



Embrace Fundamental Change

Life after ChatGPT

Introduction

ChatGPT has become a household name in the world of conversational AI, captivating our imagination and pushing the limits of what machines can do. Yet, what often goes unnoticed are the underlying developments and innovations that have enabled this technology to thrive, and the transformative impact it will have on our lives.

In fact, the impact of AI on businesses and society could be as significant as that of the industrial revolution.

In this six-part series, written in close corporation with ChatGPT we will shed light on these developments and explore the technological advancements that make hyper-personalized, AI-driven customer interactions possible. Our journey will cover a broad range of topics, including the history and future of AI, the integration of intelligent machines into our daily lives, the practical implications for organizations, and the structural impact on business and society. We will also examine the legal and ethical frameworks that must be put in place to ensure the responsible use of these developments.

After outlining the context in the first chapter, we will delve deeper into the impact of AI, and conversational technology, on customer journeys and the practical implications for businesses in the following chapters.

Chapters

1. The past, present, and future of AI
from Turing test to ChatGPT and beyond
2. Humans and AI
the integration into our daily lives
3. The practical implications for organizations
adapting to a fast-changing environment
4. The disrupting potential of intelligent machines
the Industrial revolution revisited
5. The fundamental impact on business & society
existential questions in a new reality
6. Regulations & ethical aspects
the legal and compliance framework in the AI era

Join us on this journey as we explore the possibilities and pitfalls of Life after ChatGPT.

Arjen Bonsing



Chapter 1

The Past, Present, and Future of AI

From Turing test to ChatGPT and beyond

The development of AI technology has been a long and complex journey, culminating in the creation of advanced language models such as ChatGPT.

In this chapter, we explore the history of AI and language models, discussing the technological advancements that have enabled their development. We also examine the role of big tech companies in driving innovation and explore the challenges that come with integrating this technology into existing processes. Despite these challenges, the future of AI and conversational technology is bright, with unprecedented opportunities arising from developments such as quantum computing, nanotech, and augmented reality.

Sections

- ChatGPT is not a surprise
- Why did it take so long?
- This is only the beginning
- It will be a challenging road
- Unlocking unprecedented opportunities
- Now what?

This first chapter sets the stage for the upcoming articles, which will explore the impact of AI on consumers and businesses, we explore the broader implications and provide guidance on leveraging the unprecedented business opportunities that are going to arise and the ethical considerations that come with this technological revolution.

Readable at various levels

This chapter contains a wealth of information and may not be easy reading for everyone. We have designed it to be readable at various levels, so readers can choose the depth of engagement that suits them best.

- *For those who prefer a more superficial reading experience, the italicized intro text of each section and the heading texts provide guidance and help to navigate the chapter.*
- *For those with a longer attention span or deeper interest in the subject matter, the full text offers a more comprehensive exploration of the topic.*

Regardless of your reading preference, we hope you find this chapter informative and insightful.



ChatGPT is not a surprise

The fast adoption of ChatGPT highlights the enthusiasm for intelligent machines that can interact naturally with people. But the development of advanced AI-driven language models as predicted by visionaries like Alan Turing and Ray Kurzweil did not happen suddenly. It is the result of a long history of technological advancements, accelerated by the recent rise of voice assistants. The emergence of ChatGPT should not have come as a surprise. Those who paid attention could have seen the fast progress of conversational AI as it happened.

Fast but not so Suddenly

It is unfortunate that educational institutions, just like many others, were surprised by the rise of ChatGPT, because the development of advanced AI-driven language models that can understand and generate human-like responses is not exactly coming out of the blue. ChatGPT is the result of a long history of technological developments.

What is spectacular is the incredibly fast adoption of ChatGPT with more than 100 million users in the first two months after its launch in November 2022. This merely illustrates the desire of people to interact with intelligent machines in a natural way.

The Visionaries

One of the pioneers in this field was Alan Turing, a British mathematician widely considered the father of computer science. In his 1950 article "Computing Machinery and Intelligence," Turing proposed a test to determine whether a machine could exhibit intelligent behavior equal to or indistinguishable from that of a human. This test, now known as the Turing Test, has become a benchmark for assessing the intelligence of AI systems.

Another key figure in the development of intelligent machines is Ray Kurzweil, an American inventor, futurist, and author. In his 1990 book "The Age of Intelligent Machines," Kurzweil predicted that computers would rival human intelligence by the year 2029 ultimately leading to singularity, the state that AI surpasses human intelligence.

Moore's law and the Underlying Technological Developments

The predictions of Kurzweil are based on the observation that the power of computer chips doubled every two years, a trend known as Moore's Law. However, it is not only the doubling of processor speed that increased the exponential growth of computing power in recent decades. That increase has also been stimulated through underlying technology innovations like parallel computing, graphics processing units (GPU), cloud computing, Tensor Processing Units (TPUs), Low-latency networking (LLN), and lithography used to produce semiconductors.

Also many scientists like Weizenbaum and Landay have made important contributions to the development of chatbots and the user-centered design of AI systems. Meanwhile, researchers such as Bengio, Hinton, and LeCun have contributed to the underlying technologies of ChatGPT, such as deep learning and neural networks. Moore's Law, named after Intel co-founder Gordon Moore, is the driving force behind the exponential growth of computing power in recent decades.

The Introduction of Voice Assistants

In more recent years, the introduction of voice assistants has sparked significant activity in the field of conversational AI in recent years. Major tech players like Amazon, Apple, and Google have launched voice assistants like Alexa, Siri, and Google Assistant, which have revolutionized the way we interact with technology. This has led to increased investment and research into natural language processing and machine learning, as these big-tech players seek to understand and respond to natural language commands and questions. As a result, conversational AI has emerged as a key area of innovation, in which they invested heavily because of the enormous potential they see in transforming the way we communicate and interact with websites, apps and machines.

An Inevitable Result, not a Surprise

So for everyone who paid attention, the rise of ChatGPT is no surprise, but the inevitable result of structural developments and recent acceleration in technological advancements.



Why Did it Take so Long?

Alan Turing predicted in 1950 that machines would exhibit intelligent behavior equivalent to that of humans. However, the development of artificial intelligence technology to this level took several decades, with setbacks in the 1970s and 1980s. Recent advancements in parallel computing, natural language processing, named entity recognition, and energy efficiency have enabled the creation of more sophisticated language models like GPT-3. The development of voice assistants by the big-tech players really accelerated conversational AI technology. The big-tech investments and research funding have driven innovation, resulting in the rapid acceleration of generative AI development over the past couple of years. Simply put, the enormous complexity and required prerequisites for AI to work well are what caused it to take so long.

From Prediction to AI Winter

Although Turing predicted in 1950 that machines would eventually exhibit intelligent behavior equivalent to that of humans the development of artificial intelligence technology to approach this level of sophistication took several decades. The field of AI faced significant setbacks during the 1970s and 1980s, known as the "AI winter,". This was mainly due to a lack of funding for research in the area, as well as inadequate computing power to support the development of sophisticated AI systems, especially large language models.

The AI Spring

In the last decade, the AI spring started, characterized by a rapid acceleration in the development of generative AI, driven by several factors. The availability of large-scale data and processing power, enabled by parallel computing and graphics processing units (GPU), has allowed for faster training and inference of deep neural networks, necessary for large language models. Cloud computing has also played a significant role in providing researchers with access to vast computing resources, with research funding increasing from public and private entities.

Advancements in natural language processing (NLP) and named entity recognition (NER) have facilitated the creation of more advanced language models such as GPT-3, which can generate human-like responses. Federated learning and edge computing have enabled distributed device training of these models while ensuring privacy and reducing data transfer. Energy efficiency has become a critical consideration, with Tensor Processing Units (TPUs) designed for deep learning, allowing more energy-efficient training. Explainable AI and synthetic data have enabled the development of more transparent and ethical AI systems.

Voice Assistants as Accelerators

The introduction of voice assistants, such as Siri in 2011, Alexa in 2014, and Google Assistant in 2016, marked a significant turning point in the development of conversational AI. These tech giants recognized voice assistants as a crucial element of their future strategy, leading to rapid acceleration in the field. Voice assistants rely on conversational AI technology to understand and respond to natural language commands and questions, propelling the growth and development of increasingly sophisticated AI systems and large language models.

Strategic Big-tech Investments

As a result, big tech companies, Amazon, Google, Apple, Meta, and Microsoft, in the western hemisphere, and Baidu and Alibaba in China have invested heavily in developing conversational AI technology to power voice assistants and other conversational interfaces. They poured significant resources into research and development to improve the natural language processing and machine learning capabilities of their conversational AI systems.

They have also focused on building out the infrastructure needed to support these systems, including cloud computing resources, big data analytics tools, and edge computing capabilities. And last but not least they have made strategic acquisitions of smaller startups and AI companies to gain access to talent and technology that can accelerate the development of their conversational AI platforms.



The AI Flying Wheel Started Spinning

The flying wheel of AI development has been accelerated by the availability of necessary technology and strategic investments by big tech players. These investments have led to increased research and development, better understanding of conversational AI, access to large amounts of learning data, and a large customer reach. The widespread adoption of smartphones, mobile devices, and smart speakers has also played a critical role in popularizing voice assistants and creating a need for improved performance, driving the development of conversational AI technology.

Many Prerequisites Had to be Met

In conclusion, the long-awaited breakthrough in AI was delayed due to the extensive prerequisites required for its development and operation. Fortunately, with advancements in technology, big tech investments, and broader customer reach, we are now seeing a rapid evolution of AI-driven applications and have entered the age of intelligent machines.



This is Only the Beginning

The launch of ChatGPT has been met with rapid adoption by consumers and a sense of wonder at the possibilities it brings. While attention is largely focused on the front-end applications, it is important to consider the underlying structural developments. Big tech players are driving the integration of these applications into their platforms and clouds to maintain their dominance. Voice and digital assistants will become increasingly important, and we can expect to see them integrated into our daily lives, leading to increasingly personalized experiences. Now that all the technical and practical prerequisites have been met, the development of AI and its applications will proceed increasingly faster.

A Spectacular Start

The launch of ChatGPT has been spectacular, and also resulted in an unprecedented explosion of publications, tutorials, applications, apps, and integrations with other technologies. This is happening on such an overwhelming scale that it is difficult to keep track of all the new applications and solutions that are emerging.

On Top of the Hype-cycle

After the launch of ChatGPT, there has been a lot of research and publications on how to use the technology, including sharing experiences, tutorials, and guides for achieving desired results. In addition, there is a trend of connecting ChatGPT and other generative AI systems with cutting-edge technologies, leading to the creation of powerful applications capable of tasks such as generating images, creating videos and audio, completing complex tasks, and even generating code based on conversational text input. These innovative solutions offer opportunities for businesses to improve their efficiency and productivity,

The Underlying Development

The applications utilizing generative AI-driven chatbots such as ChatGPT are all built upon the technology owned or funded by the big tech companies from the US and China who can afford the massive processing power and bandwidth required for these applications. This means that players like Amazon, Google, Microsoft, Apple, Meta, Baidu, and Alibaba will continue to dominate the field, and they will profit from the increasing amount of processed data because this will lead to even better algorithms and language understanding for greater efficiency and reliability.

Rationalization and Concentration

These big tech players will likely acquire and integrate the most relevant and widely used applications into their own tooling or ecosystems. They will be able to structure the complexity of the many new applications, make them manageable, and handle the high computing power required. As a result, this will reduce the number of applications and will automatically create a more orderly playing field. Because it is important for the big tech players to secure their market position in this new arena, they will put a lot of effort into the advancement of their solutions and platforms which will result in a further acceleration of the underlying technology development.

The Battle of BigTech

The battle between big tech companies for dominance in the generative AI and conversational technology arena will be fierce, with each investing heavily in the advancement of their platforms. Their ultimate business objectives are to improve user experience, increase customer engagement and loyalty, and become the first point of access to the world for their users. Their digital assistants and conversational AI tools also serve as valuable sources for data collection, which can be used to develop new products and services and generate new advertising and license revenue streams. As the use of voice assistants and conversational AI continues to grow, big tech companies aim to establish themselves as leaders in the field and capture a larger market share

The Integration in our Lives

In addition to advancing AI-driven chat technology, voice assistants from big tech companies will see significant improvements in conversation quality, relevance of applications, and ease of use. Voice assistants will also become more connected to devices, and the integration of AI and conversational



technology into IoT solutions will lead to exciting new prospects. Soon, we can expect to see generative AI-powered voice assistants embedded in IoT devices, such as smart homes, smart cars, and various other applications. This will simplify the use of domotica, healthcare solutions, energy management, and security systems and contribute to more convenient integration in customers life.

Increasing Personalized Experiences

The integration of sentiment detection and emotion analysis with ChatGPT and AI can have a significant impact on user experience and business operations. By accurately analyzing the emotions and sentiments expressed in text data, voice, and facial expressions, businesses can gain valuable insights into their customers' preferences, needs, and pain points. This information can be used in addition to already available customer data to enable more personalized and empathetic interactions with users. This can lead to a more engaging and satisfying user experience, as AI machines can better understand and respond to users' needs and emotions.

The Age of Intelligent Machines is Here

Overall, we can anticipate an unprecedented acceleration of technological advancements as big tech players battle for dominance. The focus will initially be on improving efficiency and integrating technologies into existing applications. As development continues, the fundamental underlying notion that machines are becoming increasingly more intelligent than humans creates exciting opportunities, but also significant challenges.

As we enter the age of intelligent machines, it is essential to safeguard responsible use and ethical frameworks to ensure that the technology benefits humanity.



It Will be a Challenging Road

The development of AI technology is multifaceted and presents a range of challenges. The adoption of new technology and its applications by society and consumers is essential but poses an extra challenge in this case because the answers of AI are not without flaws or biases. Embedding the technology logically into existing processes can also be difficult because the technology is still in its early stages. Organizations must also restructure themselves to enable humans and intelligent machines to work together to exploit the real business opportunities. Additionally, new legislation and regulation must be created not only to ensure the ethical use of the new technologies and protection of consumer data and privacy but also to tackle emerging forms of fraud, manipulation, and malpractice. Despite these challenges, the immense resources devoted to AI development mean progress is inevitable. As generative AI and conversational technology now begin to work, there is no turning back, and businesses must act and understand how it can affect them.

Human Embrace and Adoption

Just as always in history the speed of development will be determined by the ability and willingness of humans to embrace the possibilities offered by all this new technology. This will certainly be the main challenge in the beginning, as the functioning of AI-driven conversations and applications is still imperfect, and user expectations are not yet based on a clear understanding of the possibilities and limitations.

Data Quality, Reliability, and Bias

One of the major issues to achieve customer acceptance in the short term is to ensure that AI systems are free from biases and produce accurate and reliable results. Therefore it is essential to use high-quality, representative, diverse, and reliable data to train them. By regularly monitoring and auditing the system, human experts can help reduce the risk of bias in the self-learning model of AI. Additionally, the system should be designed to continually learn and improve based on feedback, which can help reduce the risk of errors and bias.

Integrating AI Systems into Existing Workflows

Integrating AI Systems into Existing Workflows

As with all new developments, integrating AI systems into existing workflows and systems can be challenging due to differences in data formats and APIs. To overcome this, there is a need for better integration tools and standards that can facilitate the seamless integration of AI systems into existing workflows. Big-tech companies also have a significant strategic and commercial interest in this. By solving these integration challenges, it will be possible to create truly intelligent machines that can work alongside human workers and other systems to improve efficiency and productivity.

The Organizational Challenges

The first stage of AI integration will typically be focused on optimizing existing processes and achieving cost savings. This involves identifying areas of the organization where AI can be easily integrated to automate routine tasks and improve efficiency.

The second stage involves more fundamental changes to the organization as a whole. This may include rethinking how work is organized and structured and identifying new areas of opportunity for AI integration. This requires a more strategic approach to AI integration, focusing on developing new capabilities and transforming how the organization operates. This will lead to changes in the structure of the workforce and new forms of collaboration between humans and intelligent machines, with all the challenges that this entails.



The Business Challenges

The AI-driven rise of personalization requires companies to shift their focus from mass marketing to targeted marketing that addresses the specific needs and preferences of individual customers. This is a fundamental change that impacts many organizations and their role in the value chain. It requires flexibility to rethink business, sales, and service models, and the knowledge, vision, and courage to explore and experiment with new models.

In the forthcoming chapters, we will explore the practical implications and fundamental business impact of AI in-depth, offering insights into how to navigate the fast changing landscape.

Adaptability & Explainability

As AI continues to advance, significant technological challenges remain that must be overcome to create truly intelligent machines.

One such challenge is developing AI systems that can generalize their knowledge to new situations. While current AI systems excel at specific tasks, they struggle when presented with novel situations. To create truly intelligent machines, AI systems must be designed to learn and generalize across a wide range of tasks and environments.

Another significant challenge is the need for AI systems to be more explainable. As these systems become more powerful and complex, there is a growing demand to understand how they make decisions and why. This is crucial not only for building trust in AI systems but also for ensuring that they make ethical and responsible decisions.

The Legal & Compliance Responsibility

Data security and compliance are critical considerations as companies collect more data on individual customers. They must ensure that this data is kept secure and private, as customers are increasingly concerned about how their personal data is being used. Companies that fail to protect their data could face significant backlash and legal consequences. Especially in the EU regulations such as GDPR give consumers control over their personal data.

In addition to legal and compliance responsibilities, there are also moral and ethical aspects in relation to AI algorithms that require consideration. Overall, it is essential to implement robust security measures and compliance protocols to ensure the safe and ethical use of data in AI systems. All these topics will be discussed in more detail in "Regulations and Ethical Aspects" the last chapter of this series that will address how to make these decisions based on maximizing the potential benefits of AI, rather than fear of the unknown.

Fake, Fraud, and Manipulation

AI can be applied in a harmful or unethical manner, such as in the case of fake, fraud, and manipulation. For example, AI-powered algorithms can be designed to generate fake news or misleading information, manipulate user behavior, or perpetrate fraud. Advanced text, image, voice, and video manipulation techniques make it difficult to distinguish between real and fake. This means that new forms of fraud, manipulation, and influence are emerging, which require new detection and enforcement measures and legislation. In addition to the ethical debate surrounding manipulation and fake news, which affects everyone, it also means that companies, whether they want to or not, must prepare for the risks that arise.

A Challenge with Inevitable Progress

The race to create truly intelligent machines is an exciting challenge for companies and researchers alike, with the potential to revolutionize productivity and efficiency. However, the path ahead is not without obstacles and risks. Yet, with the immense resources being devoted to this challenge by big tech companies and the ongoing efforts of researchers and developers, progress is inevitable. Now that we have reached the point where generative AI and conversational technology are working, there is no turning back. Therefore businesses need to act and at least understand what is going on and how it can affect them.



Unlocking Unprecedented Opportunities

This section explores the upcoming technological advancements that will shape the future of AI and conversational technology. Quantum computing, nanotech, neuroscience, augmented and virtual reality, IoT, robots, and autonomous transport are just some of the developments that are set to transform business and personal landscapes in an incredible way. Companies that adapt quickly to these changes by gaining experience with ChatGPT and generative AI will have a competitive edge in an era where personalized customer experiences and targeted marketing become crucial. However, they must also act responsibly and contribute to the ethical use of these technologies. The future looks bright for those who embrace fundamental change and work towards a better life for all.

On a Longer Horizon

Looking toward the future, the current advancements in advanced AI and conversational technology will serve as a foundation for further developments. In addition, there are a variety of technological advancements on the horizon that are expected to bring about even greater and more significant changes. While not an exhaustive list, the following provides a comprehensive overview of these advancements and their potential impact when combined with generative AI and conversational technology. However, it's worth noting that many of these technologies are still in development and their true potential has yet to be fully realized. With that in mind, let's explore them.

Conversational AI: Accelerating Advancements

The advancement of generative AI and conversational technology is being accelerated by the development of AI itself. The intensified use of big data, deep learning, large language models, and other underlying technologies is causing a rapid increase in the development of advanced AI. As generative AI and conversational technology become more widely used, there will be more experience with their operation, larger data sets, more valuable feedback loops, and thus a steeper learning curve. This will accelerate the development of more sophisticated AI systems that can perform increasingly complex tasks and make more intelligent decisions.

Quantum Computing: Exponential Computing Power

Quantum computing is one of the most exciting developments in technology. Quantum computers are exponentially faster than traditional computers because they use quantum bits (qubits) which can exist in multiple states simultaneously, allowing for multiple calculations to be performed at the same time. They can solve problems that are too complex for classical computers to handle and have the potential to accelerate certain types of AI applications. Quantum computing has the potential to revolutionize many fields, from finance to healthcare.

Nanotech: Smaller and Faster Microchips

Also in nanotech, the science of engineering and manipulating materials and structures at the nanoscale, which is about 1 to 100 nanometers in size, can have a significant impact. AI can improve the efficiency, accuracy, and speed of nanotechnology research and development as well as the development of new materials and further enhancement of the production of smaller and faster microchips. Tiny microchips can be applied in nano bots that can be used for appliances and personal health monitoring and intravenous drug delivery. Due to their small size, nanobots can be integrated into various materials, potentially connecting everything around us to AI systems.

Neuroscience: Understand, Adapt, and Influence Human Behavior

Neuroscience is the scientific study of the brain, nervous system, and how they influence behavior, cognition, and emotion. Advances in AI can significantly enhance the field of neuroscience by enabling the analysis of large amounts of data, improving brain-machine interfaces, and modeling complex brain interactions. This has the potential to provide new insights into brain function and advance treatments for neurological disorders. AI-driven neuroscience can also be used in marketing and sales to enhance campaigns, improve customer targeting and personalization, predict needs and preferences, automate tasks, and optimize pricing strategies. By understanding and influencing individual behavior, AI can greatly enhance the customer experience and lead to better business outcomes.



Augmented and Virtual Reality: The Fusion of the Physical and Digital World

The fusion of the physical and digital world is made possible by the emergence of Virtual Reality (VR) and Augmented Reality (AR). AR overlays digital information onto the real world, while VR creates a fully immersive digital experience that transports users to a different world. By integrating VR and AR, organizations can provide customers with highly personalized and engaging experiences that were previously impossible.

It enables digital assistants to take on new forms and can also be used to create digital twins of people, houses, or businesses, improving and enhancing our understanding and interaction with the physical world. It can also be used for educational purposes, providing immersive experiences of historical events or scientific concepts. This integration of the physical and digital world is commonly referred to as the metaverse, but its applications extend beyond the sci-fi gaming context often associated with it.

IOT: AI Everywhere

The widespread use and development of internet-connected devices (IoT) has significant transformative potential, particularly when combined with AI technology. AI-driven IoT devices can communicate with each other and the cloud, leading to easy-to-use home automation, home security, and energy management systems for customers. It also allows organizations to gather large amounts of real-time data, which can be utilized to optimize processes, improve products, and offer new services. The integration of AI with IoT is expected to lead to a significant increase in the use of intelligent automation, predictive maintenance, and real-time monitoring, thereby enhancing operational efficiency and improving overall customer experience.

Robots: Integrated into our Work and Private Life

The integration of advanced AI in robotization can also have a significant impact. With AI algorithms, robots can learn from their environment, adjust their behavior, and become more autonomous, adaptable, and capable. This enables them to perform tasks that require flexibility and problem-solving skills, such as defect detection in manufacturing, precision surgery, assembly, or hospitality and care tasks. AI can enable robots to understand and respond to human communication and improve human-robot collaboration. This would enable robots to work seamlessly alongside humans performing a wide range of tasks in our work and private lives.

Autonomous Transport: Affecting our Mobility

Autonomous driving vehicles powered by AI will revolutionize transportation, logistics, and supply chain management, reducing human intervention, lowering costs, improving safety, and increasing efficiency. The impact of autonomous driving vehicles will be significant for industries that heavily depend on transportation, including manufacturing and retail, as well as warehouses and distribution centers. In combination with the electrification of vehicles, autonomous driving will transform the concept of mobility, from individual cars to public transport. The integration of advanced AI in transportation will make intelligent machines omnipresent, creating natural daily interactions at scale and ultimately influencing people's lives in various ways.

There will be Winners

To stay ahead of the above-mentioned developments, it is crucial for companies to gain experience with ChatGPT and generative AI now. Those who can adapt quickly and seize the opportunities presented by this new frontier will gain a competitive edge. By leveraging their experience, these companies will be well-positioned for success in an era where personalized customer experiences and targeted marketing are crucial. The future looks bright for those who embrace fundamental change.

And They have a Moral Duty to Act Responsibly

These companies must contribute to the responsible use of all these new technologies, working alongside governments and legislators to shape regulations that ensure these fantastic technological developments are used to create a better life for us all.



Now what...?

Stay tuned!

In this first chapter, we explored the developments from Turing to ChatGPT and beyond.

In the next chapters of this series, we explore the broader implications and also provide more practical guidance on leveraging the unprecedented business opportunities that are going to arise.

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