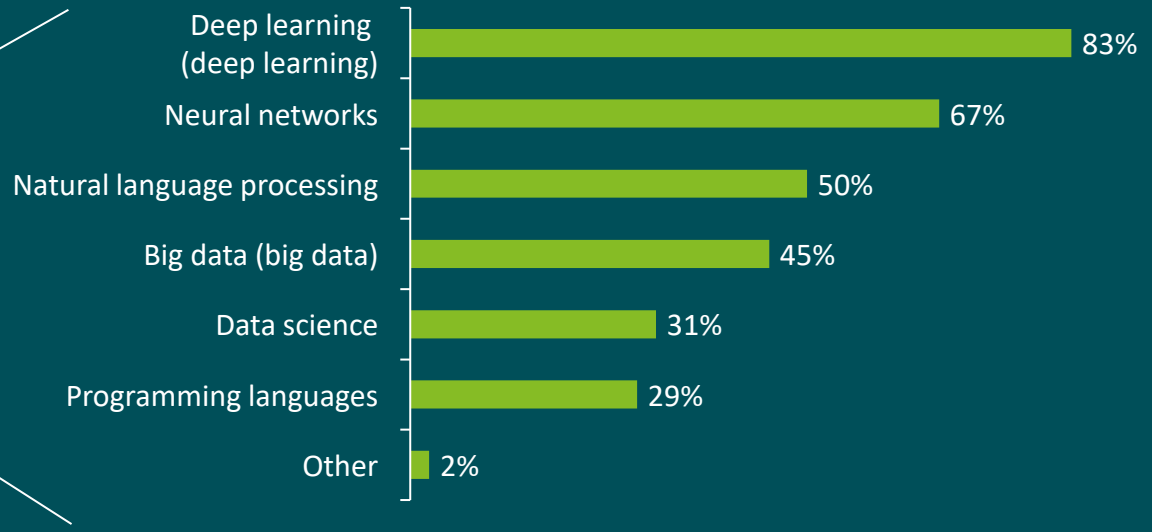
Analysis of survey results - ICT sector | Staff knowledge/skills

Based on the survey, companies that consider that they already have staff with the necessary knowledge/skills are evenly matched with those that consider that there is room for further skills development around Gen AI

Does your existing staff have the necessary knowledge/skills to develop/utilize Gen AI solutions?



Skills missing from existing staff



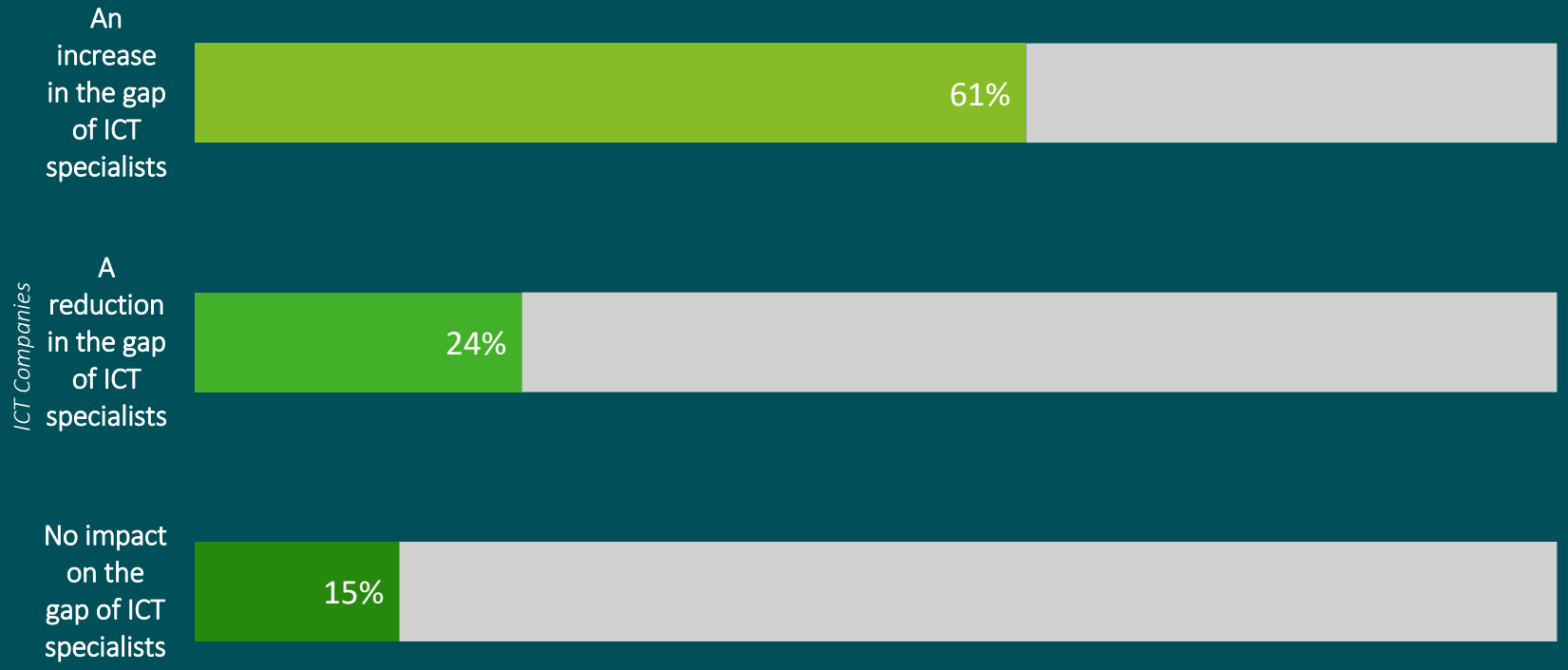
*Question where multiple answers were possible

Source: Primary survey by SEPE / NDC / Deloitte, 2023

Analysis of survey results - ICT sector | ICT skills gap

According to the results of the survey of companies in the ICT sector, the majority believe that the ICT skills gap is set to increase due to Gen AI

A previous study by SEPE and Deloitte estimated that there is a gap of 7.000 – 7.500 positions per year in ICT specialists by comparing supply and demand.
Do you anticipate that Gen AI will lead to:



3 out of 5

companies in the ICT sector estimate that Gen AI is going to lead to an

increase of the vacuum

to ICT specialists

Source: Primary survey by SEPE / NDC / Deloitte, 2023

Impact of Gen AI on the Greek economy

Impact of Gen AI on the Greek economy | Introduction

In the context of the present study, an assessment of the impact of Gen AI on two "axes" was carried out - on the one hand on the growth of the economy and on the other hand on employment with a special emphasis on the demand for ICT specialists

Impact on GDP

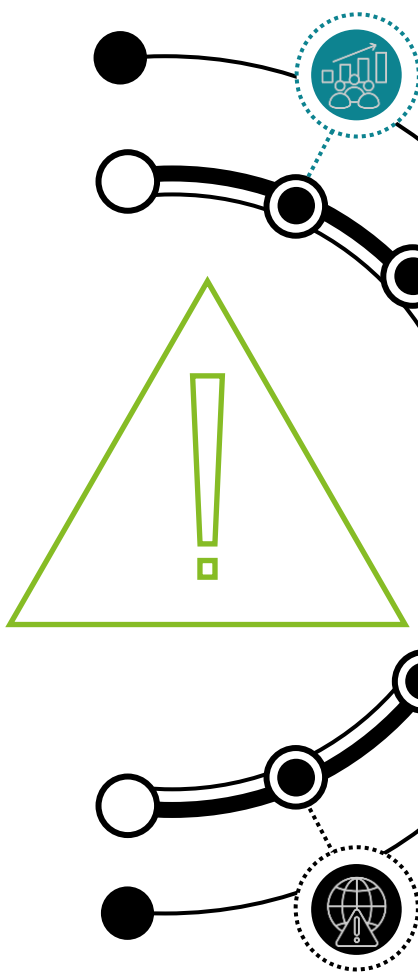
The 1st axis of assessment of the effects of Gen AI, which concerns the imminent impact on GDP, is mainly linked to the projected increase in productivity that is expected to be achieved by the adoption of Gen AI solutions

Implications for the ICT specialist gap

The 2nd axis of assessment of the effects of Gen AI, which concerns the imminent impact it will bring to the ICT specialist gap, is based on last year's SEPE / Deloitte study on the "Assessment of the sufficiency of ICT Specialists" and is mainly linked to the predicted change in demand for relevant human resources

Impact of Gen AI on the Greek economy | Qualitative parameters

Regarding the impact of Gen AI on both GDP and employment (ICT specialists), there are a number of qualitative parameters that may determine the degree of its impact on the Greek economy, which cannot be precisely determined in advance



New, **unpredictable** demand for human resources, either due to increased technological capabilities or GDP growth (which usually leads to greater demand for human resources more broadly)

Re-skilling & Up-skilling

New, emerging trends, to refocus resources in the technology sector (e.g. twin transition of the economy)

Freeing up resources to deal with more **critical processes**

Creation of **new professions** that do not exist today

External volatile factors that may have a significant impact on the international and/or national economy

Source: Deloitte analysis

Impact of Gen AI on the Greek economy – Impact on GDP

Impact on GDP | Methodological approach

In order to assess the impact of Gen AI on the Greek economy, a number of factors were taken into account, starting from the current levels of productivity and taking into account estimates for the achievement of this improvement, thanks to automation and work augmentation within individual sectors of the economy until 2030.

Breakdown by sector of the economy (NACE-2 level of analysis)

Starting point: GDP – Employment – Productivity 2023

1 Real GDP in total and by sector for 2023

A calculation was made for the country's total (real) GDP taking into account the latest available data and growth estimates. Based on the gross added value per sector, the contribution to the total GDP of each sector of the economy was approximated.

2 Employment overall and by sector for 2023

A calculation was made for the total employment of the country taking into account the latest available data and estimates of its development.

3 Current Productivity by Industry for 2023

Current productivity by sector for the year 2023 was calculated based on GDP and employment, i.e. the GDP "produced" by each employed person in individual sectors of the economy (before any impact of Gen AI)

Impact of Gen AI by sector of the economy

1 Productivity improvement due to Gen AI by 2030*

The new productivity per year was calculated on the basis of international studies on the effect of Gen AI on human work, in more detail the following were taken into account:

- ✓ *the % of jobs per industry expected to be affected (~5-10%)*
- ✓ *the degree of impact on the productivity of the tasks in question by sector (~10-35%)*
- ✓ *lower impact for executive jobs (5% of total staff) - in the context of their role*

2 Employment calculation by sector until 2030

The estimated – on an annual basis - employment for each sector was calculated as a result of 2 counterbalancing "forces" (based on international studies):

- ✓ *to some degree reduction in employment due to automation by Gen AI (from 0% in 2023 to 0,6% in 2030)*
- ✓ *parallel increase in employment as a result of economic development - GDP growth (weighted average, ~0,5% per year)*

3 Calculation of (real) GDP by sector until 2030

Real GDP by sector and by year up to 2030 was calculated taking into account 'new' productivity and 'new' employment as estimated to have been affected by Gen AI

Country level analysis

Impact of Gen AI on Greek GDP by 2030

1 Calculation of real GDP

To calculate the total annual GDP, the following were carried out:

- ✓ *concentration of Gen AI impact results on GDP in each distinct sector of the economy and*
- ✓ *factoring in the projected GDP growth that would exist even without the adoption of Gen AI solutions*

As a result, the estimated total annual GDP growth was derived.

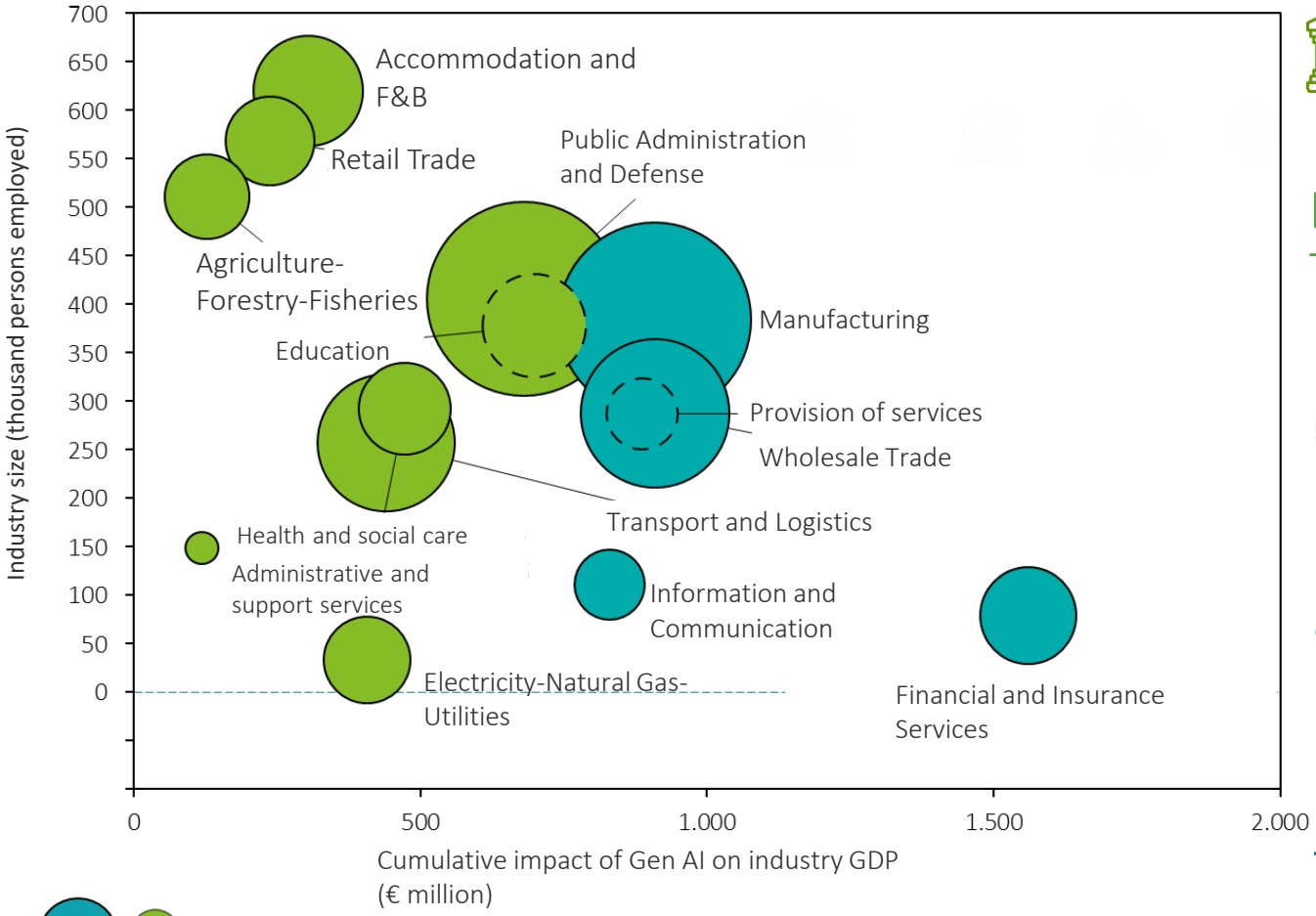
* The figures presented correspond to a "prudent" approach captured in the context of a base scenario. Based on this scenario, it was estimated that the country would achieve high but not the maximum degrees of automation due to Gen AI reported by international studies, while it was estimated that it would achieve this productivity improvement with a time lag compared to larger economies.

Note - Sources used: ELSTAT, Access Partnership, Forrester Research, International Labor Organization (ILO), Economist Intelligence Unit

Impact of Gen AI on the Greek economy | Impact on GDP - Results

48% of the impact of Gen AI is estimated to come from 5 sectors of the economy: Financial and Insurance Services, Wholesale Trade, Manufacturing, Service Providers and Information & Communication

Sectors concentrating the greatest impact of Gen AI on GDP
(The depicted sectors correspond to ~80% of the Greek GDP)



The size of the bubble represents the percentage (%) contribution of the sector to the country's total GDP, based on the current distribution of GDP by sector

Indicative use cases of Gen AI that will drive productivity gains in selected leading sectors of the economy

Financial and Insurance Sector: Advanced fraud detection systems | Virtual assistants providing personalized service

Wholesale Trade : Supply chain optimization with demand variation forecasts | Development of pricing and profitability estimation models

Manufacturing: Creation of patterns and correlations by taking sensor and maintenance historic data to predict equipment malfunction| Simulation and evaluation of multiple maintenance scenarios to ensure operational effectiveness of equipment

Provision of Services : Data analysis to develop proposals for improving the performance and quality of services | Development of technical user manuals

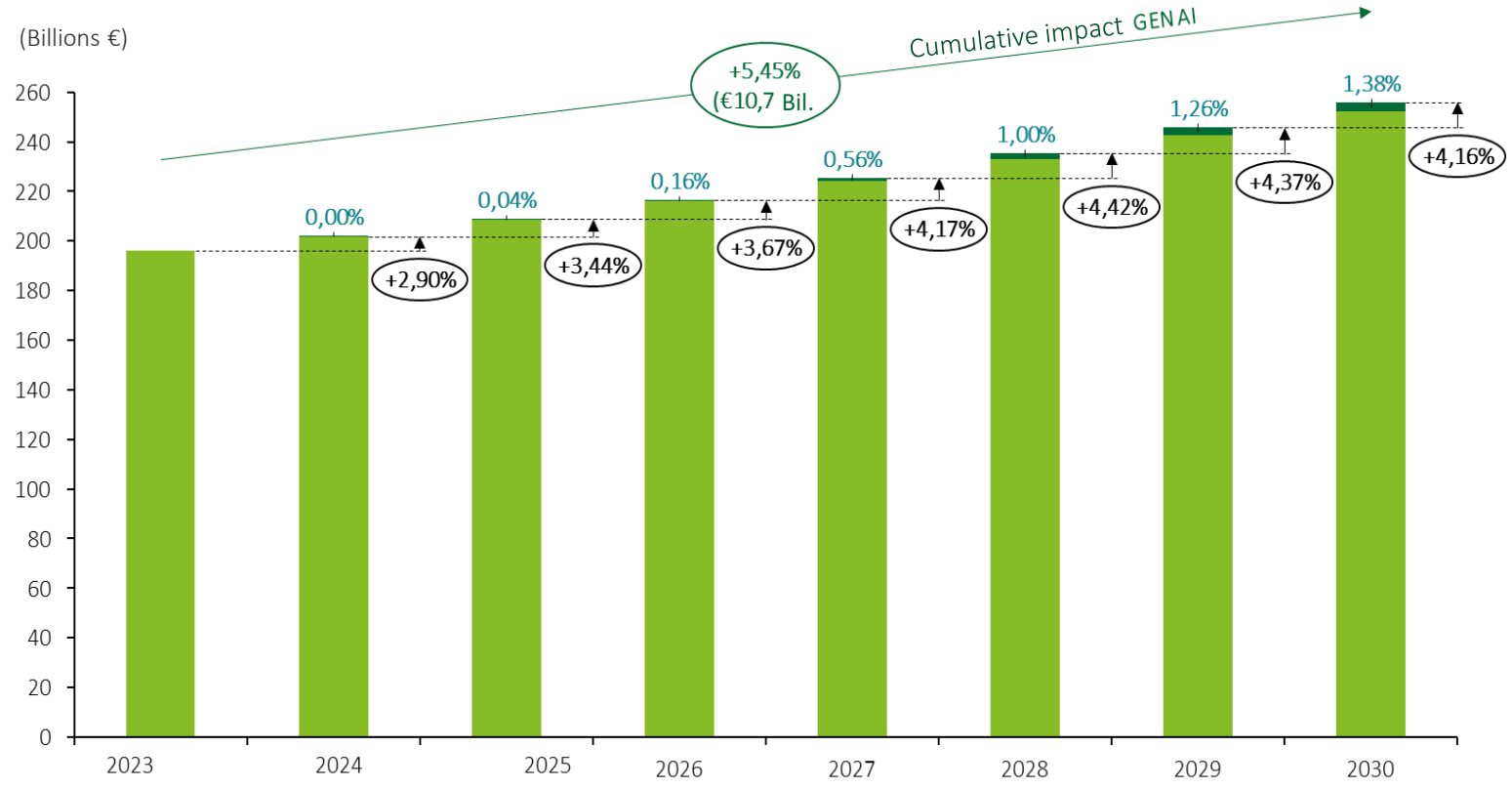
Information & Communication: Development of technical specifications | Creation of marketing content with local market adaptation

Source: Deloitte analysis

Impact on GDP | Aggregated results

The impact of Gen AI on the Greek economy is expected to be significant, with an estimated impact of a +5,5% increase of the country's GDP by 2030...

Impact of GEN AI on Greek GDP



Cumulative impact of Gen AI (%)

By 2030

+5,5%

Cumulative impact of Gen AI (€)

By 2030

+~10,7Bil.

Source: Deloitte analysis

% Annual GDP growth rate attributable exclusively to GEN AI

(%) Total annual GDP growth rate, including the effect of GEN AI

Isolated effect of GEN AI on GDP

Annual GDP without the effect of GEN AI

Impact on GDP | Alternative scenarios

... moreover, for the impact of Gen AI on the Greek economy, scenarios have been developed, with the most optimistic ones estimating that the impact on the country's GDP by 2030, could reach an increase of up to ~10%, if the country manages to be at the center of international developments

Impact of GEN AI on Greek GDP

"Base Scenario"

Cumulative impact of Gen AI (%)

By 2030

+5,5%

Cumulative impact of Gen AI (€)

By 2030

+~10,7 bil.

"Optimistic Scenario"

Cumulative impact of Gen AI (%)

By 2030

+7,3%

Cumulative impact of Gen AI (€)

By 2030

+~14,3 bil.

"Leading Country"

Cumulative impact of Gen AI (%)

By 2030

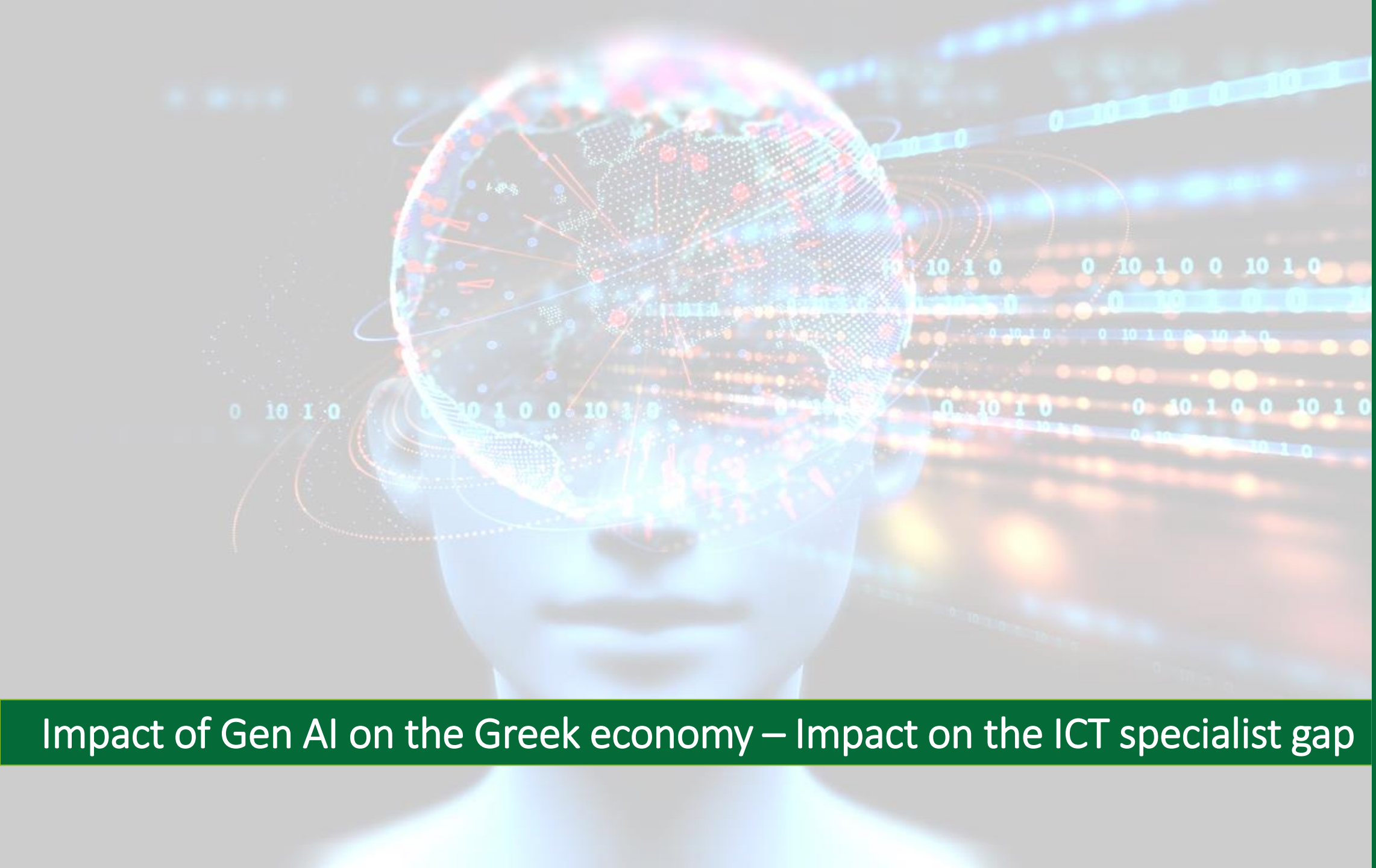
+9,8%

Cumulative impact of Gen AI (€)

By 2030

+~19,2 bil.

Source: Deloitte analysis



Impact of Gen AI on the Greek economy – Impact on the ICT specialist gap

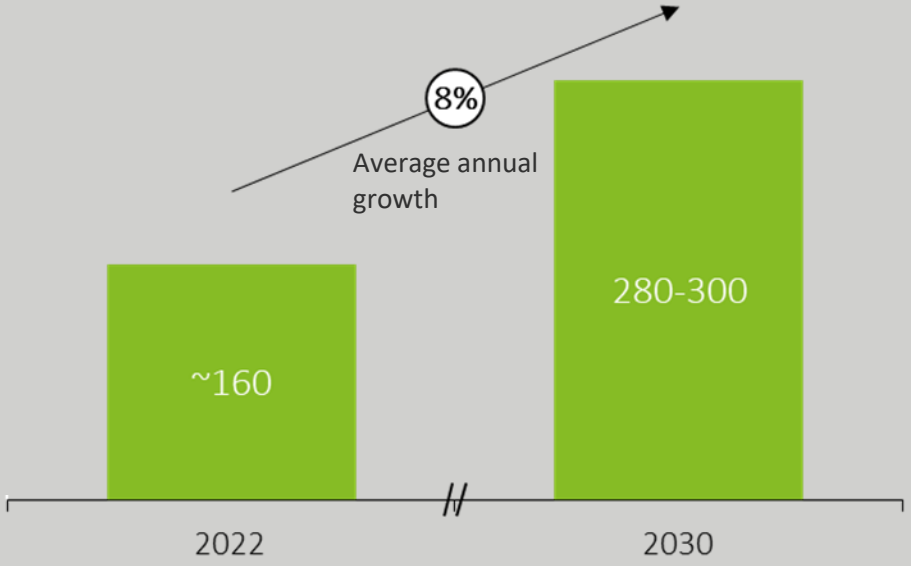
Impact on the ICT specialist gap | Study results 2022

An annual gap in ICT specialists of 7.000 – 7.500 was estimated in 2022. As the exploitation of Gen AI solutions requires a significant contribution of the ICT industry, the impact on their potential was studied, based on the improved productivity that the industry itself can achieve

2022 SEPE / Deloitte Study on the Assessment of the Sufficiency of ICT Specialists*

Let's remember…

Estimate of ICT experts, 2022 & 2030 (in thousands)



Demand

~15.000-16.000

the additional demand for specific ICT specialists per year for the period 2023-2030

Supply

~8.000-8.500

the supply of ICT specialists per year for the period 2023-2030

Gap

~7.000-7.500

ICT specialists are "needed" by year due to the demand-supply gap for the period 2023-2030

** For more details see SEPE study - Deloitte "Assessment of the Sufficiency of ICT Specialists in Greece", 2022*

Source: Deloitte analysis

Impact on the ICT specialists gap | Methodological approach

In order to determine the impact on the employment of ICT specialists due to Gen AI, the estimated values of the 2022 SEPE - Deloitte study "Assessment of the sufficiency of ICT Specialists in Greece", were used and redefined based on the estimated impact of Gen AI due to new needs, automation and work augmentation.

Calculation of new potential demand due to Gen AI (increased needs)

1 Starting point: 2022 SEPE - Deloitte Study

- Utilization of estimated ICT specialist supply and demand figures per year – up to 2030

2 Identification of potential increased demand due to Gen AI

- Estimated increase in demand for ICT specialists due to the proliferation of Gen AI and the subsequent digital transformation that ICT specialists will be called upon to support
- Based on international studies, it has been estimated that the additional demand for ICT specialists that Gen AI will create cumulatively by 2030 may reach **20%**

It is noted that historically certain countries have achieved corresponding growth rates of ICT specialists over a similar time period

Note - Sources used: ELSTAT, International Labor Organization (ILO)

Calculation of reduced forecast demand due to Gen AI (automation & work augmentation)

1 Categorization of ICT specialists

- Developers were estimated to be the work profile among ICT professionals expected to be most impacted by Gen AI solutions
- Developers were separated from other ICT specialists in order to estimate the impact of Gen AI more accurately, based on an international distribution *(46% of ICT specialists were estimated to be developers)*

2 Automation

- Gen AI has the potential to fully automate individual processes in the ICT industry, resulting in reduced demand.
- This reduction has been calculated based on relevant studies and a corresponding assumption to adjust this incidence for programmers (2.5%) and other ICT specialists (1.5%) respectively.

3 Work Augmentation

- At the same time, Gen AI is expected to speed up the processing of work performed by ICT specialists, leading to an increase in their productivity and, therefore, a reduction in demand.
- This reduction in demand has been calculated based on relevant studies and a corresponding assumption to adjust this impact for programmers (15.5%) and other ICT specialists (7%) respectively.

Calculation of gap between Demand and Supply

1 Gap calculation based on current status

Demand is affected by 3 counterbalancing "forces".

- increase in demand due to increased needs
- decrease in demand due to automation
- decrease in demand due to the enhancement of productivity (work augmentation)

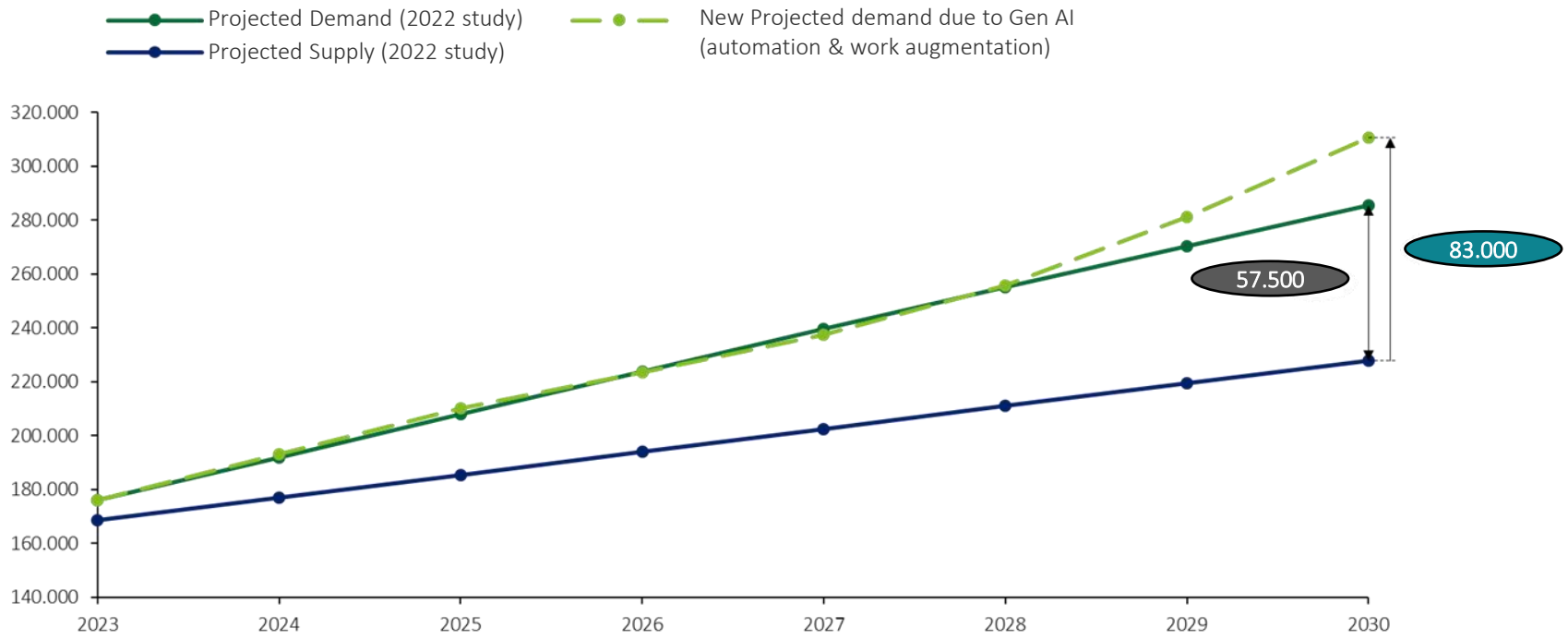
Taking the above into account, the annual change is calculated and hence the new forecasted demand levels are derived and then compared – in order to calculate the new gap between demand and supply.

2 Calculation of estimated gap after Implementation of policy measures

- In addition, a new potential supply of ICT specialists is estimated in case the proposed policy measures, as identified in the 2022 SEPE-Deloitte study, are implemented in a timely manner
- The supply was re-evaluated taking into consideration the policy measure of accelerated training programs - as the acquisition of Gen AI skills can be achieved in faster times while training programs can be extended to graduates from other academic disciplines outside of STEM.

Impact of Gen AI on the ICT specialists gap | Results

The impact on the ICT specialists gap is expected to be significant, with the projected gap between supply and demand reaching ~83.000 positions cumulatively by 2030



Increasing gap between supply and demand:

+ 25.500 positions
(from ~57.500 to ~83.000)

Notes: The exact number of positions will depend on the degree of penetration of Gen AI. Based on a relative sensitivity analysis of the degree of automation and work augmentation due to Gen AI, the gap may vary between 21.000 and 29.000 positions in total

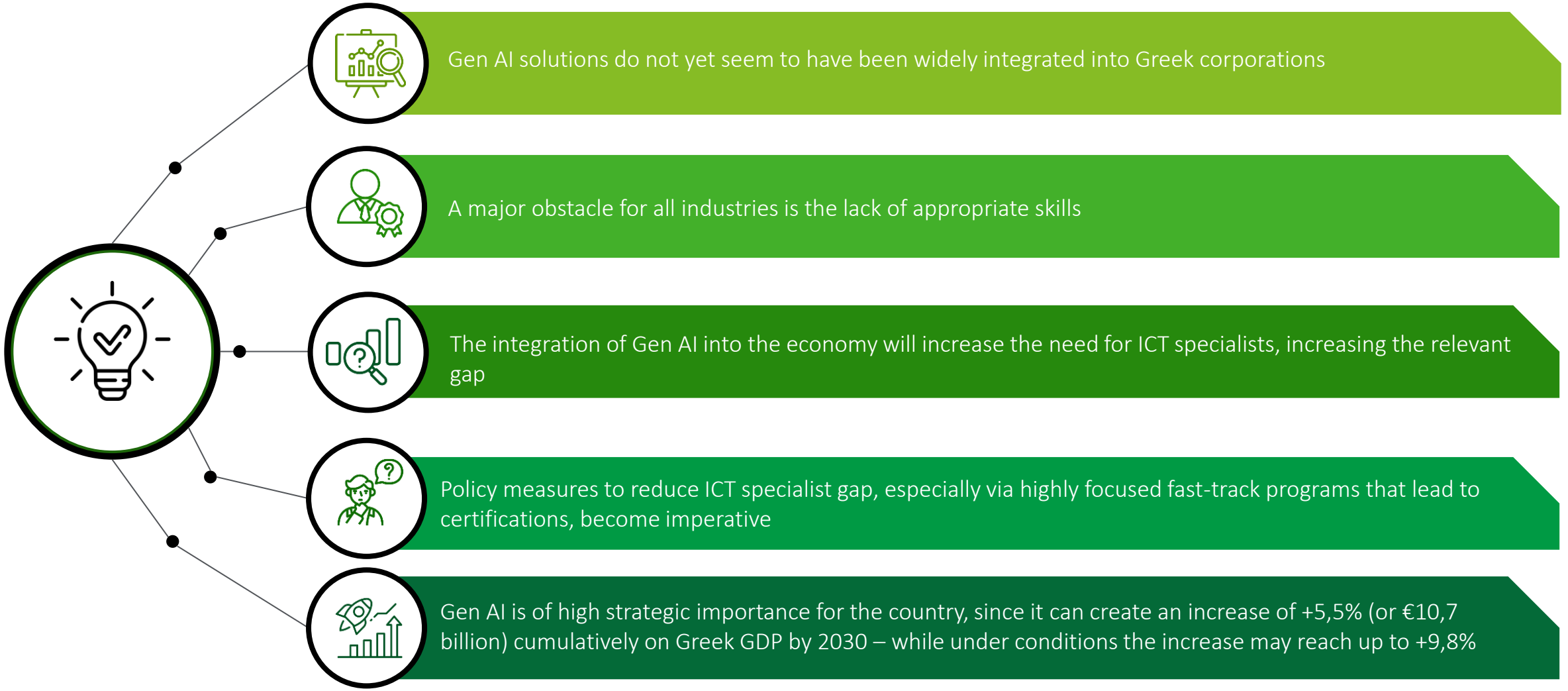
Source: Deloitte analysis

With policy measures, the gap could be reduced to 44.500 jobs (instead of 83.000)

- Based on the 2022 study, it was estimated that a series of policy measures could increase supply by **30.500 by 2030**
- Considering that **skills around Gen AI** can be developed in faster timescales and utilizing **graduates from other non-STEM disciplines with relative ease**, an increase in supply by **8.000 positions**, or a total of **38.500 by 2030** was estimated
- Therefore, **dedicated fast-track programs** for ICT skills training, **managed by specialized institutions** in the field and leading to **certifications** sought by the labor market, are of special importance

In conclusion…

In conclusion…



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FEDERATION OF HELLENIC ICT ENTERPRISES

DIGITALEUROPE & WITSA MEMBER